Santa Ana-Garden Grove Fixed Guideway Corridor

Appendix I

Traffic Impact Assessment Report

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List of Abbreviations

BRT	Bus Rapid Transit
CEQA	California Environmental Quality Act
CIA	Community Impact Assessment
DOI	Department of Interior
FTA	Federal Transit Administration
HCPs	Habitat Conservation Plans
IOS	Initial Operable Segment
LRTP	Long-Range Transportation Plan
MPO	Metropolitan Planning Organization
NCCP	Natural Communities Conservation Plan
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance Facility
OCTA	Orange County Transportation Authority
PE ROW	Pacific Electric right-of-way
ROW	right-of-way
RTP	Regional Transportation Plan
SARTC	Santa Ana Regional Transportation Center
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategy
SHPO	State Historic Preservation Officer
TMP	Traffic Management Plan
TOD	transit-oriented development
TSM	Transportation System Management

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Executive Summary

The cities of Santa Ana and Garden Grove are considering a fixed guideway project (Project) that would provide high frequency transit service between the Santa Ana Regional Transportation Center (SARTC) and a new multi-modal transportation center to be located in the city of Garden Grove. Two Build Alternatives including Streetcar Alternative 1 and 2, a Transportation System Management (TSM) Alternative and a No Build Alternative are under consideration. The purpose of this Traffic Technical Report is to document the traffic analysis for these alternatives for the Environmental Impact Report/Environmental Assessment (EIR/EA) for the proposed project.

The overall Santa Ana and Garden Grove Fixed Guideway Corridor Study Area of the proposed project is generally defined by Westminster Avenue/Seventeenth Street on the north, Harbor Boulevard on the west, First Street on the south and Grand Avenue on the east. In this Traffic Technical Report, only intersections and roadways along the proposed streetcar alignment routes were evaluated within the defined Study Area.

To further support the environmental analysis, the two "Build" streetcar alternatives are divided into four segments, as shown in Figure ES-1. These segments are:

- **PE ROW Segment** – the portion of the alignment generally within the PE ROW from west of Harbor Boulevard to Raitt Street.
- **Raitt Street to Flower Street Segment** – the portion of the alignment along Santa Ana Boulevard from Raitt Street to Flower Street.
- **Streetcar Alternative 1** – the portion of the alignment through the Santa Ana Civic Center, Downtown and easterly to SARTC; in Streetcar Alternative 1, this segment generally involves Santa Ana Boulevard and Fourth Street.
- **Streetcar Alternative 2** – the portion of the alignment through the Santa Ana Civic Center, Downtown and easterly to SARTC; in Streetcar Alternative 2, this segment involves portions of Brown Street/Sixth Street, Santa Ana Boulevard, Civic Center Drive, Spurgeon Street, Flower Street and Fifth Street.

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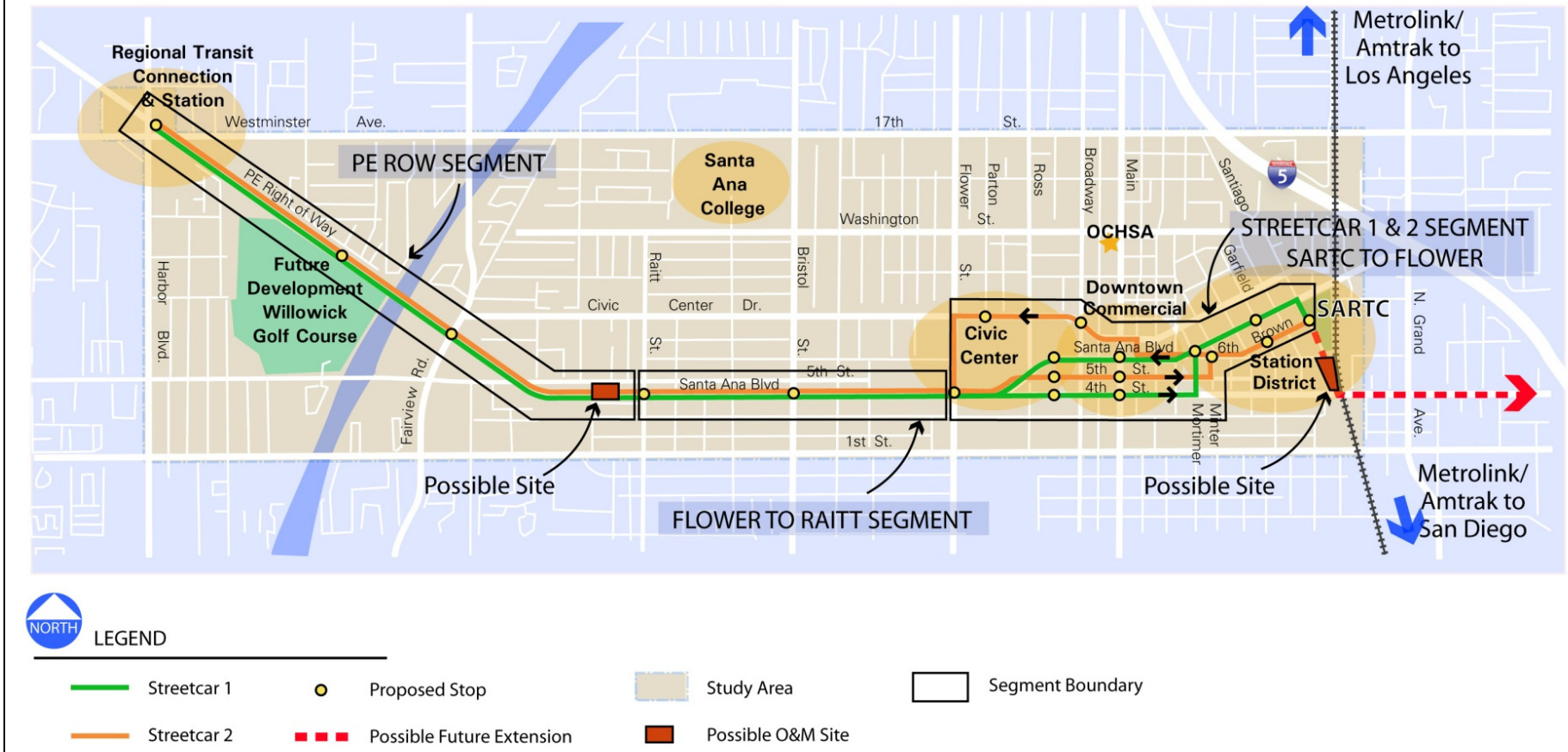

Source: Conceptual Design Technical Report, Cordoba Corporation, March 25, 2011

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Intersection Impact Assessment

Forty-two (42) key intersections have been identified in the Study Area that are along or adjacent to the proposed streetcar alignment routes for analysis in the traffic study. Table ES-1 summarizes the number of intersections that operate or are projected to operate at LOS E or F for the existing and future year conditions as part of this Project.

Table ES-1: Summary of Intersection LOS

Alternatives	No. of Intersections (LOS E or F)	% of Total Study Intersections (42)
Existing	4	10%
2035 No Build	5	12%
2035 TSM	4	10%
2035 Streetcar Alternative 1	4	10%
2035 Streetcar Alternative 2	2	5%

Source: URS Corp., 2011.

Overall, the level of service and/or intersection delay on the Study Area intersections are generally maintained or improved during the peak hours of the 2035 Streetcar Alternatives as compared to the 2035 No Build condition.

Roadway Segment Impact Assessment

One hundred twenty six (126) key roadway segments have been identified in the Study Area that are along or adjacent to the proposed streetcar alignment routes for analysis in the traffic study. Table ES-2 summarizes the number of roadway segments that operate or are projected to operate at LOS E or F for the existing and future year conditions as part of this Project.

Table ES-2: Summary of Roadway Segments LOS

Alternatives	No. of Roadway Segments (LOS E or F)	% of Total Study Roadway Segments (128)
Existing	16	13%
2035 No Build	18	14%
2035 TSM	18	14%
2035 Streetcar Alternative 1	18	14%
2035 Streetcar Alternative 2	18	14%

Source: URS Corp., 2011.

The project does not have any impact on the roadway segments that are along or adjacent to the proposed streetcar alignment routes. Overall, the level of service on the Study Area roadway segments are generally maintained during the peak hours of the 2035 Streetcar Alternatives compared to the 2035 No Build condition.

Parking Impact Assessment

On-street Parking

A summary of existing on-street parking spaces within the Study Area that could potentially be impacted along the streetcar alternatives are presented in Table ES-3.

Table ES-3: Summary of On-Street Parking

Streetcar Alternative	Existing Space	Lost	Remain	Net Loss (%)
Streetcar Alt. 1 (4th St. Parking Scenario A)	370	120	250	32%
Streetcar Alt. 1 (4th St. Parking Scenario B)	370	171	199	46%
Streetcar Alt. 1 (4th St. Parking Scenario C)	370	226	144	61%
Streetcar Alternative 2	362	108	254	30%

Source: URS Corp., 2011.

As shown on the summary tables, existing on-street parking spaces were either maintained or eliminated as a result of the implementation of the streetcar alignment routes. Overall, the total existing on-street parking availability in the arterial roadway segments along the proposed streetcar alignment routes could result in net loss of approximately 30% to 61% as a result of the project.

The majority of the parking spaces lost are along Santa Ana Boulevard between Raitt Street and Flower Street. However, the loss of on-street parking in this area of Santa Ana Boulevard is an impact that is not considered to be significant. Per the city of Santa Ana Planning staff, every residential unit along this segment of the proposed streetcar alignment has on-site parking capacity consistent with the City's occupancy entitlements. Therefore the loss of on-street parking spaces in this area would not result in a significant impact.

Station Area Transportation-Related Impact Assessment

In general, the primary impact expected in the areas surrounding the streetcar stations is an increase in pedestrian activity around the station areas. The station area impacts are discussed below in the following three groupings: Western Terminus, Eastern Terminus, and Intermediate Stations.

Western Terminus

Given the high level of ridership on the two OCTA fixed route bus lines that intersect at this location (Route 43 – Harbor Boulevard; and Route 60 – Westminster Avenue), it is anticipated that the primary mode of access to this station will be via bus transit. Pedestrian access will also make up a meaningful proportion of the activity (boarding and alighting) at this station. The primary expected impact at the Harbor Boulevard/Westminster Avenue station will be an increase in pedestrian activity at the intersection.

Eastern Terminus

It is not anticipated that the streetcar system will attract a significant volume of vehicle traffic, or commuters using SARTC as a park-and-ride to access the streetcar system on a routine basis. It is anticipated that streetcar patrons will come primarily from Metrolink and Amtrak riders, and secondarily from other local and intercity bus services that also utilize SARTC. It is generally understood that the parking structure currently has adequate capacity to absorb the insignificant number of streetcar patrons that may use SARTC as a park-and-ride to access the streetcar. Other station area impacts will be more focused on the SARTC property, and should not have any significant impacts on the surrounding area.

Intermediate Stations

Pedestrian activity is anticipated to be the primary station area impact at the intermediate stations, between SARTC and the Harbor Boulevard/Westminster Avenue intersection. It is not anticipated that commuters would routinely drive to an intermediate station area for the exclusive purpose of accessing the streetcar system.

Station Parking at Western and Eastern Terminus

Station parking is anticipated to be provided at only two stations; at each endpoint of the proposed Streetcar line (Harbor Boulevard/Westminster Avenue station and Santa Ana Regional Transportation Center [SARTC]).

Between the surface parking lot and the parking structure immediately adjacent to SARTC, there are currently approximately 700 existing parking spaces available at SARTC. The proposed station parking at Harbor Boulevard/Westminster Avenue will have approximately 40-50 parking spaces.

At both locations, on an average weekday, it is projected that approximately 14% of the passengers boarding the streetcar will travel on foot, approximately 85% from other modes of transit (60% by bus and 25% by rail), and approximately 1% or less via automobile. With less than 1% of passengers accessing the station parking via automobile, existing parking and proposed parking spaces at both these facilities should meet the future parking demand; therefore, there are no significant impacts to parking at either parking facility.

Grade Crossing Impact Assessment

Under both Streetcar alternatives, there are two proposed grade crossings west of Raitt Street. They are located on Fairview Street just south of Civic Center Drive and on Fifth Street just west of Hawley Street. With the recommended railroad and signal control improvements that include signal coordination, queue cutters, transit signals and other highway-rail crossing safety enhancements, the grade crossings would have no impact to localized traffic.

Public Transportation Services Impact Assessment

The main effects of the proposed project on bus transit in the project Study Area are largely considered to be enhancements in service, service frequency and connectivity. It is anticipated that the proposed streetcar Build Alternatives would provide more connections to OCTA local fixed route service along the selected streetcar alignment than the current Stationlink Route 462 service. At this time, there are no adverse impacts on bus or rail transit in the project Study Area from implementation of the Project.

Pedestrian and Bicycle Impact Assessment

There are no significant impacts to both pedestrian and bicycle travel anticipated in the project Study Area from implementation of the Project. Generally speaking, current pedestrian and bicycle access will remain available with implementation of the Build Alternatives. As far as exclusive bike lanes, currently, there are no officially designated bike lanes (Class II bike lanes) or bike routes (Class III bike routes) on any of the proposed street-running portions of the Build Alternatives of the Project.

However, the primary impacts to pedestrian and bicycle travel that result from implementation of the Project are mainly related to construction activities, mitigation measures for pedestrian and bicycle-related impacts are as follow:

- Encourage night construction if it results in reduced traffic impacts and no disruption to local area residents.
- Stage and sequence construction to localize adverse construction related impacts to the greatest degree feasible.
- Minimize lane closures during AM and PM peak hours to the greatest degree feasible.
- Minimize sidewalk closures to the greatest degree feasible.
- Incorporate bicycle and pedestrian travel into the TMP.
- To the greatest degree possible, notify commuters, business owners, government agencies, and residents at least 10 days prior to any parking removal, lane closure, and street closures.

Construction-related Impact Assessment

In general, all construction of tracks will be within the existing Pacific Electric right-of-way (PE ROW), on existing streets, or on proposed future streets. The construction period is anticipated to be approximately 30 months, with major activities to be completed within the first 24-month period.

- Construction-related impacts, which are expected to be temporary, are expected to include the following:
- Periodic and/or intermittent closure of roadway travel lanes, resulting in reduced roadway capacity, due to construction related activities.
- Periodic and/or intermittent closure of roadway sidewalks, resulting in restricted pedestrian travel due to construction related activities.

- Periodic and/or intermittent loss or reduction of parking resulting in restricted access to business and residences due to construction related activities.
- Short term, temporary blockage of driveways and limited access to businesses and residences in the immediate vicinity of active construction activities.
- Increased heavy vehicle traffic, related to construction activities.
- Increased noise in the vicinity of construction related activities.
- Potential for temporary diversion of traffic from primary travel routes in the construction area, into residential areas, and other secondary travel routes.
- Wherever the streetcar alignment crosses a perpendicular street, operations of the entire intersection will be adversely impacted on a temporary basis.

Mitigation measures for construction-related impacts are as follow:

- Generally limit hours of construction to 7:00 A.M. to 5:00 P.M., Monday through Friday.
- Encourage night construction if it results in reduced traffic impacts and no disruption to local area residents.
- Stage and sequence construction to localize adverse construction related impacts to the greatest degree feasible.
- Minimize lane closures during AM and PM peak hours to the greatest degree feasible.
- Minimize sidewalk closures to the greatest degree feasible.
- Develop a traffic management plan (TMP) that will strive to reduce the disruption to commuter traffic during construction and propose alternate travel routes.
- Develop a TMP for construction of the O&M facility, either as a stand-alone TMP or as a chapter of the overall streetcar construction TMP.
- Incorporate bicycle and pedestrian travel into the TMP.
- To the greatest degree possible, notify commuters, business owners, government agencies, and residents at least 10 days prior to any parking removal, lane closure, and street closures.
- Maintain access to businesses at all times except for minor temporary driveway closures.
- Identify potential types of traffic control that may have a real or perceived business impact such as short term lane closure, extended full street closures, detours, or sidewalk closures.
- Designate parking areas for construction personnel.
- Designate haul routes for construction related heavy duty vehicles.
- Minimize unnecessary heavy vehicle idling in construction zones.
- Plan temporary traffic detours to minimize traffic diversion into residential areas.
- Expedite construction in roadway intersections to reduce instances where multiple streets are impacted due to construction related activities.

Summary and Conclusions

Based on the analysis, it is expected that the proposed project will improve traffic operations and maintain and/or reduce delay and congestion levels at the local arterial roadway segments and Study Area intersections. Major findings of the analysis presented in this report are briefly summarized below:

- Mitigation measures have been recommended to mitigate any significant impacts identified during the analysis.
- Based on the analysis presented in this report, it is expected that local arterial intersections within the Study Area will be maintained with the implementation of the proposed project.
- Traffic operations for the local arterial intersections will improve with the proposed signal improvements.
- There are no significant impacts to on-street parking in the streets along the proposed streetcar alignment routes.
- There are no significant impacts to adjacent intersections as a result of the proposed grade crossings.
- The following study intersection is projected to be impacted with and without the project during both Build Conditions:
  - Fairview Street and Civic Center Drive

Main Street from Eighth Street to Third Street Table ES-4 summarizes the City of Santa Ana Environmental Checklist questions and responses based on the aforementioned Transportation/Traffic mitigation, summary of results and conclusion:

Table ES-4: Transportation/Traffic Environmental Checklist – Responses

	Would the Project:	Potential CEQA Impact	Potential NEPA Affects	Comments
A	Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	Less than significant	Limited positive effect	Design criteria can be established for project to address potential impacts.
B	Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	Less than significant	Limited positive effect	Design criteria can be established for project to address potential impacts.
C	Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	No impact	No effect	Project will not impact air traffic patterns.
D	Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	Less than significant	Limited effect	Design criteria can be established for project to address potential impacts.
E	Result in inadequate emergency access?	Less than significant	Limited effect	Design criteria can be established for project to address potential impacts.
F	Result in inadequate parking capacity?	Less than significant	Limited effect	Some localized loss of parking with limited impacts.
G	Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	No Impact	Limited positive effect	Project is consistent with local and regional alternative transportation plans.

Source: URS Corp., 2011.

Chapter 1 Introduction

The cities of Santa Ana and Garden Grove are considering a fixed guideway project (Project) that would provide high frequency transit service between the Santa Ana Regional Transportation Center (SARTC) and a new multi-modal transportation center to be located in the city of Garden Grove. A "fixed guideway" refers to any transit service that uses exclusive or controlled rights-of-way or rails. The proposed project would 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 where city, county, State and federal government offices and courthouses are located. It would connect the historic and densely populated neighborhoods east and west of the Downtown and Civic Center areas with employment and educational opportunities, and goods and services, and would also provide access to several redeveloping, transit-oriented areas within both cities.

1.1 Study Purpose

The purpose of this Traffic Technical Report is to document the traffic analysis conducted for the Environmental Assessment/Draft Environmental Impact Report (EA/DEIR) for the proposed project.

Traffic impacts have been analyzed for the "No Build" Alternative, the "Transportation System Management" (TSM) Alternative, and the two proposed Streetcar Alternatives known as the Streetcar 1 and Streetcar 2 Alternatives.

1.2 Report Organization

Chapter 1 Introduction – This chapter provides an introduction to the Study Area of the proposed project, a description of the proposed project as currently envisioned, and an overview of the organization of this report.

Chapter 2 Analysis Methodologies – This chapter describes the methodologies, analysis procedures, and standards utilized, to evaluate roadway and intersection traffic conditions.

Chapter 3 Existing Conditions – This chapter describes the existing transportation network within the Study Area of the proposed project, and provides analysis results for existing traffic conditions.

Chapter 4 Regulatory Framework/Significance Criteria - This section provides an overview of the State and local Regulatory Framework under which the proposed project will be evaluated.

Chapter 5 Impact Assessment – This chapter describes traffic operations impacts of the four proposed project alternatives, including the two streetcar alignment alternatives.

Chapter 6 Intersection Queuing Analysis – This chapter provides queuing analysis of the Harbor Boulevard/Westminster Avenue and Fairview Street/Civic Center Drive intersections.

Chapter 7 Travel Forecasting – This section provides an overview of Study Area performance measures, such as Vehicle Miles Traveled (VMT), and Vehicle Hours Traveled (VHT).

Chapter 8 Mitigation Measures – This section provides an overview of proposed mitigation measures for the proposed project.

Chapter 9 Summary and Conclusion – This chapter summarizes analysis presented in the preceding chapters.

1.3 Project Study Area

The Project corridor is located in central Orange County within the cities of Santa Ana and Garden Grove. Figure 1-1 (Regional Location) shows the corridor Study Area in the context of the area surrounding Santa Ana and Garden Grove. The Study Area of the proposed project has been defined to support the development and evaluation of a broad range of modal alternatives that satisfy the goals and objectives of the proposed project. It encompasses the Santa Ana Regional Transportation Center (SARTC), which provides access to Metrolink and Amtrak rail services, as well as a portion of the Pacific Electric Right-of-Way (PE ROW), an historic former interurban streetcar line. The Study Area also encompasses planned development surrounding the rail station; employment, government, and commercial and cultural activity centers in the Civic Center and downtown Santa Ana; and existing neighborhoods, businesses, and activity centers in central Santa Ana and east Garden Grove.

Planned development areas and areas that offer future development and redevelopment opportunities were also considered, as were planned regional transportation system improvements such as OCTA's Bus Rapid Transit (BRT) program, and Metrolink service expansions.

The Study Area of the proposed project is generally defined by Westminster Avenue/Seventeenth Street on the north, Harbor Boulevard on the west, First Street on the south and Grand Avenue on the east. However, this defined Study Area is for the entire Santa Ana and Garden Grove Fixed Guideway Corridor. For this traffic impact assessment report, the primary Study Area focuses mainly on intersections and arterial roadway segments along and/or adjacent to the proposed Santa Ana Streetcar alignments. Figure 1-2 (Project Area Map) provides a more detailed view of the Study Area.

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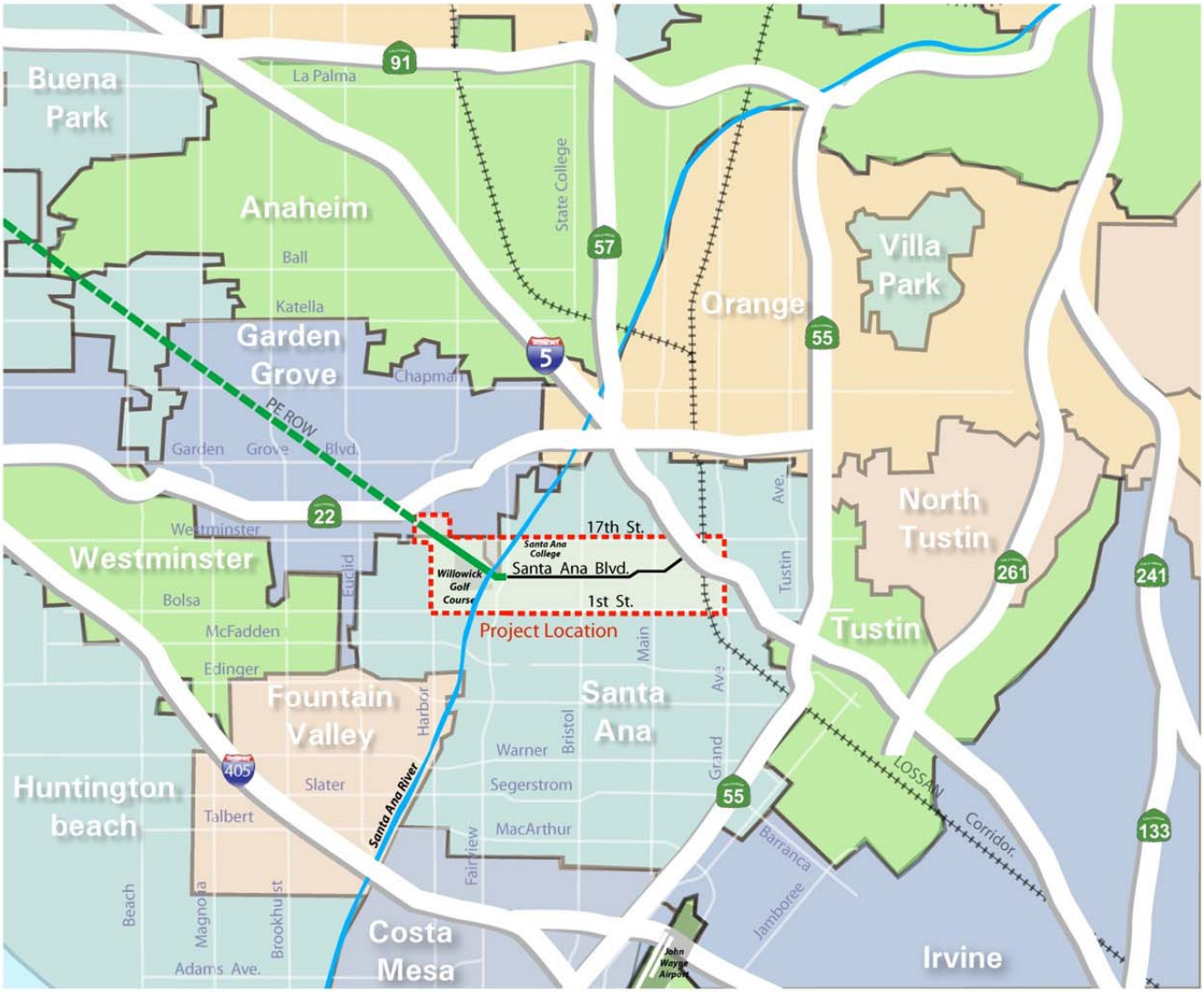
Regional Location



Source: Cordoba Corporation, Draft Conceptual Design Technical Report, March 25, 2011

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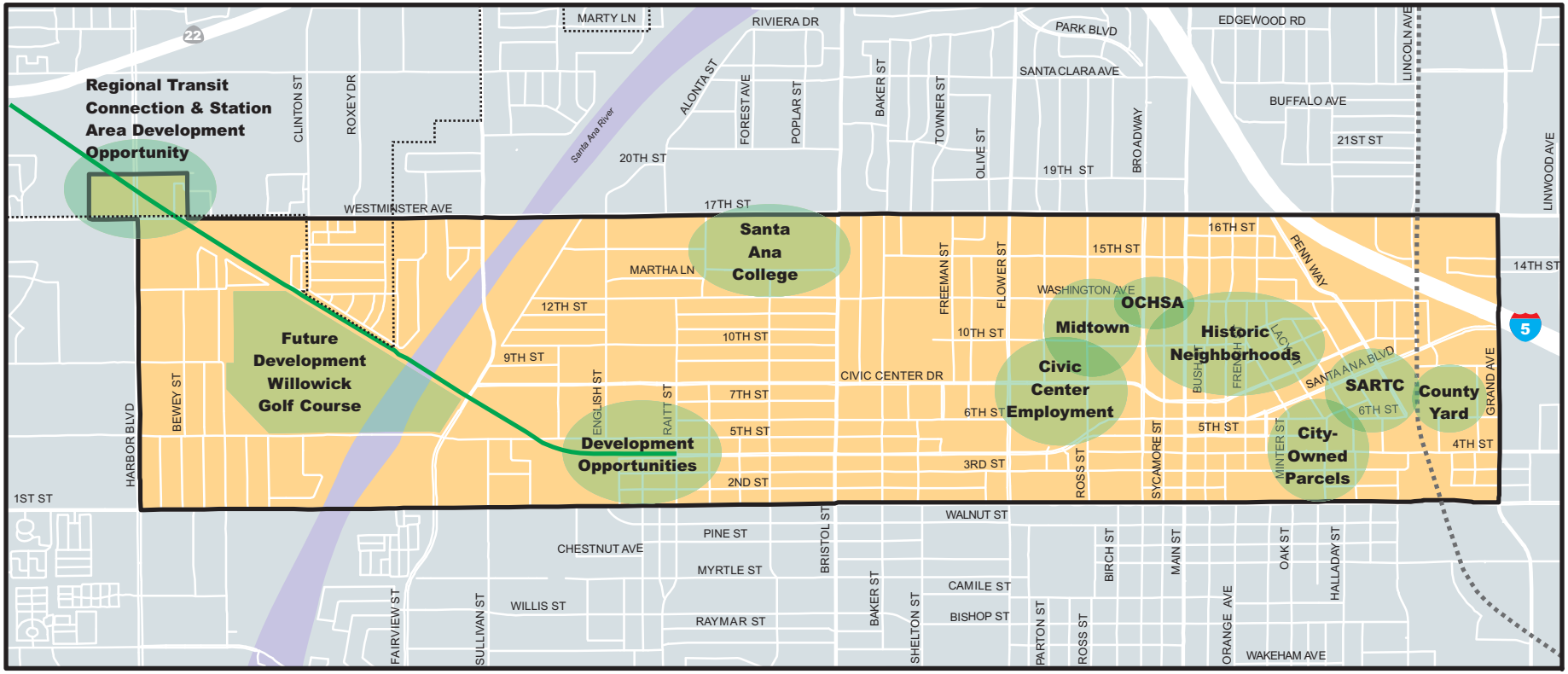
Project Area Map



LEGEND:

- Study Area
- Activity Center
- PE ROW
- Metrolink/Amtrak Rail Line
- Boundary of City of Garden Grove

NORTH

0 1500 3000 FEET

Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012; updated by Terry A. Hayes Associates Inc., August 2012.

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1.4 Project Background

The cities of Santa Ana and Garden Grove, in cooperation with the Orange County Transportation Authority (OCTA), initiated the Alternatives Analysis and Draft Environmental Impact Report/Environmental Assessment for the Santa Ana and Garden Grove Fixed Guideway Corridor Study in October 2009. The intent was to evaluate a fixed guideway corridor that would provide high-frequency transit service between SARTC and a new transportation hub to be located near the intersection of Harbor Boulevard and Westminster Avenue.

An Alternatives Analysis (AA) is a formal planning study that provides the analytical framework for making sound decisions about potential major transit investments in metropolitan areas. This type of planning study, along with the accompanying environmental studies, is necessary for major projects seeking federal funding. As such, the AA is part of the federal planning process, yet decision making takes place at the local and regional levels. For AA studies that may result in the local selection of a project eligible for Federal Transit Administration (FTA) New Starts or Small Starts funding, the AA further serves as the process for the development of technical information necessary to support a candidate project's entry into FTA's New Starts/Small Starts project development process.

The environmental studies for the Project are being prepared in accordance with the California Environmental Quality Act (CEQA, 1970) and the National Environmental Policy Act (NEPA, 1969). The City of Santa Ana is serving as the CEQA lead agency for the project, while FTA is the lead agency under NEPA. The Notice of Preparation (NOP) for the Project was issued in June 2010. Based on preliminary analysis conducted to date, it is envisioned that an EIR/EA document will be prepared for the proposed project.

Funding for the Project was awarded to the City of Santa Ana through OCTA's four-step Go Local Program. OCTA's Go Local Program provides competition-based transit grants to Orange County cities for projects intended to broaden the reach of Orange County's rail system by developing transit system extensions that will link communities and activity centers to the existing Metrolink rail corridor. The AA and Draft EIR/EA studies for the Project are being developed under the auspices of Step Two of OCTA's Go Local Program.

Step One for the project was completed in March 2008 when a fixed guideway project between SARTC and Harbor Boulevard was approved in concept by the Santa Ana and Garden Grove City Councils at the conclusion of a transit needs assessment and visioning process: *Santa Ana and Garden Grove Transit Vision and Go Local Project Concept, Final Study Report*; May 2008. The Project was evaluated by OCTA staff along with 20 other Go Local Step One projects and achieved a "high" ranking. In May 2008, the OCTA Board accepted staff's recommendations to advance the Project into Step Two, and authorized funds for further study and evaluation through alternatives analysis, conceptual engineering, and the environmental review process.

1.5 Project Description

Four alternatives have been identified for the Project. These alternatives consist of a No Build Alternative, a Transportation System Management (TSM) Alternative and two streetcar Build Alternatives. The four alternatives are labeled as follows:

- No Build Alternative
- TSM Alternative
- Streetcar Alternative 1 (Santa Ana Boulevard and Fourth Street Couplet)
- Streetcar Alternative 2 (Santa Ana Boulevard/Fifth Street and Civic Center Drive Couplet)

A detailed project description is provided in Appendix A.

Chapter 2 Analysis Methodologies

The traffic analyses prepared for this study were performed in accordance with City of Santa Ana requirements and the Orange County Congestion Management Program (CMP) (OCTA 2003) requirements. Detailed information on intersection analysis methodologies, standards, and thresholds are discussed in the following sections.

2.1 Intersection Level of Service Analysis and Criteria

A combination of analysis methodologies has been utilized for intersection Level of Service (LOS) analysis for this traffic assessment. The Intersection Capacity Utilization (ICU) method has been used for signalized intersections; and the Highway Capacity Manual (HCM) method has been used for unsignalized intersections. In cases where intersections are currently unsignalized but will, or have been, recommended to be signalized in the future, the HCM method was used to analyze existing conditions and the ICU method was used to analyze future conditions. Of the overall 42 study intersections analyzed, the number of intersections that are currently unsignalized that are proposed (or recommended) to be signalized in the future is approximately nine (9). The ICU method of calculating signalized intersection LOS is consistent with City of Santa Ana directives for the preparation of traffic impact studies. The LOS calculation worksheets for Existing and Future conditions are provided in Appendix B of this Technical Study.

2.1.1 Intersection Capacity Utilization (ICU) Method of Analysis

The ICU methodology consists of comparing critical turn movements through signalized intersections based on a flow rate capacity of 1,700 vehicles per hour per lane (vphpl) for through lanes and 1,600 vphpl for turn lanes. An additional clearance interval of 0.05 was added to each ICU calculation.

The ICU value translates to a Level of Service (LOS) estimate, which is a relative measure of the intersection performance. The ICU value is the sum of the critical volume-to-capacity ratios at an intersection; it is not intended to be indicative of the LOS of each of the individual turning movements. The resultant ICU calculations provide a level of service based on the following as listed in Table 2-1.

Table 2-1: LOS Criteria for Signalized Intersections (ICU)

LOS	ICU Value (V/C)	Level of Service Description
A	≤0.60	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	0.61-0.70	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.71-0.80	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.81-0.90	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.91-1.00	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	>1.01	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Potentially very long delays with continuously increasing queue lengths.

Source: Transportation Research Board, 1980. Circular 212 – Interim Materials on Highway Capacity.

2.1.2 Highway Capacity Manual (HCM) Method of Analysis

The Highway Capacity Manual (HCM) analysis method for evaluating minor street stop intersections is based on the average total delay for each impeded movement. For all-way stop controlled intersections, it is based on the average total delay for the entire intersection. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of a queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. Table 2-2 presents LOS criteria used for analysis of the unsignalized intersections.

Table 2-2: LOS Criteria for All-Way Stop and Minor Street Stop Intersections

LOS	Average Total Delay (Sec/Veh)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50

Source: Transportation Research Board, 2000. Highway Capacity Manual.

2.1.3 Intersection Capacity Utilization (ICU) Method of Analysis Versus

Highway Capacity Manual (HCM) Method of Analysis

There are a few different reasons for utilizing the two different methodologies for analysis of the study intersections. The primary reason is that the city of Santa Ana guidelines for traffic impact analysis directs the use of the ICU methodology for analysis of signalized intersections. However, the guidelines are silent on the methodology for the analysis for unsignalized intersections. In considering the best methodology to utilize for the analysis of

unsignalized intersections, it was determined that the ICU method is generally not appropriate for unsignalized intersections because the ICU method assumes a traffic signal to allocate discrete slices of time for traffic movements through the intersection. In particular, the ICU method is heavily weighted towards measuring the times allocated for conflicting movements through the intersection. Unsignalized intersections have no allocation of time for any of the traffic movements and Level of Service is dictated by delay to the traffic stopped at a Yield or Stop sign. Conflicting movements through unsignalized intersections are allocated as openings occur in platoons of conflicting, or opposing traffic.

Since the city of Santa Ana guidelines for traffic impact analysis are silent on the methodology to be utilized for the analysis for unsignalized intersections, there is some degree of latitude as to the selection of an appropriate methodology. When considering the methodology to utilize for the analysis of unsignalized intersections for this traffic study, the authors reviewed other recent traffic studies in or near the Project Study Area. It was found that other recent, relevant traffic studies in and around the Project Study Area utilized a similar, multiple-methodology approach. In addition, there was outreach to city of Santa Ana staff involved in the Project that confirmed this approach. Therefore, the ICU-HCM multiple-methodology approach is employed for the analysis of study intersections for this traffic study.

2.2 Roadway Segment Level of Service Analysis and Criteria

Road segment Level of Service (LOS) analysis is determined based on the methodology presented in the Orange County Master Plan of Arterial Highways (MPAH) and the City of Santa Ana Circulation Element. The City of Santa Ana's maximum roadway capacities and corresponding LOS by roadway classification are shown in Table 2-3.

Segment LOS standards and thresholds provide the basis for analysis of arterial roadway segment performance. The analysis of roadway segment LOS is based on the functional classification of the roadway, the maximum capacity, roadway geometrics, and existing or forecast Average Daily Traffic (ADT) volumes. The maximum 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

Table 2-3: Levels of Service for Arterial Street Segments Based upon Daily Traffic Volumes

Roadway Classification	Lanes/Configuration	Level of Service					
		A	B	C	D	E	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	7,000	8,800	10,000	11,300	12,500	> 12,500

Source: City of Santa Ana, General Plan – Circulation Element, 1998a.

Consistent with the City of Santa General Plan Circulation Element, the LOS for roadway segments were evaluated by comparing the roadway segment volumes to the LOS capacities described in Table 2-3.

2.3 Intersection Queuing Analysis

The queuing analysis compares the minimum required storage lengths to the storage lengths provided for the analyzed intersections. The minimum required storage lengths are based on the 50th and 95th percentile queue lengths as calculated in the Synchro queuing worksheets. Synchro reports the 50th and 95th percentile queue length for a single lane of a lane group (highest queue length considering all lanes of the lane group) and not the total queue length of all lanes in that lane group.

2.4 On-Street Parking Analysis

The on-street parking analysis is based on estimated total on-street parking spaces for existing and proposed streetcar alternatives. The approximate total parking space estimation is based on the assumption of an average vehicle length of 20 feet (per parallel parking stall) over the length of the existing designated on-street parking segments. Where existing parallel parking stalls are clearly marked, they are individually counted as a single parking space. This is a "planning-level" analysis, not a detailed parking inventory, observation, and analysis. Parking availability length does not include driveways, emergency parking (red curb), or clearly identified restricted parking.

2.5 Thresholds of Significance

This section outlines the thresholds that indicate significant impacts under the California Environmental Quality Act (CEQA). Mitigation Measures and any other measures required improving traffic level of service and operations in the Study Area of the proposed project will be outlined in Chapter 8 (Mitigation Measures) of this report.

2.5.1 City of Santa Ana Impact Criteria

The City of Santa Ana General Plan has established LOS D as the threshold for an acceptable service level for signalized intersections. Areas of the City designated "District Center[1]" in the Land Use Element of the City's General Plan are also considered "Major Development Areas" (MDAs)[2]. In MDAs, the City considers LOS E as the minimum acceptable service level for signalized intersections. These thresholds are consistent with, or more stringent than, program goals for Measure M and Congestion Management Plan (CMP, OCTA 2003) criteria

[1] "The District Center (DC) land use designation includes the major activity areas in the City. Seven areas of the City, totaling 513.4 acres, are designated as District Center. District Centers are considered to be the City's "major development areas.

[2] Downtown Major Development Area: The Downtown District serves as one of the County's major employment and governmental operations centers complemented with a mix of residential, commercial, and services uses to enhance its urban vibrancy. Emphasis on streets that accommodate all modes of transportation, including mass transit, pedestrian and bicyclist, are key in this urban setting

that designate LOS E as the minimum acceptable LOS. The City of Santa Ana does not have thresholds of significance for unsignalized intersections.

The Study Area of the proposed project contains (or passes through) two Major Development Areas. One of the MDAs is known as the Downtown District, MDA #3 in Figure 2-1. The other MDA is known as the Transit Village District[3], MDA #9, also shown in Figure 2-1. Intersections located in those MDAs will be identified in the analysis and summary tables.

For the purposes of traffic study preparation, a project is considered to have a significant traffic impact at a signalized intersection if the traffic level of service deteriorates to an unacceptable level of service (i.e., LOS E or F at intersections outside of an MDA; or LOS F within an MDA) with the addition of project traffic. If a significant impact is identified, the project is required to mitigate the project's traffic-related impacts by incorporating mitigation measures to achieve an acceptable level of service.

For study intersections located outside of an MDA, if the intersection is expected to operate at an unacceptable LOS (LOS 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 LOS (intersection LOS 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, for intersections either located outside or within an MDA, an impact is considered significant if the project related increase in the volume to capacity (V/C) ratio equals or exceeds 0.01 when compared to No Build project conditions that are projected to operate at LOS E or F.

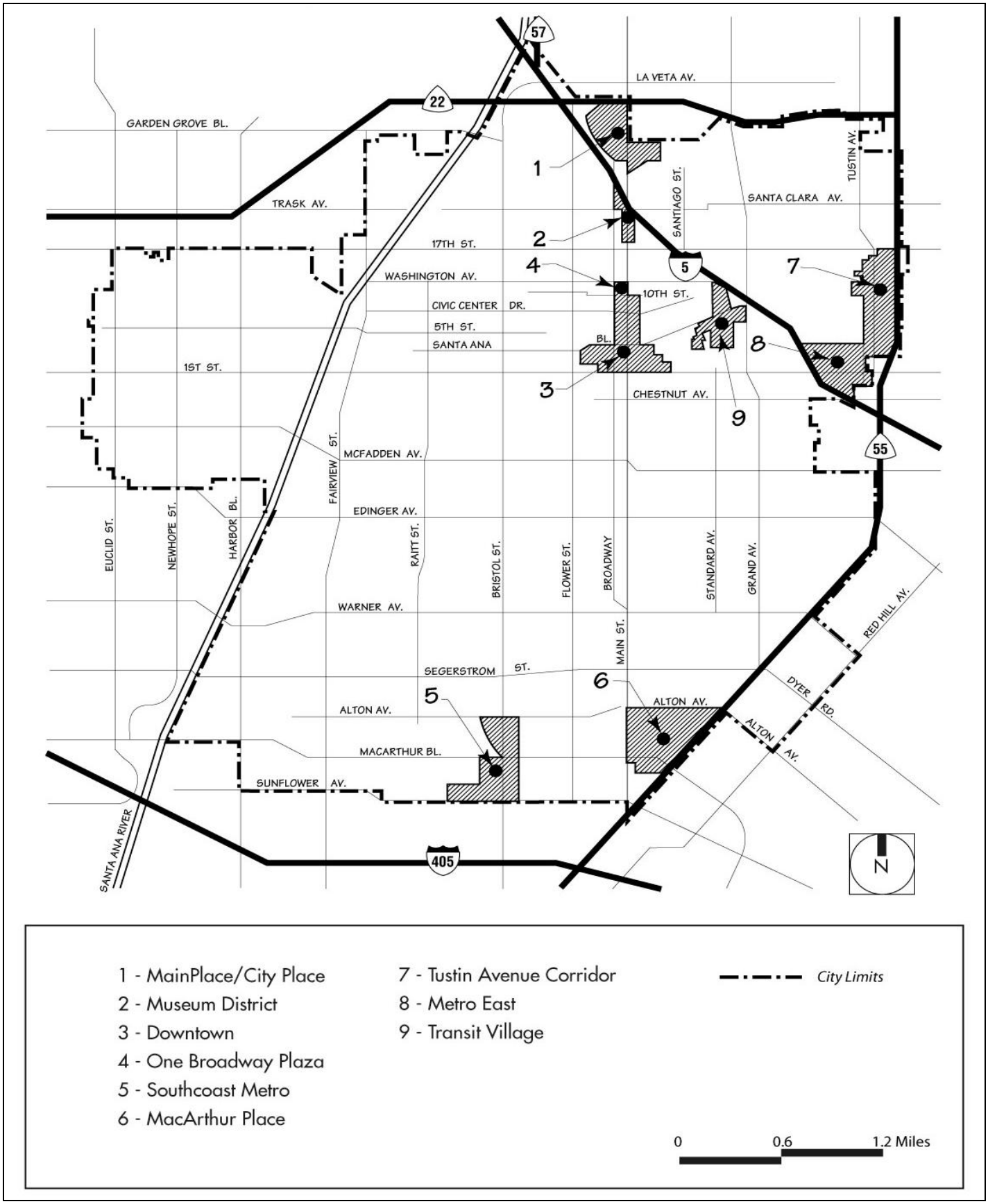
For example, the thresholds of significance criteria for determining which intersections are impacted when comparing any of the 2035 Build Alternatives (Streetcar Alternatives 1 and 2) to the 2035 No Build includes:

- LOS moves to E or F in the Streetcar Alternatives; and / or
- Increase in intersection V/C of 0.01 over the No Build condition (for intersections already operating at LOS E or F).

If the thresholds presented above are met or exceeded, mitigation measures such as additional turn lanes (or other physical or operational improvements) may be required to mitigate the impact to acceptable levels of service at the intersections.

[3] Transit Village Major Development Area: The Transit Village District is envisioned as a vibrant intense urban village with a balance of employment centers, residential and service uses. Pedestrian and transit linkages to the Santa Ana Regional Transportation Center are key in this district.

City of Santa Ana Major Development Areas



Source: City of Santa Ana General Plan Circulation Element, 1998.

2.5.2 City of Garden Grove Impact Criteria

Similar to the Santa Ana General Plan, the Garden Grove General Plan has established LOS D as the threshold for an acceptable service level for signalized intersections. This criteria is consistent with City of Garden Grove impact criteria for evaluating project impacts at signalized intersections. The primary intersection to be considered, from the City of Garden Grove's perspective, is the intersection of Harbor Boulevard and Westminster Avenue.

2.5.3 Congestion Management Plan

The Orange County Congestion Management Program (CMP) was established in 1991 to reduce traffic congestion and to provide a mechanism for coordinating land use and development decisions. Compliance with the CMP requirements ensures a city's eligibility to compete for State gas tax funds for local transportation projects.

As part of the CMP, a CMP Highway Network was identified for Orange County that consists of Orange County's State highway system, and highways and arterials from OCTA's Smart Street network. OCTA has implemented an Intersection Capacity Utilization (ICU) monitoring method, developed with technical staff members from local and State agencies, for measuring the Level of Service (LOS) at CMP Highway System (CMPHS) intersections.

Within the defined CMP highway network, CMPHS intersections are not allowed to deteriorate to a condition which is worse than LOS E or the base year LOS, if worse than E, without mitigation being prescribed in an acceptable deficiency plan. The threshold of significance criteria for traffic impacts for the Cities of Santa Ana and Garden Grove meet or exceed (are more stringent than) the threshold of significance criteria for the CMP.

There are two CMPHS roadways, and one CMPHS intersection located in the Study Area of the proposed project. The CMPHS roadways are Harbor Boulevard and First Street. The CMPHS intersection is the intersection of Harbor Boulevard and First Street, in the southwest corner of the Study Area.

2.6 Traffic Forecast Methodology

This section discusses the methodology employed to develop the future year 2035 background traffic for the proposed project. The traffic analysis for this Project developed future year (2035) projected volumes primarily using theOCTA's travel demand forecasting model known as Orange County Transportation Analysis Model (OCTAM), version 3.3. The 2035 model reflects socioeconomic data and build out of land use as designated by each local agency General Plan contained in the model area. As such, the OCTAM model reflects general ambient growth in background traffic over time, reflecting the cumulative impacts of general plan build out throughout the modeling area.

The OCTAM 3.3 highway network was refined for use in developing traffic projections for the proposed project. The modified travel demand forecasting models were used to develop link volume traffic forecasts within the Study Area for the AM-peak hour, PM-peak hour, and 24-

hour (Average Daily Traffic [ADT]) time periods, both for the base year model (2005) and the future year model (2035). 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 2035 future traffic volumes.

Intersection approach and departure traffic volumes from the model were used to develop peak-hour turning movement volumes for intersection traffic analysis purposes. The turning movements produced by the raw model were not used directly for the analyses. The turning movements produced by the raw model were "calibrated," or "post-processed," to ensure that the forecasted turning movements more accurately reflect actual observations in the field. In the post-processing stage of developing traffic analysis forecasts, the rate of growth of the turning movements taken from the model was applied to each turning movement volume from the observed ground counts. This methodology is provided in the National Cooperative Highway Research Program (NCHRP) Report 255 to ensure reasonableness and validity.

The traffic analysis for this project developed both AM and PM peak-hour turning movement volumes based on the NCHRP 225 methodology. Both AM and PM peak-hour turning movement volumes were post-processed at each study intersection using the design year (2035) peak-hour approach and departure volumes, in conjunction with the existing turning movement volumes. Morning and evening peak-hour turning movement volumes were post-processed and balanced between intersections.

Once the intersection approach and departure traffic volumes were post-processed, they were then used to develop future year (2035) ADT for each roadway segment. The AM and PM peak-hour linked volume forecasts from the future year models, along with the existing ADT traffic counts, were used as the basis for producing 2035 future ADT volumes. A peaking factor was then applied to the AM and PM peak-hour links to develop future year 2035 ADT for each roadway segment. The peaking factor was developed using the ratio between AM and PM peak-hour link volumes forecast from the future year models and existing ADT traffic counts.

Chapter 3 Existing Conditions

This section describes key study roadway segments and intersections, existing peak-hour intersection traffic volume information, and LOS analysis results for Existing conditions.

3.1 Freeway Network

Two freeways run through or in close proximity to the Project Study Area. Interstate 5 (I-5) passes within one-half mile of the eastern terminus of the proposed project at SARTC. I-5 is a major commuter and goods movement corridor that stretches from the U.S. border with Mexico, in the San Diego area, through Orange County and northward to the United States border with Canada. I-5, in the vicinity of the Study Area, is a ten-lane freeway plus carpool lanes. One key feature of I-5 in the vicinity of the Study Area is a carpool lane direct access ramp to and from Grand Avenue, located approximately one-half mile from the eastern terminus of the proposed project.

State Route 22 (SR-22) runs parallel to the proposed project, from one-half to one-and-one-half miles to the north of the proposed project. SR-22 has six general-purpose lanes and one carpool lane in each direction, plus auxiliary lanes between interchanges. It is a limited-access corridor that provides access to the central Orange County cities of Westminster, Garden Grove, Santa Ana, and Orange. SR-22 provides connections to I-605, I-405, I-5, SR-57, and SR-55.

Other area freeways surround the Study Area, such as I-405, SR-57, and SR-55. However, I-5 and SR-22 are the closest in proximity to the proposed project and are the most pertinent to the regional transportation surrounding the Study Area of the proposed project.

3.2 Arterial Network

Several regionally and locally significant roadways traverse the Study Area. The key roadways within the Study Area are discussed below. Figure 3-1 shows the current Master Plan of Streets and Highways from the Circulation Element of the Santa Ana General Plan. The City of Santa Ana is currently studying street classifications citywide as part of a Circulation Element Update. Street classifications may change based on the Circulation Element Update. A separate environmental document will be issued, as needed.

3.2.1 Major East/West Roadways

Fourth Street – Fourth Street is a two-lane undivided east/west road that is classified in the Circulation Element of the Santa Ana General Plan as a Secondary Arterial (four lanes) between French Street and Standard Avenue, and a Primary Arterial (six lanes) between Standard Avenue and I-5. In the Study Area, Fourth Street has a 56-foot curb-to-curb width. Metered parking is allowed on both sides. The posted speed limit is 25 mph.

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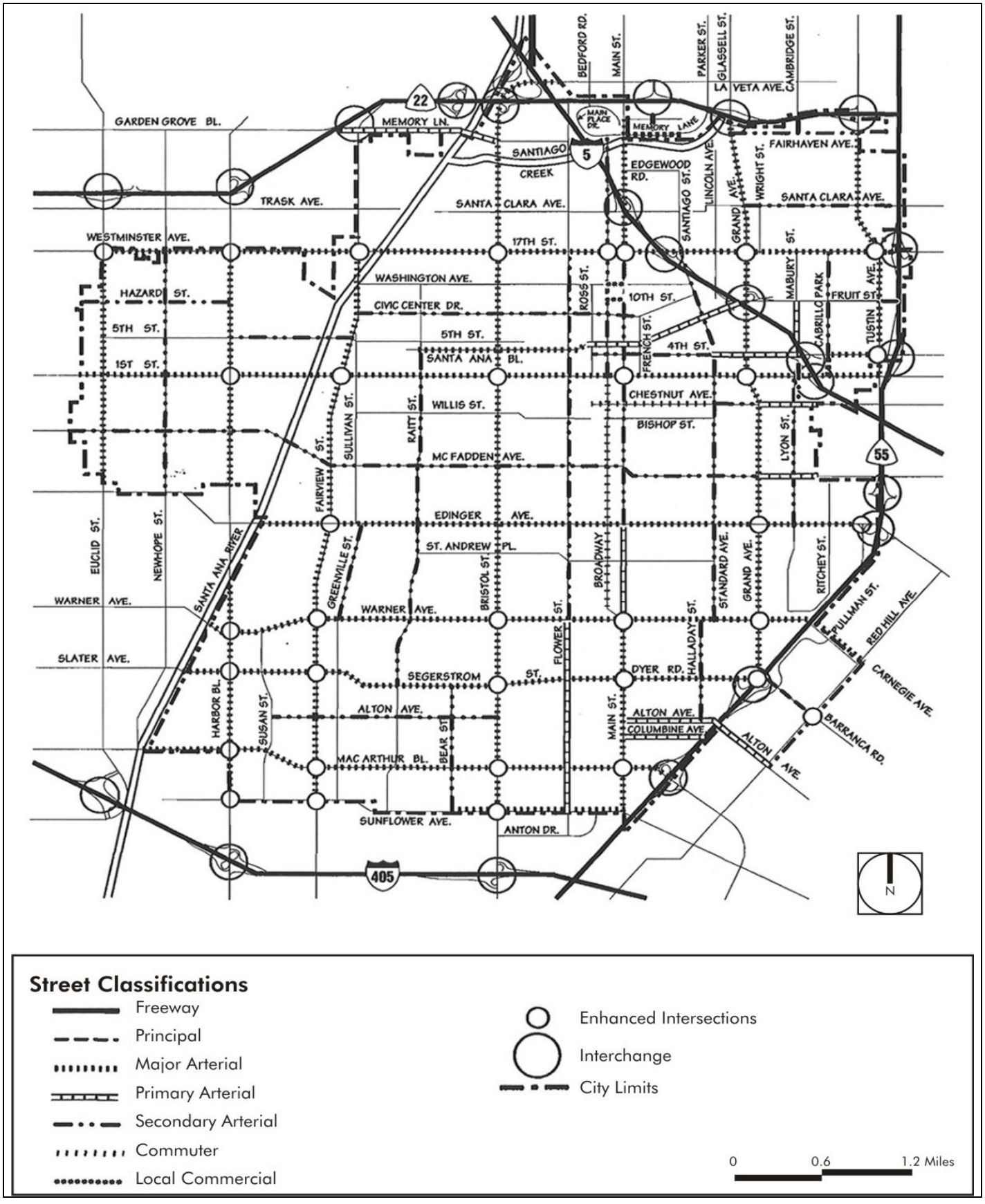
City of Santa Ana Master Plan of Streets and Highways



Street Classifications

- Freeway
- Principal
- Major Arterial
- Primary Arterial
- Secondary Arterial
- Commuter
- Local Commercial

- Enhanced Intersections
- Interchange
- City Limits

0 0.6 1.2 Miles

Source: Source: City of Santa Ana General Plan Circulation Element, 1998

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Fifth Street – Fifth Street is a three-lane east/west road classified as a Secondary Arterial in the Circulation Element of the Santa Ana General Plan 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 of Santa Ana Boulevard. Parking is generally prohibited, except for a segment west of Main Street where metered parking spaces are provided along the south side of the street. The posted speed limit is 25 mph.

Santa Ana Boulevard – Santa Ana Boulevard is an east/west road classified in the Circulation Element of the Santa Ana General Plan as a Major Arterial from Raitt Street to just west of Ross Street. It is then classified as a Primary Arterial from just west of Ross Street to I-5. The segment between Ross Street and French Street is operated as a one-way westbound street 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, except certain segments west of Flower Street where parallel parking spaces are provided on either side of the street. The posted speed limit is 30 mph.

Civic Center Drive – Civic Center Drive is a four-lane divided east/west road that is classified as a Secondary Arterial in the Circulation Element of the Santa Ana General Plan from Fairview Street to French Street. Within the Study Area, Civic Center Drive has a curb-to-curb width of 64 feet. Parking is generally permitted along Civic Center Drive to the west of Bristol Street. Parking is prohibited along Civic Center Drive from Bristol Street to Main St, with the exception of four metered spaces on the south side of the street, immediately west of Main Street. Between Main Street and Spurgeon Street, parking is permitted on the south side of the street only. The posted speed limit is 35 mph.

Westminster Avenue/Seventeenth Street – Westminster Avenue/Seventeenth Street is a six-lane divided east/west road that is classified as a Major Arterial in the Circulation Element of the Santa Ana General Plan. Westminster Avenue is also classified a Major Arterial in the Circulation Element of the Garden Grove General Plan. Seventeenth Street has a curb-to-curb width of 80 to 88 feet and a 14-foot raised median. Parking is prohibited along Westminster Avenue/Seventeenth Street. The posted speed limit is 40 mph.

3.2.2 Major North/South Roadways

Bristol Street – Bristol Street is generally a four-lane divided north/south road that is classified as a Major Arterial in the Circulation Element of the Santa Ana General Plan. Parking is prohibited along Bristol Street in the Study Area. Bristol Street is currently posted at 40 mph speed limit in the vicinity of the Study Area.

Flower Street – Flower Street is a four-lane divided north/south road that is classified as a Secondary Arterial in the Circulation Element of the Santa Ana General Plan. Parking is not allowed, and the posted speed limit ranges from 30 to 35 mph in the Study Area.

Broadway – Broadway is a north/south four-lane undivided road that is classified as a Secondary Arterial between First Street and Seventeenth Street in the Circulation Element of the Santa Ana General Plan. Within the boundaries of the Study Area, Broadway varies in width from 55 feet curb-to-curb north of Fifth Street, to 60 feet between Fifth Street and Civic Center Drive. Broadway has a 10-foot, two-way center turn lane in the vicinity of the Study Area. Parking is prohibited. The posted speed limit is 35 mph.

Main Street - Main Street is a north/south four-lane road that is classified as a Secondary Arterial in the Circulation Element of the Santa Ana General Plan, in the vicinity of the project. 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 and a 10-foot two-way center turn lane, from Civic Center Drive to Seventeenth Street. Metered parking spaces are provided on certain segments of Main Street between Fifth Street and Seventeenth Street. Main Street has a posted speed limit of 30 mph, in the Study Area.

Santiago Street - Santiago Street is a north/south, two-lane divided roadway. It is classified as a Secondary Arterial the Circulation Element of the Santa Ana General Plan. Portions of the road in the Study Area have a two-way left turn lane. Santiago Street fronts the west face of the Santa Ana Regional Transportation Center (SARTC). The City of Santa Ana is currently planning the extension of this roadway through to First Street.

Harbor Boulevard - Harbor Boulevard is a six-lane divided north/south road that is classified as a Major Arterial in the Circulation Element of the Santa Ana General Plan. Harbor Boulevard is also classified a Major Arterial in the Circulation Element of the Garden Grove General Plan. Harbor Boulevard has a curb-to-curb width of approximately 85 to 102 feet and an approximately 14-foot raised median. Parking is prohibited along Harbor Boulevard. The posted speed limit is 40 mph.

3.3 Study Intersections

The existing 2011 traffic volumes utilized in this traffic operations analysis were obtained from the traffic volumes presented in the City of Santa Ana Transit Zoning Code (SD 84A and SD84B) EIR and from the City of Santa Ana traffic data and model. However, existing traffic data was not available for some study intersections; therefore, existing approach and departure volumes from adjacent intersection were used to estimate existing peak-hour turn movements. On a more conservative approach, existing morning and evening peak-hour turning movement volumes within the Study Area network, were post-processed and balanced between intersections. All available existing traffic volumes are provided in Appendix B.

Though there are many more intersections in the overall Project Study Area, 42 key intersections have been identified in the Study Area for analysis in the traffic study. These intersections were determined based on the alignments proposed in the Build Alternatives and sound engineering judgment regarding the dispersal of impacts from the proposed alignments. Not all intersections in the vicinity of proposed Streetcar stations were identified as study intersections because it is not anticipated that there will be significant park-and-ride traffic;

nor is it anticipated that the pedestrian-related impacts in the station areas will be significant. Table 3-1 lists the 42 Study Area intersections, with the existing traffic control method in place at each study intersection. Changes in the traffic control methods between Existing and future will be noted in the summary tables for each of the Build Alternatives.

Table 3-1: Study Area Intersections

ID	Main Street	Cross Street	Existing Traffic Control Method
1	Westminster Avenue	Harbor Boulevard	Signalized
2	Westminster Avenue	Nautilus Drive	1-Way Stop
3	Fairview Street	Civic Center Drive	Signalized
4	Santa Ana Boulevard	Raitt Street	2-Way Stop
5	Santa Ana Boulevard	Pacific Avenue	Signalized
6	Santa Ana Boulevard	Bristol Street	Signalized
7	Santa Ana Boulevard	Shelton Street	Signalized
8	Flower Street	Civic Center Drive	Signalized
9	Flower Street	6th Street	Signalized
10	Santa Ana Boulevard	Flower Street	Signalized
11*	Civic Center Drive	Parton Street	Signalized
12*	Santa Ana Boulevard	Civic Center Plaza/Parton Street	Signalized
13*	Civic Center Drive	Van Ness Avenue	2-Way Stop
14*	Civic Center Drive	Ross Street	Signalized
15*	Santa Ana Boulevard	Ross Street	Signalized
16*	4th Street	Ross Street	2-Way Stop
17*	Civic Center Drive	Ped Xing (Between Ross St and Birch St)	Signalized
18*	Civic Center Drive	Broadway	Signalized
19*	Santa Ana Boulevard	Broadway	Signalized
20*	5th Street	Broadway	Signalized
21*	4th Street	Broadway	Signalized
22*	Civic Center Drive	Sycamore Street	Signalized
23*	Civic Center Drive	Main Street	Signalized
24*	Santa Ana Boulevard	Main Street	Signalized
25*	5th Street	Main Street	Signalized
26*	4th Street	Main Street	Signalized
27*	Civic Center Drive	Bush Street	Signalized
28*	Santa Ana Boulevard	Bush Street	Signalized
29*	5th Street	Bush Street	Signalized
30*	4th Street	Bush Street	Signalized
31*	Civic Center Drive	Spurgeon Street	2-Way Stop
32*	Santa Ana Blvd/6th Street	French Street	2-Way Stop
33*	4th Street	French Street	Signalized
34*	4th Street	Mortimer Street	1-Way Stop
35*	5th Street	Minter Street	2-Way Stop
36	Santa Ana Boulevard	Lacy Street	2-Way Stop
37*	Santa Ana Boulevard	Poinsettia Street	2-Way Stop
38	Brown Street	Poinsettia Street	Uncontrolled
39*	Santa Ana Boulevard	Santiago Street	Signalized
40	4th Street	Daisy Avenue	1-Way Stop
41	3rd Street	Daisy Avenue	2-Way Stop
42	3rd Street	Raitt Street	2-Way Stop

Source: URS Corp., 2011

Note: Shaded row indicates analysis only in future year scenarios (Westminster Avenue at Nautilus Drive).
*Intersections located in MDA's (Intersections 11 - 35, 37, and 39)

Figure 3-2A through 3-2D show the existing lane geometrics and AM and PM peak-hour traffic volumes at the 42 study intersections.

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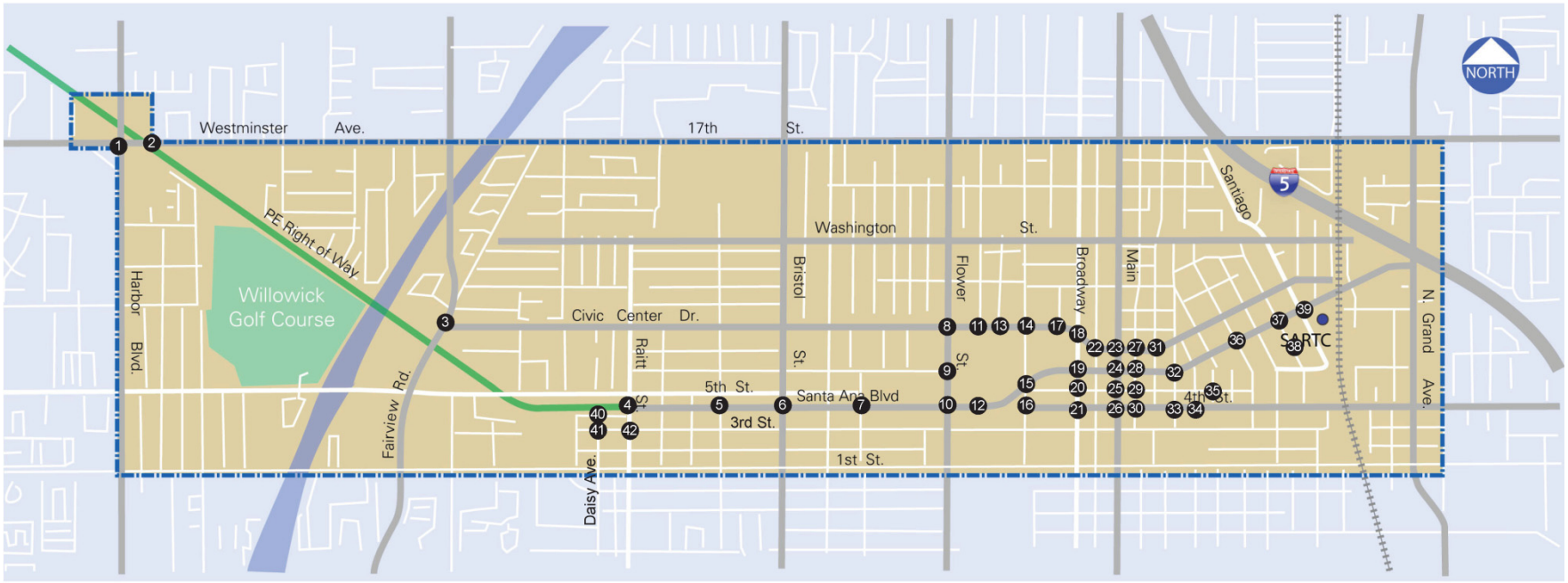
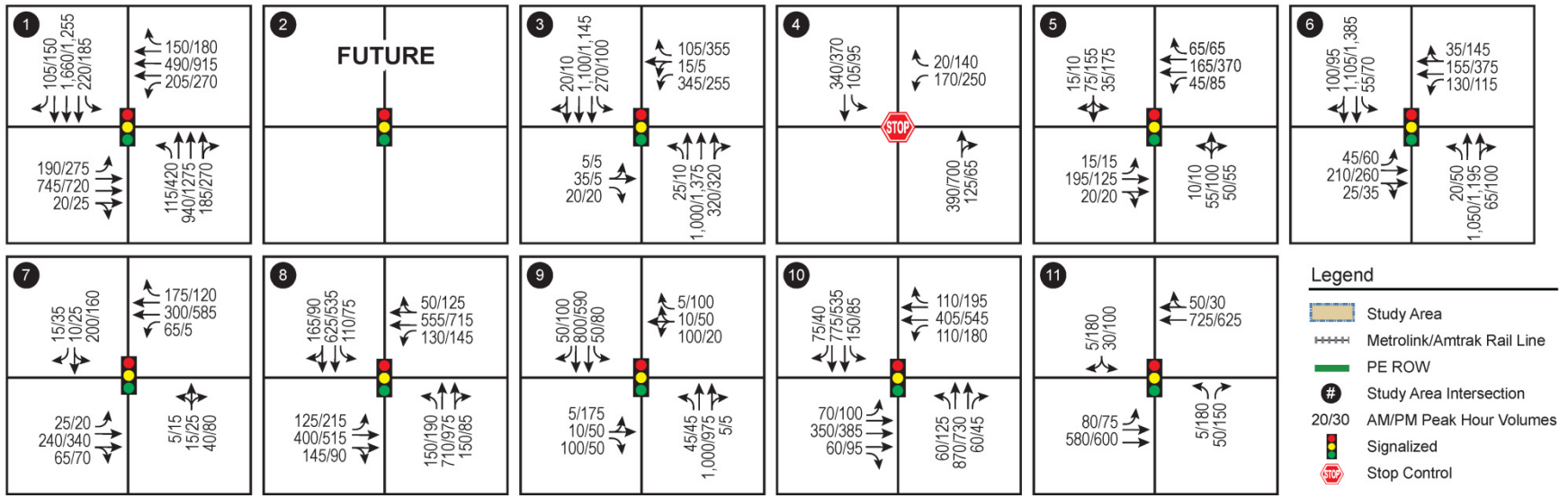
Existing Lane Geometrics and Traffic Volumes (Study Intersections 1 through 11)





Source: URS, January 2012

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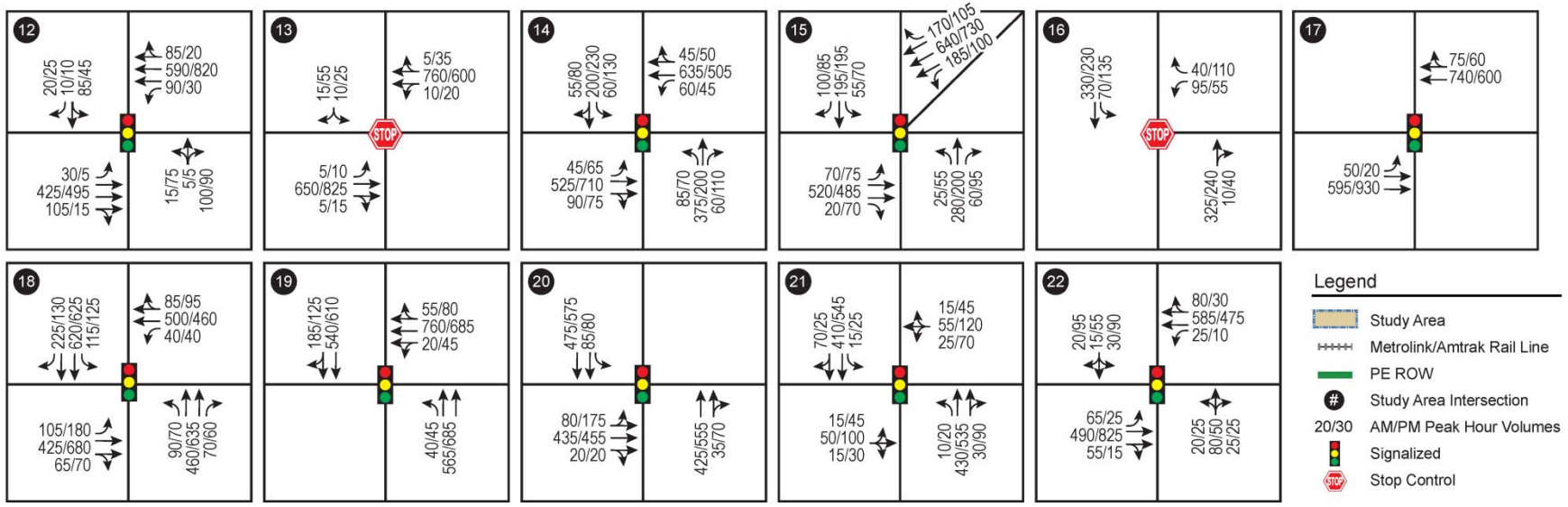
Existing Lane Geometrics and Traffic Volumes (Study Intersections 12 through 22)



Source: URS, January 2012

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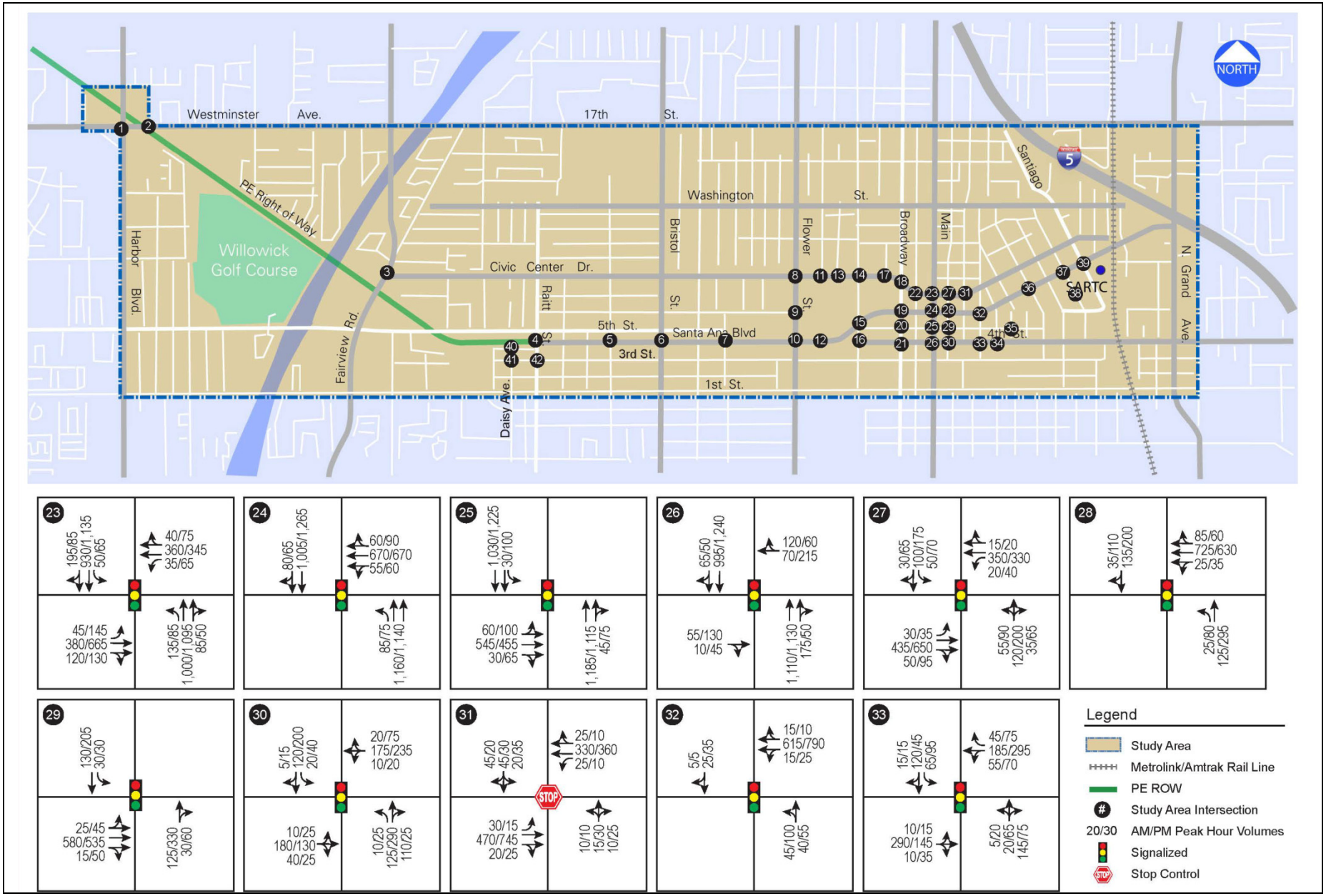
Existing Lane Geometrics and Traffic Volumes (Study Intersections 23 through 33)



Source: URS, January 2012

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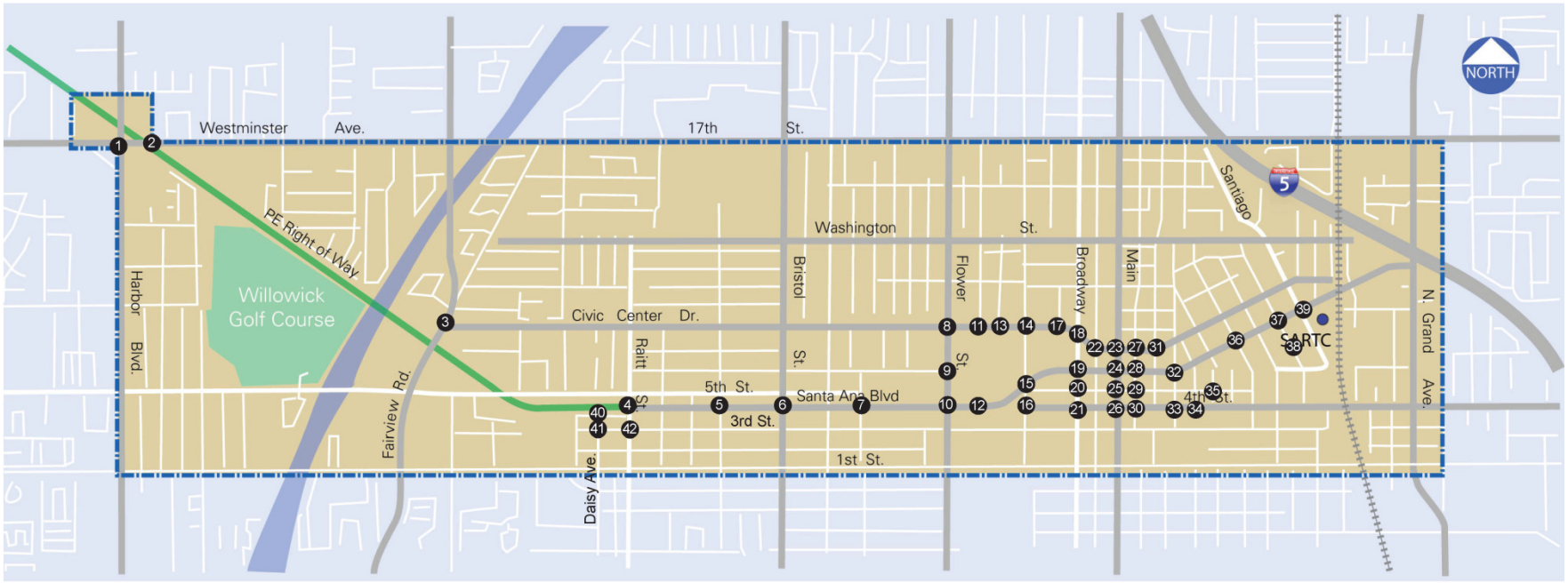
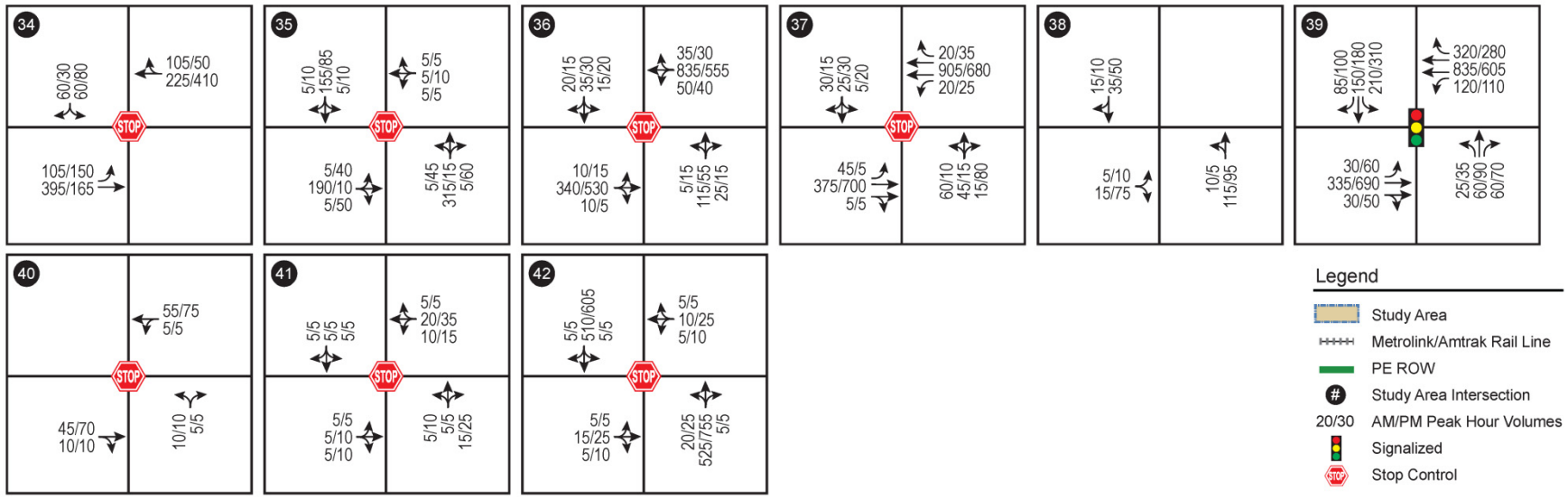
Existing Lane Geometrics and Traffic Volumes (Study Intersections 34 through 42)





Source: URS, January 2012

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3.4 Existing Intersection Levels of Service

3.4.1 Intersection Analysis

Table 3-2 shows the existing intersection Level of Service for each of the 42 study intersections. Intersection LOS was calculated using a combination of methods comprised of the Intersection Capacity Utilization (ICU) and Highway Capacity Manual (HCM) methods for signalized intersections; and the Highway Capacity Manual (HCM) method for unsignalized intersections – as described in Chapter 2 of this document.

As shown in the table, the following intersections are currently operating at LOS E or F during either the AM or PM peak hour.

- ID #1: Westminster Avenue/Harbor Boulevard – PM Peak Hour
- ID #4: Santa Ana Boulevard/Raitt Street – AM and PM Peak Hours
- ID #36: Santa Ana Boulevard/Lacy Street – AM Peak Hour
- ID #42: Third Street/Raitt Street – PM Peak Hour

All other study intersections are currently operating at an acceptable LOS D or better during both AM and PM peak hours under Existing conditions.

3.4.2 Roadway Segment Analysis

The existing roadway segment ADT analysis is presented in Table 3-3. The following locations are potentially experiencing capacity deficiencies under existing conditions:

- Fifth Street from Hawley Street to Raitt Street
- Fourth Street from Main Street to Mortimer Street
- Raitt Street from Fifth Street to Third Street
- Bristol Street from Fifth Street to Third Street
- Main Street from Fifth Street to Third Street

All other arterial roadways segments are operating at acceptable levels.

3.5 Public Transportation Services

This section provides an overview of existing public transportation services that serve the Study Area of the proposed project.

3.5.1 Bus Transit

The Orange County Transportation Authority (OCTA) is the primary provider of fixed route bus service in Orange County. An extensive network of fixed-route bus transit service is provided in Santa Ana due to its central location in Orange County. In addition to the bus routes that traverse the City, many routes also serve the periphery of the City. Figure 3-3 shows OCTA fixed route bus service in and around the project Study Area.

Table 3-2: Peak Hour Intersection Level of Service Results – Existing Conditions

ID	Main St	Cross St	Existing Traffic Control	Existing LOS (HCM)				Existing LOS (ICU)			
				AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
1	Westminster Ave	Harbor Blvd	Signalized	N/A	N/A	N/A	N/A	0.73	C	1.10	**F**
2	Westminster Ave	Nautilus Dr	1-Way Stop	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	Fairview St	Civic Center Dr	Signalized	N/A	N/A	N/A	N/A	0.65	B	0.67	B
4	Santa Ana Blvd	Raitt St	2-Way Stop	92.4	**F**	393.2	**F**	N/A	N/A	N/A	N/A
5	Santa Ana Blvd	Pacific Ave	Signalized	N/A	N/A	N/A	N/A	0.21	A	0.37	A
6	Santa Ana Blvd	Bristol St	Signalized	N/A	N/A	N/A	N/A	0.57	A	0.71	C
7	Santa Ana Blvd	Shelton St	Signalized	N/A	N/A	N/A	N/A	0.30	A	0.34	A
8	Flower St	Civic Center Dr	Signalized	N/A	N/A	N/A	N/A	0.63	B	0.79	C
9	Flower St	6th St	Signalized	N/A	N/A	N/A	N/A	0.56	A	0.67	B
10	Santa Ana Blvd	Flower St	Signalized	N/A	N/A	N/A	N/A	0.56	A	0.54	A
11*	Civic Center Dr	Parton St	Signalized	N/A	N/A	N/A	N/A	0.36	A	0.57	A
12*	Santa Ana Blvd	Civic Center Plaza/Parton St	Signalized	N/A	N/A	N/A	N/A	0.39	A	0.37	A
13*	Civic Center Dr	Van Ness Ave	2-Way Stop	11.1	B	12.0	B	N/A	N/A	N/A	N/A
14*	Civic Center Dr	Ross St	Signalized	N/A	N/A	N/A	N/A	0.54	A	0.54	A
15*	Santa Ana Blvd	Ross St	Signalized	N/A	N/A	N/A	N/A	0.52	A	0.42	A
16*	4th St	Ross St	2-Way Stop	19.5	C	13.7	B	N/A	N/A	N/A	N/A
17*	Civic Center Dr	Ped Xing	Signalized	N/A	N/A	N/A	N/A	0.32	A	0.32	A
18*	Civic Center Dr	Broadway	Signalized	N/A	N/A	N/A	N/A	0.53	A	0.59	A
19*	Santa Ana Blvd	Broadway	Signalized	N/A	N/A	N/A	N/A	0.53	A	0.52	A
20*	5th St	Broadway	Signalized	N/A	N/A	N/A	N/A	0.49	A	0.54	A
21*	4th St	Broadway	Signalized	N/A	N/A	N/A	N/A	0.25	A	0.39	A
22*	Civic Center Dr	Sycamore St	Signalized	N/A	N/A	N/A	N/A	0.36	A	0.44	A
23*	Civic Center Dr	Main St	Signalized	N/A	N/A	N/A	N/A	0.63	B	0.74	C
24*	Santa Ana Blvd	Main St	Signalized	N/A	N/A	N/A	N/A	0.62	B	0.69	B
25*	5th St	Main St	Signalized	N/A	N/A	N/A	N/A	0.59	A	0.60	A
26*	4th St	Main St	Signalized	N/A	N/A	N/A	N/A	0.54	A	0.59	A
27*	Civic Center Dr	Bush St	Signalized	N/A	N/A	N/A	N/A	0.36	A	0.55	A
28v	Santa Ana Blvd	Bush St	Signalized	N/A	N/A	N/A	N/A	0.38	A	0.47	A
29*	5th St	Bush St	Signalized	N/A	N/A	N/A	N/A	0.33	A	0.46	A
30*	4th St	Bush St	Signalized	N/A	N/A	N/A	N/A	0.34	A	0.45	A
31*	Civic Center Dr	Spurgeon St	2-Way Stop	18.9	C	25.9	D	N/A	N/A	N/A	N/A
32*	Santa Ana Blvd/ 6th St	French St	2-Way Stop	16.9	C	16.6	C	N/A	N/A	N/A	N/A
33*	4th St	French St	Signalized	N/A	N/A	N/A	N/A	0.37	A	0.42	A
34*	4th St	Mortimer St	1-Way Stop	13.7	B	15.1	C	N/A	N/A	N/A	N/A

ID	Main St	Cross St	Existing Traffic Control	Existing LOS (HCM)				Existing LOS (ICU)			
				AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
35*	5th St	Minter St	2-Way Stop	16.8	C	11.0	B	N/A	N/A	N/A	N/A
36	Santa Ana Blvd	Lacy St	2-Way Stop	40.7	**E**	19.6	C	N/A	N/A	N/A	N/A
37*	Santa Ana Blvd	Poinsettia St	2-Way Stop	20.3	C	17.2	C	N/A	N/A	N/A	N/A
38	Brown St	Poinsettia St	Uncontrolled	8.9	A	9.1	A	N/A	N/A	N/A	N/A
39*	Santa Ana Blvd	Santiago St	Signalized	N/A	N/A	N/A	N/A	0.48	A	0.58	A
40	4th St	Daisy Avenue	1-Way Stop	9.0	A	9.3	A	N/A	N/A	N/A	N/A
41	3rd St	Daisy Avenue	2-Way Stop	9.2	A	9.5	A	N/A	N/A	N/A	N/A
42	3rd St	Raitt St	2-Way Stop	22.4	C	45.2	**E**	N/A	N/A	N/A	N/A

Source: URS Corp., 2011

Note: Shaded and bold cells indicate LOS E or F.

N/A – Not applicable – indicates which analysis methodology (HCM or ICU) was NOT used for a particular intersection.

*Intersections located in MDA's (Intersections 11 - 35, 37, and 39)

Table 3-3: Levels of Service Results – Existing Conditions

Street	From	To	Existing ADT	No. of Lanes	LOS E Capacity	LOS
Santa Ana Boulevard	Raitt St	Western Ave	10,137	4U	25,000	B
	Western Ave	Forest St	10,137	4U	25,000	B
	Forest St	Pacific Ave	10,137	4U	25,000	B
	Pacific Ave	Hesperian St	10,137	4U	25,000	B
	Hesperian St	Bristol St	10,137	4U	25,000	B
	Bristol St	Baker St	9,967	4U	25,000	B
	Baker St	Shelton St	9,967	4U	25,000	B
	Shelton St	Flower St	9,967	4D	37,500	A
	Flower St	Parton St	12,363	6D	56,300	A
	Parton St	Ross St	12,363	6D	56,300	A
	Ross St	Broadway	12,000	3D	28,150	A
	Broadway	Sycamore St	10,055	3D	28,150	A
	Sycamore St	Main St	10,055	3D	28,150	A
	Main St	Bush St	10,094	3D	28,150	A
	Bush St	Spurgeon St	10,094	3D	28,150	A
	Spurgeon St	French St	10,094	3D	28,150	A
	French St	Mortimer St	14,716	2D	18,750	C
	Mortimer St	Minter St	14,716	2D	18,750	C
	Minter St	Lacy St	14,716	2D	18,750	C
	Lacy St	Garfield St	14,716	4D	37,500	A
	Garfield St	Poinsettia St	14,716	4D	37,500	A
	Poinsettia St	Santiago St	14,716	4D	37,500	A
5th St	Hawley St	Sunset St	12,329	2U	12,500	**E**
	Sunset St	English St	12,329	2U	12,500	**E**
	English St	Townsend St	12,329	2U	12,500	**E**
	Townsend St	Daisy Ave	12,329	2U	12,500	**E**
	Daisy Ave	Fairlawn St	12,329	2U	12,500	**E**
	Fairlawn St	Raitt St	12,329	2U	12,500	**E**
	Ross St	Broadway	8,166	3D	28,150	A
	Broadway	Sycamore St	8,166	3D	28,150	A
	Sycamore St	Main St	8,166	3D	28,150	A
	Main St	Bush St	5,881	3D	28,150	A
	Bush St	Spurgeon St	5,881	3D	28,150	A
	Spurgeon St	French St	5,881	3D	28,150	A
	French St	Mortimer St	4,300	3D	28,150	A
	Mortimer St	Minter St	2,000	2U	12,500	A
4th St	Townsend St	Daisy Ave	1,500	2U	12,500	A
	Daisy Ave	Raitt St	1,500	2U	12,500	A
	Ross St	Birch St	6,737	2U	12,500	A
	Birch St	Broadway	6,737	2U	12,500	A
	Broadway	Sycamore St	6,737	2U	12,500	A
	Sycamore St	Main St	6,737	2U	12,500	A
	Main St	Bush St	11,974	2U	12,500	**E**
	Bush St	Spurgeon St	11,974	2U	12,500	**E**
	Spurgeon St	French St	11,974	2U	12,500	**E**
	French St	Mortimer St	11,974	2U	12,500	**E**
6th/Brown	French St	Mortimer St	900	2U	12,500	A
	Mortimer St	Minter St	1,200	2U	12,500	A
	Minter St	Lacy St	700	2U	12,500	A
	Lacy St	Garfield St	900	2U	12,500	A
	Garfield St	Poinsettia St	400	2U	12,500	A

Street	From	To	Existing ADT	No. of Lanes	LOS E Capacity	LOS
Civic Center Dr	Flower St	Parton St	16,943	4D	37,500	A
	Parton St	Van Ness Ave	16,943	4D	37,500	A
	Van Ness Ave	Ross St	16,943	4D	37,500	A
	Ross St	Birch St	15,024	4D	37,500	A
	Birch St	Broadway	15,024	4D	37,500	A
	Broadway	Sycamore St	14,602	4D	37,500	A
	Sycamore St	Main St	14,602	4D	37,500	A
	Main St	Bush St	11,483	4D	37,500	A
	Bush St	Spurgeon St	11,483	4D	37,500	A
Raitt St	5th St	Santa Ana Blvd	14,147	2U	12,500	**F**
	Santa Ana Blvd	3rd St	14,279	2U	12,500	**F**
Pacific Ave	5th St	Santa Ana Blvd	2,400	2U	12,500	A
	Santa Ana Blvd	3rd St	2,400	2U	12,500	A
Bristol St	5th St	Santa Ana Blvd	34,487	4D	37,500	**E**
	Santa Ana Blvd	3rd St	34,487	4D	37,500	**E**
Shelton St	5th St	Santa Ana Blvd	4,100	2D	18,750	A
	Santa Ana Blvd	3rd St	1,900	2U	12,500	A
Flower St	10th St	Civic Center Dr	18,722	4D	37,500	A
	Civic Center Dr	Santa Ana Blvd	18,792	4D	37,500	A
	Santa Ana Blvd	3rd St	13,270	4D	37,500	A
Ross St	10th St	Civic Center Dr	6,260	2D	18,750	A
	Civic Center Dr	Santa Ana Blvd	6,054	2D	18,750	A
	Santa Ana Blvd	4th St	6,233	2D	18,750	A
	4th St	3rd St	6,233	2D	18,750	A
Broadway	10th St	Civic Center Dr	23,651	4D	37,500	B
	Civic Center Dr	Santa Ana Blvd	18,621	4D	37,500	A
	Santa Ana Blvd	4th St	15,994	4D	37,500	A
	4th St	3rd St	15,994	4D	37,500	A
Sycamore St	10th St	Civic Center Dr	2,700	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	2,000	2U	12,500	A
	Santa Ana Blvd	4th St	1,000	2U	12,500	A
	4th St	3rd St	1,000	2U	12,500	A
Main St	8th St	Civic Center Dr	32,580	4D	37,500	D
	Civic Center Dr	Santa Ana Blvd	33,148	4D	37,500	D
	Santa Ana Blvd	5th St	33,148	4D	37,500	D
	5th St	4th St	33,148	4U	25,000	**F**
	4th St	3rd St	28,886	4U	25,000	**F**
Bush St	8th St	Civic Center Dr	3,200	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	3,500	2U	12,500	A
	Santa Ana Blvd	5th St	2,900	2D	18,750	A
	5th St	4th St	2,800	2U	12,500	A
	4th St	3rd St	3,900	2U	12,500	A
Spurgeon St	8th St	Civic Center Dr	1,700	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	1,200	2U	12,500	A
	Santa Ana Blvd	5th St	1,200	2U	12,500	A
	5th St	4th St	1,200	2U	12,500	A
French St	Civic Center Dr	Santa Ana Blvd	700	2U	12,500	A
	Santa Ana Blvd	5th St	1,200	2U	12,500	A
	5th St	4th St	2,600	2U	12,500	A
	4th St	3rd St	3,300	2U	12,500	A
Mortimer St	N/A	N/O Santa Ana Blvd	500	2U	12,500	A
	Santa Ana Blvd	6th St	4,400	2U	12,500	A
	6th St	5th St	4,200	2U	12,500	A
	5th St	4th St	3,100	2U	12,500	A

Street	From	To	Existing ADT	No. of Lanes	LOS E Capacity	LOS
Minter St	Civic Center Dr	Santa Ana Blvd	1,500	2U	12,500	A
	Santa Ana Blvd	6th St	4,100	2U	12,500	A
	6th St	5th St	4,600	2U	12,500	A
	5th St	4th St	4,600	2U	12,500	A
Lacy St	Civic Center Dr	Santa Ana Blvd	2,100	2U	12,500	A
	Santa Ana Blvd	6th St/Brown St	2,200	2U	12,500	A
	6th St/Brown St	5th St	2,000	2U	12,500	A
Garfield	Civic Center Dr	Santa Ana Blvd	1,500	2U	12,500	A
	Santa Ana Blvd	Brown St	3,000	2U	12,500	A
	Brown St	6th St	2,600	2U	12,500	A
	6th St	5th St	3,100	2U	12,500	A
Poinsettia St	Civic Center Dr	Santa Ana Blvd	1,600	2U	12,500	A
	Santa Ana Blvd	Brown St	1,600	2U	12,500	A
	Brown St	6th St	1,600	2U	12,500	A
	6th St	5th St	1,700	2U	12,500	A
Santiago St	Civic Center Dr	Santa Ana Blvd	9,044	2U	12,500	C
	Santa Ana Blvd	6th St	6,751	2U	12,500	A
Fairview St	Civic Center Dr	5th St	47,782	6D	56,300	C
Westminster Ave	Harbor Blvd	Enterprise Dr	31,428	6D	56,300	A
Daisy Ave	4th St	3rd St	206	2U	12,500	A
3rd St	Daisy Ave	Raitt St	796	2U	12,500	A

Source: URS Corp., 2011

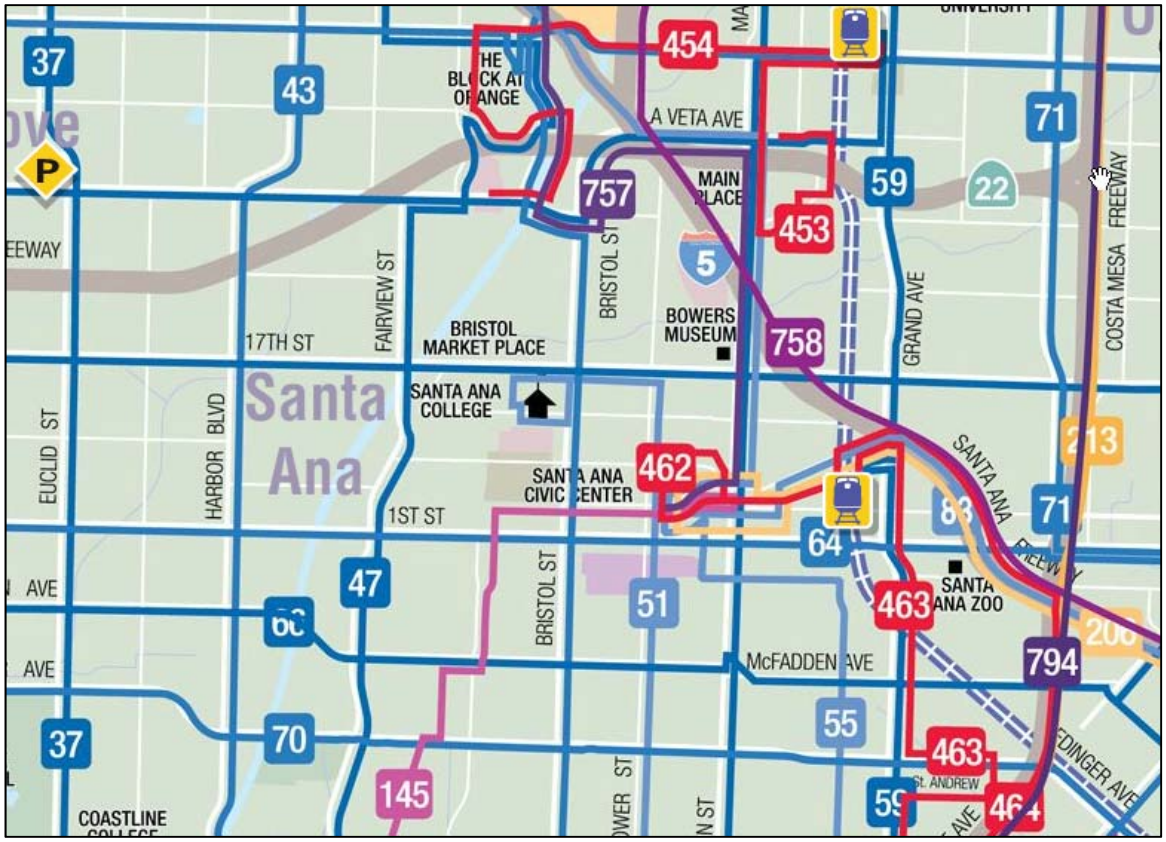
Notes:

D – divided roadway
N/A – Not applicable
N/O – North of arterial roadway
Shaded and bold cells indicate LOS E or F
U – Undivided roadway

A subset of OCTA's fixed route bus service is a rail station feeder-distributor service known as Stationlink. OCTA currently operates a Stationlink route (currently Route 462) in the Project Study Area between the Santa Ana Regional Transportation Center (SARTC) and the downtown/Civic Center area of Santa Ana. Figure 3-4 shows the current routing and schedule for Route 462. The general intent of the Stationlink service is to extend the reach of Metrolink service from the train station to the downtown Santa Ana employment center, and back. Stationlink service is concentrated in the AM and PM peak periods with limited stop service. Stationlink service is not provided on weekends and most major holidays. Stationlink buses are scheduled to meet selected Metrolink trains in the AM peak period to take Metrolink patrons to their jobs. In the PM peak period, returning buses are scheduled to arrive a few minutes before the departing Metrolink trains to allow passengers transferring to Metrolink trains adequate walking time to the platform.

The SARTC is a hub of public transit service for central Orange County. SARTC is located at the corner of Santa Ana Boulevard and Santiago Avenue. It is a central transfer point for several fixed route bus lines and is an interface point between commuter rail service (Metrolink) and intercity rail service (Amtrak) and local fixed route bus service. SARTC is also a major stopping and transfer point for intercity, interstate, and international bus services such as Greyhound and Transportes Intercalifornias.

OCTA Fixed Route Bus Service in the Study Area



Source: OCTA System Map (8/11)..

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In addition to the fixed route and Stationlink services, OCTA also operates ACCESS, a shared-ride service for people who are unable to use the regular, fixed-route bus service because of functional limitations caused by a disability. These passengers must be certified by OCTA to use the ACCESS system by meeting the Americans with Disabilities Act (ADA [United States Department of Justice, 1990]) eligibility criteria. Because ACCESS services are demand-responsive (ride reservation required) and do not follow any fixed routes, so that service is not reflected in Figure 3-3 or Figure 3-4.

3.5.2 Rail Transit

Metrolink

OCTA, in coordination with the Southern California Regional Railroad Authority (SCRRA, 2011), also operates commuter rail service in Orange County under the name Metrolink. The Orange County Metrolink line, which passes through the Study Area, is key to the initiation of the proposed project. Metrolink trains on the Orange County Line provide service between Oceanside and downtown Los Angeles; and between Oceanside and San Bernardino. The Metrolink trains utilize SARTC, which provides the point of interface between the train and other modes of transportation – public and private. The eastern terminus of the proposed project is immediately adjacent to SARTC. Thus, the proposed project would extend the reach of the Metrolink service for individuals commuting to and from the downtown Santa Ana and eastern Garden Grove areas.

As of July 2011, on weekdays, twenty (20) northbound Metrolink trains (traveling towards Los Angeles or San Bernardino) stop at SARTC; and nineteen (19) southbound Metrolink trains (traveling towards Oceanside) stop at SARTC. On weekends, six (6) northbound and six (6) southbound Metrolink trains stop at SARTC. Figure 3-5 shows the southern portion of the Metrolink system map (SCRRA, 2011), complete with stations and overlapping services.

Amtrak

The National Railroad Passenger Corporation operates intercity and transcontinental rail passenger service under the operating name, Amtrak. One of Amtrak's highest ridership intercity services in the country passes through Orange County, overlapping service with Metrolink, and on some of the same trackage on which Metrolink operates. One of the primary distinctions between Metrolink's commuter rail service and Amtrak's intercity service is the time of day in which the services operate. Metrolink primarily caters to daily commuters, operates primarily in the AM and PM peak periods, and at relatively higher frequencies than Amtrak. Amtrak tends to cater more to the casual, or leisure traveler, tends to operate outside of the peak periods, and provides less frequent service than Metrolink.

Just like Metrolink trains, Amtrak trains utilize SARTC, which provides the point of interface between the train and other modes of transportation. The proposed project also extends the reach of the Amtrak service for intercity rail passengers traveling to and from the downtown Santa Ana and eastern Garden Grove areas.

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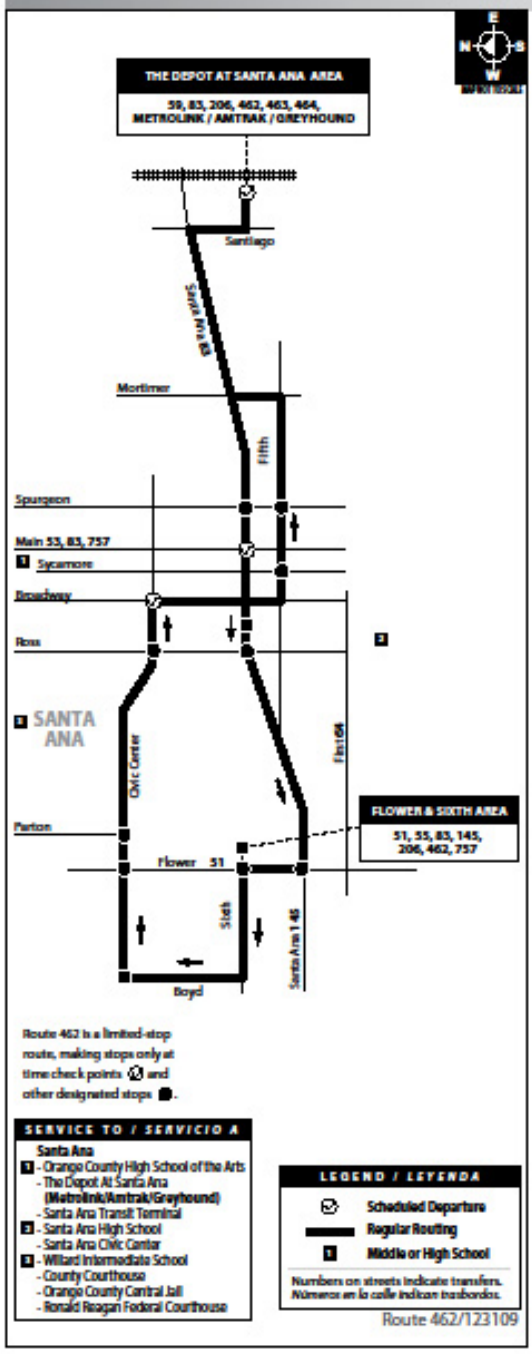
The Depot At Santa Ana to Civic Center
via Santa Ana Blvd / Civic Center Dr

Route 462



MONDAY - FRIDAY: Clockwise
TO: The Depot At Santa Ana - Civic Center

The Depot at Santa Ana	Santa Ana & Main	Broadway & Civic Center	The Depot at Santa Ana	
6:03	6:07	6:16	6:21	AM
6:17	6:21	6:30	6:35	
6:35	6:40	6:50	6:55	
6:53	6:58	7:08	7:13	
7:11	7:16	7:26	7:31	
7:37	7:42	7:52	7:57	
7:39	7:44	7:54	7:59	
8:22	8:27	8:37	8:42	
8:53	8:58	9:08	9:13	
3:46	3:50	3:59	4:06	PM
4:38	4:42	4:51	4:58	
4:52	4:56	5:05	5:12	
5:13	5:17	5:26	5:33	

F – AM Times are approximate.

NOTE: Limited Stop Service. No service on weekends. No service on Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day or New Years Day.

NOTA: Servicio de paradas limitadas. No hay servicio los fines de semana. No hay servicio en Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day or New Years Day.

NOTE:
Stationlink buses are scheduled to meet selected trains, and can be boarded at selected stops along the route. In the morning, Stationlink buses are scheduled to depart when all passengers from the arriving train are on board. When meeting more than one train, Stationlink buses must wait for the last train's arrival before departing. In the afternoon, buses are scheduled to arrive a few minutes before the departing train to allow passengers adequate walking time to the platform. Stationlink passengers must present fare media to the coach operator each time they board the bus.

www.octa.net *Effective October 9, 2011*

Source: OCTA eBusbook; http://www.octa.net/pdf/pdf/oct11/route462.pdf; 11/2011

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Metrolink System Map

Source: Metrolink System Map (8/11)

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As of July 2011, on weekdays, ten (10) southbound (traveling towards Oceanside/San Diego) and eleven (11) northbound (traveling towards Los Angeles) Amtrak trains stop at SARTC; plus five Amtrak Thruway buses. On weekends, twelve (12) southbound and twelve (12) northbound Amtrak trains stop at SARTC; plus five Amtrak Thruway buses.

3.6 Transportation Centers and Hubs

The Santa Ana Regional Transportation Center (SARTC) is located at Santa Ana Boulevard and Santiago Avenue, adjacent to the Los Angeles-San Diego-San Luis Obispo (LOSSAN) Rail Corridor. As has been mentioned previously in this report, SARTC is a central transfer point for local fixed route bus travel, and is an interface point between commuter rail service (Metrolink), intercity rail service (Amtrak) and local fixed route bus service. Moreover, SARTC is a major stopping and transfer point for intercity and international bus services.


Santa Ana Regional Transportation Center

The eastern terminus of the proposed project is immediately adjacent to SARTC. This arrangement would extend the reach of the Metrolink and Amtrak rail passenger services for individuals traveling to and from the downtown Santa Ana and eastern Garden Grove areas. That extension of Metrolink and Amtrak is a further leveraging of previous investments in SARTC by the City of Santa Ana.

SARTC is a full-service, multimodal transportation center with Amtrak-staffed ticket sales and package handling operations. In addition to the outdoor waiting area and platform areas, a full indoor waiting area is available with amenities such as a café, restrooms, a newsstand and gift shop, and staffed intercity and international bus ticket sales. A pedestrian bridge allows passengers to safely cross over the train tracks from the west boarding platforms to the east boarding platforms. SARTC also houses local and regional workforce development organizations. Conference and meeting rooms in the facility are available for rent. In addition to a surface parking lot, there is also a four-story parking structure immediately adjacent to the facility. Together, the surface parking lot and the adjacent parking structure host approximately 700 parking spaces.

Though a physical transportation center does not currently exist at the western terminus of the proposed project route, it is assumed that some type of physical facility will be constructed after completion of the proposed project. Only conceptual plans have been developed for the western terminus at this time. The level of bus transit activity in the vicinity of the western terminus of the proposed project – at the intersection of Harbor Boulevard and Westminster Avenue – presents an opportunity to develop additional transportation amenities in the area. OCTA Local Route 43 traverses Harbor Boulevard in this area; and OCTA Local Route 60 traverses Westminster Avenue/Seventeenth Street in this area. Routes 43 and 60 are two of the highest ridership routes in OCTA's fixed route bus

system. Additionally, OCTA has proposed implementation of bus rapid transit (BRT) service on both Harbor Boulevard and Westminster Avenue/Seventeenth Street. The intersection of these two BRT routes, plus the local services (routes 43 and 60), and the addition of a streetcar service, would enhance the prominence of this area as a subregional hub of transportation activity.

3.7 Goods Movement

The OCTA *Multi-County Goods Movement Action Plan, Orange County Action Plan*; April 2008,

shows that there is not a concentration of regionally significant wholesaling/warehousing and distribution facilities in the Study Area of the proposed project. Some of the freeways surrounding the Study Area – I-5 in particular – do host significant concentrations of truck traffic but that traffic is largely regional and inter-regional pass-through truck traffic. Goods movement activity on surface streets in the Study Area is largely limited to local and intra-county activities.

The Circulation Element of the Santa Ana General Plan includes a Truck Route map that designates Local Truck Routes and Terminal Access Routes. The following surface streets are designated truck routes in the Study Area:

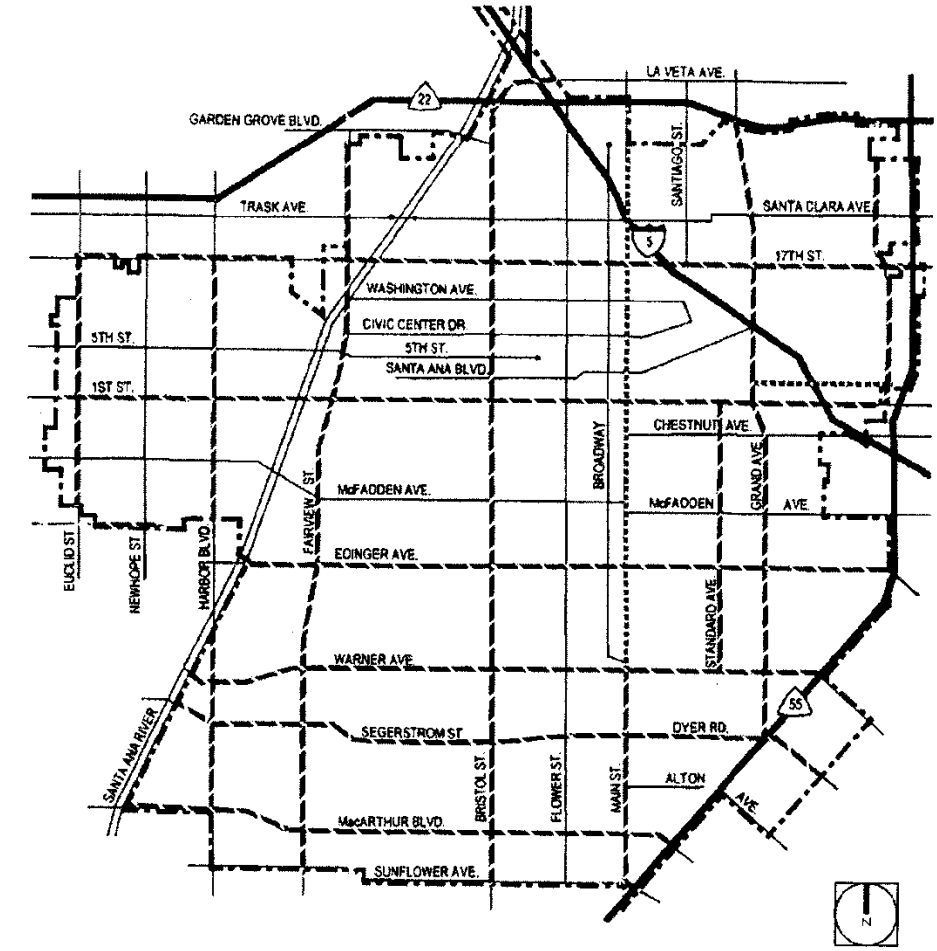
- First Street – Local Truck Route / Terminal Access Route
- Seventeenth Street – Local Truck Route / Terminal Access Route
- Harbor Boulevard – Local Truck Route / Terminal Access Route
- Fairview Street – Local Truck Route / Terminal Access Route
- Bristol Street – Local Truck Route / Terminal Access Route
- Main Street – Local Truck Route
- Grand Avenue – Local Truck Route / Terminal Access Route

Figure 3-6 shows the Truck Route Map from the Santa Ana General Plan. One of the primary purposes of this exhibit in the General Plan is to identify local roads that are appropriate for the operation of large commercial vehicles and to control, to some extent, the routing of trucks through and within the City. The General Plan does not outline specifics for length, width, weight, or height of commercial vehicles that can, or cannot operate, on the designated Truck Routes.

"Terminal Access Route" is a term taken from the Surface Transportation Assistance Act of 1982. The Surface Transportation Assistance Act of 1982 updated federal standards for commercial vehicles with regards to vehicle length, width, and weight. In the General Plan, there is a reference to "super trucks," which the General Plan describes as commercial vehicles that "…exceed the maximum weight allowed and are not permitted on the local routes." They are, however, permitted to operate on the designated Terminal Access Routes.

CIRCULATION ELEMENT

Exhibit A-10 Truck Routes



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The design of the proposed project should take into account the designation of such truck routes, especially the Terminal Access Routes, to ensure that the Project adheres to design guidelines, if any, and project interfaces with these Terminal Access Routes.

Passenger and freight rail activities in and around the Study Area do have some impact on surface street operations at highway-rail grade crossings. The *Multi-County Goods Movement Action Plan, Orange County Action Plan* forecasts that approximately 80 to 130 trains would pass through the Study Area on the Los Angeles-San Diego-San Luis Obispo (LOSSAN) Rail Corridor in the year 2025. Through a series of regional and local planning exercises, including the *Multi-County Goods Movement Action Plan, Orange County Action Plan*, a number of highway-rail grade separation projects have been proposed and are in various stages of planning, design and construction. Of significance to the proposed project are three grade separation projects that will separate passenger vehicle traffic on surface streets from rail traffic on the LOSSAN Corridor. They are located in (or very near) the Study Area, at the following locations:

- Santa Ana Boulevard, directly adjacent to SARTC;
- Seventeenth Street, on the border of the Study Area, approximately one-half mile north of SARTC; and
- Grand Avenue, approximately one-half mile south of First Street (and just outside the Study Area).

3.8 Non-motorized Access

This section provides an overview of existing conditions for pedestrian and bicycle access to, and in the vicinity of, the proposed project.

3.8.1 Pedestrian Access

Outside of the PE ROW segment of the proposed project, sidewalks exist on both sides of all street-running segments, except for one segment of Sixth Street that is part of the Streetcar Alternative 2 (Streetcar 2). That segment of Sixth Street does have a sidewalk on the north side of the street but not the south side of the street. The segment without a sidewalk is approximately 320 feet long and is adjacent to a set of long-time industrial properties, some of which are currently vacant.

It is assumed that pedestrian access would be available to all station areas. Some pedestrian improvements to ensure compliance with the Americans with Disabilities Act (ADA) and to ensure public safety would be located directly adjacent to the proposed stations. However, major improvements to provide pedestrian access along the alternative streetcar routes for the proposed project are not anticipated to be needed. Throughout the Study Area, the existing sidewalk widths vary from approximately 5- to 24-feet.

3.8.2 Suggested Routes to Schools

There are currently three elementary schools located directly adjacent to the proposed project alignments. Two of these, Carver Elementary School and Romero-Cruz Elementary School, are located just two blocks from one another on Santa Ana Boulevard, just east of Raitt Street. Both of the proposed streetcar alignments pass these two elementary schools on Santa Ana Boulevard. The station planned to be located on westbound Santa Ana Boulevard, just west of Bristol Street, would be located approximately 300 feet to the east of the main entrance area to Carver Elementary School. Several of the suggested routes to these two elementary schools cross, or parallel (on the same street), the streetcar alignments for the proposed project.

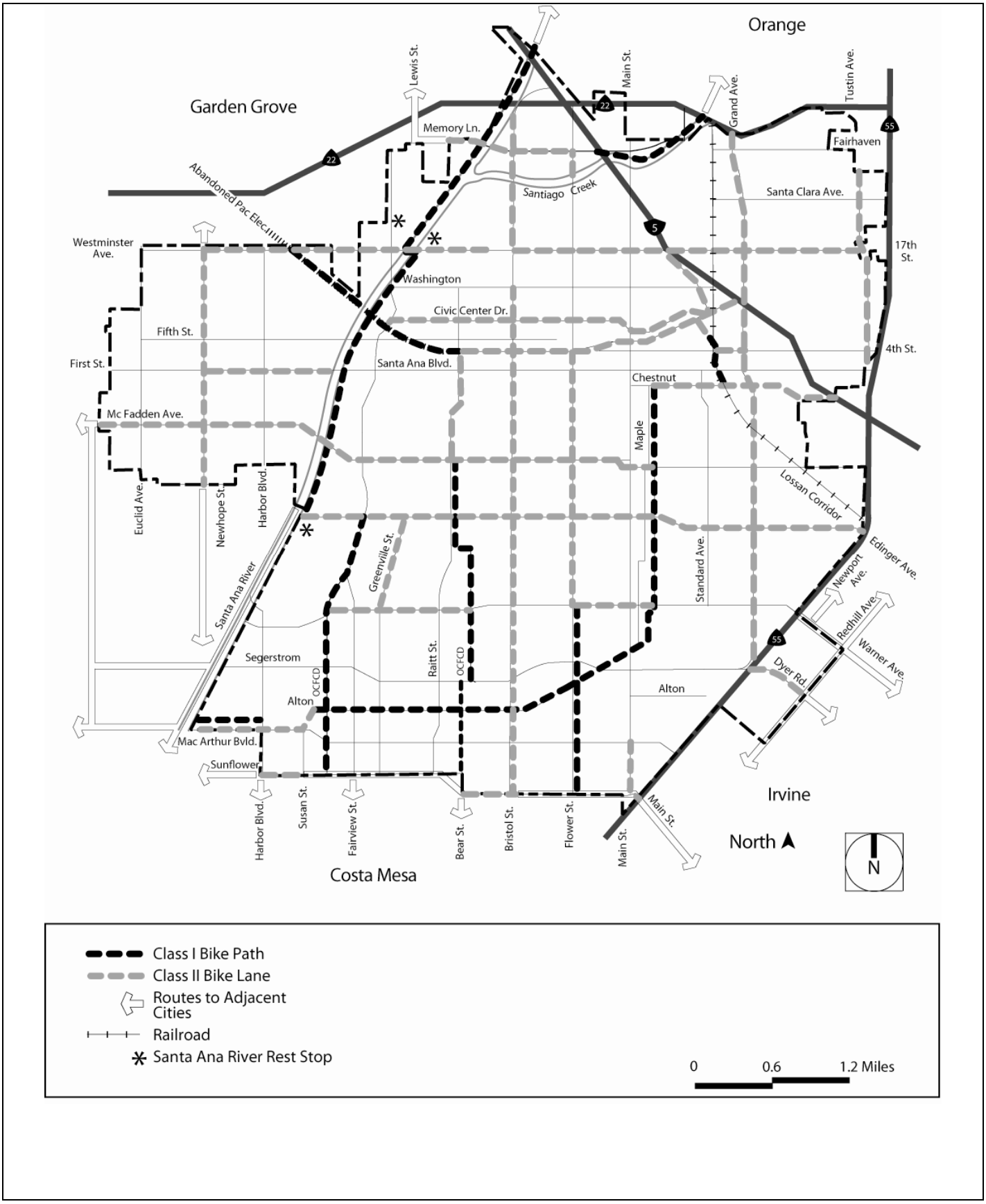
The third elementary school is Garfield Elementary School, located on Sixth Street between Lacy and Garfield Streets. This elementary school is directly on the alignment of Streetcar Alternative 2. A streetcar station is planned to be located directly in front of the main entrance area of the school. As with the other two elementary schools, several suggested routes to Garfield Elementary School either cross or parallel, on the same street, both streetcar alignments of the proposed project.

3.8.3 Bicycle Access

In 1995, the City adopted a Bikeway Master Plan that provides comprehensive linkages to the City's major activity centers and regional bikeway routes. It is the goal of the City of Santa Ana General Plan to provide greater coverage and improved system continuity, thereby enhancing the status of bikeways as an integral component of the overall circulation system. The City of Santa Ana has established the following two classifications of bikeways that generally correspond with the Orange County Transportation Authority (OCTA) Commuter Bikeways Strategic Plan classifications: Class I bike paths (off-street), and Class II bike lanes (on-street). There are two Class I (off-street) bikeways located in the City of Santa Ana and several Class II (on-street) bikeways.

An existing Class I bikeway runs along the banks of the Santa Ana River, and passes through the Study Area. Other Class I bikeways exist and are planned elsewhere in the City. The PE ROW is designated for future implementation of a Class I bikeway. Similarly, portions of Raitt Street, Ross Street, Santa Ana Boulevard, Fairview Street, Flower Street, Harbor Boulevard, and Seventeenth Street in the Study Area are also designated for future implementation of Class II bikeways. On-street bicycle lanes are planned only for locations on major arterials, where they can be safely accommodated. Figure 3-7 shows the City of Santa Ana Bikeway Master Plan.

Bicycle Facilities Map



Source: City of Santa Ana General Plan Circulation Element, 1998

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3.9 Parking Inventory

3.9.1 On-Street Parking

Existing on-street parking is currently allowed on Fourth Street and Civic Center Drive in designated areas. There are currently approximately 130 angled street parking spaces available along Fourth Street between Ross Street and French Street. Currently approximately 140 spaces for on-street parking are also allowed on Santa Ana Boulevard from Raitt Avenue to Flower Street. Further details for on-street parking are provided in Sections 5.3.3 and 5.4.3.

3.9.2 Off-street Parking

Existing parking facilities in the Study Area include the courthouse parking structure with 550 available spaces, the old courthouse surface parking lot with 25 spaces, SARTC at Santa Ana Boulevard and Santiago Street with approximately 700 spaces, the Orange County Health Care Agency parking structure along West Fifth Street with approximately 600 spaces, the two parking structures along West Third Street that serve the businesses along West Third Street and West Fourth Street, and other public parking structures located along East and West Fifth Street, including the Fiesta Marketplace parking structures.

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Chapter 4 Regulatory Framework/Significance Criteria

This section describes the regulatory framework for this traffic impact assessment, and details the significance criteria used to evaluate the traffic impacts of the proposed project.

4.1 Regulatory Framework

4.1.1 Federal

National Environmental Policy Act (NEPA) of 1969

The National Environmental Policy Act (NEPA) was enacted by Congress in 1969 to create mechanisms to restore and maintain environmental quality. NEPA is the basic national charter for the protection of the environment. NEPA requires that the federal government, in cooperation with local and State governments, use practicable measures to maintain and protect the social, economic, and environmental conditions for overall welfare of the public.

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970

The Uniform Relocation Assistance and Real Property Acquisition Policies of 1970 and implementing regulation (49 CFR 24) outline minimum standards for federally-funded projects that acquire real property or displace persons from their homes or businesses. The purpose of the Act is to provide fair and equitable treatment and relocation assistance to those whose property is acquired or who have been displaced. The proposed project would be required to comply with this Act in the event that properties were acquired or any persons were displaced.

4.1.2 State

California Environmental Quality Act of 1970

Adopted in 1970, the purpose of the California Environmental Quality Act (CEQA, 1970) is to: 1) inform decision makers and the public of the potential significant environmental effects of a proposed project, 2) identify the ways in which environmental damage can be avoided or reduced; 3) require changes in projects through the use of less damaging alternatives or mitigation measures when feasible; and 4) disclose to the public the reasons why a governmental agency approved the project if significant environmental effects were involved.

Pursuant to CEQA, the focus of the environmental analysis is on the physical changes resulting from a project. Social or economic effects of a project are typically not treated as significant effects on the environment. However, environmental analysis "...may trace a chain of cause and effects from a proposed decision on a project through anticipated economic or social changes resulting from the project to physical changes caused in turn by the economic or social changes (CEQA Guidelines Section 15131[a]). Economic or social effects of a project may be used to determine the significance of physical changes caused by

the project (CEQA Guidelines Section 15131[b]). Also, economic, social, and particularly housing factors will be considered together with technological and environmental factors in deciding whether changes in a project are feasible to reduce or avoid the identified significant effects on the environment (CEQA Guidelines Section 15131[c]).

4.1.3 Regional

Southern California Association of Governments

The Southern California Association of Governments (SCAG), which is the designated Metropolitan Planning Organization (MPO) for six Southern California counties including Orange County, is federally mandated to develop plans for transportation, growth management, hazardous waste management, and air quality. SCAG is federally-mandated to develop and update the Regional Transportation Plan (RTP) on a 3-year cycle to provide a basic policy and program framework for the long-term investment in the regional transportation system in a coordinated, cooperative, and continuous manner. The proposed project has been identified in the 2008 RTP (adopted in May 2008).

The 2012 RTP is currently in development. When completed, the RTP will provide a sketch to local planning jurisdictions, a planning tool to analyze impact of Senate Bill 375 (greenhouse gas emissions reductions) goals, including the impacts of various land use scenarios on vehicle ownership, vehicle miles traveled, mode choice, and alternative land use scenarios. The plan will provide basic planning tools to reduce greenhouse gas emissions, from automobiles and light trucks, through integration of transportation, land use, housing, and environmental planning. The proposed project is consistent with the transit development and land use integration goals contained in the RTP.

Orange County Long-Range Transportation Plan

The 2010 Long-Range Transportation Plan (LRTP) is the Orange County Transportation Authority's vision of how people, goods, and services would use the transportation system for work, commerce, school, and recreational travel. Goals and objectives are developed to address travel needs and challenges associated with providing a balanced transportation system that meets the future needs of the residents, workers, and visitors. The LRTP is updated every four years to coincide with the Orange County Transportation Authority's (OCTA) input into the Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan (RTP) and to Orange County's 2011 Sustainable Communities Strategy. The proposed project would be consistent with the relevant goals and objectives of the 2010 LRTP. It would expand transportation choices for the general public, would improve transportation system performance by improving travel time, and increase person throughput. The LRTP provides goals and objectives for carrying out the vision, as briefly summarized here:

Goal 1 – Expand Transportation System Choices. The proposed project would add to the transportation choices of the community to meet their transportation needs by providing

convenient travel to and from jobs and from other activities, improving access to the transportation system across and between travel modes, providing access to an integrated multimodal transportation system. The proposed project is consistent with achieving the objectives below, which are intended to enhance the versatility and accessibility of the future transportation system.

Objectives

- Expand travel options across modes including transit, driving, bicycling, walking, and ridesharing opportunities.
- Improve connectivity to/from employment and regional destinations.
- Ensure multimodal integration throughout the transportation system.

Goal 2 – Improve Transportation System Performance. The proposed project would improve the efficient movement of people and goods by providing economic, environmental, and social benefits for the residents and workers in the City of Santa Ana and the City of Garden Grove. The proposed project would comply with the following objectives below, intended to improve transportation system performance and make better use of existing infrastructure.

Objectives

- Improve travel speeds by reducing congestion by cars and other passenger travel methods
- Improve travel time by increasing speed and reducing congestion
- Increase person throughput through a mass transit system that can support mass movement of people
- Improve roadway and transit level of service by alleviating passenger-car traffic

4.1.4 Local

Assessment of the compatibility and consistency of the proposed project with future land use and community characteristics is based upon the following locally-adopted plans:

City of Garden Grove General Plan

The City of Garden Grove General Plan (2008) is a policy document designed to guide the future of the City of Garden Grove. The General Plan describes the goals and policies of resources within the city such as land use, community design, economic development, transportation, housing, parks, recreation and open space. Along with these goals and policies are implementation programs geared towards carrying out these goals and policies. The City of Garden Grove General Plan Land Use Element goals include entering into a cooperative agreement with OCTA and the City of Santa Ana to develop a "Go Local" transit extension from Harbor and Westminster Boulevards in Garden Grove to the Santa Ana Regional Transportation Center. The goals of the City of Garden Grove Circulation Element include continued fostering and coordination with adjoining cities and regional agencies, as well as utility companies and transportation agencies with right-of-ways within the City, in order to facilitate transit opportunities (*CIR-IMP-10B Circulation Element*) and increase the

awareness and use of alternative forms of transportation generated in and traveling through the City of Garden Grove (*Goal CIR-5, Circulation Element*). The proposed project would be consistent with the City of Garden Grove General Plan by facilitating alternative transit opportunities for passengers and residents through provision of a streetcar system.

City of Santa Ana General Plan

The City of Santa Ana General Plan (2010a) guides the future development of the City and consists of several elements including land use, circulation, conservation, economic development, education, housing, noise, public facilities, and open space and recreation elements. The goals and policies included within the General Plan provide for a uniform vision for the future development of the City. The 2010 General Plan is implemented by the decision of the City's Commissions and City Council, by the zoning and subdivision ordinances, and by the community and specific plans. The proposed project is consistent with Polices 1.9, 3.2, 3.4, 5.4, and 8.2 in the City's General Plan, Circulation Element (City of Santa Ana 1998a) as described below. The proposed project would support the City of Santa Ana's General Plan in the transit development zone, a major development area, and it would utilize the PE ROW as a transportation corridor and add to the aesthetics of the corridor by adding landscaped improvements along Santa Ana Boulevard. Adding landscape improvements would enhance the visual character of the street, improve the walkability, and enhance the perceived sense of safety to the communities and neighborhoods within the Study Area.

Based on the City's General Plan Circulation Element, the goals and policies are set forth by the City to enhance, support, and strengthen the circulation of the City's transportation, which are applicable to the proposed project. These include:

Goal 1 – Provide and maintain a comprehensive circulation system that facilitates the efficient movement of people and goods throughout the City, and enhances its economic viability.

Policy 1.9 – Program future use of the Pacific Electric Railroad right-of-way as a transportation corridor.

Goal 3 – Provide a full spectrum of travel alternatives for the community's residents, employees, and visitors.

Policy 3.2 – Support programs which complement bus and rail services for specialized transit needs.

Policy 3.4 – Encourage the development of multi-modal transit opportunities within major development areas.

Goal 5 – Create attractive circulation corridors to enhance the City's image.

Policy 5.4 – Coordinate with rail service providers to improve the aesthetics of rail corridors.

Goal 8 – Strengthen the coordination of transportation and land use planning activities with adjacent jurisdictions and regional agencies.

Policy 8.2 – Maintain compliance with regional, State, and federal programs which provide funding for transportation improvements.

Selection of the proposed project would comply with the City of Santa Ana's goals as stated above by allowing residents and visitors the opportunity to choose a multi-modal transit opportunity that enhances movement within the City and regionally. Community residents will benefit from increased choices in transportation and transit service, since most of the residents either use their own automobile or use the local bus service for their transportation needs. New transit options in the Study Area would enhance their movement and accessibility by providing connections to other transportation and transit options within the City (bus, taxi cab) and regionally (Metrolink and Amtrak rail services and regional and interstate bus service). Although the TSM Alternative would generally be consistent with the City's goals and policies, the Streetcar 1 and Streetcar 2 Alternatives would be superior because they make use of the PE ROW and create a stronger, more permanent link between land use and transportation.

The Study Area is located within the planning boundaries of three of the City of Santa Ana's Specific and Community Plan areas. These Plans are listed below.

North Harbor Boulevard Specific Plan

This plan promotes quality commercial development, and land use compatibility along Harbor Boulevard within a 426-acre planning area, and is located at the western terminus of the Study Area. It is bounded to the north by Westminster Avenue, to the south, by Fountain Valley city limits and lies approximately 500 feet east and west of Harbor Boulevard. The proposed project would be consistent with the community and land use goals and policies set by the North Harbor Boulevard Specific Plan (1994, Revised 2009), particularly in relation to maintaining current neighborhood-serving commercial activities, in the area where the streetcar intersects Harbor Boulevard and Westminster. The proposed project would also be consistent with the policies for improving intra-neighborhood circulation and connectivity due to the transportation access provided by the streetcar system. The proposed project would enhance the transit system's shelters and the land uses adjacent to the planned streetcar station locations. The following goals and objectives are part of the North Harbor Boulevard Specific Plan.

Goal 2.2: To enhance and support the residential neighborhoods surrounding Harbor Boulevard.

Objective 1: Provide and maintain a variety of neighborhood-serving commercial activities along Harbor Boulevard and First Street including, but not limited to, neighborhood shopping centers, sit-down, familiar-style restaurants, theaters, and neighborhood-oriented services.

Objective 3: Improve intra-neighborhood circulation through enhanced collector street and pedestrian travel routes, land use planning, and improved traffic flow on Harbor Boulevard.

Goal 2.3: To improve vehicular and pedestrian circulation in and around the Harbor Boulevard area.

Objective 6: Enhance public transit systems in the Study Area by including turnouts at designated bus stops, shelters and handicapped access, which should be carried out in close cooperation with the transit operators.

Selection of either of the Streetcar Alternatives would be consistent with these goals and policies.

Bristol Street Corridor Specific Plan

This plan applies to a 3.9 mile section of Bristol Street in the central portion of downtown Santa Ana, and goes through the mid-portion of the Study Area on Santa Ana Boulevard. The Streetcar 1 and Streetcar 2 Alternatives would be consistent with the Bristol Street Corridor Specific Plan's (1991) land use and circulation goals and objectives. Particularly, the Streetcar 1 and Streetcar 2 Alternatives would encourage the retention of as many existing businesses as possible in the area where Santa Ana Boulevard traverses Bristol Street. Because the alignment for Streetcar 1 and Streetcar 2 would travel along the existing PE ROW, new businesses along the Bristol Street corridor would not be taken as a result of Streetcar 1 and Streetcar 2. The proposed project would also provide a new type and alternative mode of transportation along Santa Ana Boulevard, intersecting Bristol Street. The following goals and objectives are part of the Bristol Street Corridor Specific Plan.

Goal: Utilize the redevelopment of the Bristol Street Corridor as an opportunity to upgrade the development character of the area and to enhance the viability of those commercial enterprises which remain.

Objective: Retain as many existing businesses as possible and encourage their rehabilitation and possible expansion. Businesses which serve and benefit local residents and provide high levels of employment would receive highest priority for retention and rehabilitation. Parcels which are stagnant or underutilized would be re-planned.

Goal: Facilitate the safe and efficient movement of traffic on Bristol Street.

Objective: Provide facilities that would encourage the use of alternative modes of transportation along the corridor.

Selection of either of the Streetcar alternatives would be consistent with these goals and policies.

Midtown Specific Plan

This plan falls in the areas north of downtown and east of Civic Center, and is near the eastern terminus of the Study Area. This Midtown Specific Plan (1996, Revised 2005) establishes policies and principles to help guide land use, design, parking and circulation, and development throughout the specific planning area. Streetcar 1 and Streetcar 2 are

consistent with the relevant land use and circulation principles listed below in that it would help to establish links to surrounding employment and shopping areas to and from the Midtown Specific Plan, primarily in the areas where Streetcar 1 and Streetcar 2 intersects or passes through Civic Center Drive. Streetcar 1 and Streetcar 2, most importantly, would be in compliance with the incorporation of a passenger-oriented transit system. The Midtown Specific Plan strives to integrate district, civic, cultural, and commercial activities. Several of the principles relevant to the Streetcar 1 and Streetcar 2 Alternatives include: Principle 1: Establish links to surrounding employment and shopping areas.

Principle 3: Develop land use and design strategies for incorporating a proposed fixed guideway rail mass transit system through Midtown, including possible alignments.

Selection of either of the Streetcar alternatives would be consistent with these goals and policies.

City of Santa Ana Transit Zoning Code

The Transit Zoning Code (Specific Development No. 84A and 84B (City of Santa Ana, 1998b) establishing land use regulations and standards, would guide physical development and provide zoning integration of new infill development into existing neighborhoods, allow for reuse of existing structures, provide for a range of housing options, include affordable housing, and provide a transit-supportive, pedestrian-oriented development framework to support the addition of new transit infrastructure.

Within the Purpose and Intent section of the Transit Zoning Code, rules on Specific Development No. 84A and 84B are provided to allow for the integration of new development and rehabilitation of existing structures with new and existing public transit infrastructure. The following are encouraged:

- A mixture of development and open spaces that situate commerce, work places, residences, and civic buildings within walking distance of transit and one another;
- Streets that meet the needs of many transit modes, including public transit, pedestrians, cyclists and automobiles; and
- Development that is maximally transit-supportive

It should be noted that the street network concepts in the Transit Zoning Code anticipate development of a pedestrian-friendly transit system in the zone.

Selection of either of the Streetcar alternatives would be consistent with the framework provided by the Transit Zoning Code.

Santa Ana Regional Transportation Center (SARTC) Master Plan

The SARTC Master Plan (2010b) serves as a tool to guide the development of the SARTC and its facilities. The goals of the SARTC Master Plan are to accommodate increased public transit options and to increase pedestrian and bike accessibility through linkages to the

SARTC and other transportation hubs. The proposed project would serve to improve connectivity to the SARTC by offering another transit option to and from the SARTC. The project would be consistent with the following objectives from the SARTC Master Plan:

- Provide a transportation center where people can easily transfer between services
- Fit in well with the surrounding community
- Provide parking and support facilities for each service offered at SARTC
- Include support commercial, retail and/or residential uses, if feasible
- Ensure that passenger safety and security are adequately addressed
- Support and encourage pedestrian and bicycle use

Consistent with the SARTC Master Plan objectives, the proposed project will provide opportunities for people to transfer between complementary transit and transportation services and modes. The proposed project would construct an area in which to transfer between the streetcar service and other transportation modes operating at SARTC. Many of the intermediate streetcar stations will be places where people can easily transfer between the streetcar system and other transit services, primarily OCTA fixed route services. The proposed intermediate stations would not only support and encourage pedestrian and bicycle use, but would also help support local commercial, retail and/or residential uses along the streetcar alignment route. In terms of system safety, the proposed project will implement safety measures and enhancements such as advance warning signage, transit signals, at-grade highway-rail crossing signals and equipment, and other signing, striping and warning devices deemed necessary during the final design of the system.

4.2 Significance Criteria

4.2.1 Intersections

The City of Santa Ana General Plan has established Level of Service (LOS) D as the threshold for an acceptable service level for signalized intersections. Areas of the City designated "District Center" in the Land Use Element of the City General Plan are also considered "Major Development Areas" (MDAs). In Major Development Areas, the City considers LOS E as the minimum acceptable service level for signalized intersections. These thresholds are consistent with, or more stringent than, program goals for Measure M and the Orange County Congestion Management Plan (CMP) criteria that designate LOS E as the minimum acceptable LOS. The City of Santa Ana does not have thresholds of significance for unsignalized intersections.

Similar to the Santa Ana General Plan, the Garden Grove General Plan has established LOS D as the threshold for an acceptable service level for signalized intersections. This criteria is consistent with City of Santa Ana impact criteria for evaluating project impacts at signalized intersections. The primary intersection to be considered, from the City of Garden Grove's perspective, is the intersection of Harbor Boulevard and Westminster Avenue.

Within the defined Orange County Congestion Management Program (CMP [2003]) highway network, CMP intersections are not allowed to deteriorate to a condition which is worse than LOS E or the base year LOS, (if worse than E), without mitigation being prescribed in an acceptable deficiency plan. The threshold of significance criteria for traffic impacts for both the City of Santa Ana and the City of Garden Grove meet or exceed (are more stringent than) the threshold of significance criteria for the CMP.

4.3 Environmental Checklist

As part of the California Environmental Quality Act (CEQA), an environmental checklist is prepared to identify any physical, biological, social and economic factors that might be affected by the proposed project. It is important to note that under CEQA the specific impact, significance measures, and thresholds are left to the local jurisdiction - in the case of the proposed project, the city of Santa Ana sets the thresholds of significance. Table 4-1 summarizes the local municipality, (city of Santa Ana) Environmental Checklist questions evaluating the potential impacts in regards to Transportation/Traffic: Responses to these questions are presented and summarized later in this report.

Table 4-1: Transportation/Traffic Environmental Checklist

Would the Project:		Comments
A	Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	Design criteria can be established for project to address potential impacts.
B	Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	Design criteria can be established for project to address potential impacts.
C	Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	Project will not impact air traffic patterns.
D	Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	Design criteria can be established for project to address potential impacts.
E	Result in inadequate emergency access?	Design criteria can be established for project to address potential impacts.
F	Result in inadequate parking capacity?	Some localized loss of parking with limited impacts.
G	Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	Project is consistent with local and regional alternative transportation plans.

Source: City of Santa Ana Environmental Checklist

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Chapter 5 Impact Assessment

This section will describe and assess the impacts of the four proposed project alternatives: No Build, Transportation System Management (TSM), Streetcar Alternative 1, and Streetcar Alternative 2.

The traffic volumes and intersection-level data for 2035 were developed using the methodologies described in Chapter 2 of this report and assume existing intersection geometry would remain in place.

5.1 2035 No Build Alternative

This section provides an analysis of 2035 traffic conditions for the No Build Alternative. The No Build Alternative is described as follows:

The No Build Alternative includes all existing highway and transit services and future committed transportation projects in the Study Area, aside from projects currently under construction or projects funded for construction, environmentally cleared, and planned to be in operation by future year 2035.

The results of the intersection analysis are discussed below.

5.1.1 Intersection Analysis

Figure 5-1A through 5-1D show the 2035 No Build Alternative lane geometrics and AM and PM peak-hour traffic volumes at the 42 study intersections.

Table 5-1 shows the 2035 intersection Level of Service for each of the 42 study intersections, for the No Build Alternative. Intersection LOS were calculated using a combination of methods comprised of the Intersection Capacity Utilization (ICU) method for signalized intersections; and the Highway Capacity Manual (HCM[2000]) method for unsignalized intersections – as described in Chapter 2 of this report.

As shown in Table 5-1, the following intersections are projected to operate at LOS E or F during either the AM or PM peak hour.

- ID #1: Westminster Avenue/Harbor Boulevard – PM Peak Hour
- ID #4: Santa Ana Boulevard/Raitt Street – AM and PM Peak Hours
- ID #8: Flower Street/Civic Center Drive – PM Peak Hour
- ID #31: Civic Center Drive/Spurgeon Street – PM Peak Hour
- ID #42: Third Street/Raitt Street – PM Peak Hour

All other study intersections are projected to operate at an acceptable LOS D or better during both peak hours under 2035 No Build conditions.

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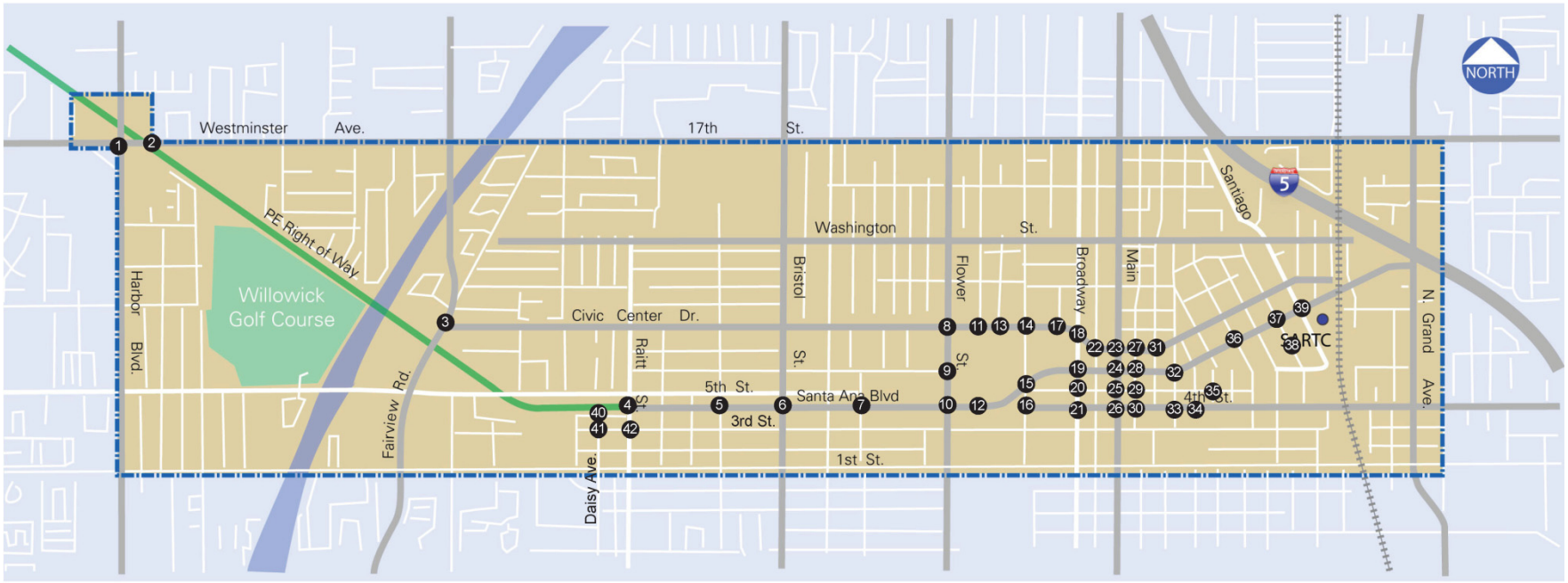
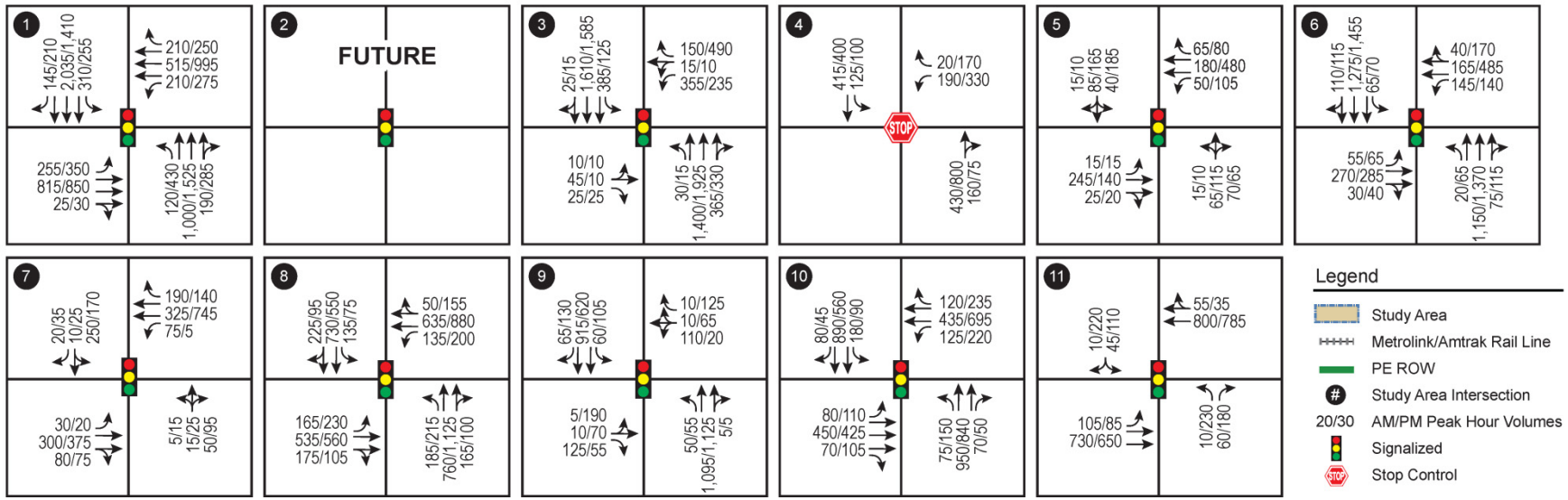
2035 No Build Lane Geometrics and Traffic Volumes (Study Area Intersections 1 through 11)





Source: URS, January 2012

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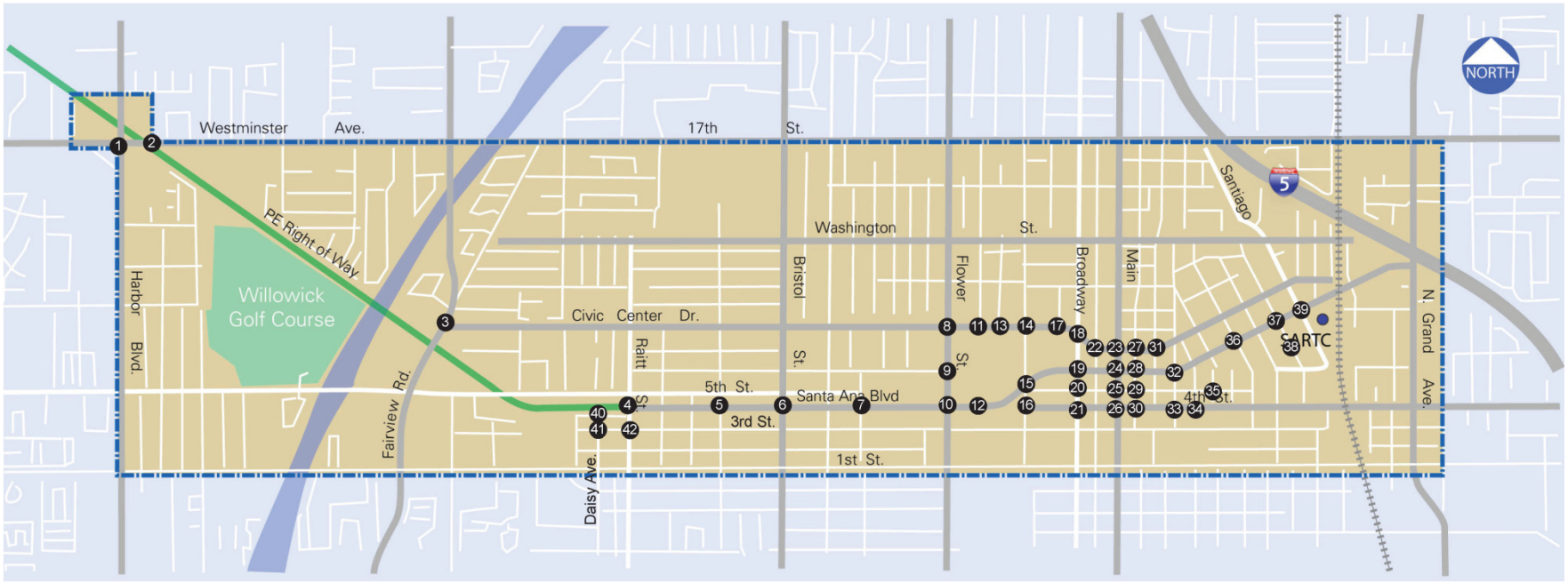
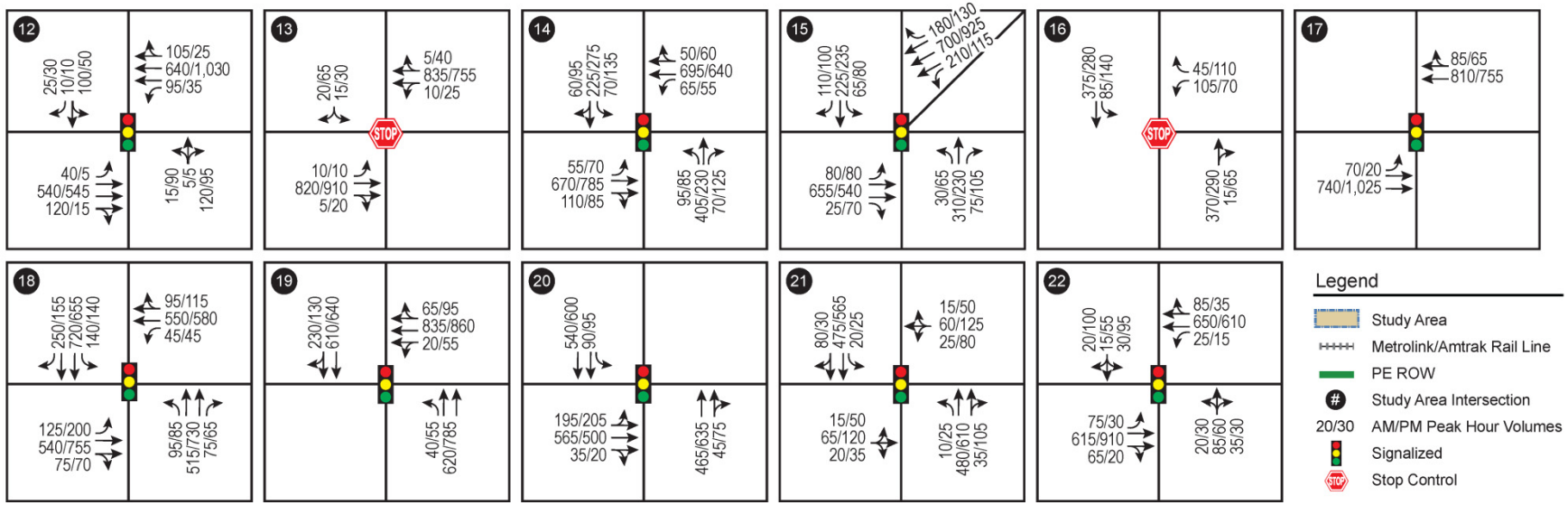
2035 No Build Lane Geometrics and Traffic Volumes (Study Area Intersections 12 through 22)





Source: URS, January 2012

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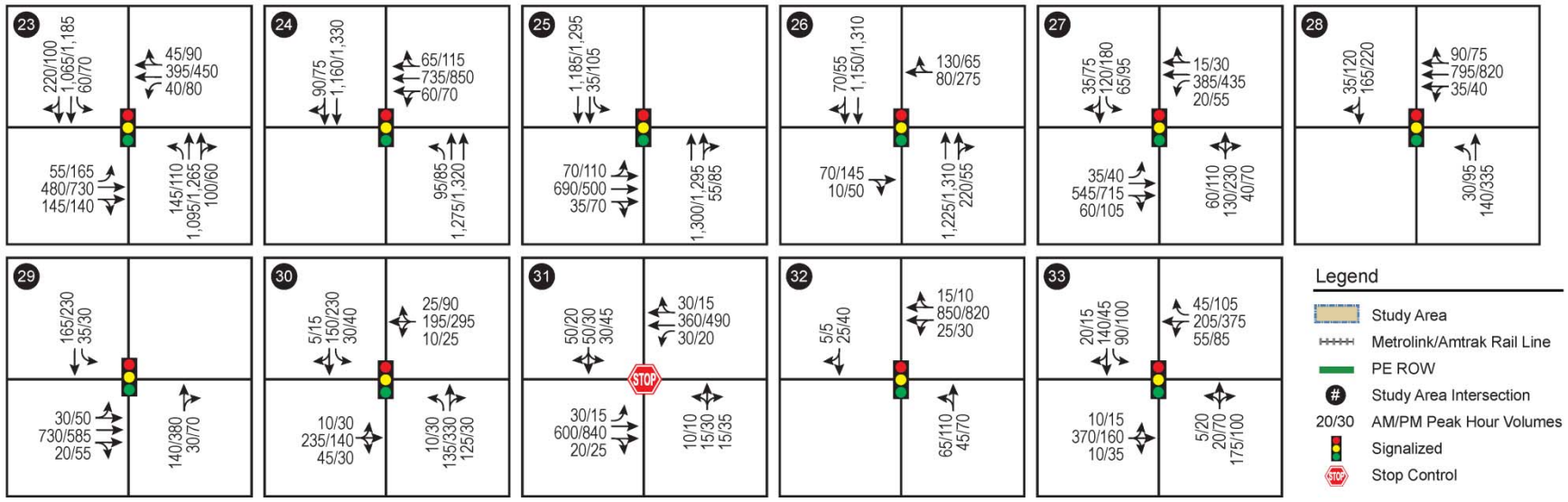
2035 No Build Lane Geometrics and Traffic Volumes (Study Area Intersections 23 through 33)



Source: URS, January 2012

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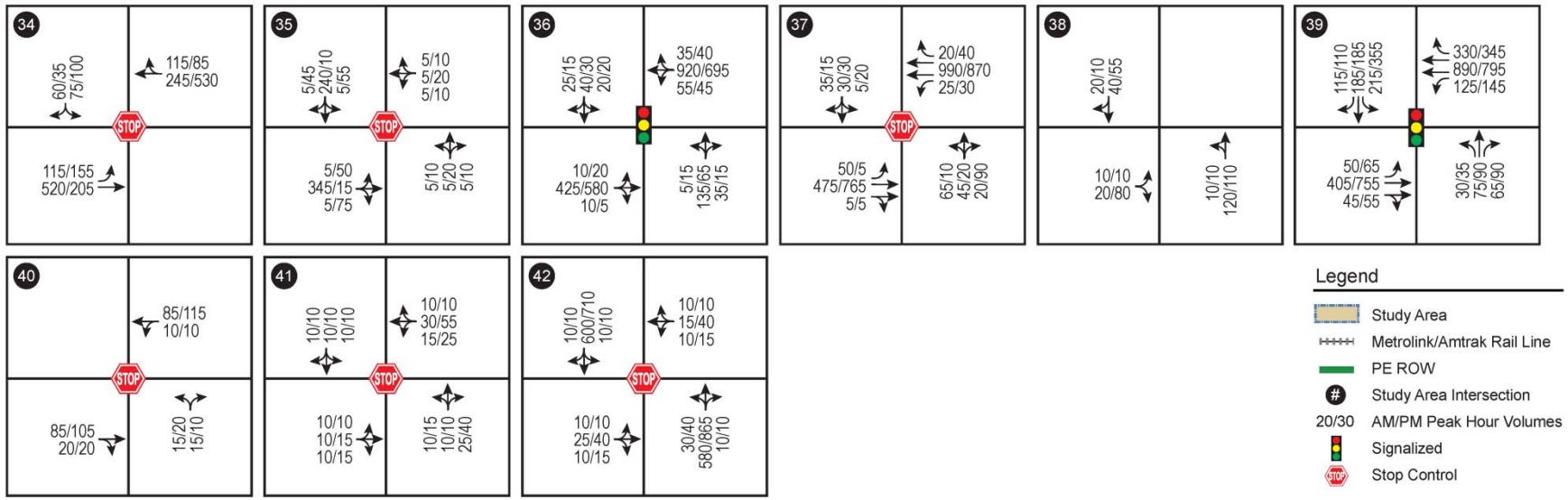
2035 No Build Lane Geometrics and Traffic Volumes (Study Area Intersections 34 through 42)



Source: URS, January 2012

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Table 5-1: Peak-Hour Intersection Level of Service Results – 2035 No Build Conditions

ID	Main St	Cross St	Existing Traffic Control	2035 No Build LOS (HCM)**				2035 No Build LOS (ICU)***			
				AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
1	Westminster Ave	Harbor Blvd	Signalized	N/A	N/A	N/A	N/A	0.82	D	1.01	F
2	Westminster Ave	Nautilus Dr	1-Way Stop	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	Fairview St	Civic Center Dr	Signalized	N/A	N/A	N/A	N/A	0.82	D	0.89	D
4	Santa Ana Blvd	Raitt St	2-Way Stop	234.2	F	6608.4	F	N/A	N/A	N/A	N/A
5	Santa Ana Blvd	Pacific Ave	Signalized	N/A	N/A	N/A	N/A	0.25	A	0.41	A
6	Santa Ana Blvd	Bristol St	Signalized	N/A	N/A	N/A	N/A	0.51	A	0.63	B
7	Santa Ana Blvd	Shelton St	Signalized	N/A	N/A	N/A	N/A	0.36	A	0.40	A
8	Flower St	Civic Center Dr	Signalized	N/A	N/A	N/A	N/A	0.75	C	0.91	E
9	Flower St	6th St	Signalized	N/A	N/A	N/A	N/A	0.63	B	0.76	C
10	Santa Ana Blvd	Flower St	Signalized	N/A	N/A	N/A	N/A	0.62	B	0.63	B
11*	Civic Center Dr	Parton St	Signalized	N/A	N/A	N/A	N/A	0.41	A	0.68	B
12*	Santa Ana Blvd	Civic Center Plaza/Parton St	Signalized	N/A	N/A	N/A	N/A	0.45	A	0.43	A
13*	Civic Center Dr	Van Ness Ave	2-Way Stop	11.6	B	13.0	B	N/A	N/A	N/A	N/A
14*	Civic Center Dr	Ross St	Signalized	N/A	N/A	N/A	N/A	0.60	B	0.61	B
15*	Santa Ana Blvd	Ross St	Signalized	N/A	N/A	N/A	N/A	0.60	A	0.47	A
16*	4th St	Ross St	2-Way Stop	24.0	C	16.4	C	N/A	N/A	N/A	N/A
17*	Civic Center Dr	Ped Xing	Signalized	N/A	N/A	N/A	N/A	0.36	A	0.35	A
18*	Civic Center Dr	Broadway	Signalized	N/A	N/A	N/A	N/A	0.59	A	0.68	B
19*	Santa Ana Blvd	Broadway	Signalized	N/A	N/A	N/A	N/A	0.61	B	0.59	A
20*	5th St	Broadway	Signalized	N/A	N/A	N/A	N/A	0.53	A	0.61	B
21*	4th St	Broadway	Signalized	N/A	N/A	N/A	N/A	0.28	A	0.43	A
22*	Civic Center Dr	Sycamore St	Signalized	N/A	N/A	N/A	N/A	0.40	A	0.48	A
23*	Civic Center Dr	Main St	Signalized	N/A	N/A	N/A	N/A	0.73	C	0.80	D
24*	Santa Ana Blvd	Main St	Signalized	N/A	N/A	N/A	N/A	0.69	B	0.77	C
25*	5th St	Main St	Signalized	N/A	N/A	N/A	N/A	0.67	B	0.67	B
26*	4th St	Main St	Signalized	N/A	N/A	N/A	N/A	0.60	A	0.65	B
27*	Civic Center Dr	Bush St	Signalized	N/A	N/A	N/A	N/A	0.42	A	0.63	B
28*	Santa Ana Blvd	Bush St	Signalized	N/A	N/A	N/A	N/A	0.42	A	0.55	A
29*	5th St	Bush St	Signalized	N/A	N/A	N/A	N/A	0.39	A	0.51	A

ID	Main St	Cross St	Existing Traffic Control	2035 No Build LOS (HCM)**				2035 No Build LOS (ICU)***			
				AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
30*	4th St	Bush St	Signalized	N/A	N/A	N/A	N/A	0.39	A	0.53	A
31*	Civic Center Dr	Spurgeon St	2-Way Stop	23.4	C	43.0	**E**	N/A	N/A	N/A	N/A
32*	Santa Ana Blvd/6th St	French St	2-Way Stop	19.4	C	24.5	C	N/A	N/A	N/A	N/A
33*	4th St	French St	Signalized	N/A	N/A	N/A	N/A	0.45	A	0.49	A
34*	4th St	Mortimer St	1-Way Stop	16.0	C	18.2	C	N/A	N/A	N/A	N/A
35*	5th St	Minter St	2-Way Stop	19.4	C	11.3	B	N/A	N/A	N/A	N/A
36	Santa Ana Blvd	Lacy St	2-Way Stop	N/A	N/A	N/A	N/A	0.75	C	0.56	A
37*	Santa Ana Blvd	Poinsettia St	2-Way Stop	23.7	C	19.1	C	N/A	N/A	N/A	N/A
38	Brown St	Poinsettia St	Uncontrolled	9.0	A	9.1	A	N/A	N/A	N/A	N/A
39*	Santa Ana Blvd	Santiago St	Signalized	N/A	N/A	N/A	N/A	0.52	A	0.66	B
40	4th St	Daisy Ave	1-Way Stop	9.4	A	9.8	A	N/A	N/A	N/A	N/A
41	3rd St	Daisy Ave	2-Way Stop	9.6	A	10.1	B	N/A	N/A	N/A	N/A
42	3rd St	Raitt St	2-Way Stop	32.1	D	147.5	**F**	N/A	N/A	N/A	N/A

Source: URS Corp., 2011

Notes: Shaded and bold cells indicate LOS E or F

* Intersections located in MDA's (Intersections 11 - 35, 37, and 39)

** HCM analysis conducted for unsignalized intersections

*** ICU analysis conducted for signalized intersections

5.1.2 Roadway Segment Analysis

The 2035 No Build roadway segment ADT analysis is presented in Table 5-2. The following locations would potentially experience capacity deficiencies under 2035 No Build conditions:

- Fifth Street from Hawley Street to Raitt Street
- Fourth Street from Main Street to Mortimer Street
- Raitt Street from Fifth Street to Third Street
- Main Street from Eighth Street to Third Street
- Fairview Street from Civic Center Drive to Fifth Street

Also note that the roadway segments along Bristol Street show an improvement from LOS E (Table 3-3, Existing Conditions) to LOS B as result of the proposed widening from existing four lane divided to six lane divided roadway as part of the City of Santa Ana General Plan. All other arterial roadways segments are operating at acceptable LOS.

Table 5-2: Levels of Service for Arterial Street Segments – 2035 No Build Conditions

Street	From	To	2035 No Build ADT	No. of Lanes	LOS E Capacity	LOS
Santa Ana Boulevard	Raitt St	Western Ave	11,900	4U	25,000	B
	Western Ave	Forest St	11,900	4U	25,000	B
	Forest St	Pacific Ave	11,900	4U	25,000	B
	Pacific Ave	Hesperian St	11,900	4U	25,000	B
	Hesperian St	Bristol St	11,900	4U	25,000	B
	Bristol St	Baker St	11,700	4U	25,000	B
	Baker St	Shelton St	11,700	4U	25,000	B
	Shelton St	Flower St	11,600	4D	37,500	A
	Flower St	Parton St	14,400	6D	56,300	A
	Parton St	Ross St	14,400	6D	56,300	A
	Ross St	Broadway	13,100	3D	28,150	A
	Broadway	Sycamore St	11,100	3D	28,150	A
	Sycamore St	Main St	11,100	3D	28,150	A
	Main St	Bush St	11,100	3D	28,150	A
	Bush St	Spurgeon St	11,100	3D	28,150	A
	Spurgeon St	French St	11,100	3D	28,150	A
	French St	Mortimer St	16,200	2D	18,750	D
	Mortimer St	Minter St	16,700	2D	18,750	D
	Minter St	Lacy St	16,800	2D	18,750	D
	Lacy St	Garfield St	16,900	4D	37,500	A
	Garfield St	Poinsettia St	16,800	4D	37,500	A
	Poinsettia St	Santiago St	16,900	4D	37,500	A
5th St	Hawley St	Sunset St	14,600	2U	12,500	**F**
	Sunset St	English St	14,600	2U	12,500	**F**
	English St	Townsend St	14,600	2U	12,500	**F**
	Townsend St	Daisy Ave	14,600	2U	12,500	**F**
	Daisy Ave	Fairlawn St	14,600	2U	12,500	**F**
	Fairlawn St	Raitt St	14,500	2U	12,500	**F**
	Ross St	Broadway	10,200	3D	28,150	A

Street	From	To	2035 No Build ADT	No. of Lanes	LOS E Capacity	LOS
5th St	Broadway	Sycamore St	10,300	3D	28,150	A
	Sycamore St	Main St	10,200	3D	28,150	A
	Main St	Bush St	7,400	3D	28,150	A
	Bush St	Spurgeon St	7,300	3D	28,150	A
	Spurgeon St	French St	7,400	3D	28,150	A
	French St	Mortimer St	5,400	3D	28,150	A
	Mortimer St	Minter St	2,500	2U	12,500	A
4th St	Townsend St	Daisy Ave	1,300	2U	12,500	A
	Daisy Ave	Raitt St	1,300	2U	12,500	A
	Ross St	Birch St	7,800	2U	12,500	B
	Birch St	Broadway	7,800	2U	12,500	B
	Broadway	Sycamore St	7,800	2U	12,500	B
	Sycamore St	Main St	7,700	2U	12,500	B
	Main St	Bush St	14,300	2U	12,500	**F**
	Bush St	Spurgeon St	14,400	2U	12,500	**F**
	Spurgeon St	French St	14,400	2U	12,500	**F**
	French St	Mortimer St	14,300	2U	12,500	**F**
6th/Brown	French St	Mortimer St	1,000	2U	12,500	A
	Mortimer St	Minter St	1,300	2U	12,500	A
	Minter St	Lacy St	800	2U	12,500	A
	Lacy St	Garfield St	1,000	2U	12,500	A
	Garfield St	Poinsettia St	500	2U	12,500	A
Civic Center Dr	Flower St	Parton St	20,100	4D	37,500	A
	Parton St	Van Ness Ave	20,000	4D	37,500	A
	Van Ness Ave	Ross St	19,900	4D	37,500	A
	Ross St	Birch St	17,400	4D	37,500	A
	Birch St	Broadway	17,400	4D	37,500	A
	Broadway	Sycamore St	17,100	4D	37,500	A
	Sycamore St	Main St	17,000	4D	37,500	A
	Main St	Bush St	13,500	4D	37,500	A
	Bush St	Spurgeon St	13,600	4D	37,500	A
Raitt St	5th St	Santa Ana Blvd	16,400	2U	12,500	**F**
	Santa Ana Blvd	3rd St	17,100	2U	12,500	**F**
Pacific Ave	5th St	Santa Ana Blvd	2,600	2U	12,500	A
	Santa Ana Blvd	3rd St	2,900	2U	12,500	A
Bristol St	5th St	Santa Ana Blvd	38,900	6D	56,300	B
	Santa Ana Blvd	3rd St	38,800	6D	56,300	B
Shelton St	5th St	Santa Ana Blvd	4,800	2D	18,750	A
	Santa Ana Blvd	3rd St	2,200	2U	12,500	A
Flower St	10th St	Civic Center Dr	21,100	4D	37,500	A
	Civic Center Dr	Santa Ana Blvd	21,100	4D	37,500	A
	Santa Ana Blvd	3rd St	15,000	4D	37,500	A
Ross St	10th St	Civic Center Dr	6,900	2D	18,750	A
	Civic Center Dr	Santa Ana Blvd	6,700	2D	18,750	A
	Santa Ana Blvd	4th St	7,100	2D	18,750	A
	4th St	3rd St	7,100	2D	18,750	A
Broadway	10th St	Civic Center Dr	27,100	4D	37,500	C
	Civic Center Dr	Santa Ana Blvd	21,100	4D	37,500	A
	Santa Ana Blvd	4th St	18,200	4D	37,500	A
	4th St	3rd St	18,200	4D	37,500	A
Sycamore St	10th St	Civic Center Dr	2,900	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	2,200	2U	12,500	A
	Santa Ana Blvd	4th St	1,100	2U	12,500	A
	4th St	3rd St	1,100	2U	12,500	A

Street	From	To	2035 No Build ADT	No. of Lanes	LOS E Capacity	LOS
Main St	8th St	Civic Center Dr	36,600	4D	37,500	**E**
	Civic Center Dr	Santa Ana Blvd	37,200	4D	37,500	**E**
	Santa Ana Blvd	5th St	37,200	4D	37,500	**E**
	5th St	4th St	37,300	4U	25,000	**F**
	4th St	3rd St	32,900	4U	25,000	**F**
Bush St	8th St	Civic Center Dr	3,700	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	4,000	2U	12,500	A
	Santa Ana Blvd	5th St	3,500	2D	18,750	A
	5th St	4th St	3,300	2U	12,500	A
	4th St	3rd St	4,500	2U	12,500	A
Spurgeon St	8th St	Civic Center Dr	1,900	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	1,300	2U	12,500	A
	Santa Ana Blvd	5th St	1,300	2U	12,500	A
	5th St	4th St	1,300	2U	12,500	A
French St	Civic Center Dr	Santa Ana Blvd	800	2U	12,500	A
	Santa Ana Blvd	5th St	1,500	2U	12,500	A
	5th St	4th St	3,100	2U	12,500	A
	4th St	3rd St	3,800	2U	12,500	A
Mortimer St	N/A	N/O Santa Ana Blvd	600	2U	12,500	A
	Santa Ana Blvd	6th St	4,900	2U	12,500	A
	6th St	5th St	4,700	2U	12,500	A
	5th St	4th St	3,400	2U	12,500	A
Minter St	Civic Center Dr	Santa Ana Blvd	1,600	2U	12,500	A
	Santa Ana Blvd	6th St	4,600	2U	12,500	A
	6th St	5th St	5,100	2U	12,500	A
	5th St	4th St	5,100	2U	12,500	A
Lacy St	Civic Center Dr	Santa Ana Blvd	2,400	2U	12,500	A
	Santa Ana Blvd	6th St/Brown St	2,600	2U	12,500	A
	6th St/Brown St	5th St	2,300	2U	12,500	A
Garfield	Civic Center Dr	Santa Ana Blvd	1,700	2U	12,500	A
	Santa Ana Blvd	Brown St	3,400	2U	12,500	A
	Brown St	6th St	3,000	2U	12,500	A
	6th St	5th St	3,600	2U	12,500	A
Poinsettia St	Civic Center Dr	Santa Ana Blvd	1,700	2U	12,500	A
	Santa Ana Blvd	Brown St	1,800	2U	12,500	A
	Brown St	6th St	1,700	2U	12,500	A
	6th St	5th St	1,900	2U	12,500	A
Santiago St	Civic Center Dr	Santa Ana Blvd	10,300	2U	12,500	D
	Santa Ana Blvd	6th St	8,000	2U	12,500	B
Fairview St	Civic Center Dr	5th St	57,200	6D	56,300	**F**
Westminster Ave	Harbor Blvd	Enterprise Dr	44,500	6D	56,300	C
Daisy Ave	4th St	3rd St	300	2U	12,500	A
3rd St	Daisy Ave	Raitt St	1,000	2U	12,500	A

Source: URS Corp., 2011

Notes:

D – divided roadway

N/A – Not applicable

N/O – North of arterial roadway

Shaded and bold cells indicate LOS E or F

U – Undivided roadway

5.1.3 Parking Analysis

There are no anticipated on-street or off-street parking impacts Under 2035 No Build Conditions.

5.2 Transportation System Management (TSM) Alternative

This section provides an analysis of 2035 Traffic Conditions for the Transportation System Management (TSM) Alternative.

In keeping with federal guidance, a Transportation Systems Management (TSM) Alternative has been defined. The TSM Alternative represents the best that can be done for mobility given the existing transportation infrastructure without construction of major new transportation facilities or physical capacity improvements. The TSM Alternative contains all elements of the highway, transit, and bus service described under the No Build Alternative. In addition, the TSM Alternative includes modifications and enhancements to OCTA Bus Routes 64, 462, and 560, intersection/signal improvements along Santa Ana Boulevard and Civic Center Drive, bus stop amenity upgrades along Santa Ana Boulevard and Main Street, and improvements to the bicycle and pedestrian network to promote connectivity between the transit system and the surrounding neighborhoods and activity centers.

5.2.1 Intersection Analysis

Figure 5-2A through 5-2D show the 2035 TSM Alternative lane geometrics and AM and PM peak-hour traffic volumes at the 42 study intersections.

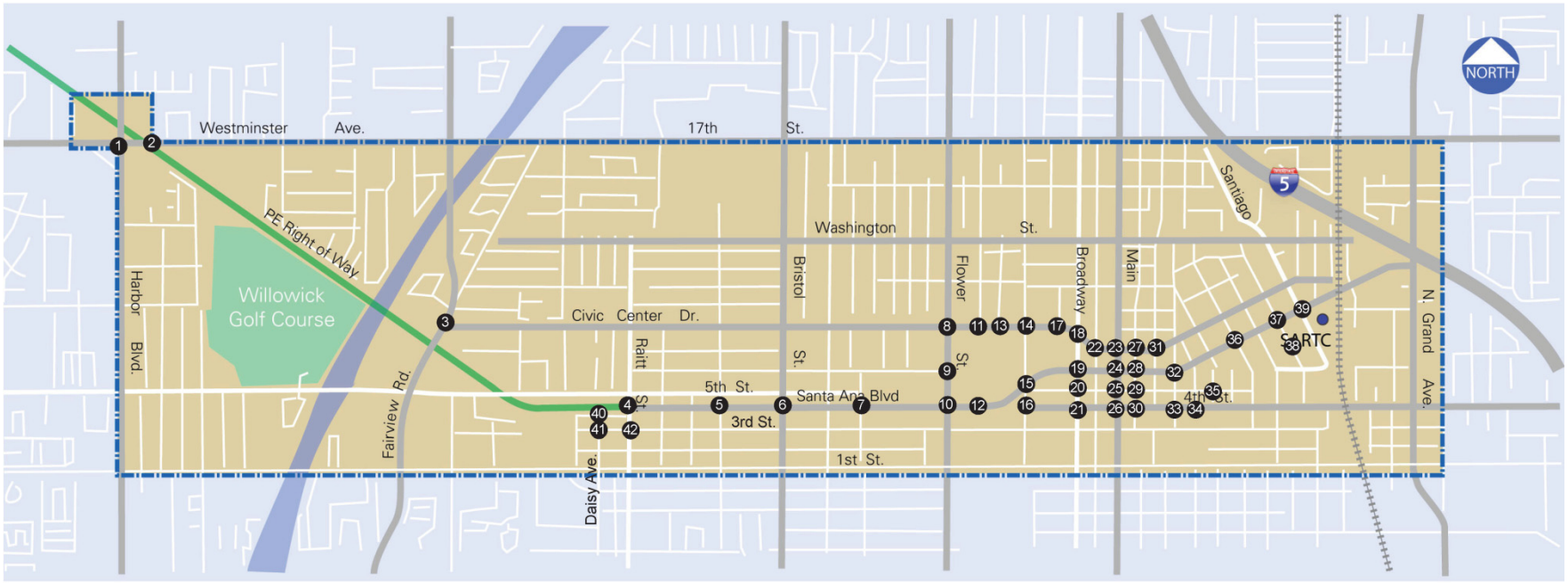
Table 5-3 shows the projected 2035 intersection Level of Service for each of the 42 study intersections, for the TSM Alternative. Intersection LOS was calculated using a combination of methods comprised of the Intersection Capacity Utilization (ICU) method for signalized intersections; and the Highway Capacity Manual (HCM) method for unsignalized intersections – as described in Chapter 2 of this document.

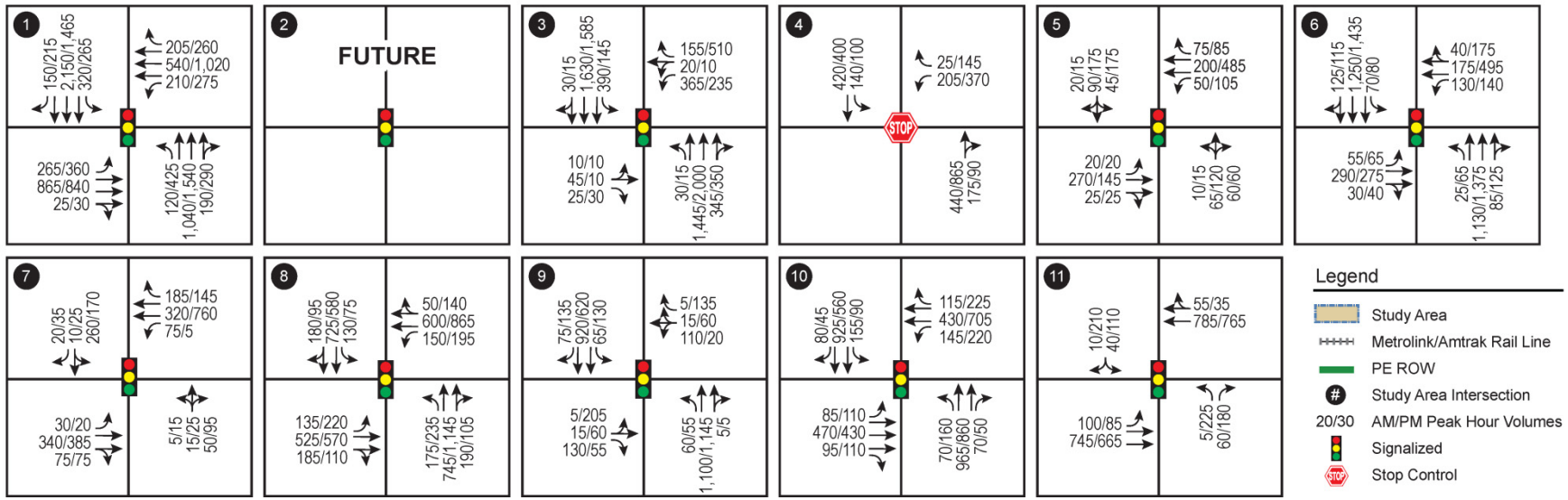
As shown in Table 5-3, the following intersections are projected to operate at a poor level of service (LOS E or F) during either the AM or PM peak hour.

- ID #1: Westminster Avenue/Harbor Boulevard – PM Peak Hour
- ID #3: Fairview Street/Civic Center Drive – PM Peak Hour
- ID #4: Santa Ana Boulevard/Raitt Street – AM and PM Peak Hours
- ID #42: Third Street/Raitt Street – AM and PM Peak Hours

Two intersections, Flower Street at Civic Center Drive and Civic Center Drive at Spurgeon Street, improve to LOS D or better when compared to 2035 No Build Conditions. All other study intersections are projected to operate at an acceptable LOS D or better during both peak hours under 2035 TSM conditions.

2035 TSM Lane Geometrics and Traffic Volumes (Study Area Intersections 1 through 11)





Source: URS, January 2012

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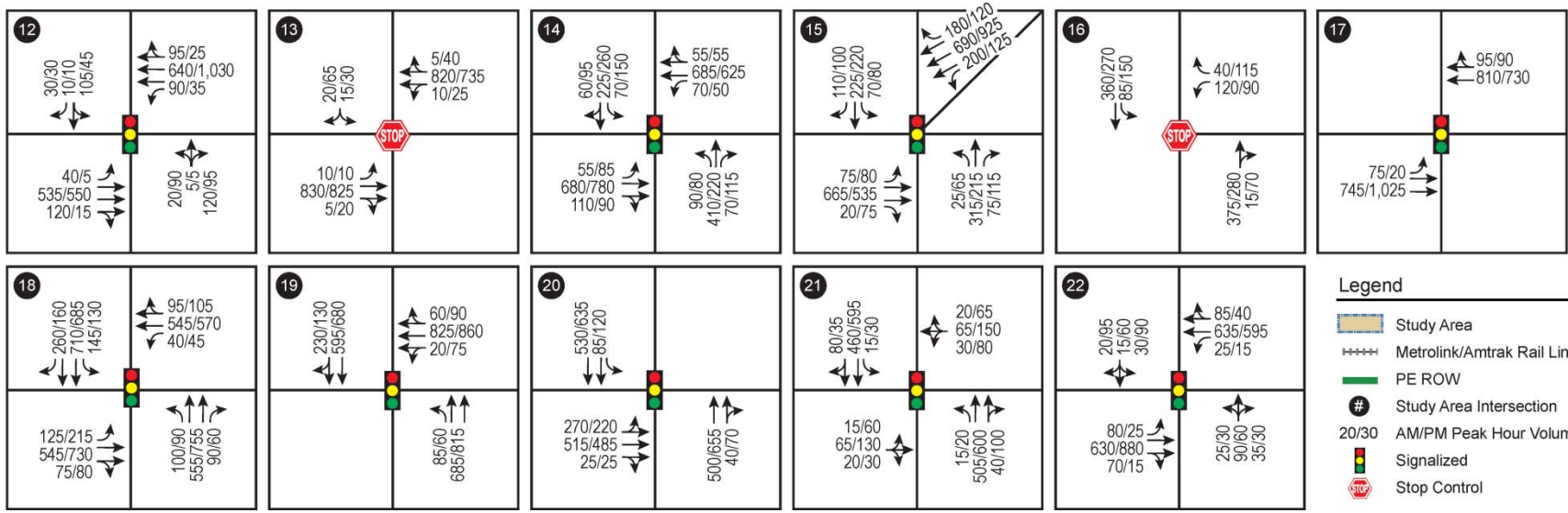
2035 TSM Lane Geometrics and Traffic Volumes (Study Area Intersections 12 through 22)



Source: URS, January 2012

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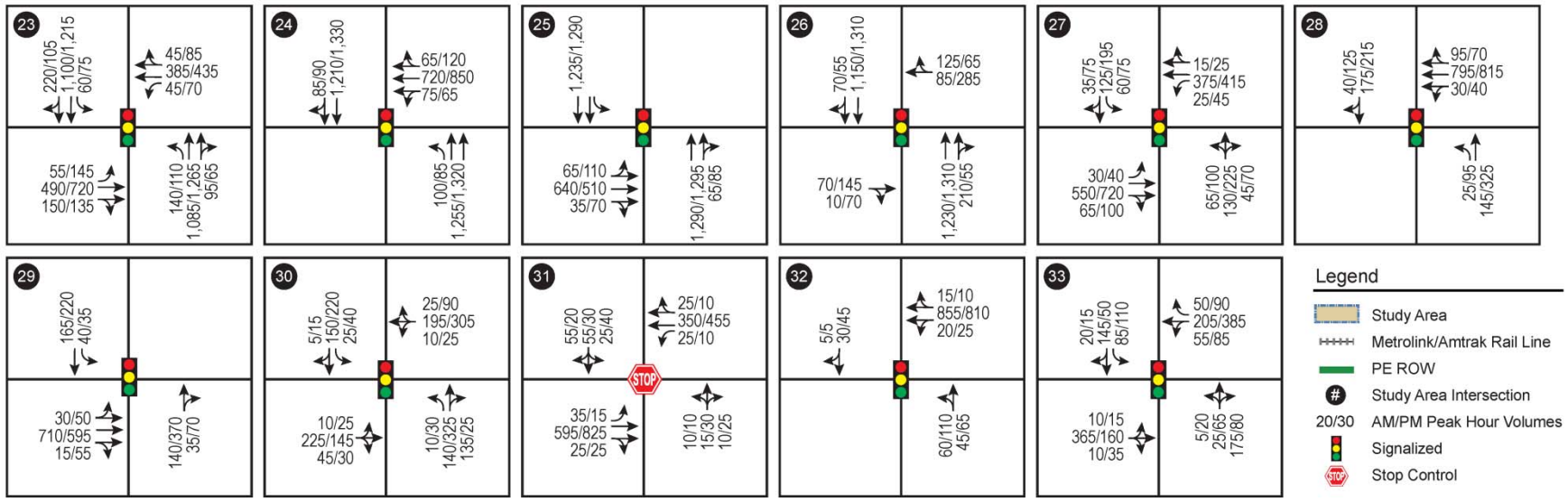
2035 TSM Lane Geometrics and Traffic Volumes (Study Area Intersections 23 through 33)



Source: URS, January 2012

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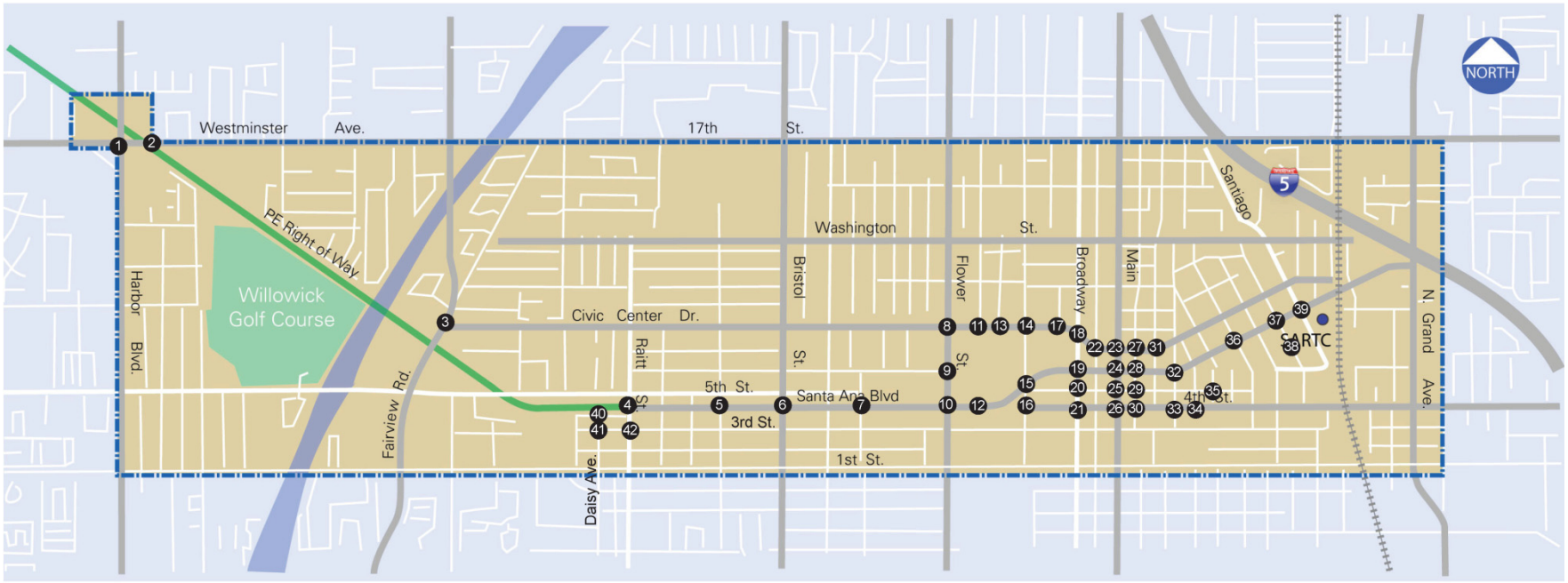
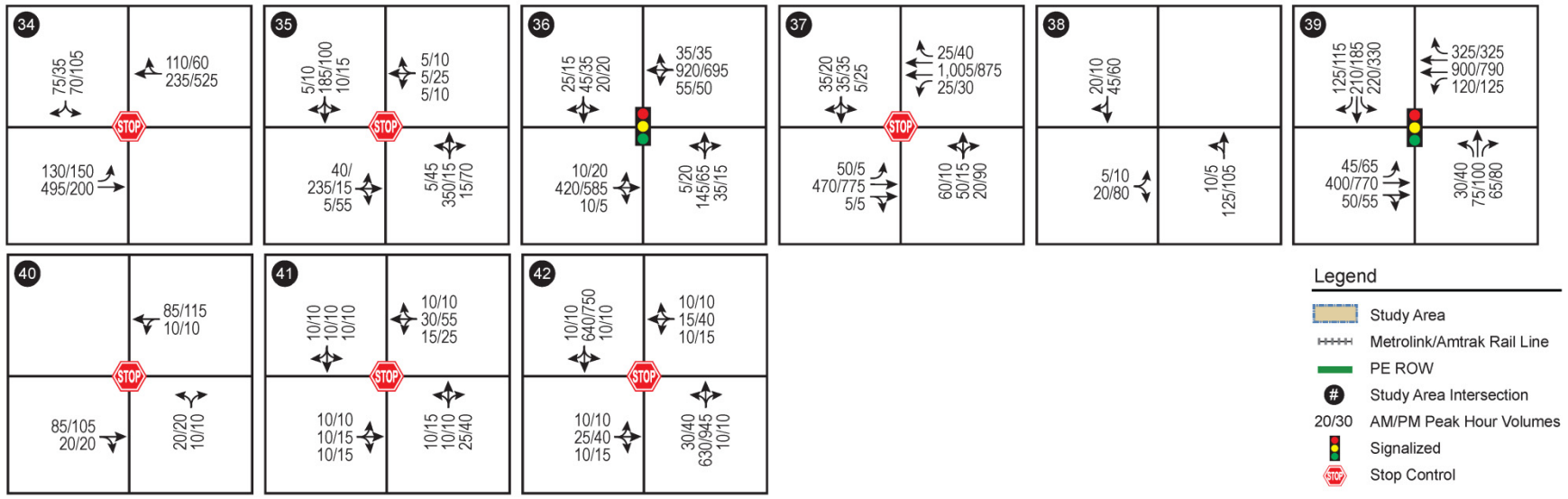
2035 TSM Lane Geometrics and Traffic Volumes (Study Area Intersections 34 through 42)





Source: URS, January 2012

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Table 5-3: Peak-Hour Intersection Level of Service Results – 2035 TSM Conditions

ID	Main St	Cross St	Existing Traffic Control	2035 TSM LOS (HCM)**				2035 TSM LOS (ICU)***			
				AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
1	Westminster Ave	Harbor Blvd	Signalized	N/A	N/A	N/A	N/A	0.85	D	1.03	F
2	Westminster Ave	Nautilus Dr	1-Way Stop	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	Fairview St	Civic Center Dr	Signalized	N/A	N/A	N/A	N/A	0.83	D	0.93	E
4	Santa Ana Blvd	Raitt St	2-Way Stop	345.7	F	7192.0	F	N/A	N/A	N/A	N/A
5	Santa Ana Blvd	Pacific Ave	Signalized	N/A	N/A	N/A	N/A	0.26	A	0.42	A
6	Santa Ana Blvd	Bristol St	Signalized	N/A	N/A	N/A	N/A	0.51	A	0.63	B
7	Santa Ana Blvd	Shelton St	Signalized	N/A	N/A	N/A	N/A	0.38	A	0.40	A
8	Flower St	Civic Center Dr	Signalized	N/A	N/A	N/A	N/A	0.73	C	0.90	D
9	Flower St	6th St	Signalized	N/A	N/A	N/A	N/A	0.63	B	0.81	D
10	Santa Ana Blvd	Flower St	Signalized	N/A	N/A	N/A	N/A	0.61	B	0.64	B
11*	Civic Center Dr	Parton St	Signalized	N/A	N/A	N/A	N/A	0.40	A	0.67	B
12*	Santa Ana Blvd	Civic Center Plaza/Parton St	Signalized	N/A	N/A	N/A	N/A	0.45	A	0.43	A
13*	Civic Center Dr	Van Ness Ave	2-Way Stop	11.3	B	12.9	B	N/A	N/A	N/A	N/A
14*	Civic Center Dr	Ross St	Signalized	N/A	N/A	N/A	N/A	0.61	B	0.60	A
15*	Santa Ana Blvd	Ross St	Signalized	N/A	N/A	N/A	N/A	0.60	A	0.46	A
16*	4th St	Ross St	2-Way Stop	26.6	D	18.3	C	N/A	N/A	N/A	N/A
17*	Civic Center Dr	Ped Xing	Signalized	N/A	N/A	N/A	N/A	0.36	A	0.35	A
18*	Civic Center Dr	Broadway	Signalized	N/A	N/A	N/A	N/A	0.59	A	0.69	B
19*	Santa Ana Blvd	Broadway	Signalized	N/A	N/A	N/A	N/A	0.63	B	0.61	B
20*	5th St	Broadway	Signalized	N/A	N/A	N/A	N/A	0.64	B	0.66	B
21*	4th St	Broadway	Signalized	N/A	N/A	N/A	N/A	0.29	A	0.45	A
22*	Civic Center Dr	Sycamore St	Signalized	N/A	N/A	N/A	N/A	0.40	A	0.47	A
23*	Civic Center Dr	Main St	Signalized	N/A	N/A	N/A	N/A	0.74	C	0.80	D
24*	Santa Ana Blvd	Main St	Signalized	N/A	N/A	N/A	N/A	0.71	C	0.77	C
25*	5th St	Main St	Signalized	N/A	N/A	N/A	N/A	0.67	B	0.67	B
26*	4th St	Main St	Signalized	N/A	N/A	N/A	N/A	0.60	A	0.66	B
27*	Civic Center Dr	Bush St	Signalized	N/A	N/A	N/A	N/A	0.43	A	0.60	A
28*	Santa Ana Blvd	Bush St	Signalized	N/A	N/A	N/A	N/A	0.43	A	0.55	A
29*	5th St	Bush St	Signalized	N/A	N/A	N/A	N/A	0.39	A	0.51	A

ID	Main St	Cross St	Existing Traffic Control	2035 TSM LOS (HCM)**				2035 TSM LOS (ICU)***			
				AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
30*	4th St	Bush St	Signalized	N/A	N/A	N/A	N/A	0.39	A	0.53	A
31*	Civic Center Dr	Spurgeon St	2-Way Stop	22.9	C	32.9	D	N/A	N/A	N/A	N/A
32*	Santa Ana Blvd/6th St	French St	2-Way Stop	19.3	C	23.2	C	N/A	N/A	N/A	N/A
33*	4th St	French St	Signalized	N/A	N/A	N/A	N/A	0.45	A	0.49	A
34*	4th St	Mortimer St	1-Way Stop	15.6	C	17.9	C	N/A	N/A	N/A	N/A
35*	5th St	Minter St	2-Way Stop	19.3	C	11.6	B	N/A	N/A	N/A	N/A
36	Santa Ana Blvd	Lacy St	2-Way Stop	N/A	N/A	N/A	N/A	0.75	C	0.57	A
37*	Santa Ana Blvd	Poinsettia St	2-Way Stop	22.9	C	19.5	C	N/A	N/A	N/A	N/A
38	Brown St	Poinsettia St	Uncontrolled	8.9	A	9.1	A	N/A	N/A	N/A	N/A
39*	Santa Ana Blvd	Santiago St	Signalized	N/A	N/A	N/A	N/A	0.52	A	0.64	B
40	4th St	Daisy Ave	1-Way Stop	9.5	A	9.8	A	N/A	N/A	N/A	N/A
41	3rd St	Daisy Ave	2-Way Stop	9.6	A	10.1	B	N/A	N/A	N/A	N/A
42	3rd St	Raitt St	2-Way Stop	37.6	**E**	236.3	**F**	N/A	N/A	N/A	N/A

Source: URS Corp., 2011

Notes: Shaded and bold cells indicate LOS E or F

* Intersections located in MDA's (Intersections 11 - 35, 37, and 39)

** HCM analysis conducted for unsignalized intersections

*** ICU analysis conducted for signalized intersections

5.2.2 Roadway Segment Analysis

The 2035 TSM roadway segment ADT analysis is presented in Table 5-4. The following locations would potentially experience capacity deficiencies under 2035 TSM conditions:

- Fifth Street from Hawley Street to Raitt Street
- Fourth Street from Main Street to Mortimer Street
- Raitt Street from Fifth Street to Third Street
- Main Street from Eighth Street to Third Street
- Fairview Street from Civic Center Drive to Fifth Street

The segments that show deficient LOS experience the same LOS under the No Build scenario. Therefore, there would not be an impact. Also note that the roadway segments along Bristol Street show an improvement from LOS E (Table 3-3, Existing Conditions) to LOS B as result of the proposed widening from an existing four-lane to six-lane divided roadway as part of the City of Santa Ana General Plan. All other arterial roadways segments are operating at acceptable LOS.

Table 5-4: Levels of Service for Arterial Street Segments – 2035 TSM Conditions

Street	From	To	2035 TSM	Number of Lanes	LOS E Capacity	LOS
Santa Ana Blvd.	Raitt Street	Western Ave	13,200	4U	25,000	B
	Western Ave	Forest St	13,200	4U	25,000	B
	Forest St	Pacific Ave	13,200	4U	25,000	B
	Pacific Ave	Hesperian St	12,800	4U	25,000	B
	Hesperian St	Bristol St	12,800	4U	25,000	B
	Bristol St	Baker St	12,100	4U	25,000	B
	Baker St	Shelton St	12,100	4U	25,000	B
	Shelton St	Flower St	12,000	4D	37,500	A
	Flower St	Parton St	14,400	6D	56,300	A
	Parton St	Ross St	14,300	6D	56,300	A
	Ross St	Broadway	12,900	3D	28,150	A
	Broadway	Sycamore St	10,900	3D	28,150	A
	Sycamore St	Main St	10,900	3D	28,150	A
	Main St	Bush St	11,100	3D	28,150	A
	Bush St	Spurgeon St	11,100	3D	28,150	A
	Spurgeon St	French St	11,100	3D	28,150	A
	French St	Mortimer St	16,300	2D	18,750	D
	Mortimer St	Minter St	16,700	2D	18,750	D
	Minter St	Lacy St	16,800	2D	18,750	D
	Lacy St	Garfield St	16,800	4D	37,500	A
	Garfield St	Poinsettia St	16,800	4D	37,500	A
	Poinsettia St	Santiago St	17,000	4D	37,500	A
5th St	Hawley St	Sunset St	15,300	2U	12,500	**F**
	Sunset St	English St	15,300	2U	12,500	**F**
	English St	Townsend St	15,500	2U	12,500	**F**
	Townsend St	Daisy Ave	15,500	2U	12,500	**F**
	Daisy Ave	Fairlawn St	15,500	2U	12,500	**F**
	Fairlawn St	Raitt St	15,400	2U	12,500	**F**

Street	From	To	2035 TSM	Number of Lanes	LOS E Capacity	LOS
5th St (cont.)	Ross St	Broadway	10,400	3D	28,150	A
	Broadway	Sycamore St	9,400	3D	28,150	A
	Sycamore St	Main St	9,500	3D	28,150	A
	Main St	Bush St	7,200	3D	28,150	A
	Bush St	Spurgeon St	7,200	3D	28,150	A
	Spurgeon St	French St	7,100	3D	28,150	A
	French St	Mortimer St	5,200	3D	28,150	A
	Mortimer St	Minter St	2,400	2U	12,500	A
4th St	Townsend St	Daisy Ave	1,300	2U	12,500	A
	Daisy Ave	Raitt St	1,300	2U	12,500	A
	Ross St	Birch St	8,100	2U	12,500	B
	Birch St	Broadway	8,100	2U	12,500	B
	Broadway	Sycamore St	8,300	2U	12,500	B
	Sycamore St	Main St	8,300	2U	12,500	B
	Main St	Bush St	14,000	2U	12,500	**F**
	Bush St	Spurgeon St	14,300	2U	12,500	**F**
	Spurgeon St	French St	14,300	2U	12,500	**F**
	French St	Mortimer St	14,300	2U	12,500	**F**
6th/Brown	French St	Mortimer St	900	2U	12,500	A
	Mortimer St	Minter St	1,300	2U	12,500	A
	Minter St	Lacy St	800	2U	12,500	A
	Lacy St	Garfield St	1,100	2U	12,500	A
	Garfield St	Poinsettia St	500	2U	12,500	A
Civic Center Dr	Flower St	Parton St	20,000	4D	37,500	A
	Parton St	Van Ness Ave	19,900	4D	37,500	A
	Van Ness Ave	Ross St	19,800	4D	37,500	A
	Ross St	Birch St	17,500	4D	37,500	A
	Birch St	Broadway	17,500	4D	37,500	A
	Broadway	Sycamore St	17,300	4D	37,500	A
	Sycamore St	Main St	17,000	4D	37,500	A
	Main St	Bush St	13,500	4D	37,500	A
	Bush St	Spurgeon St	13,600	4D	37,500	A
Raitt St	5th St	Santa Ana Blvd	17,000	2U	12,500	**F**
	Santa Ana Blvd	3rd St	17,700	2U	12,500	**F**
Pacific Ave	5th St	Santa Ana Blvd	2,900	2U	12,500	A
	Santa Ana Blvd	3rd St	2,800	2U	12,500	A
Bristol St	5th St	Santa Ana Blvd	38,500	6D	56,300	B
	Santa Ana Blvd	3rd St	38,200	6D	56,300	B
Shelton St	5th St	Santa Ana Blvd	4,800	2D	18,750	A
	Santa Ana Blvd	3rd St	2,200	2U	12,500	A
Flower St	10th St	Civic Center Dr	21,200	4D	37,500	A
	Civic Center Dr	Santa Ana Blvd	21,200	4D	37,500	A
	Santa Ana Blvd	3rd St	15,600	4D	37,500	A
Ross St	10th St	Civic Center Dr	7,000	2D	18,750	A
	Civic Center Dr	Santa Ana Blvd	6,800	2D	18,750	A
	Santa Ana Blvd	4th St	7,000	2D	18,750	A
	4th St	3rd St	7,100	2D	18,750	A
Broadway	10th St	Civic Center Dr	27,800	4D	37,500	C
	Civic Center Dr	Santa Ana Blvd	21,700	4D	37,500	A
	Santa Ana Blvd	4th St	18,300	4D	37,500	A
	4th St	3rd St	18,600	4D	37,500	A

Street	From	To	2035 TSM	Number of Lanes	LOS E Capacity	LOS
Sycamore St	10th St	Civic Center Dr	3,000	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	2,400	2U	12,500	A
	Santa Ana Blvd	4th St	1,200	2U	12,500	A
	4th St	3rd St	1,300	2U	12,500	A
Main St	8th St	Civic Center Dr	37,000	4D	37,500	**E**
	Civic Center Dr	Santa Ana Blvd	37,600	4D	37,500	**F**
	Santa Ana Blvd	5th St	38,000	4D	37,500	**F**
	5th St	4th St	38,000	4U	25,000	**F**
	4th St	3rd St	33,300	4U	25,000	**F**
Bush St	8th St	Civic Center Dr	3,700	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	4,200	2U	12,500	A
	Santa Ana Blvd	5th St	3,500	2D	18,750	A
	5th St	4th St	3,300	2U	12,500	A
	4th St	3rd St	4,600	2U	12,500	A
Spurgeon St	8th St	Civic Center Dr	2,000	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	1,300	2U	12,500	A
	Santa Ana Blvd	5th St	1,400	2U	12,500	A
	5th St	4th St	1,300	2U	12,500	A
French St	Civic Center Dr	Santa Ana Blvd	800	2U	12,500	A
	Santa Ana Blvd	5th St	1,500	2U	12,500	A
	5th St	4th St	3,200	2U	12,500	A
	4th St	3rd St	3,900	2U	12,500	A
Mortimer St	N/A	N/O Santa Ana Blvd	600	2U	12,500	A
	Santa Ana Blvd	6th St	5,000	2U	12,500	A
	6th St	5th St	4,800	2U	12,500	A
	5th St	4th St	3,600	2U	12,500	A
Minter St	Civic Center Dr	Santa Ana Blvd	1,700	2U	12,500	A
	Santa Ana Blvd	6th St	4,700	2U	12,500	A
	6th St	5th St	5,200	2U	12,500	A
	5th St	4th St	5,300	2U	12,500	A
Lacy St	Civic Center Dr	Santa Ana Blvd	2,600	2U	12,500	A
	Santa Ana Blvd	6th St/Brown St	2,700	2U	12,500	A
	6th St/Brown St	5th St	2,400	2U	12,500	A
Garfield	Civic Center Dr	Santa Ana Blvd	1,800	2U	12,500	A
	Santa Ana Blvd	Brown St	3,500	2U	12,500	A
	Brown St	6th St	3,100	2U	12,500	A
	6th St	5th St	3,700	2U	12,500	A
Poinsettia St	Civic Center Dr	Santa Ana Blvd	1,900	2U	12,500	A
	Santa Ana Blvd	Brown St	1,800	2U	12,500	A
	Brown St	6th St	1,800	2U	12,500	A
	6th St	5th St	2,000	2U	12,500	A
Santiago St	Civic Center Dr	Santa Ana Blvd	10,600	2U	12,500	D
	Santa Ana Blvd	6th St	8,200	2U	12,500	B
Fairview St	Civic Center Dr	5th St	56,900	6D	56,300	**F**
Westminster Ave	Harbor Blvd	Enterprise Dr	44,700	6D	56,300	C
Daisy Ave	4th St	3rd St	300	2U	12,500	A
3rd St	Daisy Ave	Raitt St	1,000	2U	12,500	A

Source: URS Corp., 2011

Notes:
D – divided roadway
N/A – Not applicable
N/O – North of arterial roadway
Shaded and bold cells indicate LOS E or F
U – Undivided roadway

5.2.3 Parking Analysis

There are no anticipated on-street or off-street parking impacts Under 2035 TSM Conditions.

5.3 Streetcar Alternative 1: Santa Ana Boulevard and Fourth Street Couplet

This section provides an analysis of 2035 traffic conditions for Streetcar Alternative 1. Streetcar Alternative 1 is described as follows:

Streetcar Alternative 1 includes construction and implementation of a streetcar rail line between Harbor Boulevard and SARTC. Streetcars would follow an east-west alignment on the PE ROW from Harbor Boulevard to Raitt Street, then along Santa Ana Boulevard to Ross Street, then in a Santa Ana Boulevard and Fourth Street couplet configuration through the downtown area. The couplet converges on Santa Ana Boulevard at Mortimer Street, where the bi-directional tracks continue on Santa Ana Boulevard to SARTC. Streetcar Alternative 1 is approximately 4.0 miles in length with 24 directional stations spaced at approximately one-third mile intervals. The following is a list of proposed station locations for Streetcar Alternative 1:

Eastbound		Westbound	
1	Harbor Blvd./Westminster Ave.	1	SARTC
2	Willowick	2	Lacy St. /Santa Ana Blvd.
3	Fairview St. Santa Ana Blvd.	3	French St./Santa Ana Blvd.
4	Raitt St./Santa Ana Blvd.	4	Main St./Santa Ana Blvd.
5	Bristol St./Santa Ana Blvd.	5	Broadway/Santa Ana Blvd
6	Flower St./Santa Ana Blvd.	6	Ross St./Santa Ana Blvd.
7	Sasscer Park	7	Flower St./Santa Ana Blvd.
8	Broadway/4th St.	8	Bristol St./Santa Ana Blvd.
9	Main St./4th St.	9	Raitt St./Santa Ana Blvd.
10	French St./4th St.	10	Fairview St./Santa Ana Blvd.
11	Lacy St./Santa Ana Blvd.	11	Willowick
12	SARTC	12	Harbor Blvd./Westminster Ave.

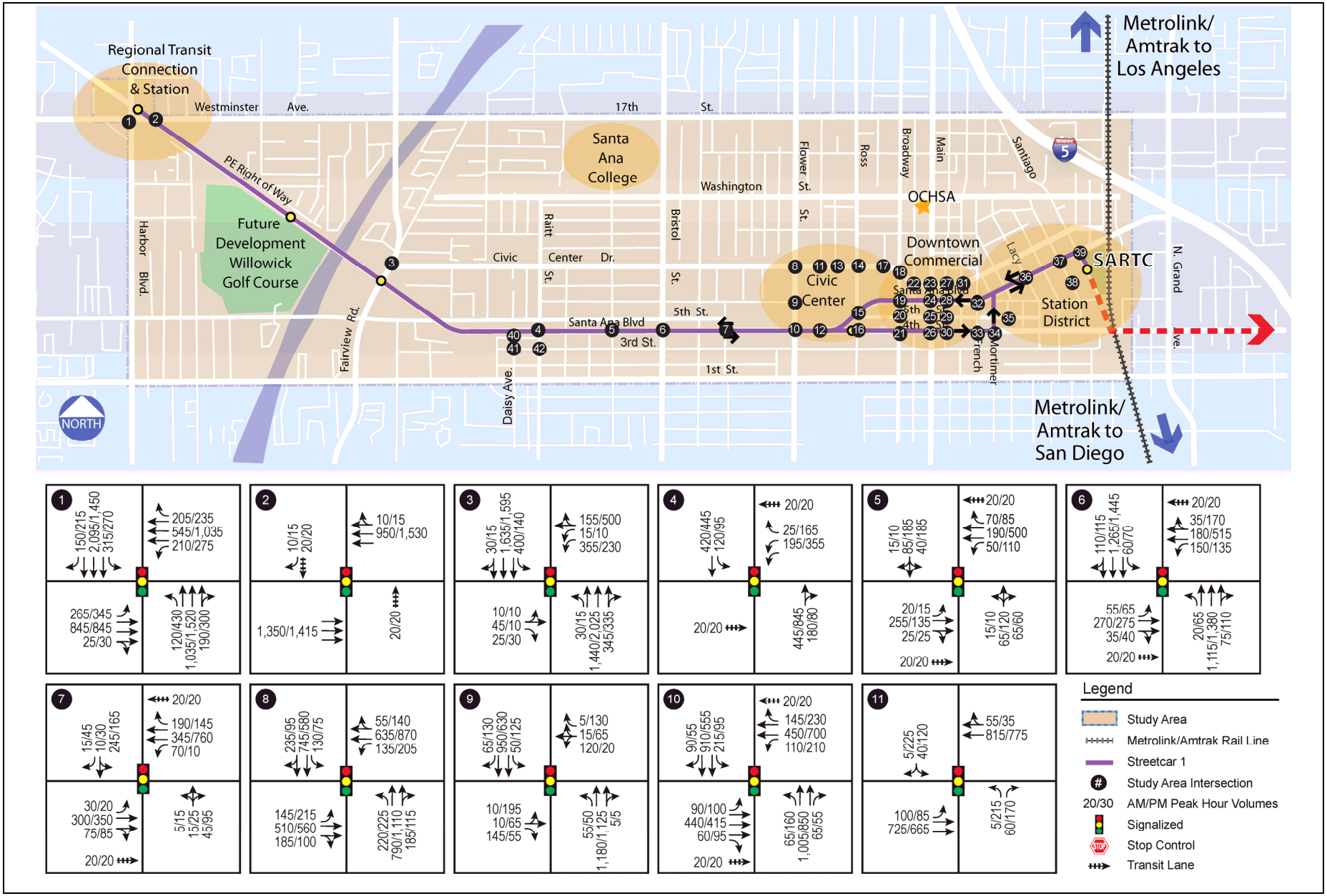
Source: Cordoba Corporation, Conceptual Design Plans, November 2011

5.3.1 Intersection Analysis

Figure 5-3A through 5-3D show the 2035 Streetcar Alternative 1 lane geometrics and AM and PM peak-hour traffic volumes at the 42 study intersections.

Table 5-5 shows the projected intersection Level of Service for each of the 42 study intersections for the 2035 Streetcar Alternative 1. Intersection LOS was calculated using a combination of methods comprised of the Intersection Capacity Utilization (ICU) method for signalized intersections; and the Highway Capacity Manual (HCM) method for unsignalized intersections – as described in Chapter 2 of this document.

2035 Streetcar Alternative 1 Lane Geometrics and Traffic Volumes (Study Area Intersections 1 through 11)



Source: URS, January 2012

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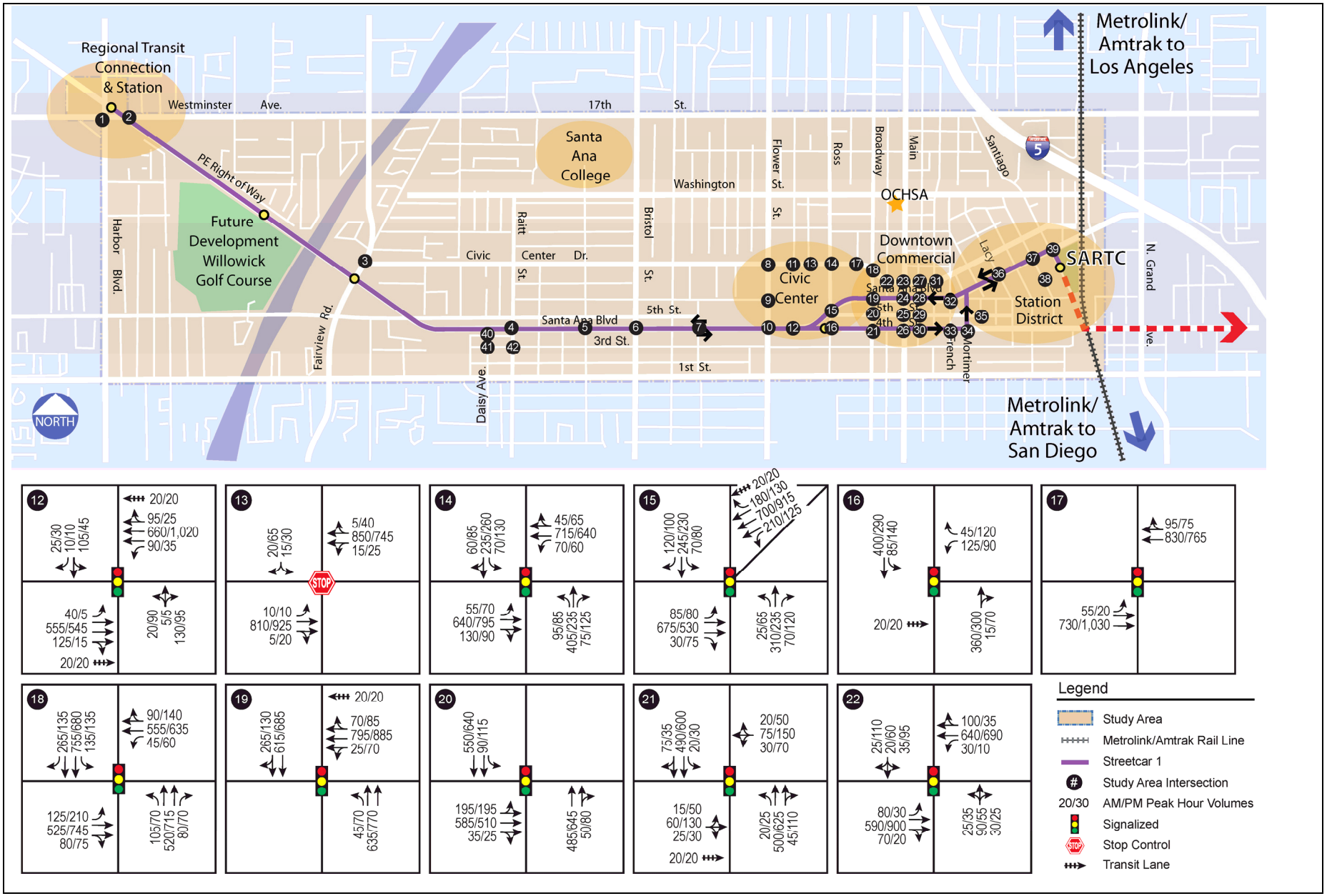
2035 Streetcar Alternative 1 Lane Geometrics and Traffic Volumes (Study Area Intersections 12 through 22)



Source: URS, January 2012

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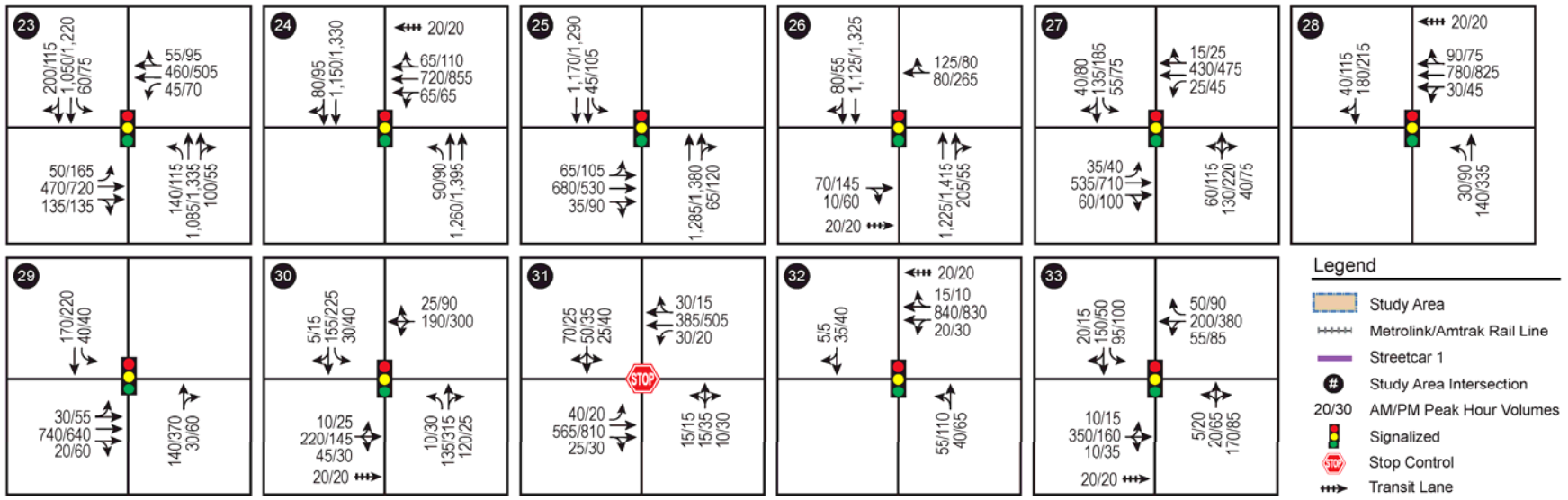
2035 Streetcar Alternative 1 Lane Geometrics and Traffic Volumes (Study Area Intersections 23 through 33)



Source: URS, January 2012

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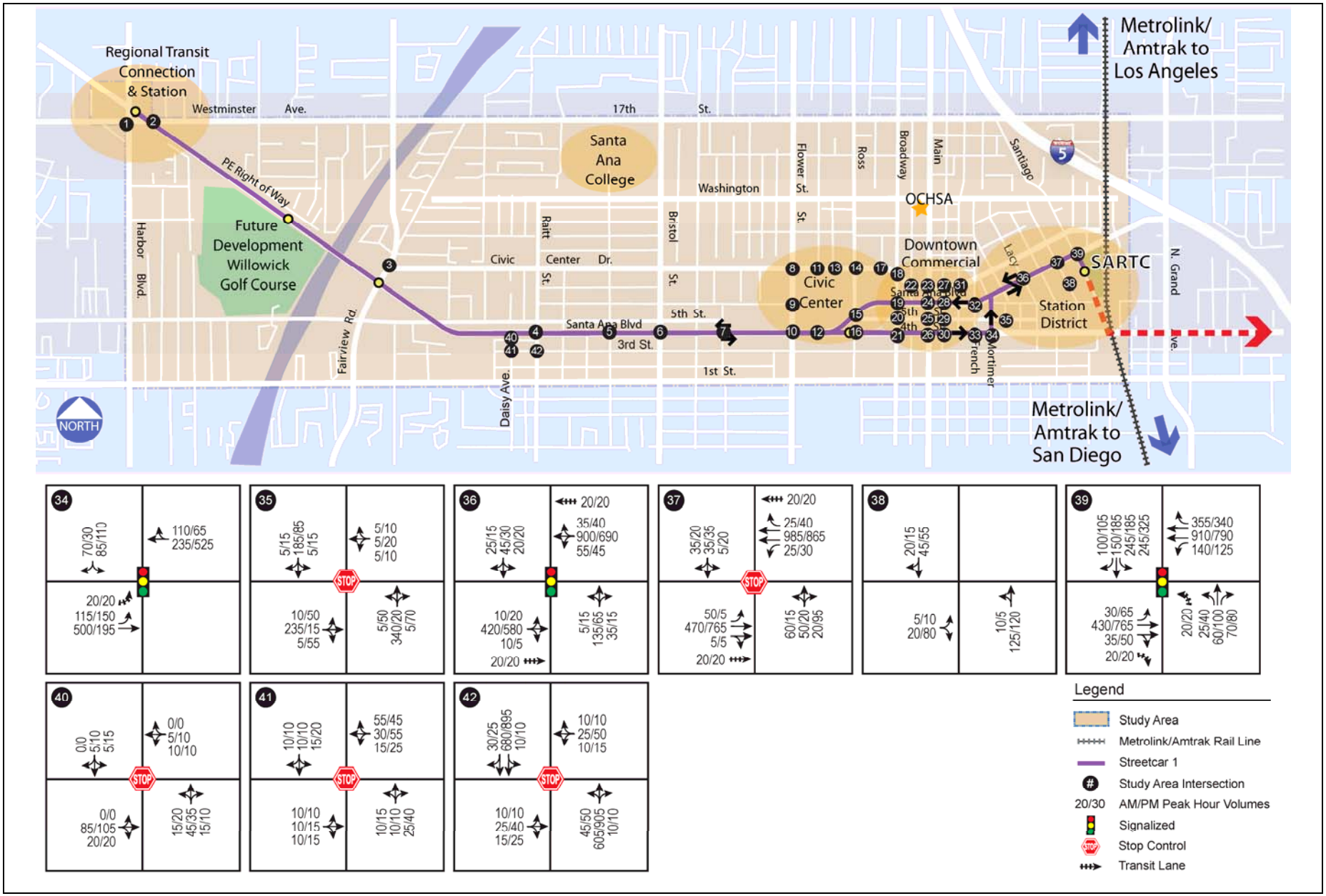
2035 Streetcar Alternative 1 Lane Geometrics and Traffic Volumes (Study Area Intersections 34 through 42)



Source: URS, January 2012

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Table 5-5: Peak-Hour Intersection Level of Service Results – 2035 Streetcar Alternative 1

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control	2035 Streetcar Alt. 1 LOS (HCM)**				2035 Streetcar Alt. 1 LOS (ICU)***			
					AM Peak		PM Peak		AM Peak		PM Peak	
					Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
1	Westminster Ave	Harbor Blvd	Signalized		N/A	N/A	N/A	N/A	0.82	D	1.01	**F**
2	Westminster Ave	Nautilus Dr	1-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.34	A	0.38	A
3	Fairview St	Civic Center Dr	Signalized		N/A	N/A	N/A	N/A	0.73	C	0.88	**D**
4	Santa Ana Blvd	Raitt St	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.60	A	0.84	D
5	Santa Ana Blvd	Pacific Ave	Signalized		N/A	N/A	N/A	N/A	0.25	A	0.44	A
6	Santa Ana Blvd	Bristol St	Signalized		N/A	N/A	N/A	N/A	0.52	A	0.64	B
7	Santa Ana Blvd	Shelton St	Signalized		N/A	N/A	N/A	N/A	0.36	A	0.41	A
8	Flower St	Civic Center Dr	Signalized		N/A	N/A	N/A	N/A	0.77	C	0.89	D
9	Flower St	6th St	Signalized		N/A	N/A	N/A	N/A	0.67	B	0.79	C
10	Santa Ana Blvd	Flower St	Signalized		N/A	N/A	N/A	N/A	0.67	B	0.63	B
11*	Civic Center Dr	Parton St	Signalized		N/A	N/A	N/A	N/A	0.41	A	0.68	B
12*	Santa Ana Blvd	Civic Center Plaza/Parton St	Signalized		N/A	N/A	N/A	N/A	0.47	A	0.43	A
13*	Civic Center Dr	Van Ness Ave	2-Way Stop		11.6	B	11.7	B	N/A	N/A	N/A	N/A
14*	Civic Center Dr	Ross St	Signalized		N/A	N/A	N/A	N/A	0.60	B	0.60	B
15*	Santa Ana Blvd	Ross St	Signalized		N/A	N/A	N/A	N/A	0.61	B	0.47	A
16*	4th St	Ross St	1-Way Stop	**4-Way Stop**	16.7	C	13.8	B	N/A	N/A	N/A	N/A
17*	Civic Center Dr	Ped Xing	Signalized		N/A	N/A	N/A	N/A	0.36	A	0.35	A
18*	Civic Center Dr	Broadway	Signalized		N/A	N/A	N/A	N/A	0.61	B	0.70	C
19*	Santa Ana Blvd	Broadway	Signalized		N/A	N/A	N/A	N/A	0.65	B	0.63	B
20*	5th St	Broadway	Signalized		N/A	N/A	N/A	N/A	0.54	A	0.62	B
21*	4th St	Broadway	Signalized		N/A	N/A	N/A	N/A	0.30	A	0.44	A
22*	Civic Center Dr	Sycamore St	Signalized		N/A	N/A	N/A	N/A	0.40	A	0.48	A
23*	Civic Center Dr	Main St	Signalized		N/A	N/A	N/A	N/A	0.71	C	0.81	D
24*	Santa Ana Blvd	Main St	Signalized		N/A	N/A	N/A	N/A	0.69	B	0.78	C
25*	5th St	Main St	Signalized		N/A	N/A	N/A	N/A	0.68	B	0.71	C
26*	4th St	Main St	Signalized		N/A	N/A	N/A	N/A	0.59	A	0.69	B
27*	Civic Center Dr	Bush St	Signalized		N/A	N/A	N/A	N/A	0.41	A	0.60	B
28*	Santa Ana Blvd	Bush St	Signalized		N/A	N/A	N/A	N/A	0.43	A	0.55	A
29*	5th St	Bush St	Signalized		N/A	N/A	N/A	N/A	0.39	A	0.52	A

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control	2035 Streetcar Alt. 1 LOS (HCM)**				2035 Streetcar Alt. 1 LOS (ICU)***			
					AM Peak		PM Peak		AM Peak		PM Peak	
					Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
30*	4th St	Bush St	Signalized		N/A	N/A	N/A	N/A	0.39	A	0.52	A
31*	Civic Center Dr	Spurgeon St	2-Way Stop		24.4	C	36.1	E	N/A	N/A	N/A	N/A
32*	Santa Ana Blvd/6th St	French St	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.67	B	0.73	C
33*	4th St	French St	Signalized		N/A	N/A	N/A	N/A	0.45	A	0.49	A
34*	4th St	Mortimer St	1-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.45	A	0.64	B
35*	5th St	Minter St	2-Way Stop		19.5	C	11.5	B	N/A	N/A	N/A	N/A
36	Santa Ana Blvd	Lacy St	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.75	C	0.57	A
37*	Santa Ana Blvd	Poinsettia St	2-Way Stop		24.5	C	19.5	C	N/A	N/A	N/A	N/A
38	Brown St	Poinsettia St	Uncontrolled		8.9	A	9.1	A	N/A	N/A	N/A	N/A
39*	Santa Ana Blvd	Santiago St	Signalized		N/A	N/A	N/A	N/A	0.53	A	0.64	B
40	4th St	Daisy Ave	1-Way Stop	**IOS-1**	9.9	A	10.1	A	N/A	N/A	N/A	N/A
41	3rd St	Daisy Ave	2-Way Stop	**IOS-1**	9.5	A	10.1	B	N/A	N/A	N/A	N/A
42	3rd St	Raitt St	2-Way Stop	**IOS-1**	39.5	E	419.5	F	N/A	N/A	N/A	N/A

Source: URS Corp., 2011

Notes: Shaded and bold cells indicate LOS E or F

* Intersections located in MDA's (Intersections 11 - 35, 37, and 39)

** HCM analysis conducted for unsignalized intersections

*** ICU analysis conducted for signalized intersections

As shown in Table 5-5, the following intersections are expected to operate at a poor level of service (LOS E or F) during either the AM or PM peak hour.

- ID #1: Westminster Avenue/Harbor Boulevard – PM Peak Hours
- ID #31: Civic Center Drive/Spurgeon – PM Peak Hour
- ID #42: Third Street/Raitt Street – AM and PM Peak Hours (IOS)

The intersection of Westminster Avenue and Harbor Boulevard is currently operating at LOS F in the PM peak hour. This intersection is projected to continue to operate at LOS F in 2035 in the No Build alternative, as well as the two Build Alternatives (Alternatives 1 and 2). The grade separated crossing of Westminster Avenue, just east of Harbor Boulevard does not impact the operation of the Westminster Avenue/Harbor Boulevard intersection.

The intersections at Civic Center Drive at Spurgeon Street, and Santa Ana Boulevard at Raitt Street which are shown to operate at poor level of service (LOS E or F) during either the AM or PM peak hour are a result of the existing traffic control at these intersections (unsignalized). Santa Ana Boulevard at Raitt Street is shown to operate at an acceptable LOS D or better when the intersection is signalized as part of both of the streetcar Build Alternatives (Alternative 1 and Alternative 2). Also, the intersection at Santa Ana Boulevard at Lacy Street is shown to improve from LOS F/C to LOS C/A during the AM and PM peak hour, respectively, as a result of the proposed signal at this intersection (Build Alternative 1).

The Civic Center Drive/Spurgeon Street intersection is currently located in a City of Santa Ana Major Development Area (MDA) and is projected to operate at LOS E under Streetcar Alternative 1 conditions. As discussed in Chapter 2 of this report, the City considers LOS E as the minimum acceptable LOS for signalized intersections within the City-designated MDAs. Therefore, there is no impact.

The analysis of the intersection at Fairview Street and Civic Center Drive include the Project Design Feature to add an extra left-turn lane on the southbound approach.

The intersection at Third Street at Raitt Street only applies to the Streetcar Initial Operable Segment 1 (IOS-1). Further detail and discussion is provided at the end of this section.

5.3.2 Roadway Segment Analysis

The 2035 Streetcar Alternative 1 roadway segment ADT analysis is presented in Table 5-6. The following locations would potentially experience capacity deficiencies under 2035 conditions:

- Fifth Street from Hawley Street to Raitt Street
- Fourth Street from Main Street to Mortimer Street
- Raitt Street from Fifth Street to Third Street
- Main Street from Eighth Street to Third Street
- Fairview Street from Civic Center Drive to Fifth Street

The segments that show deficient LOS experience the same LOS under the No Build scenario. Therefore, there would not be an impact. Also note that the roadway segments along Bristol Street shows an improvement from LOS E (Table 3-3, Existing Conditions) to LOS B as result of the proposed widening from an existing four-lane to six-lane divided roadway as part of the City of Santa Ana General Plan. All other arterial roadways segments would operate at acceptable LOS.

Table 5-6: Levels of Service for Arterial Street Segments – 2035 Streetcar Alternative 1 Conditions

Street	From	To	2035 Streetcar Alt. 1 ADT	Number of Lanes	LOS E Capacity	LOS
Santa Ana Blvd.	Raitt Street	Western Ave	12,600	4U	25,000	B
	Western Ave	Forest St	12,100	4U	25,000	B
	Forest St	Pacific Ave	12,600	4U	25,000	B
	Pacific Ave	Hesperian St	12,200	4U	25,000	B
	Hesperian St	Bristol St	12,200	4U	25,000	B
	Bristol St	Baker St	11,800	4U	25,000	B
	Baker St	Shelton St	11,800	4U	25,000	B
	Shelton St	Flower St	11,700	4D	37,500	A
	Flower St	Parton St	14,900	6D	56,300	A
	Parton St	Ross St	14,700	6D	56,300	A
	Ross St	Broadway	13,100	3D	28,150	A
	Broadway	Sycamore St	10,700	3D	28,150	A
	Sycamore St	Main St	10,700	3D	28,150	A
	Main St	Bush St	10,900	3D	28,150	A
	Bush St	Spurgeon St	10,900	3D	28,150	A
	Spurgeon St	French St	10,900	3D	28,150	A
	French St	Mortimer St	15,900	2D	18,750	D
	Mortimer St	Minter St	16,400	2D	18,750	D
	Minter St	Lacy St	16,500	2D	18,750	D
	Lacy St	Garfield St	16,600	4D	37,500	A
	Garfield St	Poinsettia St	16,500	4D	37,500	A
	Poinsettia St	Santiago St	16,700	4D	37,500	A
5th St	Hawley St	Sunset St	14,600	2U	12,500	**F**
	Sunset St	English St	14,600	2U	12,500	**F**
	English St	Townsend St	14,400	2U	12,500	**F**
	Townsend St	Daisy Ave	14,400	2U	12,500	**F**
	Daisy Ave	Fairlawn St	14,400	2U	12,500	**F**
	Fairlawn St	Raitt St	14,400	2U	12,500	**F**
	Ross St	Broadway	10,500	3D	28,150	A
	Broadway	Sycamore St	10,700	3D	28,150	A
	Sycamore St	Main St	10,000	3D	28,150	A
	Main St	Bush St	7,500	3D	28,150	A
	Bush St	Spurgeon St	7,400	3D	28,150	A
	Spurgeon St	French St	7,400	3D	28,150	A
	French St	Mortimer St	5,500	3D	28,150	A
	Mortimer St	Minter St	2,500	2U	12,500	A

Street	From	To	2035 Streetcar Alt. 1 ADT	Number of Lanes	LOS E Capacity	LOS
4th St	Townsend St	Daisy Ave	1,300	2U	12,500	A
	Daisy Ave	Raitt St	1,300	2U	12,500	A
	Ross St	Birch St	8,500	2U	12,500	B
	Birch St	Broadway	8,500	2U	12,500	B
	Broadway	Sycamore St	8,900	2U	12,500	C
	Sycamore St	Main St	8,100	2U	12,500	B
	Main St	Bush St	13,700	2U	12,500	**F**
	Bush St	Spurgeon St	13,800	2U	12,500	**F**
	Spurgeon St	French St	13,800	2U	12,500	**F**
	French St	Mortimer St	14,000	2U	12,500	**F**
6th/Brown	French St	Mortimer St	1,000	2U	12,500	A
	Mortimer St	Minter St	1,300	2U	12,500	A
	Minter St	Lacy St	800	2U	12,500	A
	Lacy St	Garfield St	1,100	2U	12,500	A
	Garfield St	Poinsettia St	500	2U	12,500	A
Civic Center Dr	Flower St	Parton St	20,000	4D	37,500	A
	Parton St	Van Ness Ave	20,000	4D	37,500	A
	Van Ness Ave	Ross St	20,000	4D	37,500	A
	Ross St	Birch St	17,600	4D	37,500	A
	Birch St	Broadway	17,200	4D	37,500	A
	Broadway	Sycamore St	16,900	4D	37,500	A
	Sycamore St	Main St	16,800	4D	37,500	A
	Main St	Bush St	14,000	4D	37,500	A
	Bush St	Spurgeon St	14,100	4D	37,500	A
Raitt St	5th St	Santa Ana Blvd	16,700	2U	12,500	**F**
	Santa Ana Blvd	3rd St	17,700	2U	12,500	**F**
Pacific Ave	5th St	Santa Ana Blvd	2,700	2U	12,500	A
	Santa Ana Blvd	3rd St	2,900	2U	12,500	A
Bristol St	5th St	Santa Ana Blvd	38,100	6D	56,300	B
	Santa Ana Blvd	3rd St	38,300	6D	56,300	B
Shelton St	5th St	Santa Ana Blvd	4,700	2D	18,750	A
	Santa Ana Blvd	3rd St	2,100	2U	12,500	A
Flower St	10th St	Civic Center Dr	21,000	4D	37,500	A
	Civic Center Dr	Santa Ana Blvd	22,500	4D	37,500	B
	Santa Ana Blvd	3rd St	15,200	4D	37,500	A
Ross St	10th St	Civic Center Dr	7,000	2D	18,750	A
	Civic Center Dr	Santa Ana Blvd	7,000	2D	18,750	A
	Santa Ana Blvd	4th St	7,300	2D	18,750	A
	4th St	3rd St	7,400	2D	18,750	A
Broadway	10th St	Civic Center Dr	27,800	4D	37,500	C
	Civic Center Dr	Santa Ana Blvd	21,900	4D	37,500	A
	Santa Ana Blvd	4th St	18,800	4D	37,500	A
	4th St	3rd St	19,300	4D	37,500	A
Sycamore St	10th St	Civic Center Dr	3,300	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	2,400	2U	12,500	A
	Santa Ana Blvd	4th St	1,200	2U	12,500	A
	4th St	3rd St	1,200	2U	12,500	A
Main St	8th St	Civic Center Dr	36,000	4D	37,500	**E**
	Civic Center Dr	Santa Ana Blvd	36,700	4D	37,500	**E**
	Santa Ana Blvd	5th St	36,900	4D	37,500	**E**
	5th St	4th St	37,000	4U	25,000	**F**
	4th St	3rd St	32,400	4U	25,000	**F**

Street	From	To	2035 Streetcar Alt. 1 ADT	Number of Lanes	LOS E Capacity	LOS
Bush St	8th St	Civic Center Dr	3,900	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	4,100	2U	12,500	A
	Santa Ana Blvd	5th St	3,600	2D	18,750	A
	5th St	4th St	3,400	2U	12,500	A
	4th St	3rd St	4,500	2U	12,500	A
Spurgeon St	8th St	Civic Center Dr	2,200	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	1,500	2U	12,500	A
	Santa Ana Blvd	5th St	1,400	2U	12,500	A
	5th St	4th St	1,400	2U	12,500	A
French St	Civic Center Dr	Santa Ana Blvd	800	2U	12,500	A
	Santa Ana Blvd	5th St	1,400	2U	12,500	A
	5th St	4th St	3,300	2U	12,500	A
	4th St	3rd St	3,800	2U	12,500	A
Mortimer St	N/A	N/O Santa Ana Blvd	600	2U	12,500	A
	Santa Ana Blvd	6th St	4,900	2U	12,500	A
	6th St	5th St	4,700	2U	12,500	A
	5th St	4th St	3,600	2U	12,500	A
Minter St	Civic Center Dr	Santa Ana Blvd	1,700	2U	12,500	A
	Santa Ana Blvd	6th St	4,700	2U	12,500	A
	6th St	5th St	5,200	2U	12,500	A
	5th St	4th St	5,100	2U	12,500	A
Lacy St	Civic Center Dr	Santa Ana Blvd	2,500	2U	12,500	A
	Santa Ana Blvd	6th St/Brown St	2,600	2U	12,500	A
	6th St/Brown St	5th St	2,500	2U	12,500	A
Garfield	Civic Center Dr	Santa Ana Blvd	1,700	2U	12,500	A
	Santa Ana Blvd	Brown St	3,500	2U	12,500	A
	Brown St	6th St	3,000	2U	12,500	A
	6th St	5th St	3,800	2U	12,500	A
Poinsettia St	Civic Center Dr	Santa Ana Blvd	1,900	2U	12,500	A
	Santa Ana Blvd	Brown St	1,800	2U	12,500	A
	Brown St	6th St	1,800	2U	12,500	A
	6th St	5th St	1,900	2U	12,500	A
Santiago St	Civic Center Dr	Santa Ana Blvd	9,800	2U	12,500	C
	Santa Ana Blvd	6th St	7,300	2U	12,500	B
Fairview St	Civic Center Dr	5th St	56,900	6D	56,300	**F**
Westminster Ave	Harbor Blvd	Enterprise Dr	44,400	6D	56,300	C
Daisy Ave	4th St	3rd St	500	2U	12,500	A
3rd St	Daisy Ave	Raitt St	1,200	2U	12,500	A

Source: URS Corp., 2011

Notes: D – divided roadway
N/A – Not applicable
N/O – North of arterial roadway
Shaded and bold cells indicate LOS E or F
U – Undivided roadway

5.3.3 Parking Analysis

Existing on-street parking spaces that could potentially be impacted along the Streetcar alternative alignments are presented in the tables below. Table 5-7 through Table 5-10 summarize the approximate total existing on-street parking spaces and the total lost or gained after the implementation of the streetcar alignment routes. Note that this is an approximate total parking space estimation as it is based on the assumption of an average vehicle length of 20 feet (per parallel parking stall) over the length of the existing designated on-street parking segments. This is a "planning-level" analysis, not a detailed parking inventory, observation, and analysis. Parking availability length does not include driveways, emergency parking (red curb), or clearly identified restricted parking.

As shown on the summary tables, existing on-street parking spaces were either maintained or eliminated as a result of the implementation of the streetcar alignment routes. The majority of the parking spaces lost (approximately 51%) are along Santa Ana Boulevard west of Flower Street, and other losses (approximately 21%) are due to reconfiguration of the existing angle parking to parallel parking spaces along Fourth Street between Ross Street and French Street, at locations where streetcar platforms are proposed, and where the streetcar turns to an adjacent cross street.

Table 5-7: On-Street Parking Spaces – Raitt Street to Flower Street (Streetcar Alts. 1 and 2)

Road	Segment	Direction	Existing Spaces	Streetcar Alternatives1 and 2	
				Lost	Remain
Santa Ana Blvd	Raitt Ave to Western Ave	North Side	17	14	3
		South Side	9	9	0
	Western Ave to Forest Ave	North Side	14	0	14
		South Side	14	14	0
	Forest Ave to Pacific Ave	North Side	4	0	4
		South Side	3	3	0
	Pacific Ave to Hesperian St	North Side	14	0	14
		South Side	5	5	0
	Hesperian St to Bristol St	North Side	5	0	5
		South Side	6	6	0
	Bristol St to Baker St	North Side	8	0	8
		South Side	12	12	0
	Baker St to Shelton St	North Side	5	0	5
		South Side	8	8	0
	Shelton St to Flower St	North Side	0	0	0
		South Side	19	2	17
		TOTAL =	**143**	**70**	**73**

Source: URS Corp., 2011

Table 5-8: On-Street Parking Spaces – Downtown Segment (Streetcar Alt. 1, Fourth Street Parking Scenario A - South Side Parallel Parking)

Road	Segment	Direction	Existing Spaces	Streetcar Alternatives1 and 2 Parking Scenario A	
				Lost	Remain
Santa Ana Blvd	Bush St to Spurgeon St	North Side	4	0	4
	Spurgeon St to French St	North Side	8	3	5
	French St to Mortimer St	North Side	7	1	6
	Mortimer St to Minter St	North Side	10	0	10
		South Side	10	0	10
	Minter St to Lacy St	North Side	15	5	10
		South Side	15	5	10
Ross St	5th St to 4th St	West Side	0	0	0
4th St	Ross St to Birch St	South Side	10	2	8
	Birch St to Broadway	South Side	12	6	6
	Broadway to Sycamore St	North Side	11	0	11
		South Side	11	2	9
	Sycamore St to Main St	North Side	11	0	11
		South Side	11	6	5
	Main St to Bush St	North Side	11	0	11
		South Side	11	2	9
	Bush St to Spurgeon St	North Side	11	0	11
		South Side	11	2	9
	Spurgeon St to French St	North Side	11	0	11
		South Side	11	6	5
	French St to Mortimer St	North Side	0	0	0
		South Side	4	0	4
Mortimer St	6th St to 5th St	East Side	5	0	5
		West Side	6	0	6
	5th St to 4th St	East Side	7	7	0
		West Side	4	0	4
		TOTAL =	**227**	**47**	**180**

Source: URS Corp., 2011

Table 5-9: On-Street Parking Spaces – Downtown Segment (Streetcar Alt. 1, Fourth Street Parking Scenario B - No South Side Parking)

Road	Segment	Direction	Existing Spaces	Streetcar Alt. 1 - Parking Scenario B	
				Lost	Remain
4th St	Ross St to Birch St	South Side	10	10	0
	Birch St to Broadway	South Side	12	12	0
	Broadway to Sycamore St	North Side	11	0	11
		South Side	11	11	0
	Sycamore St to Main St	North Side	11	0	11
		South Side	11	11	0
	Main St to Bush St	North Side	11	0	11
		South Side	11	11	0
	Bush St to Spurgeon St	North Side	11	0	11
		South Side	11	11	0
	Spurgeon St to French St	North Side	11	0	11
		South Side	11	11	0
	French St to Mortimer St	North Side	0	0	0
		South Side	4	0	4
		TOTAL =	**136**	**77**	**59**

Source: URS Corp., 2011

Table 5-10: On-Street Parking Spaces – Downtown Segment (Streetcar Alt. 1, Parking Scenario C South Side and North Side Parking Removal)

Road	Segment	Direction	Existing Spaces	Streetcar Alt. 1 - Parking Scenario C	
				Lost	Remain
4th St	Ross St to Birch St	South Side	10	10	0
	Birch St to Broadway	South Side	12	12	0
	Broadway to Sycamore St	North Side	11	11	0
		South Side	11	11	0
	Sycamore St to Main St	North Side	11	11	0
		South Side	11	11	0
	Main St to Bush St	North Side	11	11	0
		South Side	11	11	0
	Bush St to Spurgeon St	North Side	11	11	0
		South Side	11	11	0
	Spurgeon St to French St	North Side	11	11	0
		South Side	11	11	0
	French St to Mortimer St	North Side	0	0	0
		South Side	4	0	4
		TOTAL =	**136**	**132**	**4**

Source: URS Corp., 2011

The loss of on-street parking on Santa Ana Boulevard, west of Flower Street (between Raitt Street and Flower Street) is an impact that is not considered to be significant. Per the city of Santa Ana Planning staff, every residential unit along this segment of the proposed streetcar alignment has on-site parking capacity consistent with the City's occupancy entitlements. Therefore the loss of 73 on-street parking spaces in this area does not result in a significant impact.

For Streetcar Alternative 1, along Fourth Street between Ross Street and Mortimer Street, there are three proposed Parking Scenarios. Under Fourth Street Parking Scenario A, parking is reconfigured on the south side of Fourth Street. This results in a loss of approximately 21% of the existing parking spaces in this segment. Under Fourth Street Parking Scenario B, parking is removed on the south side of Fourth Street. This results in a loss of approximately 57% of the existing parking spaces in this segment. Under Fourth Street Parking Scenario C, parking is removed and restricted on both the north and south side of Fourth Street. This results in a loss of approximately 97% of the existing parking spaces in this segment. The loss in on-street parking along Fourth Street under Build Alternative 1 is expected to be absorbed in nearby parking structures, including the two parking structures along West Third Street that serve the businesses along West Third Street and West Fourth Street, and other public parking structures located along East and West Fifth Street, including the Fiesta Marketplace parking structures; and potentially in the Orange County Health Care Agency parking structure along West Fifth Street.

The Streetcar Alternative 1 alignment along the proposed route would not impact existing off-street parking facilities within the Study Area, except for 31 spaces in the surface parking lot at the Santa Ana Regional Transportation Center (SARTC). However, it is generally understood that there is adequate excess parking capacity in the SARTC parking structure to absorb for the loss of the 31 surface lot spaces.

Streetcar Alternative 1 proposes an additional 40 to 50 parking spaces at the western terminus of the streetcar at Harbor Boulevard and Westminster Avenue. Proposed access to the station parking would be located at Westminster Avenue between Harbor Boulevard and Nautilus Drive and at Harbor Boulevard just north of Westminster Avenue. Because of the close proximity to the intersection of Harbor Boulevard and Westminster Avenue, both access points to the station parking would most likely have to be "right in/right out only" driveways.

5.3.4 Initial Operable Segment 1 (IOS-1)

Due to funding constraints, it may be necessary to construct Streetcar Alternative 1 in shorter segments. Initial Operable Segment 1 (IOS-1) follows the same alignment as Streetcar Alternative 1, but it terminates at the Raitt Street and Santa Ana Boulevard station rather than extending to Harbor Boulevard and Westminster Avenue. IOS-1 includes the same project features, design options, and parking scenarios as Streetcar Alternative 1 between Raitt Street and SARTC. The following summarizes the different project features for IOS-1.

IOS-1 is the same as Streetcar Alternative 1, except that the western terminus moves to the west side of the intersection of Raitt Street and Santa Ana Boulevard. An interim station parking lot of approximately 51 spaces is proposed at this interim western terminus within the PE ROW. It is anticipated that the interim station parking lot will be removed once the streetcar system extends westward to the intersection of Westminster Avenue and Harbor Boulevard via the PE ROW.

The proposed site configuration includes access to the interim station parking lot to and from Fourth Street and Daisy Avenue. The intersection of Fourth Street and Raitt Street would be configured primarily as an exit only and allows eastbound right turn only movement. Both northbound and southbound traffic along Raitt Street would access the interim station parking lot via Third Street and Second Street to Daisy Avenue.

It is projected that the proposed interim station parking would generate approximately 130 total daily trips based on the ITE Trip Generation, Eighth Edition. Table 5-11 summarizes the projected trips generated by the proposed interim station parking site. Note that the ITE Trip Generation does not include a specific land use for a Streetcar interim station parking, therefore, the light rail transit station with parking was used to generate future trips.

Table 5-11: Trip Generation Summary

Land Use	Qty	Units	Trips Generated				
			Daily Total	AM Peak Hour		PM Peak Hour	
				In	Out	In	Out
Santa Ana Fixed Guideway Station - Raitt Street and Santa Ana Street							
Light Rail Transit Station with Parking (093)	51	Parking Spaces	128.01	45	10	35	25

Source: ITE Trip Generation, 8th Edition

The daily and the peak hour trips were added to the projected 2035 Streetcar Alternative 1 traffic volumes. As a result of the added trips, the following key intersections and roadway segments were analyzed as part of the IOS-1.

- ID #40: Fourth Street/Daisy Avenue
- ID #41: Third Street/Daisy Avenue
- ID #42: Third Street/Raitt Street

Table 5-12 shows the projected intersection Level of Service for each of the 3 study intersections for the 2035 Streetcar IOS 1. Figure 5-3A through 5-3D show the 2035 Streetcar Alternative 1 lane geometrics and AM and PM peak-hour traffic volumes at the 3 study intersections.

Table 5-12: Peak-Hour Intersection Level of Service Results – 2035 Streetcar IOS-1

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control (Streetcar IOS 1)	2035 Streetcar IOS 1 LOS (HCM)**			
					AM Peak		PM Peak	
					Delay (Sec.)	LOS	Delay (Sec.)	LOS
40	4th St	Daisy Ave	1-Way Stop		9.9	A	10.1	A
41	3rd St	Daisy Ave	2-Way Stop		9.5	A	10.1	B
42	3rd St	Raitt St	2-Way Stop		39.5	E	419.5	F

Source: URS Corp., 2011
Notes: Shaded and bold cells indicate LOS E or F.
** HCM analysis conducted for unsignalized intersections

As shown in Table 5-12, the following intersections are expected to operate at a poor level of service (LOS E or F) during either the AM or PM peak hour.

- ID #42: Third Street/Raitt Street – AM and PM Peak Hours

The intersection at Third Street at Raitt Street is shown to operate at poor level of service (LOS E or F) during either the AM or PM peak hour as a result of the existing traffic control at the intersections (unsignalized). Since the intersection is in close proximity to the signalized intersection of Santa Ana Boulevard and Raitt Street (approximately 315 feet south), traffic signal control at the Third/Raitt Street intersection is not recommended.

The 2035 Streetcar IOS-1 roadway segment ADT analysis is presented in Table 5-13. As shown in Table 5-13, all study arterial roadways segments would operate at acceptable LOS.

Table 5-13: Levels of Service for Arterial Street Segments – 2035 Streetcar IOS 1 Conditions

Street	From	To	2035 Streetcar Alt. 1 ADT	No. of Lanes	LOS E Capacity	LOS
Daisy Ave	4th St	3rd St	500	2U	12,500	A
3rd St	Daisy Ave	Raitt St	1,200	2U	12,500	A

Source: URS Corp., 2011
Notes: U – Undivided roadway

5.4 Streetcar Alternative 2: Santa Ana Boulevard / Fifth Street and Civic Center Drive Couplet

This section provides an analysis of 2035 traffic conditions for Streetcar Alternative 2. This alternative is described as follows:

Streetcar Alternative 2 includes construction and implementation of a streetcar rail line between Harbor Boulevard and SARTC. Streetcars would travel east from Harbor Boulevard along the PE ROW, and exit the PE ROW at Raitt Street. Like Alternative 1, Alternative 2 travels along Santa Ana Boulevard in both directions from Raitt Street to Flower Street, then in a couplet configuration on Santa Ana Boulevard/Fifth Street and Civic Center Drive/Sixth Street, from Flower Street to Minter Street. The couplet converges on Sixth Street at Minter Street, where the bi-directional tracks continue on Sixth Street to Poinsettia Street. The bi-directional track than forms a single track loop on Poinsettia Street/Santa Ana Boulevard/Santiago Street/Sixth Street known as the SARTC Loop. Streetcar Alternative 2 is approximately 4.1 miles in length with 25 stations spaced at one-third mile intervals. The following is a list of proposed station locations in Streetcar Alternative 2:

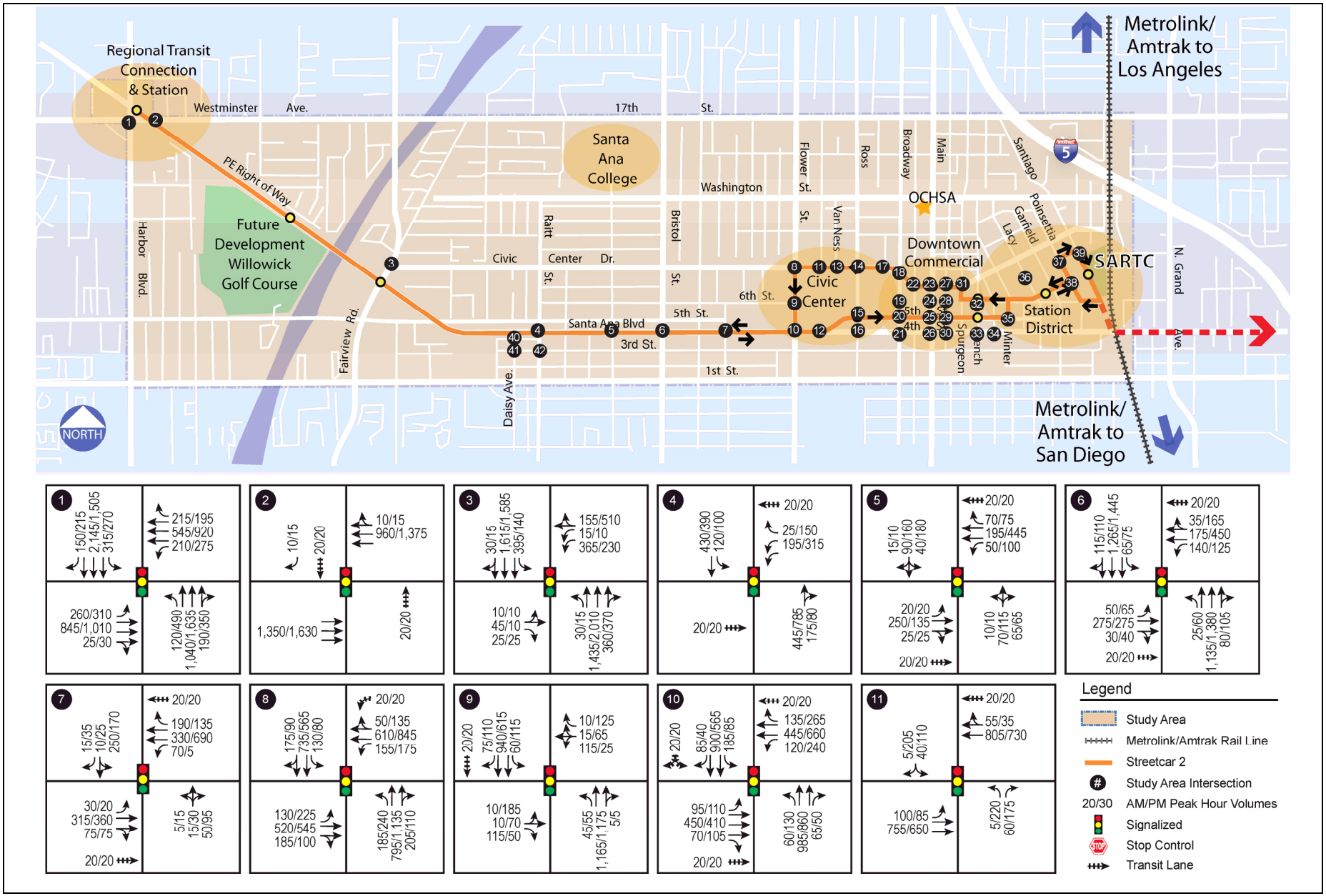
Eastbound	Westbound
1. Harbor Blvd./Westminster Ave.	1. SARTC
2. Willowick	2. Brown St./Lacy St.
3. Fairview St. Santa Ana Blvd.	3. French St./Santa Ana Blvd.
4. Raitt St./Santa Ana Blvd.	4. Main St./Civic Center Dr.
5. Bristol St./Santa Ana Blvd.	5. Broadway/Civic Center Dr.
6. Flower St./Santa Ana Blvd.	6. Van Ness Ave./Civic Center Dr.
7. -------	7. Flower St./Civic Center Dr.
8. Ross St./Santa Ana Blvd.	8. Flower St./6th St.
9. Broadway/5th St.	9. Bristol St./Santa Ana Blvd.
10. Main St./5th St.	10. Raitt St./Santa Ana Blvd.
11. French St./5th St.	11. Fairview St./Santa Ana Blvd.
12. Brown St./Lacy St.	12. Willowick
13. SARTC	13. Harbor Blvd./Westminster Ave.

5.4.1 Intersection Analysis

Figure 5-4A through 5-4D show the 2035 Streetcar Alternative 2 lane geometrics and AM and PM peak hour traffic volumes at the 42 study intersections.

Table 5-14 shows the projected intersection Level of Service for each of the 42 study intersections for the 2035 Streetcar Alternative 2. Intersection LOS were calculated using a combination of methods comprised of the Intersection Capacity Utilization (ICU) method for signalized intersections; and the Highway Capacity Manual (HCM) method for unsignalized intersections – as described in Chapter 2 of this document.

2035 Streetcar Alternative 2 Lane Geometrics and Traffic Volumes (Study Area Intersections 1 through 11)



Source: URS, January 2012

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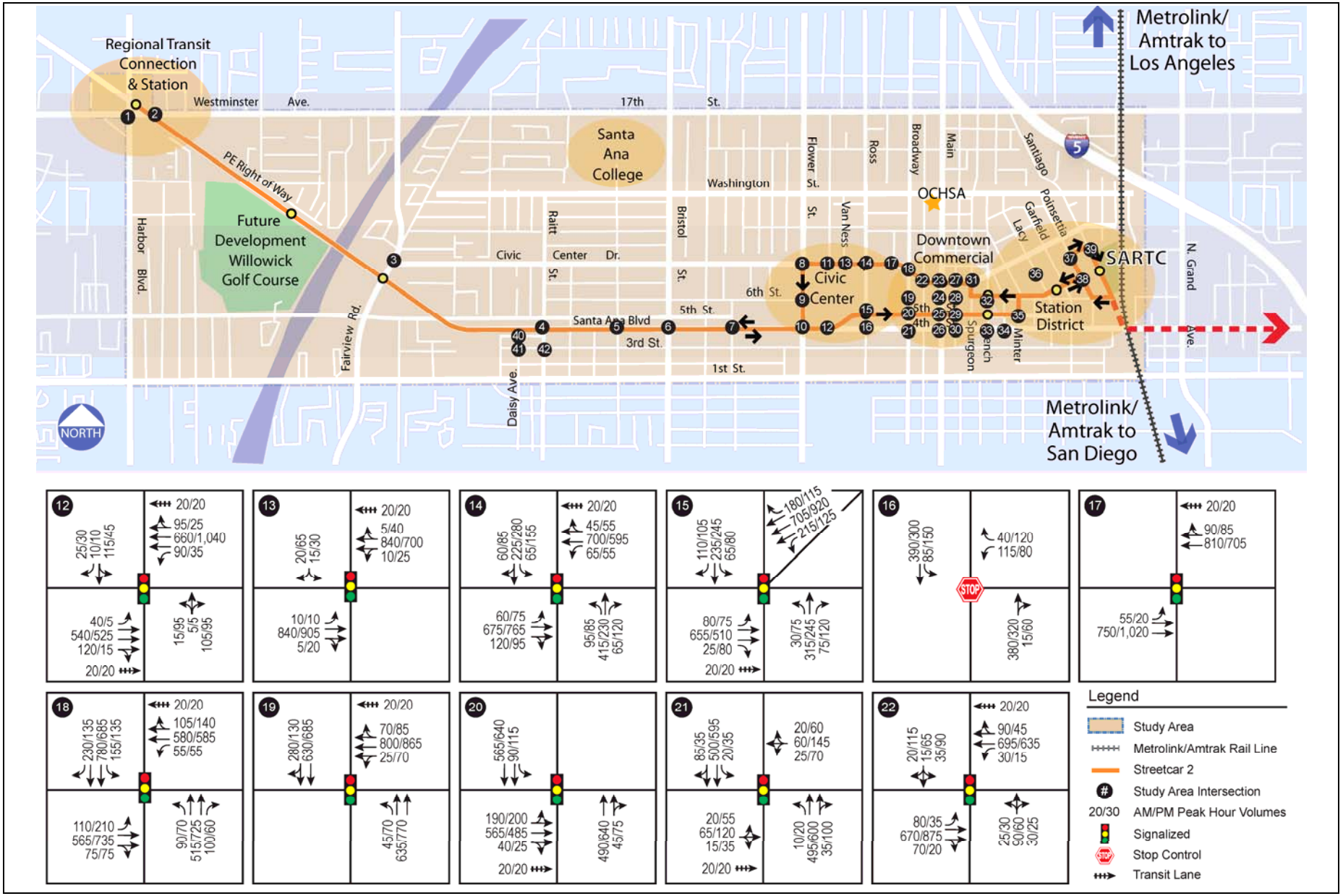
2035 Streetcar Alternative 2 Lane Geometrics and Traffic Volumes (Study Area Intersections 12 through 22)



Source: URS, January 2012

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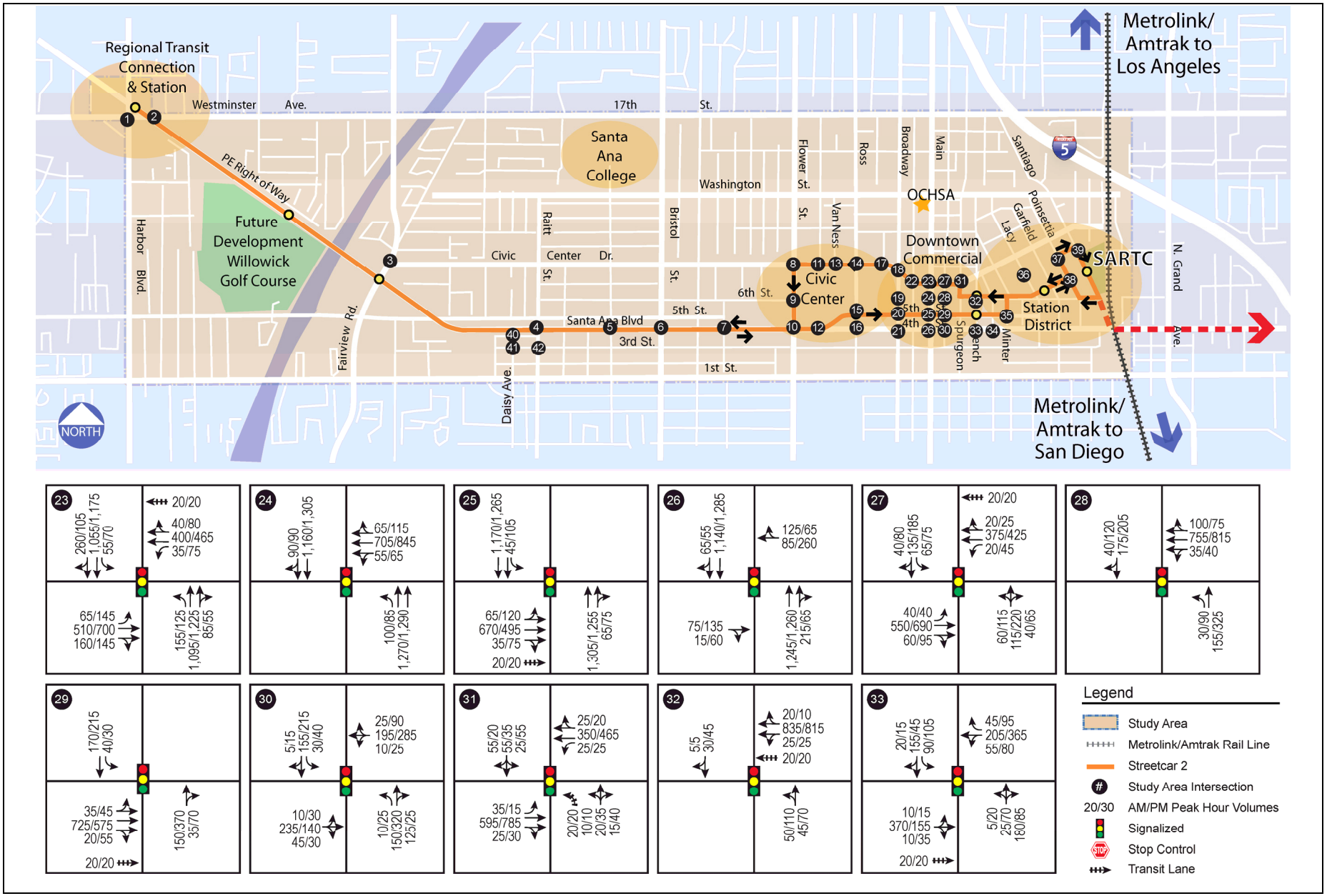
2035 Streetcar Alternative 2 Lane Geometrics and Traffic Volumes (Study Area Intersections 23 through 33)



Source: URS, January 2012

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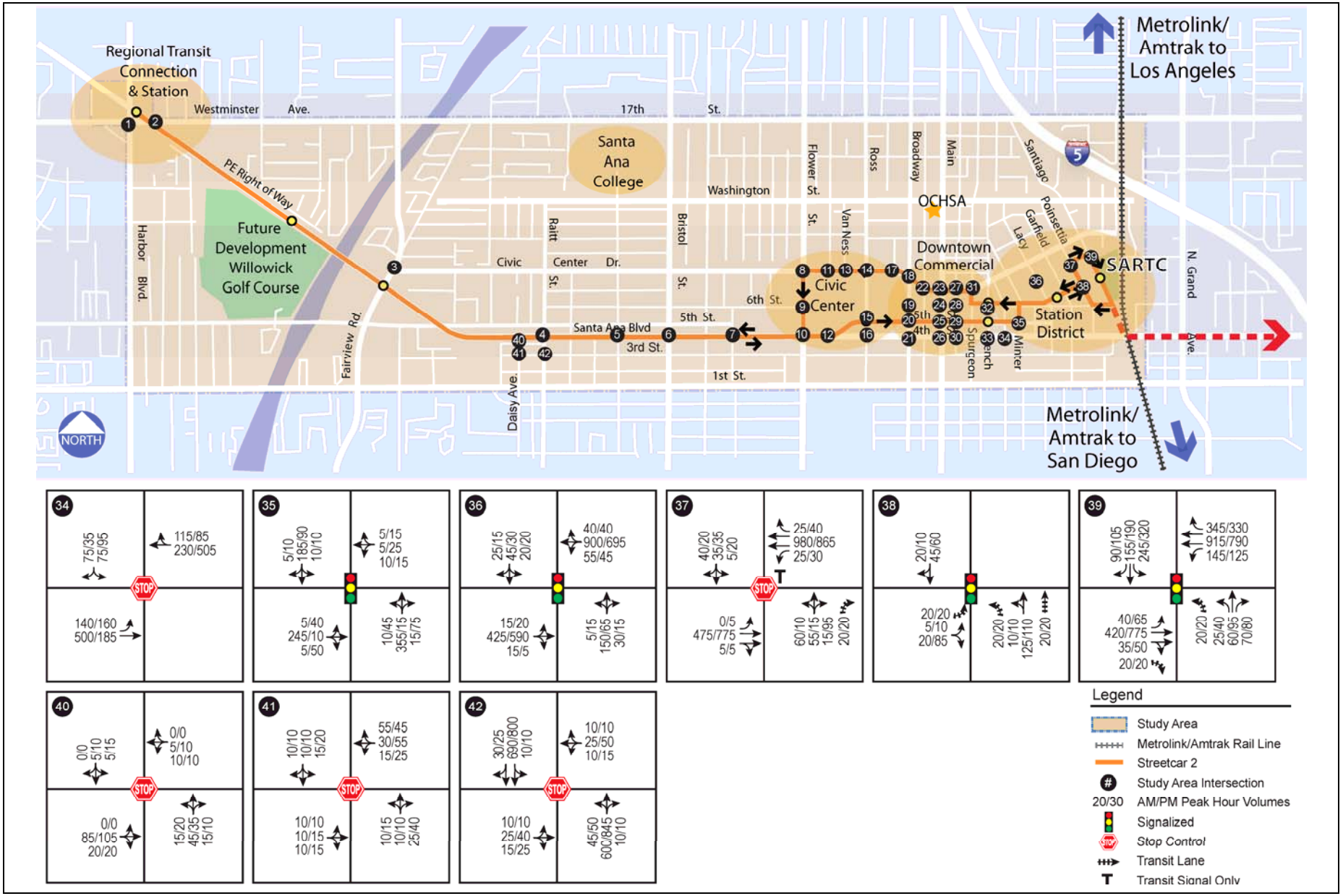
2035 Streetcar Alternative 2 Lane Geometrics and Traffic Volumes (Study Area Intersections 34 through 42)



Source: URS, January 2012

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Table 5-14: Peak-Hour Intersection Level of Service Results – 2035 Streetcar Alternative 2

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control	2035 Streetcar Alt. 2 LOS (HCM)**				2035 Streetcar Alt. 2 LOS (ICU)***			
					AM Peak		PM Peak		AM Peak		PM Peak	
					Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
1	Westminster Ave	Harbor Blvd	Signalized		N/A	N/A	N/A	N/A	0.82	D	1.01	**F**
2	Westminster Ave	Nautilus Dr	1-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.34	A	0.40	A
3	Fairview St	Civic Center Dr	Signalized		N/A	N/A	N/A	N/A	0.73	C	0.89	**D**
4	Santa Ana Blvd	Raitt St	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.55	A	0.72	C
5	Santa Ana Blvd	Pacific Ave	Signalized		N/A	N/A	N/A	N/A	0.25	A	0.41	A
6	Santa Ana Blvd	Bristol St	Signalized		N/A	N/A	N/A	N/A	0.52	A	0.62	B
7	Santa Ana Blvd	Shelton St	Signalized		N/A	N/A	N/A	N/A	0.37	A	0.39	A
8	Flower St	Civic Center Dr	Signalized		N/A	N/A	N/A	N/A	0.75	C	0.90	D
9	Flower St	6th St	Signalized		N/A	N/A	N/A	N/A	0.65	B	0.78	C
10	Santa Ana Blvd	Flower St	Signalized		N/A	N/A	N/A	N/A	0.66	B	0.63	B
11*	Civic Center Dr	Parton St	Signalized		N/A	N/A	N/A	N/A	0.41	A	0.66	B
12*	Santa Ana Blvd	Civic Center Plaza/ Parton St	Signalized		N/A	N/A	N/A	N/A	0.46	A	0.43	A
13*	Civic Center Dr	Van Ness Ave	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.34	A	0.42	A
14*	Civic Center Dr	Ross St	Signalized		N/A	N/A	N/A	N/A	0.61	B	0.61	B
15*	Santa Ana Blvd	Ross St	Signalized		N/A	N/A	N/A	N/A	0.61	B	0.48	A
16*	4th St	Ross St	1-Way Stop		27.9	D	18.9	C	N/A	N/A	N/A	N/A
					N/A	N/A	N/A	N/A	0.41	A	0.44	A
17*	Civic Center Dr	Ped Xing	Signalized		N/A	N/A	N/A	N/A	0.35	A	0.35	A
18*	Civic Center Dr	Broadway	Signalized		N/A	N/A	N/A	N/A	0.61	B	0.70	B
19*	Santa Ana Blvd	Broadway	Signalized		N/A	N/A	N/A	N/A	0.66	B	0.62	B
20*	5th St	Broadway	Signalized		N/A	N/A	N/A	N/A	0.54	A	0.62	B
21*	4th St	Broadway	Signalized		N/A	N/A	N/A	N/A	0.29	A	0.44	A
22*	Civic Center Dr	Sycamore St	Signalized		N/A	N/A	N/A	N/A	0.42	A	0.48	A
23*	Civic Center Dr	Main St	Signalized		N/A	N/A	N/A	N/A	0.75	C	0.80	C
24*	Santa Ana Blvd	Main St	Signalized		N/A	N/A	N/A	N/A	0.69	B	0.76	C
25*	5th St	Main St	Signalized		N/A	N/A	N/A	N/A	0.68	B	0.66	B
26*	4th St	Main St	Signalized		N/A	N/A	N/A	N/A	0.60	B	0.64	B

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control	2035 Streetcar Alt. 2 LOS (HCM)**				2035 Streetcar Alt. 2 LOS (ICU)***			
					AM Peak		PM Peak		AM Peak		PM Peak	
					Delay (Sec.)	LOS	Delay (Sec.)	LOS	ICU	LOS	ICU	LOS
27*	Civic Center Dr	Bush St	Signalized		N/A	N/A	N/A	N/A	0.43	A	0.59	A
28*	Santa Ana Blvd	Bush St	Signalized		N/A	N/A	N/A	N/A	0.42	A	0.54	A
29*	5th St	Bush St	Signalized		N/A	N/A	N/A	N/A	0.40	A	0.50	A
30*	4th St	Bush St	Signalized		N/A	N/A	N/A	N/A	0.40	A	0.51	A
31*	Civic Center Dr	Spurgeon	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.33	A	0.37	A
32*	Santa Ana Blvd/6th St	French St	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.65	B	0.73	C
33*	4th St	French St	Signalized		N/A	N/A	N/A	N/A	0.46	A	0.48	A
34*	4th St	Mortimer St	1-Way Stop		16.3	C	17.4	C	N/A	N/A	N/A	N/A
35*	5th St	Minter St	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.44	A	0.20	A
36	Santa Ana Blvd	Lacy St	2-Way Stop	**Signalized**	N/A	N/A	N/A	N/A	0.74	C	0.56	A
37*	Santa Ana Blvd	Poinsettia St	2-Way Stop	**Transit Signal**	26.0	D	19.9	C	N/A	N/A	N/A	N/A
38	Brown St	Poinsettia St	Uncontrolled	**Signalized**	N/A	N/A	N/A	N/A	0.18	A	0.25	A
39*	Santa Ana Blvd	Santiago St	Signalized		N/A	N/A	N/A	N/A	0.54	A	0.63	B
40	4th St	Daisy Avenue	1-Way Stop	**IOS-2**	9.9	A	10.1	A	N/A	N/A	N/A	N/A
41	3rd St	Daisy Avenue	2-Way Stop	**IOS-2**	9.5	A	10.1	B	N/A	N/A	N/A	N/A
42	3rd St	Raitt St	2-Way Stop	**IOS-2**	39.9	E	177.4	F	N/A	N/A	N/A	N/A

Source: URS Corp., 2011

Notes: Shaded and bold cells indicate LOS E or F

* Intersections located in MDA's (Intersections 11 - 35, 37, and 39)

** HCM analysis conducted for unsignalized intersections

*** ICU analysis conducted for signalized intersections

As shown in Table 5-14, the following intersections are expected to operate at a poor level of service (LOS E or F) during either the AM or PM peak hour.

- ID # 1: Westminster Avenue/Harbor Boulevard – PM Peak Hours
- ID #42: Third Street/Raitt Street – AM and PM Peak Hours (IOS-2 Only)

Compared to No Build Conditions, the intersections at Santa Ana Boulevard at Raitt Street and Civic Center Drive at Spurgeon Street are shown to operate at an acceptable LOS D or better when the intersections are signalized as part of Streetcar Alternative 2. Also, under Streetcar Alternative 2, Civic Center Drive at Flower Street is shown to improve from LOS C/E to LOS C/D during the AM and PM peak hour, respectively, when compared to No Build Conditions.

The analysis of the intersection at Fairview Street and Civic Center Drive includes the Project Design Feature to add an extra left-turn lane on the southbound approach.

The intersection at Third Street at Raitt Street only applies to the Streetcar Initial Operable Segment 2 (IOS-2). Further detail and discussion is provided at the end of this section.

5.4.2 Roadway Segment Analysis

The 2035 Streetcar Alternative 2 roadway segment ADT analysis is in Table 5-15. The following locations would potentially experience capacity deficiencies under 2035 conditions:

- Fifth Street from Hawley Street to Raitt Street
- Fourth Street from Main Street to Mortimer Street
- Raitt Street from Fifth Street to Third Street
- Main Street from Eighth Street to Third Street
- Fairview Street from Civic Center Drive to Fifth Street

The segments that show deficient LOS experience the same LOS under the No Build scenario. Therefore, there would not be an impact. Also note that the roadway segment along Bristol Street shows improvement from LOS E to LOS B as result of the proposed widening from existing four-lane to six-lane divided roadway, as part of the City of Santa Ana General Plan. All other arterial roadways segments would operate at acceptable LOS.

Table 5-15: Peak-Hour Intersection Level of Service Results – 2035 Streetcar Alternative 2

Street	From	To	2035 Streetcar Alt. 2 ADT	No. of Lanes	LOS E Capacity	LOS
Santa Ana Blvd.	Raitt St	Western Ave	12,400	4U	25,000	B
	Western Ave	Forest St	12,400	4U	25,000	B
	Forest St	Pacific Ave	12,400	4U	25,000	B
	Pacific Ave	Hesperian St	12,200	4U	25,000	B
	Hesperian St	Bristol St	12,200	4U	25,000	B
	Bristol St	Baker St	11,800	4U	25,000	B
	Baker St	Shelton St	11,800	4U	25,000	B
	Shelton St	Flower St	11,800	4D	37,500	A
	Flower St	Parton St	14,600	6D	56,300	A
	Parton St	Ross St	14,400	6D	56,300	A
	Ross St	Broadway	13,300	3D	28,150	A
	Broadway	Sycamore St	10,800	3D	28,150	A
	Sycamore St	Main St	10,800	3D	28,150	A
	Main St	Bush St	10,600	3D	28,150	A
	Bush St	Spurgeon St	10,800	3D	28,150	A
	Spurgeon St	French St	10,800	3D	28,150	A
	French St	Mortimer St	16,000	2D	18,750	D
	Mortimer St	Minter St	16,400	2D	18,750	D
	Minter St	Lacy St	16,700	2D	18,750	D
	Lacy St	Garfield St	16,600	4D	37,500	A
	Garfield St	Poinsettia St	16,800	4D	37,500	A
	Poinsettia St	Santiago St	16,700	4D	37,500	A
5th St	Hawley St	Sunset St	14,400	2U	12,500	**F**
	Sunset St	English St	14,400	2U	12,500	**F**
	English St	Townsend St	14,400	2U	12,500	**F**
	Townsend St	Daisy Ave	14,400	2U	12,500	**F**
	Daisy Ave	Fairlawn St	14,400	2U	12,500	**F**
	Fairlawn St	Raitt St	14,300	2U	12,500	**F**
	Ross St	Broadway	10,200	3D	28,150	A
	Broadway	Sycamore St	10,200	3D	28,150	A
	Sycamore St	Main St	9,900	3D	28,150	A
	Main St	Bush St	7,400	3D	28,150	A
5th St (cont.)	Bush St	Spurgeon St	7,400	3D	28,150	A
	Spurgeon St	French St	7,400	3D	28,150	A
	French St	Mortimer St	5,400	3D	28,150	A
	Mortimer St	Minter St	2,500	2U	12,500	A
4th St	Townsend St	Daisy Ave	1,300	2U	12,500	A
	Daisy Ave	Raitt St	1,300	2U	12,500	A
	Ross St	Birch St	8,000	2U	12,500	B
	Birch St	Broadway	8,000	2U	12,500	B
	Broadway	Sycamore St	8,000	2U	12,500	B
	Sycamore St	Main St	8,100	2U	12,500	B
	Main St	Bush St	14,300	2U	12,500	**F**
	Bush St	Spurgeon St	14,400	2U	12,500	**F**
	Spurgeon St	French St	14,400	2U	12,500	**F**
	French St	Mortimer St	14,400	2U	12,500	**F**
6th/Brown	French St	Mortimer St	1,000	2U	12,500	A
	Mortimer St	Minter St	1,300	2U	12,500	A
	Minter St	Lacy St	800	2U	12,500	A
	Lacy St	Garfield St	1,100	2U	12,500	A
	Garfield St	Poinsettia St	500	2U	12,500	A

Street	From	To	2035 Streetcar Alt. 2 ADT	No. of Lanes	LOS E Capacity	LOS
Civic Center Dr	Flower St	Parton St	20,300	4D	37,500	A
	Parton St	Van Ness Ave	20,200	4D	37,500	A
	Van Ness Ave	Ross St	20,200	4D	37,500	A
	Ross St	Birch St	17,600	4D	37,500	A
	Birch St	Broadway	17,600	4D	37,500	A
	Broadway	Sycamore St	18,400	4D	37,500	A
	Sycamore St	Main St	18,300	4D	37,500	A
	Main St	Bush St	13,600	4D	37,500	A
	Bush St	Spurgeon St	13,600	4D	37,500	A
Raitt St	5th St	Santa Ana Blvd	16,900	2U	12,500	**F**
	Santa Ana Blvd	3rd St	17,800	2U	12,500	**F**
Pacific Ave	5th St	Santa Ana Blvd	2,800	2U	12,500	A
	Santa Ana Blvd	3rd St	2,900	2U	12,500	A
Bristol St	5th St	Santa Ana Blvd	38,500	6D	56,300	B
	Santa Ana Blvd	3rd St	38,500	6D	56,300	B
Shelton St	5th St	Santa Ana Blvd	4,800	2D	18,750	A
	Santa Ana Blvd	3rd St	2,100	2U	12,500	A
Flower St	10th St	Civic Center Dr	21,400	4D	37,500	A
	Civic Center Dr	Santa Ana Blvd	22,000	4D	37,500	A
	Santa Ana Blvd	3rd St	15,100	4D	37,500	A
Ross St	10th St	Civic Center Dr	7,000	2D	18,750	A
	Civic Center Dr	Santa Ana Blvd	6,900	2D	18,750	A
	Santa Ana Blvd	4th St	7,300	2D	18,750	A
	4th St	3rd St	7,400	2D	18,750	A
Broadway	10th St	Civic Center Dr	27,800	4D	37,500	C
	Civic Center Dr	Santa Ana Blvd	22,400	4D	37,500	A
	Santa Ana Blvd	4th St	19,300	4D	37,500	A
	4th St	3rd St	18,900	4D	37,500	A
Sycamore St	10th St	Civic Center Dr	3,100	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	2,400	2U	12,500	A
	Santa Ana Blvd	4th St	1,200	2U	12,500	A
	4th St	3rd St	1,200	2U	12,500	A
Main St	8th St	Civic Center Dr	37,000	4D	37,500	**E**
	Civic Center Dr	Santa Ana Blvd	37,200	4D	37,500	**E**
	Santa Ana Blvd	5th St	37,200	4D	37,500	**E**
	5th St	4th St	37,300	4U	25,000	**F**
	4th St	3rd St	33,000	4U	25,000	**F**
Bush St	8th St	Civic Center Dr	4,200	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	4,300	2U	12,500	A
	Santa Ana Blvd	5th St	3,700	2D	18,750	A
	5th St	4th St	3,500	2U	12,500	A
	4th St	3rd St	4,700	2U	12,500	A
Spurgeon St	8th St	Civic Center Dr	2,000	2U	12,500	A
	Civic Center Dr	Santa Ana Blvd	1,400	2U	12,500	A
	Santa Ana Blvd	5th St	1,400	2U	12,500	A
	5th St	4th St	1,400	2U	12,500	A
French St	Civic Center Dr	Santa Ana Blvd	900	2U	12,500	A
	Santa Ana Blvd	5th St	1,400	2U	12,500	A
	5th St	4th St	3,300	2U	12,500	A
	4th St	3rd St	4,000	2U	12,500	A
Mortimer St	N/A	N/O Santa Ana Blvd	600	2U	12,500	A
	Santa Ana Blvd	6th St	5,000	2U	12,500	A
	6th St	5th St	4,800	2U	12,500	A

Street	From	To	2035 Streetcar Alt. 2 ADT	No. of Lanes	LOS E Capacity	LOS
	5th St	4th St	3,800	2U	12,500	A
Minter St	Civic Center Dr	Santa Ana Blvd	1,700	2U	12,500	A
	Santa Ana Blvd	6th St	4,700	2U	12,500	A
	6th St	5th St	5,300	2U	12,500	A
	5th St	4th St	5,400	2U	12,500	A
Lacy St	Civic Center Dr	Santa Ana Blvd	2,700	2U	12,500	A
	Santa Ana Blvd	6th St/Brown St	2,800	2U	12,500	A
	6th St/Brown St	5th St	2,400	2U	12,500	A
Garfield	Civic Center Dr	Santa Ana Blvd	1,800	2U	12,500	A
	Santa Ana Blvd	Brown St	3,500	2U	12,500	A
	Brown St	6th St	3,200	2U	12,500	A
	6th St	5th St	3,800	2U	12,500	A
Poinsettia St	Civic Center Dr	Santa Ana Blvd	2,100	2U	12,500	A
	Santa Ana Blvd	Brown St	1,800	2U	12,500	A
	Brown St	6th St	1,800	2U	12,500	A
	6th St	5th St	2,100	2U	12,500	A
Santiago St	Civic Center Dr	Santa Ana Blvd	9,800	2U	12,500	C
	Santa Ana Blvd	6th St	7,400	2U	12,500	B
Fairview St	Civic Center Dr	5th St	57,000	6D	56,300	**F**
Westminster Ave	Harbor Blvd	Enterprise Dr	44,700	6D	56,300	C
Daisy Ave	4th St	3rd St	500	2U	12,500	A
3rd St	Daisy Ave	Raitt St	1,200	2U	12,500	A

Source: URS Corp., 2011

Notes: D – divided roadway U – Undivided roadway Shaded and bold cells indicate LOS E or F

5.4.3 Parking Analysis

Existing on-street parking spaces that could potentially be impacted along the Streetcar 2 Alternative are presented in Table 5-16. These tables summarize the approximate total existing on-street parking spaces and the total lost after the implementation of the streetcar alignment routes. Note that this is an estimated total parking space as it is based on the assumption of an average vehicle length of 20 feet (per parallel parking stall) over the length of the existing designated on-street parking segments. This is a "planning-level" analysis, not a detailed parking inventory, observation, and analysis. Parking availability length does not include driveways, emergency parking (red curb), or clearly identified restricted parking. See Table 5-7 for summary of on-street parking spaces along Santa Ana Boulevard between Raitt Avenue and Flower Street.

Table 5-16: On-Street Parking Spaces – Downtown Segment (Streetcar Alt. 2)

Road	Segment	Direction	Existing Spaces	Streetcar Alt. 2	
				Lost	Remain
Santa Ana Blvd	Spurgeon St to French St	North Side	8	5	3
5th St	Ross St to Broadway	South Side	5	5	0
	Broadway to Sycamore St	South Side	4	2	2
	Sycamore St to Main St	South Side	3	0	3
	Main St to Bush St	South Side	0	0	0
	Bush St to Spurgeon St	South Side	0	0	0
	Spurgeon St to French St	South Side	0	0	0
	French St to Mortimer St	North Side	3	0	3
		South Side	0	-3	3
	Mortimer St to Minter St	North Side	9	0	9
		South Side	9	3	6
Minter St	6th St to 5th St	East Side	10	6	4
		West Side	10	0	10
6th St	French St to Mortimer St	North Side	4	0	4
	Mortimer St to Minter St	North Side	10	0	10
		South Side	10	0	10
	Minter St to Porter St	North Side	8	0	8
		South Side	10	0	10
	Porter St to Lacy St	North Side	7	0	7
		South Side	10	0	10
Brown St	Lacy St to Garfield St	North Side	13	6	7
		South Side	9	5	4
	Garfield St to Poinsettia St	North Side	13	6	7
		South Side	13	6	7
Poinsettia St	Santa Ana Blvd to Brown St	East Side	12	0	12
		West Side	17	0	17
	Brown St to 6th St	East Side	0	-7	7
		West Side	11	0	11
Spurgeon St	Civic Center Dr to Santa Ana Blvd	East Side	7	1	6
		West Side	4	0	4
		TOTAL =	**219**	**35**	**184**

Existing on-street parking spaces would be maintained or eliminated as a result of the implementation of the streetcar alignment routes. Similar to the Streetcar 1 Alternative, the majority of the parking spaces lost (approximately 51%) are along Santa Ana Boulevard west of Flower Street, and other losses are due to locations where streetcar platforms are proposed, and where the streetcar turns to an adjacent cross street.

The Streetcar Alternative 2 alignment along the proposed route would not impact any existing off-street parking facilities within the Study Area. Similar to Streetcar Alternative 1, Streetcar Alternative 2 proposes an additional 40 to 50 parking spaces at the western terminus of the streetcar at Harbor Boulevard and Westminster Avenue. Proposed access to the parking lot would be located at Westminster Avenue between Harbor Boulevard and Nautilus Drive and at Harbor Boulevard just north of Westminster Avenue. Because of the close proximity to the

intersection of Harbor Boulevard and Westminster Avenue, both access points to the station parking would most likely have to be "right in/right out only" driveways.

5.4.4 Initial Operable Segment 2 (IOS-2)

Due to funding constraints, it may be necessary to construct Streetcar Alternative 2 in shorter segments. Initial Operable Segment 2 (IOS-2) follows the same alignment as Streetcar Alternative 2, but it terminates at the Raitt Street and Santa Ana Boulevard station rather than extending to Harbor Boulevard and Westminster Avenue. IOS-2 includes the same project features, design options, and parking scenarios as Streetcar Alternative 2 between Raitt Street and SARTC. The following summarizes the different project features for IOS-2.

IOS-2 is the same as Streetcar Alternative 2, except that the western terminus moves to the west side of the intersection of Raitt Street and Santa Ana Boulevard. An interim station parking lot of approximately 51 spaces is proposed at this interim western terminus within the PE ROW. It is anticipated that the interim station parking lot will be removed once the streetcar system extends westward to the intersection of Westminster Avenue and Harbor Boulevard via the PE ROW.

Similar to IOS-1, the proposed site configuration includes access to the interim station parking lot to and from Fourth Street and Daisy Avenue. The intersection of Fourth Street and Raitt Street would be configured primarily as an exit only and allows eastbound right turn only movement. Both northbound and southbound traffic along Raitt Street would access the interim station parking lot via Third Street and Second Street to Daisy Avenue.

Similar to IOS-1, it is projected that the proposed interim station parking would generate approximately 130 total daily trips based on the ITE Trip Generation, Eighth Edition. Table 5-17 summarizes the projected trips generated by the proposed interim station parking site. Note that the ITE Trip Generation does not include a specific land use for a Streetcar interim station parking, therefore, the light rail transit station with parking was used to generate future trips.

Table 5-17: Trip Generation Summary

Land Use	Qty	Units	Trips Generated				
			Daily Total	AM Peak Hour		PM Peak Hour	
				In	Out	In	Out
Santa Ana Fixed Guideway Station - Raitt Street and Santa Ana Street							
Light Rail Transit Station with Parking (093)	51	Parking Spaces	128.01	45	10	35	25

Source: ITE Trip Generation, 8th Edition

The daily and the peak hour trips were added to the projected 2035 Streetcar Alternative 2 traffic volumes. As a result of the added trips, the following key intersections and roadway segments were analyzed as part of the IOS-2.

- ID #40: Fourth Street/Daisy Avenue
- ID #41: Third Street/Daisy Avenue
- ID #42: Third Street/Raitt Street

Table 5-18 shows the projected intersection Level of Service for each of the 3 study intersections for the 2035 Streetcar IOS 2. Figure 5-4A through 5-4D show the 2035 Streetcar Alternative 2 lane geometrics and AM and PM peak-hour traffic volumes at the 3 study intersections

Table 5-18: Peak-Hour Intersection Level of Service Results – 2035 Streetcar IOS 2

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control (Streetcar IOS 2)	2035 Streetcar IOS 2 LOS (HCM) **			
					AM Peak		PM Peak	
					Delay (Sec.)	LOS	Delay (Sec.)	LOS
40	4th St	Daisy Ave	1-Way Stop		9.9	A	10.1	A
41	3rd St	Daisy Ave	2-Way Stop		9.5	A	10.1	B
42	3rd St	Raitt St	2-Way Stop		39.9	E	177.4	**F**

Source: URS Corp., 2011

Notes: Shaded and bold cells indicate LOS E or F

** HCM analysis conducted for unsignalized intersections

Table 5-18 shows the projected intersection Level of Service for each of the 3 study intersections for the 2035 Streetcar IOS 2. Figure 5-4A through 5-4D show the 2035 Streetcar Alternative 2 lane geometrics and AM and PM peak-hour traffic volumes at the 3 study intersections.

As shown in Table 5-18, the following intersections are expected to operate at a poor level of service (LOS E or F) during either the AM or PM peak hour.

- ID #42: Third Street/Raitt Street – AM and PM Peak Hours

The intersections at Third Street at Raitt Street which are shown to operate at poor level of service (LOS E or F) during either the AM and PM peak hour are a result of the existing traffic control at the intersections (unsignalized). Since the intersections is in close proximity (approximately 315 feet south) to the intersection of Santa Ana Street and Raitt Street, in terms of traffic signal operations, a propose signal control at this intersections is not recommended.

The 2035 Streetcar IOS 2 roadway segment ADT analysis is presented in Table 5-18. As shown in Table 5-19, all study arterial roadways segments would operate at acceptable LOS.

Table 5-19: Levels of Service for Arterial Street Segments – 2035 Streetcar IOS 2 Conditions

Street	From	To	2035 Streetcar Alt. 2 ADT	No. of Lanes	LOS E Capacity	LOS
Daisy Ave	4th St	3rd St	500	2U	12,500	A
3rd St	Daisy Ave	Raitt St	1,200	2U	12,500	A

Source: URS Corp., 2011

Note: U – Undivided roadway

5.5 Summary of Grade Crossing Impacts and Improvements

Under both Streetcar alternatives (Streetcar Alternative 1 and Streetcar Alternative 2), there are three proposed grade crossings west of Raitt Street. They are located on Westminster Avenue just east of Harbor Boulevard, on Fairview Street just south of Civic Center Drive, and on Fifth Street just west of Hawley Street.

Proposed improvements for the two grade crossings, located in the vicinity of Fairview Street at Civic Center Drive and Fifth Street at Hawley Street, include railroad crossing or traffic signal controls, as well as proposed raised medians on both approaches.

The proposed improvements for the crossing in the vicinity of Harbor Boulevard at Westminster Avenue includes grade-separated tracks, a proposed transit overpass bridge would span over Westminster Avenue into the proposed western terminus station located on the northeast quadrant of Harbor Boulevard and Westminster Avenue, which would preclude the need for a new traffic signal at the intersection of Nautilus Drive and Westminster Avenue.

As discussed later in Chapter 6, the queuing analysis indicates that westbound vehicle queues at the intersection of Westminster Avenue and Harbor Boulevard will not extend beyond the streetcar grade crossing at Nautilus Drive. However, northbound vehicle queues at the intersection of Fairview Street and Civic Center Drive will extend beyond the streetcar crossing on Fairview Street, just south of Civic Center Drive. The grade crossing on Fifth Street just west of Hawley Street is not located near an adjacent signalized intersection; therefore, it does not require queuing analysis.

Even though the vehicle queue at the intersection of Fairview Street and Civic Center Drive is projected to extend beyond the streetcar crossing at Fairview Street, proposed railroad and traffic signal control improvements that include signal coordination should provide sufficient clearance time for these vehicles to clear the proposed grade crossings. Both grade crossings may require further safety enhancements such as pre-signals or queue cutters to ensure vehicles do not stop on tracks. Pre-signals and queue cutters are additional traffic signal enhancements at or in advance of the grade crossing that facilitate clearance of the grade crossing prior to a rail vehicle crossing event.

5.5.1 Initial Operable Segment (IOS) Grade Crossings

Under an Initial Operable Segment operation the three grade crossings discussed above – Westminster Avenue just east of Harbor Boulevard, on Fairview Street just south of Civic Center Drive, and on Fifth Street just west of Hawley Street – would be eliminated, at least for the initial operating period. Once the full streetcar Build is implemented, these three grade crossings will then be part of the overall system.

5.6 Impacts to Public Transportation Services

Impacts of the proposed project on bus transit in the project Study Area are largely considered to be enhancements in service, service frequency and connectivity. Either of the streetcar Build Alternatives will most likely supplant the current Stationlink Route 462 service. It is currently anticipated that there would be no other reductions in transit service in the Study Area as a result of implementation of the Project. The streetcar would provide more frequent service throughout the day than the Stationlink service. The streetcar service would not just concentrate on the AM and PM peak hours, as does the current Stationlink service. The increased frequency spread throughout the day will be an enhancement for Amtrak patrons, as well as patrons of the intercity, interstate, and international bus services that may have arrivals and departures outside of the typical AM and PM peak periods. It is also anticipated that the proposed streetcar Build Alternatives would provide more connections to other OCTA local fixed route service along the selected streetcar alignment than the current Stationlink service. At this time, there are no adverse impacts on bus or rail transit in the project Study Area anticipated from implementation of the Project.

5.7 Impacts to Non-motorized Travel

5.7.1 Pedestrian Travel

There are no significant impacts to pedestrian travel anticipated in the project Study Area from implementation of the Project. Generally speaking, current pedestrian access will remain available with implementation of the Build Alternatives. Local residents, employees, and visitors will need to exercise appropriate precautions when walking in the vicinity of the streetcars in operation, but this should not differ from walking in the vicinity of a roadway with active vehicle traffic.

Some minor alteration, or deviation in pedestrian circulation will likely occur at some of the station platform areas but these impacts would be expected to be minor, and localized. All of the station area improvements would be required to adhere to all applicable Americans with Disabilities Act (ADA) provisions to ensure accessibility to and around the proposed stations.

There is potential for pedestrian impacts at the stations located in close proximity to the schools along the proposed streetcar alignments at school arrival and departure times. Those impacts may include pedestrian crossing issues and vehicle weaving issues in front of the schools that may impact pedestrians in localized areas. Parking lot ingress/egress issues may

occur at school arrival and departure times that may also impact pedestrians in concentrated areas. The potential issues associated with proximity to schools are not anticipated to be significant, especially if additional recommended signing and public education measures are employed to mitigate any anticipated issues.

As is noted in the construction-related impacts section below, construction will take place on, or in very close proximity to the sidewalks of the roadways on which the streetcar is being constructed. Some sidewalk closures will be inevitable. Sidewalk closures will generally be limited to the areas immediately surrounding the proposed streetcar stations. Construction-related impacts that affect pedestrian travel, which are expected to be temporary, are expected to include the following:

- Periodic and/or intermittent closure of roadway sidewalks, resulting in restricted pedestrian travel due to construction related activities.
- Periodic and/or intermittent loss or reduction of parking resulting in restricted access to business and residences due to construction related activities.
- Short term, temporary blockage of driveways and limited access to businesses and residences in the immediate vicinity of active construction activities.

Every effort will be made to minimize or eliminate adverse impacts related to construction of the streetcar system. Once a detailed construction staging plan is developed, a traffic management plan (TMP) will be prepared that will also identify impacts to pedestrian travel in the vicinity of construction activities and will propose detours or alternate travel routes for pedestrians.

Since the primary impacts to pedestrian travel that result from implementation of the Project are related to construction activities, mitigation measures for pedestrian-related impacts are offered in the Construction-related Mitigation section of this document.

5.7.2 Bicycle Travel

There are no significant impacts to bicycle travel anticipated in the project Study Area from implementation of the Project. Currently, there are no officially designated bike lanes (Class II bike lanes) or bike routes (Class III bike routes) on any of the proposed street-running portions of the Build Alternatives of the Project. This being the case, there will be no removal of existing on-street bike facilities with implementation of the Project. However, bicyclists do ride the streets and sidewalks of the project Study Area regardless of the placement of any officially designated bike lanes or bike route designations. Adverse impacts to bicycle travel in the proposed project area is expected to be minimal. Special attention will need to be paid by bicyclists riding in the streets in close proximity to the rails in the streets. Bicyclists should, to the greatest degree possible, cross the rails at a right angle to the rails to avoid getting bicycle tires caught in the grooves in the pavement where the rails are placed in the street. Bicyclists will need to exercise appropriate precautions when riding in the vicinity of the streetcars in operation, but this should be nothing different from riding in the vicinity of a

roadway with active vehicle traffic. Bicyclists using sidewalks in the vicinity of a streetcar station will be subjected to the same minor alterations, or deviation in circulation due to the placement of stations in close proximity to, or adjacent to the sidewalks.

Build Alternative 2 includes the placement of on-street bike lanes on Civic Center Drive between Spurgeon Street and Flower Street. If selected and implemented, this bike lane will be an enhancement to bicycle travel in the Civic Center area. There is potential for a Class I bikeway to be implemented with construction of the proposed project. The Class I bikeway running along the banks of the Santa Ana River in the Study Area is not expected to be impacted except during construction activities, which will be temporary.

As is noted in the construction-related impacts section below, construction will generally take place in the right-most travel lane, in the direction of travel, of the roadways on which the streetcar is being constructed. Lane closures will be inevitable. Although there are no existing bike lanes on any of the proposed Build Alternative alignments, these lane closures will no doubt impact bicycle travel on the alignment roadways. Construction-related impacts that affect bicycle travel, which are expected to be temporary, are expected to include the following:

- Periodic and/or intermittent closure of roadway travel lanes, resulting in reduced roadway capacity, due to construction related activities.
- Periodic and/or intermittent closure of roadway sidewalks, resulting in restricted pedestrian and/or bicycle travel due to construction related activities.
- Short term, temporary blockage of driveways and limited access to businesses and residences in the immediate vicinity of active construction activities.
- Increased heavy vehicle traffic, related to construction activities.
- Potential for temporary diversion of traffic from primary travel routes in the construction area, into residential areas, and other secondary travel routes.

Every effort will be made to minimize or eliminate adverse impacts related to construction of the streetcar system. Once a detailed construction staging plan is developed, a traffic management plan (TMP) will be prepared that will also identify impacts to bicycle travel in the vicinity of construction activities and will propose detours or alternate travel routes for bicycle travel.

Since the primary impacts to bicycle travel that result from implementation of the Project are related to construction activities, mitigation measures for bicycle-related impacts are offered in the Construction-related Mitigation section of this document.

5.8 Station Parking

Station parking is anticipated to be provided at only two stations; at each endpoint of the proposed Streetcar line (Harbor Boulevard/Westminster Avenue station and Santa Ana Regional Transportation Center [SARTC]). It is anticipated that all intermediate stations will be accessed by residents, employees, and visitors on foot and from other modes of transit

(bus and rail), and not via automobile. It is possible that some individuals will drive to the Civic Center area and utilize the Streetcar system but, according to current ridership forecasts, this is not expected to be a typical mode of commuting.

5.9 Station Area Transportation-Related Impacts

In general, the primary impact expected in the areas surrounding the streetcar stations is an increase in pedestrian activity around the station areas. Sidewalks are currently present on both sides of all streets of the proposed streetcar alignments, with one exception; an approximately 300-foot-long segment of Sixth Street, near Santiago Street, in which there is a sidewalk on the north side of the street but not on the south side of the street. It is not anticipated that any significant effort will be required to provide or improve pedestrian access to the streetcar station areas, except as needed to ensure Americans with Disabilities Act (ADA) compliance and public safety.

The station area impacts are discussed below in the following three groupings: Western Terminus, Eastern Terminus, and Intermediate Stations.

Western Terminus

Under Streetcar Alternative 1, 26 directional stations[4] are proposed, to be spaced at approximately one-third mile intervals.

The Project includes a grade separated rail crossing at Westminster Avenue with the tracks returning to the approximate grade of the surrounding area for placement of a station with boarding platforms adjacent to Harbor Boulevard, just north of Westminster Avenue. This configuration would include "right in, right out only" access to the parking lot to and from both Westminster Avenue and Harbor Boulevard. Approximately 20 to 30 parking spaces would be provided depending on the final configuration and design of the grade separation and station area. The most distant parking space from the station platform area would be approximately 425 feet. It is anticipated that the parking lot will be fully utilized on a regular basis.

Given the high level of ridership on the two OCTA fixed route bus lines that intersect at this location (Route 43 – Harbor Boulevard; and Route 60 – Westminster Avenue), it is anticipated that the primary mode of access to this station will be via bus transit. Pedestrian access will also make up a meaningful proportion of the activity (boardings and alightings) at this station. The primary expected impact at the Harbor Boulevard/Westminster Avenue (western terminus) station will be an increase in pedestrian activity at the intersection.

[4] Because of the couplet configuration of parts of the alignments of the of the two Streetcar Alternatives, the stations are designated as "directional" to distinguish between a westbound station at a given cross street, versus an eastbound station at the same cross street, but which may be separated by two or three city blocks.

A secondary impact will be an increase in U-turns at the intersection of Harbor Boulevard and Westminster Avenue due to the anticipated "right-in/right-out only" vehicle access to this station parking lot. However, given the relatively small number of parking spaces anticipated to be available, even the U-turn impact is expected to be insignificant.

Eastern Terminus

The precise configuration of the eastern terminus of the proposed system has not yet been selected. Two design options are under consideration as part of the environmental review of the project. It is generally understood that a streetcar station platform/boarding area will be located adjacent to the Santa Ana Regional Transportation Center (SARTC), on the west side of the SARTC property.

Under Streetcar Alternative 1, the streetcar station will be located on the same side of Santiago Street as SARTC. This configuration will effectively confine streetcar patrons to the SARTC property if they are transferring from other rail and bus services to the streetcar. Under Alternative 1, streetcar patrons that live and work in the area will need to cross Santiago Street and / or Santa Ana Boulevard to access the streetcar system.

Under Streetcar Alternative 2, the streetcar station will be located across Santiago Street from SARTC (on the west side of Santiago Street). This will require streetcar patrons transferring from other rail and bus services to the streetcar to cross Santiago Street. The impact of this increased pedestrian activity at the intersection of Santiago Street and Santa Ana Boulevard is not expected to be significant, as traffic volumes are not particularly high, and the Level of Service is forecast to be in the A and B range.

It is not anticipated that the streetcar system will attract a significant volume of vehicle traffic, or commuters using SARTC as a park-and-ride to access the streetcar system on a routine basis. It is anticipated that streetcar patrons will come primarily from Metrolink and Amtrak, and secondarily from other local and intercity bus services that also utilize SARTC. Under Streetcar Alternative 1, there will be a loss of approximately 31 spaces in the surface lot at SARTC but it is generally understood that the parking structure at SARTC currently has adequate capacity to absorb the 31 lost surface lot spaces and the insignificant number of streetcar patrons expected use SARTC as a park-and-ride to access the streetcar.

Intermediate Stations

Increased pedestrian activity is anticipated to be the primary transportation-related station area impact at the intermediate stations, between SARTC and the Harbor Boulevard/Westminster Avenue intersection. Parking is not being provided at any of the intermediate streetcar stations.

It is not anticipated that commuters would routinely drive to an intermediate station area for the exclusive purpose of accessing the streetcar system. It is generally understood that there is ample parking capacity in surface parking lots and parking structures to accommodate the anticipated small number of streetcar patrons that may drive to the downtown area to access

the streetcar system. The streetcar is expected to be used a feeder/distributor for Metrolink and Amtrak patrons, and as a local circulator in the downtown Santa Ana area. Approximately half of the street-running alignments are proposed to operate in a couplet configuration (i.e. two one-way alignments, separated by one to three city blocks). This separation of stations by direction of travel tends to dilute pedestrian activity at a given station in the areas of couplet configuration.

5.9.1 Initial Operable Segment Station Area Transportation-Related Impacts

Under an Initial Operable Segment (IOS) operation (both IOS 1 and 2), all of the station area transportation-related impacts remain the same with the exception of the Raitt Street/Santa Ana Boulevard station and the Harbor Boulevard/Westminster Avenue station. Under both IOS scenarios, the western terminus of the streetcar system becomes the Raitt Street/Santa Ana Boulevard station. Under both of the full Build Alternatives there is no parking provided at the Raitt Street/Santa Ana Boulevard station. Under both IOS scenarios temporary station parking (approximately 50 spaces) is provided at the Raitt Street/Santa Ana Boulevard station, fully within the confines of the PE ROW. This would be a temporary condition that would last as long as the streetcar system operates under the IOS scenario. Once construction on a full Build Alternative is commenced, the temporary station parking would be displaced by the extension of the streetcar tracks in the PE ROW.

Access to the station parking will be from two driveways on the north side of Fourth Street, west of Raitt Street, on the southern edge of the PE ROW. The primary access point will be at the intersection of Daisy Avenue and Fourth Street. This temporary station parking arrangement will create some additional traffic in the neighborhood adjacent to the station parking access point. The neighborhood is a mix of residential use, with some industrial and retail use. The traffic related impacts of the temporary station parking at the Raitt Street/Santa Ana Boulevard station are summarized in sections 5.3.4 and 5.4.4.

Another exception to the station area transportation-related impacts under an IOS operating scenario is the temporary lack of a station at Harbor Boulevard/Westminster Avenue. The mostly pedestrian-related impacts at this station will not evolve until a full Build Alternative is implemented. Additionally, the grade separated crossing of Westminster Avenue would not be implemented in an IOS operating scenario.

5.10 Suggested Routes to Schools

Related to increased pedestrian activity at the intermediate stations, as was discussed in more detail in the Pedestrian Access subsection of this report, there are currently three elementary schools located directly adjacent to the proposed project alignments. The proposed Santa Ana Boulevard/Bristol Street streetcar station is located in close proximity to Carver Elementary School and Romero-Cruz Elementary School. The proposed streetcar station on Brown Street between Lacy Street and Garfield Street is located directly in front of the main entrance area of the Garfield Elementary School.

There is potential for impacts at the stations located in close proximity to the schools at school arrival and departure times. Those impacts may include pedestrian crossing issues and vehicle weaving in front of the schools. Parking lot ingress/egress issues may also occur at school arrival and departure times.

5.11 Construction-related Impacts

In general, all construction of tracks will be within the existing PE ROW, existing streets, or proposed future streets. The construction period is anticipated to be approximately 30 months, with major activities to be completed within the first 24-month period. Hours of construction will generally be limited to 7:00 A.M. to 5:00 P.M., Monday through Friday. Night construction will be permitted to lessen traffic impacts if it results in no disruption to the residents.

It is anticipated that the construction activities will be staged and sequenced based on location and types of construction. The likely staging of the project will include 4-5 segments to allow for construction crews to work in sequence, moving one team to a new location while the next team takes over the next set of activities. It is also anticipated that construction impacts will be fairly localized for the duration of the construction activities. Widespread disruptions to circulation in the streetcar construction area are not anticipated.

It is expected that construction will generally take place in the right-most travel lane, in the direction of travel, of the roadways on which the streetcar is being constructed. Construction will also take place on, or in very close proximity to the sidewalks of the roadways on which the streetcar is being constructed. Lane closures will be inevitable, as will some sidewalk closures. Sidewalk closures will generally be limited to the areas immediately surrounding the proposed streetcar stations.

- Construction-related impacts, which are expected to be temporary, are expected to include the following:
- Periodic and/or intermittent closure of roadway travel lanes, resulting in reduced roadway capacity, due to construction related activities.
- Periodic and/or intermittent closure of roadway sidewalks, resulting in restricted pedestrian travel due to construction related activities.
- Periodic and/or intermittent loss or reduction of parking resulting in restricted acces to business and residences due to construction related activities.
- Short term, temporary blockage of driveways and limited access to businesses and residences in the immediate vicinity of active construction activities.
- Increased heavy vehicle traffic, related to construction activities.
- Increased noise in the vicinity of construction related activities.
- Potential for temporary diversion of traffic from primary travel routes in the construction area, into residential areas, and other secondary travel routes.
- Wherever the streetcar alignment crosses a perpendicular street, operations of the entire intersection will be adversely impacted on a temporary basis.

The duration of roadway disruption due to installation of rails in the roadbed will depend to varying degrees on the construction material specified and the method of construction.

Every effort will be made to minimize or eliminate adverse impacts related to construction of the streetcar system. Once a detailed construction staging plan is developed, a traffic management plan (TMP) will be prepared that will strive to reduce the disruption to commuter traffic during construction and alternate routes will be identified. The TMP will also identify impacts to bicycle and pedestrian travel in the vicinity of construction activities and will propose detours or alternate travel routes for bicyclists and pedestrians. Some mitigation measures are proposed in the Mitigation section of this document.

5.12 Operations and Maintenance Facility (O&M) Impacts

In general terms, the operations and maintenance facility (O&M) will be used to store and maintain the streetcar vehicles when they are not in use. The site will need to accommodate a building that houses both maintenance and administrative functions; provide for off-street employee parking; and provide for various functions such as outside storage of system components, vehicle washing, and local requirements for landscaping and visual screening.

There are two alternate proposed sites for the supporting O&M facility. O&M facility Site A is located at the east end of the proposed project south of the existing SARTC. Vehicular access to the site would primarily be off Sixth Street and/or Fourth Street. O&M facility Site B is located west of Raitt Street between Fifth Street and the PE ROW. Vehicular access to site B would primarily be off Fifth Street and possibly off the future roadway improvements on the PE ROW.

In terms of traffic, both O&M facility sites would accommodate off-street parking of approximately 25 spaces within the proposed site layout. It is assumed that approximately 25 employees would report to the O&M facility site throughout the day. These employees would be a mix of maintenance employees and streetcar operators. Assuming each employee drives alone, this would equate to approximately a maximum of 25 daily trips entering and/or exiting the site. The majority of these trips are projected to be generated by employees working at the site and depending on the employee work hours and work shifts, projected peak hour trips of 15 or less can be assumed.

For the O&M facilities, the typical employee day shift would run from 7:00 AM to 3:30 PM and the typical night shift would run from 11:00 PM to 7:30 AM. During the day shift peak period between 7:00 am and 9:00 am, it is estimated that 60% of day shift employees would arrive at the O&M facility, and 100% of night shift employees would leave the O&M facility in the AM peak hour. This equates to approximately 8 inbound trips and 7 outbound trips for a total of 15 trips during the AM peak hour. The number of trips during the PM peak hour would be approximately 7 outbound trips, and 8 inbound trips. Other employees would report to the facility at off peak hour times. Neither the AM nor the PM peak hour trips generated by/from the O&M facilities would be considered significant. The number of trips generated by/from the O&M facilities outside of the AM and PM peak periods would also not be

considered significant. Therefore; the proposed O&M sites would have no adverse localized traffic impacts.

In terms of construction related traffic impacts during the construction phase of the O&M facility, construction traffic generated by the employees as well as truck traffic that are utilized to haul construction materials to and from the site can be scheduled to operate only during non-peak hours. These trips would be considered a temporary condition that would last only the duration of construction activities. A detailed construction staging plan and a traffic management plan (TMP) will be prepared that will strive to reduce the disruption to localized traffic during construction. The TMP for the O&M facility can be a chapter of a larger TMP to address construction-related impacts of the streetcar system as a whole.

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Chapter 6 Intersection Queuing Analysis

This section evaluates projected queuing for existing and 2035 Streetcar Alternatives 1 and 2 conditions at Fairview Street/Civic Center Drive intersections. Under the Streetcar Alternative 1 and 2 conditions, at-grade streetcar crossing is proposed adjacent to Fairview Street/Civic Center Drive intersection.

The predicted maximum queue lengths (in feet) are calculated in Synchro, and are shown by approach movement at each Study Area intersection, by AM and PM peak-hour, in the queuing calculation worksheets contained in Appendix E. Figure 6-1 illustrate the spacing distance between the Fixed Guideway intersection and Fairview Street at Civic Center Drive. Table 6-1, Table 6-2 and Table 6-3 present the existing conditions and the projected 2035 conditions for Streetcar Alternatives 1 and 2 conditions by identifying whether adequate storage is provided for each of the movements, separated by the 50th and 95th percentile queue lengths, or in other words, the average traffic volume (50th percentile) and 95 percent of the expected traffic volumes per approach, respectively. Shading in the tables below identifies where and when storage capacity at the intersection is insufficient for demand. The addition of double asterisks further identifies where and when the queue lengths are almost met (within 50 feet of the available storage, or approximately 2 car lengths).

As shown in the intersection queuing analysis tables (Table 6-1, Table 6-2 and Table 6-3), the Fairview Street/Civic Center Drive intersection for which queuing analysis was performed have at least one movement in the peak hour with insufficient storage for the projected demand. The following summarizes movements in the peak hour with insufficient storage for Existing Conditions and for the two 2035 Streetcar Alternatives:

Movement with Insufficient Storage under Existing Conditions:

Fairview Street at Civic Center Drive:

- Northbound through
- Southbound left turn
- Eastbound through

Movement with Insufficient Storage under 2035 Streetcar Alternative 1 and 2 Conditions:

Fairview Street at Civic Center Drive:

- Northbound and Eastbound through
- Southbound left turn

Table 6-1: Intersection Queuing Analysis – Existing Conditions

Intersection/Movement	% Queue	Storage (ft.)	Existing AM	Existing PM	Storage Sufficient?
3. Fairview St / Civic Center Dr					
Fairview St NB Left-turn	50th	415	a 25	a 25	Yes
	95th		m 26	ma 25	Yes
Fairview St NB Through	50th	200	106	227	**No****
	95th		137	279	**No**
Fairview St SB Left-turn	50th	140	186	55	**No****
	95th		m 216	m 69	**No**
Fairview St SB Through	50th	1000	211	280	Yes
	95th		234	286	Yes
Civic Center Dr EB Through	50th	85	36	a 25	Yes
	95th		# 112	27	**No****
Civic Center Dr EB Right-turn	50th	85	a 25	a 25	Yes
	95th		28	28	Yes
Civic Center Dr WB Left-turn	50th	250	136	80	Yes
	95th		215	142	Yes

Source: URS Corp., 2011

Notes:
# = 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m = Volume for 95th percentile queue is metered by upstream signal.
a = Minimum queue is 25'.
** = Queue lengths exceeds storage by 50' or less.

Table 6-2: Intersection Queuing Analysis – 2035 Streetcar Alt. 1 Conditions

Intersection/Movement	% Queue	Storage (ft.)	2035 Streetcar Alt. 1 AM	2035 Streetcar Alt. 1 PM	Storage Sufficient?
3. Fairview St / Civic Center Dr					
Fairview St NB Left-turn	50th	415	25	a 25	Yes
	95th		58	36	Yes
Fairview St NB Through	50th	200	562	~ 986	**No**
	95th		# 685	# 1077	**No**
Fairview St SB Left-turn	50th	140	~ 484	115	**No**
	95th		m# 588	m 154	**No**
Fairview St SB Through	50th	1000	547	536	Yes
	95th		m 578	589	Yes
Civic Center Dr EB Through	50th	85	~ 70	a 25	Yes
	95th		# 164	# 54	**No**
Civic Center Dr EB Right-turn	50th	85	a 25	a 25	Yes
	95th		29	33	Yes
Civic Center Dr WB Left-turn	50th	250	149	92	Yes
	95th		233	155	Yes

Source: URS Corp., 2011

Notes:
~ = Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
# = 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m = Volume for 95th percentile queue is metered by upstream signal.
a = Minimum queue is 25'.

Table 6-3: Intersection Queuing Analysis – 2035 Streetcar Alt. 2 Conditions

Intersection/Movement	% Queue	Storage (ft.)	2035 Streetcar Alt. 2 AM	2035 Streetcar Alt. 2 PM	Storage Sufficient?
3. Fairview St / Civic Center Dr					
Fairview St NB Left-turn	50th	415	25	a 25	Yes
	95th		58	38	Yes
Fairview St NB Through	50th	200	566	~ 998	**No**
	95th		# 690	# 1089	**No**
Fairview St SB Left-turn	50th	140	~ 475	107	**No**
	95th		m# 531	m 147	**No**
Fairview St SB Through	50th	1000	544	121	Yes
	95th		m 534	223	Yes
Civic Center Dr EB Through	50th	85	~ 70	a 25	Yes
	95th		# 164	# 47	**No**
Civic Center Dr EB Right-turn	50th	85	a 25	a 25	Yes
	95th		29	30	Yes
Civic Center Dr WB Left-turn	50th	250	154	92	Yes
	95th		240	155	Yes

Source: URS Corp., 2011

Notes:
~ = Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
# = 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m = Volume for 95th percentile queue is metered by upstream signal.
a = Minimum queue is 25'.

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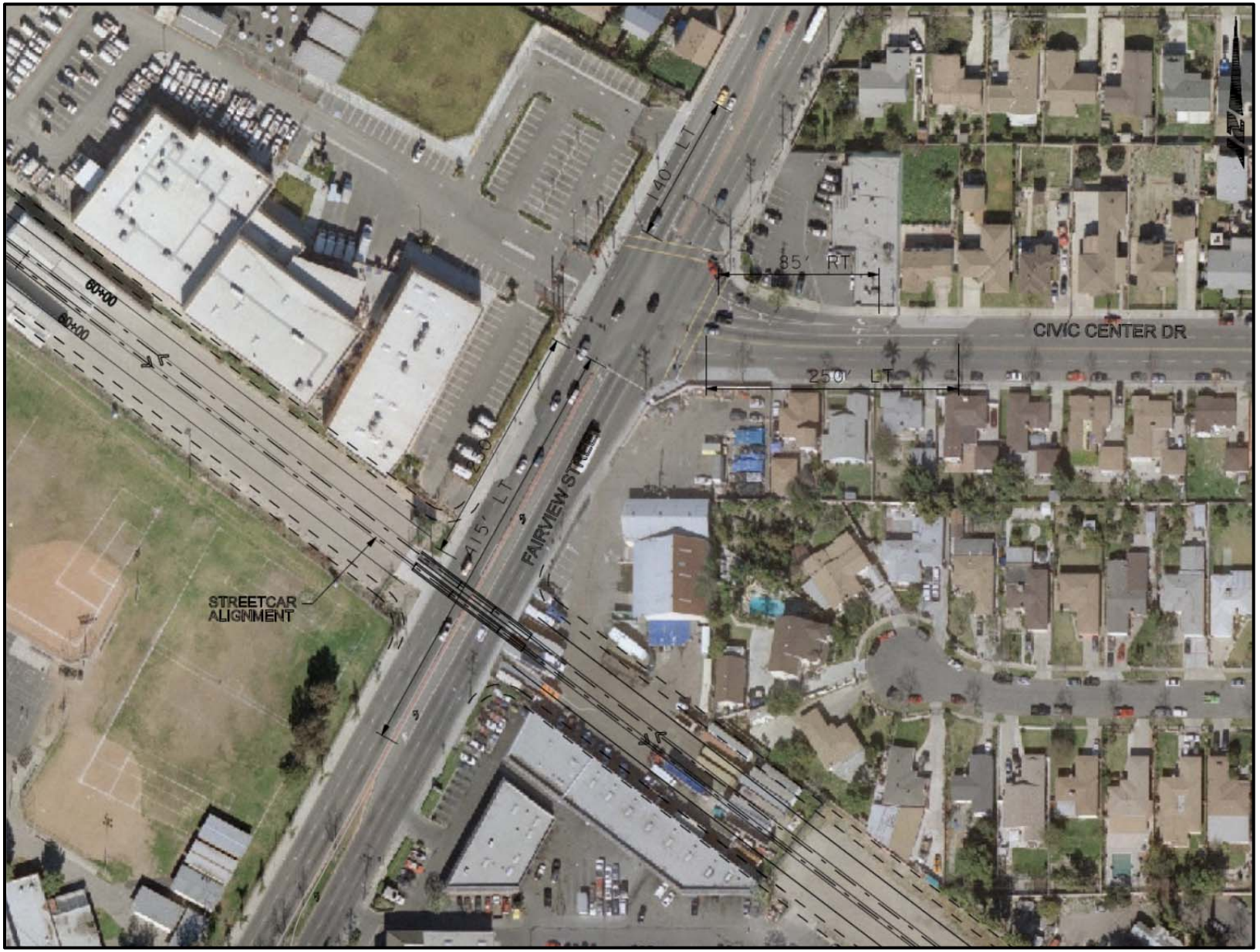
Intersection Spacing Between Fixed Guideway Xing and Fairview St at Civic Center Dr



Source: URS Corporation, 2011

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Chapter 7 Travel Forecasting

This section discusses and analyzes the arterial roadway performance measures as shown below for existing and future scenarios:

- Vehicle Hours Traveled
- Vehicle Miles Traveled

These performance measures are objective, quantifiable criteria used to evaluate the performance of the transportation system and to determine how well the planned improvements to the system are achieving the established objectives.

The following data provides the performance measure results from OCTA's Orange County. Transportation Analysis Model (OCTAM) version 3.3 for the arterial roadway segments on which the streetcar system is proposed to operate, as well as arterial roadways that cross the streetcar alignments for daily total, and AM and PM peak periods, in the northbound, southbound, eastbound, and westbound directions.

7.1 Vehicle Hours Traveled

The vehicle hours traveled represents the arterial roadway segment travel time multiplied by the number of vehicles on that segment. The travel time is based on the individual segment travel time values produced by the model.

Table 7-1 shows the vehicle hours traveled for each alternative by peak period and direction for the arterial roadway segments parallel and adjacent to the proposed streetcar alignments. The total daily vehicle hours traveled is also shown. This data reveals that the vehicle hours traveled for daily and both peak periods during 2035 TSM Conditions are higher than 2035 No Build. During both Streetcar Alternative Conditions, it shows that vehicle hours traveled for daily and both peak periods are lower than 2035 No Build. This indicates that the proposed project is shifting trips from the arterial roadways with the proposed streetcar routes to adjacent arterial roadways. This modal shift is reducing the vehicle hours traveled by placing trips on less congested arterial roadways or changing mode of access by increasing transit or pedestrian trips within in the Study Area. Figure 7-1 depicts this data and illustrates the reduction in vehicle hours traveled under 2035 Build Conditions for the arterial roadway segments parallel and adjacent to the proposed streetcar alignments. No appreciable change in Vehicle Hours Traveled is anticipated in 2035 in either of the Initial Operable Segment (IOS) operating scenarios.

Table 7-1: Vehicle Hours Traveled

Alternatives	AM Peak Period				PM Peak Period				Daily Total
	NB	SB	EB	WB	NB	SB	EB	WB	
2005 Baseline	282	357	267	214	427	374	265	316	3,535
2035 No Build	332	456	389	243	538	427	288	435	4,246
2035 TSM	333	473	407	241	532	428	289	446	4,276
2035 Streetcar Alt. 1	332	460	390	239	536	428	286	442	4,241
2035 Streetcar Alt. 2	332	467	391	240	527	423	283	418	4,212

Source: URS Corp., 2011

Notes: NB – Northbound; SB – Southbound; EB – Eastbound; WB – Westbound

7.2 Vehicle Miles Traveled

The vehicle miles traveled represents the arterial roadway segment travel mile multiplied by the number of vehicles on that segment. The travel mile is based on the individual segment travel miles values produced by the model.

Table 7-2 shows the vehicle miles traveled for each alternative by peak period and direction for the arterial roadway segments parallel and adjacent to the proposed streetcar alignments. The total daily vehicle miles traveled is also shown. This data reveals that the vehicle miles traveled for daily and both peak periods during 2035 TSM, and Streetcar Alternatives 1 Conditions are higher than 2035 No Build. The vehicle miles traveled for daily and both peak periods during Streetcar Alternatives 2 Conditions are lower than 2035 No Build. Overall, during both 2035 Streetcar Alternative Conditions, there are fewer projected vehicle trips and local transit trips and/or pedestrian trips are either maintained or increased as a result of the proposed project. Figure 7-2 depicts this data and illustrates the reduction in total daily vehicle miles traveled under 2035 streetcar alternative Conditions for the arterial roadway segments parallel and adjacent to the proposed streetcar alignments. No appreciable change in Vehicle Miles Traveled is anticipated in 2035 in either of the Initial Operable Segment (IOS) operating scenarios.

Table 7-2: Vehicle Miles Traveled

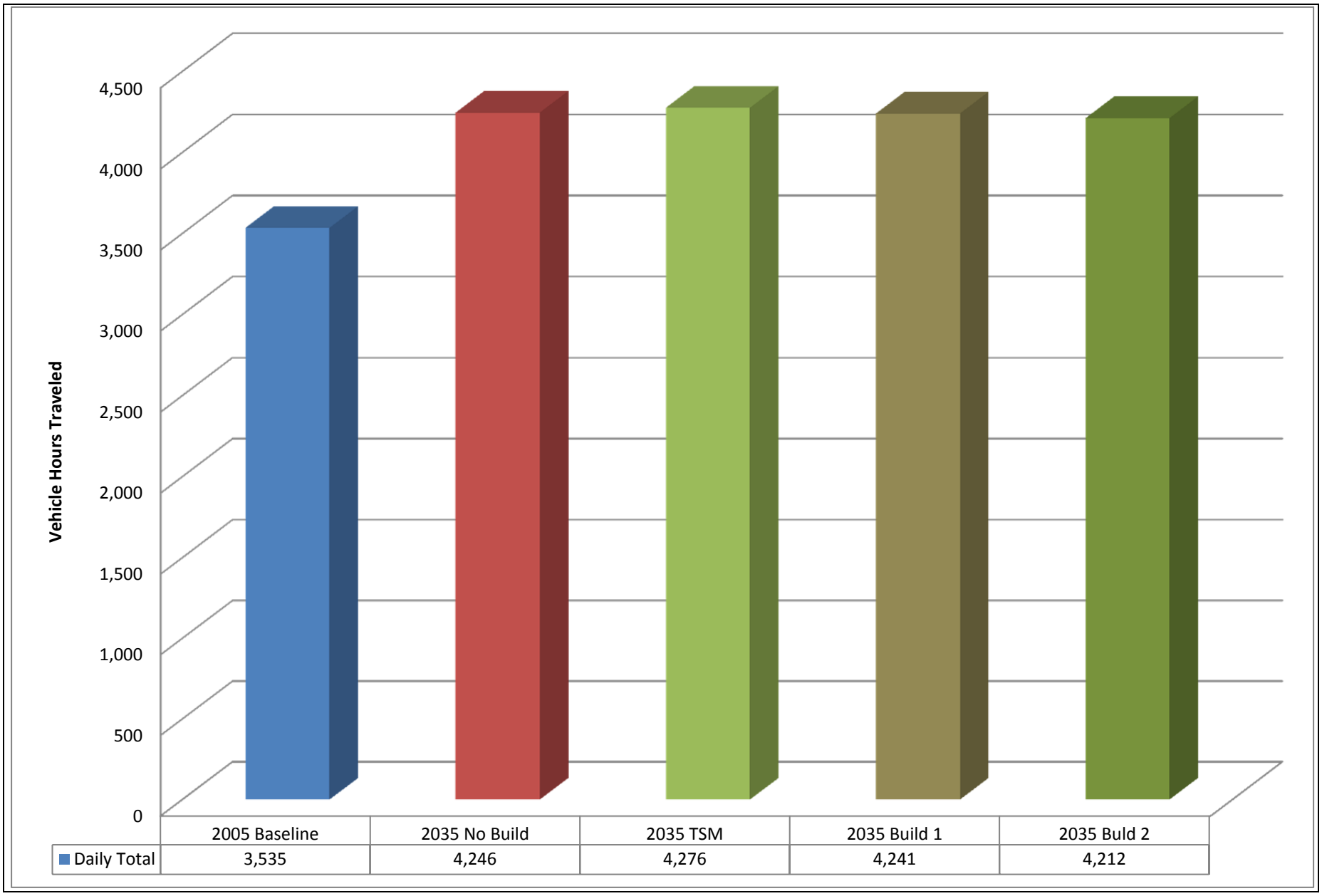
Alternatives	AM Peak Period				PM Peak Period				Daily Total
	NB	SB	EB	WB	NB	SB	EB	WB	
2005 Baseline	8,107	9,793	8,543	6,742	12,111	10,918	8,654	10,341	110,268
2035 No Build	9,394	11,771	11,398	7,576	14,463	12,511	9,439	13,392	128,393
2035 TSM	9,401	11,942	11,707	7,529	14,393	12,471	9,432	13,601	129,007
2035 Streetcar Alt. 1	9,385	11,869	11,428	7,498	14,426	12,495	9,356	13,549	128,467
2035 Streetcar Alt. 2	9,430	11,959	11,471	7,555	14,350	12,391	9,280	12,994	127,913

Source: URS Corp., 2011

Notes: NB – Northbound; SB – Southbound; EB – Eastbound; WB – Westbound

Figure 7-1

Daily Vehicle Hours Traveled



Source: URS Corporation, 2011

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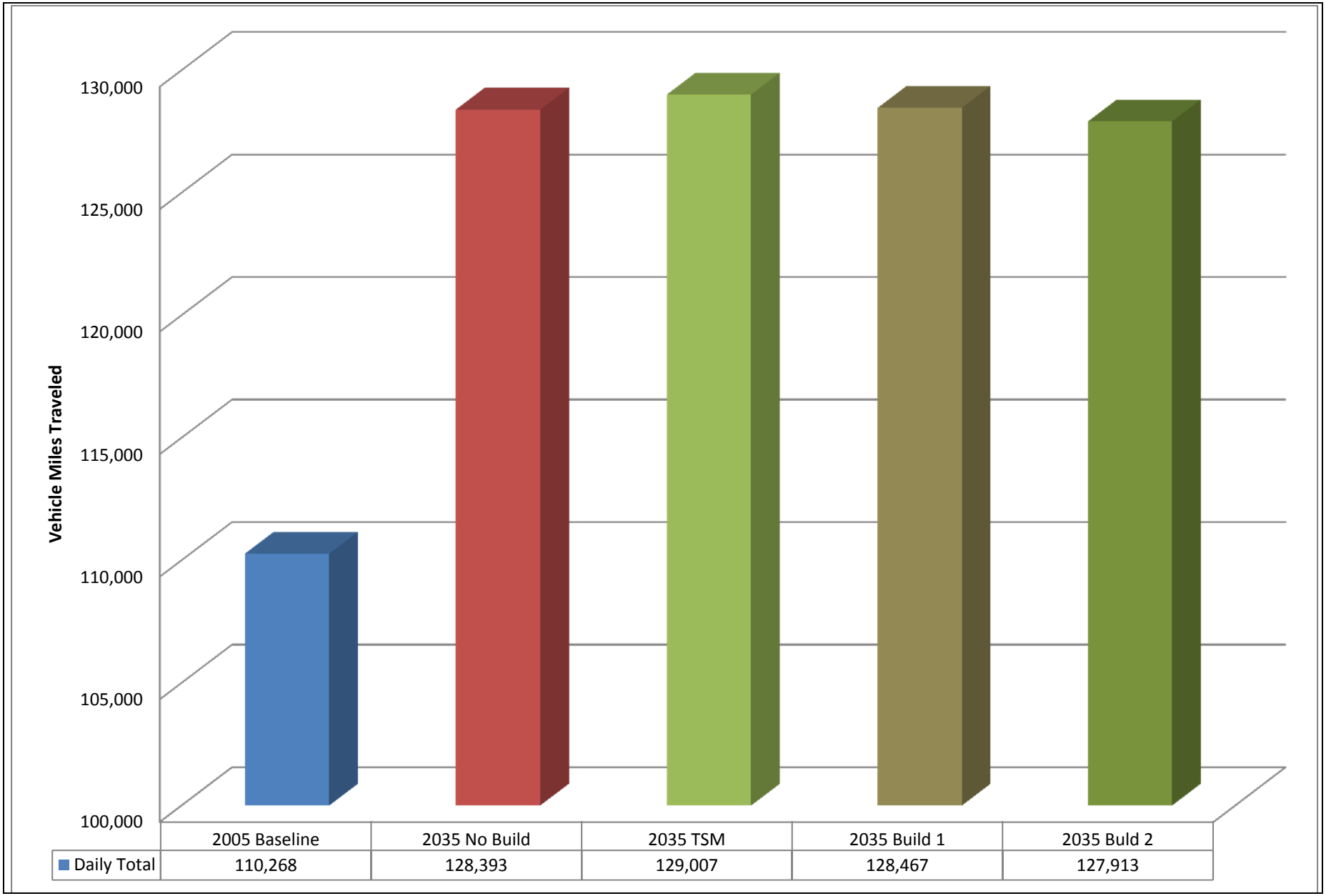
Daily Vehicle Miles Traveled



Source: URS Corporation, 2011

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Chapter 8 Standard Conditions, Avoidance, Minimization, and/or Mitigation Measures

This section includes recommendations to mitigate any project-related impacts identified from the intersection and parking analyses presented in this report for each of the Streetcar Alternatives. The proposed project improvements are not considered "traffic generators", but rather, transit network enhancements that redistribute existing and forecasted traffic volumes throughout the Study Area. The projected future traffic volumes show that some of the local intersections will be impacted within the Study Area when the project is implemented. Therefore, the mitigation measures recommended in this section are in addition to any planned future operational enhancements to the local and regional roadway network.

8.1 Intersection Improvements

No intersection impacts were identified under any of the alternatives. However, as part of Build Alternatives 1 and 2, an extra left-turn lane would be added to the southbound approach of the intersection at Fairview Street and Civic Center Drive.

8.2 Other Mitigation

8.2.1 Suggested Routes to School

Though the proposed streetcar operates much like a vehicle in the flow of street traffic, some additional design consideration for Suggested Routes to Schools should be given to signing and striping plans in the vicinity of the three elementary schools along the proposed Streetcar alignments in the Preliminary and Final Design stages of the Project. The Final Design may even determine the need for additional traffic or pedestrian control devices at key locations in close proximity to the schools. In addition to additional signing and striping design considerations, the City of Santa Ana and/or OCTA will implement an annual education program for the schools in the vicinity of the streetcar alignments to teach proper safety and precautionary behaviors when walking in the vicinity of an operational streetcar system.

8.2.2 Construction-related Mitigation

Following is a list of construction-related mitigations to be implemented by the City to minimize construction-related impacts. Depending the final design, selection of a construction contractor, and development of a final construction staging plan, some of these may be modified, and others may be added, as appropriate.

- Generally limit hours of construction to 7:00 A.M. to 5:00 P.M., Monday through Friday.
- Encourage night construction if it results in reduced traffic impacts and no disruption to local area residents.

- Stage and sequence construction to localize adverse construction related impacts to the greatest degree feasible.
- Minimize lane closures during AM and PM peak hours to the greatest degree feasible.
- Minimize sidewalk closures to the greatest degree feasible.
- Develop a traffic management plan (TMP) that will strive to reduce the disruption to commuter traffic during construction and propose alternate travel routes.
- Incorporate bicycle and pedestrian travel into the TMP.
- Generate a site specific TMP for construction of the O&M facility, either as a stand-alone document, or as part of the larger streetcar construction TMP.
- To the greatest degree possible, notify commuters, business owners, government agencies, and residents at least 10 days prior to any parking removal, lane closure, and street closures.
- Maintain access to businesses at all times except for minor temporary driveway closures.
- Identify potential types of traffic control that may have a real or perceived business impact such as short term lane closure, extended full street closures, detours, or sidewalk closures.
- Designate parking areas for construction personnel.
- Designate haul routes for construction related heavy duty vehicles.
- Minimize unnecessary heavy vehicle idling in construction zones.
- Plan temporary traffic detours to minimize traffic diversion into residential areas.
- Expedite construction in roadway intersections to reduce instances where multiple streets are impacted due to construction related activities.

Chapter 9 Summary and Conclusion

This section summarizes the analysis results and findings presented in previous sections of this report. The analysis was performed for local arterial roadway segments and intersections (both signalized and unsignalized) within the Study Area under Existing Conditions, 2035 No Build, 2035 TSM, and 2035 Streetcar Alternative 1 and 2 conditions. The purpose of this analysis was to identify any project-related impacts associated with the proposed project's Streetcar Alternatives, to identify potential project improvements, and to recommend appropriate mitigation measures to minimize those project-related impacts.

9.1 Summary of Intersection Level of Service Analysis

Table 9-1 and Table 9-2 provide a summary comparison of the signalized and unsignalized intersections analysis at each of the study intersections for the Existing Conditions, 2035 No Build, 2035 TSM, and 2035 Streetcar Alternatives 1 and 2. Overall, the level of service and/or intersection delay on the Study Area intersections are generally maintained or improved during the peak hours, of the 2035 Streetcar Alternatives, as compared to the 2035 No Build condition.

9.2 Summary of Roadway Segment Analysis

The summary of roadway segment ADT analysis is presented in Table 9-3. The following locations are experiencing or will experience capacity deficiencies (degrade to LOS E or F, depending on the location) under all scenarios:

- Fifth Street from Hawley Street to Raitt Street
- Fourth Street from Main Street to Mortimer Street
- Raitt Street from Fifth Street to Third Street
- Bristol Street from Fifth Street to Third Street
- Main Street from Fifth Street to Third Street

The segments that show deficient LOS experience the same LOS under the No Build scenario. Therefore, there would not be an impact. Overall, the level of service on the Study Area roadway segments are generally maintained during the peak hours of the 2035 Streetcar Alternatives compared to the 2035 No Build condition.

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Table 9-1: Summary of Peak-Hour Intersection Level of Service (HCM)

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control	Proposed Traffic Control	Existing LOS (HCM)				2035 No Build LOS (HCM)				2035 TSM LOS (HCM)				2035 Streetcar Alt. 1 LOS (HCM)				2035 Streetcar Alt. 2 LOS (HCM)			
						AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
						Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Westminster Ave	Harbor Blvd	Signalized																						
2	Westminster Ave	Nautilus Dr	1-Way Stop																						
3	Fairview St	Civic Center Dr	Signalized																						
4	Santa Ana Blvd	Raitt St	1-Way Stop			92.4		F		393.2	F	234.2	F	6608.4	F	345.7	F	7192.0	F						
				Signalized	**Signalized**																				
5	Santa Ana Blvd	Pacific Ave	Signalized																						
6	Santa Ana Blvd	Bristol St	Signalized																						
7	Santa Ana Blvd	Shelton St	Signalized																						
8	Flower St	Civic Center Dr	Signalized																						
9	Flower St	6th St	Signalized																						
10	Santa Ana Blvd	Flower St	Signalized																						
11	Civic Center Dr	Parton St	Signalized																						
12	Santa Ana Blvd	Civic Center Plaza/Parton St	Signalized																						
13	Civic Center Dr	Van Ness Ave	2-Way Stop		**Signalized**	11.1	B	12.0	B	11.6	B	13.0	B	11.3	B	12.9	B	11.6	B	11.7	B				
14	Civic Center Dr	Ross St	Signalized																						
15	Santa Ana Blvd	Ross St	Signalized	**Sasscer Park**																					
16	4th St	Ross St	1-Way Stop	**4-Way Stop**		19.5	C	13.7	B	24.0	C	16.4	C	26.6	D	18.3	C	16.7	C	13.8	B	27.9	D	18.9	C
17	Civic Center Dr	Ped Xing (btwn Ross St and Birch St)	Signalized																						
18	Civic Center Dr	Broadway	Signalized																						
19	Santa Ana Blvd	Broadway	Signalized																						
20	5th St	Broadway	Signalized																						
21	4th St	Broadway	Signalized																						
22	Civic Center Dr	Sycamore St	Signalized																						
23	Civic Center Dr	Main St	Signalized																						
24	Santa Ana Blvd	Main St	Signalized																						
25	5th St	Main St	Signalized																						
26	4th St	Main St	Signalized																						
27	Civic Center Dr	Bush St	Signalized																						
28	Santa Ana Blvd	Bush St	Signalized																						
29	5th St	Bush St	Signalized																						
30	4th St	Bush St	Signalized																						
31	Civic Center Dr	Spurgeon	2-Way Stop		**Signalized**	18.9	C	25.9	D	23.4	C	43	E	22.9	C	32.9	D	24.4	C	36.1	E				
32	Santa Ana Blvd/ 6th St	French St	2-Way Stop	**Signalized**	**Signalized**	16.9	C	16.6	C	19.4	C	24.5	C	19.3	C	16.9	C								

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control	Proposed Traffic Control	Existing LOS (HCM)				2035 No Build LOS (HCM)				2035 TSM LOS (HCM)				2035 Streetcar Alt. 1 LOS (HCM)				2035 Streetcar Alt. 2 LOS (HCM)			
						AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
						Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
33	4th St	French St	Signalized																						
34	4th St	Mortimer St	1-Way Stop	**Signalized**		13.7	B	15.1	C	16.0	C	18.2	C	15.6	C	17.9	C					16.3	C	17.4	C
35	5th St	Minter St	2-Way Stop		**Signalized**	16.8	C	11.0	B	19.4	C	11.3	B	19.3	C	11.6	B	19.5	C	11.5	B				
36	Santa Ana Blvd	Lacy St	2-Way Stop	**Signalized**	**Signalized**	40.7	**E**	19.6	C																
37	Santa Ana Blvd	Poinsettia St	2-Way Stop		**Transit Signal**	20.3	C	17.2	C	23.7	C	19.1	C	22.9	C	19.5	C	24.5	C	19.5	C	26.0	D	19.9	C
38	Brown St	Poinsettia St	Uncontrolled		**Signalized**	8.9	A	9.1	A	9	A	9.1	A	8.9	A	9.1	A	8.9	A	9.1	A				
39	Santa Ana Blvd	Santiago St	Signalized																						
40	4th St	Daisy Ave	1-Way Stop	**IOS-1**	**IOS-2**	9.0	A	9.3	A	9.4	A	9.8	A	9.5	A	9.8	A	9.9	A	10.1	A	9.9	A	10.1	A
41	3rd St	Daisy Ave	2-Way Stop	**IOS-1**	**IOS-2**	9.2	A	9.5	A	9.6	A	10.1	B	9.6	A	10.1	B	9.5	A	10.1	B	9.5	A	10.1	B
42	3rd St	Raitt St	2-Way Stop	**IOS-1**	**IOS-2**	22.4	C	45.2	**E**	32.1	D	147.5	**F**	37.2	**E**	236.3	**F**	39.5	**E**	419.5	**F**	39.9	**E**	177.4	**F**

Source: URS Corp., 2011

Notes: Shaded and bold cells indicate LOS E or F.
IOS – Initial Operable Segment

Table 9-2: Summary of Peak Hour Intersection Level of Service (ICU)

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control	Proposed Traffic Control	Existing LOS (ICU)				2035 No Build LOS (ICU)				2035 TSM LOS (ICU)				2035 Streetcar Alt. 1 LOS (ICU)				2035 Streetcar Alt. 2 LOS (ICU)			
						AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
						ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
1	Westminster Ave	Harbor Blvd	Signalized			0.73	C	1.1	**F**	0.82	D	1.01	**F**	0.85	D	1.03	**F**	0.82	D	1.01	**F**	0.82	D	1.01	**F**
2	Westminster Ave	Nautilus Dr	1-Way Stop															0.34	A	0.38	A	0.34	A	0.40	A
3	Fairview St	Civic Center Dr	Signalized			0.65	B	0.67	B	0.82	D	0.89	D	0.83	D	0.93	**E**	0.73	C	0.88	**D**	0.73	C	0.88	**D**
4	Santa Ana Blvd	Raitt St	1-Way Stop	**Signalized**	**Signalized**													0.60	A	0.84	D	0.55	A	0.72	C
5	Santa Ana Blvd	Pacific Ave	Signalized			0.21	A	0.37	A	0.25	A	0.41	A	0.26	A	0.42	A	0.25	A	0.44	A	0.25	A	0.41	A
6	Santa Ana Blvd	Bristol St	Signalized			0.57	A	0.71	C	0.51	A	0.63	B	0.51	A	0.63	B	0.52	A	0.64	B	0.52	A	0.62	B
7	Santa Ana Blvd	Shelton St	Signalized			0.30	A	0.34	A	0.36	A	0.40	A	0.38	A	0.40	A	0.36	A	0.41	A	0.37	A	0.39	A
8	Flower St	Civic Center Dr	Signalized			0.63	B	0.79	C	0.75	C	0.91	**E**	0.73	C	0.90	D	0.77	C	0.89	D	0.75	C	0.90	D
9	Flower St	6th St	Signalized			0.56	A	0.67	B	0.63	B	0.76	C	0.63	B	0.81	D	0.67	B	0.79	C	0.65	B	0.78	C
10	Santa Ana Blvd	Flower St	Signalized			0.56	A	0.54	A	0.62	B	0.63	B	0.61	B	0.64	B	0.67	B	0.63	B	0.66	B	0.63	B
11	Civic Center Dr	Parton St	Signalized			0.36	A	0.57	A	0.41	A	0.68	B	0.40	A	0.67	B	0.41	A	0.68	B	0.41	A	0.66	B
12	Santa Ana Blvd	Civic Center Plaza/Parton St	Signalized			0.39	A	0.37	A	0.45	A	0.43	A	0.45	A	0.43	A	0.47	A	0.43	A	0.46	A	0.43	A
13	Civic Center Dr	Van Ness Ave	2-Way Stop		**Signalized**																	0.34	A	0.42	A
14	Civic Center Dr	Ross St	Signalized			0.54	A	0.54	A	0.60	B	0.61	B	0.61	B	0.60	A	0.60	B	0.60	B	0.61	B	0.61	B
15	Santa Ana Blvd	Ross St	Signalized	**Sasscer Park**		0.52	A	0.42	A	0.60	A	0.47	A	0.60	A	0.46	A	0.61	B	0.47	A	0.61	B	0.48	A
16	4th St	Ross St	1-Way Stop	**4-Way Stop**																					
17	Civic Center Dr	Ped Xing (btwn Ross St and Birch St)	Signalized			0.32	A	0.32	A	0.36	A	0.35	A	0.36	A	0.35	A	0.36	A	0.35	A	0.35	A	0.35	A
18	Civic Center Dr	Broadway	Signalized			0.53	A	0.59	A	0.59	A	0.68	B	0.59	A	0.69	B	0.61	B	0.70	C	0.61	B	0.70	B
19	Santa Ana Blvd	Broadway	Signalized			0.53	A	0.52	A	0.61	B	0.59	A	0.63	B	0.61	B	0.65	B	0.63	B	0.66	B	0.62	B
20	5th St	Broadway	Signalized			0.49	A	0.54	A	0.53	A	0.61	B	0.64	B	0.66	B	0.54	A	0.62	B	0.54	A	0.62	B
21	4th St	Broadway	Signalized			0.25	A	0.39	A	0.28	A	0.43	A	0.29	A	0.45	A	0.30	A	0.44	A	0.29	A	0.44	A
22	Civic Center Dr	Sycamore St	Signalized			0.36	A	0.44	A	0.40	A	0.48	A	0.40	A	0.47	A	0.40	A	0.48	A	0.42	A	0.48	A
23	Civic Center Dr	Main St	Signalized			0.63	B	0.74	C	0.73	C	0.8	D	0.74	C	0.80	D	0.71	C	0.81	D	0.75	C	0.80	C
24	Santa Ana Blvd	Main St	Signalized			0.62	B	0.69	B	0.69	B	0.77	C	0.71	C	0.77	C	0.69	B	0.78	C	0.69	B	0.76	C
25	5th St	Main St	Signalized			0.59	A	0.60	A	0.67	B	0.67	B	0.67	B	0.67	B	0.68	B	0.71	C	0.68	B	0.66	B
26	4th St	Main St	Signalized			0.54	A	0.59	A	0.60	A	0.65	B	0.6	A	0.66	B	0.59	A	0.69	B	0.6	B	0.64	B
27	Civic Center Dr	Bush St	Signalized			0.36	A	0.55	A	0.42	A	0.63	B	0.43	A	0.60	A	0.41	A	0.60	B	0.43	A	0.59	A
28	Santa Ana Blvd	Bush St	Signalized			0.38	A	0.47	A	0.42	A	0.55	A	0.43	A	0.55	A	0.43	A	0.55	A	0.42	A	0.54	A
29	5th St	Bush St	Signalized			0.33	A	0.46	A	0.39	A	0.51	A	0.39	A	0.51	A	0.39	A	0.52	A	0.40	A	0.50	A
30	4th St	Bush St	Signalized			0.34	A	0.45	A	0.39	A	0.53	A	0.39	A	0.53	A	0.39	A	0.52	A	0.40	A	0.51	A
31	Civic Center Dr	Spurgeon	2-Way Stop		**Signalized**																	0.33	A	0.37	A
32	Santa Ana Blvd/ 6th St	French St	2-Way Stop	**Signalized**	**Signalized**													0.67	B	0.73	C	0.65	B	0.73	C

ID	Main St	Cross St	Existing Traffic Control	Proposed Traffic Control	Proposed Traffic Control	Existing LOS (ICU)				2035 No Build LOS (ICU)				2035 TSM LOS (ICU)				2035 Streetcar Alt. 1 LOS (ICU)				2035 Streetcar Alt. 2 LOS (ICU)			
						AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
						ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
33	4th St	French St	Signalized			0.37	A	0.42	A	0.45	A	0.49	A	0.45	A	0.49	A	0.45	A	0.49	A	0.46	A	0.48	A
34	4th St	Mortimer St	1-Way Stop	**Signalized**														0.45	A	0.64	B				
35	5th St	Minter St	2-Way Stop		**Signalized**																	0.44	A	0.20	A
36	Santa Ana Blvd	Lacy St	2-Way Stop	**Signalized**	**Signalized**					0.75	C	0.56	A	0.75	C	0.57	A	0.75	C	0.57	A	0.74	C	0.56	A
37	Santa Ana Blvd	Poinsettia St	2-Way Stop		**Transit Signal**																				
38	Brown St	Poinsettia St	Uncontrolled		**Signalized**																	0.18	A	0.25	A
39	Santa Ana Blvd	Santiago St	Signalized			0.48	A	0.58	A	0.52	A	0.66	B	0.52	A	0.64	B	0.53	A	0.64	B	0.54	A	0.63	B
40	4th St	Daisy Ave	1-Way Stop	**IOS-1**	**IOS-2**																				
41	3rd St	Daisy Ave	2-Way Stop	**IOS-1**	**IOS-2**																				
42	3rd St	Raitt St	2-Way Stop	**IOS-1**	**IOS-2**																				

Source: URS Corp., 2011

Notes: Shaded and bold cells indicate LOS E or F.
IOS – Initial Operable Segment

Table 9-3: Summary of Levels of Service for Arterial Street Segments

Street	From	To	Existing LOS	2035 No Build LOS	2035 TSM LOS	2035 Streetcar Alt. 1 LOS	2035 Streetcar Alt. 2 LOS
Santa Ana Boulevard	Raitt Street	Western Ave	B	B	B	B	B
	Western Ave	Forest St	B	B	B	B	B
	Forest St	Pacific Ave	B	B	B	B	B
	Pacific Ave	Hesperian St	B	B	B	B	B
	Hesperian St	Bristol St	B	B	B	B	B
	Bristol St	Baker St	B	B	B	B	B
	Baker St	Shelton St	B	B	B	B	B
	Shelton St	Flower St	A	A	A	A	A
	Flower St	Parton St	A	A	A	A	A
	Parton St	Ross St	A	A	A	A	A
	Ross St	Broadway	A	A	A	A	A
	Broadway	Sycamore St	A	A	A	A	A
	Sycamore St	Main St	A	A	A	A	A
	Main St	Bush St	A	A	A	A	A
	Bush St	Spurgeon St	A	A	A	A	A
	Spurgeon St	French St	A	A	A	A	A
	French St	Mortimer St	C	D	D	D	D
	Mortimer St	Minter St	C	D	D	D	D
	Minter St	Lacy St	C	D	D	D	D
	Lacy St	Garfield St	A	A	A	A	A
	Garfield St	Poinsettia St	A	A	A	A	A
	Poinsettia St	Santiago St	A	A	A	A	A
5th St	Hawley St	Sunset St	**E**	**F**	**F**	**F**	**F**
	Sunset St	English St	**E**	**F**	**F**	**F**	**F**
	English St	Townsend St	**E**	**F**	**F**	**F**	**F**
	Townsend St	Daisy Ave	**E**	**F**	**F**	**F**	**F**
	Daisy Ave	Fairlawn St	**E**	**F**	**F**	**F**	**F**
	Fairlawn St	Raitt St	**E**	**F**	**F**	**F**	**F**
	Ross St	Broadway	A	A	A	A	A
	Broadway	Sycamore St	A	A	A	A	A
	Sycamore St	Main St	A	A	A	A	A
	Main St	Bush St	A	A	A	A	A
	Bush St	Spurgeon St	A	A	A	A	A
	Spurgeon St	French St	A	A	A	A	A
	French St	Mortimer St	A	A	A	A	A
	Mortimer St	Minter St	A	A	A	A	A
4th St	Townsend St	Daisy Ave	A	A	A	A	A
	Daisy Ave	Raitt St	A	A	A	A	A
	Ross St	Birch St	A	B	B	B	B
	Birch St	Broadway	A	B	B	B	B
	Broadway	Sycamore St	A	B	B	C	B
	Sycamore St	Main St	A	B	B	B	B
	Main St	Bush St	**E**	**F**	**F**	**F**	**F**
	Bush St	Spurgeon St	**E**	**F**	**F**	**F**	**F**
	Spurgeon St	French St	**E**	**F**	**F**	**F**	**F**
	French St	Mortimer St	**E**	**F**	**F**	**F**	**F**

Street	From	To	Existing LOS	2035 No Build LOS	2035 TSM LOS	2035 Streetcar Alt. 1 LOS	2035 Streetcar Alt. 2 LOS
6th Brown	French St	Mortimer St	A	A	A	A	A
	Mortimer St	Minter St	A	A	A	A	A
	Minter St	Lacy St	A	A	A	A	A
	Lacy St	Garfield St	A	A	A	A	A
	Garfield St	Poinsettia St	A	A	A	A	A
Civic Center Dr	Flower St	Parton St	A	A	A	A	A
	Parton St	Van Ness Ave	A	A	A	A	A
	Van Ness Ave	Ross St	A	A	A	A	A
	Ross St	Birch St	A	A	A	A	A
	Birch St	Broadway	A	A	A	A	A
	Broadway	Sycamore St	A	A	A	A	A
	Sycamore St	Main St	A	A	A	A	A
	Main St	Bush St	A	A	A	A	A
	Bush St	Spurgeon St	A	A	A	A	A
Raitt St	5th St	Santa Ana Blvd	**F**	**F**	**F**	**F**	**F**
	Santa Ana Blvd	3rd St	**F**	**F**	**F**	**F**	**F**
Pacific Ave	5th St	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	3rd St	A	A	A	A	A
Bristol St	5th St	Santa Ana Blvd	**E**	B	B	B	B
	Santa Ana Blvd	3rd St	**E**	B	B	B	B
Shelton St	5th St	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	3rd St	A	A	A	A	A
Flower St	10th St	Civic Center Dr	A	A	A	A	A
	Civic Center Dr	Santa Ana Blvd	A	A	A	B	A
	Santa Ana Blvd	3rd St	A	A	A	A	A
Ross St	10th St	Civic Center Dr	A	A	A	A	A
	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	4th St	A	A	A	A	A
	4th St	3rd St	A	A	A	A	A
Broadway	10th St	Civic Center Dr	B	C	C	C	C
	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	4th St	A	A	A	A	A
	4th St	3rd St	A	A	A	A	A
Sycamore St	10th St	Civic Center Dr	A	A	A	A	A
	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	4th St	A	A	A	A	A
	4th St	3rd St	A	A	A	A	A
Main St	8th St	Civic Center Dr	D	**E**	**E**	**E**	**E**
	Civic Center Dr	Santa Ana Blvd	D	**E**	**F**	**E**	**E**
	Santa Ana Blvd	5th St	D	**E**	**F**	**E**	**E**
	5th St	4th St	**F**	**F**	**F**	**F**	**F**
	4th St	3rd St	**F**	**F**	**F**	**F**	**F**

Street	From	To	Existing LOS	2035 No Build LOS	2035 TSM LOS	2035 Streetcar Alt. 1 LOS	2035 Streetcar Alt. 2 LOS
Bush St	8th St	Civic Center Dr	A	A	A	A	A
	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	5th St	A	A	A	A	A
	5th St	4th St	A	A	A	A	A
	4th St	3rd St	A	A	A	A	A
Spurgeon St	8th St	Civic Center Dr	A	A	A	A	A
	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	5th St	A	A	A	A	A
	5th St	4th St	A	A	A	A	A
French St	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	5th St	A	A	A	A	A
	5th St	4th St	A	A	A	A	A
	4th St	3rd St	A	A	A	A	A
Mortimer St	N/A	N/O Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	6th St	A	A	A	A	A
	6th St	5th St	A	A	A	A	A
	5th St	4th St	A	A	A	A	A
Minter St	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	6th St	A	A	A	A	A
	6th St	5th St	A	A	A	A	A
	5th St	4th St	A	A	A	A	A
Lacy St	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	6th St/Brown St	A	A	A	A	A
	6th St/Brown St	5th St	A	A	A	A	A
Garfield	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	Brown St	A	A	A	A	A
	Brown St	6th St	A	A	A	A	A
	6th St	5th St	A	A	A	A	A
Poinsettia St	Civic Center Dr	Santa Ana Blvd	A	A	A	A	A
	Santa Ana Blvd	Brown St	A	A	A	A	A
	Brown St	6th St	A	A	A	A	A
	6th St	5th St	A	A	A	A	A
Santiago St	Civic Center Dr	Santa Ana Blvd	C	D	D	C	C
	Santa Ana Blvd	6th St	A	B	B	B	B
Fairview St	Civic Center Dr	5th St	C	**F**	**F**	**F**	**F**
Westminster Ave	Harbor Blvd	Clinton St	A	C	C	C	C
Daisy Ave	4th St	3rd St	A	A	A	A	A
3rd St	Daisy Ave	Raitt St	A	A	A	A	A

Source: URS Corp., 2011

Notes:
D – divided roadway
U – Undivided roadway
Shaded and bold cells indicate LOS E or F.

9.3 Summary of On-Street Parking Analysis

A summary of existing on-street parking spaces within the Study Area that could potentially be impacted along the streetcar alternatives alignments are presented in the Table 9-4.

Table 9-4: Summary of On-Street Parking Spaces – Streetcar 1 and 2

Streetcar Alternative	Existing Spaces	Lost	Remain	Net Loss (%)
Streetcar Alt. 1 (4th St Parking Scenario A)	370	120	250	32%
Streetcar Alt. 1 (4th St Parking Scenario B)	370	171	199	46%
Streetcar Alt. 1 (4th St Parking Scenario C)	370	226	144	61%
Streetcar Alt. 2	362	108	254	30%

Source: URS Corp., 2011

As shown on the summary tables, existing on-street parking spaces were either maintained or eliminated as a result of the implementation of the streetcar alignment routes. Overall, the total existing on-street parking availability in the arterial roadway segments along the proposed streetcar alignment routes could result in net loss of approximately 30% to 61% as a result of the project.

However, the loss of on-street parking on Santa Ana Boulevard, west of Flower Street (between Raitt Street and Flower Street) is an impact that is not considered to be significant. Per the city of Santa Ana Planning staff, every residential unit along this segment of the proposed streetcar alignment has on-site parking capacity consistent with the City's occupancy entitlements. Therefore the loss of 73 on-street parking spaces in this area would not result in a significant impact.

9.4 Summary of Intersection Queuing Analysis

Table 9-5 summarizes the queuing analysis for the existing and 2035 Streetcar Alternative 1 and 2 Conditions, by identifying whether adequate storage is provided for each of the movements, separated by the 50th and 95th percentile queue lengths. Shading in the tables below identifies where and when storage capacity at the intersection is insufficient for demand. The addition of double asterisks further identifies where and when the queue lengths are almost met (within 50 feet of the available storage or approximately 2 car lengths).

As shown in the intersection queuing analysis tables, Fairview Street/Civic Center Drive) has movements in the peak hour with inadequate storage for the projected demand. Vehicle queues will extend beyond the streetcar crossing near Fairview Street/Civic Center Drive. However, as discussed earlier, signal coordination should provide sufficient clearance time for these vehicles to clear the proposed grade crossings. Both crossings may require further safety improvements such as pre-signals or queue cutters to ensure vehicles do not stop on tracks.

Table 9-5: Summary of Intersection Queuing Analysis

Intersection/Movement	% Queue	Storage (ft.)	Existing Storage Sufficient?	2035 Streetcar Alt. 1 Storage Sufficient?	2035 Streetcar Alt. 2 Storage Sufficient?
3. Fairview St / Civic Center Dr					
Fairview St NB Left-turn	50th	415	Yes	Yes	Yes
	95th		Yes	Yes	Yes
Fairview St NB Through	50th	200	**No****	**No**	**No**
	95th		**No**	**No**	**No**
Fairview St SB Left-turn	50th	140	**No****	**No**	**No**
	95th		**No**	**No**	**No**
Fairview St SB Through	50th	1000	Yes	Yes	Yes
	95th		Yes	Yes	Yes
Civic Center Dr EB Through	50th	85	Yes	Yes	Yes
	95th		**No****	**No**	**No**
Civic Center Dr EB Right-turn	50th	85	Yes	Yes	Yes
	95th		Yes	Yes	Yes
Civic Center Dr WB Left-turn	50th	250	Yes	Yes	Yes
	95th		Yes	Yes	Yes

Source: URS Corp., 2011

9.5 Summary of Travel Forecasting

A summary of daily vehicle hours traveled (VHT) and vehicle miles traveled (VMT) within the Study Area (along arterial roadway segments parallel and adjacent to the proposed streetcar alignments).are presented in Table 9-6:

Table 9-6: Summary of Travel Forecasting

Alternatives	VHT Daily Total	VMT Daily Total
2005 Baseline	3,535	110,268
2035 No Build	4,246	128,393
2035 TSM	4,276	129,007
2035 Streetcar Alt. 1	4,241	128,467
2035 Streetcar Alt. 2	4,212	127,913

Source: URS Corp., 2011

Notes:
VHT – Vehicle Hours Traveled
VMT – Vehicle Miles Traveled

As shown in the table, during the 2035 TSM Conditions, the daily VHT and VMT increase by approximately 0.71% and 0.48%, respectively, compared to 2035 No Build Conditions. During the 2035 Streetcar Alternative 1 Conditions, the daily VHT decrease by approximately 0.12% and the daily VMT increase by approximately 0.06%, compared to 2035 No Build Conditions. During the 2035 Streetcar Alternative 2 Conditions, the daily VHT and VMT decrease by approximately 0.80% and 0.37%, respectively, compared to 2035 No Build Conditions.

Overall, during both 2035 Streetcar Alternative Conditions, the daily VHT and VMT decreases except during the 2035 Streetcar Alternative 1 Condition where the daily VMT increase by 0.06%. This negligible increase during 2035 Streetcar Alternative 1 Condition indicates that the overall daily VMT is generally maintained compared to 2035 No Build Conditions.

9.6 Conclusion

The proposed project will include construction and implementation of a streetcar rail line between Harbor Boulevard and SARTC. Analysis was performed for 2035 No Build, TSM, and Streetcar Alternatives 1 and 2 to identify project-related effects to the traffic conditions on local arterial roadway segments and arterial intersections within the Study Area. Based on the analysis, it is expected that the proposed project will improve traffic operations and maintain and/or reduce delay and congestion levels at the local arterial roadway segments and Study Area intersections. Table 9-7 summarizes the City of Santa Ana Environmental Checklist questions and responses based on the aforementioned Transportation/Traffic mitigation, summary of results and conclusion:

Table 9-7: Transportation/Traffic Environmental Checklist - Responses

	Would the Project:	Potential CEQA Impact	Potential NEPA Affects	Comments
A	Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	Less than significant	Limited positive effect	Design criteria can be established for project to address potential impacts.
B	Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	Less than significant	Limited positive effect	Design criteria can be established for project to address potential impacts.
C	Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	No impact	No effect	Project will not impact air traffic patterns.
D	Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	Less than significant	Limited effect	Design criteria can be established for project to address potential impacts.
E	Result in inadequate emergency access?	Less than significant	Limited effect	Design criteria can be established for project to address potential impacts.
F	Result in inadequate parking capacity?	Less than significant	Limited effect	Some localized loss of parking with limited impacts.
G	Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	No Impact	Limited positive effect	Project is consistent with local and regional alternative transportation plans.

Source: URS Corp., 2011

9.7 Cumulative Analysis

The Santa Ana and Garden Grove Fixed Guideway Project (Project) was evaluated in order to determine if the proposed alternatives would result in direct and/or indirect impacts that, when combined with other projects, would contribute to cumulative impacts to the traffic and circulation network. Cumulative impacts are defined as impacts that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of the Project. A cumulative assessment is performed in order to identify impacts that may result from individually minor, but collectively substantial impacts taking place over a period of time.

Working with the cities of Santa Ana and Garden Grove, a list of current and reasonably foreseeable future actions and projects was developed that may have an impact on environmental resources within the Study Area. This list is presented in Table 9-8, and includes known future land use developments as well as transportation projects.

The projects depicted in Table 9-8 are mainly land use development projects or are future funded and committed transportation projects that are encompassed in the 2035 traffic analysis that was performed for the No Build Alternative, TSM Alternative, Streetcar Alternative 1, and Streetcar Alternative 2. The results of the analysis for the Project - including potential traffic and circulation impacts, proposed mitigation measures, and any impacts remaining after the proposed mitigation measures are implemented - is presented in Sections 5 (Impact Assessment) and 8 (Mitigation Measures) of this report and captures the known cumulative impacts associated with the proposed project.

However, there are three major transportation projects listed in Table 9-8 that are in very early in the planning stages of conceptual development and that are not yet funded and committed. While each of these has the potential to affect how traffic circulates within the Study Area, a sufficient amount of design, traffic, or environmental analysis has yet to be performed for these projects that would allow for a reliable, detailed assessment of cumulative impacts with respect to traffic and circulation. Each of these projects, including a project description, project status, and relevant cumulative factors is discussed as follows:

Pacific Electric (PE) Arterial: The PE Arterial is a proposal for a new four-lane roadway in the PE ROW between State Route 22 (SR-22) in the City of Garden Grove and Raitt Street in the City of Santa Ana. The PE Arterial is on the countywide Master Plan of Arterial Highways (MPAH). However, for the time being, the proposal has not moved beyond a concept plan. The City of Santa Ana is currently working with OCTA in order to initiate a possible feasibility study for the PE Arterial. According to the *Central County Corridor Major Investment Study* (URS 2010), a conceptual travel demand modeling exercise determined that the PE Arterial attracted approximately 28,000 vehicles per day, mostly from the west along State Route 22 (SR-22).

Table 9-8: Santa Ana and Garden Grove Fixed Guideway - Cumulative Projects List

No.	Project	Description/Land Use	No. of u or square feet (sf)	Location	Primary APN
Approved					
1	Alliance Church of Orange	Church addition (gym/classroom), *approved 2009*	21,000 sf	2130 N. Grand Ave.	396-191-44
2	Christ Our Savior Cathedral	Sanctuary (2,800-seat), *approved 2005*		2001 W. McArthur Blvd.	140-061-94
3	Discovery Science Center Ph. II	IMAX theatre (275-seat), *approved 2002*		2032 N. Main St.	399-102-09
4	Lyon Homes	Residential (Condo), *approved 2011*	300 u	100-130 E. McArthur Blvd.	411-081-26
5	Promenade Point	Residential (Condo), *approved 2005*	194 u	200 E. First American Wy.	411-074-03
6	CVS/Sav-On Drug Store	Pharmacy, drive through, *approved 2008*	15,836 sf	115 N. Harbor Blvd.	198-182-22
7	Skyline Phase II	Residential (Condo), *approved 2005*	150 u	10 E. Hutton Ctr.	411-081-28
8	Vista Del Rio	Residential, *approved 2009*	41 u	1600 W. Memory Ln.	101-055-27
9	Xerox Tower II	Office, *approved 2001*	210,000 sf	200 N. Cabrillo Park Dr.	400-071-03
10	YMCA	Recreational Facility, *approved 2007*	32,000 sf	2100 W. Alton Ave.	140-061-91
11	1306 W. Santa Ana Blvd.	Medical/Office Building, *approved 2011*	6,000 sf	1306 W. Santa Ana Blvd.	007-183-08
12	Grand Avenue Widening NOTE: Specifically included in SAFG No Build Description	Roadway Widening		First St. to Fourth St.	Multiple APNS
13	Broadway Reconstruction	Street Reconstruction		Civic Center Dr. to Santa Clara St.	Multiple APNS
14	Bristol Street Widening NOTE: Specifically included in SAFG No Build Description	Street Widening		Warner Ave. to Memory Ln.	Multiple APNS
15	First and Cabrillo Towers	Residential (Condo), *approved 2007*	374 u	1901 E. First St.	400-081-08
16	Related Co. Apartments	Residential (Apartments)	74 u	611 E. Minter St.	398-301-07
A	First Street Widening Source: RTIP / RTP. Specifically included in SAFG No Build Description	Roadway widening from 4 to 6 Lanes		Susan St. to Fairview St.	Multiple APNS
B	Transit Zoning Code NOTE: Specifically included in SAFG No Build Description	Land Use/Zoning Overlay, approved 2010		eastern third of SAFG Project area	Multiple APNS
Application Under Review					
17	C & C Affordable Housing Project	Residential (Apartments)	36 u	605 E. Washington Ave.	398-151-12
18	Dayton Commercial Center	Commercial	7,275 sf	W. Edinger Ave.	408-273-11
19	Dr. Bui Medical Building	Medical Office	6,500 sf	202 N. Euclid Ave.	099-223-26

No.	Project	Description/Land Use	No. of u or square feet (sf)	Location	Primary APN
20	Francis Xavier	Residential (Affordable/Special Needs)	12 u	801 E. Santa Ana Blvd.	398-303-04
21	Related Co. Apartments	Residential (Apartments)	13 u	714 E. Santa Ana Blvd.	398-312-18
22	Related Co. Apartments	Residential (Apartments)	12 u	801 E. Brown St.	398-312-09
23	Related Co. Apartments	Residential (Apartments)	12 u	806 E. Santa Ana Blvd.	398-313-02
24	Related Co. Site A	Residential (Rowhouse)	6 u	501-515 E. Fifth St.	398-332-06
25	Related Co. Site B	Residential (Rowhouse)	9 u	606-620 E. Fifth St.	398-228-02
26	Related Co. Site C1 & C2	Residential (Rowhouse and duplex)	6 u	601-607 E. Fifth St.	398-333-01
27	Related Co. Site D	Residential (Rowhouse)	4 u	615-621 E. Fifth St.	398-333-05
28	Related Co. Site E	Residential (Duplex)	2 u	712 E. Fifth St.	398-337-03
29	Santa Ana Blvd. Spec. Plan Area	Mixed-used	600 u	Santa Ana Blvd.	398-311-14
30	The MET at South Coast	Residential (Condo) (five-and six-story over parking)	TBD	200 E. First American Wy.	411-074-03
31	TAVA Homes	Residential (Single Family)	24 u	1584 E. Santa Clara Ave.	396-052-14
32	Town and Country Independent Living	Residential (Condo)	144 u	555 E. Memory Ln.	041-213-04
33	Vista Del Rio	Residential (Apartments/Special needs)	41 u	1600 W. Memory Ln.	101-055-27
34	1100 S. Grand Ave.	McDonald's with drive through	3,838 sf	1100 S. Grand Ave.	011-263-02
35	3312 W. First St.	Office (two-story)	29,000 sf	3312 W. First St.	144-341-07
36	630 S. Hathway St.	Industrial (two-story)	4,100 sf	630 S. Hathaway	011-311-04
C	Santa Ana Blvd. Grade Separation NOTE: PSR / conceptual engineering is in process. City of Santa Ana is lead. Not included in SAFG No Build	Reconstruct Santa Ana Blvd. at Metrolink railroad tracks		north of SARTC	Multiple APNS
D	SARTC Expansion / Redevelopment NOTE: Master Planning Stage - Santa Ana is lead, funded by OCTA Go Local. Not included in SAFG No Build	Intermodal Transportation Center / Land Use Development		SARTC and surrounding parcels including east of existing Metrolink tracks	Multiple APNS
E	PE Major Arterial NOTE: RSTIS completed. OCTA to issue RFQ for PSR phase in 2011. OCTA is lead. Project is listed as part of the MPAH. Not included in SAFG No Build	New four-lane roadway in PE ROW / ramps to SR-22		PE ROW, from SR-22 to Raitt St.	Multiple APNS

No.	Project	Description/Land Use	No. of u or square feet (sf)	Location	Primary APN
F	Class II bike lane on Civic Center Dr. NOTE: City of Santa Ana is lead and planning concept for this bike lane has been identified. Not in SAFG No Build, but design for SAFG Streetcar Alternative 2 accounts	Early planning stages (per Citywide bicycle program)		TBD – on Civic Center Dr.	Multiple APNS
G	Class I bicycle facility on PE ROW NOTE: No work has been completed. Not in SAFG No Build list.	OCTA and County of Orange Bicycle Master Plan only.		Harbor Blvd. to Raitt	Multiple APNS
		Under Construction			
37	Alton Court	Residential (Single Family)	38 u	3321 S. Fairview St.	414-171-01
38	Wintersburg Presbyterian Church	Classrooms, Gym, Outreach Center	24,348 sf	2000 N. Fairview St.	101-652-13
39	Audi Dealership	Commercial, addition to showroom	7,700 sf	1425 S. Auto Mall Dr.	402-101-37
40	Courtyard by Marriot Hotel	Hotel (155 rooms)	100,000 sf	8 McArthur Pl.	411-081-28
41	Downtown Artist Lofts III	Artist Live/Work Lofts	16 u	SWC Main/Third St.	398-601-02
42	Dr. Do Medical Office	Office (two-story)	6,000 sf	4718 W. First St.	108-101-45
43	Goodwill Industries	Office/Industrial	12,000 sf	410 N. Fairview St.	405-222-04
44	Latino Health Access	Community Center	3,074 sf	602 E. Fourth St.	398-481-05
45	Santa Ana Express Car Wash	Drive-through car wash		202 E. First St.	398-51-401
46	Olen Properties (Parkcenter)	Office (one and two-story)	29,170 sf	601 N. Park Center Dr.	400-042-04
47	One Broadway Plaza	Office (37-story)	518,000 sf	1109 N. Broadway	398-561-07

Source: City of Santa Ana Planning Department Aug. 2011

Notes:
Unit (u), Not Applicable (N/A)
Projects A - G are reasonably foreseeable, but note that Projects C – F are not yet funded and committed.
Projects A and B have been approved. Projects C - F are in various stages of early project development.
Project Number: 12-14 retrieved from City of Santa Ana Capital Improvement Program FY 09-10 CIP Projects by Category (http://www.ci.santaana.ca.us/finance/budget/1011/10-11_proposed_annual_budget.pdf)

Those vehicles primarily headed into downtown Santa Ana and points south, which reduced demand on the Orange Crush (the I-5/SR-22/SR-57 freeway interchange). While the regional circulation network is relieved, it is reasonable to assume that traffic volumes will increase on city streets such as Santa Ana Boulevard, Bristol Street, and First Street, if the PE Arterial is constructed. The regional, travel demand estimate for the PE Arterial will be refined, including identification of potential traffic impacts to the local circulation network, through a progression of additional definitional studies (e.g., feasibility study, project study report, and project report/environmental document). These studies will examine features such as potential ramp connections to SR-22, elevated versus at-grade intersections; and the number, location, and configuration of access points (intersections) between the PE Arterial and the local, street network.

As additional engineering and design work is performed for the PE Arterial, more will become known as to where and how local circulation patterns will be affected. Some intersections within the Santa Ana and Garden Grove Fixed Guideway Project Study Area will likely be impacted by the PE Arterial, while others may be relieved. Future environmental studies performed for the PE Arterial will identify impacted local roadways and intersections, as well as any required mitigation. This environmental analysis performed for the PE Arterial will also assess and address any potential cumulative impacts with respect to traffic and circulation.

Santa Ana Regional Transportation Center (SARTC) Expansion/Redevelopment: The SARTC Expansion/Redevelopment project is a proposal to redevelop the property on which SARTC is located and to fundamentally reconfigure access to SARTC. However, for the time being, the proposal has not moved beyond a concept plan. Conceptual plans have been rendered that envision redeveloping the existing SARTC surface parking lot into a mixed-use, commercial/retail transit-oriented space. The existing SARTC station building would also be redeveloped into a yet to be determined use, but would likely remain a community asset for community use.

A new rail station and intermodal transfer area would be constructed on the east side of the Los Angeles-San Diego-San Luis Obispo (LOSSAN) corridor tracks. The existing SARTC parking structure would remain and would be supplemented by additional parking on the east side of the LOSSAN corridor tracks. This concept, as described here, will undergo further enhancements and revisions upon the selection of a developer for the site as well as the preliminary site design that has yet to be initiated. The timeframe for project development will governed, in part, by funding availability and financial considerations, as well as continued community input. A formal analysis of environmental impacts has not yet been performed, but at this stage in the conceptual plan for the site, it is generally believed that access to SARTC will fundamentally be changed from the west side of the LOSSAN corridor tracks to the east side of the LOSSAN corridor tracks. This would change traffic circulation in the SARTC area.

The intensification of development on the existing SARTC surface parking lot (on the west side of the LOSSAN Corridor tracks) would likely lead to more vehicle trips in and around the

SARTC area. However, with the transit-oriented nature of the redevelopment and the transit-oriented nature of burgeoning development around SARTC, the vehicle trips in and around the SARTC area may not be significant. Should the City of Santa Ana complete any further analysis or project development activities for the SARTC Expansion/Redevelopment during the environmental process for the Project, that information will be added to the environmental documentation for the Project.

Santa Ana Boulevard Grade Separation: A project related to the SARTC site is the Santa Ana Boulevard Grade Separation project. It is one of many grade separations proposed along the LOSSAN rail corridor. The intent of the project is to grade separate Santa Ana Boulevard from the LOSSAN rail corridor, immediately adjacent to SARTC. The City of Santa Ana is actively forwarding this project. It is currently in the early stages of development of Project Study Report Equivalent (PSRE) that includes a preliminary environmental documentation. Following the environmental process the project will move into detailed design, and development of Plans, Specifications, and Estimates (PS&E). Because the project is in the early stages of the environmental process, the environmental impacts are not yet known. However, as with most grade separation projects the environmental impacts are assumed to be fairly localized. The traffic and circulation impacts of a grade separation project would typically be temporary, and would be most adverse during construction activities. Upon completion of construction, traffic and circulation are generally improved over the pre-construction conditions in the vicinity of the grade separation. Safety is typically improved significantly due to the removal of at-grade passenger vehicle/rail vehicle conflicts. It is not anticipated that there would be any adverse cumulative impacts due to the implementation of the Santa Ana Boulevard Grade Separation project and the Project.

Chapter 10 References

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Appendix A: Detailed Project Description

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Project Description

The alternatives addressed in this EA/DEIR consist of a No Build Alternative, which is used as a basis for comparing the costs and benefits of the three alternatives, TSM, Streetcar 1 and Streetcar 2, each of which responds to purpose and need, study goals, and community input. Additional details are provided below.

Project Location

The Study Area is located in the Cities of Santa Ana and Garden Grove, in Orange County, California. The transit corridor is regionally located in central Orange County, California and directly accesses both the Los Angeles-San Diego (LOSSAN) rail corridor and the Pacific Electric Right-of-Way (PE ROW) rail corridor. The Study Area is generally bounded by Harbor Boulevard to the west, 17th Street/Westminster Avenue to the north, Grand Avenue to the east, and 1st Street to the south. The approximate foul-mile transit corridor extends from the Harbor Boulevard/Westminster Avenue intersection in the City of Garden Grove at its western terminus to the Santa Ana Regional Transportation Center (SARTC) in the City of Santa Ana at its eastern terminus. **Figures A-1** and **A-2** provide the Regional Location and Study Area maps, respectively

No Build Alternative

The No Build Alternative includes existing conditions, as well as conditions that would be reasonably expected to occur in the foreseeable future without implementation of any of the build alternatives. The No Build Alternative provides the basis for comparing future conditions resulting from other alternatives. Conditions in the foreseeable future (through planning horizon year 2035) include projects that (1) have environmental analysis approved by an implementing agency and (2) have a funding source identified for implementation.

Other projects in the foreseeable future include:

- Implementation of the Transit Zoning Code (SD 84A and SD 84B), both project-level and program-level components, that are anticipated for build-out by 2028
- Implementation of the Station District Development Projects, which consist of a variety of residential develop projects, community open space and some limited neighborhood-serving commercial development
- Transit improvements including modest adjustments to existing local bus routes; and expanded Metrolink service
- Three, new bus rapid transit routes: (1) Harbor Boulevard Bus Rapid Transit Corridor [Costa Mesa to Fullerton, 10-minute headways, peak period]; (2) Westminster/17th Street Bus Rapid Transit Corridor [Santa Ana to Long Beach, 10-minute headways, peak period]; and (3) Bristol Street Bus Rapid Transit Corridor [Irvine Transportation Center to Brea Mall, 10-minute headways, peak period]
- Roadway improvements including the Bristol Street Widening project, which will widen Bristol Street from four to six lanes between Warner Avenue and Memory Lane, and the

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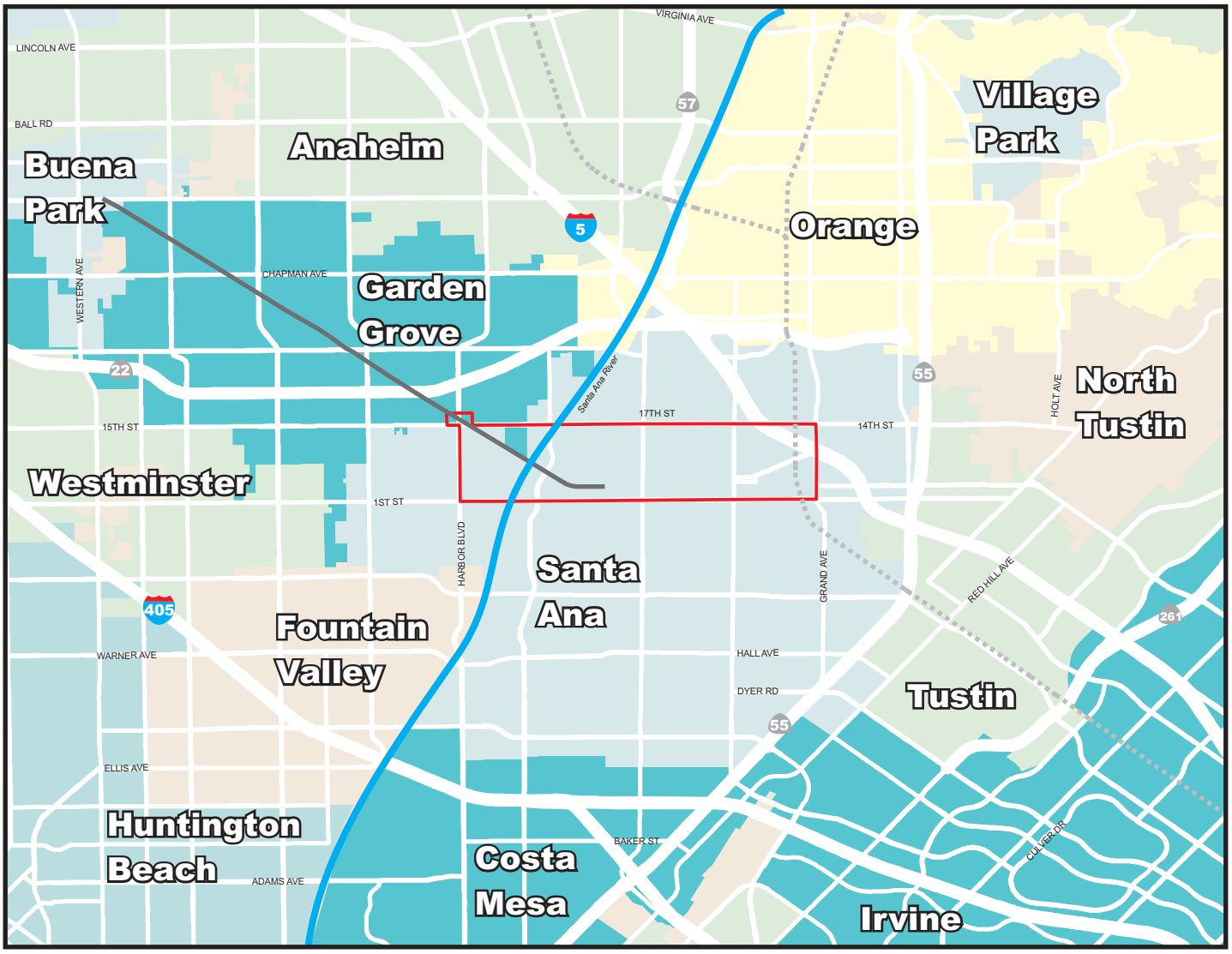
Location Map



LEGEND:

- Study Area
- PE ROW
- Metrolink/Amtrak Rail Line

0 1.1 2.2 MILES

NORTH

Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012; updated by Terry A. Hayes Associates Inc., August 2012.

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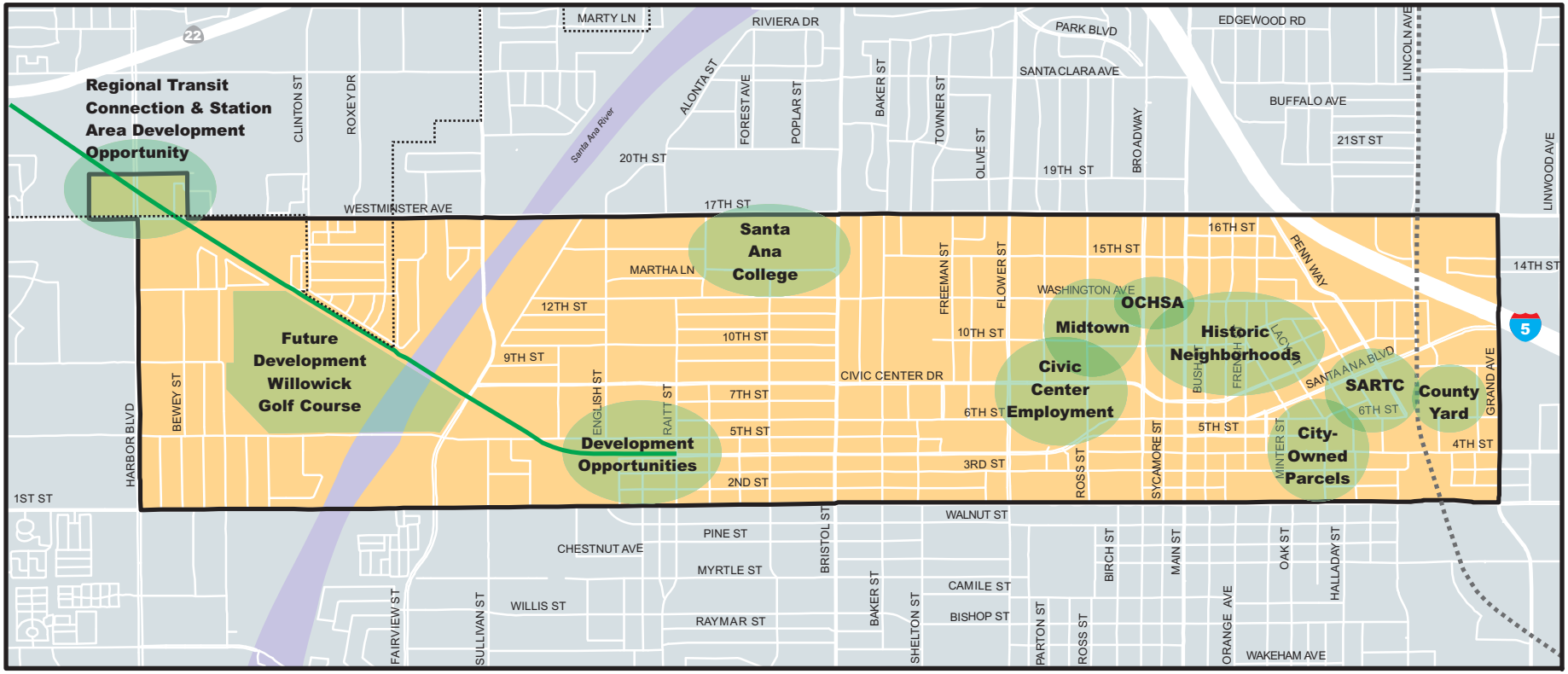
Study Area



LEGEND:

- Study Area
- Activity Center
- PE ROW
- Metrolink/Amtrak Rail Line
- Boundary of City of Garden Grove

NORTH

0 1500 3000 FEET

Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012; updated by Terry A. Hayes Associates Inc., August 2012.

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- Grand Avenue Widening project, which will widen Grand Avenue from four to six lanes between 1st Street and 17th Street

TSM Alternative

The TSM Alternative enhances the mobility of existing transportation facilities and transit network without construction of major new transportation facilities or significantly, costly physical capacity improvements. Consistent with FTA guidelines, the TSM Alternative emphasizes low cost (i.e., small physical) improvements and operational efficiencies such as focused traffic engineering actions, expanded bus service, and improved access to transit services. Included within the TSM Alternative are modifications and enhancements to selected bus routes in the Study Area including:

- Skip-stop overlay service on 1st Street (Route 64) which includes access to SARTC
- A new route between SARTC and Harbor Boulevard/Westminster Avenue via Civic Center Drive, Bristol Street and 17th Street/Westminster Avenue, providing 10-minute peak and 20-minute off-peak service
- Expanded service span for StationLink service (Route 462) between SARTC and the Civic Center, providing 15-minute service during both peak and off-peak hours.

Figure A-3 is a map of the proposed routes for the TSM bus network enhancements.

In addition, the following system operational improvements are included in the TSM Alternative:

- Traffic signal timing improvements at select congested locations along Santa Ana Boulevard and Civic Center Drive to provide for enhanced east-west bus flow, potential including but not limited to:
    - Main Street at Civic Center Drive
    - Broadway at Civic Center Drive
    - Flower Street at Civic Center Drive
    - Fairview Street at Civic Center Drive
    - Santa Ana Boulevard at Santiago Street
    - Santa Ana Boulevard at Lacy Street (install traffic signal)
- Real-time bus schedule information at high-volume transit stops (e.g., Flower Street and 6th Street, Santa Ana Boulevard and Main Street)
- Improvements to transit stop amenities (benches, shelters, kiosks, sidewalk connections, etc.) along the Santa Ana Boulevard and Main Street corridors
- Improvements to bicycle and pedestrian circulation to promote safe, convenient and attractive connectivity between the transit system and surrounding neighborhoods and activity centers , including accommodating bicycles on all buses, providing real time bus arrival information via internet and mobile devices, installing bicycle storage facilities at SARTC and the Harbor/Westminster stop, and providing study area maps/walking guides on all buses

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Transportation Systems Management (TSM) Alternative

Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012; updated by Terry A. Hayes Associates Inc., August 2012.

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Streetcar Alternative 1

Streetcar Alternative 1 would utilize the PE ROW through the western half of its alignment and generally operate along Santa Ana Boulevard and 4th Street on the way to SARTC. The 4.1-mile alignment for Streetcar Alternative 1 would include 12 stations. It is anticipated that the streetcar system would operate seven days a week with 10-minute headways during peak periods and 15-minute headways during off-peak periods. The streetcars would be electrically powered using an overhead contact system and a series of TPSS located intermittently along the alignment. Although the specific vehicle has not been selected at this preliminary stage, streetcars generally have a capacity of 30 to 40 seated passengers and 80 to 90 standing passengers for a total of 120 to 130 passengers. **Table A-1** provides a summary description of the key physical and operational attributes of Streetcar Alternative 1 (PE ROW with Santa Ana Boulevard and 4th Street Couplet). **Figure A-4** provides a conceptual illustration of the alignment for Streetcar Alternative 1 relative to the existing street network within the Study Area.

Sasscer Park Alignment

In Streetcar Alternative 1, the Downtown Santa Ana segment features couplet operations with the westbound streetcar alignment on Santa Ana Boulevard and the eastbound streetcar alignment on 4th Street. For the eastbound transition from Santa Ana Boulevard to 4th Street, a direct route from Santa Ana Boulevard along a public easement on the southern edge of Sasscer Park to 4th Street has been identified in **Figure A-5**.

Streetcar Alternative 2

Streetcar Alternative 2 would utilize the PE ROW through the western half of its alignment and substantially operate along Santa Ana Boulevard, Civic Center Drive, and 5th Street along the eastern half of the alignment to SARTC. The operational characteristic of this alternative are identical to Streetcar Alternative 1. The differences between the two streetcar alternatives are the alignment and the fact that Streetcar 2 would have one additional station for a total of 13. **Table A-2** provides a summary description of the key physical and operational attributes of Streetcar Alternative 2 (PE ROW with Santa Ana Boulevard and 5th Street/Civic Center Drive Couplet). This table also includes station locations for comparison to station locations for Streetcar Alternative 1 shown in Table A-1, above. **Figure A-6** provides a conceptual illustration of the alignment for Streetcar Alternative 2 relative to the existing street network within the Study Area.

Civic Center Bike Lane

The Streetcar Alternative 2 alignment travels westbound through the Civic Center along Civic Center Drive between Spurgeon and Flower Streets. As part of the City of Santa Ana's Complete Streets Program, and not as part of the SA-GG Fixed Guideway, the City plans to construct bicycle lanes are along Civic Center Drive. Streetcar Alternative 2 would acquire additional ROW (**Figure A-7**) in order not to preclude the westbound bike lane.

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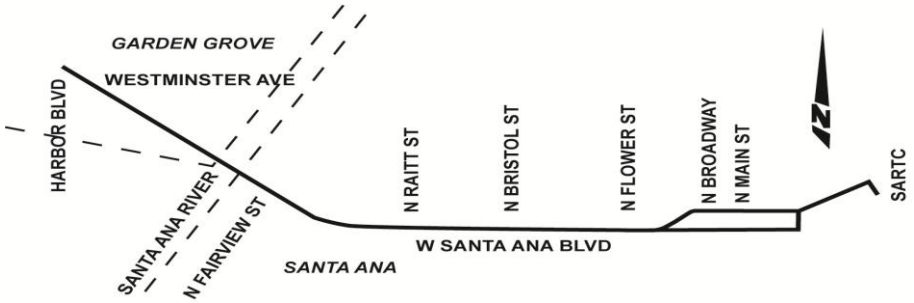
TABLE A-1: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 1		
Key Attributes	**Descriptions**	
Transmit Mode	Streetcar	
Termini	Western Terminus: Harbor Blvd. Eastern Terminus: SARTC	
Alignment Description	<u>Routing by Segment:</u> • PE ROW, from Harbor Blvd. to Raitt St.: streetcars operate at-grade, bi-directionally, in exclusive ROW. • Santa Ana Blvd., from Raitt St. to Ross St.: streetcars operate in the street, at-grade, bi-directionally, along with mixed-flow traffic. • 4th St./Santa Ana Blvd. Couplet, from Ross St. to Mortimer St.: streetcars operate in the street, at-grade, one-way, along with mixed-flow traffic. • Santa Ana Blvd., from Mortimer St. to SARTC: streetcars operate in the street, at-grade, bi-directionally, along with mixed-flow traffic.  	
Length of Alignment	4.1 miles (Harbor Blvd. to SARTC)	
Stations (12 Stations)	<u>Station Locations:</u> 1. Harbor Blvd. and Westminster Ave. 2. Willowick 3. Fairview St. and PE ROW 4. Raitt St. and Santa Ana Blvd. 5. Bristol St. and Santa Ana Blvd. 6. Flower St. and Santa Ana Blvd.	
	Couplet Section (Eastbound) 7E. Sasscer Park 8E. Broadway and 4th St. 9E. Main St. and 4th St. 10E. French St. and 4th St.	*Couplet Section (Westbound)* 7W. Ross St. and Santa Ana Blvd. 8W. Broadway and Santa Ana Blvd. 9W. Main St. and Santa Ana Blvd. 10W. French St. and Santa Ana Blvd.
	11. Lacy St. and Santa Ana Blvd.	

TABLE A-1: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 1	
Key Attributes	**Descriptions**
	12. SARTC
Design Options Carried Forward	Santa Ana River Crossing: • Adjacent Single Track Bridge Option
	4th Street Parking Scenarios: • Scenario A: South side parallel • Scenario B: South side removal • Scenario C: South side and north side removal
Headways	Peak: 10 minutes (6:00 a.m. to 6:00 p.m.) Off-Peak: 15 minutes (after 6:00 p.m.)
Hours of Operation (in revenue service)	Monday – Thursday: 6:00 a.m. to 11:00 p.m. (17 hours) Friday and Saturday: 6:00 a.m. to 1:00 a.m. (19 hours) Sunday: 7:00 a.m. to 10:00 p.m. (15 hours)
Transit Vehicle	Streetcar – Vehicle type selection has yet to be determined. The two classifications under consideration include: • Classic Modern Streetcar (e.g., Portland, Oregon) • CPUC Compliant Streetcar (e.g., San Diego, California)
Power Source	Electric, Overhead Contact System, Traction Power Substations (TPSS) TPSS Locations: a. Northwest of Harbor Boulevard and Westminster Avenue b. Along PE ROW, west of Susan Street c. Along PE ROW, east of Santa Ana River d. North on Santa Ana Boulevard. East of Bristol Street e. North of 5th Street, east of Main Street
Operations and Maintenance Facility Sites	Two Candidate Sites: • Site A: South of SARTC, bordered by 4th St., 6th St., Poinsettia St., and Metrolink tracks. • Site B: West of Raitt St., between the PE ROW and 5th Street
Major Bicycle and Pedestrian Features	• Sidewalk and pedestrian improvements in the vicinity of proposed station platforms. • 4th St.: In conjunction with on-street parking modifications, widen sidewalks on 4th St. between Ross St. and French St.: – Scenario A: On south side by 8 ft. for a total width of 20 ft. – Scenario B: On south side by 16 ft. for a total width of 28 ft. – Scenario C: On both sides by 16 ft. for a total width of 28 ft.

Source: Cordoba Corporation, Conceptual Design Plan Set, August 2011.

Streetcar Alternative 1 Alignment

LEGEND:

- Study Area
- Proposed Stop
- Streetcar Alternative 1

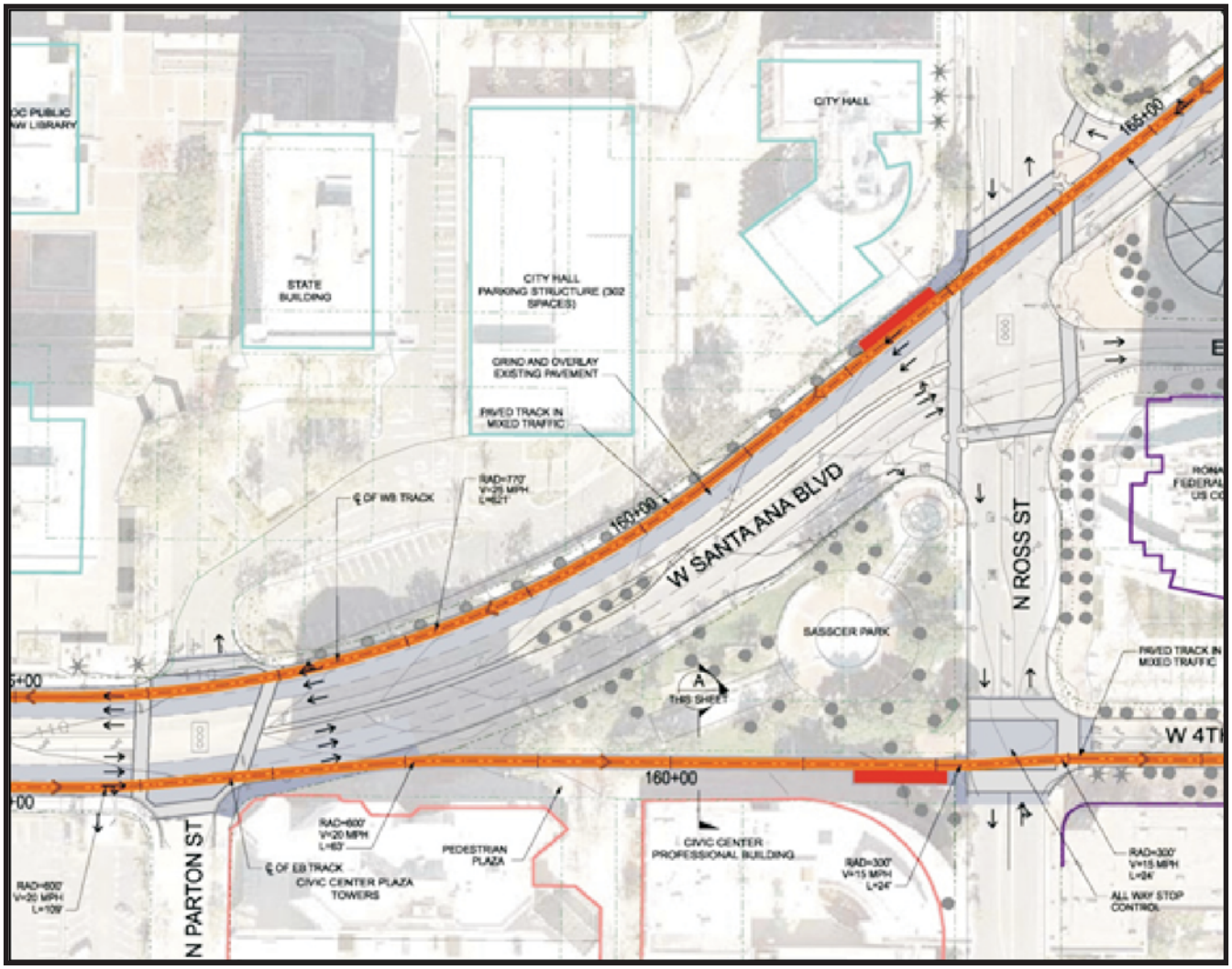
0 1500 3000 FEET

NORTH

Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study*, July 11, 2012; updated by Terry A. Hayes Associates Inc., August 2012.

Note: Termini for Initial Operable Segment 1 (IOS-1) are located at Raitt Street and SARTC.

Sasscer Park Design



Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

TABLE A-2: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 2

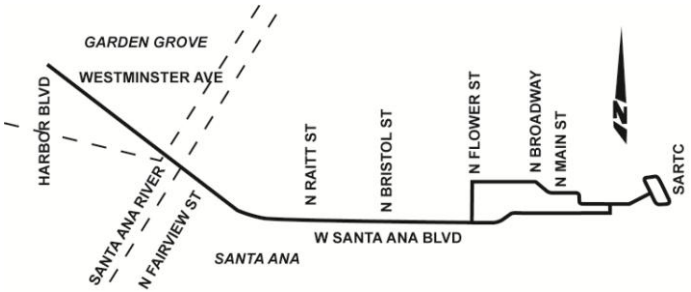
Key Attributes	Descriptions
Transit Mode	Streetcar
Termini	Western Terminus: Harbor Blvd. Eastern Terminus: SARTC
Alignment Description	Routing by Segment: • PE ROW, from Harbor Blvd. to Raitt St.: streetcars operate at-grade, bi-directionally, in exclusive ROW. • Santa Ana Blvd., from Raitt St. to Flower St.: streetcars operate in the street, at grade, bi-directionally, along with mixed-flow traffic. • Santa Ana Blvd./5th St. and Civic Center Dr. Couplet, from Flower St. to Minter St.: streetcars operate in the street, at-grade, one-way, along with mixed-flow traffic. • 6th St./Brown St., from Minter St. to Poinsettia St.: streetcars operate in the street, at-grade, bi-directionally, along with mixed-flow traffic. • Poinsettia St./Santa Ana Blvd./Santiago St./6th St. (SARTC Loop): streetcars operate in a one-way loop, in the street, at-grade, along with mixed-flow traffic. 
Length of Alignment	4.5 miles (Harbor Boulevard to SARTC)
Stations(13 Stations)	Station Locations: 1. Harbor Blvd. and Westminster Ave. 2. Willowick 3. Fairview St. and PE ROW 4. Raitt St. and Santa Ana Blvd. 5. Bristol St. and Santa Ana Blvd.
	Couplet Section(Eastbound) 6E. Flower St. and Santa Ana Blvd. 7E. ---------- 8E. Ross St. and Santa Ana Blvd. 9E. Broadway and 5th St. 10E. Main St. and 5th St. 11E. French St. and 5th St.
	Couplet Section(Westbound) 6W. Flower St. and 6th St. 7W. Flower St. and Civic Center Dr. 8W. Van Ness Ave. and Civic Center Dr. 9W. Broadway and Civic Center Dr. 10W. Main St. and Civic Center Dr. 11W. French St. and Santa Ana Blvd.
	12. Brown St. and Lacy St.

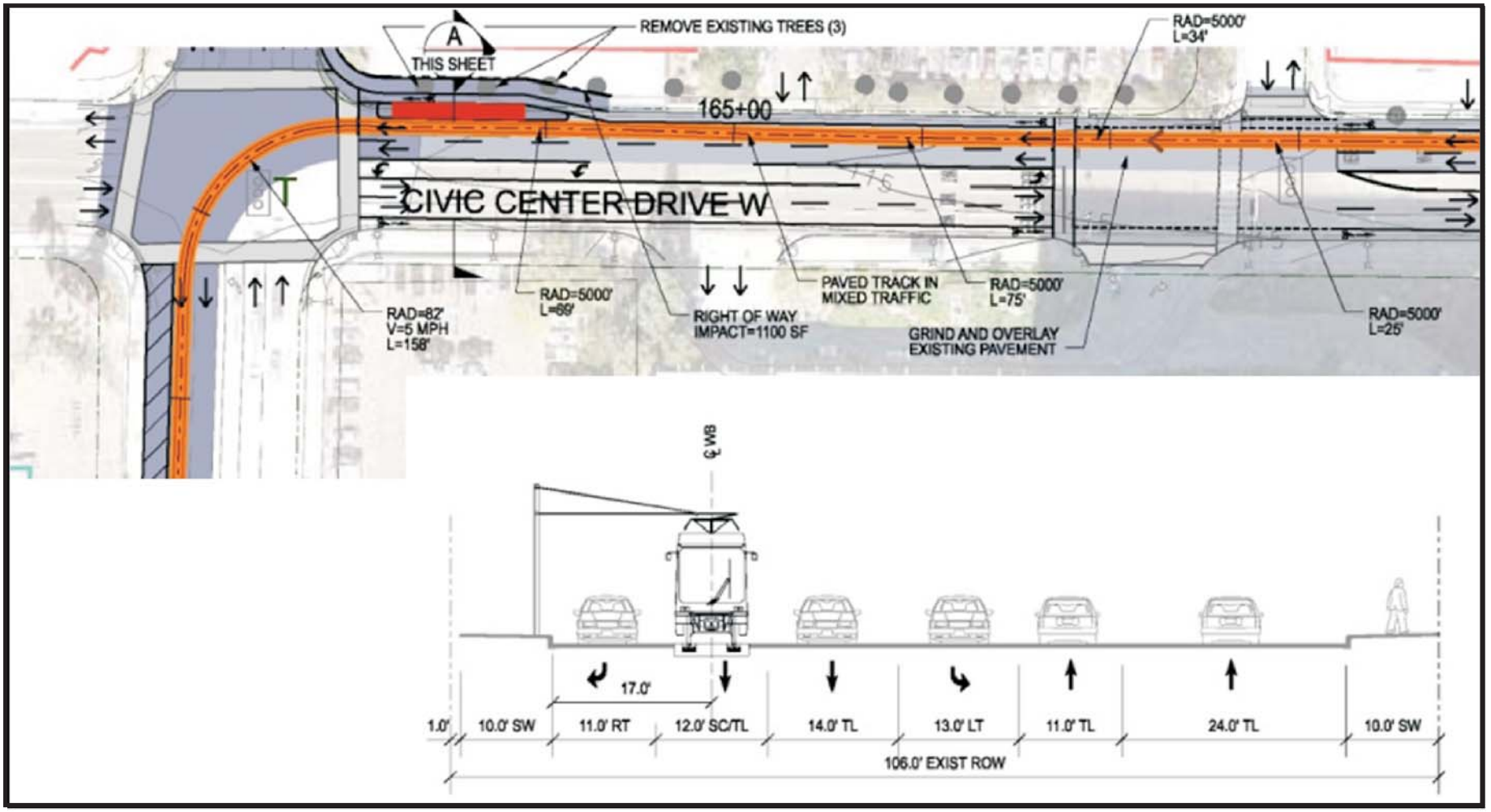
TABLE A-2: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 2	
Key Attributes	**Descriptions**
	13. SARTC
Design Options Carried Forward	Santa Ana River Crossing: Adjacent Single Track Bridge
Headways	Peak: 10 minutes (6:00 a.m. to 6:00 p.m.) Off-Peak: 15 minutes (after 6:00 p.m.)
Hours of Operation (in revenue service)	Monday – Thursday: 6:00 a.m. to 11:00 p.m. (17 hours) Friday and Saturday: 6:00 a.m. to 1:00 a.m. (19 hours) Sunday: 7:00 a.m. to 10:00 p.m. (15 hours)
Transit Vehicle	Streetcar – Vehicle type selection has yet to be determined. The two classifications under consideration include: • Classic Modern Streetcar (e.g., Portland, Oregon) • CPUC Compliant Streetcar (e.g., an Diego, California)
Power Source	Electric, Overhead Contact System, Traction Power Substations(TPSS) TPSS Locations: a. Northwest of Harbor Boulevard and Westminster Avenue b. Along PE ROW, west of Susan Street c. Along PE ROW, east of Santa Ana River d. North on Santa Ana Boulevard, east of Bristol Street e. North of 5th Street, east of Main Street
Operations and Maintenance Facility Sites	Two Candidate Sites: • Site A: South of SARTC, bordered by 4th St., 6th St., Poinsettia St., and the Metrolink tracks. • Site B: West of Raitt St., between the PE ROW and 5th St.
Major Bicycle and Pedestrian Features	• Sidewalk and pedestrian improvements in the vicinity of proposed station platforms. • Civic Center Drive: Provide sufficient street width on Civic Center Drive between Flower Street and Spurgeon Street to support the City's planned development of a striped bike lane on each side of the street.

Source: Cordoba Corporation, Conceptual Design Plan Set, August 2011.

Streetcar Alternative 2 Alignment

Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012*;* updated by Terry A. Hayes Associates Inc., August 2012.
Note: Termini for Initial Operable Segment 2 (IOS-2) are located at Raitt Street and SARTC.

Civic Center Drive Bike Lane



Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

Streetcar Alternatives Initial Operable Segments

In response to funding and phasing issues raised by fiscal constraints identified during OCTA's long-range transportation planning process, IOSs which are shorter segments of Streetcar Alternatives 1 and 2 were developed for the SA-GG Fixed Guideway Project. The intent of the IOSs was to identify starter segments that could be constructed and operated until funding is assembled to complete the projects. Both IOS-1 and IOS-2 would terminate at Raitt Station (Raitt Street and Santa Ana Boulevard) rather than Harbor Station (Harbor Boulevard and Westminster Avenue). Both would include the same project features and design options as their respective full alignment build alternatives between Raitt Street and SARTC. These tracks would extend another hundred feet west within the PE ROW to reach the O & M Facility Site B should this site ultimately be selected for either IOS-1 or IOS-2.

The configuration of Raitt as an interim terminus station is the same for IOS-1 and IOS-2. Just over 50 spaces would be provided for station parking at Raitt within the PE ROW on an interim basis to be replaced by parking at Harbor Station upon completion of the full Project. Vehicular access to Raitt Station parking would be via Daisy Avenue.

IOS-1 (Santa Ana Boulevard and 4th Street Couplet). IOS-1 follows the same alignment as Streetcar Alternative 1, but terminates at Raitt Station rather than extending to Harbor Station (**Figures A-8** through **A-10**). The IOS-1 streetcar alignment is about 2.2 miles in length. IOS-1 includes the same project features, design options, and parking scenarios as Streetcar Alternative 1 between Raitt Street and SARTC (**Table A-3**).

IOS-2 (Santa Ana Boulevard/5th Street and Civic Center Drive Couplet). IOS-2 follows the same alignment as Streetcar Alternative 2, but terminates at Raitt Station rather than extending to Harbor Station (**Figures A-8** through **A-10**). The IOS-2 streetcar alignment is about 2.6 miles in length. IOS-2 includes the same project features and design options as Streetcar Alternative 2 between Raitt Street and SARTC (**Table A-3**).

Key Attributes

Western Terminus Elevated Crossing

The western terminus for both of the streetcar alternatives is located at the northeast corner of Harbor Boulevard and Westminster Avenue; the transition from the PE ROW to the western terminus site will include an elevated crossing. This crossing is illustrated in **Figure A-11**.

Streetcar Stations

The stations for each streetcar alternative alignment are located curbside adjacent to the platforms within the public ROW. They will consist of a shelter constructed substantially of transparent materials. In addition to seating, the stations will provide traveler information such as estimates of next train arrival time. The two terminus stations will include parking (approximately 52 spaces at the western terminus station; shared-use of SARTC parking for the eastern terminus station). The terminus stations and one inline station in the Downtown

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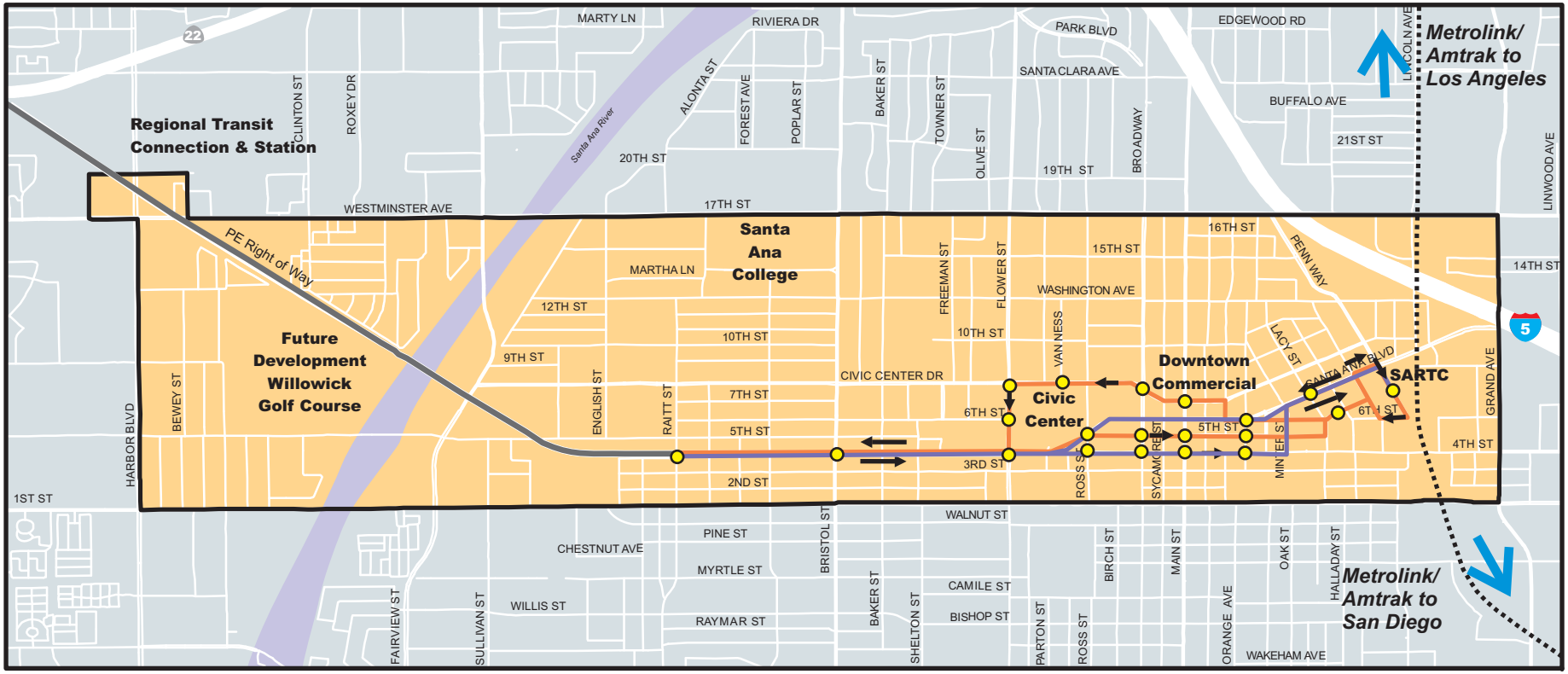
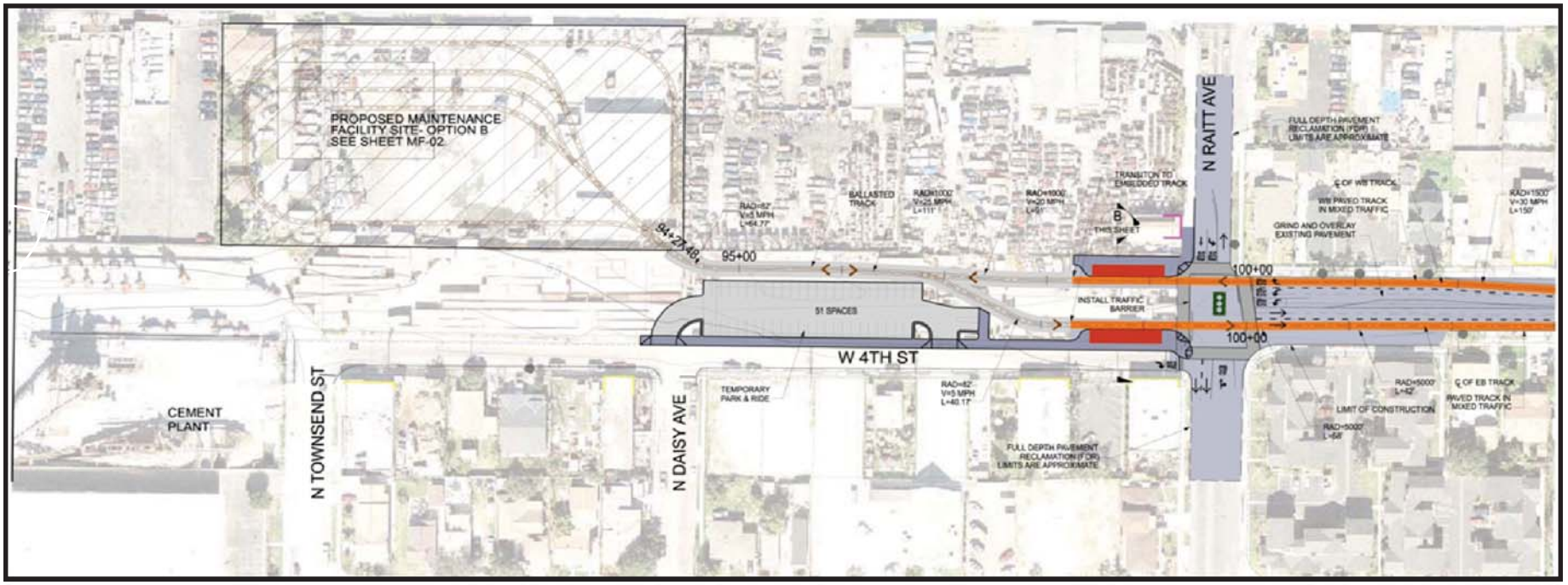
IOS-1 and IOS-2 Alignments



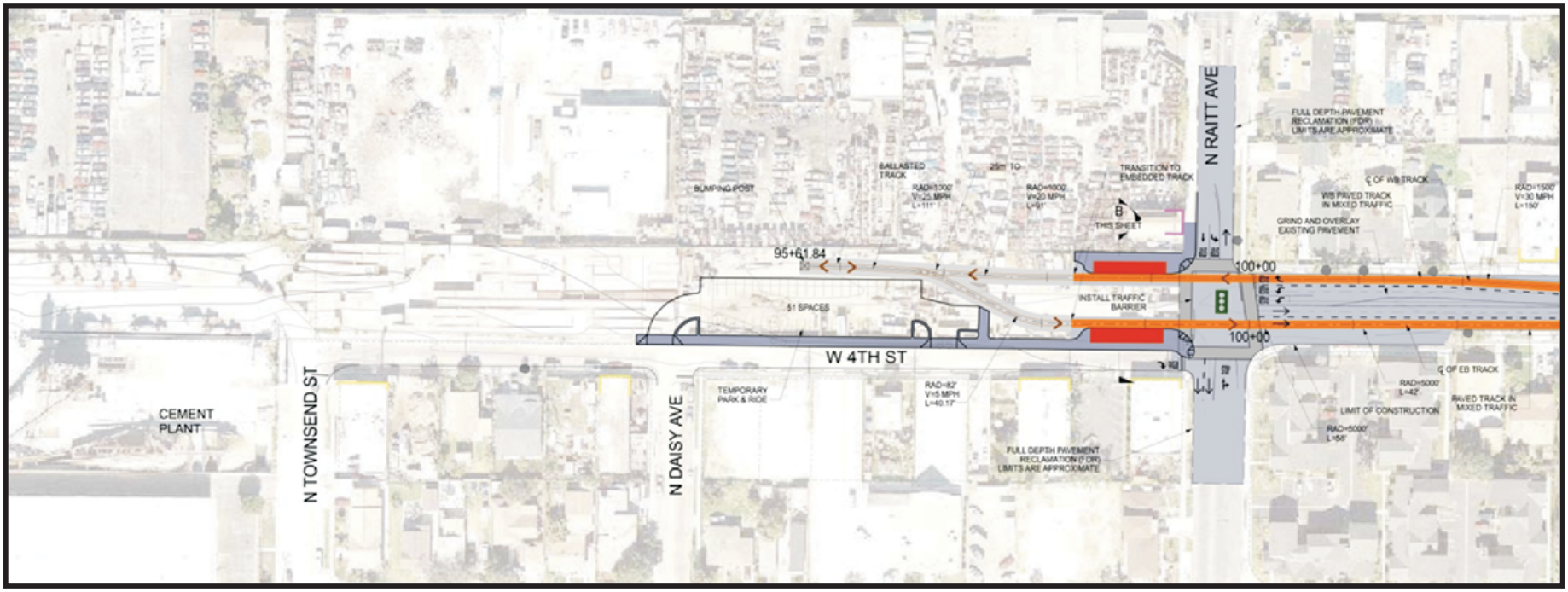
Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012*;* updated by Terry A. Hayes Associates Inc., August 2012.

IOS-1 and IOS-2 Raitt Street Terminus Configuration with O & M Facility



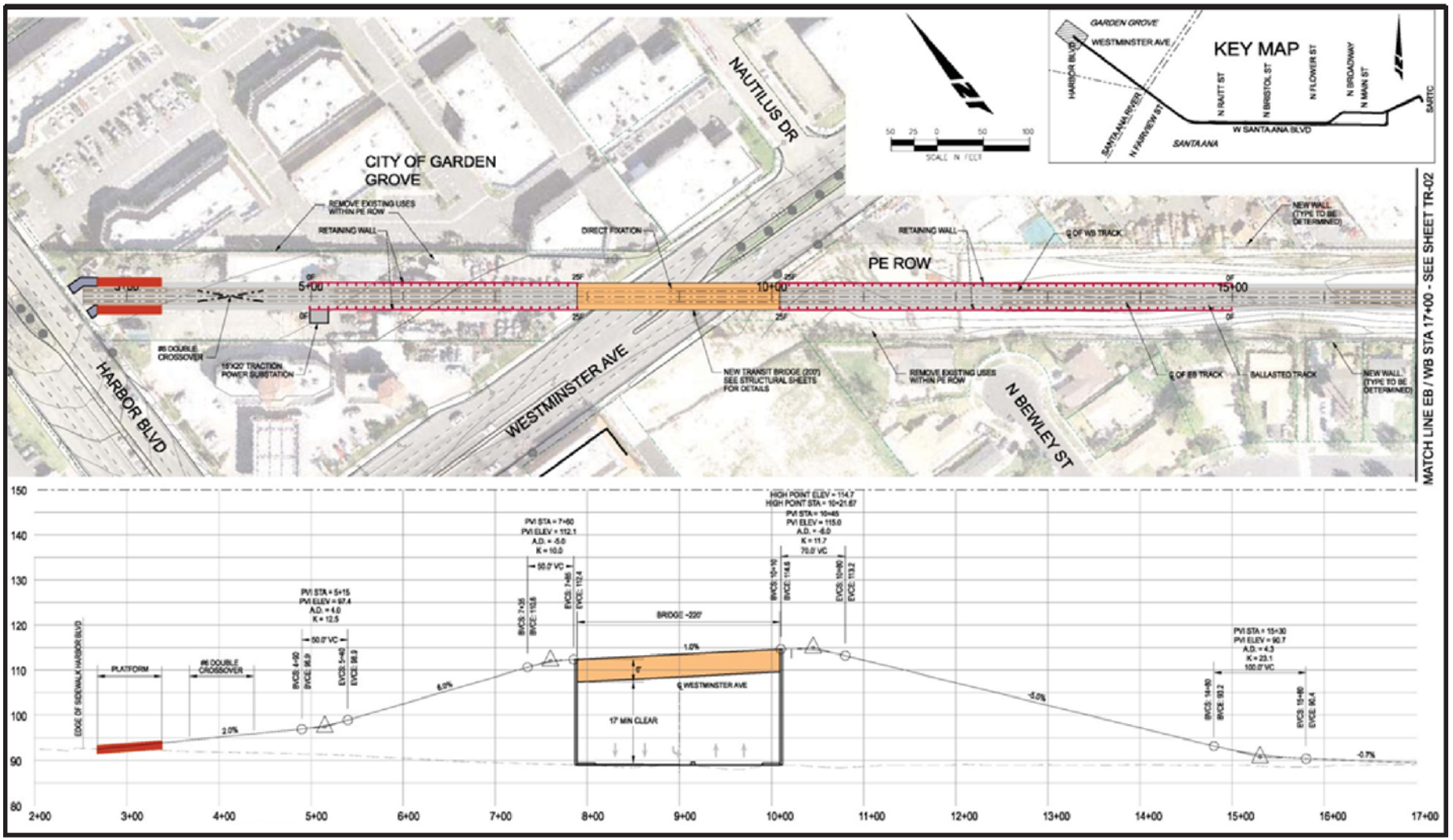
Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

IOS-1 and IOS-2 - Raitt Street Terminus Configuration without O & M Facility



Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

Western Terminus Design



Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

TABLE A-3: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR IOS-1 AND IOS-2

Key Attributes	IOS-1	IOS-2
Termini	Western Terminus: Raitt St. Eastern Terminus: SARTC	
Alignment Description	Routing by Segment: • Santa Ana Blvd., from Raitt St. to Ross St.: streetcars operate in the street, at grade, bi-directionally, along with mixed-flow traffic. • 4th St./Santa Ana Blvd. Couplet, from Ross St. to Mortimer St.: streetcars operate in the street, at grade, one-way, along with mixed-flow traffic. • Santa Ana Blvd., from Mortimer St. to SARTC: streetcars operate in the street, at grade, bi-directionally, along with mixed-flow traffic.	Routing by Segment: • Santa Ana Blvd., from Raitt St. to Flower St.: streetcars operate in the street, at grade, bi-directionally, along with mixed-flow traffic. • Santa Ana Blvd./5th St. and Civic Center Dr. Couplet, from Flower St. to Minter St.: streetcars operate in the street, at-grade, one-way, along with mixed-flow traffic. • 6th St./Brown Street, from Minter St. to Poinsettia St.: streetcars operate in the street, at-grade, bi-directionally, along with mixed-flow traffic. • Poinsettia St./Santa Ana Blvd./Santiago St./6th St. (SARTC Loop): streetcars operate in a one-way loop, in the street, at-grade, along with mixed-flow traffic.
Length of Alignment	2.2 miles (Raitt St. to SARTC)	2.6 miles (Raitt St. to SARTC)
Stations	Station Locations: 4. Raitt St. and Santa Ana Blvd. 5. Bristol St. and Santa Ana Blvd. 6. Flower St. and Santa Ana Blvd.	Station Locations: 4. Raitt St. and Santa Ana Blvd. 5. Bristol St. and Santa Ana Blvd.
	Couplet Section (Eastbound) 7E. Sasscer Park 8E. Broadway and 4th St. 9E. Main St. and 4th St. 10E. French St. and 4th St. *Couplet Section (Westbound)* 7W. Ross St. and Santa Ana Blvd. 8W. Broadway and Santa Ana Blvd. 9W. Main St. and Santa Ana Blvd. 10W. French St. and Santa Ana Blvd.	*Couplet Section (Eastbound)* 6E. Flower St. and Santa Ana Blvd. 7E. ---------- 8E. Ross St. and Santa Ana Blvd. 9E. Broadway and 5th St. 10E. Main St. and 5th St. 11E. French St. and 5th St. *Couplet Section (Westbound)* 6W. Flower St. and 6th St. 7W. Flower St. and Civic Center Dr. 8W. Van Ness Ave.* and Civic Center Dr. 9W. Broadway and Civic Center Dr. 10W. Main St. and Civic Center Dr. 11W. French St. and Santa Ana Blvd.
	11. Lacy St. and Santa Ana Blvd. 12. SARTC	12. Lacy St. and Santa Ana Blvd. 13. SARTC
Headways	Peak: 10 minutes (6:00 a.m. to 6:00 p.m.) Off-Peak: 15 minutes (after 6:00 p.m.)	
Hours of Operation (in revenue service)	Monday – Thursday: 6:00 a.m. to 11:00 p.m. (17 hours) Friday and Saturday: 6:00 a.m. to 1:00 a.m. (19 hours) Sunday: 7:00 a.m. to 10:00 p.m. (16 hours)	
Power Source	Electric, Overhead Contact System, Traction Power Substations (TPSS) TPSS Locations: d. North on Santa Ana Boulevard. East of Bristol Street e. North of 5th Street, east of Main	
Operations and Maintenance Facility Sites	Two Candidate Sites: • Site A: South of SARTC, bordered by 4th St., 6th St., Poinsettia St. and Metrolink tracks. • Site B: West of Raitt St., between the PE ROW and 5th St.	

Source: Cordoba Corporation, Conceptual Design Plan Set, August 2011.

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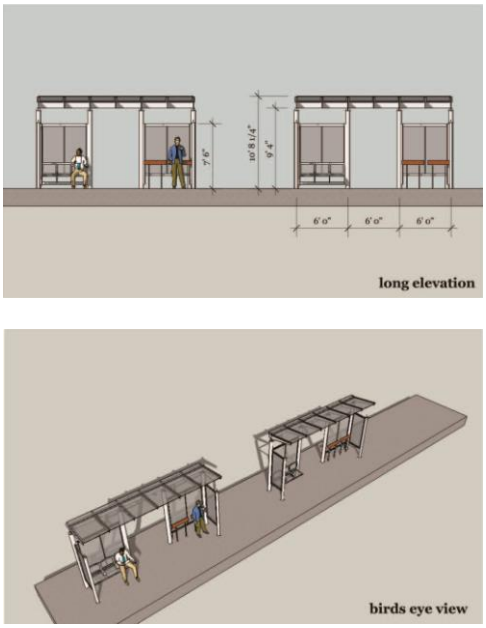
area will also include ticketing machines for the convenience of passengers who may want an alternative to the on-vehicle ticketing during busy peak periods.

Streetcar Alternative 1 includes 12 stations along its 4.1-mile long alignment. Streetcar Alternative 2 includes 13 stations along its 4.5-mile long alignment. An additional station is included in Streetcar Alternative 2 compared to Streetcar Alternative 1. It is located at Flower Street and 6th Street for the westbound streetcar couplet. This is because of the distance between the directional Flower Street stations in Streetcar Alternative 2, with the eastbound stop at Santa Ana Boulevard and the corresponding westbound stop at Civic Center Drive. Additionally, Flower Street, at 6th Street, is a gateway to the Civic Center Plaza with City, County, State and federal offices, as well as the Orange County Sheriff's Department and jail, and the Santa Ana Police Department.



Views of typical streetcar station structure and platform.

Source: Cordoba Corporation

Streetcar Vehicles

Views of typical streetcar vehicles.

Source: Cordoba Corporation

Two types of streetcar vehicles have been identified for use: classic European style streetcar, and the CPUC-compliant vehicle. The former would be similar to the vehicles currently in service in Portland, Oregon and Tucson, Arizona, manufactured by Oregon Ironworks. Neither the Portland vehicle nor the Tucson vehicle meet all CPUC structural requirements, and would therefore require either a waiver from the CPUC or a revision of the CPUC regulations that specifically acknowledge streetcars operating in mixed flow traffic at lower speed. The CPUC-compliant vehicle is derived from a light rail vehicle design. Light rail vehicles are typically CPUC-compliant and do not require CPUC waivers. The Siemens built "S70 short" is a CPUC-compliant vehicle. Both the Oregon Ironworks vehicle and the Siemens vehicle comply with Section 165: "Buy America" provisions of the Surface Transportation Assistance Act of 1982.

Santa Ana River Crossing

Both streetcar alternatives would utilize the PE ROW and cross over the Santa Ana River. This alignment was once used for the Pacific Electric Railway red car system and the Old Pacific Electric Santa Ana River Bridge still remains.

However, it has long been closed for use and not utilized by vehicles or pedestrians since 1950. The historic bridge is inadequate to accommodate the proposed project due to its age, size, (it was constructed as a single-track bridge), disrepair, undetermined structural integrity (both superstructure and foundation) and non-compliance with current building and safety requirements. Four design options were developed for Streetcar Alternatives 1 and 2 at the Santa Ana River Crossing.

These design options were evaluated against identified criteria (cost, feasibility, and potential impacts) to determine which were to be carried forward for evaluation in the EA/DEIR. As detailed in the Section 4(f) Resources Technical Report, Appendix D, and Bridge Design Options Technical Memorandum, Appendix N, four design options were developed for Streetcar Alternatives 1 and 2 at the Santa Ana River Crossing. One was determined feasible for carrying forward for analysis in the EA/DEIR, as illustrated in **Figure A-12**.

The existing bridge would remain in its current location and condition. A new single-track bridge would be constructed immediately south of the existing bridge for the fixed guideway. Through the use of gates and signaling, the single-track bridge would accommodate bi-directional fixed guideway traffic.

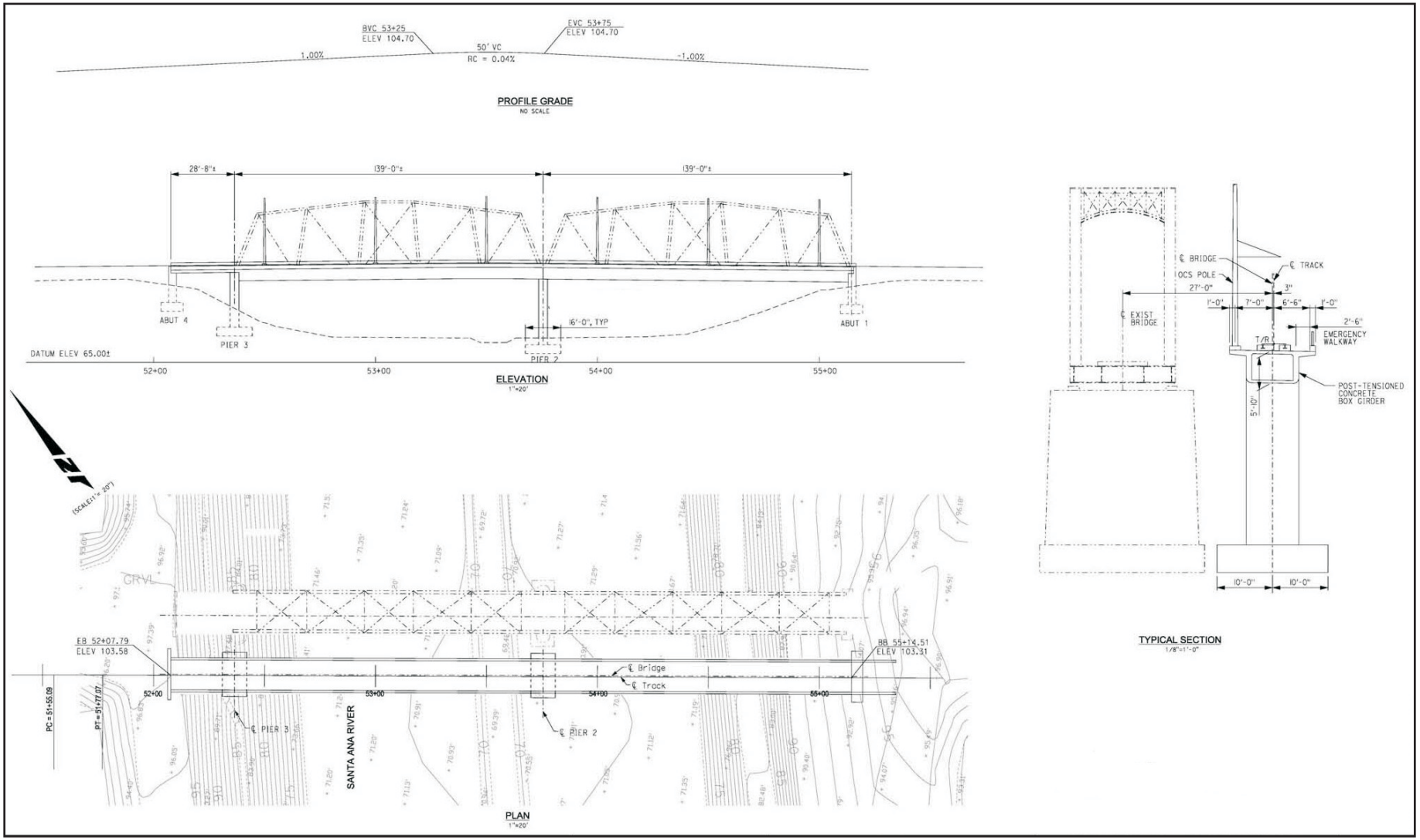
Design Options

During detailed evaluation, design options were developed to avoid identified constraints or to take advantage of specific opportunities presented along the alignments. In most cases the design options are the same for Streetcar Alternatives 1 and 2. However, where the design option is unique to a specific alternative, it is identified in the discussion. The full results of the analysis of the design options are provided in the Detailed Evaluation of Alternatives Technical Report, March 2012. Based on this technical report, the design options that have been carried into the environmental assessment are described below:

Operations and Maintenance (O & M) Facility Site Options

Both Streetcar Alternatives 1 and 2 would require the construction of an O & M Facility for streetcar operations. An O & M Facility is a stand-alone building which would meet the maintenance, repair, operational and storage needs of the proposed streetcar system. The O & M Facility accommodates daily and routine vehicle inspections, interior/exterior cleaning of the streetcars, preventative (scheduled) maintenance, unscheduled maintenance, and component change-outs. The proposed facility would also provide a venue for parking vehicles that are not in use and for rebuilding components.

The site for the O & M Facility would need to accommodate a building that houses both maintenance and administrative functions; provides for off-street employee parking; and provides for various functions such as outside storage of system components, vehicle washing, and local requirements for landscaping and screening. Currently, two candidates O & M Facility sites have been identified for either Streetcar Alternative 1 or 2. See **Figure A-13** for the approximate locations of these sites.



Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

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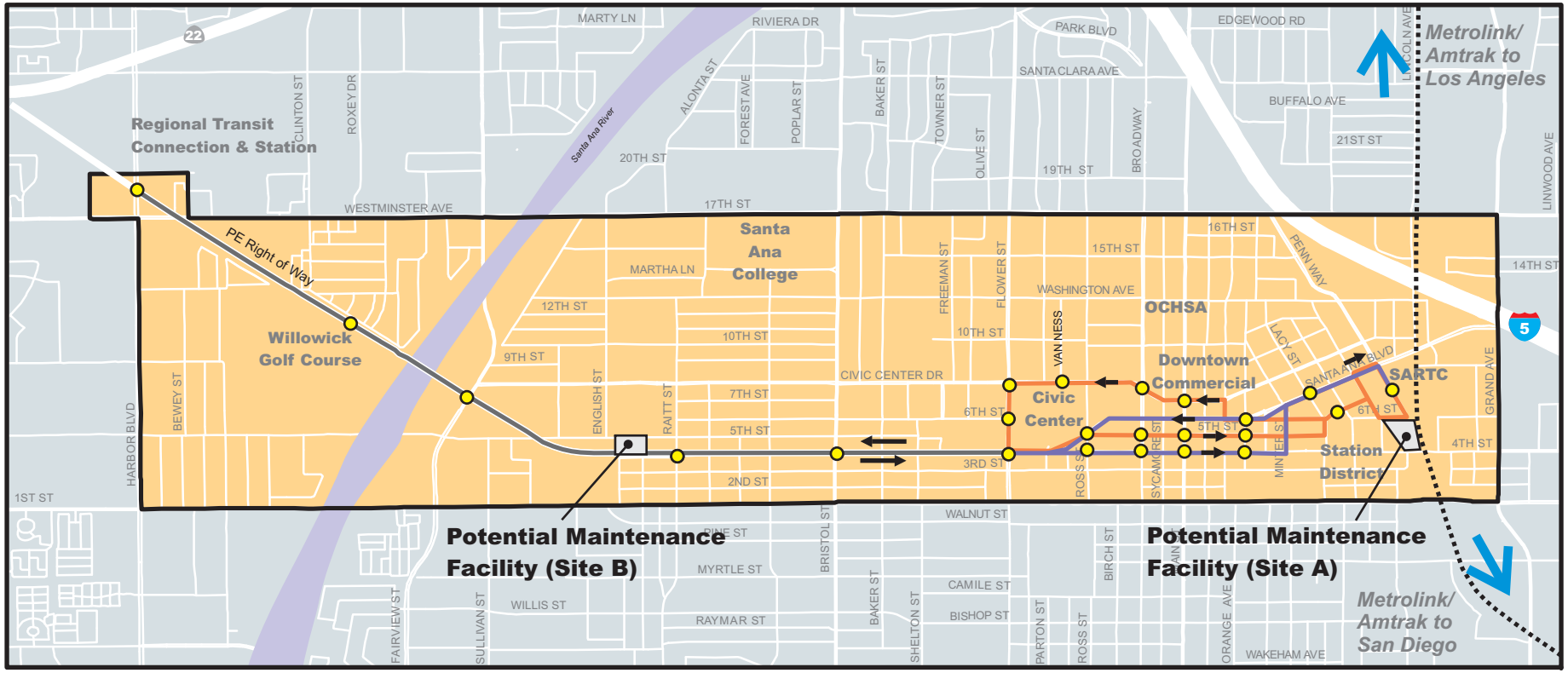
Candidate Sites of Operations and Maintenance Facilities



Source: Cordoba Corporation, Draft Conceptual Design Technical Report, March 2011, updated by Terry A. Hayes Associates Inc. August 2012.

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O & M Facility Site A (near SARTC). O & M Facility Site A is an irregularly shaped parcel slightly larger than 2.2 acres, and bordered by 6th Street to the north, 4th Street to the south, the Metrolink tracks to the east, and various industrial and commercial businesses to the west. Currently used as a waste transfer and recycling center, this site contains one primary structure with the remainder of the site used for receiving and sorting recycling materials, and parking. **Figure A-14** shows the proposed location of Site A and **Figure A-15** shows a conceptual layout of Site A. This site connects to either Streetcar Alternative 1 or 2 via a nonrevenue extension of track on Santiago Street for the equivalent of approximately two city blocks.

O & M Facility Site B (near Raitt Street). O & M Facility Site B is a rectangular site slightly larger than 2.4 acres. It is located west of Raitt Street and is bordered by 5th Street to the north and the PE ROW to the south. Located in an area zoned for industrial and commercial uses, this site is comprised of three parcels, two of which contain existing businesses and a combination of industrial buildings. The third parcel contains several residences. **Figure A-16** shows the proposed location of Site B and **Figure A-17** shows a conceptual layout of Site B. This site connects to the streetcar alignment for Streetcar Alternative 1 or 2 from the PE ROW. Motor vehicle access to the site would be to and from 5th Street.

Fourth Street Parking Scenarios

The Streetcar Alternative 1 alignment would utilize 4th Street between Ross Street and Mortimer Street in the westbound direction. From east of Ross Street to French Street, 4th Street has one travel lane in each direction with head-in diagonal parking along each side of the roadway. The diagonal parking, with vehicles exiting parking spaces by backing into the travel lane, is incompatible with reliable streetcar operations. Three design scenarios were identified to address the diagonal parking on 4th Street as described below and shown on **Figure A-18**.

Scenario A: Convert the diagonal parking along the south side of 4th Street, between Ross Street and French Street, to parallel parking and widen the sidewalk along the south side from 12 feet to 20 feet, and replace streetlights and landscaping. A total of 26 on-street parking spaces would be removed under this scenario.

Scenario B: Remove the diagonal parking along the south side of 4th Street, between Ross Street and French Street, and widen the sidewalk along the south side from 12 feet to 28 feet, and replace streetlights and landscaping. A total of 77 on-street parking spaces would be removed under this scenario.

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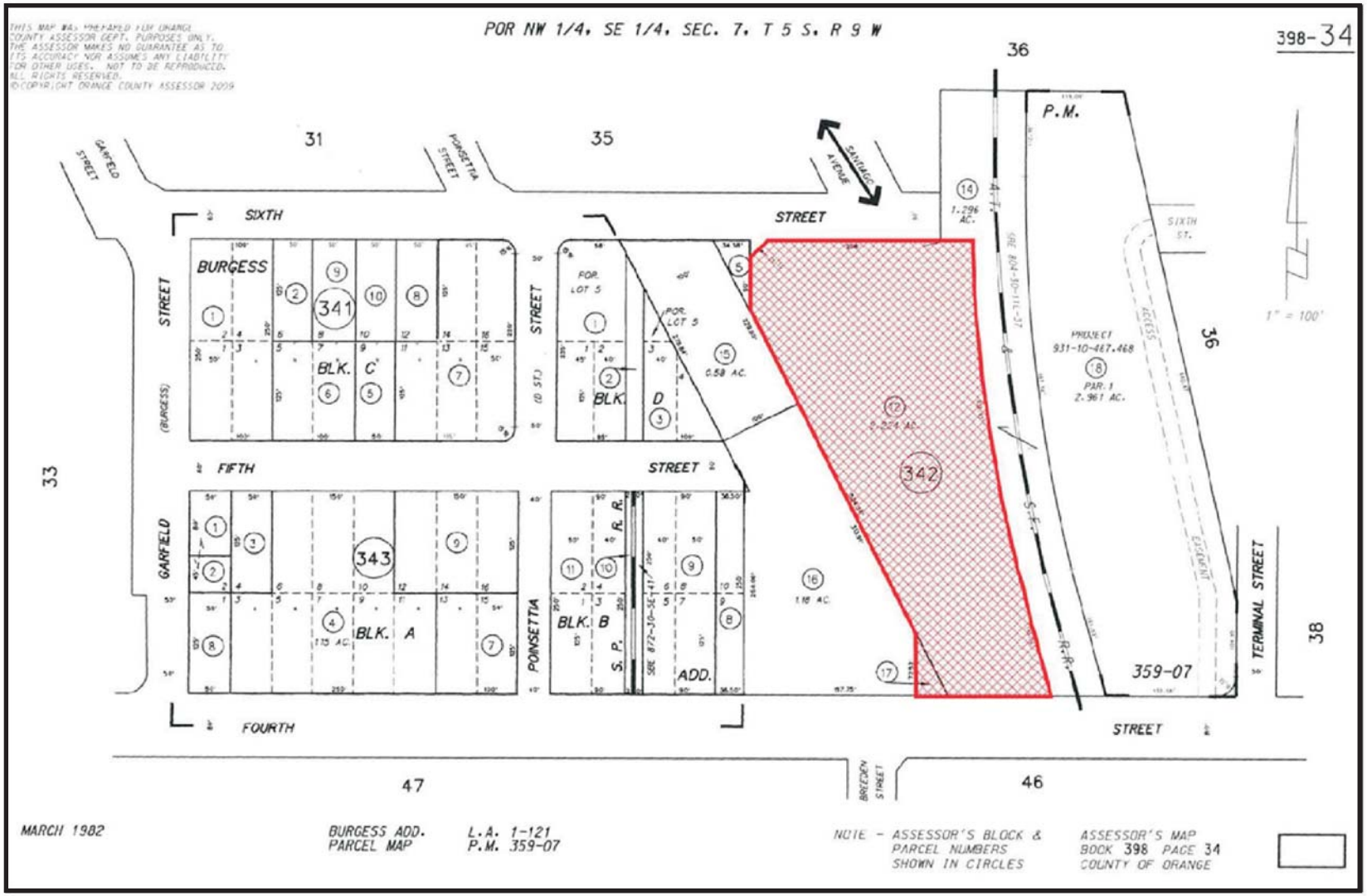
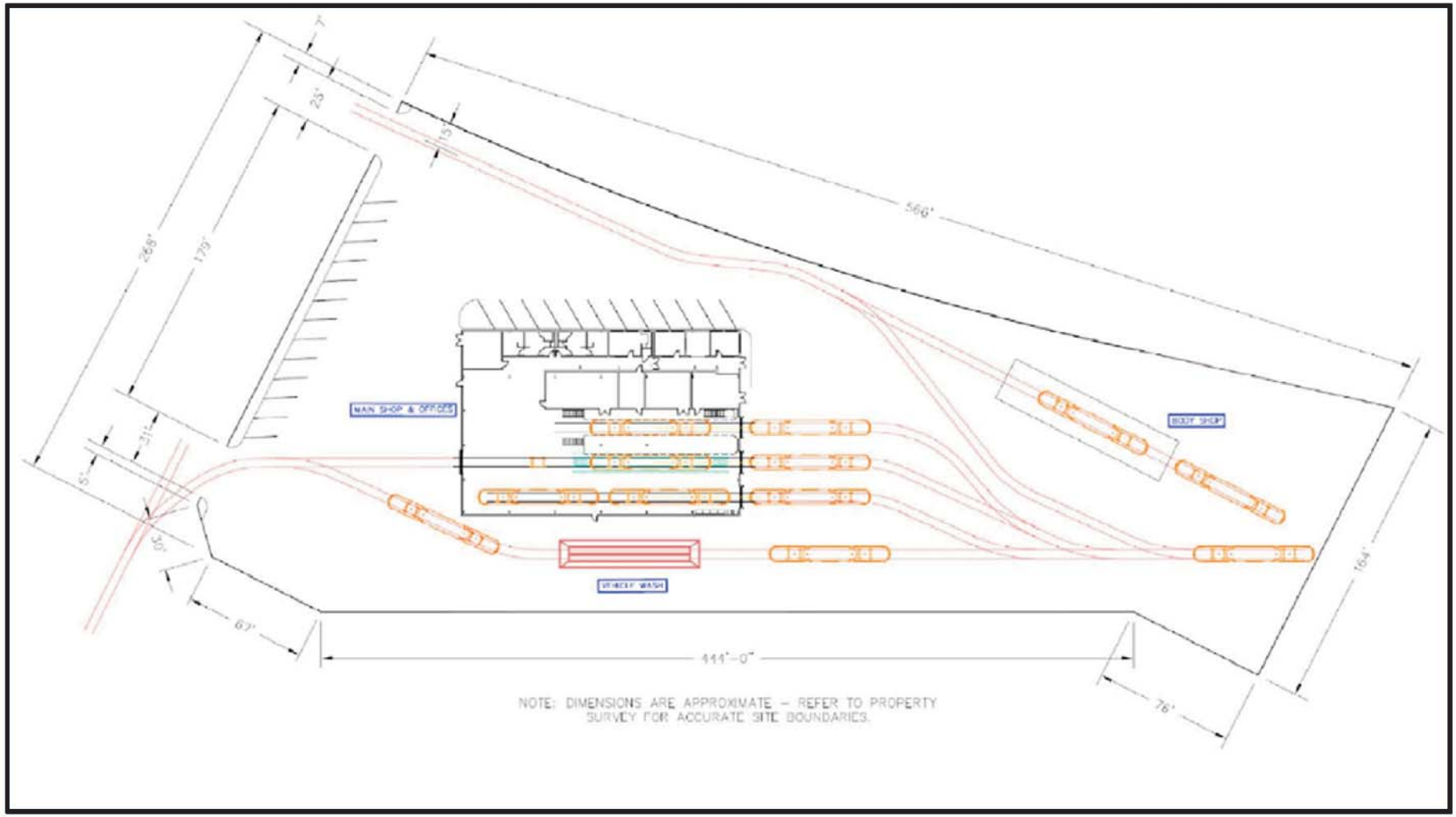
Operations and Maintenance Facility Site A - Location and Configuration



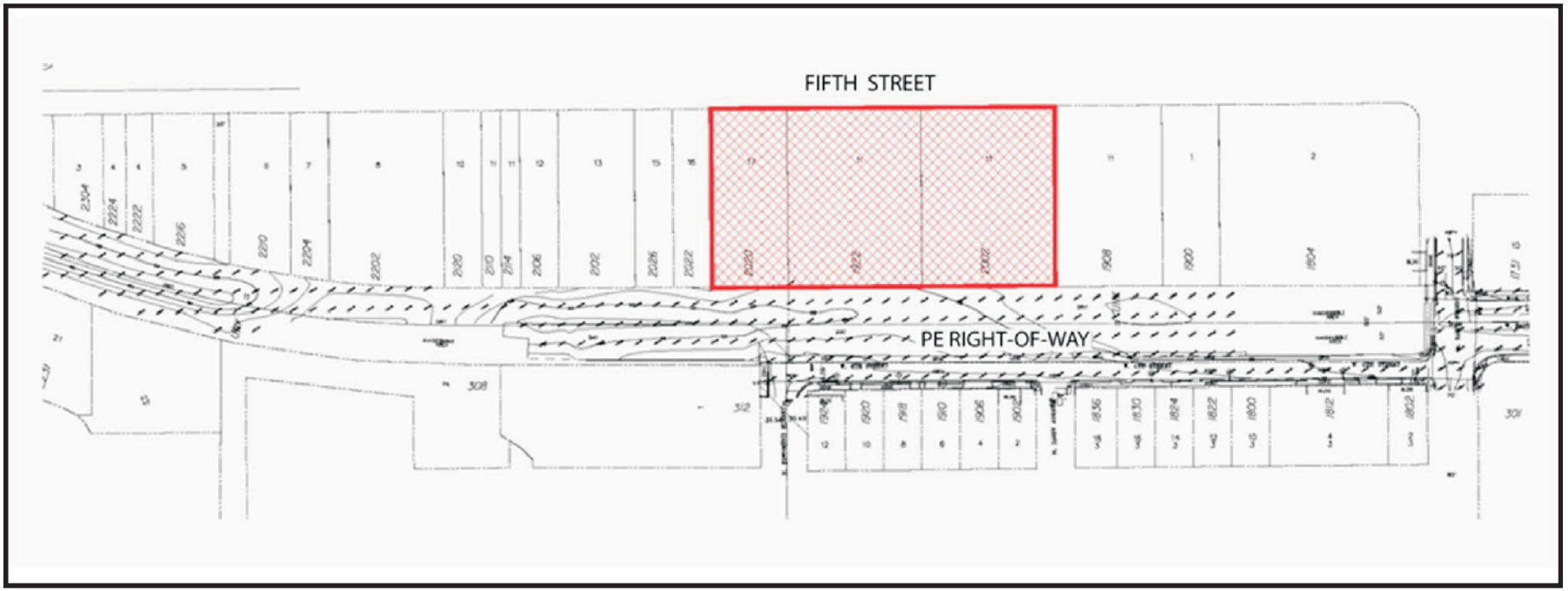
Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

Operations and Maintenance Facility Site A - Conceptual Layout



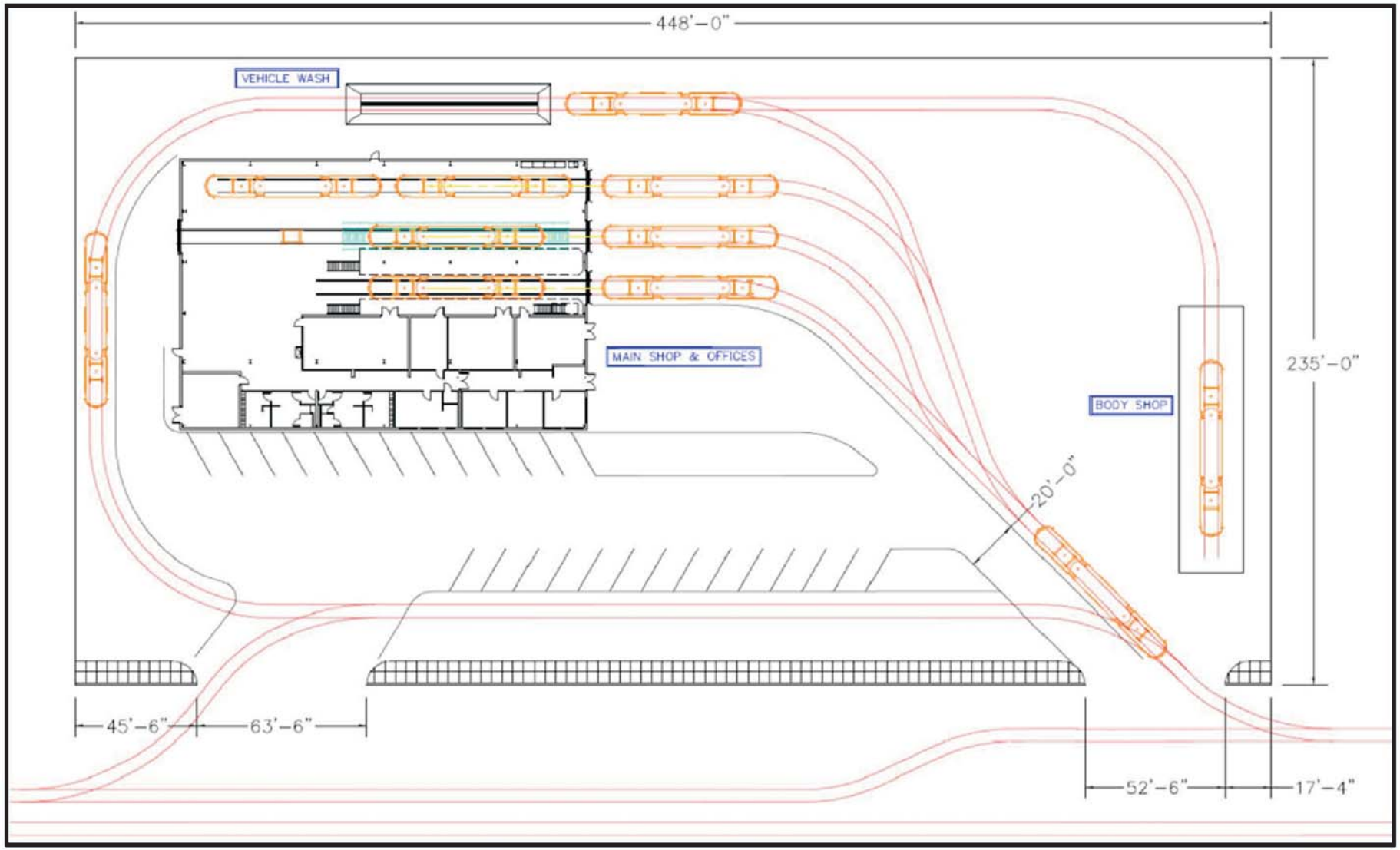
Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

Operations and Maintenance Facility Site B - Location and Configuration



Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

Operations and Maintenance Facility Site B - Concept Layout



Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

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Scenario C: Remove the diagonal parking along both sides of 4th Street, between Ross Street and French Street, widen the sidewalks along both sides from 12 feet to 28 feet. In this scenario, only the parking removal and sidewalk widening along the south side would be included in the cost of the project. The City of Santa Ana would pursue alternative funding to construct the improvements to the north side.

Construction

Construction of either Streetcar Alternative 1 or 2 would take place on a segment-by-segment basis along the streetcar alignment, with the exception of the bridge structures and the O & M Facility. The duration of concentrated construction activities would be no more than six months at one location along the alignment. The construction approach would be the same for Streetcar Alternatives 1 and 2. Construction activities would include, but would not be limited to, site preparation, bridge structure construction, roadway and sidewalk reconstruction, laying streetcar track and embedded trackwork, and construction of an O & M Facility.

Construction hours would generally occur between 7:00 a.m. and 6:00 p.m., Monday through Friday. There are some exceptions, such as nighttime construction, where temporary street lane closures and utility work would be required. Project construction would follow the applicable local, State, and federal laws for building and safety. In addition, standard conditions would be included in project construction contracts to ensure consistency with applicable laws for traffic, noise, vibration, and dust control.

The following description summarizes the construction approach and methods that have been defined for the project at this preliminary stage of conceptual design:

- In general, all construction of tracks would be within the existing PE ROW, existing streets, or proposed future streets;
- Construction of the O & M Facility would be within one of the designated sites along the alignment, as defined in the project description as O & M Facility Sites A and B;
- The construction period is anticipated to be approximately 30 months, with major activities to be completed within the first 24-month period;
- It is anticipated that the construction activities would be staged and sequenced based on location and types of construction. The likely staging of the proposed project would include four to five segments to allow for construction crews to work in sequence, moving one team to a new location, while the next team takes over the next set of activities; and
- Two potential areas are identified as construction staging and track laydown areas:
  - The east end of the PE ROW at Raitt Street would be used as a temporary construction and welding plant and material storage sites. This location would serve as the midpoint of distribution to both east and west directions of the alignment. The welding plant would be a combined operation of flash butt welding and laydown storage to produce designated length of rail ribbons to be dragged or truck-hauled into position for embedment or attachment to ties; and

- The second area is identified as land owned by the City of Santa Ana, located at the corner of 6th and Santiago Streets. Some special trackwork and pre-curved rails could be stored at this location;

- Construction of the proposed project would require the relocation of one catch basin under Alternative 2 at Flower Street and Civic Center Drive in addition to the installations of approximately 50 new catch basins to improve drainage along the alignment.

Construction Scenario

The project would use conventional construction techniques and equipment typical to the Southern California region and follow all applicable federal, State, and local laws for building and safety. Working hours would be varied to meet special circumstances and restrictions. Customary local practices consistent with all applicable laws would be used to control traffic, noise, vibration, erosion, and dust during construction. Design and construction would include mitigation commitments. Generally, construction would be divided into a series of often overlapping activities to minimize the construction duration and associated impacts. **Table A-4** depicts a typical construction activities sequencing for an LRT project of similar scope and complexity.

TABLE A-4: TYPICAL CONSTRUCTION SEQUENCE AND AVERAGE CONSTRUCTION TIME

Activity/a/	Tasks	Average Time Required (months)
Preconstruction	Locate utilities; establish right-of-way and project control points and centerlines; establish and relocate survey monuments	2 – 4
Site Preparation	Establish environmental controls and install soil and erosion-control measures; relocate utilities and clear and grub right-of-way (demolition); establish detours and haul routes; erect safety devices and mobilize special construction equipment; prepare construction equipment yards, and stockpile materials	3 – 6
Heavy Construction	Construct aerial structure, retaining walls, trackbed drainage, at-grade guideway, soil stabilization, pile caps/foundations, abutments, bents, and dispose of excess material	12 – 16
Medium Construction	Lay track, construct stations, install off-site drainage, and construct elevated station enclosures	6 – 12
Light Construction	Finish work, install systems elements (electrical, signals, and communication), street lighting where applicable, traffic signals, signing and striping, landscaping, close/remove detours, and clean up and test system	3 – 9
Pre-Revenue Service	Test vehicles, power, communication, signaling, train operators and maintenance personnel	1 – 3

/a/ Some of these activities would be conducted in parallel.
Source: Terry A. Hayes Associates Inc., 2012.

- Some profile grade leveling, clearing, and grubbing of the PE ROW would take place during the early stages to establish grade for the ballast track sections. The duration of this activity would be two to three months;

Construction equipment would include graders, bulldozers, cranes, drill rigs, excavators, concrete-batching equipment, pumping equipment, concrete trucks, flat bed trucks, dump trucks, and rail-mounted equipment. While the final construction approach, including methods, staging, and sequencing coordination, will be determined in detail with the construction contractor, who has yet to be selected, the following describes the likely sequencing of the major construction activities. It should be noted that most of these activities overlap.

- Early work activities would include relocation of some of the private and public underground utilities identified as being in conflict with the track alignment;
- Work on the new bridge structure at Westminster Avenue and for the new Santa Ana River bridge structure would also begin early in the construction period;
- Demolition and clearing of the selected O & M Facility site would begin in the early phase of construction in order to be available for receipt and testing of the vehicles. Construction of the maintenance facility yard would also likely commence at this time;
- Prior to initiating work on the ballast track, overhead contact wire pole foundations and station foundations would be constructed to grade level. In addition, structure approach slabs, underground utilities, or subsurface structures would be constructed prior to the laying of the ballasted sections;
- Track construction would begin next for the in-street and the non-structure ballasted sections of the streetcar trackway. The steps would involve setting up the reinforcement for the concrete slab, placing the rail, boots, and ties and finally pouring track slab concrete. The following construction activities would also occur during the same 24-month timeframe as track construction:
  - Preparation for substation sites and installation of conduits, grounding mats, and substation foundations.
  - Track construction activity, including installation of special trackwork, field welds, installation of insulated joints and other special trackwork material.
  - Sidewalk improvements, platforms, pavement grading and resurfacing to the limits of the project between Raitt Street and SARTC.
  - Foundation work for new traffic signal, lighting, and overhead contact wire poles.
  - Roadway grinding and overlay operations beginning at Raitt Street and advancing eastward along the alignment; and
- The final steps of the construction work would include pavement striping, reestablishing ROW temporarily impacted by construction, landscaping, system testing, lining and surfacing of the ballasted track, and other miscellaneous finishing.

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