Santa Ana-Garden Grove
Fixed Guideway Corridor

Appendix K

Air Quality Impact Analysis

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Air Quality Impact Analysis

in support of the

SANTA ANA AND GARDEN GROVE FIXED GUIDEWAY CORRIDOR STUDY

Santa Ana Regional Transportation Center (SARTC) to Harbor Boulevard

Prepared for
City of Santa Ana
in cooperation with
City of Garden Grove
Orange County Transportation Authority

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List of Abbreviations

μ/m^3	Microns per cubic meter, amount of air pollutants within a volume of air
$\mu g/m^3$	Micrograms per cubic meter
AADT	Annual average daily traffic
AB 1493	Assembly Bill 1493
ACM	Asbestos Containing Materials
APCDs	Air Pollution Control Districts
AQIA	Air Quality Impact Analysis
AQMDs	Quality Management Districts
Ar	Argon
BACM	Best Available Control Measures
Basin	South Coast Air Basin
BRT	Bus rapid transit
$C2F_6$	Perfluoroethane
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CF_4	Perfluoromethane
CFCs	Chlorofluorocarbons
CFR CH4	Code of Federal Regulation Methane
CO	Carbon Monoxide
CO_2	Carbon dioxide
DPM	Diesel Particulate Matter
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program Water
GHG	Greenhouse gas
GWP	Global warming potentials
H_2O	Water
HCFCs	Hydrochlorofluorocarbons
HFC-134a	s, s, s, 2 – tetrafluoroethane
HFC-152a	Difluoroethane
HFC-23	Fluoroform
HFCs	Hydrofluorocarbons
HGWP	High Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRIS	EPA's Integrated Risk Information System

LSTs	Localized Significance Thresholds
MPO	Metropolitan Planning Organization
MSAT	Mobile Source Air Toxics
N_2	Nitrogen
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act
NO2	Nitrogen dioxide, Nitrogen Oxides
NOA	Naturally Occurring Asbestos
NO_X	oxides of nitrogen, Nitrogen oxides, Nitrogen oxide
O_2	Oxygen
O_3	Ozone
OCTA	Orange County Transportation Authority
Pb	Lead
PE ROW	Pacific Electric right-of-way
PFCs	Perfluorocarbons
PM	Particulate Matter
PM_{10}	Particles 10 microns and smaller, Coarse Inhalable Particulates
$PM_{2.5}$	Particles less than or equal to 2.5 microns, Fine Inhalable Particulates
POAQC	Project of Air Quality Concern
ppm	Parts per million, Amount of air pollutants within a volume of air
ROG	Reactive Organic Gases
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
SARTC	Santa Ana Regional Transportation Center
SCAQMD	South Coast Air Quality Management District
SF_6	Sulfur Hexafluoride
SIP	State Implementation Plan
SO_2	Sulfur dioxide
SO_3	Sulfur trioxide
SO_X	Oxides of sulfur, Sulfur Oxides
SRA	Source Receptor Area
TCM	Transportation Control Measure
TIP	Transportation Improvement Program
TSM	Transportation System Management
VMT	Vehicle Miles Traveled
WRCC	Western Regional Climate Center

Chapter 1 Introduction

1.1 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.

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Chapter 2 Existing Conditions

2.1 Climate and Meteorology of the South Coast Air Basin

The project site is located in the City of Santa Ana, which is within the South Coast Air Basin (Basin) that includes Orange, Los Angeles (non-desert portions), Riverside (non-desert portion), and San Bernardino (non-desert portion) counties. The South Coast Air Quality Management District (SCAQMD) administers air quality regulation in the Basin.

Meteorological (short-term) and climatological (long-term) conditions influence ambient air quality. The proposed Project is located in central Orange County, which is situated in the southwestern part of the Basin. The Basin both transports to and receives air pollutants from the coastal portions of Ventura and Santa Barbara Counties. The Basin also receives air pollutants from oil and gas development operations on the outer continental shelf in Santa Monica Bay and the San Pedro Channel.

Temperatures for the area are markedly higher during the summer months. Using the 30-year (i.e., 1971 to 2000) monthly climate summary from the nearest meteorological station, the Western Regional Climate Center (WRCC) #047888 at Santa Ana Fire Station, located approximately 1.4 miles south of the proposed Project area, the average maximum temperature was 28.9 degrees Celsius (°C [84 degrees - Fahrenheit °F]) in August, with an average minimum temperature of 7.9°C (46.3°F) in December. The average annual temperature is 17.7°C (63.8°F).

During the winter months, a semi-permanent, subtropical high-pressure system over the eastern Pacific Ocean moves south, allowing frontal systems that normally are blocked and forced to the north of the area to pass through the region. This results in most of the area’s annual precipitation, which totals about 14 inches. Average maximum rainfall occurs in February (i.e., 3.26 inches), with minimum rainfall in July (i.e., 0.03 inches) (WRCC, #047888 [2011]).

On occasion during fall and winter months, a high-pressure system develops over Nevada and Utah and pushes air south and southwestward over the San Gabriel and San Bernardino Mountains. The resulting wind is known as a Santa Ana wind. Santa Ana winds can be very strong, with wind speeds through mountain passes sometimes exceeding 62 miles per hour, and are usually warm and dry. They tend to clear the Basin of accumulated air pollutants, but can also cause dust storms and high particulate levels.

The topographical features in the region around the proposed Project area restrict air movement through and out of the valley (especially in the northern portion). The San Gabriel and Santa Ana Mountains hinder wind access into the valley from the northwest, north, west, and southwest; the Agua Tibia range hinders winds from the south; and the San Bernardino and San Jacinto Mountains are significant barriers to the northeast, east, and southeast, causing a weak air flow through the valley. This weak air flow is also frequently blocked vertically by temperature inversions.

2.2 Temperature Inversion

Air pollutants depend on buoyant forces (the polluted air being warmer than the surrounding atmosphere) enabling it to rise and disperse. When cool air flows into the Basin from the ocean, it sinks, pushes the warm air up, and creates a subsidence temperature inversion (i.e., atmospheric temperature increases with elevation). Subsidence inversions occur during warmer summer months. As the cooler ocean air absorbs pollutants and begins to rise, it becomes “trapped” by the warm air above and settles back into the Basin. As the sun warms the ground, the temperature of the lower atmosphere approaches the temperature of the base of the inversion (upper) layer and eventually becomes warmer than the warm air above, causing the inversion layer to finally break, and allowing vertical mixing within both layers. This phenomenon is observed from early to late afternoons on hot summer days, when the smog appears to suddenly clear up. Until the inversion breaks, the stagnant conditions can lead to high ground-level pollutant concentrations.

During evenings, mainly in the cooler winter months, surface or radiation inversions are formed when the ground surface becomes cooler than the air above it. The earth’s surface undergoes such a process on clear nights with low wind speeds when heat energy is transferred from the ground to the cooler night sky. As the earth’s surface cools during the evening hours, the air directly above it also cools, but the atmosphere at higher altitudes remains relatively warm. This type of inversion persists until sunrise when heat from the sun warms the ground and stimulates the air at ground level to break up the inversion. During winter months, these radiation temperature inversions usually break by mid-morning.

Temperature inversions play a significant role in determining ozone (O_3) formation. O_3 precursors (i.e., oxides of nitrogen [NO_X] and volatile organic compounds) will mix and undergo photochemical reactions to produce smog. Temperature inversions close to the ground will keep high concentrations of O_3 precursors in an area, allow the chemical reactions to take place in the presence of abundant sunlight and, hence, create ground-level O_3. Concentration levels of O_3 are directly related to inversion layer heights due to the limitation of the vertical mixing space.

On days with no temperature inversion or when high velocity winds are present, the concentration of air pollutants is generally lower. Conversely, during days of temperature inversion or when low wind speeds are present, air pollutants generated in the urbanized areas of the Basin are transported into Riverside and San Bernardino Counties and frequently create the highest concentrations. Summer wind flow patterns represent worst-case conditions, as this is the period of higher temperatures, generally lower wind speeds, and more sunlight, which result in O_3 formation.

2.3 Predominant Air Pollutants in the South Coast Air Basin and Ambient Monitoring Concentrations in the Project Vicinity

The pollutants of greatest importance in the Basin are described in this section. It provides a description of the physical properties, the health and other effects of the pollutant, the sources of the pollutant as well as the ambient air quality standards that have been developed to limit their exposure to the public.

Ambient air quality standards have been set by both the federal and State governments to protect public health and welfare with an adequate margin of safety. Pollutants for which National Ambient Air Quality Standards (NAAQS) or California Ambient Air Quality Standards (CAAQS) have been set are often referred to as criteria air pollutants. These health-based pollutant standards are reviewed on a legally-prescribed frequency and revised as new health and welfare effects data warrant. Each standard is based on a specific averaging time over which the concentration is measured. Different averaging times are based upon protection of short-term, high dosage effects or longer-term, low dosage effects. NAAQS may be exceeded no more than once per year; CAAQS are not to be exceeded.

Ambient air quality in Orange County is monitored at four permanent air monitoring stations. The nearest monitoring station to the Study Area of the proposed Project is the Anaheim-Pampas Lane Station. The data from the Anaheim-Pampas Lane Station (1630 Pampas Lane, Anaheim, CA) is the most representative of conditions at the Study Area. Air quality measurements taken at this station are presented in Table 2-1.

2.3.1 Ozone

Ozone (O_3) is the main component of photochemical smog. Ozone is a principal cause of lung and eye irritation in an urban environment. It is formed in the atmosphere through a series of reactions involving hydrocarbons and nitrogen oxides (NO_X) in the presence of sunlight.

Table 2-1 shows that the federal 8-hour ozone NAAQS of 0.075 parts per million (ppm) has been exceeded from one to five times within the last five years at the Anaheim-Pampas Lane monitoring station. The highest 8-hour concentration was 0.10 ppm in 2007. The data presented in the table show that the CAAQS 1-hour average exceeded the 0.09 ppm standard for four of the last five monitored years. The federal standard requires maintaining 0.08 ppm as a three-year average of the fourth-highest daily maximum value. Therefore, the number of days that the maximum concentration exceeds the standard concentration is not necessarily the number of violations of the standard for the year. The proposed Project would be located in an area that is in nonattainment for the 1-hour and 8-hour ozone State standards and severe nonattainment for the 8-hour ozone federal standards.

2.3.2 Particulate Matter

Particulate matter includes both aerosols and solid particles of a wide range of size and composition. Of particular concern are those particles 10 microns and smaller (i.e., PM_{10}) and particles less than or equal to 2.5 microns (i.e., $PM_{2.5}$). The size of the particulate matter is referenced to the aerodynamic diameter of the particulate. The principal health effect of airborne particulate matter is on the respiratory system. PM_{10} are the largest-sized particles that can enter the lungs without typically getting caught in the nasal passages. Their size allows them to easily enter the lungs, contributing to increased respiratory disease, lung damage, cancer, and premature death.

Table 2-1: Ambient Air Quality at the Anaheim Air Monitoring Station

	CO				O_3				PM_{10}		$PM_{2.5}$			NO_2		
Calendar Year	Max 1-hour Conc. (ppm)	Number of Days Exceeded	Max 8-hour Conc. (ppm)	Number of Days Exceeded	Max 1-hour Conc. (ppm)	Number of Days Exceeded	Max 8-hour Conc. (ppm)	Number of Days Exceeded	Max 24-hour Conc. ($\mu g/m^3$)	Number of Days Exceeded	Max 24-hour Conc. ($\mu g/m^3$)	Number of Days Exceeded	Max Annual Conc. ($\mu g/m^3$)	Max 1-hour Conc. (ppm)	Number of Days Exceeded	Max Annual Conc. (ppm)
State Standards[1]	20 ppm / 1-hour		9 ppm / 8-hour		0.09 ppm / 1-hour		0.070 ppm / 8-hour		50 $\mu g/m^3$ / 24-hour		--		12 $\mu g/m^3$/ annual AM	0.18 ppm / 1-hour		0.030 ppm / annual AM
2009	3	0	2.7	0	0.09	0	0.08	2	62	1	64.5	ND	11.8	0.07	0	0.018
2008	4	0	3.4	0	0.1	2	0.09	10	61	3	67.8	ND	13.7	0.09	0	0.02
2007	4	0	2.9	0	0.13	2	0.1	7	488	6	79.4	ND	14.5	0.09	0	0.02
2006	3	0	2.9	0	0.11	6	0.09	5	103	7	56.2	ND	14.1	0.11	0	0.02
2005	4	0	3.3	0	0.09	1	0.08	8	65	3	54.7	ND	14.7	0.09	0	0.021
Federal Standards[2]	35 ppm / 1-hour		9 ppm / 8-hour		--		0.078 ppm / 8-hour		150 $\mu g/m^3$ / 24-hour		35 $\mu g/m^3$ / 24-hour		15 $\mu g/m^3$/ annual AM	0.100 ppm / 1-hour		0.053 ppm / annual AM
2009	3	0	2.7	0	0.09	ND	0.08	1	63	0	64.5	4	11.8	0.07	0	0.018
2008	4	0	3.4	0	0.1	ND	0.09	5	61	0	67.8	5	13.7	0.09	0	0.02
2007	4	0	2.9	0	0.13	ND	0.1	1	489	1	79.4	14	14.5	0.09	0	0.02
2006	3	0	2.9	0	0.11	ND	0.09	3	104	0	56.2	7	14.1	0.11	0	0.02
2005	4	0	3.3	0	0.09	ND	0.08	2	65	0	54.7	13	14.7	0.09	0	0.021

Sources:

[1] CARB, 2010b

[2] EPA, 2006a

Notes:

AM - Arithmetic Mean
ND – No data available from CARB
$\mu g/m^3$ – micrograms per cubic meter
Data are from the Anaheim-Pampas Lane monitoring station

The potential adverse health effects of $PM_{2.5}$ are the same as PM_{10}, except these particles can enter deeper into the lungs and cause greater lung impairment, especially in at-risk individuals. Particulates in the air are caused by a combination of:

- Windblown fugitive dust or road dust;
- Particles emitted from combustion sources (usually carbon particles); and
- Organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, and oxides of sulfur (SO_X), and nitrogen (NO_X).

Particulate Matter <10 Microns

Particulate matter with a diameter size equal to or less than 10 microns is referred to as PM_{10}. Their size allows them to easily enter the lungs contributing to increased respiratory disease, lung damage, cancer, and premature death. PM_{10} can also contribute to reduced visibility. In 1987, the U.S. Environmental Protection Agency (EPA) adopted standards for PM_{10} and phased out the total suspended particulate standards that had been in effect until then.

Background PM_{10} data for the Anaheim-Pampas Lane Station are provided in Table 2-1 above. The PM_{10} data show that the 24-hour average CAAQS of 50 micrograms per cubic meter (μg/m3) is consistently exceeded at the Anaheim-Pampas Lane Station (between 1-7 days per year, with a maximum concentration of 489 $\mu g/m^3$ in 2007). In the past five years, the federal 24-hour average PM_{10} NAAQS of 150 $\mu g/m^3$ has been exceeded once, in 2007, at the Anaheim-Pampas Lane Station. This exceedance is likely due to the October 2007 wildfires that occurred through southern California. The proposed Project area is designated as federal serious nonattainment for PM_{10}.

Fine Particulate Matter <2.5 Microns

Fine particulates ($PM_{2.5}$) come from fuel combustion in motor vehicles and industrial sources, residential and agricultural burning, and from the reaction of NO_X, SO_X, and organic compounds. Fine particulates are referred to as $PM_{2.5}$, having a diameter equal to or less than 2.5 microns. The potential adverse health effects are the same as PM_{10}, except these particles can enter deeper into the lungs and cause greater lung impairment, especially in at-risk individuals.

The $PM_{2.5}$ data in Table 2-1 show that the federal 24-hour average (98th percentile) NAAQS of 35 $\mu g/m^3$ was exceeded consistently within the past five years at the Anaheim-Pampas Lane Station. The 24-hour standard is attained when 98% of the daily concentrations averaged over three years are equal to or less than the standard. The 98th percentile maximum 24-hour $PM_{2.5}$ background concentration of 79.4 $\mu g/m^3$ was measured in 2007. The numerous wildfires that occurred during in 2007 substantially affected PM_{10} and $PM_{2.5}$ concentrations to a lesser extent. The annual $PM_{2.5}$ data are also presented in Table 2-1. The annual arithmetic mean concentrations are all above the $PM_{2.5}$ CAAQS of 12 $\mu g/m^3$. The maximum annual arithmetic mean concentration recorded at the Anaheim-Pampas Lane Station was 14.7 $\mu g/m^3$ in 2005, which is below the federal annual $PM_{2.5}$ NAAQS of 15 $\mu g/m^3$. The Basin has not recorded annual particulate levels above the federal standard for the past five years. The Basin has been designated as nonattainment for $PM_{2.5}$.

2.3.3 Carbon Monoxide

Carbon Monoxide (CO) is a colorless and odorless gas which, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. Peak CO levels occur typically during winter months, due to a combination of higher emission rates and stagnant weather conditions. CO combines with hemoglobin in the bloodstream and reduces the amount of oxygen that can be circulated through the body. High CO concentrations can lead to headaches, aggravation of cardiovascular disease, and impairment of central nervous system functions. CO concentrations can vary greatly over comparatively short distances. Relatively high concentrations are typically found at or near ground level near crowded intersections along heavily used roadways carrying slow moving traffic. Even under the most severe meteorological and traffic conditions, high concentrations of CO are limited to locations within a relatively short distance (i.e., 90 to 185 meters) of heavily traveled roadways.

The data in Table 2-1 present CO averages for the Anaheim-Pampas Lane Station. The table indicates that 1-hour maximum CO levels comply with the NAAQS and CAAQS. These standards have not been exceeded at any station in the vicinity of the project in the last five years. The maximum federal and State 1-hour concentration was 4.0 ppm in 2005, 2007 and 2008. The data in the Table 2-1 also show that 8-hour maximum CO levels comply with the NAAQS and CAAQS of 9.0 ppm. These standards also have not been exceeded in the Study Area of the proposed Project in the last five years. The maximum 8-hour concentration was 3.4 ppm, occurring in 2008.

2.3.4 Nitrogen Oxides

Nitrogen oxide (NOx) emissions from vehicular sources are some of the precursors in the formation of ozone and secondary particulate matter. Ozone and aerosol particulate matter are formed through a series of photochemical reactions in the atmosphere. Because the reactions are slow and occur as the pollutants are diffusing downwind, elevated ozone levels are often found many miles from the source of precursor emissions. NO_X and the corresponding ground-level O_3 can provoke lung irritation and lung damage.

NOX emissions are primarily generated from the combustion of fuels. Nitrogen oxides include nitric oxide (NO) and nitrogen dioxide (NO_2). Because NO converts to NO_2 in the atmosphere over time and nitrogen dioxide is the more toxic of the two, it is the listed criteria pollutant. Background NO_2 data from the Anaheim-Pampas Lane Station are provided in Table 2-1, above. The Study Area of the proposed Project is, and has been in attainment, of NO_2 for many years.

As shown in this table, the maximum annual average NO_2 levels comply with the NAAQS of 0.05 ppm. This limit has not been exceeded in the proposed Project area in the last five years. The maximum annual concentration was 0.021 ppm in 2005. The data in the table also show that maximum 1-hour average NO_2 levels comply with the CAAQS of 0.030 ppm. This limit also has not been exceeded in the proposed Project area in the last five years.

2.3.5 Sulfur Oxides and Sulfur Dioxide

Sulfur Oxides (SOx) constitute a class of compounds, of which sulfur dioxide (SO2) and sulfur trioxide (SO3) are of greatest importance. The oxides are formed during combustion of the sulfur components in motor fuels. Relatively few sulfur oxides are generated from motor vehicles, since motor fuels are now de-sulfured. The health effects of sulfur oxides include respiratory illness, damage to the respiratory tract, and bronchia constriction. Sulfur oxides are also emitted by chemical plants that treat or refine sulfur or sulfur-containing chemicals. Natural gas contains trace amounts of sulfur, while fuel oils and coal contain much larger amounts. Sulfur oxides react in the atmosphere to form acid rain, which is destructive to crops and vegetation, as well as to buildings, materials, and works of art. High concentrations of SO2 can result in breathing problems in children and adults with asthma or other respiratory problems. Wheezing and shortness of breath are linked to short-term exposure while long-term exposure could lead to respiratory problems and aggravation of cardiovascular disease. Historical data show that sulfur oxides levels in the Basin, are, and have been, lower than the standard for many years and the Basin is classified as in attainment for sulfur dioxide (See Table 2-2).

Table 2-2: Designations of Criteria Pollutants for the Air Basin

Pollutant	Federal	State
O_3 (1-hr)	Not Applicable	Nonattainment
O_3 (8-hr)	Extreme Nonattainment	Nonattainment
NO_2	Attainment	Nonattainment
CO	Attainment	Attainment
PM_{10}	Serious Nonattainment	Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
Pb	Attainment	Attainment
SO_2	Attainment	Attainment
Sulfates	Not Applicable	Attainment
Visibility Reducing Particles	Not Applicable	Attainment

Source for State Information: CARB, 2011

2.3.6 Lead

Lead (Pb) is a stable compound, which persists and accumulates both in the environment and in animals. In humans, it affects the blood-forming or hematopoietoc system, and the nervous and renal systems. In addition, lead has been shown to affect the normal functions of the reproductive, endocrine, hepatic, cardiovascular, immunological, and gastrointestinal systems, although there is significant individual variability in response to lead exposure. Since 1975, lead emissions have been in decline, due in part to the introduction of catalyst-equipped vehicles, and decline in production of leaded gasoline. In general, an analysis of lead is limited to projects that emit significant quantities of the pollutant (i.e., lead smelters) and is generally not applied to transportation projects. Lead gasoline additives, non-ferrous smelters, and battery plants were the most significant contributors to atmospheric lead emissions. Legislation in the early 1970s required gradual reduction of the lead content of gasoline over a period of time, which has dramatically reduced lead emissions from mobile and other combustion sources. In addition, unleaded gasoline was introduced in 1975, and in combination, these controls have essentially eliminated violations of the lead standard for ambient air in urban areas.

Federal lead standards are measured on a calendar quarterly averaging time not to exceed 1.5 μg/m3. The State standard is also a monthly average of 1.5 μg/m3. Historical data show that Pb levels in the Basin are, and have been, below the standard for many years and the Basin is classified as attainment for lead (See Table 2-2).

2.3.7 Particulate Sulfates

Particulate sulfates are the product of further oxidation of sulfur dioxide (SO2). Sulfate compounds consist of primary and secondary particles. Primary sulfate particles are directly emitted from open pit mines, dry lakebeds, and desert soils. Fuel combustion is another source of sulfates, both primary and secondary. Secondary sulfate particles are produced when sulfur oxide emissions are transformed into particles through physical and chemical processes in the atmosphere. These particles are small and can be transported long distances.

The 24-hour average CAAQS for sulfates is 25 μg/m3. There is no federal standard for sulfates. Historical levels of sulfates for the proposed Project area show that sulfate levels have been well below State standards for the past five years, and the Basin is classified as attainment for sulfates.

2.3.8 Other State-Designated Criteria Pollutants

In addition to the federal criteria pollutants, California has designated hydrogen sulfide and visibility-reducing particles as criteria pollutants. The entire State is designated as unclassified for visibility-reducing particles, and the Basin is designated as unclassified for hydrogen sulfide.

2.4 Attainment Status for the South Coast Air Basin

The AQMP provides the framework for air quality basins to achieve attainment of the State and federal ambient air quality standards through the State Implementation Plan (SIP). Areas are classified as attainment or nonattainment areas for particular pollutants, depending on whether they meet ambient air quality standards for that pollutant. Severity classifications for ozone nonattainment range in magnitude from marginal, moderate, and serious to severe and extreme. Attainment classifications apply to individual pollutants:

- Unclassified: the data are incomplete and do not support a designation of attainment or nonattainment for a pollutant;
- Attainment: the California AAQS were not violated at any site in the area during a three-year period for that pollutant;

- Nonattainment: there was at least one violation of a State AAQS for that pollutant in the area; and
- Nonattainment/Transitional: a subcategory of the nonattainment designation; signifies that the area is close to attaining the AAQS for that pollutant.

The attainment status for the criteria pollutants in the Basin is listed in Table 2-2 above. The Basin is also designated as in attainment of the California AAQS for SO2, lead, CO and visibility reducing particles, and sulfates. According to the 2007 AQMP, the Basin will have to meet the new federal PM2.5 standards by 2015 and the 8-hour ozone standard by 2024, and will most likely have to achieve the recently revised 24-hour PM2.5 standard by 2020. SCAQMD has recently designated the Basin as nonattainment for NO2 (entire basin) and lead (Los Angeles County only) under the California AAQS and attainment/maintenance for PM10 under the national AAQS.

2.5 Greenhouse Gas Emissions

Climate change as it is currently used refers to the change in temperature in Earth's climate over time, whether due to natural variability or as a result of human activities. The climate system is interactive and dynamic, consisting of five major components: the atmosphere, the hydrosphere (ocean, rivers, and lakes), the cryosphere (sea ice, ice sheets, and glaciers), the land surface, and the biosphere (flora and fauna). The atmosphere is the most unstable and rapidly changing part of the system. It is made up of 78.1 percent nitrogen (N2), 20.9 percent oxygen (O2), and 0.93 percent argon (Ar). These gases have only limited interaction with the incoming solar radiation and do not interact with infrared (long-wave) radiation emitted by the Earth. However, there are a number of trace gases, such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and ozone (O3), that absorb and emit infrared radiation (heat) and, therefore, have an effect on climate. These are greenhouse gases (GHG), and while they comprise less than 0.1 percent of the total volume mixing ratio in dry air, they play an essential role in influencing climate (IPCC 2001).

Non-CO2 GHG are those listed in the Kyoto Protocol (CH4, N2O, hydrofluorocarbons [HFC], perfluorocarbons [PFC], and sulfur hexafluoride [SF6]) and those listed under the Montreal Protocol and its Amendments (chlorofluorocarbons [CFC], hydrochlorofluorocarbons [HCFC], and halons). Although not included in this table, water vapor (H2O) is the strongest GHG and is the most variable in its phases (vapor, cloud droplets, ice crystals). However, water vapor is not considered to be a pollutant (IPCC 2001). The following are the principal greenhouse gas pollutants that contribute to climate change:

- Carbon Dioxide: Carbon dioxide (CO2) is a colorless, odorless gas at standard temperature. Atmospheric concentrations of CO2 fluctuate slightly with the change of the seasons, and are more predominant in the winter months. CO2 enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions.

- Methane: Methane (CH_4) is a colorless, odorless gas at standard temperature. It is the principal component of natural gas. CH_4 is extremely reactive with oxidizers, halogens, and other halogen-containing compounds. Methane is also an asphyxiant and may displace oxygen in an enclosed space. CH_4 is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- Nitrous Oxide: Nitrous oxide (N_2O) is a colorless non-flammable gas, with an odor and taste described as slightly sweet. It is commonly known as "laughing gas" due to the euphoric effects of inhaling it. N_2O is an asphyxiant at high concentrations. At lower concentrations, exposure may cause central nervous system, cardiovascular, hepatic, hematopoietic, and reproductive effects. N_2O is produced by both natural and human-related sources. Primary human-related sources of N_2O are agricultural soil management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. N_2O is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests.
- Fluorinated gases are synthetic, strong greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances. These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes called High Global Warming Potential (HGWP) gases. These HGWP include:
  - Chlorofluorocarbons (CFCs) are greenhouse gases covered under the 1987 Montreal Protocol and are used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Since they are not destroyed in the lower atmosphere (troposphere, stratosphere), CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. Because these gases are ozone depleting, they are being replaced by other compounds that are GHGs covered under the Kyoto Protocol.
  - Perfluorocarbons (PFCs) are a group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly perfluoromethane [CF_4] and perfluoroethane [C_2F_6]) were introduced as alternatives, along with hydrofluorocarbons (HFCs), to ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they have a high global warming potential.
  - Sulfur Hexafluoride (SF_6) is a colorless gas soluble in alcohol and ether, and slightly soluble in water. SF_6 is a strong greenhouse gas used primarily as an insulator in electrical transmission and distribution systems.
  - Hydrochlorofluorocarbons (HCFCs) contain hydrogen, fluorine, chlorine, and carbon atoms. Although ozone-depleting substances, they are less potent at destroying stratospheric ozone than CFCs. They have been introduced as temporary replacements for CFCs and are also greenhouse gases.

- Hydrofluorocarbons (HFCs) contain only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone-depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are strong greenhouse gases.

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Chapter 3 Regulatory Setting

3.1 Chronology of Transportation Conformity Milestones

The basis of the regional and project-level air quality analysis dates back to the passage of the Clean Air Act (CAA) in 1970. Since the inception of the CAA, many milestones to improve air quality have been undertaken through various laws, regulations, and rules. Several of the significant achievements are highlighted below:

- In 1976, the California Legislature adopted the Lewis Air Quality Management Act that created Air Quality Management Districts (AQMDs) in addition to Air Pollution Control Districts (APCDs). Though separate from federal actions, the creation of AQMDs became an integral part of transportation conformity. The AQMDs and APCDs promulgate the State Implementation Plans (SIPs) for achieving cleaner air quality on a region-by-region basis. The SIP is a legal agreement between California and the federal government to commit resources to improving air quality. It serves as the template for conducting regional and project-level air quality analyses. The regional analysis is performed by the appropriate Metropolitan Planning Organization (MPO) and the project-level analysis by the project sponsor. For both analyses, the AQMD or APCD for the applicable area provides technical assistance.
- Amendments were added that culminated in the Clean Air Act Amendments (CAAA) of 1977. The key provisions of the 1977 CAAA ascertained the assurance of conformity as an affirmative responsibility of the head of each federal agency and that no MPO could approve any transportation plan, program, or project that did not conform to a SIP. Specifically, the 1977 CAAA stated: "No federal department shall 1) engage in, 2) support in any way or provide financial assistance for, 3) license or permit, or 4) approve any activity which does not conform to a (State Implementation Plan) after it has been approved or promulgated."
- The most recent revision to the CAA are the CAAA of 1990. The scope and content of transportation conformity provisions were expanded to require the reconciliation of the emissions impacts of transportation plans, programs, and projects with the SIP. Specifically, transportation plans, programs, and projects must conform to the purpose of the SIP. This integration of transportation and air quality planning is intended to ensure that transportation plans, programs, and projects will not: (i) cause or contribute to any new violation of any standard in any area; (ii) increase the frequency or severity of any existing violation of any standard in any area; or (iii) delay timely attainment of any standard or any required interim emissions reductions or other milestones in any area.
- The 1990 CAAA required a mechanism to conform the transportation plans, programs, and projects to the SIPs. This was accomplished by the development of the Transportation Conformity Rule (40 Code of Federal Regulations [CFR] Parts 51 and 93) in 1993. This rule established the criteria and procedures by which the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and MPO entities determine the conformity of federally funded or approved highway and transit plans, programs, and projects to SIP provisions.

Subsequently, several revisions were made to the Transportation Conformity Rule. For example, the August 1997 Transportation Conformity Rule Amendments (FHWA 1997) set revisions that:

- Streamline and clarify regulatory text.
- Eliminate the build/no build test when SIP budgets have been submitted.
- Provide more flexibility even where there are no submitted SIP budgets.
- Allow for previously planned non-federal projects to go forward when there is no currently conforming transportation plan/Transportation Improvement Program (TIP). (The Courts found this provision invalid and it no longer applies.)
- Limit network-based modeling requirements to large, urban areas.
- Provide rural areas the flexibility to choose among several conformity tests.
- Streamline and clarify modeling requirements.

Since 1997, other notable milestones have also been reached. In March 2000, the EPA designated and issued guidance for the new 8-hour ozone nonattainment areas. States were allowed to proceed with implementation measures under their respective nitrogen oxide SIPs that were prepared in response to the EPA's 1998 nitrogen oxides SIP call. The EPA and U.S. Department of Transportation issued a joint memorandum entitled Use of Latest Planning Assumptions in Conformity Determinations on January 18, 2001. The most recent revision is the March 24, 2010 Transportation Conformity Rule PM2.5 and PM10 Amendments. This Rule primarily affects conformity's implementation in PM2.5 and PM10 nonattainment and maintenance areas with an update in the regulations associated with the strengthening of the 24-hour PM2.5 NAAQS and revocation of the annual PM10 NAAQS.

3.2 Clean Air Act of 2008

The CAA of 2008 directs the EPA to implement strong environmental policies and regulations that will ensure cleaner air quality. According to 7506(c) of the CAA, "No department, agency, or instrumentality of the Federal Government shall engage in, support in any way, or provide financial assistance for, license or permit, or approve, any activity which does not conform to an implementation plan after it has been approved or promulgated under section 7410 of this title."

The CAA defines conformity as follows:

i. Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards;
ii. That such activities will not cause or contribute to any new violation of any standard in any area;
iii. That such activities will not increase the frequency or severity of any existing violation of any standard in any area; or
iv. Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

3.3 Ambient Air Quality Standards

Since the passage of the CAA and subsequent amendments, the EPA has established and revised the NAAQS. The purpose of the NAAQS is two-tiered: primarily, to protect public health, and secondarily, to prevent degradation to the environment (i.e., impairment of visibility, damage to vegetation and property). The NAAQS were originally established for six criteria pollutants: O_3, CO, PM_{10}, NO_2, SO_2, and Pb. Recently, $PM_{2.5}$ was added as the seventh criteria pollutant. Currently, the NAAQS include new standards for $PM_{2.5}$ and 8-hour O_3.

Certain cities in California have consistently had some of the worst levels of air pollution within the country and, as such, established their own California Ambient Air Quality Standards (CAAQS). With the exception of 1-hour NO_2, the air pollutant exposure levels within the CAAQS are more stringent than the NAAQS. Table 3-1 delineates the NAAQS and CAAQS for the criteria pollutants followed by a brief explanation of each pollutant.

3.4 Greenhouse Gas Legislation

While climate change has been a concern since at least 1988, as evidenced by the establishment of the United Nations and World Meteorological Organization's Intergovernmental Panel on Climate Change (IPCC), the efforts devoted to GHG emissions reduction and climate change research and policy have increased dramatically in recent years. In 2002, with the passage of Assembly Bill 1493 (AB 1493), California launched an innovative and proactive approach to dealing with GHG emissions and climate change at the State level which required the California Air Resources Board (CARB) to develop and implement regulations to reduce automobile and light truck GHG emissions. These efforts are primarily concerned with the emissions of GHG related to human activity that include carbon dioxide (CO_2), methane, nitrous oxide, tetrafluoromethane, hexafluoroethane, sulfur hexafluoride, HFC-23 (fluoroform), HFC-134a (s, s, s, 2 –tetrafluoroethane), and HFC-152a (difluoroethane).

These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year; however, in order to enact the standards, California needed to obtain a waiver from the U.S. Environmental Protection Agency (EPA). The waiver was denied by EPA in March 6, 2008. However, on January 26, 2009, it was announced that EPA would reconsider their decision regarding the denial of California's waiver. On May 18, 2009, President Obama announced the enactment of a 35.5 miles per gallon fuel economy standard for automobiles and light duty trucks, which will take effect in 2012. On June 30, 2009 EPA granted California the waiver. California is expected to enforce its standards for 2009 to 2011 and then look to the federal government to implement equivalent standards for 2012 to 2016. The granting of the waiver will also allow California to implement even stronger standards in the future. The State is expected to start developing new standards for the post-2016 model years later this year.

Table 3-1: National and California Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS[1,3]	NAAQS[2]	
			Primary[3,4]	Secondary[3,5]
O_3	1 hour	0.09 ppm (180 $\mu g/m^3$)	---	Same as primary
	8 hours	0.070 ppm (137 $\mu g/m^3$)*	0.075 ppm (147 $\mu g/m^3$)[6]	Same as primary
CO	8 hours	9.0 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)	---
	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	---
NO_2	Annual Arithmetic Mean	0.030 ppm (56 $\mu g/m^3$)[8]	0.053 ppm (100 $\mu g/m^3$)	Same as primary
	1 hour	0.18 ppm (338 $\mu g/m^3$)	100 ppb (188 $\mu g/m^3$)	None
SO_2	24 hours	0.04 ppm (105 $\mu g/m^3$)	---	---
	3 hours	---	---	0.5 ppm (1,300 $\mu g/m^3$)
	1 hour	0.25 ppm (655 $\mu g/m^3$)	75 ppb (196 188 $\mu g/m^3$)	---
Respirable PM_{10}	Annual Arithmetic Mean	20 $\mu g/m^3$	---	Same as primary
	24 hours	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as primary
$PM_{2.5}$ [6]	Annual Arithmetic Mean	12 $\mu g/m^3$	15 $\mu g/m^3$	Same as primary
	24 hours	---	35 $\mu g/m^3$	Same as primary
Sulfates	24 hours	25 $\mu g/m^3$	---	---
Pb	30 day Average	1.5 $\mu g/m^3$	---	---
	Calendar Quarter	---	1.5 $\mu g/m^3$	Same as primary
Hydrogen sulfide	1 hour	0.03 ppm (42 $\mu g/m^3$)	---	---
Vinyl chloride [7]	24 hours	0.010 ppm (26 $\mu g/m^3$)	---	---
Visibility reducing particles	8 hours	Extinction coefficient of 0.23 per km - visibility of 10 miles or more – due to particles when the relative humidity is less than 70 percent.	---	---

Source: CARB, September 8, 2010. "Ambient Air Quality Standards Chart (California and Federal).

Notes:

1. California standards for O_3, CO, SO_2 (1-hour and 24-hour), NO_2, suspended particulate matter – PM_{10}, $PM_{2.5}$, and visibility reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards, other than O_3, particulate matter, and those based on annual averages (or annual arithmetic mean), are not to be exceeded more than once a year. The O_3 standard is attained when the fourth-highest 8-hour concentration, averaged over three years is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over three years, are equal to or less than the standard.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference atmospheric pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference atmospheric pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
6. New Federal 8-hour O_3 and fine $PM_{2.5}$ standards were promulgated by EPA on July 18, 1997.
7. The CARB has identified Pb and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. The goal of this Executive Order is to reduce California's GHG emissions to: 1) 2000 levels by 2010, 2) 1990 levels by the 2020 and 3) 80 percent below the 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006. AB 32 sets the same overall GHG emissions reduction goals while further mandating that CARB create a plan, which includes market mechanisms, and implement rules to achieve "...real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs State agencies to begin implementing AB 32, including the recommendations made by the State's Climate Action Team.

With Executive Order S-01-07, Governor Schwarzenegger set forth the low carbon fuel standard for California. Under this executive order, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

Climate change and GHG reduction is also a concern at the federal level; however, at this time, no legislation or regulations have been enacted specifically addressing GHG emissions reductions and climate change. California, in conjunction with several environmental organizations and several other states, sued to force the U.S. EPA to regulate GHG as a pollutant under the Clean Air Act (Massachusetts vs. Environmental Protection Agency et al., 549 U.S. 497 (2007). The court ruled that GHG does fit within the Clean Air Act's definition of a pollutant, and that the EPA does have the authority to regulate GHG. Despite the Supreme Court ruling, there are no promulgated federal regulations to date limiting GHG emissions. The EPA has recently issued the Mandatory Reporting of Greenhouse Gases Rule, effective December 29, 2009. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to EPA.

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Chapter 4 NEPA Assessment - Transportation Conformity

4.1 Transportation Conformity

Transportation conformity is required under CAA Section 176(c) (42 U.S.C. §7506(c)) to ensure that federally supported highway and transit project activities are consistent with the purpose of the State Implementation Plan (SIP). Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS. The USEPA's transportation conformity rule (40 CFR 51.390 and Part 93) establishes the criteria and procedures for determining whether transportation activities conform to the SIP. Under the criteria, transportation projects must demonstrate conformity on regional and local levels.

Regional conformity for a given project is analyzed by discussing if the proposed project is included in a conforming Regional Transportation Plan (RTP) or Transportation Improvement Plan (TIP) with substantially the same design concept and scope that was used for the regional conformity analysis. Project-level conformity is analyzed by discussing if the proposed project would cause localized exceedances of CO, $PM_{2.5}$, and/or PM_{10} standards, or it would interfere with "timely implementation" of Transportation Control Measures called out in the SIP.

4.2 Regional Conformity Analysis

The proposed project is fully funded and included in the 2012-2035 RTP/SCS, which was found to conform to the SIP by the SCAG on April 4, 2012. The Federal Highway Administration and FTA adopted air quality conformity findings on June 4, 2012_. The proposed project is listed in the adopted 2011 TIP under the project ID ORA080909 (See Appendix C). The description of the project within the TIP is "A Project Study for the City of Santa Ana – Fixed Guideway System linking the SARTC to Harbor Boulevard in the City of Garden Grove" and is classified as exempt from conformity analysis. However, based on 42 U.S.C. §7506(c)(2)(C)(ii), the design concept and scope of a project cannot change substantially since the conformity finding regarding the plan. The proposed project should no longer be classified as a "Project Study" in the TIP because the project sponsor is seeking funding for construction. An amendment to the TIP is necessary to revise the project description to reflect project implementation.

4.3 Project Level Conformity

Project level conformity determinations must be made for federal highway and transit projects to demonstrate that the project is consistent with the conforming metropolitan transportation plan and TIP. The determination of conformity for transportation projects are based on the statutory requirements under 42 U.S.C. §7506(c)(3)(B) which states:

(i) The project would come from a conforming transportation plan and program; or

(ii) The project is located in carbon monoxide nonattainment areas, eliminate or reduce the severity and number of violations of the carbon monoxide standards in the area substantially affected by the project.

4.3.1 Carbon Monoxide Hotspots

The procedure for determining CO conformity in California is detailed in the Transportation Project-Level Carbon Monoxide Protocol developed by the Institute of Transportation Studies at the University of California, Davis. The Protocol was approved by the USEPA in October of 1997.[1] Figure 3 in the Protocol lists project conditions that result in no further CO analysis. These conditions include no significant increase in cold starts, no significant increase in intersection volumes, improved traffic flow, and no roadway realignment that moves a source closer to a receptor site. The proposed project complies with each of these conditions and a CO analysis related to transportation conformity is not required.

4.3.2 Particulate Matter

Qualitative particulate matter hotspot analysis is required under the USEPA Transportation Conformity rule for Projects of Air Quality Concern (POAQC). Projects that are not POAQC are not required to complete a detailed particulate matter hotspot analysis. According to the USEPA Transportation Conformity Guidance, the following types of projects are considered POAQC:

- New or expanded highway projects that have a significant number of or significant increase in diesel vehicles (defined as greater than 125,000 Annual Average Daily Traffic (AADT) and eight percent or more of such AADT is diesel truck traffic)
- Projects affecting intersections that are at a Level of Service D, E, or F with a significant number of diesel vehicles, or that that will change to Level of Service D, E, or F, because of increased traffic volumes from a significant number of diesel vehicles related to the project
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location
- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location
- Projects in or affecting locations, areas, or categories of sites which are identified in the $PM_{2.5}$ or PM_{10} implementation plan or implementation plan submission, as appropriate, as sites of possible violation

The proposed project is not considered a POAQC because it does not meet the definition of a POAQC as defined in the USEPA's Transportation Conformity Guidance. The proposed project would not increase the percentage of diesel vehicles on the roadway, would not involve a bus or rail terminal that significantly increases diesel vehicles, and is not identified in

[1] CARB, Transportation Project-Level Carbon Monoxide Protocol, December 1997.

the SIP as a possible $PM_{2.5}$ or PM_{10} violation site. Operational activity would not generate diesel emissions. The proposed project has undergone Interagency Consultation and participants concurred on July 24, 2012 that it is not a POAQC. A particulate matter hotspot analysis is not required.

4.3.3 Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSAT) are a subset of the 188 air toxics defined by the CAA. The MSAT are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead federal agency for administering the CAA, and has certain responsibilities regarding the health effects of MSAT. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources (February 26, 2007). This rule requires controls that would substantially decrease in MSAT emissions through the use of cleaner fuels and cleaner engines.

Unavailable Information for Project Specific MSAT Impact Analysis

The following section describes the limitations and methods for conducting a quantitative MSAT analysis for transportation projects. Due to the limitations on accuracy of available technical tools, the following discussion is included in accordance with Council on Environmental Quality (CEQ) regulations [40 CFR 1502.22(b)] regarding incomplete or unavailable information.

Evaluating the environmental and health impacts from MSAT on roadways would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

Emissions

The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSAT in the context of transportation projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model with emission factors that are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSAT are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of particulate matter under the conformity rule, EPA has identified problems with MOBILE 6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

Dispersion

The tools used to predict how MSAT disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of CO to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The National Cooperative Highway Research Program is conducting research on best practices in applying models and other technical methods in the analysis of MSAT. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the National Environmental Policy Act (NEPA) process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

Exposure Levels and Health Effects

Even if emission levels and concentrations of MSAT could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSAT near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSAT

Research into the health impacts of MSAT is ongoing. For different emission types, there are a variety of studies that show that some are either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The EPA is in the process of assessing the risks of various kinds of exposures to the below-described pollutants. The EPA's Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSAT was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from EPA's IRIS database and represents the agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- Benzene is characterized as a known human carcinogen.
- The potential carcinogenicity of acrolein cannot be determined because the existing data is inadequate for an assessment of human carcinogenic potential for either the oral or the inhalation route of exposure.
- Formaldehyde is a probable human carcinogen, based on limited evidence in humans and sufficient evidence in animals.
- 1,3-Butadiene is characterized as carcinogenic to humans by inhalation.
- Acetaldehyde is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.

- Diesel exhaust is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of DPM and diesel exhaust organic gases. This pollutant also represents chronic respiratory effects, possibly the primary noncancer hazard from MSAT. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hotspots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes, particularly respiratory problems. Much of this research is not specific to MSAT, instead surveying the full spectrum of both criteria and other pollutants. FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this Project.

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. The FHWA has established a tiered approach toward qualitatively analyzing and MSAT in NEPA documents. The three levels of analysis are:

1. No analysis for projects with no potential for meaningful MSAT effects;
2. Qualitative analyses for projects with low potential MSAT effects; or
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

The proposed Project is best categorized under projects with low potential MSAT effects because it seeks to improve transit without adding substantial new capacity or creating a facility to meaningfully increase MSAT emissions. For each Project alternative, the amount of MSAT emitted would be proportional to the amount of truck vehicle miles traveled (VMT) and rail activity, assuming that other variables (such as travel not associated with the intermodal center) are the same for each alternative. The VMT estimated for each of the Build

Alternatives are within 1% of the No Build Alternative. As shown in Table 4-1, the VMT associated with the Build Alternatives would lead to comparable levels of MSAT emissions (particularly diesel particulate matter) in the vicinity of the Project site as compared to the No Build Alternative.

Table 4-1: VMT for Each Project Alternative

Project Alternative	VMT	Difference from No Build	Percent Increase from No Build Alternative
2035 No Build Alternative	128,393	0	0
2035 TSM Alternative	129,007	614	0.50%
2035 Street Car 1 Alternative	128,467	74	0.10%
2035 Street Car 2 Alternative	127,913	-480	-0.40%
2035 Initial Operable Segment 1	128,467	74	0.10%
2035 Initial Operable Segment 2	127,913	-480	-0.40%

Source: URS, 2011. Traffic Study Report. December

Because the estimated VMT under each of the Build Alternatives would essentially be the same as the No Build Alternative, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent from 1999 to 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the EPA-projected reductions are so significant (even after accounting for VMT growth) that MSAT emissions in the Study Area are likely to be lower in the future as well.

4.3.4 Project Level Conformity Finding

All federal actions within nonattainment and maintenance areas must demonstrate that it would conform to the State Implementation Plan (SIP). Based on 42 U.S.C. §7506(c) (§176(c)(1) of the CAA, conformity to an implementation plan means:

- Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards;
- and that such activities will not –
  - Cause or contribute to an new violation of any new standard in any area;
  - Increase the frequency or severity of any existing violation of any standard in any area; or
  - Delay timely attainment of any standard or any required interim reductions or other milestones in any area.

As discussed previously, an amendment to the RTP and FTIP would be necessary to include the implementation of the proposed Project. The Project alternatives were evaluated and found to not create or contribute to CO and PM hotspots at analyzed intersections. Regional emissions associated with the operation of the proposed Project were found to be below the significance thresholds established by the SCAQMD, and consequently would not significantly create or contribute to violations of the ambient air quality standards or delay their timely attainment. As such, the proposed Project is considered to conform with the goals of the SIP.

Chapter 5 CEQA Assessment

The proposed Project and its alternatives would result in air pollutant emissions from the construction and operation phases. The following provides a discussion of the assessment methodology, thresholds of significance, and an analysis of both regional and localized emissions for both the construction and operation phases of the project, and a consistency analysis and cumulative impact analysis.

5.1 Methodology

This air quality evaluation was prepared in accordance with the requirements of CEQA to determine if significant air quality impacts are likely to occur in conjunction with the type and scale of development associated with the Project. SCAQMD has published the CEQA Air Quality Handbook (Handbook), as well as Handbook updates included on SCAQMD's website, to provide local governments with guidance for analyzing and mitigating project-specific air quality impacts. This Handbook and its updates provide standards, methodologies, and procedures for conducting air quality analyses in environmental impact reports, and were used extensively in the preparation of this analysis. In addition, SCAQMD has published the Final Localized Significance Threshold Methodology (SCAQMD 2008) that is intended to provide guidance in evaluating localized effects from mass emissions during construction. This document was also used in the preparation of this analysis.

The analysis makes use of the Urbemis urban emissions model (Version 9.2.4) for determination of daily construction and operational emissions, guidance included in SCAQMD Final Localized Significance Threshold Methodology for localized construction impacts, the provisions of the California Department of Transportation's (Caltrans) Transportation Project-Level Carbon Monoxide Protocol, CALINE4 computer model of on-road carbon monoxide (CO) dispersion modeling, and the EPA's Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas.

5.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would:

Air Quality

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

Greenhouse Gases

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

5.2.1 South Coast Air Quality Management District Thresholds

The analysis of the proposed Project's air quality impacts follows the guidance and methodologies recommended in SCAQMD's Air Quality Analysis Guidance Handbook (formerly the CEQA Air Quality Handbook). CEQA allows for the significance criteria established by the applicable air quality management or air pollution control district to be used to assess impacts of a project on air quality. SCAQMD has established thresholds of significance for regional air quality emissions for construction activities and project operation. In addition to the daily thresholds listed above, projects are also subject to the AAQS. These are addressed though an analysis of localized CO impacts and localized significance thresholds (LSTs).

Regional Significance Thresholds

The SCAQMD has adopted regional construction and operational emissions thresholds to determine a project's cumulative impact on air quality in the Basin. Table 5-1 lists SCAQMD's regional significance thresholds. Exceedance of these thresholds would constitute a significant air quality impact.

Table 5-1: SCAQMD Significance Thresholds

Air Pollutant	Construction Phase	Operational Phase
Reactive Organic Gases (ROG)	75 lbs/day	55 lbs/day
Carbon Monoxide (CO)	550 lbs/day	550 lbs/day
Nitrogen Oxides (NO_X)	100 lbs/day	55 lbs/day
Sulfur Oxides (SO_X)	150 lbs/day	150 lbs/day
Coarse Inhalable Particulates (PM_{10})	150 lbs/day	150 lbs/day
Fine Inhalable Particulates ($PM_{2.5}$)	55 lbs/day	55 lbs/day
Greenhouse gases	10,000 metric tons/year $CO2_{eq}$ for industrial facilities	

Source: SCAQMD 2011; SCAQMD Air Quality Significance Thresholds. http://aqmd.gov/ceqa/handbook/signthres.pdf. Accessed September 1, 2011.

Localized Significance Thresholds

The SCAQMD developed LSTs for emissions of NO_2, CO, PM_{10}, and $PM_{2.5}$ generated at the project site (offsite mobile-source emissions are not included in the LSTs analysis). LSTs represent the maximum amount of emissions at a project site that would not cause or contribute to an exceedance of the most stringent federal or State AAQS. LSTs are based on the ambient concentrations of that pollutant, within the project Source Receptor Area (SRA) and the distance to the nearest sensitive receptor.

Table 5-2 lists the LSTs for a 1-acre project site within source receptor area (SRA) 17 for sensitive receptors within 25 meters (approximately 82 feet). The South Coast Air Basin is divided into SRAs with common characteristics; these include Metrologic conditions and air pollutant sources. LST analyses are applicable for all projects of five acres and less; however, they can be used as screening criteria for larger projects to determine whether or not dispersion modeling may be required.

Table 5-2: SCAQMD Localized Significance Threshold, Screening Level Analysis

Air Pollutant	Threshold (lbs/day) Construction[1]
Nitrogen Oxides (NO_2)	183
Carbon Monoxide (CO)	1,253
Coarse Particulates (PM_{10})	13
Fine Particulates ($PM_{2.5}$)	7

Source: SCAQMD 2006. Based on a 1-acre site with receptors 25meters (82 feet) from the source in SRA 17.

CO Hotspots

Localized CO impacts are determined based on the presence of congested intersections. The significance of localized project impacts depends on whether the project would cause substantial concentrations of CO. A project is considered to have significant impacts if project-related mobile-source emissions result in an exceedance of the California one-hour and eight-hour CO standards:

- 1 hour = 20 parts per million
- 8 hour = 9 parts per million

5.3 Construction Phase Impacts

5.3.1 Regional Construction Emissions

Construction activities would include demolition of buildings and pavement, site grading, trenching, rail construction, paving, and development of maintenance facilities and ancillary structures. During construction activities, emissions from heavy equipment exhaust, delivery trucks, and fugitive dust would be generated for a short duration. The amount of construction emissions generated on a daily basis is dependent on the level of activity (e.g., quantity of construction equipment), duration of activity, and control measures implemented to reduce overall emissions. Construction of the O&M facility, bridges and railway infrastructure is anticipated to take approximately 30 months to complete. An emissions inventory was conducted using URBEMIS2007, Version 9.2.4 for the 13 individual construction phases of the Project Build Alternatives.

No Build Alternative

The No Build Alternative consists of existing conditions as well as conditions that would be reasonably expected to occur in the foreseeable future without implementation of the Build Alternatives. Because the Build Alternatives would not be constructed, no construction emissions would occur. Therefore, the No Build Alternative would not result in a significant impact to air quality from regional construction emissions.

Transportation System Management Alternative

The TSM Alternative would not involve construction of major new transportation facilities or physical capacity improvements but would focus on low-cost small physical improvements and operational efficiencies. As such, a minimal use of construction vehicles would be expected and would consequently result in minimal quantities of construction-related air pollutant emissions. This low magnitude of air pollutant emissions from construction of the TSM Alternative would not be expected to exceed the SCAQMD significance thresholds for construction activities and would not result in a significant air quality impact.

Streetcar Alternative 1 and 2

Short-term emissions for the Project's construction phase were modeled using the Urbemis emissions inventory model. Construction related emissions were calculated on a daily basis for each construction phase and evaluated against the SCAQMD's regional construction emissions thresholds. Some of the construction phases overlap so maximum emissions for the overlapping construction phases were compiled for years 2012 through 2014 and compared against the SCAQMD significance thresholds. Emissions associated with the proposed Project would result in exceedances of the SCAQMD's NOx threshold for construction activities for the years 2012 and 2013. As such, construction of Streetcar Alternative 1 and 2 would result in a significant air quality impact. The results of the Urbemis modeling are shown in Table 5-3, and model output is included in Appendix B.

Table 5-3: Regional Construction Emissions for Streetcar Alternatives

	Criteria Pollutants (lbs/day)					
Construction Phase	**VOC**	**NO_x**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Advance Utility Work	11	92	44	<1	4	4
Structures	7	63	24	<1	2	2
Clearing and Grubbing	5	42	21	<1	2	2
Grading	3	29	14	<1	1	1
Foundations	2	20	13	<1	1	1
Rail Delivery and Welding	2	8	8	<1	1	1
Civil and Track Instructions	5	38	21	<1	2	2
O&M facility Construction	1	12	5	<1	1	1
System and Substations	2	18	11	<1	1	1
Signals and Electrical	1	9	7	<1	1	1
Striping	1	5	3	<1	<1	<1
Signage	1	4	3	<1	<1	<1
Finishing	<1	2	3	<1	<1	<1
Maximum Year 2012[1]	27	**227**	103	<1	10	10
Maximum Year 2013[1]	16	**136**	69	<1	6	6
Maximum Year 2014[1]	10	78	51	<1	4	4
SCAQMD Threshold	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Threshold?	No	**Yes**	No	No	No	No

Source: Urbemis emissions inventory model conducted by URS August 2011.

[1] Maximum emissions for years 2012 – 2014 were based on combined emissions from overlapping construction phases.

Initial Operable Segment, Alternatives 1 and 2

Construction emissions associated with the initial operable segment alternatives were modeled using the Urbemis emissions based on construction equipment activity information specific to these alternatives. Construction activity associated with these alternatives would be similar to what would be required under Streetcar Alternatives 1 and 2 with the exception that construction activities would be limited to the development of the streetcar infrastructure from the SARTC to the Raitt Street and Santa Ana Boulevard station. As shown in Table 5-4, emissions occurring under the Initial Operable Segment Alternatives would exceed the SCAQMD significance thresholds and result in a significant impact to regional air quality.

Table 5-4: Regional Construction Emissions for IOS Alternatives

	Criteria Pollutants (lbs/day)					
Construction Phase	**VOC**	**NO_X**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Advance Utility Work	11	92	44	<1	4	4
Clearing and Grubbing	5	42	21	<1	2	2
Grading	3	29	14	<1	1	1
Foundations	2	20	13	<1	1	1
Rail Delivery and Welding	2	8	8	<1	1	1
Civil and Track Instructions	5	40	22	<1	2	2
O&M facility Construction	1	12	5	<1	1	1
System and Substations	2	18	11	<1	1	1
Signals and Electrical	1	9	7	<1	1	1
Striping	1	5	3	<1	<1	<1
Signage	1	4	3	<1	<1	<1
Finishing	<1	2	3	<1	<1	<1
Maximum Year 2012[1]	20	**164**	78	<1	8	7
Maximum Year 2013[1]	10	80	48	<1	4	4
Maximum Year 2014[1]	4	29	20	<1	2	1
SCAQMD Threshold	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Threshold?	No	**Yes**	No	No	No	No

Source: Urbemis emissions inventory model conducted by URS January 2012.

[1] Maximum emissions for years 2012 – 2014 were based on combined emissions from overlapping construction phases.

5.3.2 Localized Construction Emissions

Localized air pollutant emissions are evaluated relative to the exposure of local sensitive uses to air pollutant concentrations generated by the proposed Project. These are pollutant concentrations which can be directly correlated to the health-based ambient air quality standards. This differs from regional emissions which were discussed previously in that regional emissions are used to assess how much air pollution is generated within an air basin and does not have a direct correlation with health effects. Localized air pollutant concentrations are described as the amount of air pollutants within a volume of air (ppm or μ/m3).

LSTs have been developed by the SCAQMD for NO_X, CO, SO_2, PM_{10}, and $PM_{2.5}$. These LSTs are screening thresholds to determine whether project- related emissions would exceed the ambient air quality standards. The LSTs differ based on distance such that a greater allowance in air pollutant emissions is allowed for construction activities occurring further from a sensitive receptor and a lesser allowance in emissions is given for construction activities occurring closer to sensitive uses. Table 5-5 provides an evaluation of the Project's emissions for each construction phase relative to the SCAQMD's LSTs. These LSTs are based on SRA 17 at a distance of 25 meters (82 feet) for a project site of 1 acre. In accordance with SCAQMD methodology, only Project-related emissions that occur at the construction site are used in the evaluation against the SCAQMD's LST thresholds. Project-related vehicles traveling offsite are not included in the analysis.

Table 5-5: Localized Construction Emissions for Streetcar Alternatives

	Criteria Pollutants (lbs/day)			
Construction Phase	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Advance Utility Work	51.3	32.6	3.2	2.9
SCAQMD Threshold	**183**	**1,253**	**13**	**7**
Exceeds Threshold?	No	No	No	No

Source: Urbemis emissions inventory model conducted by URS January 2012.

Streetcar Alternative 1 and 2

Short-term emissions for the Project's construction phase were modeled using the Urbemis emissions inventory model without truck trips which occur offsite. Emissions generated by construction activities disperse rapidly with distance from the construction site. Because overlapping construction phases would be located at different locations, emissions would disperse rapidly with distance and combined emissions from overlapping construction phases were not evaluated. Instead, the individual construction phase that generated the most emissions was compared against the SCAQMD's LST significance criteria. As shown in Table 5-5, Project emissions would not exceed the LST screening level criteria for CO, NO, PM_{10}, or $PM_{2.5}$. Because emissions associated with this alternative would be less than the LST, onsite construction emissions would not be expected to exceed the federal or California AAQS at the nearest sensitive receptors. As such, no significant air quality impacts related to localized air pollutants would occur from the construction phase.

Transportation System Management Alternative

As stated previously, a minimal use of construction vehicles would be expected due to this Alternative's focus on small physical improvements and improvement in operational efficiencies. Therefore, the TSM Alternative would result in minimal quantities of construction-related air pollutant emissions. This low magnitude of air pollutant emissions from construction of the TSM Alternative would not be expected to exceed the SCAQMD's LST for construction activities and would not result in a significant air quality impact.

Initial Operable Segment Alternatives 1 and 2

This segment would entail the same types of construction activities as would be required under Streetcar Alternatives 1 and 2 with the exception that construction activities would be limited to the development of the project infrastructure from the SARTC to the Raitt Street and Santa Ana Boulevard station. Construction activities that generate localized air pollution would still occur at the same magnitude as that of Streetcar Alternatives 1 and 2 as shown in Table 5-4. Localized air pollutants related to development of the Alternatives 1 and 2 were found to be below the LST. Consequently, the development of the Initial Operable Segment Alternatives 1 and 2 would likewise not result in a significant localized air quality impact.

No Build Alternative

Because the Build Alternatives would not be constructed, no construction emissions would occur. Therefore, the No Build Alternative would not result in a significant impact to localized air quality from construction emissions.

Naturally Occurring Asbestos and Asbestos Containing Materials

The purpose of this discussion is to establish the impact of Naturally Occurring Asbestos (NOA) as well as Asbestos Containing Materials (ACM) during construction. Asbestos is a naturally occurring mineral distinguished from other minerals by the fact that its crystals form into long, thin fibers. The two common sets of NOA are the serpentine and ultramafic rocks. The fibers, when airborne, may enter the lungs and alveoli and remain there. When the fibers reach the alveoli, white blood cells attack them to try to remove them from the body. However, the fibers are not easily destroyed and eventually scarring of the lung tissue ensues. This scarring is called asbestosis and it leads to greatly diminished breathing capacity. Another result of asbestos exposure is lung cancer and mesothelioma. Both of these diseases are serious and frequently fatal. For these reasons, use of asbestos is limited and highly regulated. Identification of NOA in an area where soil may be disturbed (e.g., construction or demolition activities) is important. Attachment 1 of the Memorandum lists the counties in California where NOA may be present, and the County is not listed as containing either type of NOA. Also, the California Department of Conservation, Division of Mines and Geology (since renamed California Geological Society) have published a map of the State locating all areas where ultramafic rocks are present. This map indicates that there are no ultramafic rocks in the vicinity of the project location. Hence, the possibility of NOA becoming dustborne during construction is minimal.

In terms of ACM, there may be the potential for existing bridge and building structures that would be demolished to have ACM. Asbestos prior to the 1970s was used as a fire retardant in building materials which include floor tiles, ceiling panels and drywall. The potential for the release of asbestos fibers would be eliminated through mandatory compliance with SCAQMD Rule 1403, which regulates asbestos emissions from building demolition and renovation activities.

5.4 Operational Phase Impacts

5.4.1 Regional Emissions

Air pollutant emissions generated during operation of the proposed Project would be associated with electricity consumption by the proposed streetcars, energy consumption at the O&M facility, as well as the changes in air pollution generated by changes in VMT associated with the Project alternatives.

Mobile- and stationary-source emissions generated by the proposed Project were compiled using the Urbemis emissions inventory model. Traffic data used within this air quality analysis was obtained from the traffic impact analysis conducted in the Traffic Impact Assessment Report (URS, 2011).

According to the traffic study, different levels of Vehicle Miles Traveled (VMT) would be generated by each alternative. VMT is the number of vehicles multiplied with the miles that each vehicle travels on a daily basis. Levels of VMT per alternative are shown in Table 5-6. The emissions for each project alternative were calculated based on the VMT associated with each alternative and emission rates developed by the California Air Resources Board's emission factor model EMFAC7. Emissions associated with electricity consumption from the operation of the streetcars are also included for both criteria pollutants as well as GHGs. As per SCAQMD methodology, total GHG emissions from the entire construction period were amortized over a 20-year time frame to account for its contribution to the total GHG emissions from the project. As shown in Table 5-6 and detailed in Appendix B, the Project alternatives would result in less VMT and resulting emissions as compared to the No Build Alternative. This lack of increase in regional emissions is due to the similarity in VMT across all project alternatives. As such, the project alternatives would not result in an exceedance of the SCAQMD's regional emissions significance thresholds and consequently would not result in a significant air quality impact.

Table 5-6: Operational Phase Emissions by Alternative (lbs/day)

Project Alternative	VMT	CO (lbs/day)	NO_x (lbs/day)	TOG (lbs/day)	SO_2 (lbs/day)	PM_{10} (lbs/day)	$PM_{2.5}$ (lbs/day)	GHG (tons/year)
No Build	128,393	287	50	17	2	17	12	29,932
TSM	129,007	288	50	17	2	17	12	30,076
Streetcar Alternative 1	128,467	287	50	17	2	17	12	29,950
Streecar Alternative 2	127,913	286	49	17	2	17	12	29,821
IOS 1	128,467	287	50	17	2	17	12	29,950
IOS 2	127,913	286	49	17	2	17	12	29,821
Emissions Increase Over the No Build Alternative								
No Build		-	-	-	-	-	-	-
TSM		1	0	0	0	0	0	143
Streetcar Alternative 1		0	0	0	0	0	0	17
Streetcar Alternative 2		-1	0	0	0	0	0	-112
IOS 1		0	0	0	0	0	0	17
IOS 2		-1	0	0	0	0	0	-112
Streetcar Electricity Consumption		2	2	0	1	0	0	1,212
Streetcar Amortized Construction		NA	NA	NA	NA	NA	NA	1.24
SCAQMD Thresholds		550	55	55	150	150	55	10,000

Source: URS, 2012. EMFAC2007 emission factor model conducted by URS.

5.4.2 Localized Emissions

Project-related localized emissions for the operational phase of the project are shown in Table 5-7. It was found that the Project alternatives would not result in CO hotspots. Because the Build Alternatives would be powered with electricity, no localized air pollutant emissions would be emitted by the operation of streetcars. In addition, the maintenance facilities would not be a substantial source of localized air pollution. It is anticipated that the operation of the maintenance facilities would involve the use of solvents, paints, cleansers and periodic idling of vehicles during repairs. Due to the small increase in vehicular trips and the lack of stationary air pollutant sources, localized air pollutant concentrations associated with the proposed Streetcar Alternatives would not result in significant localized air quality impacts.

Table 5-7: CO Hotspot Analysis (ppm)

Intersection	1-Hour Co Concentration	1-Hour CAAQS	8-Hour Co Concentration	8-Hour CAAQS	Exceeds CAAQS?	
					1-Hour	8-Hour
Westminster Ave./Harbor Blvd.						
Northeast Receptor	6.4	20	4.3	9	No	No
Southeast Receptor	6.4	20	4.3	9	No	No
Southwest Receptor	6.4	20	4.3	9	No	No
Northwest Receptor	6.4	20	4.3	9	No	No
Fairview/Civic Center Dr.						
Northeast Receptor	6.3	20	4.3	9	No	No
Southeast Receptor	6.3	20	4.3	9	No	No
Southwest Receptor	6.3	20	4.3	9	No	No
Northwest Receptor	6.2	20	4.2	9	No	No
Santa Ana Blvd./Raitt St.						
Northeast Receptor	6.3	20	4.3	9	No	No
Southeast Receptor	6.2	20	4.2	9	No	No
Southwest Receptor	6.2	20	4.2	9	No	No
Northwest Receptor	6.1	20	4.1	9	No	No
Flower St./Civic Center Dr.						
Northeast Receptor	6.3	20	4.3	9	No	No
Southeast Receptor	6.3	20	4.3	9	No	No
Southwest Receptor	6.2	20	4.2	9	No	No
Northwest Receptor	6.2	20	4.2	9	No	No
Civic Center Dr./Spurgeon St.						
Northeast Receptor	6.1	20	4.1	9	No	No
Southeast Receptor	6.2	20	4.2	9	No	No
Southwest Receptor	6.1	20	4.1	9	No	No
Northwest Receptor	6.1	20	4.1	9	No	No
Santa Ana Blvd/Lacy St.						
Northeast Receptor	6.2	20	4.2	9	No	No
Southeast Receptor	6.1	20	4.1	9	No	No
Southwest Receptor	6.1	20	4.1	9	No	No
Northwest Receptor	6.2	20	4.2	9	No	No
Civic Center/Parton St.						
Northeast Receptor	6	20	4	9	No	No
Southeast Receptor	6	20	4	9	No	No
Southwest Receptor	6	20	4	9	No	No
Northwest Receptor	6	20	4	9	No	No

Source: URS, 2011. CALINE4. Version 1.31. Based on traffic volumes, roadway configurations, and speed limits obtained from the traffic study prepared by URS Corporation.

Park & Ride Lot

The proposed park and ride lot located on the northeast corner of the intersection of Harbor Boulevard and Westminster Avenue would serve as a temporary parking lot and pick up/drop off location for transit riders at the western terminus of the fixed guideway project. A total of 52 spaces are proposed at this site. Air pollutant emissions associated with the operation of this park and ride lot would include exhaust from vehicle ingress and egress as well as vehicle idling. Localized air pollutants generated by the operation of the 52 spaces park and ride lot would not result in substantial level of emissions due to the small magnitude of vehicle trips that would occur at this small parking lot. In comparison, CO hotspots were modeled at congested intersections with LOS E and F which have peak hour traffic volumes of approximately 7,000 vehicle trips and did not result in exceedances of the California and federal ambient air quality standard for CO. As such, air pollutant concentrations generated by the proposed 52 space park and ride lot would not result in an exceedance of the ambient air quality standards and would not result in a significant air quality impact.

5.4.3 Odor Impacts

The SCAQMD has established a significance threshold for odors. The SCAQMD considers a project to have a significant impact to the public when the project creates a new nuisance pursuant to SCAQMD Rule 402. Rule 402 states the following:

> A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

The proposed Project's O&M facility would use solvents, cleansers and paints but not in sufficient quantities to have the potential to generate odors that would cause a public nuisance. As such, the proposed Project would not result in significant air quality impacts relative to odor generation.

5.4.4 Consistency with Air Quality Plans

A consistency determination plays an important role in local agency project review by linking local planning and individual projects to the AQMP. It fulfills the CEQA goal of informing decision makers of the environmental effects of the project under consideration at an early enough stage to ensure that air quality concerns are fully addressed. It also provides the local agency with ongoing information as to whether they are contributing to clean air goals contained in the AQMP. To accurately assess the environmental impacts of new or renovated development, environmental pollution and population growth are projected for future scenarios.

The regional emissions inventory for the Basin is compiled by SCAQMD and SCAG. Regional population, housing, and employment projections developed by SCAG, are based, in part, on the City's General Plan land use designations. These projections form the foundation for the emissions inventory of the AQMP. These demographic trends are incorporated into the regional transportation plan compiled by SCAG, to determine priority transportation projects and determine VMT within the SCAG region. From local city perspective, the proposed Project is part of the City of Santa Ana's Transit Vision which is focused on providing transportation and air pollution reduction through development and improvement of mass transit facilities. The principal components of this transit vision include the proposed Project as well as the SARTC Master Plan and are also supported by the Transit Zoning Code and the Station District Plan. As such, the proposed Project is consistent with the City of Santa Ana's long term vision for transportation development and traffic congestion alleviation.

From a regional perspective, the Streetcar Alternatives propose construction of a 4-mile street car transit line with streetcar system infrastructure that would connect to the existing SARTC facility. The development of mass transit infrastructure is a Transportation Control Measure (TCM) within the 2007 AQMP, which seeks to reduce air pollutant emissions from a reduction in vehicle trips and congestion. As such, the proposed Project is consistent with the TCM in the AQMP. As discussed previously in the NEPA Impact Analysis, the Project is included within the RTP and FTIP and was found to conform to the SIP whose goal is to achieve the health based AAQS. Because the proposed Project is a mass transit development, it is also consistent with the goals of the ARB's Climate Change Scoping Plan. Since the proposed Project is consistent with the transportation and air quality goals of the City of Santa Ana's Transit Vision, listed as a TCM within the AQMP, conforms to the SIP and is consistent with the goals of the Climate Change Scoping Plan, the development of the proposed Project would be consistent with local air quality management plans.

5.4.5 Cumulative Impacts

In accordance with SCAQMD methodology, any project that results in a significant impact for either regional or localized air pollutant emissions contributes toward a cumulative impact. Cumulative projects within the local area generally consist of redevelopment of existing uses. A list of cumulative projects is shown in Table 5-8. The largest source of air pollutant emissions within the Basin is from mobile sources. Due to the extent of the area potentially impacted from cumulative project emissions, the SCAQMD considers a project cumulatively significant when project-related emissions exceed the SCAQMD regional and localized emissions thresholds.

Construction

The Basin is in nonattainment for ozone and particulate matter (PM_{10} and $PM_{2.5}$). Construction of cumulative projects will further degrade the regional and local air quality. Air quality will be temporarily impacted during construction activities that occur. Mitigation measures specified for the Project would reduce these short-term cumulative impacts and can be applied to all similar cumulative projects. However, even with the implementation of construction standard conditions, project-related construction emissions would still exceed the SCAQMD significance thresholds for NO_X, and cumulative emissions would result in larger exceedances.

Therefore, the Project's contribution to cumulative air quality impacts would be significant, and the Project's incremental contribution is cumulatively considerable.

Operation

For operational air quality emissions, any project that does not exceed or can be mitigated to less than the daily regional threshold values is not considered by the SCAQMD to be a substantial source of air pollution and does not add significantly to a cumulative impact. As discussed previously, the proposed Project would not result in air pollutant emissions that exceed the SCAQMD operational phase significance thresholds and consequently would not be cumulatively considerable.

Table 5-8: 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

No.	Project	Description/Land Use	No. of u or square feet (sf)	Location	Primary APN
19	Dr. Bui Medical Building	Medical Office	6,500 sf	202 N. Euclid Ave.	099-223-26
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)

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Chapter 6 Standard Conditions, Avoidance, Minimization, and/or Mitigation Measures

6.1 Standard Conditions

During the construction phase of the Streetcar Alternatives 1 and 2, as well as IOS 1 and 2, emissions of NOx from construction vehicle exhaust were found to exceed the SCAQMD significance threshold. The following standard condition would reduce emissions of NOx during construction.

SC-AQ-A: During the construction phase, the contractor shall use Tier 4 or higher off-road construction equipment with higher air pollutant emissions standards.

6.2 Avoidance and Minimization Measures

The submitted 2003 Particulate Matter SIP and the SCAQMD's Rule 403 contain provisions calling for mitigation of PM_{10} emissions during construction. Pursuant to Section 93.117, the proposed Project is required to include in its final plans, specifications, and estimates, control measures that will limit the emission of PM_{10} during construction. Such control plans must be contained in an applicable SIP. The prime concern during construction is to mitigate PM_{10} that occurs from earth-moving activities, such as grading. The agency who sponsored the PM_{10} SIP is SCAQMD with concurrence from the CARB. SCAQMD has published the 2004 Rule 403 Fugitive Dust Implementation Handbook (SCAQMD, 2004) that addresses the mitigation of PM_{10} by reducing the ambient entrainment of fugitive dust. Fugitive dust consists of solid particulate matter that becomes airborne due to human activity (i.e., construction) and is a subset of total suspended particulates. Likewise, PM_{10} is a subset of total suspended particulates. The Handbook states that 50% of total suspended particulate matter is comprised of PM_{10}. Hence, in mitigating for fugitive dust, emissions of PM_{10} are reduced.

The Handbook categorizes mitigation of fugitive dust into three sections: Best Available Control Measures (BACM); Dust Control Measures for Large Operations; and Contingency Control Measures for Large Operations. BACM are the set of control measures that should be used on all construction activity sources within the boundaries of the SCAQMD. Large operations are defined as those active operations on any parcel that contain 50 or more acres of disturbed surface area, or any earth-moving operation with a daily earth-moving or throughput volume of 3,850 cubic meters or more (i.e., > 5,000 cubic yards) that occurred three times during the most recent 365-day period. Since the Study Area of the proposed Project is within the boundary of the SCAQMD and it is not a large operation, BACM are the appropriate mode of mitigation. The application of BACM in compliance with the requirements of SCAQMD Rule 403 will ensure that no significant impacts would occur from the generation of dust during the Project's construction phase.

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Chapter 7 Conclusion

The proposed Project is an electric streetcar project that is designed to provide high frequency transit service between SARTC and Harbor Boulevard in the City of Garden Grove. This project would provide "last mile" transit service for commuters traveling from SARTC to employment and activity centers as well as promoting a more pedestrian friendly environment within the Study Area. The expected project construction period is expected to last approximately 30 months in duration with major activities completed within the first 24 month period. To assess whether this proposed Project conforms to State and federal transportation and air quality regulations, the procedures outlined in the Protocol were followed.

As discussed within the NEPA impact analysis, the proposed Project was evaluated for regional conformity and project level conformity based on methodology established by the FHWA and EPA. Table 3 of 40 CFR Section 93.127 entitled "Projects Exempt from Regional Emissions Analyses" does not include transit projects; thus, this project is not exempt from a regional emissions analysis. Following the regional emissions procedures for new projects outlined in the Protocol, the proposed Project has been included in the Final Adopted 2011 Federal Transportation Improvement Program. This project is identified in the document as Orange County (Lead Agency) Project ID ORA080909 SCAB. Before the scope of the Project changes from a "study" to "implementation" during Preliminary Engineering, an amendment to the FTIP would be necessary.

To address the potential for a CO hotspot, a quantitative analysis of project-level CO emissions was conducted and the results indicate that the proposed Project would not pose significant adverse impacts on the ambient air quality in the project vicinity. Since the proposed Project would not be expected to increase or directly affect a substantial number of diesel or idling vehicles within the Study Area, the proposed Project is also not a POAQC. Based on methodology established within the FHWA's interim guidance "Update on Mobile Source Air Toxics Analyses in NEPA", the Project alternatives were not found to result in a significant adverse impact from MSAT because the Project alternatives VMT would result in similar, if not a slight decrease, in air pollution as compared to the future No Build Alternative. Exposure to Diesel Particulate Matter (DPM) and other MSAT associated with construction equipment will be a short-term event, and is not expected to pose any long-term adverse health effects on the nearby population.

In terms of the CEQA impact analysis, regional and localized emissions were modeled and evaluated against significance thresholds established by the SCAQMD. Regional air pollutant emissions generated during the construction phase were found to exceed the NOx threshold and are considered to result in a temporary significant air quality impact. Despite the application of construction standard conditions, emissions of NOx would still exceed the SCAQMD's significance thresholds and would represent a temporary unavoidable significant air quality impact. Localized air pollutants proximate to project construction activities were also evaluated against SCAQMD thresholds and were found to result in less than significant air quality impacts.

In terms of asbestos, no NOA is expected to be present in the vicinity of the proposed Project and consequently would not be expected to result in exposure to asbestos. ACM present during construction activities would be addressed through compliance with SCAQMD Rule 1403.

In terms of cumulative impacts, project related construction activities were found to result in a significant air quality impact. Emissions from construction of cumulative projects would exacerbate this exceedance and, consequently, would be cumulatively considerable and result in a cumulative impact. For the operations phase of the project, the proposed Project would not result in air pollutant emissions that exceed the SCAQMD operational phase significance thresholds and consequently would not be cumulatively considerable.

The operational phase of the Project alternatives were evaluated for potential impacts from regional pollutants. The net increase in air pollutant emissions from the Project alternatives over the No Build Alternative were found to be below the SCAQMD significance thresholds for regional pollutants. As such, the Project alternatives would not result in a significant regional air quality impact. As discussed previously, a CO hotspot analysis was conducted for the Project alternatives and CO concentrations were found to be substantially below the California and federal ambient air quality standards. As such, no significant localized air quality impact is expected to occur.

Emissions of greenhouse gases were also quantified and were found to be below the SCAQMD's draft significance threshold for GHGs. In addition, the Project involves the development of a mass transit system that is a part of the City of Santa Ana's Transit Vision, is listed within the AQMP as a TCM, is in conformance with the RTP and FTIP as well as being consistent with the goals of the ARB's Climate Change Scoping Plan a Framework for Change. As such, the proposed Project would not result in a significant air quality impact relative to climate change.

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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

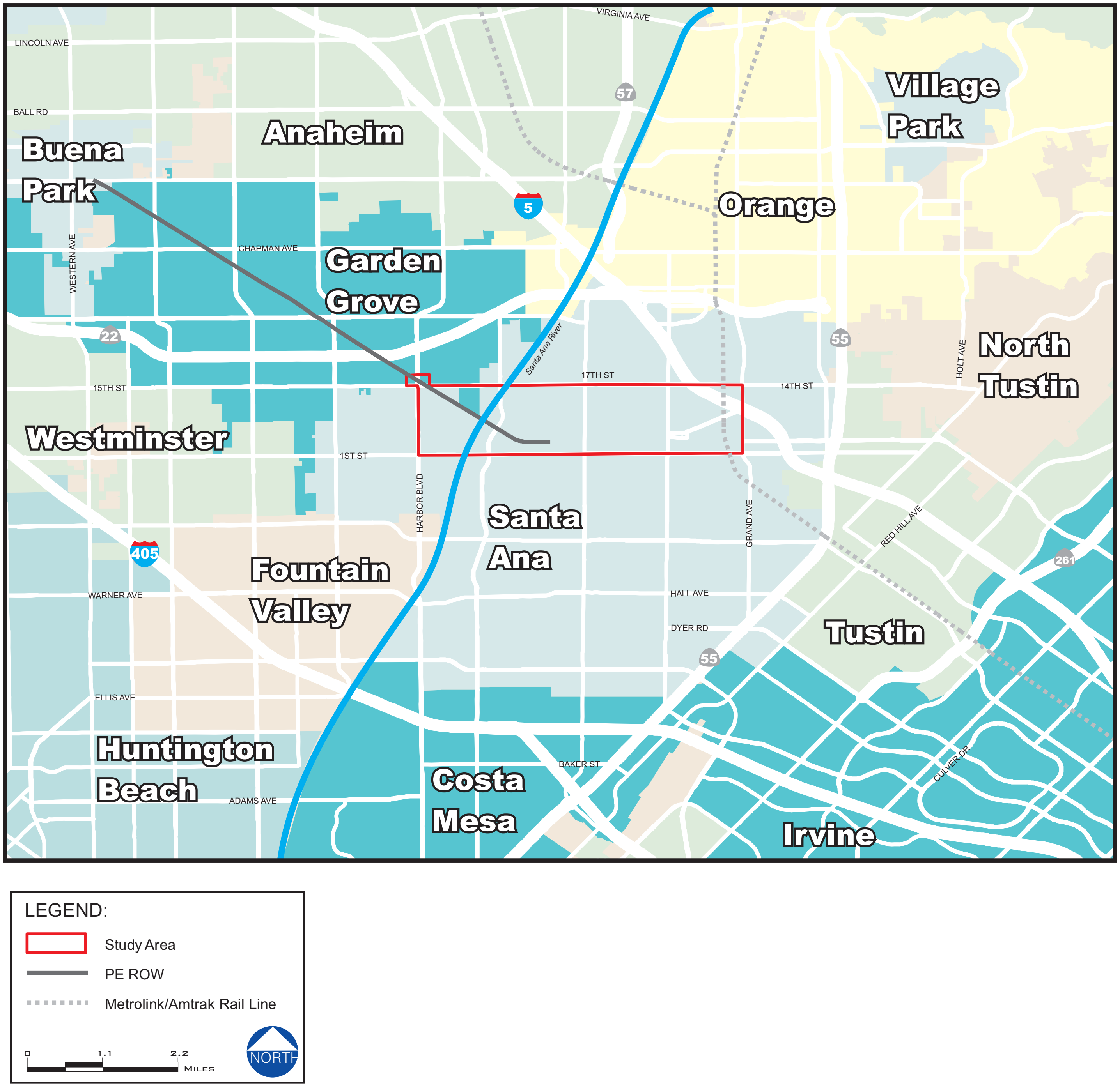
No Build Alternative

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

Location Map



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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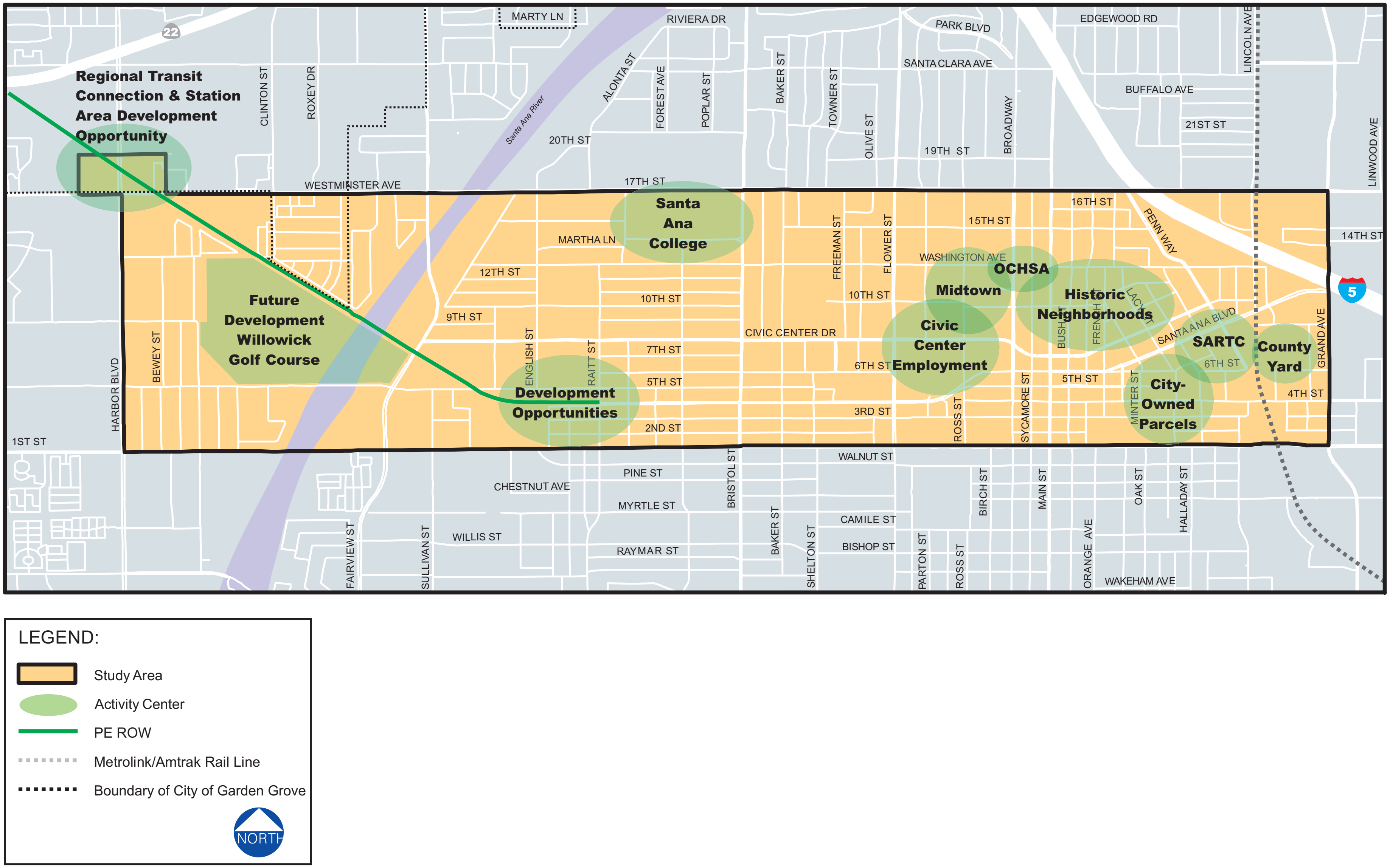
Study Area



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

LEGEND: Study Area · Proposed Stop · PE ROW

- TSM 1st Street Alignment (OCTA Route 64)
- TSM Civic Center Alignment
- Skip Stop Overlay to/from SARTC
- TSM Station Link Enhancement (OCTA BRT Route 462)

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.

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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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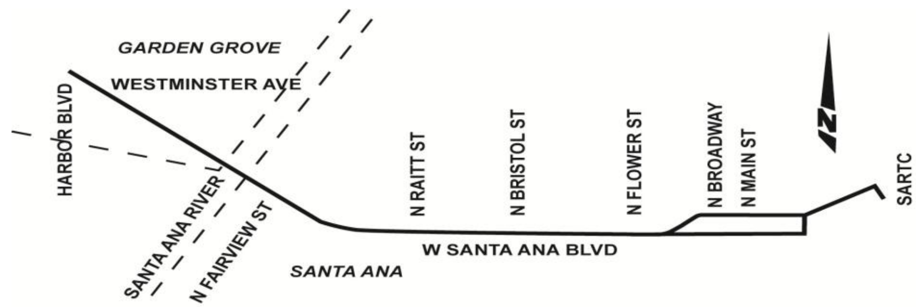
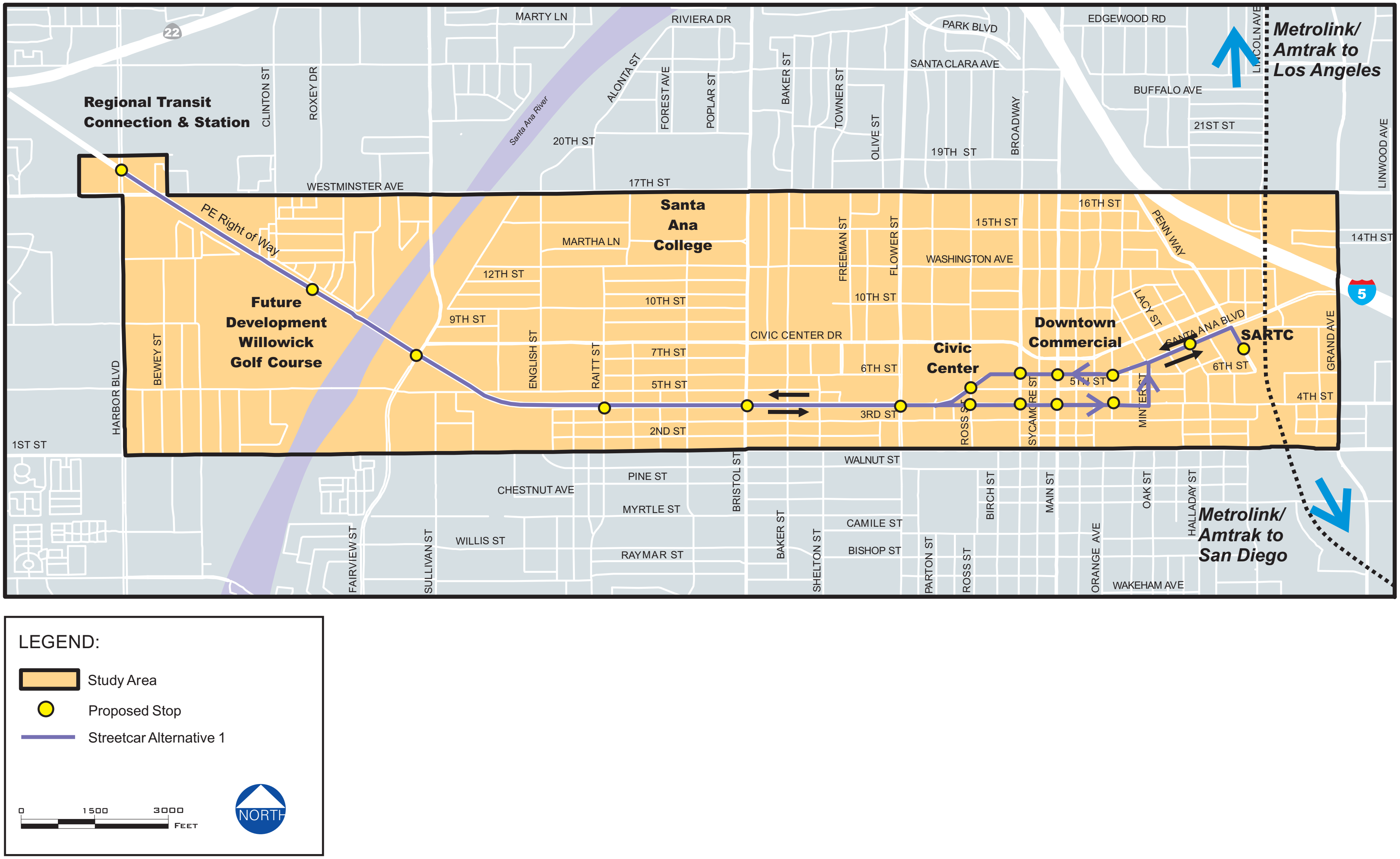
<table>
<tr><th colspan="3">TABLE A-1: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 1</th></tr>
<tr><th>Key Attributes</th><th colspan="2">Descriptions</th></tr>
<tr><td>Transmit Mode</td><td colspan="2">Streetcar</td></tr>
<tr><td>Termini</td><td colspan="2">Western Terminus: Harbor Blvd.
Eastern Terminus: SARTC</td></tr>
<tr><td>Alignment Description</td><td colspan="2"><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.

</td></tr>
<tr><td>Length of Alignment</td><td colspan="2">4.1 miles (Harbor Blvd. to SARTC)</td></tr>
<tr><td rowspan="3">Stations
(12 Stations)</td><td colspan="2"><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.</td></tr>
<tr><td>Couplet Section (Eastbound)
7E. Sasscer Park
8E. Broadway and 4th St.
9E. Main St. and 4th St.
10E. French St. and 4th St.</td><td>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.</td></tr>
<tr><td colspan="2">11. Lacy St. and Santa Ana Blvd.
12. SARTC</td></tr>
</table>

TABLE A-1: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 1	
Key Attributes	**Descriptions**
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.

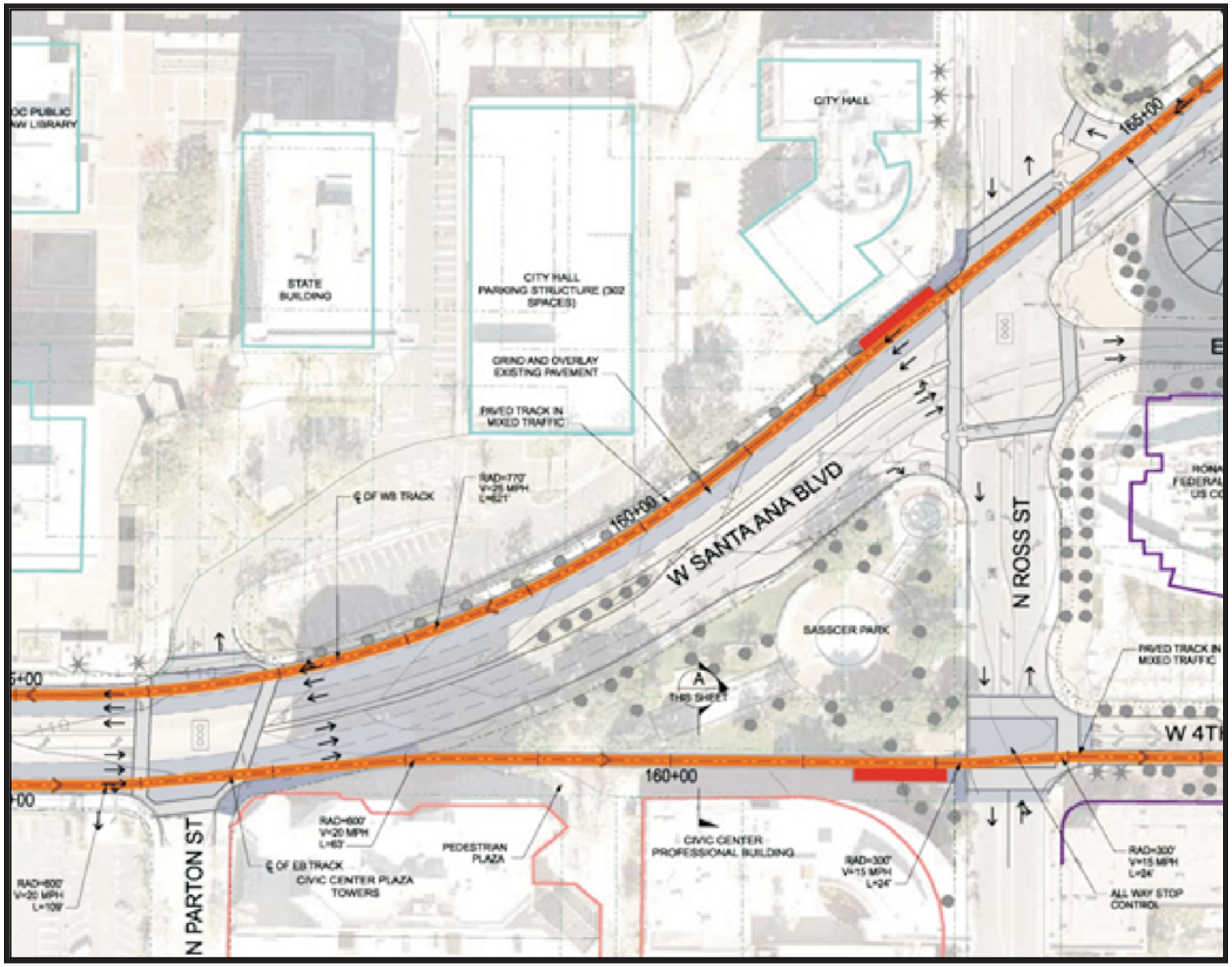
Streetcar Alternative 1 Alignment



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

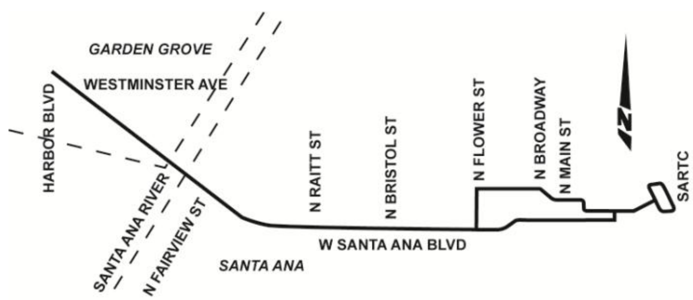


Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

<table>
<tr><th colspan="3">TABLE A-2: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 2</th></tr>
<tr><th>Key Attributes</th><th colspan="2">Descriptions</th></tr>
<tr><td>Transit Mode</td><td colspan="2">Streetcar</td></tr>
<tr><td>Termini</td><td colspan="2">Western Terminus: Harbor Blvd.
Eastern Terminus: SARTC</td></tr>
<tr><td>Alignment Description</td><td colspan="2">

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.

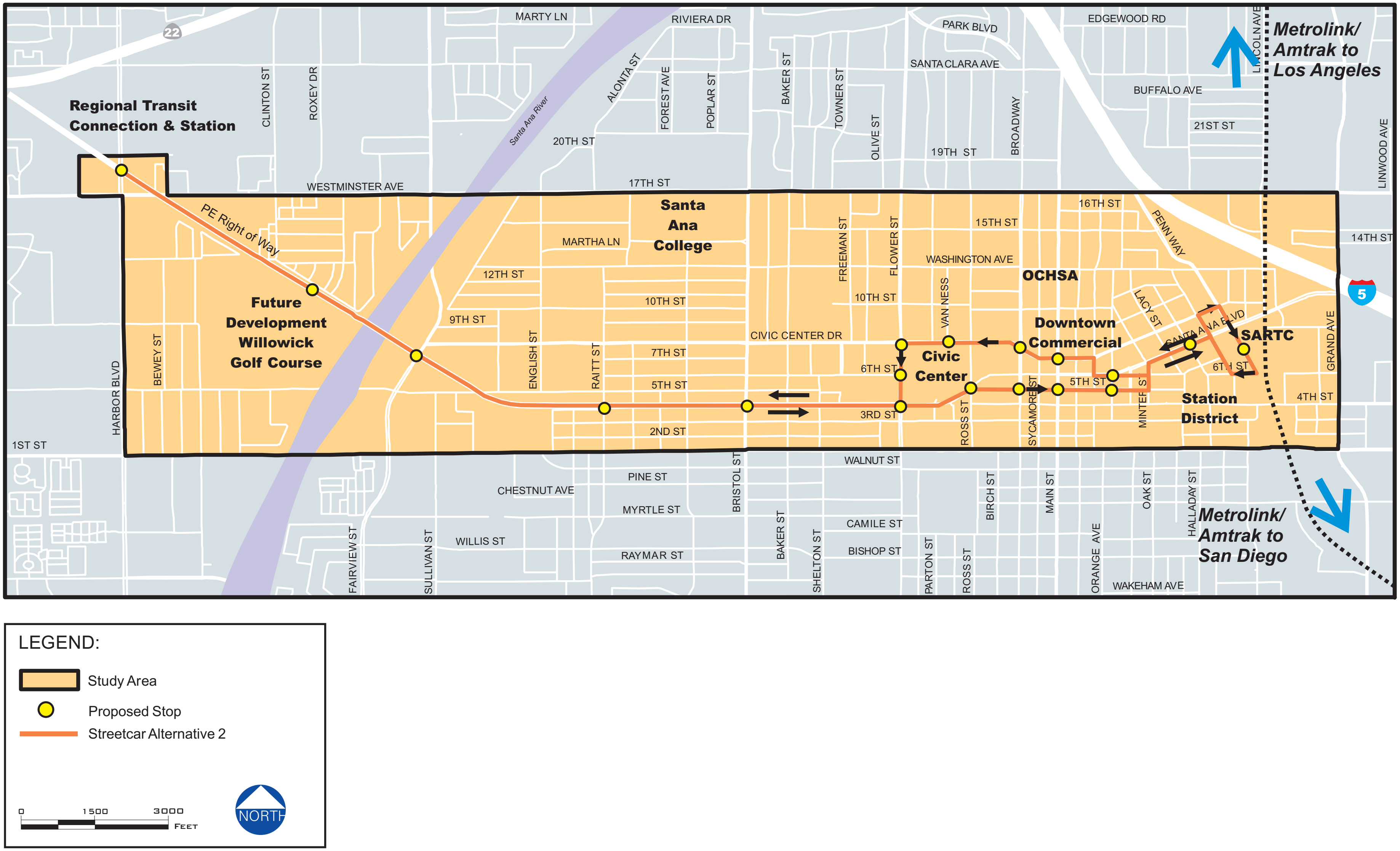


</td></tr>
<tr><td>Length of Alignment</td><td colspan="2">4.5 miles (Harbor Boulevard to SARTC)</td></tr>
<tr><td rowspan="3">Stations(13 Stations)</td><td colspan="2">Station Locations:
1. Harbor Blvd. and Westminster Ave.
2. Willowick
3. Fairview St. and PE ROW
4. Raitt St. and Santa Ana Blvd.
5. Bristol St. and Santa Ana Blvd.</td></tr>
<tr><td>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.</td><td>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.</td></tr>
<tr><td colspan="2">12. Brown St. and Lacy St.</td></tr>
</table>

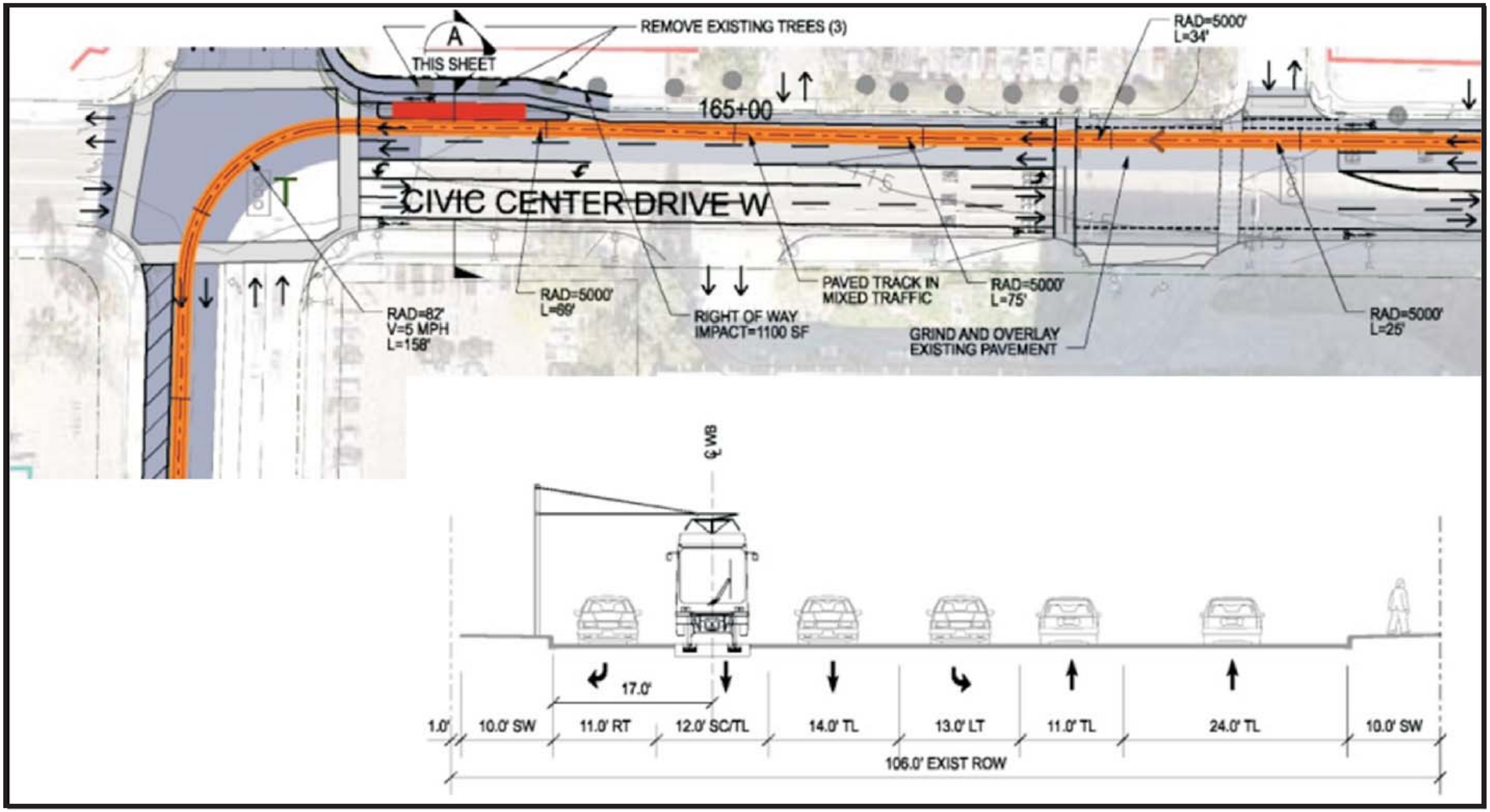
TABLE A-2: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 2	
Key Attributes	**Descriptions**
	13. SARTC
Design Options Carried Forward	Santa Ana River Crossing: Adjacent Single Track Bridge
Headways	Peak: 10 minutes (6:00 a.m. to 6:00 p.m.) Off-Peak: 15 minutes (after 6:00 p.m.)
Hours 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.



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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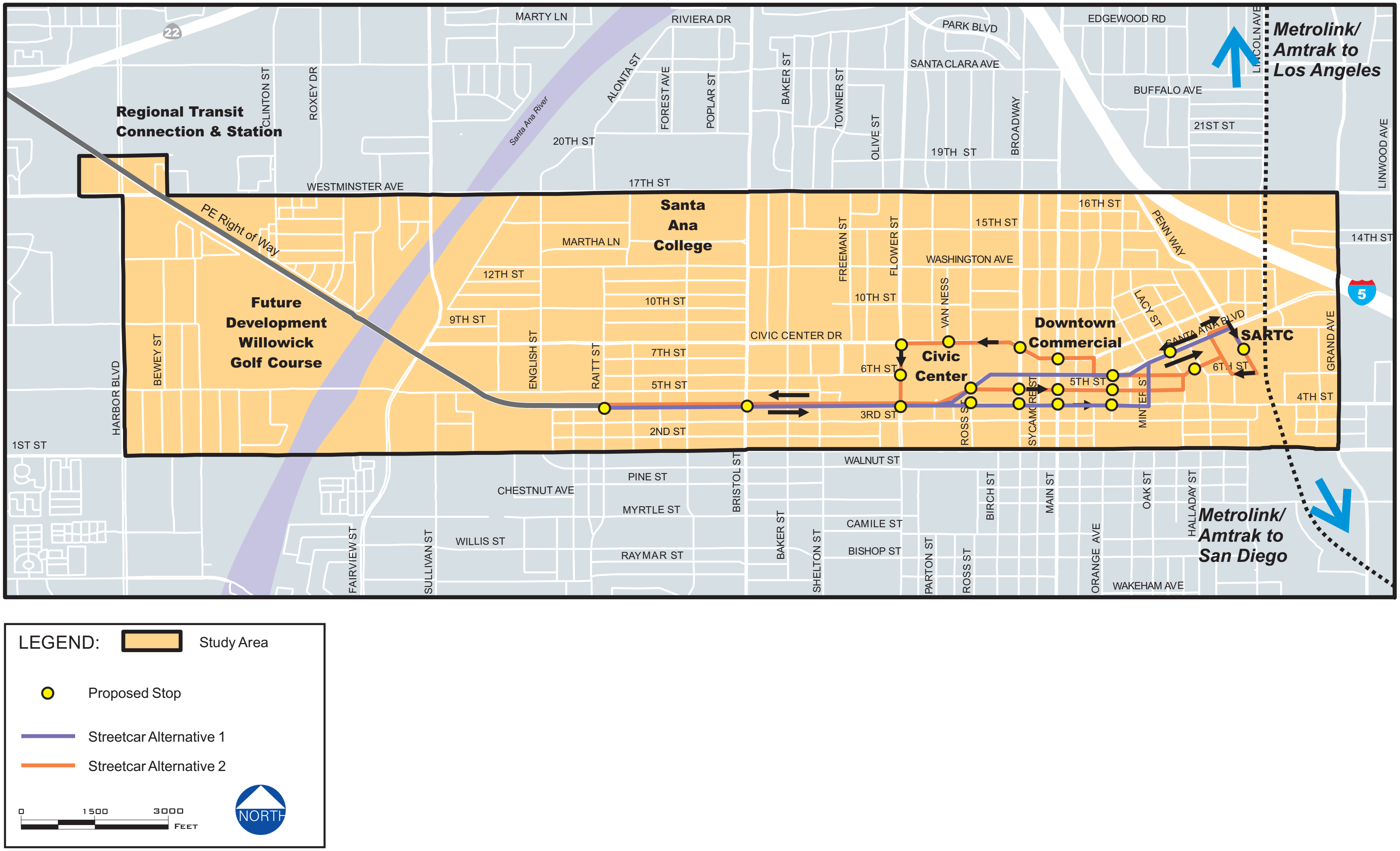
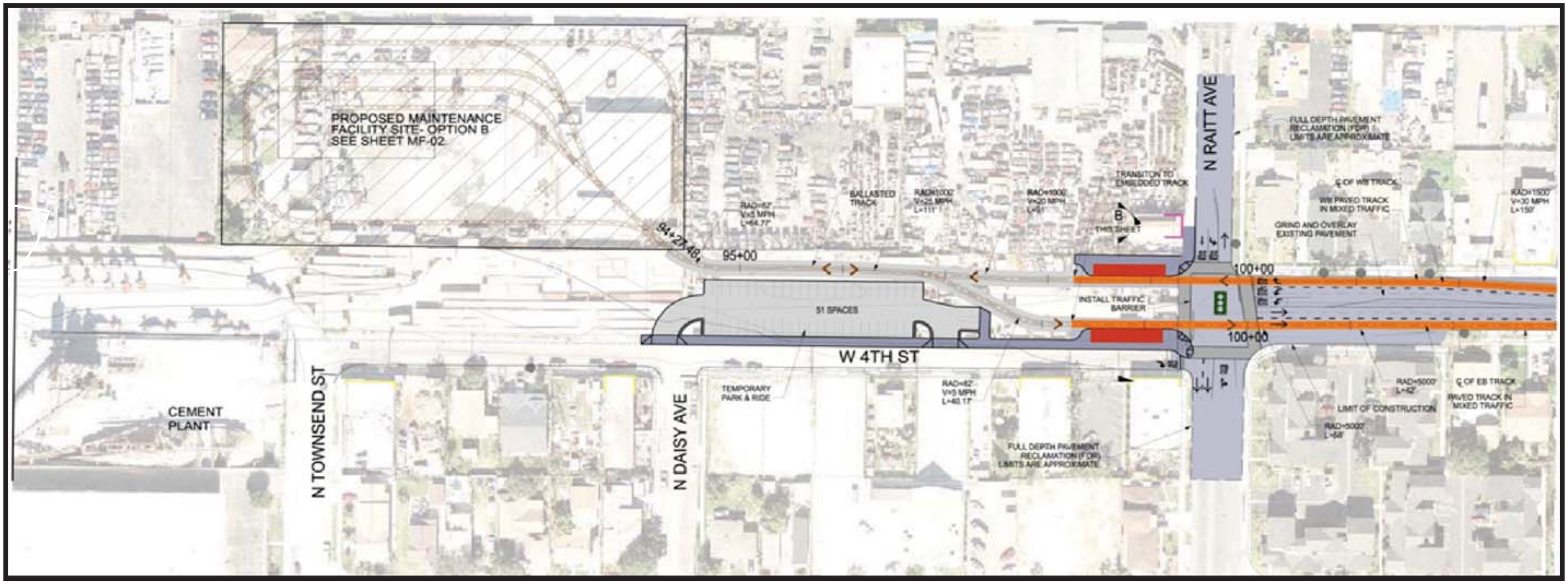
IOS-1 and IOS-2 Alignments



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.

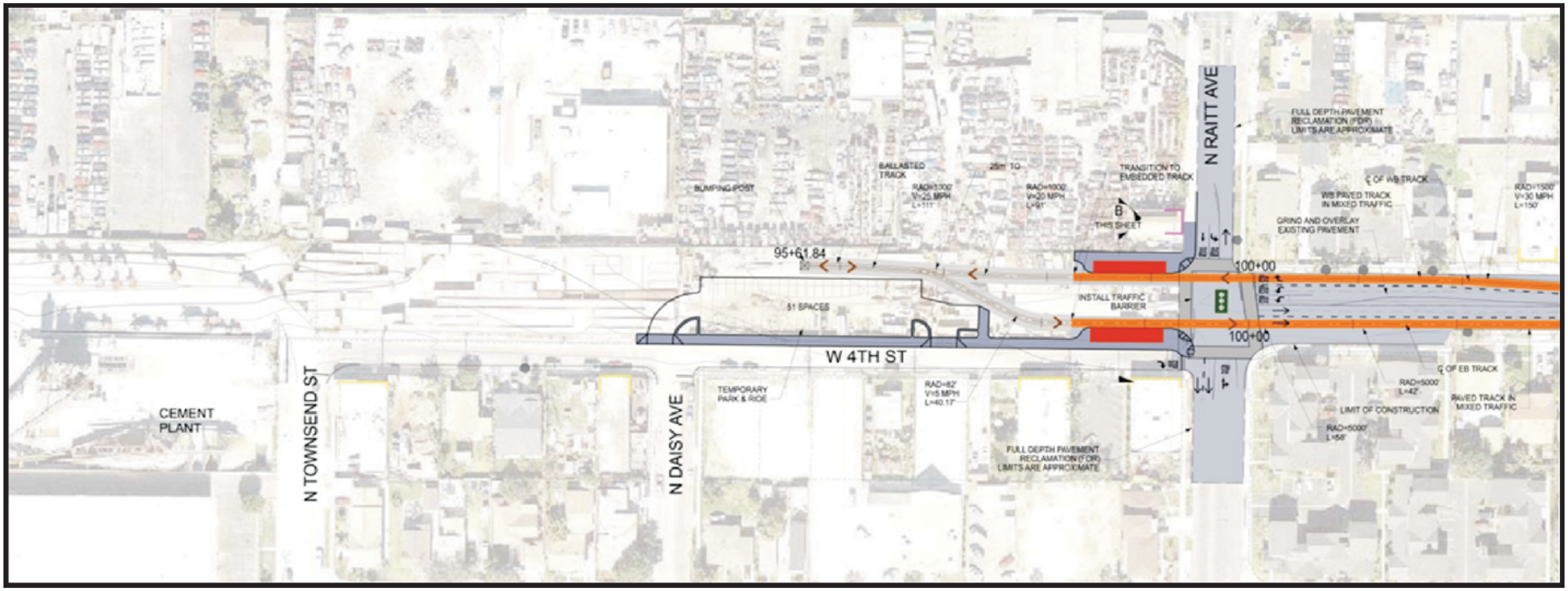
Figure A-9

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



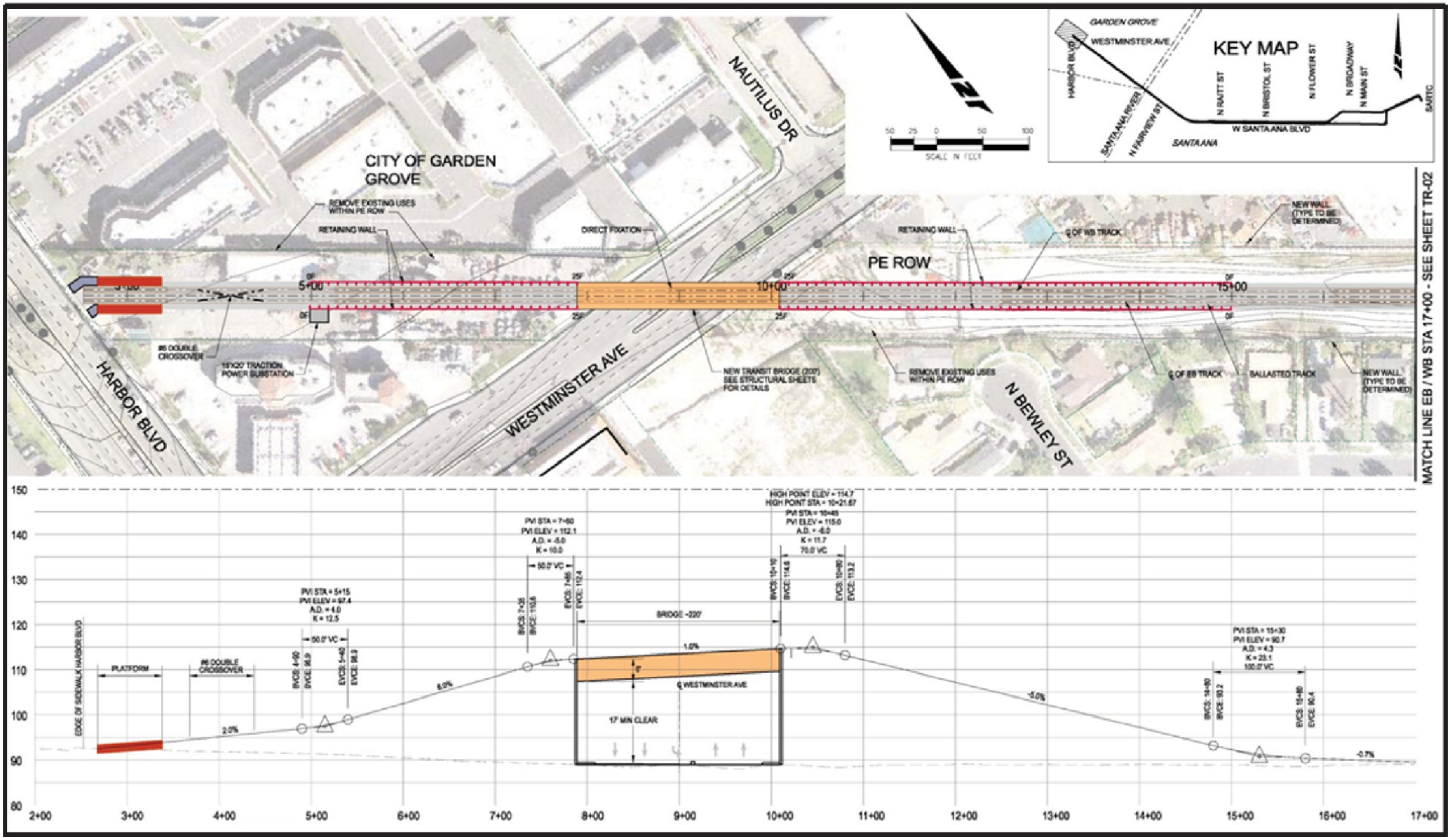
Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

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>
<tr><th colspan="5">TABLE A-3: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR IOS-1 AND IOS-2</th></tr>
<tr><th>Key Attributes</th><th colspan="2">IOS-1</th><th colspan="2">IOS-2</th></tr>
<tr><td>Termini</td><td colspan="4">Western Terminus: Raitt St.
Eastern Terminus: SARTC</td></tr>
<tr><td>Alignment Description</td><td colspan="2"><u>Routing by Segment:</u>
• 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.</td><td colspan="2"><u>Routing by Segment:</u>
• 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.</td></tr>
<tr><td>Length of Alignment</td><td colspan="2">2.2 miles (Raitt St. to SARTC)</td><td colspan="2">2.6 miles (Raitt St. to SARTC)</td></tr>
<tr><td rowspan="3">Stations</td><td colspan="2"><u>Station Locations:</u>
4. Raitt St. and Santa Ana Blvd.
5. Bristol St. and Santa Ana Blvd.
6. Flower St. and Santa Ana Blvd.</td><td colspan="2"><u>Station Locations:</u>
4. Raitt St. and Santa Ana Blvd.
5. Bristol St. and Santa Ana Blvd.</td></tr>
<tr><td>Couplet Section (Eastbound)
7E. Sasscer Park
8E. Broadway and 4th St.
9E. Main St. and 4th St.
10E. French St. and 4th St.</td><td>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.</td><td>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.</td><td>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.</td></tr>
<tr><td colspan="2">11. Lacy St. and Santa Ana Blvd.
12. SARTC</td><td colspan="2">12. Lacy St. and Santa Ana Blvd.
13. SARTC</td></tr>
<tr><td>Headways</td><td colspan="4">Peak: 10 minutes (6:00 a.m. to 6:00 p.m.)
Off-Peak: 15 minutes (after 6:00 p.m.)</td></tr>
<tr><td>Hours of Operation (in revenue service)</td><td colspan="4">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)</td></tr>
<tr><td>Power Source</td><td colspan="4">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</td></tr>
<tr><td>Operations and Maintenance Facility Sites</td><td colspan="4">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.</td></tr>
</table>

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

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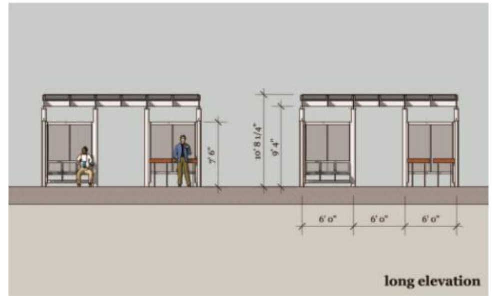
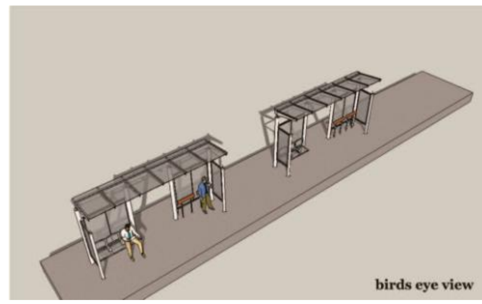
area will also include ticketing machines for the convenience of passengers who may want an alternative to the on-vehicle ticketing during busy peak periods.

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

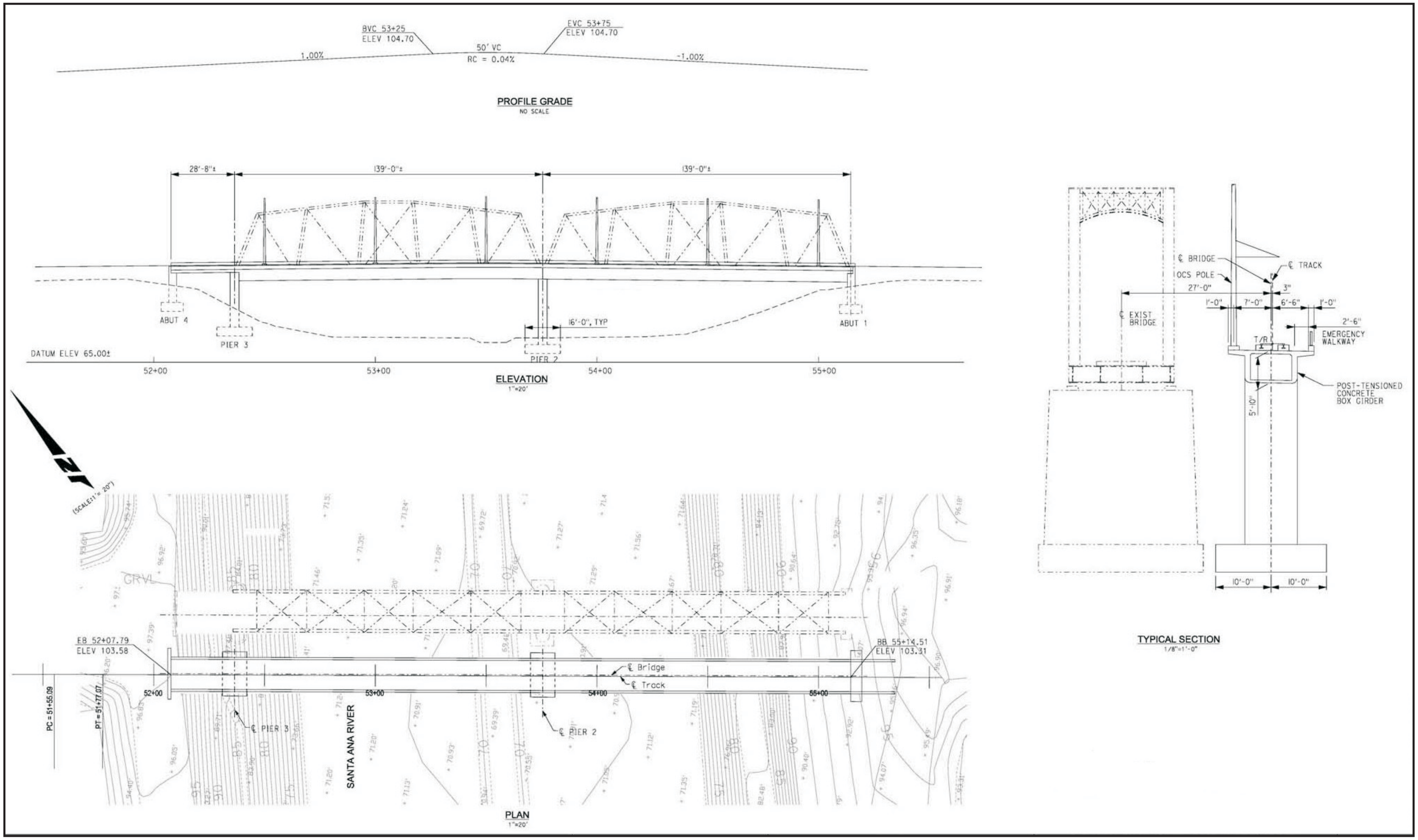
During detailed evaluation, design options were developed to avoid identified constraints or to take advantage of specific opportunities presented along the alignments. In most cases the design options are the same for Streetcar Alternatives 1 and 2. However, where the design option is unique to a specific 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.

Santa Ana River Crossing



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

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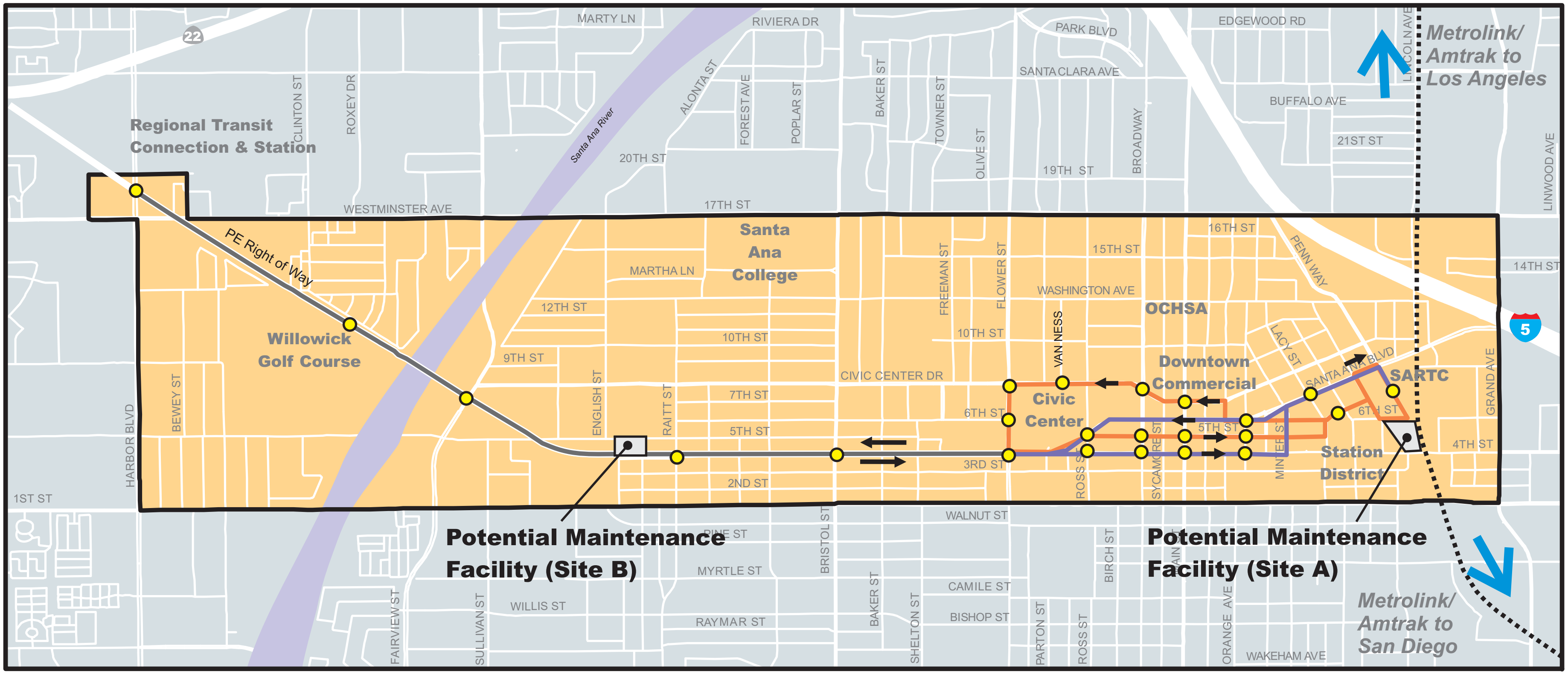
Candidate Sites of Operations and Maintenance Facilities



LEGEND:
- Study Area
- Streetcar Alternatives 1 and 2
- Streetcar Alternative 1
- Streetcar Alternative 2
- Proposed Stop
- Potential Maintenance Facility Site

0 1500 3000 Feet

NORTH

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

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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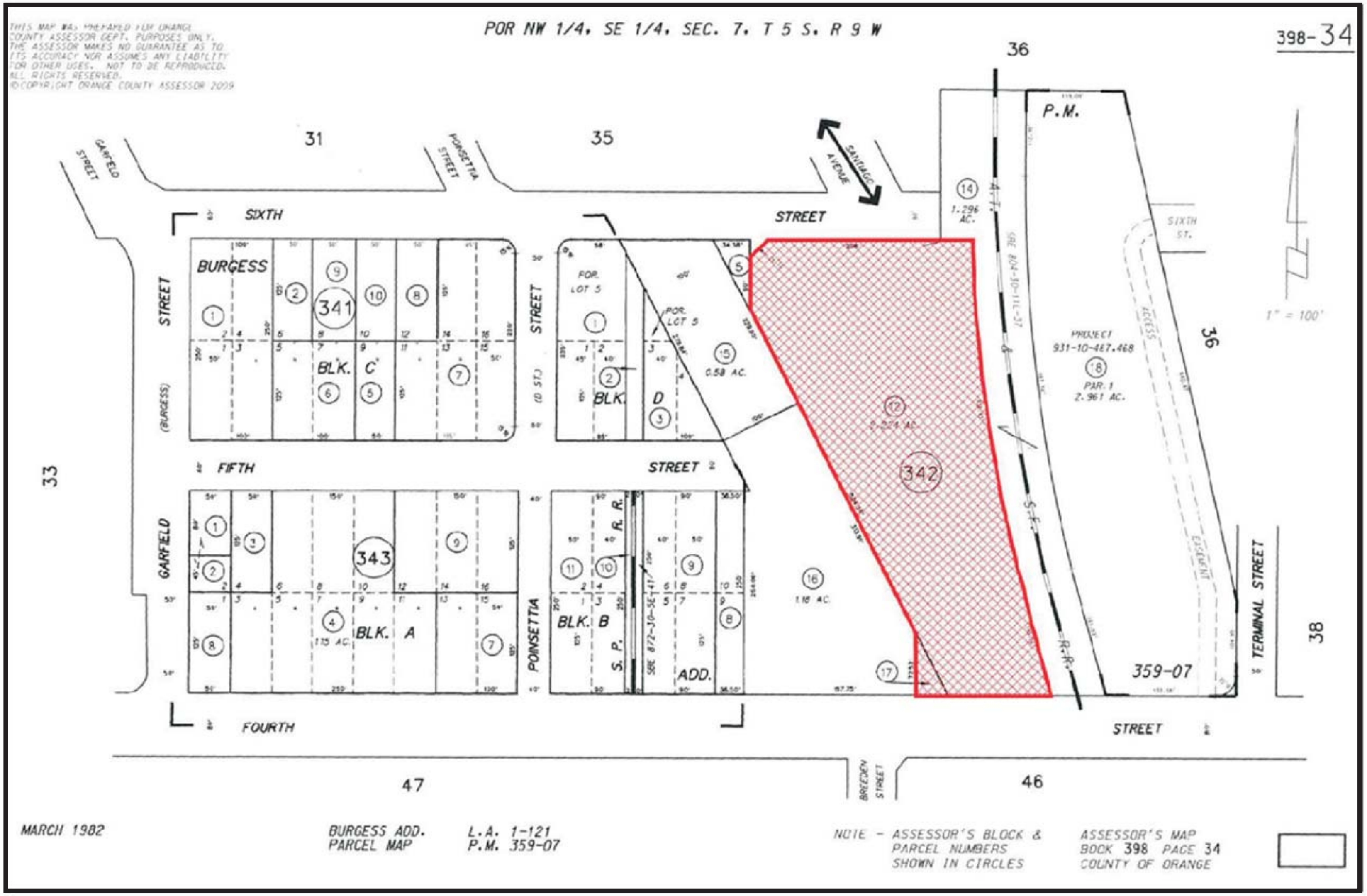
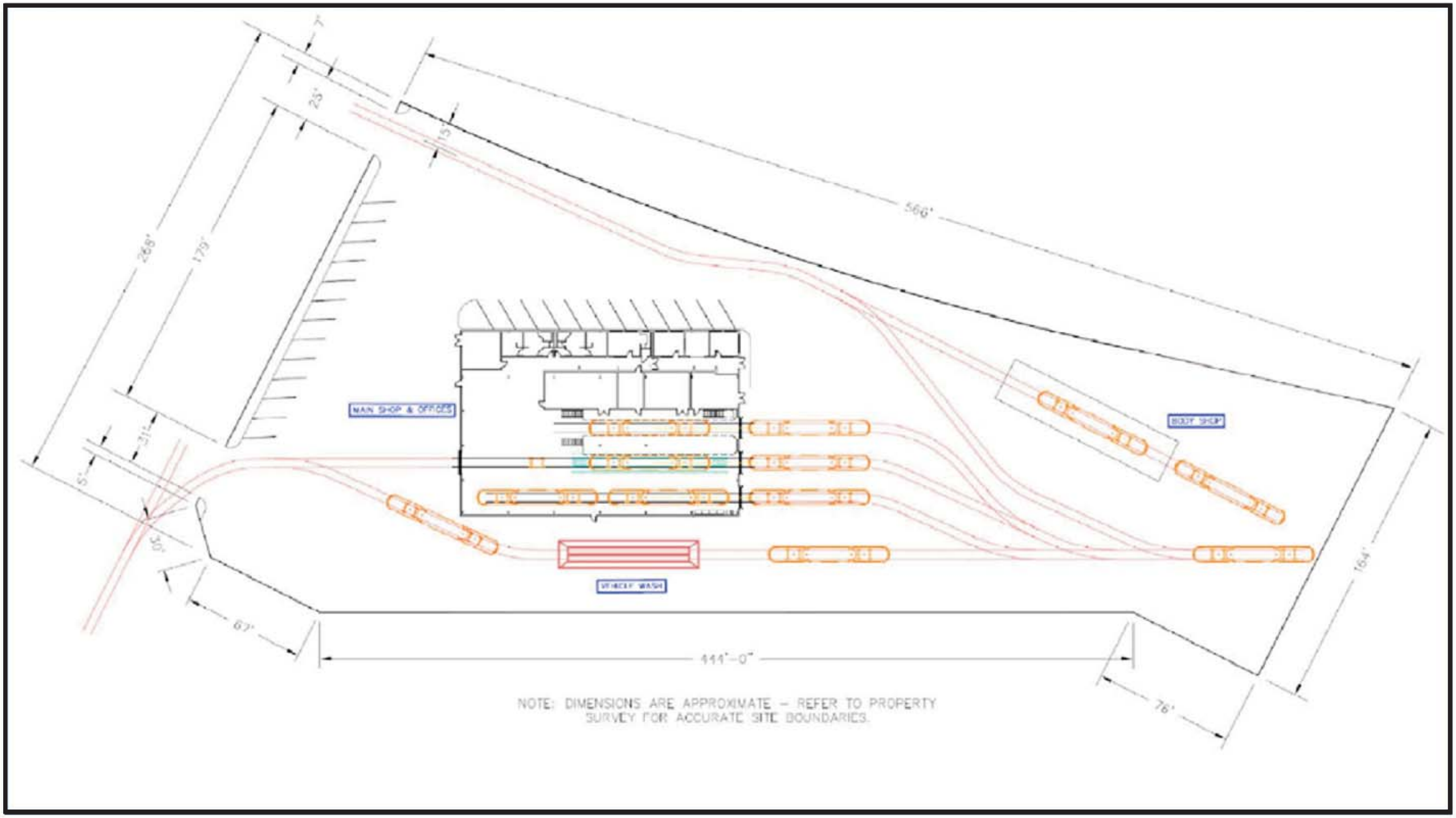
Operations and Maintenance Facility Site A - Location and Configuration



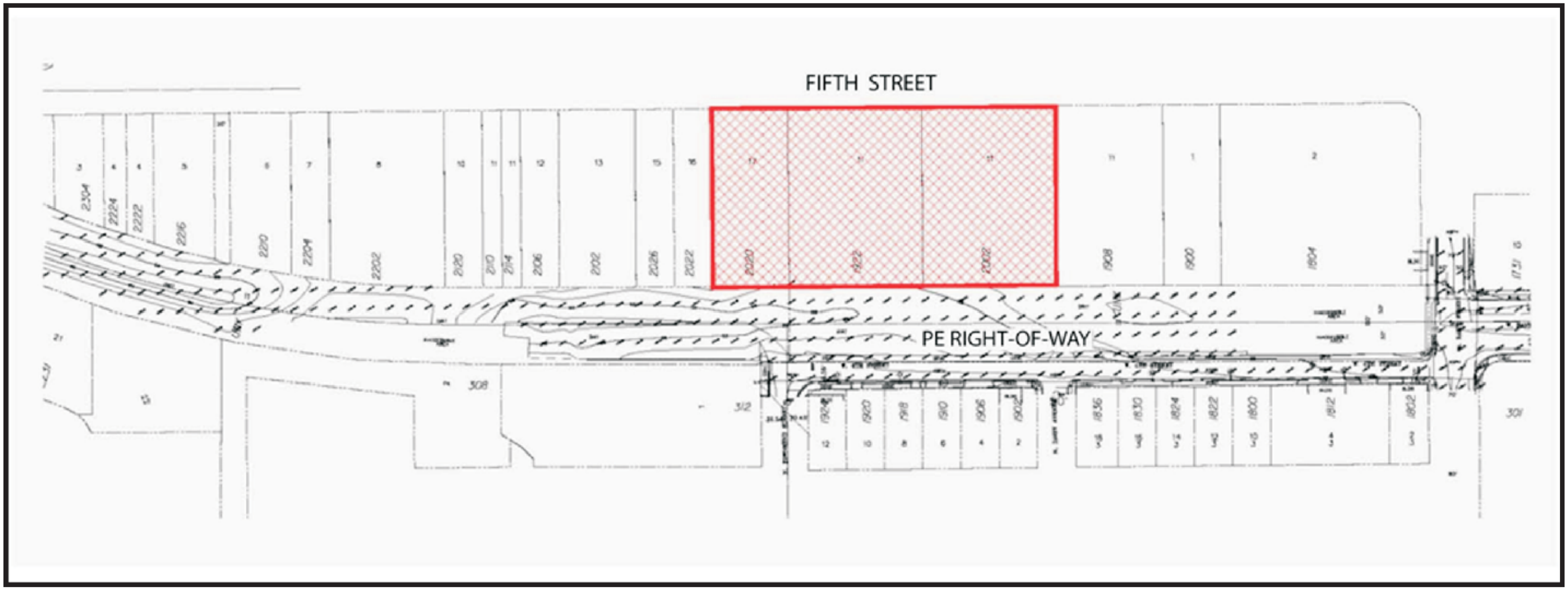
Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

Operations and Maintenance Facility Site A - Conceptual Layout



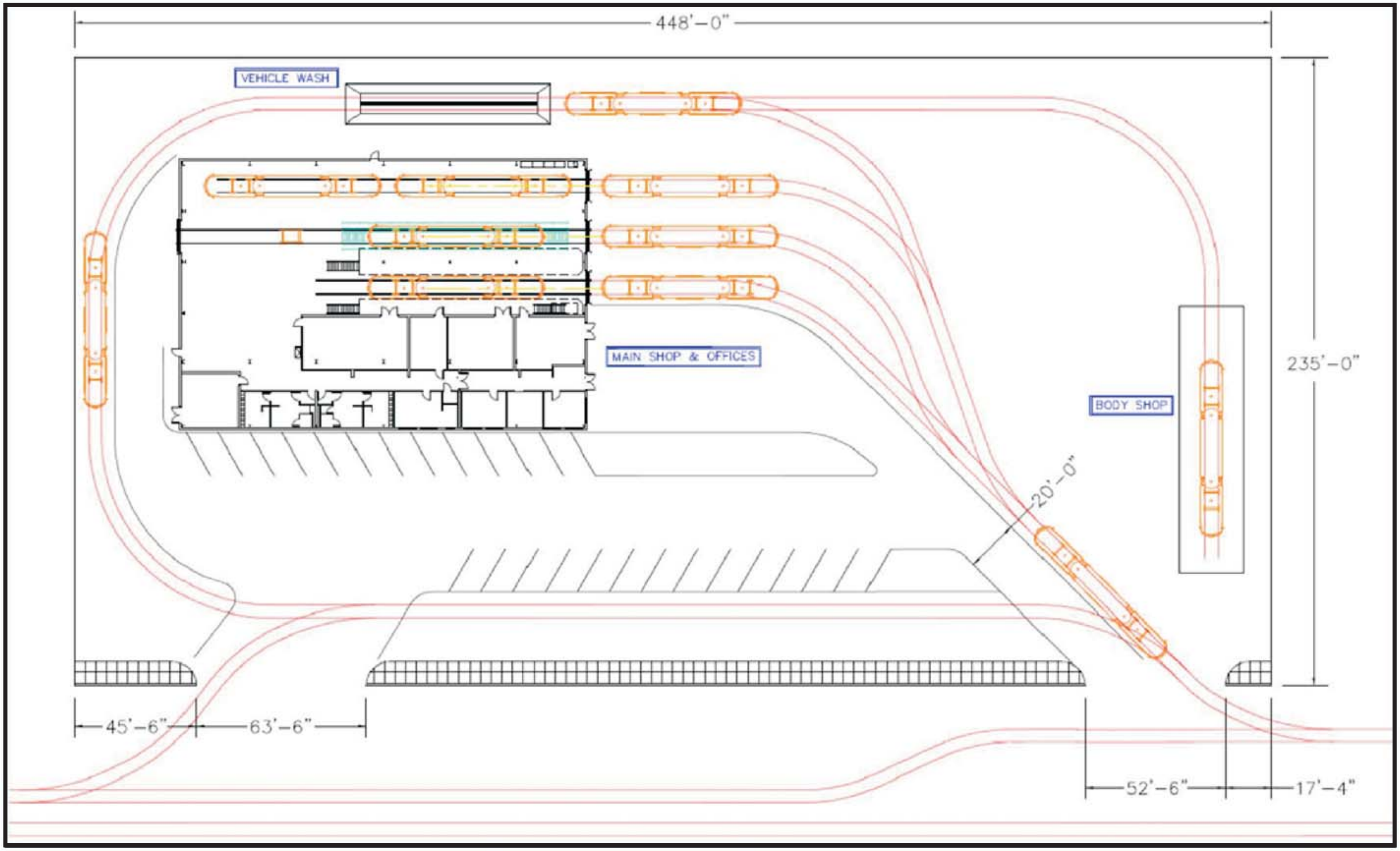
Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

Operations and Maintenance Facility Site B - Location and Configuration

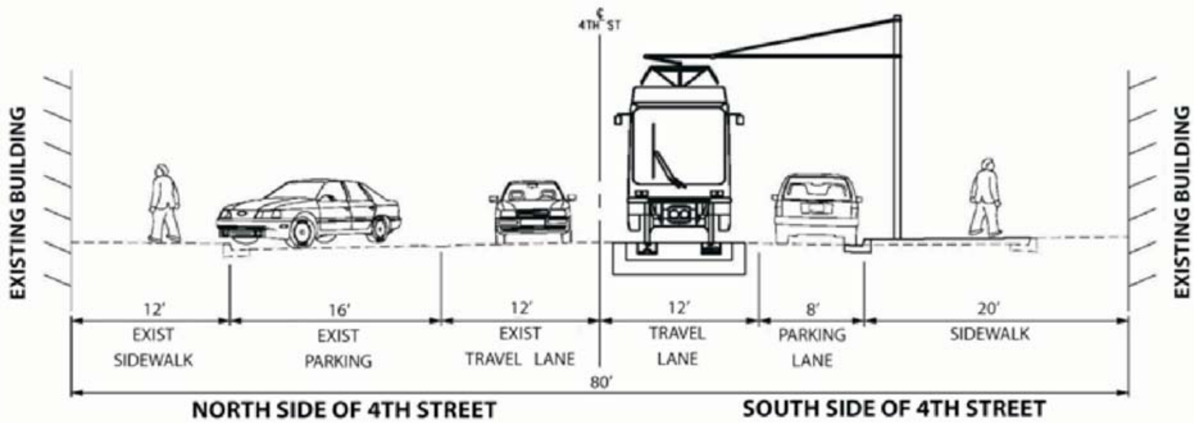


Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.

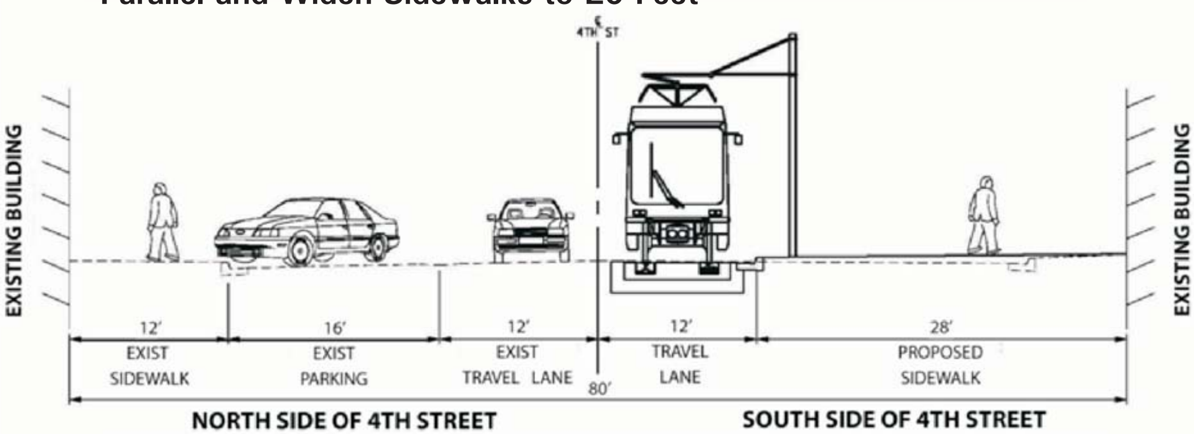
Operations and Maintenance Facility Site B - Concept Layout



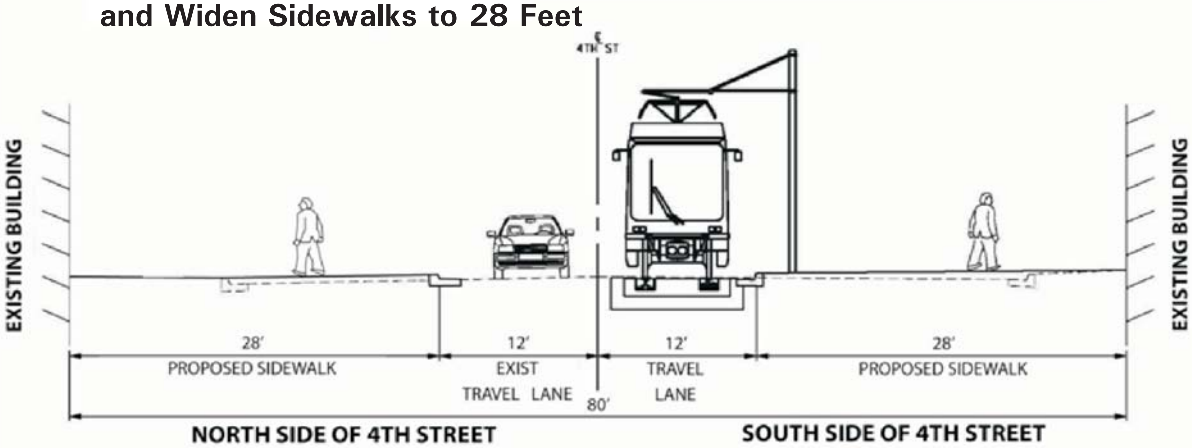
Source: Cordoba Corporation, *Draft Alternatives Analysis Report for the Santa Ana-Garden Grove Fixed Guideway Corridor Study,* July 11, 2012.



4th Street Parking Scenario A: Convert Parking along South Side to Parallel and Widen Sidewalks to 20 Feet



4th Street Parking Scenario B: Remove Parking along South Side to and Widen Sidewalks to 28 Feet



4th Street Parking Scenario C: Remove Parking along South Side and North Side and Widen Sidewalks to 28 Feet

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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APPENDIX B
Urbemis Modeling Output and GHG Calculations

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: P:\Projects\City of Santa Ana\Streetcar-SAFG\2011\450_Draft Reports\Air Quality\Modeling\Urbemis\Alt 1 IOS.urb924

Project Name: SAFG - Alt 1 IOS

Project Location: Orange County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 1/4/2012-1/31/2012 Active Days: 20	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06
Time Slice 2/1/2012-2/29/2012 Active Days: 21	16.70	134.55	64.74	0.01	0.04	6.53	6.57	0.02	6.00	6.02	15,465.59
Fine Grading 02/01/2012-03/13/2012	5.39	42.03	20.92	0.00	0.01	2.05	2.06	0.00	1.88	1.89	4,766.67
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	5.34	41.94	19.21	0.00	0.00	2.04	2.04	0.00	1.88	1.88	4,517.88
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.05	0.10	1.71	0.00	0.01	0.01	0.02	0.00	0.01	0.01	248.79
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06

Time Slice 3/1/2012-3/13/2012 Active Days: 9	20.01	163.68	78.34	0.01	0.05	7.84	7.89	0.02	7.21	7.23	18,737.27
Fine Grading 02/01/2012-03/13/2012	5.39	42.03	20.92	0.00	0.01	2.05	2.06	0.00	1.88	1.89	4,766.67
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	5.34	41.94	19.21	0.00	0.00	2.04	2.04	0.00	1.88	1.88	4,517.88
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.05	0.10	1.71	0.00	0.01	0.01	0.02	0.00	0.01	0.01	248.79
Fine Grading 03/01/2012-04/15/2012	3.32	29.13	13.59	0.00	0.01	1.31	1.32	0.00	1.20	1.21	3,271.67
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	3.28	29.06	12.31	0.00	0.00	1.30	1.30	0.00	1.20	1.20	3,085.08
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.28	0.00	0.01	0.01	0.01	0.00	0.00	0.01	186.59
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06
Time Slice 3/14/2012-3/30/2012 Active Days: 13	14.62	121.64	57.42	0.01	0.04	5.79	5.83	0.01	5.33	5.34	13,970.60
Fine Grading 03/01/2012-04/15/2012	3.32	29.13	13.59	0.00	0.01	1.31	1.32	0.00	1.20	1.21	3,271.67
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	3.28	29.06	12.31	0.00	0.00	1.30	1.30	0.00	1.20	1.20	3,085.08
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.28	0.00	0.01	0.01	0.01	0.00	0.00	0.01	186.59
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06

Time Slice 4/2/2012-4/13/2012 Active Days: 10	17.16	141.73	70.34	0.01	0.05	6.73	6.77	0.02	6.19	6.20	16,747.57
Fine Grading 03/01/2012-04/15/2012	3.32	29.13	13.59	0.00	0.01	1.31	1.32	0.00	1.20	1.21	3,271.67
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	3.28	29.06	12.31	0.00	0.00	1.30	1.30	0.00	1.20	1.20	3,085.08
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.28	0.00	0.01	0.01	0.01	0.00	0.00	0.01	186.59
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06
Trenching 04/02/2012-06/22/2012	2.54	20.08	12.93	0.00	0.01	0.94	0.94	0.00	0.86	0.86	2,776.97
Trenching Off Road Diesel	2.52	20.04	12.07	0.00	0.00	0.93	0.93	0.00	0.86	0.86	2,652.58
Trenching Worker Trips	0.03	0.05	0.85	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Time Slice 4/16/2012-4/30/2012 Active Days: 11	13.85	112.60	56.75	0.01	0.04	5.42	5.46	0.01	4.98	5.00	13,475.90
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06
Trenching 04/02/2012-06/22/2012	2.54	20.08	12.93	0.00	0.01	0.94	0.94	0.00	0.86	0.86	2,776.97
Trenching Off Road Diesel	2.52	20.04	12.07	0.00	0.00	0.93	0.93	0.00	0.86	0.86	2,652.58
Trenching Worker Trips	0.03	0.05	0.85	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39

Time Slice 5/1/2012-6/22/2012 Active Days: 39	16.06	121.14	64.71	0.01	0.04	6.10	6.14	0.02	5.61	5.62	14,475.00
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06
Trenching 04/02/2012-06/22/2012	2.54	20.08	12.93	0.00	0.01	0.94	0.94	0.00	0.86	0.86	2,776.97
Trenching Off Road Diesel	2.52	20.04	12.07	0.00	0.00	0.93	0.93	0.00	0.86	0.86	2,652.58
Trenching Worker Trips	0.03	0.05	0.85	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Trenching 05/01/2012-06/30/2012	2.21	8.55	7.96	0.00	0.01	0.68	0.68	0.00	0.62	0.63	999.10
Trenching Off Road Diesel	2.19	8.50	7.11	0.00	0.00	0.67	0.67	0.00	0.62	0.62	874.70
Trenching Worker Trips	0.03	0.05	0.85	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Time Slice 6/25/2012-6/29/2012 Active Days: 5	13.52	101.06	51.78	0.01	0.04	5.16	5.20	0.01	4.74	4.76	11,698.02
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06
Trenching 05/01/2012-06/30/2012	2.21	8.55	7.96	0.00	0.01	0.68	0.68	0.00	0.62	0.63	999.10
Trenching Off Road Diesel	2.19	8.50	7.11	0.00	0.00	0.67	0.67	0.00	0.62	0.62	874.70
Trenching Worker Trips	0.03	0.05	0.85	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Time Slice 7/2/2012-8/14/2012 Active Days: 32	16.64	132.39	65.99	0.01	0.05	6.70	6.76	0.02	6.16	6.18	15,324.10
Trenching 01/04/2012-08/14/2012	11.30	92.51	43.82	0.01	0.03	4.48	4.51	0.01	4.12	4.13	10,698.93
Trenching Off Road Diesel	11.17	92.26	39.34	0.00	0.00	4.46	4.46	0.00	4.11	4.11	10,045.86
Trenching Worker Trips	0.13	0.25	4.48	0.01	0.03	0.02	0.05	0.01	0.01	0.03	653.06
Trenching 07/02/2012-10/25/2013	5.33	39.88	22.17	0.01	0.02	2.22	2.24	0.01	2.04	2.05	4,625.17
Trenching Off Road Diesel	5.23	39.68	18.75	0.00	0.00	2.21	2.21	0.00	2.03	2.03	4,127.60
Trenching Worker Trips	0.10	0.19	3.42	0.01	0.02	0.01	0.04	0.01	0.01	0.02	497.57

Time Slice 8/15/2012-9/28/2012 Active Days: 33	5.33	39.88	22.17	0.01	0.02	2.22	2.24	0.01	2.04	2.05	4,625.17
Trenching 07/02/2012-10/25/2013	5.33	39.88	22.17	0.01	0.02	2.22	2.24	0.01	2.04	2.05	4,625.17
Trenching Off Road Diesel	5.23	39.68	18.75	0.00	0.00	2.21	2.21	0.00	2.03	2.03	4,127.60
Trenching Worker Trips	0.10	0.19	3.42	0.01	0.02	0.01	0.04	0.01	0.01	0.02	497.57
Time Slice 10/1/2012-10/1/2012 Active Days: 1	6.66	51.73	27.05	0.01	0.02	2.73	2.76	0.01	2.51	2.52	5,938.22
Building 10/01/2012-04/11/2014	1.33	11.86	4.88	0.00	0.00	0.51	0.51	0.00	0.47	0.47	1,313.05
Building Off Road Diesel	1.33	11.86	4.88	0.00	0.00	0.51	0.51	0.00	0.47	0.47	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 07/02/2012-10/25/2013	5.33	39.88	22.17	0.01	0.02	2.22	2.24	0.01	2.04	2.05	4,625.17
Trenching Off Road Diesel	5.23	39.68	18.75	0.00	0.00	2.21	2.21	0.00	2.03	2.03	4,127.60
Trenching Worker Trips	0.10	0.19	3.42	0.01	0.02	0.01	0.04	0.01	0.01	0.02	497.57
Time Slice 10/2/2012-12/31/2012 Active Days: 65	8.80	71.10	38.74	0.01	0.03	3.62	3.65	0.01	3.33	3.34	8,394.97
Building 10/01/2012-04/11/2014	1.33	11.86	4.88	0.00	0.00	0.51	0.51	0.00	0.47	0.47	1,313.05
Building Off Road Diesel	1.33	11.86	4.88	0.00	0.00	0.51	0.51	0.00	0.47	0.47	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 07/02/2012-10/25/2013	5.33	39.88	22.17	0.01	0.02	2.22	2.24	0.01	2.04	2.05	4,625.17
Trenching Off Road Diesel	5.23	39.68	18.75	0.00	0.00	2.21	2.21	0.00	2.03	2.03	4,127.60
Trenching Worker Trips	0.10	0.19	3.42	0.01	0.02	0.01	0.04	0.01	0.01	0.02	497.57
Trenching 10/02/2012-12/25/2013	2.14	19.36	11.68	0.00	0.01	0.88	0.89	0.00	0.81	0.82	2,456.75
Trenching Off Road Diesel	2.10	19.29	10.40	0.00	0.00	0.88	0.88	0.00	0.81	0.81	2,270.16
Trenching Worker Trips	0.04	0.07	1.28	0.00	0.01	0.01	0.01	0.00	0.00	0.01	186.59

Time Slice 1/1/2013-4/30/2013 Active Days: 86	8.19	66.10	37.92	0.01	0.03	3.27	3.30	0.01	3.01	3.02	8,394.90
Building 10/01/2012-04/11/2014	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Off Road Diesel	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 07/02/2012-10/25/2013	4.95	37.15	21.63	0.01	0.02	1.99	2.02	0.01	1.83	1.84	4,625.12
Trenching Off Road Diesel	4.86	36.97	18.45	0.00	0.00	1.98	1.98	0.00	1.82	1.82	4,127.60
Trenching Worker Trips	0.09	0.18	3.18	0.01	0.02	0.01	0.04	0.01	0.01	0.02	497.52
Trenching 10/02/2012-12/25/2013	2.00	17.97	11.50	0.00	0.01	0.82	0.83	0.00	0.75	0.76	2,456.73
Trenching Off Road Diesel	1.97	17.90	10.31	0.00	0.00	0.81	0.81	0.00	0.75	0.75	2,270.16
Trenching Worker Trips	0.03	0.07	1.19	0.00	0.01	0.01	0.01	0.00	0.00	0.01	186.57
Time Slice 5/1/2013-5/31/2013 Active Days: 23	9.29	74.70	44.63	0.01	0.04	3.76	3.80	0.01	3.46	3.47	9,559.69
Building 10/01/2012-04/11/2014	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Off Road Diesel	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 05/01/2013-04/01/2014	1.11	8.60	6.71	0.00	0.01	0.49	0.50	0.00	0.45	0.45	1,164.79
Trenching Off Road Diesel	1.08	8.56	5.92	0.00	0.00	0.49	0.49	0.00	0.45	0.45	1,040.41
Trenching Worker Trips	0.02	0.04	0.79	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.38
Trenching 07/02/2012-10/25/2013	4.95	37.15	21.63	0.01	0.02	1.99	2.02	0.01	1.83	1.84	4,625.12
Trenching Off Road Diesel	4.86	36.97	18.45	0.00	0.00	1.98	1.98	0.00	1.82	1.82	4,127.60
Trenching Worker Trips	0.09	0.18	3.18	0.01	0.02	0.01	0.04	0.01	0.01	0.02	497.52
Trenching 10/02/2012-12/25/2013	2.00	17.97	11.50	0.00	0.01	0.82	0.83	0.00	0.75	0.76	2,456.73
Trenching Off Road Diesel	1.97	17.90	10.31	0.00	0.00	0.81	0.81	0.00	0.75	0.75	2,270.16
Trenching Worker Trips	0.03	0.07	1.19	0.00	0.01	0.01	0.01	0.00	0.00	0.01	186.57

Time Slice 6/3/2013-10/25/2013 Active Days: 105	10.09	79.79	47.57	0.01	0.04	3.99	4.03	0.02	3.67	3.68	10,219.32
Building 10/01/2012-04/11/2014	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Off Road Diesel	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 05/01/2013-04/01/2014	1.11	8.60	6.71	0.00	0.01	0.49	0.50	0.00	0.45	0.45	1,164.79
Trenching Off Road Diesel	1.08	8.56	5.92	0.00	0.00	0.49	0.49	0.00	0.45	0.45	1,040.41
Trenching Worker Trips	0.02	0.04	0.79	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.38
Trenching 06/03/2013-05/02/2014	0.79	5.09	2.95	0.00	0.00	0.23	0.23	0.00	0.21	0.21	659.63
Trenching Off Road Diesel	0.77	5.06	2.35	0.00	0.00	0.23	0.23	0.00	0.21	0.21	566.34
Trenching Worker Trips	0.02	0.03	0.60	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.29
Trenching 07/02/2012-10/25/2013	4.95	37.15	21.63	0.01	0.02	1.99	2.02	0.01	1.83	1.84	4,625.12
Trenching Off Road Diesel	4.86	36.97	18.45	0.00	0.00	1.98	1.98	0.00	1.82	1.82	4,127.60
Trenching Worker Trips	0.09	0.18	3.18	0.01	0.02	0.01	0.04	0.01	0.01	0.02	497.52
Trenching 10/02/2012-12/25/2013	2.00	17.97	11.50	0.00	0.01	0.82	0.83	0.00	0.75	0.76	2,456.73
Trenching Off Road Diesel	1.97	17.90	10.31	0.00	0.00	0.81	0.81	0.00	0.75	0.75	2,270.16
Trenching Worker Trips	0.03	0.07	1.19	0.00	0.01	0.01	0.01	0.00	0.00	0.01	186.57

Time Slice 10/28/2013-12/25/2013 Active Days: 43	5.14	42.64	25.95	0.00	0.02	2.00	2.02	0.01	1.84	1.84	5,594.20
Building 10/01/2012-04/11/2014	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Off Road Diesel	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 05/01/2013-04/01/2014	1.11	8.60	6.71	0.00	0.01	0.49	0.50	0.00	0.45	0.45	1,164.79
Trenching Off Road Diesel	1.08	8.56	5.92	0.00	0.00	0.49	0.49	0.00	0.45	0.45	1,040.41
Trenching Worker Trips	0.02	0.04	0.79	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.38
Trenching 06/03/2013-05/02/2014	0.79	5.09	2.95	0.00	0.00	0.23	0.23	0.00	0.21	0.21	659.63
Trenching Off Road Diesel	0.77	5.06	2.35	0.00	0.00	0.23	0.23	0.00	0.21	0.21	566.34
Trenching Worker Trips	0.02	0.03	0.60	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.29
Trenching 10/02/2012-12/25/2013	2.00	17.97	11.50	0.00	0.01	0.82	0.83	0.00	0.75	0.76	2,456.73
Trenching Off Road Diesel	1.97	17.90	10.31	0.00	0.00	0.81	0.81	0.00	0.75	0.75	2,270.16
Trenching Worker Trips	0.03	0.07	1.19	0.00	0.01	0.01	0.01	0.00	0.00	0.01	186.57
Time Slice 12/26/2013-12/31/2013 Active Days: 4	3.13	24.67	14.44	0.00	0.01	1.18	1.19	0.00	1.08	1.09	3,137.47
Building 10/01/2012-04/11/2014	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Off Road Diesel	1.24	10.98	4.79	0.00	0.00	0.46	0.46	0.00	0.42	0.42	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 05/01/2013-04/01/2014	1.11	8.60	6.71	0.00	0.01	0.49	0.50	0.00	0.45	0.45	1,164.79
Trenching Off Road Diesel	1.08	8.56	5.92	0.00	0.00	0.49	0.49	0.00	0.45	0.45	1,040.41
Trenching Worker Trips	0.02	0.04	0.79	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.38
Trenching 06/03/2013-05/02/2014	0.79	5.09	2.95	0.00	0.00	0.23	0.23	0.00	0.21	0.21	659.63
Trenching Off Road Diesel	0.77	5.06	2.35	0.00	0.00	0.23	0.23	0.00	0.21	0.21	566.34
Trenching Worker Trips	0.02	0.03	0.60	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.29

Time Slice 1/1/2014-2/28/2014 Active Days: 43	3.33	25.14	16.72	0.00	0.02	1.18	1.20	0.01	1.09	1.09	3,573.28
Building 10/01/2012-04/11/2014	1.17	10.03	4.68	0.00	0.00	0.40	0.40	0.00	0.37	0.37	1,313.05
Building Off Road Diesel	1.17	10.03	4.68	0.00	0.00	0.40	0.40	0.00	0.37	0.37	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 01/01/2014-04/22/2014	0.40	2.38	2.58	0.00	0.01	0.15	0.16	0.00	0.14	0.14	435.83
Trenching Off Road Diesel	0.38	2.33	1.65	0.00	0.00	0.15	0.15	0.00	0.13	0.13	280.36
Trenching Worker Trips	0.03	0.05	0.92	0.00	0.01	0.00	0.01	0.00	0.00	0.01	155.46
Trenching 05/01/2013-04/01/2014	1.03	8.04	6.64	0.00	0.01	0.43	0.43	0.00	0.39	0.40	1,164.78
Trenching Off Road Diesel	1.01	8.00	5.90	0.00	0.00	0.42	0.42	0.00	0.39	0.39	1,040.41
Trenching Worker Trips	0.02	0.04	0.74	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.37
Trenching 06/03/2013-05/02/2014	0.73	4.68	2.83	0.00	0.00	0.20	0.21	0.00	0.19	0.19	659.62
Trenching Off Road Diesel	0.71	4.65	2.28	0.00	0.00	0.20	0.20	0.00	0.18	0.18	566.34
Trenching Worker Trips	0.02	0.03	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.28

Time Slice 3/3/2014-4/1/2014 Active Days: 22	4.05	29.38	19.88	0.00	0.02	1.57	1.59	0.01	1.44	1.45	4,023.06
Building 10/01/2012-04/11/2014	1.17	10.03	4.68	0.00	0.00	0.40	0.40	0.00	0.37	0.37	1,313.05
Building Off Road Diesel	1.17	10.03	4.68	0.00	0.00	0.40	0.40	0.00	0.37	0.37	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 01/01/2014-04/22/2014	0.40	2.38	2.58	0.00	0.01	0.15	0.16	0.00	0.14	0.14	435.83
Trenching Off Road Diesel	0.38	2.33	1.65	0.00	0.00	0.15	0.15	0.00	0.13	0.13	280.36
Trenching Worker Trips	0.03	0.05	0.92	0.00	0.01	0.00	0.01	0.00	0.00	0.01	155.46
Trenching 03/03/2014-04/25/2014	0.72	4.24	3.15	0.00	0.00	0.39	0.39	0.00	0.36	0.36	449.78
Trenching Off Road Diesel	0.71	4.23	2.97	0.00	0.00	0.39	0.39	0.00	0.36	0.36	418.69
Trenching Worker Trips	0.01	0.01	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.09
Trenching 05/01/2013-04/01/2014	1.03	8.04	6.64	0.00	0.01	0.43	0.43	0.00	0.39	0.40	1,164.78
Trenching Off Road Diesel	1.01	8.00	5.90	0.00	0.00	0.42	0.42	0.00	0.39	0.39	1,040.41
Trenching Worker Trips	0.02	0.04	0.74	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.37
Trenching 06/03/2013-05/02/2014	0.73	4.68	2.83	0.00	0.00	0.20	0.21	0.00	0.19	0.19	659.62
Trenching Off Road Diesel	0.71	4.65	2.28	0.00	0.00	0.20	0.20	0.00	0.18	0.18	566.34
Trenching Worker Trips	0.02	0.03	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.28

Time Slice 4/2/2014-4/11/2014 Active Days: 8	3.02	21.34	13.24	0.00	0.01	1.14	1.16	0.00	1.05	1.06	2,858.28
Building 10/01/2012-04/11/2014	1.17	10.03	4.68	0.00	0.00	0.40	0.40	0.00	0.37	0.37	1,313.05
Building Off Road Diesel	1.17	10.03	4.68	0.00	0.00	0.40	0.40	0.00	0.37	0.37	1,313.05
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 01/01/2014-04/22/2014	0.40	2.38	2.58	0.00	0.01	0.15	0.16	0.00	0.14	0.14	435.83
Trenching Off Road Diesel	0.38	2.33	1.65	0.00	0.00	0.15	0.15	0.00	0.13	0.13	280.36
Trenching Worker Trips	0.03	0.05	0.92	0.00	0.01	0.00	0.01	0.00	0.00	0.01	155.46
Trenching 03/03/2014-04/25/2014	0.72	4.24	3.15	0.00	0.00	0.39	0.39	0.00	0.36	0.36	449.78
Trenching Off Road Diesel	0.71	4.23	2.97	0.00	0.00	0.39	0.39	0.00	0.36	0.36	418.69
Trenching Worker Trips	0.01	0.01	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.09
Trenching 06/03/2013-05/02/2014	0.73	4.68	2.83	0.00	0.00	0.20	0.21	0.00	0.19	0.19	659.62
Trenching Off Road Diesel	0.71	4.65	2.28	0.00	0.00	0.20	0.20	0.00	0.18	0.18	566.34
Trenching Worker Trips	0.02	0.03	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.28
Time Slice 4/14/2014-4/22/2014 Active Days: 7	1.85	11.31	8.56	0.00	0.01	0.74	0.75	0.00	0.68	0.68	1,545.23
Trenching 01/01/2014-04/22/2014	0.40	2.38	2.58	0.00	0.01	0.15	0.16	0.00	0.14	0.14	435.83
Trenching Off Road Diesel	0.38	2.33	1.65	0.00	0.00	0.15	0.15	0.00	0.13	0.13	280.36
Trenching Worker Trips	0.03	0.05	0.92	0.00	0.01	0.00	0.01	0.00	0.00	0.01	155.46
Trenching 03/03/2014-04/25/2014	0.72	4.24	3.15	0.00	0.00	0.39	0.39	0.00	0.36	0.36	449.78
Trenching Off Road Diesel	0.71	4.23	2.97	0.00	0.00	0.39	0.39	0.00	0.36	0.36	418.69
Trenching Worker Trips	0.01	0.01	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.09
Trenching 06/03/2013-05/02/2014	0.73	4.68	2.83	0.00	0.00	0.20	0.21	0.00	0.19	0.19	659.62
Trenching Off Road Diesel	0.71	4.65	2.28	0.00	0.00	0.20	0.20	0.00	0.18	0.18	566.34
Trenching Worker Trips	0.02	0.03	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.28

Time Slice 4/23/2014-4/25/2014 Active Days: 3	1.44	8.92	5.98	0.00	0.01	0.59	0.60	0.00	0.54	0.55	1,109.40
Trenching 03/03/2014-04/25/2014	0.72	4.24	3.15	0.00	0.00	0.39	0.39	0.00	0.36	0.36	449.78
Trenching Off Road Diesel	0.71	4.23	2.97	0.00	0.00	0.39	0.39	0.00	0.36	0.36	418.69
Trenching Worker Trips	0.01	0.01	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.09
Trenching 06/03/2013-05/02/2014	0.73	4.68	2.83	0.00	0.00	0.20	0.21	0.00	0.19	0.19	659.62
Trenching Off Road Diesel	0.71	4.65	2.28	0.00	0.00	0.20	0.20	0.00	0.18	0.18	566.34
Trenching Worker Trips	0.02	0.03	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.28
Time Slice 4/28/2014-5/2/2014 Active Days: 5	0.73	4.68	2.83	0.00	0.00	0.20	0.21	0.00	0.19	0.19	659.62
Trenching 06/03/2013-05/02/2014	0.73	4.68	2.83	0.00	0.00	0.20	0.21	0.00	0.19	0.19	659.62
Trenching Off Road Diesel	0.71	4.65	2.28	0.00	0.00	0.20	0.20	0.00	0.18	0.18	566.34
Trenching Worker Trips	0.02	0.03	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	93.28

Phase Assumptions

Phase: Fine Grading 2/1/2012 - 3/13/2012 - Clearing and Grubbing

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Concrete/Industrial Saws (50 hp) operating at a 0.73 load factor for 8 hours per day

2 Excavators (175 hp) operating at a 0.57 load factor for 7 hours per day

3 Other Material Handling Equipment (250 hp) operating at a 0.59 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (120 hp) operating at a 0.55 load factor for 7 hours per day

Phase: Fine Grading 3/1/2012 - 4/15/2012 - Grading

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:
1 Excavators (175 hp) operating at a 0.57 load factor for 8 hours per day
1 Graders (175 hp) operating at a 0.61 load factor for 4 hours per day
2 Other Material Handling Equipment (250 hp) operating at a 0.59 load factor for 8 hours per day
1 Rollers (120 hp) operating at a 0.56 load factor for 4 hours per day
1 Rubber Tired Loaders (175 hp) operating at a 0.54 load factor for 4 hours per day

Phase: Trenching 1/4/2012 - 8/14/2012 - Advance Utility Work
Off-Road Equipment:
1 Air Compressors (50 hp) operating at a 0.48 load factor for 4.9 hours per day
1 Concrete/Industrial Saws (50 hp) operating at a 0.73 load factor for 2.5 hours per day
1 Cranes (250 hp) operating at a 0.43 load factor for 1.2 hours per day
2 Excavators (250 hp) operating at a 0.57 load factor for 10 hours per day
1 Generator Sets (50 hp) operating at a 0.74 load factor for 1.2 hours per day
4 Other Material Handling Equipment (250 hp) operating at a 0.59 load factor for 10 hours per day
1 Pavers (175 hp) operating at a 0.62 load factor for 1.2 hours per day
1 Plate Compactors (15 hp) operating at a 0.43 load factor for 1.2 hours per day
1 Pumps (50 hp) operating at a 0.74 load factor for 1.2 hours per day
1 Rollers (120 hp) operating at a 0.56 load factor for 1.2 hours per day
2 Rubber Tired Loaders (175 hp) operating at a 0.54 load factor for 10 hours per day
1 Sweepers/Scrubbers (120 hp) operating at a 0.68 load factor for 1.2 hours per day
4 Tractors/Loaders/Backhoes (120 hp) operating at a 0.55 load factor for 10 hours per day

Phase: Trenching 4/2/2012 - 6/22/2012 - Foundations
Off-Road Equipment:
1 Bore/Drill Rigs (175 hp) operating at a 0.75 load factor for 10 hours per day
1 Concrete/Industrial Saws (50 hp) operating at a 0.73 load factor for 5.8 hours per day
1 Forklifts (120 hp) operating at a 0.3 load factor for 10 hours per day
1 Other Material Handling Equipment (250 hp) operating at a 0.59 load factor for 10 hours per day

Phase: Trenching 5/1/2012 - 6/30/2012 - Rail delivery and welding
Off-Road Equipment:
1 Air Compressors (50 hp) operating at a 0.48 load factor for 10 hours per day
1 Forklifts (120 hp) operating at a 0.3 load factor for 5 hours per day
1 Generator Sets (50 hp) operating at a 0.74 load factor for 10 hours per day

1 Rubber Tired Loaders (175 hp) operating at a 0.54 load factor for 5 hours per day

Phase: Trenching 7/2/2012 - 10/25/2013 - Civil and track constructions
Off-Road Equipment:
1 Air Compressors (25 hp) operating at a 0.48 load factor for 1 hours per day
1 Concrete/Industrial Saws (25 hp) operating at a 0.73 load factor for 1.9 hours per day
1 Forklifts (120 hp) operating at a 0.3 load factor for 5.8 hours per day
1 Generator Sets (25 hp) operating at a 0.74 load factor for 5.8 hours per day
2 Other Material Handling Equipment (250 hp) operating at a 0.59 load factor for 10 hours per day
1 Pavers (120 hp) operating at a 0.62 load factor for 1.9 hours per day
1 Paving Equipment (120 hp) operating at a 0.53 load factor for 1.9 hours per day
1 Plate Compactors (15 hp) operating at a 0.43 load factor for 4.8 hours per day
1 Pressure Washers (25 hp) operating at a 0.6 load factor for 1.9 hours per day
1 Rollers (50 hp) operating at a 0.56 load factor for 4.4 hours per day
1 Rubber Tired Loaders (175 hp) operating at a 0.54 load factor for 4.8 hours per day
1 Sweepers/Scrubbers (50 hp) operating at a 0.68 load factor for 1.9 hours per day
3 Tractors/Loaders/Backhoes (120 hp) operating at a 0.55 load factor for 7.8 hours per day

Phase: Trenching 10/2/2012 - 12/25/2013 - System and Substations
Off-Road Equipment:
1 Cranes (250 hp) operating at a 0.43 load factor for 0.2 hours per day
1 Excavators (175 hp) operating at a 0.57 load factor for 0.2 hours per day
2 Other Equipment (175 hp) operating at a 0.62 load factor for 9.3 hours per day
1 Other Material Handling Equipment (250 hp) operating at a 0.59 load factor for 6.2 hours per day
1 Plate Compactors (15 hp) operating at a 0.43 load factor for 0.2 hours per day

Phase: Trenching 5/1/2013 - 4/1/2014 - Signals and Electrical
Off-Road Equipment:
1 Forklifts (120 hp) operating at a 0.3 load factor for 3.9 hours per day
1 Generator Sets (25 hp) operating at a 0.74 load factor for 1.9 hours per day
1 Other Equipment (175 hp) operating at a 0.62 load factor for 7.8 hours per day
1 Other Material Handling Equipment (175 hp) operating at a 0.59 load factor for 3.9 hours per day

Phase: Trenching 6/3/2013 - 5/2/2014 - Striping
Off-Road Equipment:

1 Air Compressors (25 hp) operating at a 0.48 load factor for 3.9 hours per day
1 Other Material Handling Equipment (250 hp) operating at a 0.59 load factor for 3.9 hours per day
1 Sweepers/Scrubbers (50 hp) operating at a 0.68 load factor for 3.9 hours per day

Phase: Trenching 1/1/2014 - 4/22/2014 - Finishing
Off-Road Equipment:
1 Air Compressors (25 hp) operating at a 0.48 load factor for 4.1 hours per day
1 Cement and Mortar Mixers (15 hp) operating at a 0.56 load factor for 8.1 hours per day
1 Forklifts (120 hp) operating at a 0.3 load factor for 8.1 hours per day
1 Generator Sets (25 hp) operating at a 0.74 load factor for 4.1 hours per day
1 Pressure Washers (25 hp) operating at a 0.6 load factor for 4.1 hours per day

Phase: Trenching 3/3/2014 - 4/25/2014 - Signage
Off-Road Equipment:
1 Other Material Handling Equipment (120 hp) operating at a 0.59 load factor for 8 hours per day

Phase: Building Construction 10/1/2012 - 4/11/2014 - MF Construction
Off-Road Equipment:
1 Air Compressors (25 hp) operating at a 0.48 load factor for 2.3 hours per day
1 Cranes (500 hp) operating at a 0.43 load factor for 2.3 hours per day
1 Excavators (175 hp) operating at a 0.57 load factor for 2.3 hours per day
1 Forklifts (175 hp) operating at a 0.3 load factor for 5.8 hours per day
1 Other Material Handling Equipment (250 hp) operating at a 0.59 load factor for 5.8 hours per day
1 Plate Compactors (15 hp) operating at a 0.43 load factor for 2.3 hours per day
1 Pressure Washers (25 hp) operating at a 0.6 load factor for 1.2 hours per day
1 Tractors/Loaders/Backhoes (120 hp) operating at a 0.55 load factor for 2.3 hours per day

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APPENDIX C
Southern California Association of Governments, Listing of 2011 Federal Transportation Implementation Project

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ProjectID	County	Air Basin	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amend
ORA990910	Orange	SCAB	ORA110619	BUO00				T	EXEMPT - 93.126	0
						PTC	5,880	Agency	ORANGE COUNTY TRANS AUTHORITY (OCTA)	

Grouped Projects for Operating assistance to transit agencies - Scope: Projects are consistent with 40 CFR Part 93.126 Exempt Tables 2 and Table 3 categories - Operating assistance to transit agencies

Fund	ENG	R/W	CON	Total	Prior	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	Total
FTA 5316 JOB ACCESS PROGRAM			1,222	1,222	1,222							1,222
FTA 5317 NEW FREEDOM PROGRAM			1,689	1,689	1,689							1,689
AGENCY			2,910	2,910	2,910							2,910
ORA990910 Total			5,821	5,821	5,821							5,821

ProjectID	County	Air Basin	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amend
ORA990920	Orange	SCAB	2TR0703	BUO00				T	EXEMPT - 93.126	3
						PTC	16,253	Agency	ORANGE COUNTY TRANS AUTHORITY (OCTA)	

CAPITAL COST OF CONTRACTING (COSTS ASSOCIATED WITH CONTRACTING FOR SERVICES SUCH AS PARATRANSIT)(Mission Viejo)

Fund	ENG	R/W	CON	Total	Prior	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	Total
LOS ANGELES/LONG BEACH/SANTA ANA URBANIZED AREA			8,697	8,697					4,241	4,456		8,697
ARRA - FTA 5307			5,382	5,382	5,382							5,382
TDA			2,174	2,174					1,060	1,114		2,174
ORA990920 Total			16,253	16,253	5,382				5,301	5,570		16,253

ProjectID	County	Air Basin	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amend
ORA080909	Orange	SCAB	2TR0708	PLN40				T	EXEMPT - 93.126	3
						PTC	5,541	Agency	SANTA ANA	

A PROJECT STUDY FOR THE CITY OF SANTA ANA - FIXED GUIDEWAY SYSTEM LINKING THE SANTA ANA REGIONAL TRANSPORTATION INTERMODAL CENTER TO HARBOR BLVD IN THE CITY OF GARDEN GROVE. PE AND ENV

Fund	ENG	R/W	CON	Total	Prior	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	Total
LOS ANGELES/LONG BEACH/SANTA ANA URBANIZED AREA	4,433			4,433		4,433						4,433
CITY FUNDS	554			554		554						554
ORANGE CO. MEASURE M2 - TRANSIT	554			554		554						554
ORA080909 Total	5,541			5,541		5,541						5,541

ProjectID	County	Air Basin	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amend
ORA020504	Orange	SCAB	2TR0704	NCR86				T	EXEMPT - 93.126	0
						PTC	6,600	Agency	SOUTHERN CALIF REGIONAL RAIL AUTHORITY	

OCTA SHARE OF COST FOR SCRRA ROLLING STOCK STORAGE FACILITY IN THE PACIFIC SURFLINER CORRIDOR NEAR LA UNION STATION AND CONTROL POINT SAN DIEGO JUNCTION AT KELLER STREET YARD. CENTRAL MAINTENANCE FACILITY (CMF): INSTALLATON OF A GUARD GATE AND MOD O

Fund	ENG	R/W	CON	Total	Prior	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	Total
CMAQ	309		4,118	4,427	4,427							4,427
LOCAL TRANS FUNDS	41		533	574	574							574
ORA020504 Total	350		4,651	5,001	5,001							5,001

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