

Santa Ana-Garden Grove Fixed Guideway Corridor

Appendix B

Biological Technical Report



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Biological Technical Report

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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Executive Summary

This report documents the findings of an evaluation of biological resources¹ conducted by URS Corporation (URS) for the proposed Santa Ana and Garden Grove Fixed Guideway Project (hereafter referred to as the Project). For the purposes of this report, the “Study Area” includes the Project’s proposed ground disturbance footprint (Project footprint) and a 500-foot buffer, to the maximum extent practical². The ground disturbance footprint includes areas where temporary and permanent Project components will be located and is generally limited to roadways, developed and undeveloped lots, parking areas, and residential and commercial developments. The Study Area is located within a densely-developed urban setting and contains no natural biological communities, special status species³, or their habitats⁴.

¹ For the purposes of this analysis, “biological resources” refers to the plants, wildlife, and habitats that occur, or have the potential to occur, within the Project’s Study Area.

² Where 100% pedestrian coverage of the Study Area was not possible due to limited access (e.g., fenced areas where access to private property or other physical barriers [vegetative cover, health and safety concerns, etc.]), field observations were made from the nearest appropriate vantage points via public rights-of-way with binoculars and/or via aerial photographic interpretation.

³ For the purposes of this analysis, “special status species” refers to any species that has been afforded special protection by federal, state, or local resource agencies (e.g., U.S. Fish and Wildlife Service, California Department of Fish and Game) or resource conservation organizations (e.g., California Native Plant Society). The term “special-status species” excludes those avian species solely identified under Section 10 of the Migratory Bird Treaty Act (MBTA) for federal protection. Nonetheless, MBTA Section 10 protected species are afforded avoidance and minimization measures per State and federal requirements.

⁴ A “habitat” is defined as the place, or type of locale where a plant or animal naturally or normally lives and grows.

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Chapter 1 Introduction

The Project is located within the Anaheim, Orange, Newport Beach, and Tustin United States Geological Survey (USGS) 7.5-Minute Topographic Quadrangle Maps (USGS 1977). The Project occurs within the cities of Santa Ana and Garden Grove, California at an approximate elevation ranging from 89-138 feet above mean sea level (msl) and spans an approximate 4.3 mile linear length in a west-east direction (Figures 1-1 and 1-2). Land use in the surrounding vicinity includes densely-developed urban areas containing residential, commercial, and public infrastructure. The intended use of this document is to disclose and evaluate habitat conditions and determine the potential for occurrence of common and special status species and their habitats within Study Area limits.

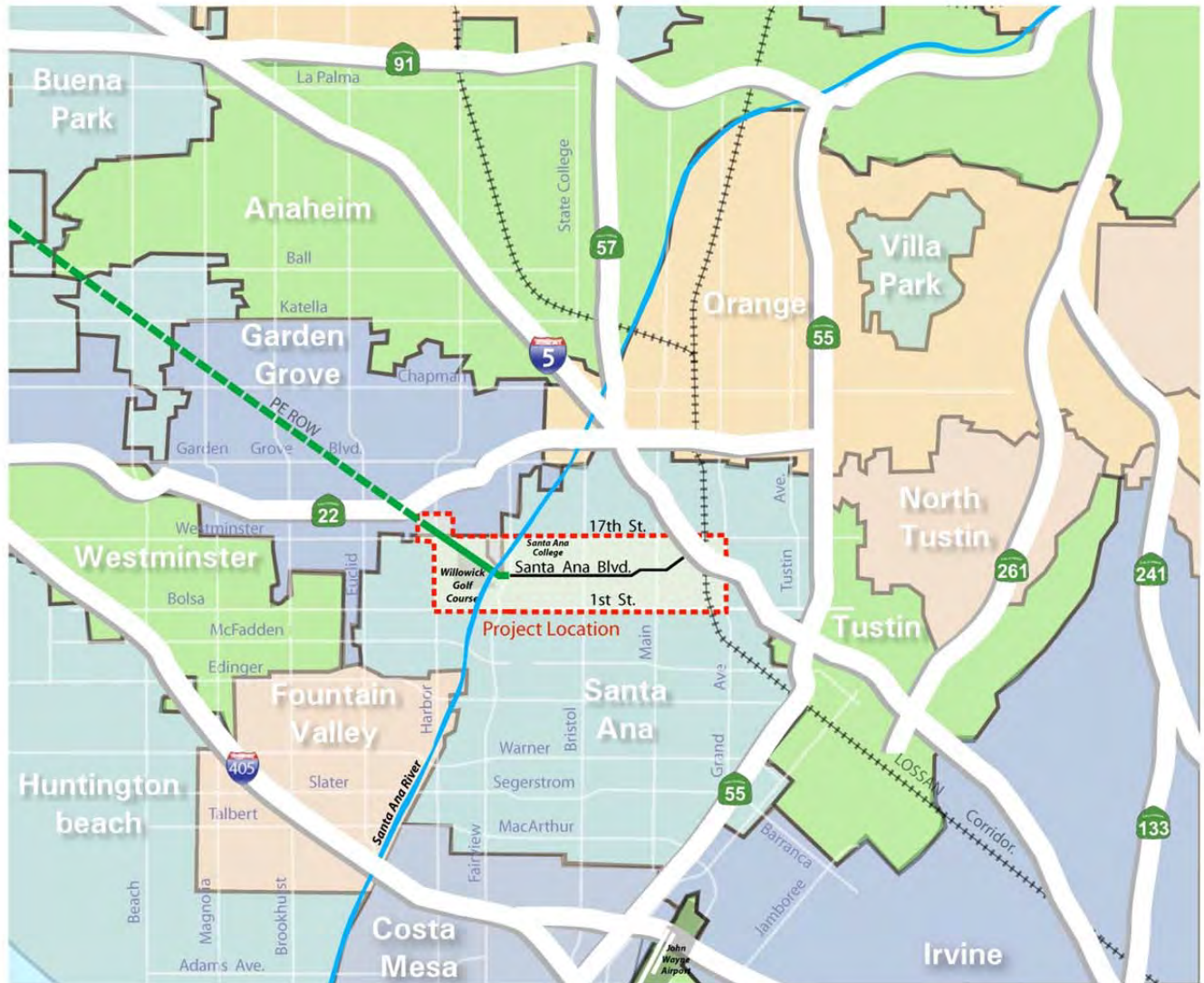
1.1 Project Description

Two Build Alternatives have been identified for detailed environmental evaluation. These alternatives would involve the construction and operation of a streetcar transit system between the Santa Ana Regional Transportation Center (SARTC) and either Harbor Boulevard or Raitt Street, depending on alternative, on city streets and within the Pacific Electric (PE) right-of-way (ROW). As such, the Build Alternatives have many attributes in common, in terms of their overall project description. The principal differences between the Build Alternatives are the alignments that the streetcar would follow through the downtown area within the City of Santa Ana and the western terminus. The two Build Alternatives are listed below:

- Streetcar Alternative 1: Santa Ana Boulevard and Fourth Street Couplet, termini at Harbor Boulevard and SARTC.
- Streetcar Alternative 2: Santa Ana Boulevard/Fifth Street and Civic Center Drive Couplet, termini at Harbor Boulevard and SARTC.


A detailed project description is provided in Appendix A.

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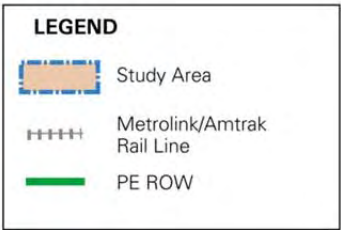
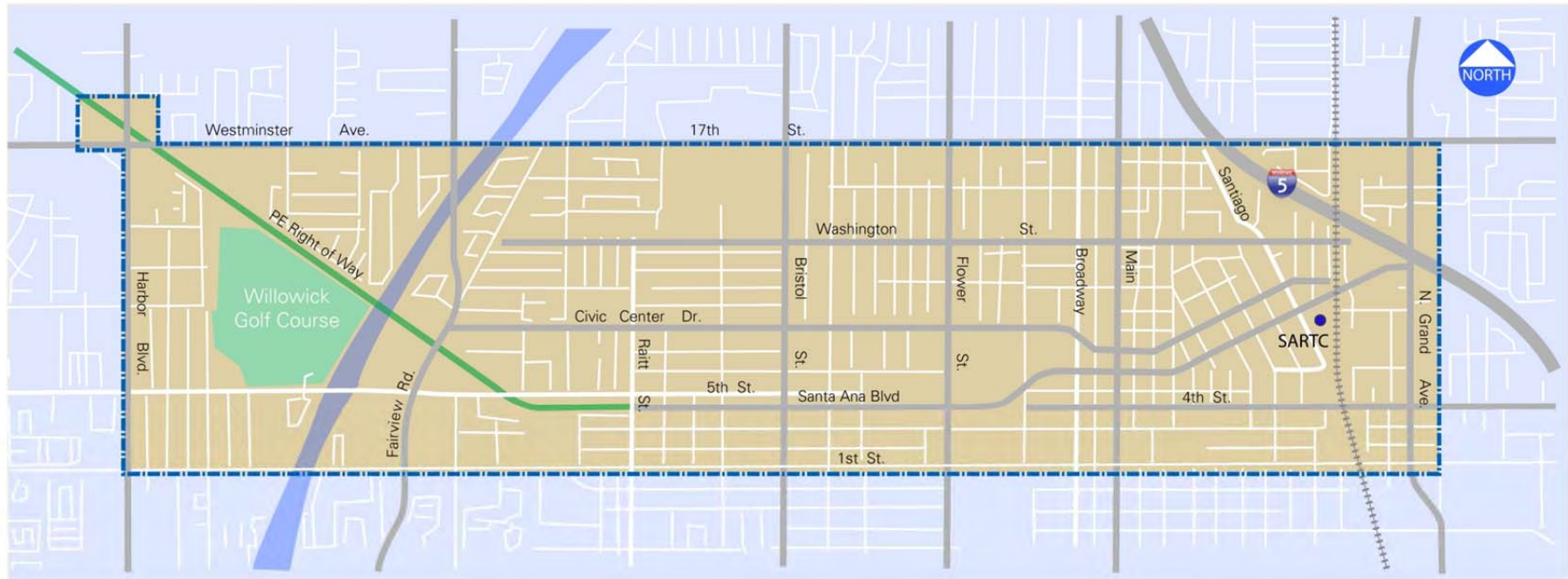


LEGEND

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



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Chapter 2 Methods

Prior to beginning the field survey in June 2011, resource specialists were consulted and available information was reviewed from resource management plans, and other relevant documents to determine locations and types of biological resources that have the potential to exist within the region (United States Fish and Wildlife Service [USFWS] Critical Habitat Mapper and File data [USFWS 2011a] and the Ventura Field Office Species List for Orange County [USFWS 2011b]). The California Department of Fish and Game's (CDFG) Natural Diversity Database (CDFG 2011), and California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2011) file data were also queried for records of occurrence of special status species and habitats within the Anaheim, Orange, Newport Beach, and Tustin USGS 7.5-minute Topographic Quadrangle Maps (USGS 1977).

URS biologists conducted field surveys to assess general and dominant vegetation community types, community sizes, habitat types, and species present within communities. Community type descriptions were based on observed dominant vegetation composition and were derived from the criteria and definitions of several widely accepted vegetation classification systems (Holland 1986, Sawyer and Keeler-Wolf 1995). Plants were identified in the field to the lowest taxonomic level sufficient to determine positive identity, nativity, or rarity status. Plants of uncertain identity were subsequently identified from taxonomic keys (Hickman 1993). Scientific and common species names were recorded according to Hickman (1993). The presence of a wildlife species was based on direct observation and/or wildlife sign (e.g., tracks, burrows, nests, scat, or vocalization). Field data compiled for wildlife species included scientific name, common name, and evidence of sign when no direct observations were made. Wildlife of uncertain distinctiveness was documented and subsequently identified from specialized field guides and related literature (Burt and Grossenheider 1980, Halfpenny 2000, Sibley 2000, Elbroch 2003, and Stebbins 2003).

The Study Area was also assessed for its potential to support special status species based on habitat suitability comparisons with reported occupied habitats. The following definitions were utilized to determine the need for subsequent surveys and to assess Project-related effects to special status species:

Absent [A] - Species distribution is restricted by substantive habitat requirements, which do not occur within the Project footprint, and no further survey or study is necessary to determine likely presence or absence of this species.

Low [L] - Species distribution is restricted by substantive habitat requirements, which are negligible within the Project footprint, and no further survey or study is obligatory to determine likely presence or absence of this species.

Habitat Present [HP] - Species distribution is restricted by substantive habitat requirements, which occur within the Project footprint, and further survey or study may be necessary to determine likely presence or absence of species.

Present [P] - Species or species sign were observed to be present in the Project footprint.

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Chapter 3 Results

URS biologists conducted surveys of the Study Area in June 2011. Weather conditions during the surveys included clear skies, temperatures ranging from 68–76°F and winds from zero to five miles per hour. Representative photos from the Study Area are provided in Chapter 7.

3.1 Vegetation Community/Land Cover Types

One vegetation community/land cover type was observed within the Study Area: Disturbed/Developed (Table 3-1 and Figure 3-1).

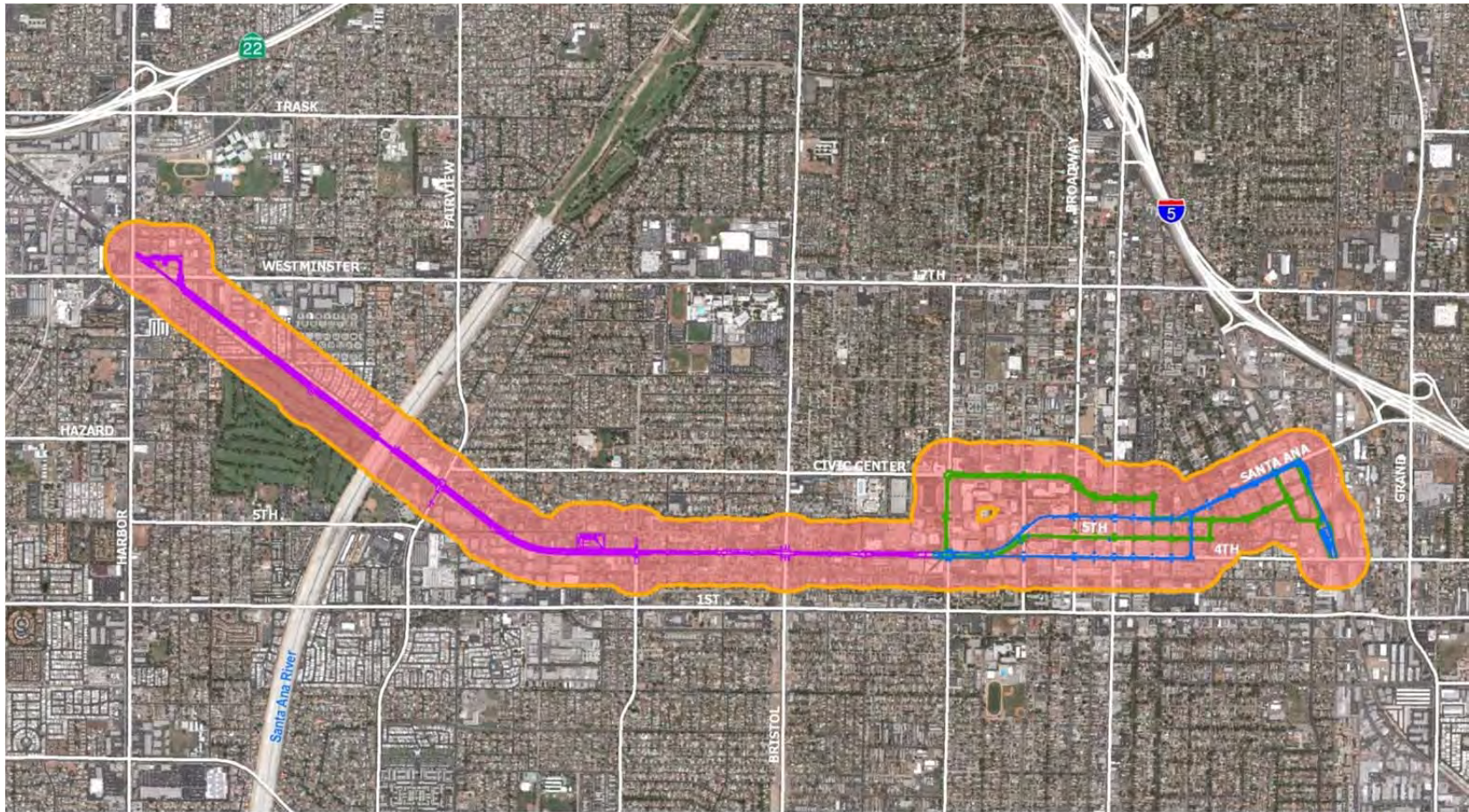
3.1.1 Disturbed/Developed

Disturbed/Developed lands within the Study Area generally include roadways, residential and commercial developments, parking areas, vacant/disturbed lots, and other private/public infrastructure. Species composition in developed communities within the Study Area is dominated by common, non-native, species as well as ornamental landscape species. No native habitats exist within these areas. Disturbed/Developed lands typically contain ornamental plantings, most of which are non-native species. Common ornamental species include Brazilian pepper tree (*Schinus terebinthifolius*), gum tree (*Eucalyptus* spp.), and oleander (*Nerium oleander*). Native ornamental species are occasionally present and include Fremont cottonwood (*Populus fremontii*) and western sycamore (*Plantanus racemosa*). Disturbed/Developed lands also contain disturbed lands that are either devoid of native vegetation (e.g., dirt lots) or contain areas dominated by ruderal vegetation (e.g., cleared/ruderal lots containing non-native grasses and annuals). Typical species present within these areas include non-native ripgut grass (*Bromus diandrus*), prickly lettuce (*Lactuca serriola*), common sow thistle (*Sonchus oleraceus*), cheeseweed (*Malva parviflora*), Russian thistle (*Salsola tragus*), red-stemmed filaree (*Erodium cicutarium*), foxtail barley (*Hordeum murinum*), and wild oats (*Avena fatua*). Typical native species within this community include telegraph weed (*Heterotheca grandiflora*), horseweed (*Conyza canadensis* and *C. bonariensis*), sunflower (*Helianthus annuus*), and dove weed (*Eremocarpus setigerus*).

Table 3-1: Vegetation Community/Land Cover Types Observed within the Study Area

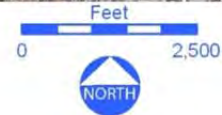
Vegetation community/land cover type	Acres
Disturbed/Developed	738

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LEGEND

-  ALTERNATIVE 1
-  ALTERNATIVE 2
-  ALTERNATIVES 1 AND 2
-  BIOLOGICAL STUDY AREA
-  DISTURBED/DEVELOPED



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3.2 Plant Species

Plant species observed within the Study Area were typical of Disturbed/Developed lands. All plant species observed within the Study Area are listed in Table 3-2.

Table 3-2: Plant Species Observed within the Study Area

Scientific name	Common name
<i>Acacia</i> sp.*	Acacia
<i>Acacia redolens</i> *	Prostrate acacia
<i>Acer negundo</i> var. <i>californicum</i>	California box-elder
<i>Acer</i> sp.*	Maple
<i>Agapanthus praecox</i> *	Lily-of-the-Nile
<i>Ailanthus altissima</i> *	Tree of heaven
<i>Albizia julibrissin</i> *	Silk tree
<i>Amaranthus albus</i>	Tumbling pigweed
<i>Amaranthus blitoides</i>	Prostrate amaranth
<i>Ambrosia acanthicarpa</i>	Annual bur-sage
<i>Anagallis arvensis</i> *	Scarlet pimpernel
<i>Aptenia cordifolia</i> *	Baby sun rose
<i>Arctotis</i> sp.*	African daisy
<i>Arecastrum</i> sp.*	Fanpalm
<i>Arundo donax</i> *	Giant reed
<i>Asparagus plumosa</i> *	Asparagus fern
<i>Atriplex lentiformis</i>	Quail brush
<i>Atriplex semibaccata</i> *	Australian saltbush
<i>Avena barbata</i> *	Slender wild oat
<i>Avena fatua</i>	Wild oat
<i>Baccharis salicifolia</i>	Mule fat
<i>Bougainvillea spectabilis</i> *	Bougainvillea
<i>Brassica nigra</i> *	Black mustard
<i>Bromus diandrus</i> *	Ripgut grass
<i>Bromus madritensis</i> *	Foxtail chess
<i>Buxus microphylla</i> *	Japanese box
<i>Callistemon</i> sp.*	Bottlebrush tree
<i>Camellia</i> sp.*	Camellia
<i>Capsella bursa-pastoris</i> *	Shepherd's-purse
<i>Carduus pycnocephalus</i> *	Italian thistle
<i>Carissa macrocarpa</i> *	Natal plum
<i>Carpobrotus chilensis</i> *	Sea-fig
<i>Carpobrotus edulis</i> *	Hottentot-fig
<i>Catharanthus roseus</i> *	Madagascar periwinkle
<i>Centaurea melitensis</i> *	Tocalote
<i>Chamaesyce</i> sp.	Spurge
<i>Chamomilla suaveolens</i> *	Pineapple weed
<i>Chenopodium album</i> *	Lamb's quarters

Scientific name	Common name
<i>Chenopodium murale</i> *	Nettle-leaved goosefoot
<i>Chrysanthemum coronarium</i> *	Garland daisy
<i>Cirsium vulgare</i> *	Bull thistle
<i>Conium maculatum</i> *	Poison hemlock
<i>Convolvulus arvensis</i> *	Bindweed
<i>Conyza bonariensis</i> *	Flax-leaved horseweed
<i>Conyza canadensis</i>	Horseweed
<i>Cortaderia selloana</i>	Pampass grass
<i>Cupaniopsis anacardioides</i> *	Carrotwood
<i>Cupressus sempervirens</i> *	Italian cypress
<i>Cupressus</i> sp.	Cypress
<i>Cycas revoluta</i> *	Japanese sago palm
<i>Cynodon dactylon</i> *	Bermuda grass
<i>Cyperus eragrostis</i>	Umbrella sedge
<i>Datura wrightii</i>	Jimson weed
<i>Dietes iridioides</i> *	Fortnight lily
<i>Disticlis spicata</i>	Salt grass
<i>Echinochloa crus-galli</i> *	Barnyard grass
<i>Epilobium ciliatum</i>	California cottonweed
<i>Eremocarpus setigerus</i>	Dove weed
<i>Erodium botrys</i> *	Broad-lobed filaree
<i>Erodium brachycarpum</i> *	Long-beaked filaree
<i>Erodium cicutarium</i> *	Red-stemmed filaree
<i>Erythrina</i> sp.*	Coral tree
<i>Eucalyptus globulus</i> *	Blue gum
<i>Eucalyptus polyanthemos</i> *	Silver dollar gum
<i>Eucalyptus</i> spp.*	Gum tree
<i>Ficus benjamina</i> *	Weeping fig
<i>Ficus macrophylla</i> *	Bay fig
<i>Ficus pumilla</i> *	Creeping fig
<i>Foeniculum vulgare</i> *	Fennel
<i>Fraxinus</i> sp.	Ash
<i>Gazania</i> sp.*	African daisy
<i>Gnaphalium californica</i>	Cudweed
<i>Grevillea robusta</i> *	Silk oak
<i>Hedera helix</i> *	English ivy
<i>Helianthus annuus</i>	Common sunflower
<i>Heliotropium curassavicum</i>	Salt heliotrope
<i>Hemerocallis</i> sp.*	Day lily
<i>Heterotheca grandiflora</i>	Telegraph weed
<i>Heterotheca sessiliflora</i>	Hairy golden-aster
<i>Hibiscus</i> sp.*	Ornamental hibiscus
<i>Hirschfeldia incana</i> *	Short-podded mustard
<i>Hordeum murinum</i> *	Glaucous foxtail barley

Scientific name	Common name
<i>Impatiens</i> sp.*	Impatiens
<i>Ipomoea purpurea</i> *	Common morning-glory
<i>Jacaranda mimosifolia</i> *	Jacaranda
<i>Juniperus</i> sp.*	Juniper
<i>Koelreuteria paniculata</i> *	Golden rain tree
<i>Lactuca serriola</i> *	Prickly lettuce
<i>Lagerstroemia indica</i> *	Crepe myrtle
<i>Lampranthus spectabilis</i> *	Trailing iceplant
<i>Lantana camara</i> *	Common lantana
<i>Lantana montevidensis</i> *	Trailing lantana
<i>Lavandula stoechas</i> *	French lavender
<i>Lepidium</i> sp.	Peppergrass
<i>Leptochloa uninervia</i>	Mexican sprangletop
<i>Ligustrum sinense</i> *	Chinese privet
<i>Ligustrum</i> sp.*	Privet
<i>Liquidambar styraciflua</i> *	Sweet gum
<i>Liriope</i> sp.*	Liriope
<i>Lobularia maritima</i> *	Sweet-alyssum
<i>Lolium perenne</i> *	Perennial ryegrass
<i>Lotus purshianus</i>	Spanish clover
<i>Magnolia grandiflora</i> *	Southern magnolia
<i>Malus</i> sp.*	Apple
<i>Malva parviflora</i> *	Cheeseweed
<i>Marrubium vulgare</i> *	Horehound
<i>Medicago lupulina</i> *	Black medick
<i>Medicago polymorpha</i> *	Bur clover
<i>Melaleuca</i> sp.*	Paperbark
<i>Melilotus alba</i> *	Sweetclover
<i>Myoporum laetum</i> *	Myoporum
<i>Myoporum parvifolium</i> *	Creeping boobialla
<i>Nandina domestica</i> *	Sacred bamboo
<i>Nerium oleander</i> *	Oleander
<i>Nicotiana glauca</i> *	Tree tobacco
<i>Olea europaea</i> *	Olive
<i>Osteospermum</i> sp.*	African daisy
<i>Oxalis pes-caprae</i> *	Bermuda buttercup
<i>Parthenocissus tricuspidata</i> *	Boston ivy
<i>Pelargonium</i> sp.*	Garden geranium
<i>Pennisetum setaceum</i> *	Fountain grass
<i>Phoenix canariensis</i> *	Canary Island date palm
<i>Phoenix dactylifera</i> *	Date palm
<i>Phormium</i> sp.*	New Zealand flax
<i>Picris echioides</i> *	Bristly ox-tongue
<i>Pinus canariensis</i> *	Canary Island pine

Scientific name	Common name
<i>Pinus halepensis</i> *	Aleppo pine
<i>Pinus</i> spp.*	Pine
<i>Plantago lanceolata</i> *	English plantain
<i>Platanus racemosa</i>	Western sycamore
<i>Plumbago auriculata</i> *	Cape plumbago
<i>Podocarpus macrophyllus</i> *	Plum pine
<i>Polypogon monspeliensis</i> *	Annual beard grass
<i>Populus fremontii</i>	Fremont cottonwood
<i>Protoasparagus plumosus</i> *	Asparagus fern
<i>Pulicaria paludosa</i> *	Spanish sunflower
<i>Pyracantha</i> sp.*	Firethorn
<i>Pyrus</i> sp.*	Ornamental pear
<i>Raphiolepis umbellata</i> *	Raphiolepis
<i>Ricinus communis</i> *	Castor-bean
<i>Rosa</i> sp.	Ornamental rose
<i>Rosmarinus officinalis</i> *	Rosemary
<i>Rumex crispus</i> *	Curly dock
<i>Salsola tragus</i> *	Russian thistle
<i>Schinus molle</i> *	Peruvian pepper tree
<i>Schinus terebinthifolius</i> *	Brazilian pepper tree
<i>Senecio vulgaris</i> *	Common groundsel
<i>Silybum marianum</i> *	Milk thistle
<i>Sisymbrium irio</i> *	London rocket
<i>Sisymbrium orientale</i> *	Oriental mustard
<i>Sonchus asper</i> *	Prickly sow thistle
<i>Sonchus oleraceus</i> *	Common sow thistle
<i>Strelitzia</i> sp.*	Bird of paradise
<i>Tecomaria capensis</i> *	Cape honeysuckle
<i>Thunbergia grandiflora</i> *	Sky flower
<i>Trachelospermum jasminoides</i> *	Star jasmine
<i>Tropaeolum majus</i> *	Garden nasturtium
<i>Tuhlbaghia violacea</i> *	Society garlic
<i>Ulmus parvifolia</i> *	Chinese elm
<i>Vinca major</i> *	Greater periwinkle
<i>Vulpia myuros</i>	Fescue
<i>Washingtonia robusta</i>	Mexican fan palm
<i>Yucca elephantipes</i> *	Giant yucca

*non-native

3.3 Wildlife Species

Wildlife species observed within the Study Area were typical of Disturbed/Developed lands. Common wildlife species observed within the Study Area included a range of avian species such as House Finch (*Carpodacus mexicanus*), Northern Mockingbird (*Mimus polyglottos*), Black Phoebe (*Sayornis nigricans*), and American Crow (*Corvus brachyrhynchos*). Commonly-occurring mammals (e.g., opossum [*Didelphis virginiana*], ground squirrel [*Spermophilus beecheyi*], and raccoon [*Procyon lotor*]), were also observed. Common wildlife species observed within the Study Area are listed in Table 3-3.

Table 3-3: Wildlife Species Observed within the Study Area

Scientific name	Common name
Reptiles	
<i>Sceloporus occidentalis</i>	Western fence lizard
Birds	
<i>Amphispiza bilineata</i>	Black-throated Sparrow
<i>Buteo jamaicensis</i>	Red-tailed Hawk
<i>Calypte anna</i>	Anna's Hummingbird
<i>Carduelis psaltria</i>	Lesser Goldfinch
<i>Carpodacus mexicanus</i>	House Finch
<i>Cathartes aura</i>	Turkey Vulture
<i>Columba livia</i>	Rock Pigeon
<i>Corvus brachyrhynchos</i>	American Crow
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird
<i>Mimus polyglottos</i>	Northern Mockingbird
<i>Passer domesticus</i>	House Sparrow
<i>Sayornis nigricans</i>	Black Phoebe
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow
<i>Sturnus vulgaris</i>	European Starling
<i>Tyrannus vociferans</i>	Cassin's Kingbird
<i>Zenaida macroura</i>	Mourning Dove
Mammals	
<i>Didelphis virginiana</i>	Virginia opossum
<i>Procyon lotor</i>	Raccoon
<i>Spermophilus beecheyi</i>	California ground squirrel

3.4 Special Status Plants

Twenty (20) special status plant species are reported to occur within the Anaheim, Orange, Newport Beach, and Tustin USGS 7.5-minute Quadrangle Maps that include the Study Area (Table 3-4). All of the special status plant species were determined to have an “A” (Absent) potential for occurrence within the Study Area due to the lack of suitable habitat, and no further survey or study is necessary to determine presence or absence of these species.

Table 3-4: Special Status Plant Species Potential for Occurrence within the Study Area

Special status species (Scientific/common name)	Habitat and distribution	Flowering season	Status designation	Potential for occurrence
<i>Abronia villosa</i> var. <i>aurita</i> Chaparral sand-verbena	Annual herb. Occurs in coastal scrub and chaparral in sandy soils. From 260 to 5,250 feet in elevation.	January – September	Fed: None CA: None CNPS: 1B.1	Absent
<i>Aphanisma blitoides</i> Aphanisma	Annual herb. Occurs in coastal scrub, coastal dunes, and coastal bluff scrub in sandy or clay soils. Up to 1,000 feet in elevation.	March – June	Fed: None CA: None CNPS: 1B.2	Absent
<i>Atriplex coulteri</i> Coulter’s saltbush	Perennial herb. Typically occurs in non-wetland dunes and coastal areas. Range in elevation from 10 to approximately 1,510 feet.	March – October	Fed: None CA: None CNPS: 1B	Absent
<i>Atriplex pacifica</i> South Coast saltscale	Annual herb. Found in alkali soil occurring in coastal scrub, coastal bluff scrub, playas, and chenopod scrub. Range in elevation up to approximately 460 feet.	March – October	Fed: None CA: None CNPS: 1B.2	Absent
<i>Atriplex parishii</i> Parish’s brittle scale	Annual herb. Typically found on drying alkali flats with fine soils within alkali meadows, vernal pools, chenopod scrub, and playas. Ranges in elevation from 75 to 6,230 feet.	June – October	Fed: None CA: None CNPS: 1B.1	Absent
<i>Atriplex serenana</i> var. <i> davidsonii</i> Davidson's saltscale	Annual herb. Suitable habitat includes floodplains (seasonal wetlands) dominated by alkali scrub, alkali playas, vernal pools, and alkali grasslands. Range in elevation from 30 to 1,970 feet.	April-October	Fed: None CA: None CNPS: 1B.1	Absent
<i>Centromadia parryi</i> ssp. <i>australis</i> Southern tarplant	Annual herb. Occurs in vernal pools, margins of marshes and swamps, and vernal mesic valley and foothill grasslands, sometimes with salt grass on alkaline soils. Up to 1394 feet in elevation.	May – November	Fed: None CA: None CNPS: 1B	Absent
<i>Cordylanthus maritimus</i> ssp. <i>maritimus</i> Salt marsh bird’s-beak	Hemi-parasitic annual herb. Occurs in coastal dunes and coastal salt marshes and swamps. Up to 100 feet in elevation.	May – October	Fed: FE CA: SE CNPS: 1B.2	Absent
<i>Dudleya multicaulis</i> Many-stemmed dudleya	Perennial herb. Occurs in coastal scrub, chaparral, and valley and foothill grassland, usually on clay soils or grassy slopes. Up to 864 feet in elevation.	April – July	Fed: None CA: None CNPS: 1B.2	Absent

Special status species (Scientific/common name)	Habitat and distribution	Flowering season	Status designation	Potential for occurrence
<i>Helianthus nuttallii</i> ssp. <i>parishii</i> Los Angeles sunflower	Rhizomatous perennial herb. Occurs in coastal salt and freshwater marshes and swamps. From 15 to 5,500 feet in elevation.	August – October	Fed: None CA: None CNPS: 1A	Absent
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i> Coulter's goldfields	Annual herb. Occurs in coastal salt marshes and swamps, valley and foothill grasslands, playas, sinks, and vernal pools. Range in elevation up to approximately 4,595 feet.	February – June	Fed: None CA: None CNPS: 1B.1	Absent
<i>Nama stenocarpum</i> Mud nama	Annual/perennial herb. Occurs within muddy embankments of marshes and swamps, and within lake margins and riverbanks. Ranges from 16 to 1,640 feet in elevation	January – July	Fed: None CA: None CNPS: 2.2	Absent
<i>Nasturtium gambelii</i> Gambel's water cress	Perennial rhizomatous herb. Occurs in marshes and swamps, within freshwater and brackish water marshes at the margins of lakes and along streams in, or just above, the water level. Range in elevation from 15 to 4,280 feet.	April – October	Fed: FE CA: ST CNPS: 1B.1	Absent
<i>Navarretia prostrata</i> Prostrate navarretia	Annual herb. Occurs in coastal scrub, vernal pools, and valley and foothill grasslands in mesic soils. From 50 to 2,300 feet in elevation.	April – July	Fed: None CA: None CNPS: 1B.1	Absent
<i>Nemacaulis denudata</i> var. <i>denudata</i> Coast woolly-heads	Annual herb. Occurs in coastal dunes. From 0 to 328 feet in elevation.	April – September	Fed: None CA: None CNPS: 1B	Absent
<i>Pentachaeta aurea</i> ssp. <i>allenii</i> Allen's pentachaeta	Annual herb. Occurs in coastal scrub openings and valley and foothill grasslands. From 245 to 1,705 feet in elevation.	March - June	Fed: None State: None CNPS: List 1B.1	Absent
<i>Senecio aphanactis</i> Chaparral ragwort	Annual herb. Occurs in chaparral, cismontane woodland, and coastal scrub, sometimes alkaline. From 45 to 2400 feet in elevation.	Jan-April	Fed: None State: None CNPS: List 2.2	Absent

Special status species (Scientific/common name)	Habitat and distribution	Flowering season	Status designation	Potential for occurrence
<i>Sidalcea neomexicana</i> Salt spring checkerbloom	Perennial herb. Occurs in alkali playas, brackish marshes, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub habitats within alkali springs and marshes from 0 to 4,920 feet.	March – June	Fed: None CA: None CNPS 2.2	Absent
<i>Suaeda esteroa</i> Estuary seablite	Perennial herb. Occurs in coastal salt marshes and swamps. Up to elevations of 15 feet.	May – October	Fed: None CA: None CNPS 1B.2	Absent
<i>Symphyotrichum defoliatum</i> San Bernardino aster	Perennial rhizomatous herb. Occurs in meadows and seeps, marshes and swamps, coastal scrub, cismontane woodland, lower montane coniferous forest, and grassland. Vernally mesic grassland or near ditches, streams and springs; disturbed areas. From 7 to 6,692 feet in elevation.	July - November	Fed: None CA: None CNPS: List 1B.2	Absent

Federal designations: (federal Endangered Species Act, USFWS):

FE - Federal-listed, endangered.

FT - Federal-listed, threatened.

State designations: (California Endangered Species Act, CDFG)

SE - State-listed, endangered.

ST - State-listed, threatened.

California Native Plant Society (CNPS) Lists:

1A - Plants presumed extinct in California.

1B - Plants rare and endangered in California and throughout their range.

2 - Plants rare, threatened, or endangered in California but more common elsewhere in their range.

3 - Plants about which we need more information; a review list.

4 - Plants of limited distribution; a watch list.

Threat Codes:

1 - Seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat)

2 - Fairly endangered in California (20-80% of occurrences threatened)

3 - Not very endangered in California (<20% of occurrences threatened or no current threats known)

3.5 Special Status Wildlife

Twenty three (23) special status wildlife species are reported to occur within the USGS quadrangles containing the Study Area (Table 3-5). All of these special status wildlife species were determined to have an “A” (Absent) potential for occurrence designation within the Study Area due to lack of suitable habitat, and no further survey or study is necessary to determine presence or absence of these species.

Table 3-5: Special Status Wildlife Species Potential for Occurrence within the Study Area

Special status species (Scientific/common name)	Habitat description	Status designation	Potential for occurrence
INVERTEBRATES			
<i>Branchinecta sandiegoensis</i> San Diego fairy shrimp	Inhabits vernal pools. Endemic to Orange and San Diego county mesas.	FE	Absent
REPTILES			
<i>Aspidoscelis hyperythra</i> Orange-throated whiptail	Inhabits low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats. Prefers washes and other sandy areas with patches of brush and rocks. Perennial plants necessary for its major food: termites.	SSC	Absent
<i>Crotalus ruber ruber</i> Northern red-diamond rattlesnake	Desert scrub, thorn scrub, open chaparral and woodland; occasional in grassland and cultivated areas. Prefers rocky areas and dense vegetation. Occurs in Morongo Valley in San Bernardino and Riverside counties to Baja California.	SSC	Absent
<i>Emys marmorata pallida</i> Southwestern pond turtle	Inhabits permanent or nearly permanent bodies of water in many habitat types including ponds, marshes, rivers, and streams with suitable basking sites.	SSC	Absent
<i>Phrynosoma blainvillei</i> Coast horned lizard	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low shrubs. Requires open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant ant and insect prey.	SSC	Absent
BIRDS			
<i>Aimophila ruficeps canescens</i> Southern California Rufous-crowned Sparrow	Resident in southern California coastal sage scrub and sparse mixed chaparral. Frequents relatively steep, often rocky hillsides, with grass and forb patches.	WL	Absent

Special status species (Scientific/common name)	Habitat description	Status designation	Potential for occurrence
<i>Ammodramus savannarum</i> Grasshopper Sparrow	Occurs in dry, dense grasslands, especially those with a variety of grasses and tall forbs and scattered shrubs for singing perches. In southern California occurs mainly on hillsides and mesas in coastal districts	SSC	Absent
<i>Athene cunicularia</i> Burrowing Owl	Prefers open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Dependent on small mammal burrows (particularly ground squirrels) for its subterranean nesting.	SSC	Absent
<i>Campylorhynchus brunneicapillus sandiegensis</i> Coastal (San Diego) Cactus Wren	(San Diego and Orange counties only) The Cactus Wren is a non-migratory resident of the coastal sage scrub plant community. Occupies southern cactus scrub, maritime succulent scrub, cactus thickets in coastal sage scrub.	SSC	Absent
<i>Charadrius alexandrinus nivosus</i> Western Snowy Plover	(Nesting). Occurs on sandy beaches, salt pond levees, and shores of large alkali lakes. Requires sandy, gravelly, or friable soils for nesting. The federal listing applies only to the Pacific coastal population.	FT	Absent
<i>Icteria virens</i> Yellow-breasted Chat	(Nesting) Summer resident; inhabits riparian thickets of willow and other brushy tangles near watercourses. Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forage and nest within 10 feet of ground.	SSC	Absent
<i>Laterallus jamaicensis coturniculus</i> California Black Rail	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering large bays.	ST	Absent
<i>Passerculus sandwichensis beldingi</i> Belding's Savannah Sparrow	Occurs from Santa Barbara to San Diego county. Nests in pickleweed on, and around, the margins of tidal flats.	SE	Absent
<i>Polioptila californica californica</i> Coastal California Gnatcatcher	Occurs in coastal sage scrub vegetation on mesas, arid hillsides, and in washes and nests almost exclusively in California sagebrush, below 2,500 feet in elevation in southern California.	FT SSC	Absent
<i>Rallus longirostris levipes</i> Light-footed Clapper Rail	Inhabits salt marshes traversed by tidal sloughs, where cordgrass and pickleweed are the dominant vegetation.	FE SE	Absent
<i>Sternula antillarum browni</i> California Least Tern	Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, landfills, or paved areas.	FE SE	Absent

Special status species (Scientific/common name)	Habitat description	Status designation	Potential for occurrence
<i>Vireo bellii pusillus</i> Least Bell's Vireo	Summer resident of southern California in low riparian in vicinity of water or in dry river bottoms; below 2,000 feet. Nests are placed along margins of bushes or on twigs projecting into pathways, usually willow, baccharis, or mesquite.	FE SE	Absent
MAMMALS			
<i>Choeronycteris mexicana</i> Mexican long-tongued bat	Known in California only from San Diego County. Uses caves, mines and buildings as day roosts, preferring dimly-lit sites.	SSC	Absent
<i>Eumops perotis californicus</i> Western mastiff bat	Inhabits many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roosts in crevices in cliff faces, high buildings, hollow trees, and tunnels.	SSC	Absent
<i>Nyctinomops macrotis</i> Big free-tailed bat	Inhabitant of rugged, rocky habitats in arid landscapes. Found in a variety of plant associations, including desert shrub, woodlands, and evergreen forests.	SSC	Absent
<i>Perognathus longimembris pacificus</i> Pacific pocket mouse	Shrub lands with firm sandy soil. Fine-grain, sandy substrates in the immediate vicinity of the ocean; coastal strand, coastal dunes, river alluvium, and coastal sage scrub growing on marine terraces	FE	Absent
<i>Sorex ornatus salicornicus</i> Southern California salt marsh shrew	Inhabits the narrow coastal plains from the Mexican border north to El Segundo, Los Angeles County.	SSC	Absent
<i>Taxidea taxus</i> American badger	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Requires sufficient food, friable soils, and open, uncultivated ground. Preys on burrowing rodents and digs burrows for shelter.	SSC	Absent

Status Codes:

Federal

FE = Federally listed Endangered

FT = Federally listed Threatened

State

ST = State listed Threatened

SE = State listed Endangered

SSC = California Species of Special Concern

WL = California Watch List

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Chapter 4 Impact Analysis

This section includes the analysis of the permanent and temporary direct and indirect impacts of the Project on biological resources. Direct effects are defined as actions that cause an immediate effect on the species or its habitat. Direct impacts result from the Project including the impacts of interrelated actions and interdependent actions. Indirect impacts are caused by or result from the Project at a later time and are reasonably certain to occur. Indirect impacts may occur outside of the area directly affected by the Project.

The impacts described below would be similar for all Build Alternatives, including the Initial Operable Segments and all other design options.

The Project is located within a densely-developed urban setting and contains no natural biological communities. The ground disturbance footprint consists entirely of Disturbed/Developed land, which includes roadways, developed and undeveloped lots, parking areas, and residential and commercial developments. Literature review and field survey data determined that no special status plant or wildlife species have the potential to occur within the Project footprint and that the Project lacks any suitable habitat that would typically support special status species or receive State or federal Endangered Species Act (ESA) protections. Because of the existing land use, it is unlikely that the construction or operation of the Project will substantially affect common or special status species, their habitats, or special aquatic resource areas. Adverse impacts are expected to be negligible and predominantly impact commonly occurring non-native wildlife and plant species.

Permanent or temporary impacts to biological resources will be limited to the maximum extent practical. However, impacts may include minor habitat loss and temporary displacement from construction and operation activities. Project activities may also temporarily deter wildlife from using portions of the Study Area. However, direct impacts would occur only during active construction within the Project's physical ground disturbance footprint. Short-term Project-related adverse impacts are considered to be insignificant because wildlife using the Study Area and foraging within these lands are assumed to be acclimated to the existing human-influenced environment (e.g., high levels of automobile and downtown city traffic).

Nonetheless, minor permanent direct impacts include long-term disturbance (e.g., noise, light, vibration, and human activity) and a negligible loss of habitat where vegetation will be cleared. Additional impacts include increased fragmentation of habitat due to reduced cover, food sources, and nesting areas. However, noise and human activity will cause most wildlife species to avoid an area until the disturbance conditions are eliminated. Bird populations and other mobile species will likely retreat from an area until construction is complete.

Impacts to migratory species could also result from habitat loss associated with construction and operation. This effect will be insignificant because of the relatively small quantity of nesting habitat affected by Project implementation. Additionally, the standard conditions described in Chapter 5 are expected to reduce the extent and duration of impacts on biological resources.

In summary, the Project's footprint lacks suitable habitat that would typically support special status species and their habitats or receive State and federal ESA protections. Consequently, there is no reasonable presumption of adverse impact to any State or federal ESA protected species or their habitats as a result of Project implementation. To that end, the Project is not anticipated to result in a trend toward additional State or federal listings, additional biological resource protection, apparent changes in habitat availability for common or special status species, or loss of habitat viability for any common and special status species; adversely affect annual production of biological resources; or substantially change migration and foraging patterns for common and special status species. In addition, standard conditions 1 through 7, described in Chapter 5, will reduce potential significant impacts to biological resources to a level that is less than significant and avoid adverse effects.

4.1 Cumulative Impacts

Cumulative impacts to biological resources are directly related to the presence and significance of these resources within the area of direct effect. The literature review and field survey data prepared for the proposed Project did not identify any special status species or their habitats that would receive State and federal ESA protections within the boundaries of the proposed Project area. The Project occurs within an area that consists of non-native habitats. Accordingly, the proposed ground disturbance footprint includes low habitat value (existing non-native grasses and human disturbances) and provides only low-quality foraging opportunities for local wildlife species. Furthermore, the planned projects within the region (See Table 4-1 below) were evaluated and include similar low value non-native habitats as this Project. Accordingly, the addition of this Project would not significantly contribute to cumulative impacts to biological resources within the region. Therefore, there is no potential for cumulative impacts related to these biological resources.

Table 4-1: Santa Ana and Garden Grove Fixed Guideway - Cumulative Projects List
 Compiled 7-21-11

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), <i>approved 2009</i>	21,000 sf	2130 N. Grand Ave.	396-191-44
2	Christ Our Savior Cathedral	Sanctuary (2,800-seat), <i>approved 2005</i>		2001 W. McArthur Blvd.	140-061-94
3	Discovery Science Center Ph. II	IMAX theatre (275-seat), <i>approved 2002</i>		2032 N. Main St.	399-102-09
4	Lyon Homes	Residential (Condo), <i>approved 2011</i>	300 u	100-130 E. McArthur Blvd.	411-081-26
5	Promenade Point	Residential (Condo), <i>approved 2005</i>	194 u	200 E. First American Wy.	411-074-03
6	CVS/Sav-On Drug Store	Pharmacy, drive through, <i>approved 2008</i>	15,836 sf	115 N. Harbor Blvd.	198-182-22
7	Skyline Phase II	Residential (Condo), <i>approved 2005</i>	150 u	10 E. Hutton Ctr.	411-081-28
8	Vista Del Rio	Residential, <i>approved 2009</i>	41 u	1600 W. Memory Ln.	101-055-27
9	Xerox Tower II	Office, <i>approved 2001</i>	210,000 sf	200 N. Cabrillo Park Dr.	400-071-03
10	YMCA	Recreational Facility, <i>approved 2007</i>	32,000 sf	2100 W. Alton Ave.	140-061-91
11	1306 W. Santa Ana Blvd.	Medical/Office Building, <i>approved 2011</i>	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), <i>approved 2007</i>	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, <i>approved 2010</i>		eastern third of SAFG Project area	Multiple APNS

No.	Project	Description/ Land Use	No. of u or square feet (sf)	Location	Primary APN
Application Under Review					
17	C & C Affordable Housing Project	Residential (Apartments)	36 u	605 E. Washington Ave.	398-151-12
18	Dayton Commercial Center	Commercial	7,275 sf	W. Edinger Ave.	408-273-11
19	Dr. Bui Medical Building	Medical Office	6,500 sf	202 N. Euclid Ave.	099-223-26
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. Hathway	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

No.	Project	Description/ Land Use	No. of u or square feet (sf)	Location	Primary APN
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
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 5 Standard Conditions, Avoidance, Minimization, and/or Mitigation Measures

The literature review and field survey data suggests that there are no special status species utilizing the Project footprint. Consequently, there is no reasonable presumption of adverse impact to any special status species or their habitats as a result of Project implementation. Nonetheless, the Study Area includes lands that are likely within the jurisdiction of the CDFG, United States Army Corps of Engineers (USACE), and Regional Water Quality Control Board (RWQCB) (i.e., Santa Ana River). Therefore, the following measures should be applied as a means of avoiding and minimizing adverse impacts to biological resources that have the potential to occur within the Project footprint:

SC-BIO A: Conduct Pre-Construction Nesting Bird Surveys during Avian Nesting Season

In order to comply with the Migratory Bird Treaty Act (MBTA) and relevant sections of the California Fish and Game Code, any vegetation clearing should take place outside of the typical avian nesting season (February 15 to August 31) to the maximum extent practical. If this is not possible, prior to ground-disturbing activities, a qualified biologist should conduct a pre-construction nesting-bird survey. If active nests are observed, a minimum buffer zone from occupied nests is recommended to the maximum extent practicable. Once nesting has ended, the buffer may be removed.

SC-BIO B: Obtain Permission from Proper Authorities Prior to Interfering with any Tree or Shrub

Prior to “removing, cutting, pruning, breaking, injuring, defacing, or in any other way interfering with any tree or shrub, or any part thereof, either above or below the ground, growing on any public thoroughfare, park, or public place”, obtain permission of the director of recreation and parks or his authorized agents within the City of Garden Grove (Garden Grove Municipal Code, Chapter 23, Section 11.32.020: Permits).

SC-BIO-C: Consult with Appropriate Resource Agency Prior to Undertaking Ground-Disturbing Activities within or Immediately Adjacent to any Aquatic Resource Areas

Prior to undertaking ground-disturbing activities within or immediately adjacent to any aquatic resource areas, the Applicant should consult with the appropriate responsible resource agency (e.g., CDFG, USACOE, and RWQCB) to verify delineation results and complete all obligatory discretionary permits/authorizations.

SC-BIO-D: Develop Plan for Impacts to Special Aquatic Resource Areas

Develop an informal plan to offset or compensate for impacts to special aquatic resource areas.

SC-BIO-E: Delineate Areas that will Undergo Grading and Construction Activities

Limits of grading and construction activities within the Project footprint should be clearly delineated with temporary staking, flagging, or similar materials.

SC-BIO F: Minimize Project Footprint and Use Pre-Existing Access Routes

The Project footprint should be minimized to the maximum extent feasible and access to it should be via pre-existing/maintained access routes to the greatest extent possible.

SC-BIO-G: Keep Project Clear of Trash Debris

To avoid attracting predators and nuisance species, the Project footprint shall be clear of debris, where possible. All food-related trash items should be enclosed in sealed containers and regularly removed from the Project footprint.

With the execution of the measures described above, the Project is not expected to adversely impact common or special status species.

The services performed by URS and documented in this report have been conducted in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representations to the Applicant are either expressed or implied, and no warranty or guarantee is included in this report. Opinions relating to presence, absence, or potential for occurrence of biological resources are based on limited data and actual conditions may vary from those encountered at the times and locations where the data were obtained despite due professional care. The services provided have been performed in accordance with a scope of work negotiated between the Applicant and URS. Any reliance on this report by any other party shall be at such party's sole risk unless that party has written authorization from URS to use this work product.

Chapter 6 References

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Chapter 7 Photograph Log



Photograph: 1
Date: June 2011
Direction: West
Location: Intersection of Main and Broadway



Photograph: 2
Date: June 2011
Direction: East
Location: Intersection of Main and Broadway



Photograph: 3
Date: June 2011
Direction: Southwest
Location: Near terminus at west end of Project



Photograph: 4
Date: June 2011
Direction: Northeast
Location: Terminus at west end of Project

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 four-mile transit corridor extends from the Harbor Boulevard/Westminster Avenue intersection in the City of Garden Grove at its western terminus to the Santa Ana Regional Transportation Center (SARTC) in the City of Santa Ana at its eastern terminus. **Figures A-1** and **A-2** provide the Regional Location and Study Area maps, respectively

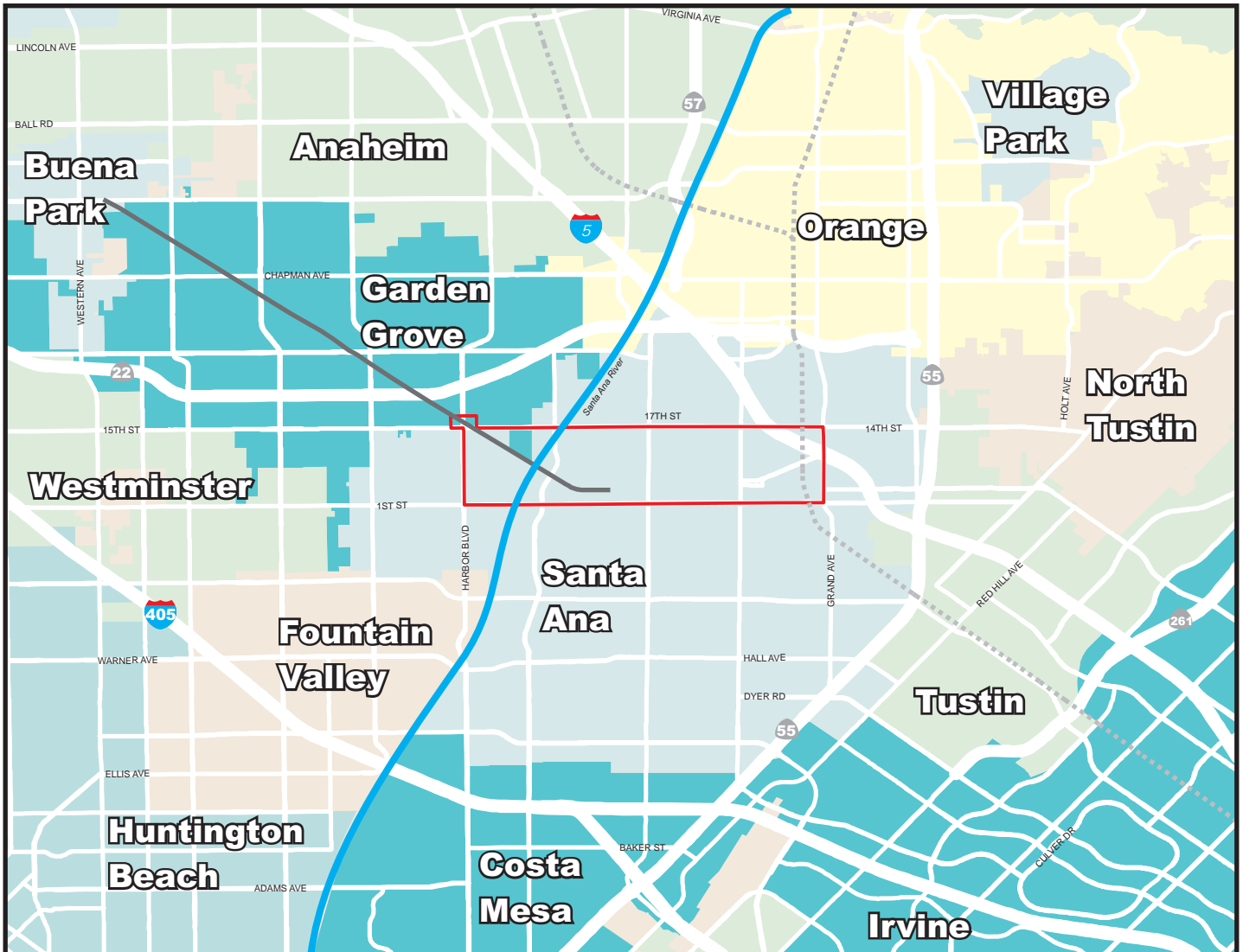
No Build Alternative

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

Other projects in the foreseeable future include:

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


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LEGEND:

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

0 1.1 2.2 MILES



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LEGEND:

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



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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

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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 along Civic Center Drive. Streetcar Alternative 2 would acquire additional ROW (**Figure A-7**) in order not to preclude the westbound bike lane.

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TABLE A-1: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 1

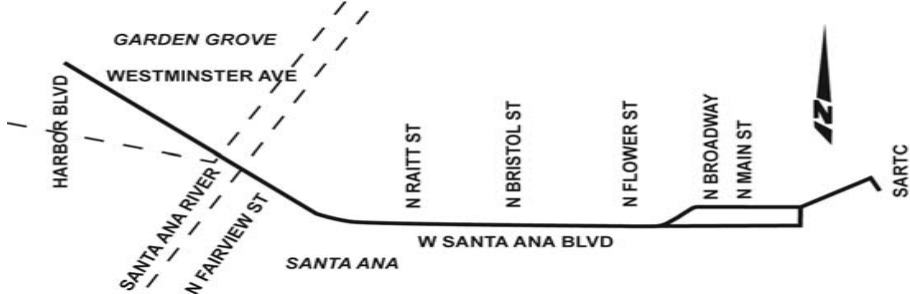
Key Attributes	Descriptions											
Transmit Mode	Streetcar											
Termini	Western Terminus: Harbor Blvd. Eastern Terminus: SARTC											
Alignment Description	<p><u>Routing by Segment:</u></p> <ul style="list-style-type: none"> • PE ROW, from Harbor Blvd. to Raitt St.: streetcars operate at-grade, bi-directionally, in exclusive ROW. • Santa Ana Blvd., from Raitt St. to Ross St.: streetcars operate in the street, at-grade, bi-directionally, along with mixed-flow traffic. • 4th St./Santa Ana Blvd. Couplet, from Ross St. to Mortimer St.: streetcars operate in the street, at-grade, one-way, along with mixed-flow traffic. • Santa Ana Blvd., from Mortimer St. to SARTC: streetcars operate in the street, at-grade, bi-directionally, along with mixed-flow traffic. 											
Length of Alignment	4.1 miles (Harbor Blvd. to SARTC)											
Stations (12 Stations)	<p><u>Station Locations:</u></p> <ol style="list-style-type: none"> 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. <table border="1" data-bbox="531 1177 1955 1356"> <thead> <tr> <th data-bbox="531 1185 1234 1213"><i>Couplet Section (Eastbound)</i></th> <th data-bbox="1245 1185 1955 1213"><i>Couplet Section (Westbound)</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="531 1221 1234 1248">7E. Sasser Park</td> <td data-bbox="1245 1221 1955 1248">7W. Ross St. and Santa Ana Blvd.</td> </tr> <tr> <td data-bbox="531 1256 1234 1284">8E. Broadway and 4th St.</td> <td data-bbox="1245 1256 1955 1284">8W. Broadway and Santa Ana Blvd.</td> </tr> <tr> <td data-bbox="531 1292 1234 1320">9E. Main St. and 4th St.</td> <td data-bbox="1245 1292 1955 1320">9W. Main St. and Santa Ana Blvd.</td> </tr> <tr> <td data-bbox="531 1328 1234 1356">10E. French St. and 4th St.</td> <td data-bbox="1245 1328 1955 1356">10W. French St. and Santa Ana Blvd.</td> </tr> </tbody> </table> <ol style="list-style-type: none"> 11. Lacy St. and Santa Ana Blvd. 12. SARTC 		<i>Couplet Section (Eastbound)</i>	<i>Couplet Section (Westbound)</i>	7E. Sasser Park	7W. Ross St. and Santa Ana Blvd.	8E. Broadway and 4 th St.	8W. Broadway and Santa Ana Blvd.	9E. Main St. and 4 th St.	9W. Main St. and Santa Ana Blvd.	10E. French St. and 4 th St.	10W. French St. and Santa Ana Blvd.
<i>Couplet Section (Eastbound)</i>	<i>Couplet Section (Westbound)</i>											
7E. Sasser Park	7W. Ross St. and Santa Ana Blvd.											
8E. Broadway and 4 th St.	8W. Broadway and Santa Ana Blvd.											
9E. Main St. and 4 th St.	9W. Main St. and Santa Ana Blvd.											
10E. French St. and 4 th St.	10W. French St. and Santa Ana Blvd.											

TABLE A-1: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 1

Key Attributes	Descriptions
Design Options Carried Forward	Santa Ana River Crossing: <ul style="list-style-type: none"> • Adjacent Single Track Bridge Option 4 th Street Parking Scenarios: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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) <u>TPSS Locations:</u> <ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.: <ul style="list-style-type: none"> – Scenario A: On south side by 8 ft. for a total width of 20 ft. – Scenario B: On south side by 16 ft. for a total width of 28 ft. – Scenario C: On both sides by 16 ft. for a total width of 28 ft.

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



Streetcar Alternative 1 Alignment

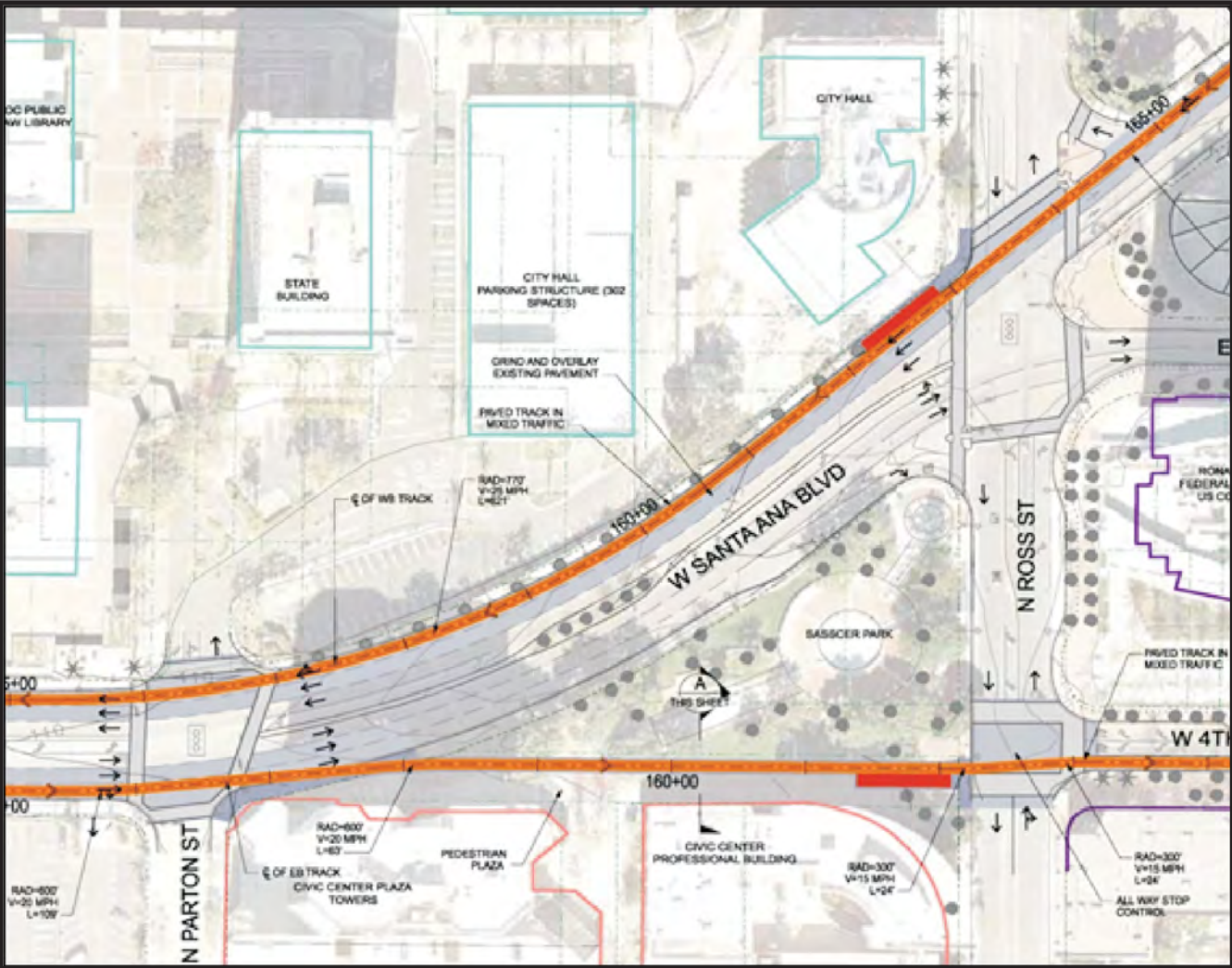


LEGEND:

- Study Area
- Proposed Stop
- Streetcar Alternative 1

0 1500 3000 FEET

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.



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

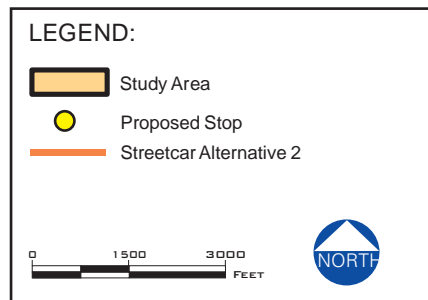
TABLE A-2: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 2			
Key Attributes	Descriptions		
Transit Mode	Streetcar		
Termini	Western Terminus: Harbor Blvd. Eastern Terminus: SARTC		
Alignment Description	<p><u>Routing by Segment:</u></p> <ul style="list-style-type: none"> • PE ROW, 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. <div style="text-align: center;"> </div>		
Length of Alignment	4.5 miles (Harbor Boulevard to SARTC)		
Stations(13 Stations)	<p><u>Station Locations:</u></p> <ol style="list-style-type: none"> 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. <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><i>Couplet Section(Eastbound)</i></p> <ol style="list-style-type: none"> 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 style="width: 50%; vertical-align: top;"> <p><i>Couplet Section(Westbound)</i></p> <ol style="list-style-type: none"> 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> </table> <ol style="list-style-type: none"> 12. Brown St. and Lacy St. 	<p><i>Couplet Section(Eastbound)</i></p> <ol style="list-style-type: none"> 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. 	<p><i>Couplet Section(Westbound)</i></p> <ol style="list-style-type: none"> 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.
<p><i>Couplet Section(Eastbound)</i></p> <ol style="list-style-type: none"> 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. 	<p><i>Couplet Section(Westbound)</i></p> <ol style="list-style-type: none"> 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. 		

TABLE A-2: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR ALTERNATIVE 2	
Key Attributes	Descriptions
	13. SARTC
Design Options Carried Forward	<u>Santa Ana River Crossing:</u> 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: <ul style="list-style-type: none"> • 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) <u>TPSS Locations:</u> <ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Sidewalk and pedestrian improvements in the vicinity of proposed station platforms. • Civic Center Drive: Provide sufficient street width on Civic Center Drive between Flower Street and Spurgeon Street to support the City’s planned development of a striped bike lane on each side of the street.

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



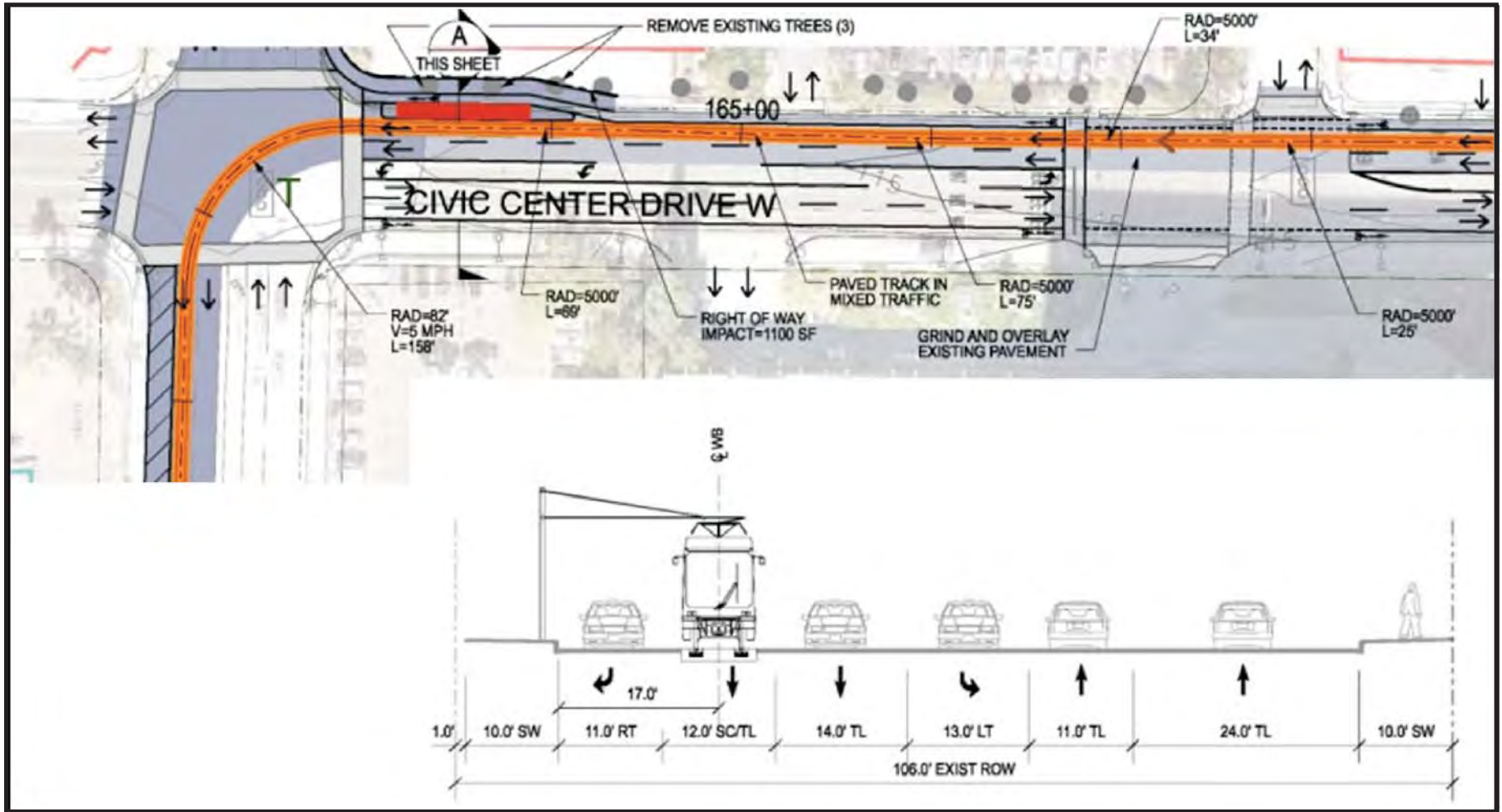
Streetcar Alternative 2 Alignment



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



Civic Center Drive Bike Lane



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

2.6.1 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**.

2.6.2 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 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.

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IOS-1 and IOS-2 Alignments



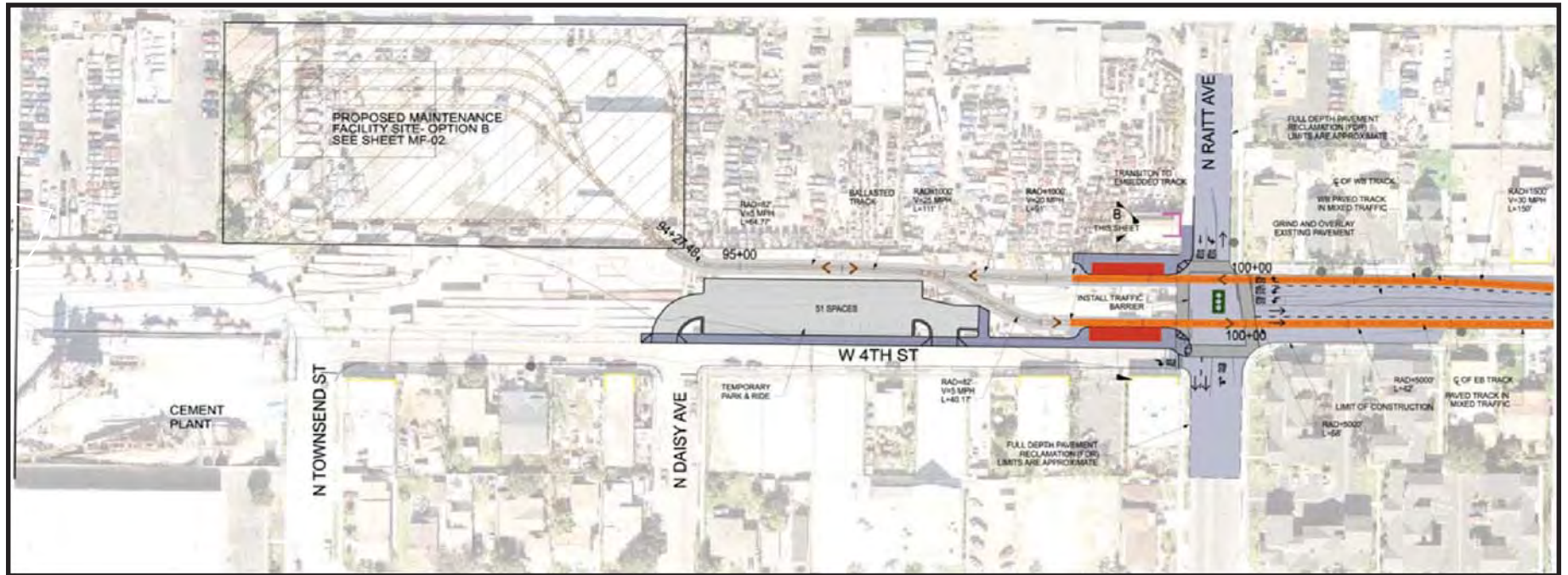
LEGEND:

- Study Area
- Proposed Stop
- Streetcar Alternative 1
- Streetcar Alternative 2

0 1500 3000 FEET

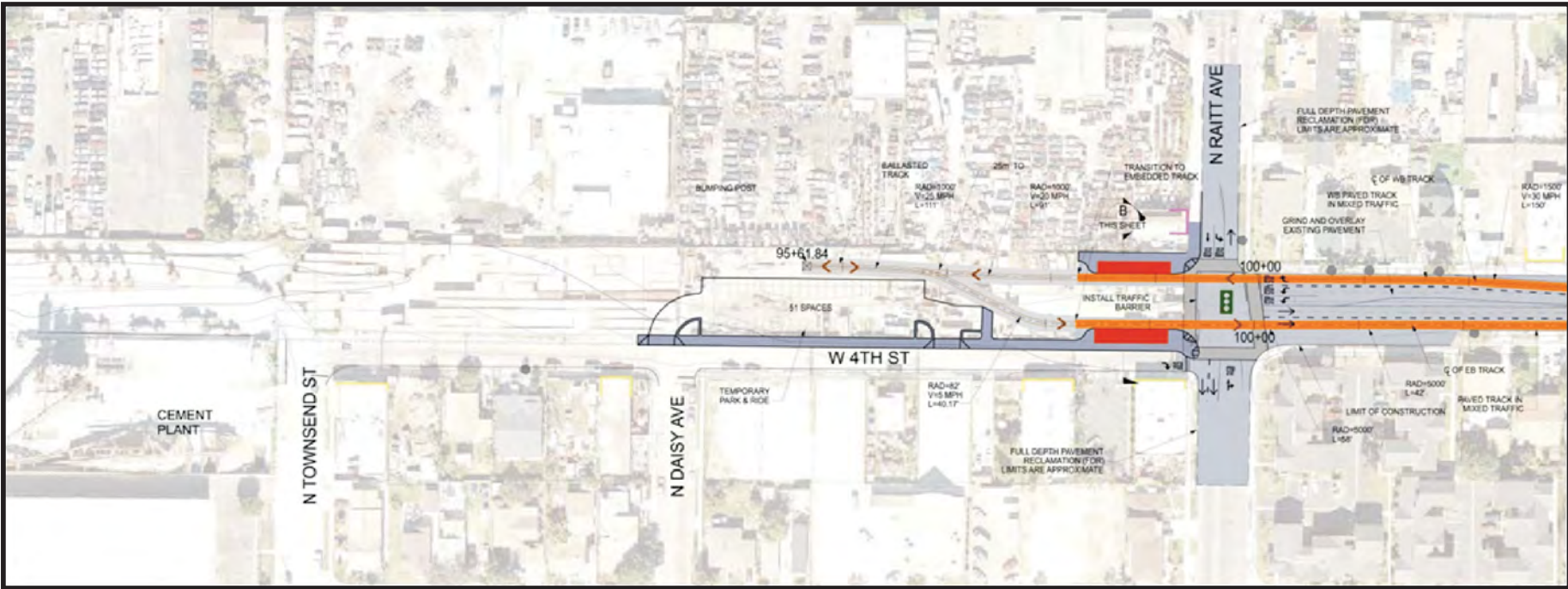


IOS-1 and IOS-2 Raitt Street Terminus Configuration with O & M Facility





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

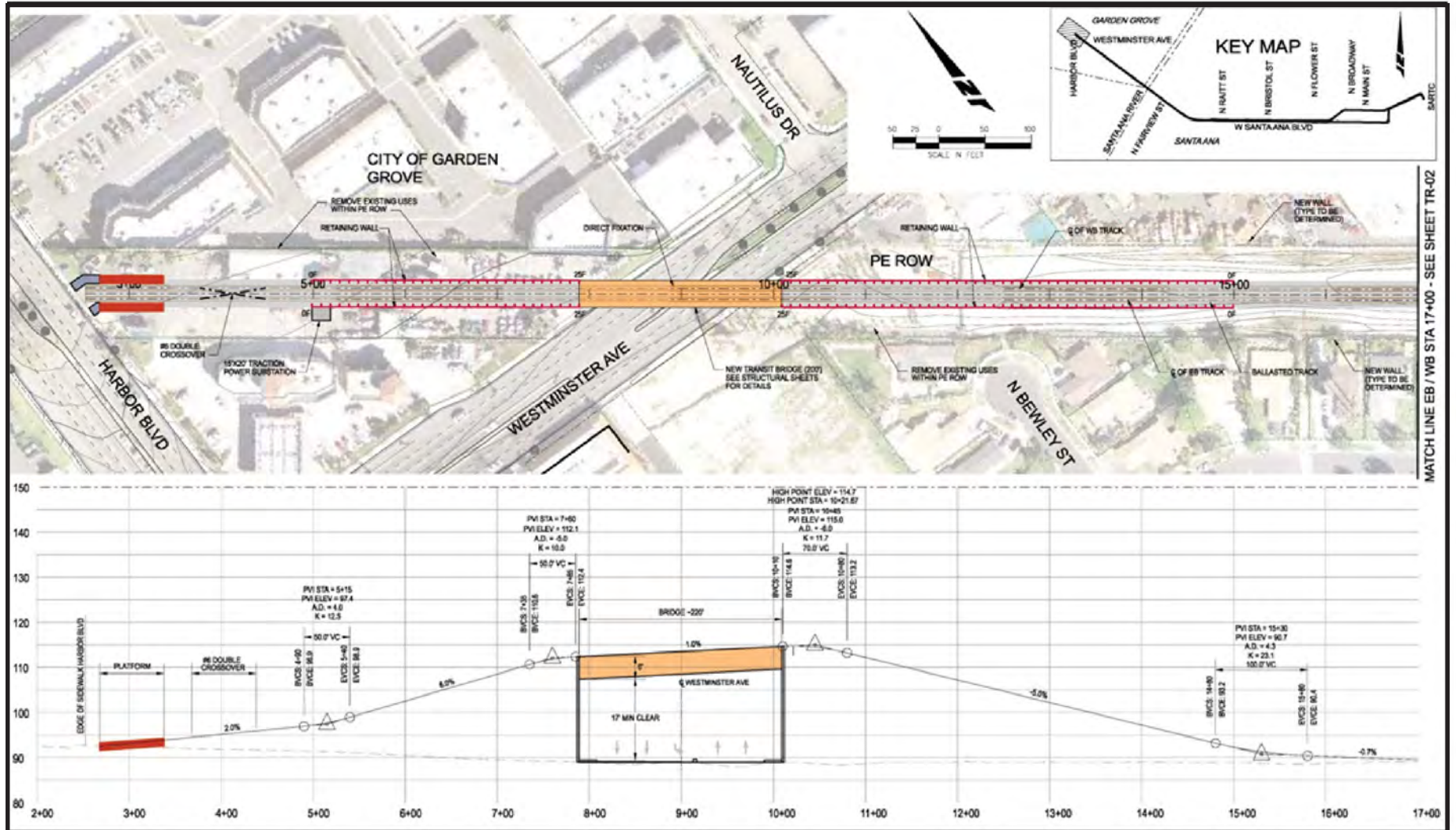
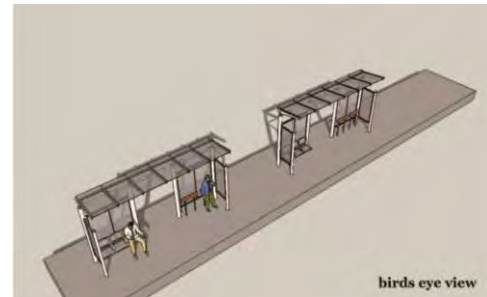
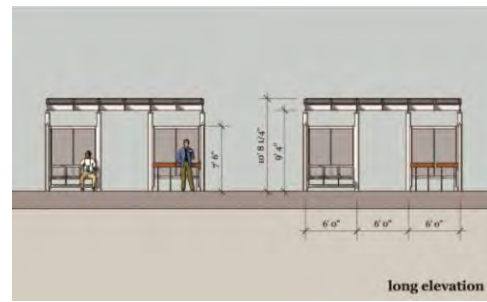


TABLE A-3: KEY PHYSICAL AND OPERATIONAL ATTRIBUTES OF STREETCAR IOS-1 AND IOS-2				
Key Attributes	IOS-1		IOS-2	
Termini	Western Terminus: Raitt St. Eastern Terminus: SARTC			
Alignment Description	<u>Routing by Segment:</u> <ul style="list-style-type: none"> • Santa Ana Blvd., from Raitt St. to Ross 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. 		<u>Routing by Segment:</u> <ul style="list-style-type: none"> • Santa Ana Blvd., from Raitt St. to Flower St.: streetcars operate in the street, at grade, bi-directionally, along with mixed-flow traffic. • Santa Ana Blvd./5th St. and Civic Center Dr. Couplet, from Flower St. to Minter St.: streetcars operate in the street, at-grade, one-way, along with mixed-flow traffic. • 6th St./Brown Street, from Minter St. to Poinsettia St.: streetcars operate in the street, at-grade, bi-directionally, along with mixed-flow traffic. • Poinsettia St./Santa Ana Blvd./Santiago St./6th St. (SARTC Loop): streetcars operate in a one-way loop, in the street, at-grade, along with mixed-flow traffic. 	
Length of Alignment	2.2 miles (Raitt St. to SARTC)		2.6 miles (Raitt St. to SARTC)	
Stations	<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.		<u>Station Locations:</u> 4. Raitt St. and Santa Ana Blvd. 5. Bristol St. and Santa Ana Blvd.	
	<i>Couplet Section (Eastbound)</i> 7E. Sasser Park 8E. Broadway and 4 th St. 9E. Main St. and 4 th St. 10E. French St. and 4 th St.	<i>Couplet Section (Westbound)</i> 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.	<i>Couplet Section (Eastbound)</i> 6E. Flower St. and Santa Ana Blvd. 7E. ----- 8E. Ross St. and Santa Ana Blvd. 9E. Broadway and 5 th St. 10E. Main St. and 5 th St. 11E. French St. and 5 th St.	<i>Couplet Section (Westbound)</i> 6W. Flower St. and 6 th St. 7W. Flower St. and Civic Center Dr. 8W. Van Ness Ave.* and Civic Center Dr. 9W. Broadway and Civic Center Dr. 10W. Main St. and Civic Center Dr. 11W. French St. and Santa Ana Blvd.
	11. Lacy St. and Santa Ana Blvd. 12. SARTC		12. Lacy St. and Santa Ana Blvd. 13. SARTC	
Headways	Peak: 10 minutes (6:00 a.m. to 6:00 p.m.) Off-Peak: 15 minutes (after 6:00 p.m.)			
Hours of Operation (in revenue service)	Monday – Thursday: 6:00 a.m. to 11:00 p.m. (17 hours) Friday and Saturday: 6:00 a.m. to 1:00 a.m. (19 hours) Sunday: 7:00 a.m. to 10:00 p.m. (16 hours)			
Power Source	Electric, Overhead Contact System, Traction Power Substations (TPSS) TPSS Locations: d. North on Santa Ana Boulevard. East of Bristol Street e. North of 5 th Street, east of Main			
Operations and Maintenance Facility Sites	Two Candidate Sites: <ul style="list-style-type: none"> • Site A: South of SARTC, bordered by 4th St., 6th St., Poinsettia St. and Metrolink tracks. • Site B: West of Raitt St., between the PE ROW and 5th St. 			

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

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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:

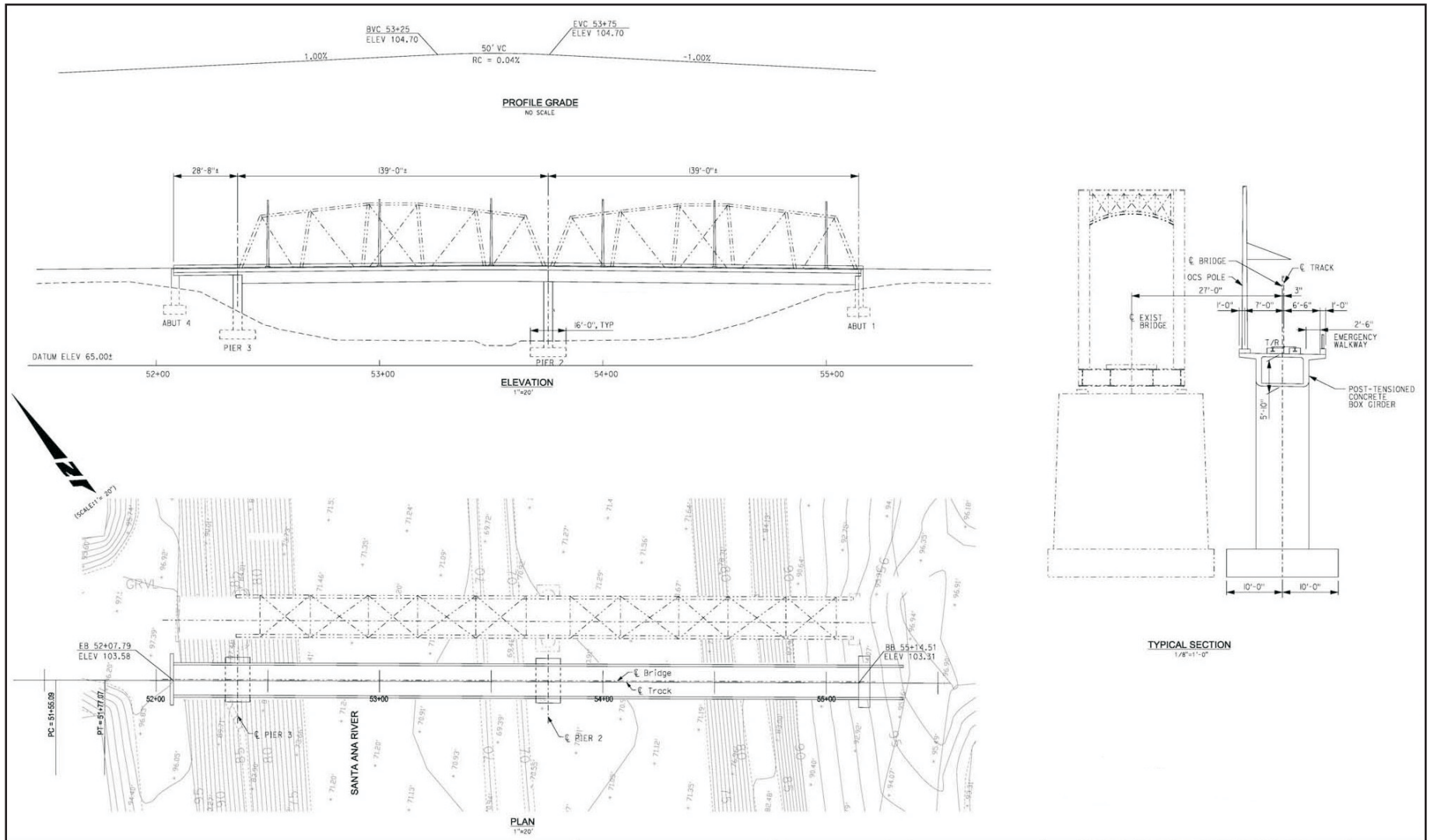
Operations and Maintenance (O & M) Facility Site Options

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.



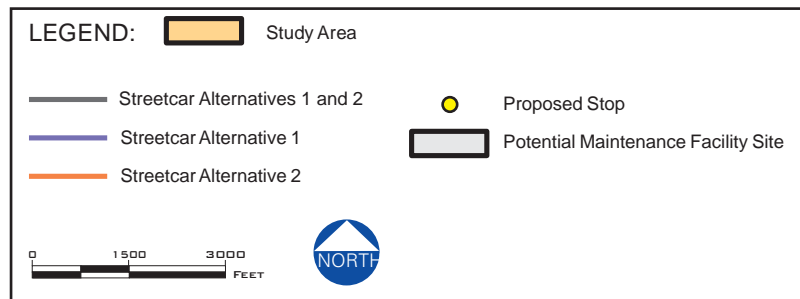
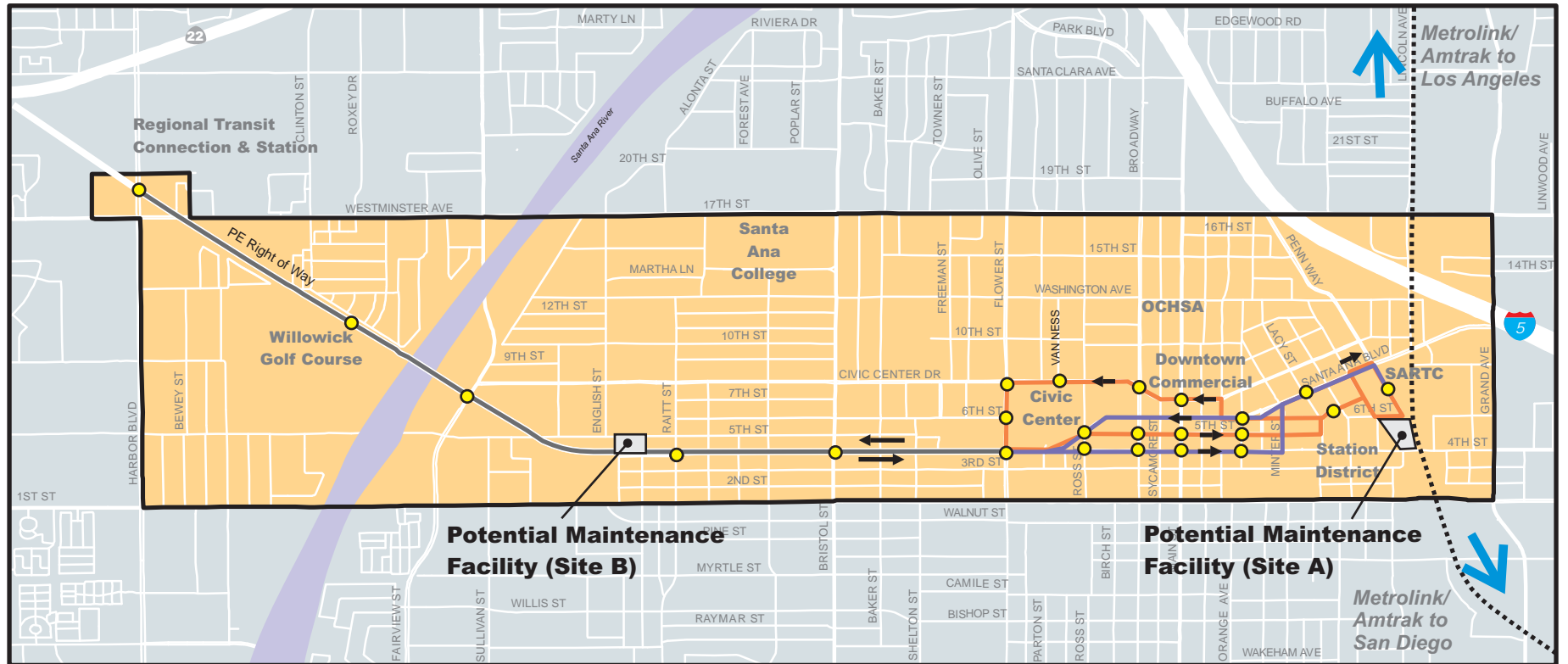
Santa Ana River Crossing



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Candidate Sites of Operations and Maintenance Facilities



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

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

Fourth Street Parking Scenarios

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

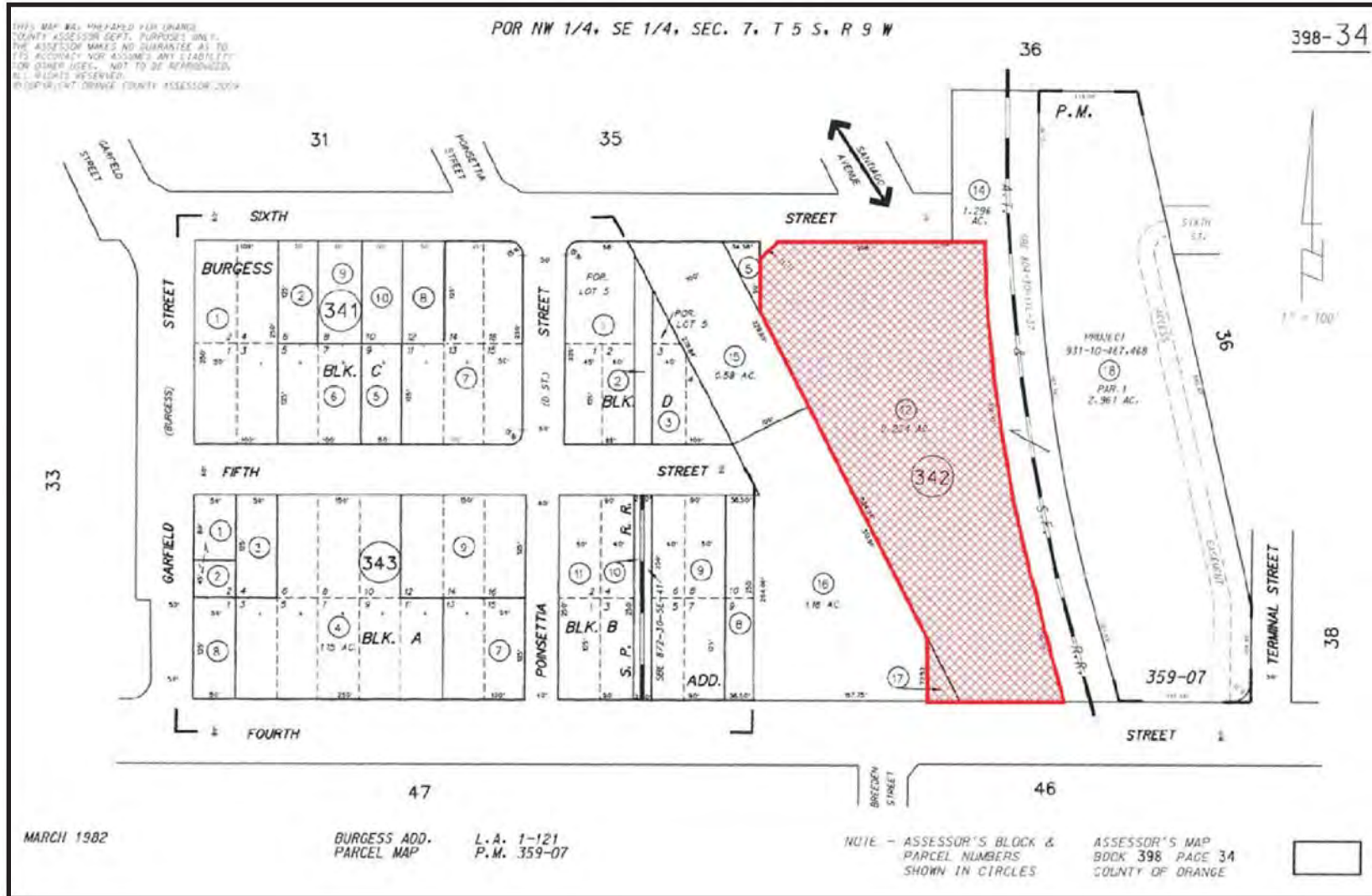
Scenario A: Convert the diagonal parking along the south side of 4th Street, between Ross Street and French Street, to parallel parking and widen the sidewalk along the south side from 12 feet to 20 feet, and replace streetlights and landscaping. A total of 26 on-street parking spaces would be removed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

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

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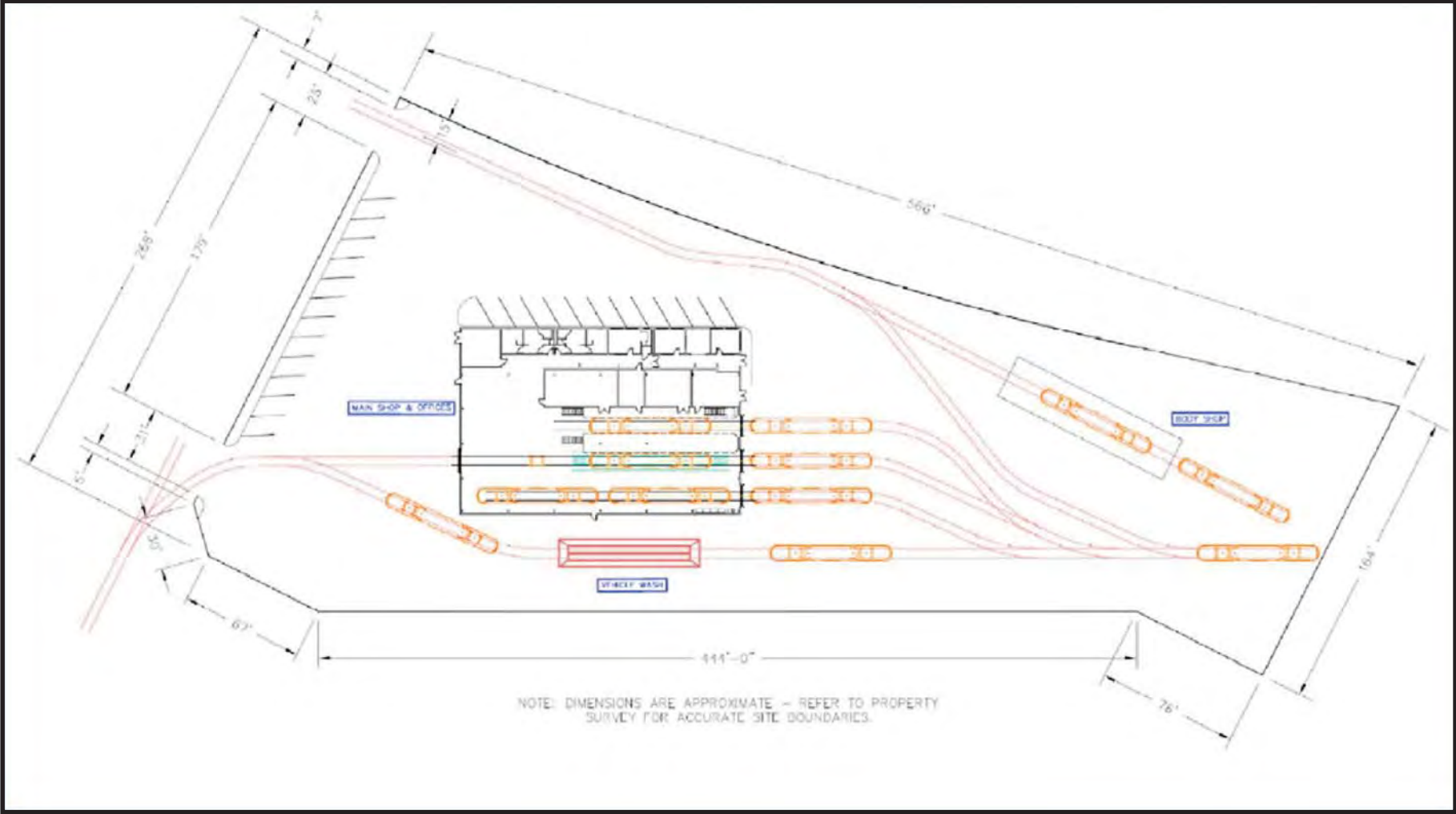


Operations and Maintenance Facility Site A - Location and Configuration





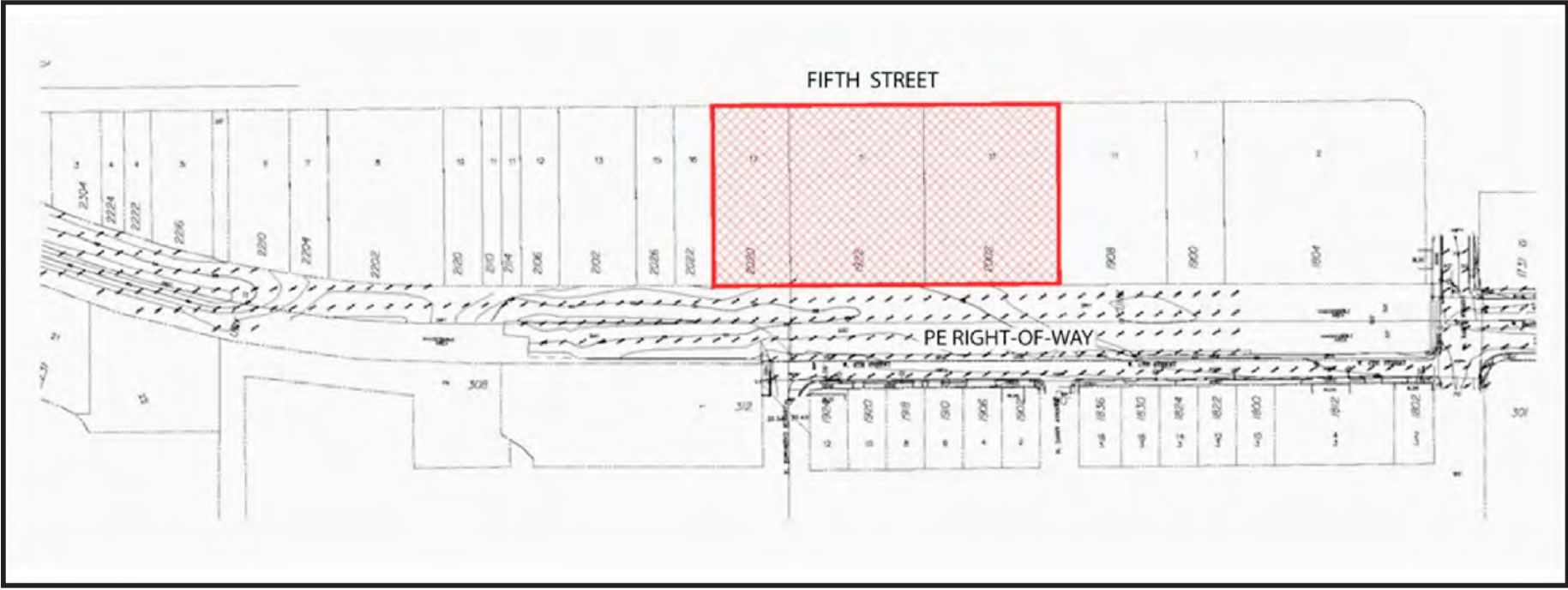
Operations and Maintenance Facility Site A - Conceptual Layout



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



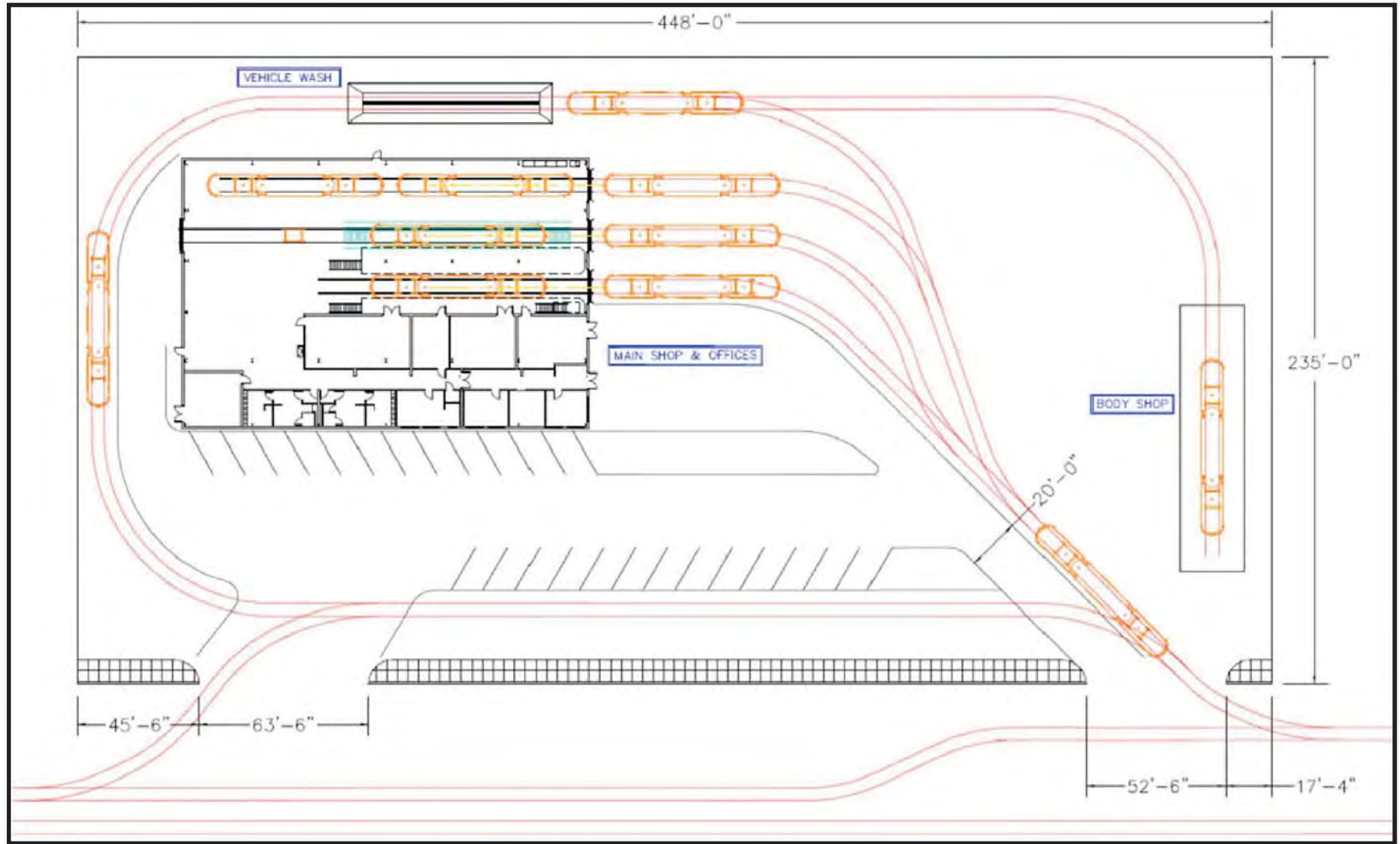
Operations and Maintenance Facility Site B - Location and Configuration



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

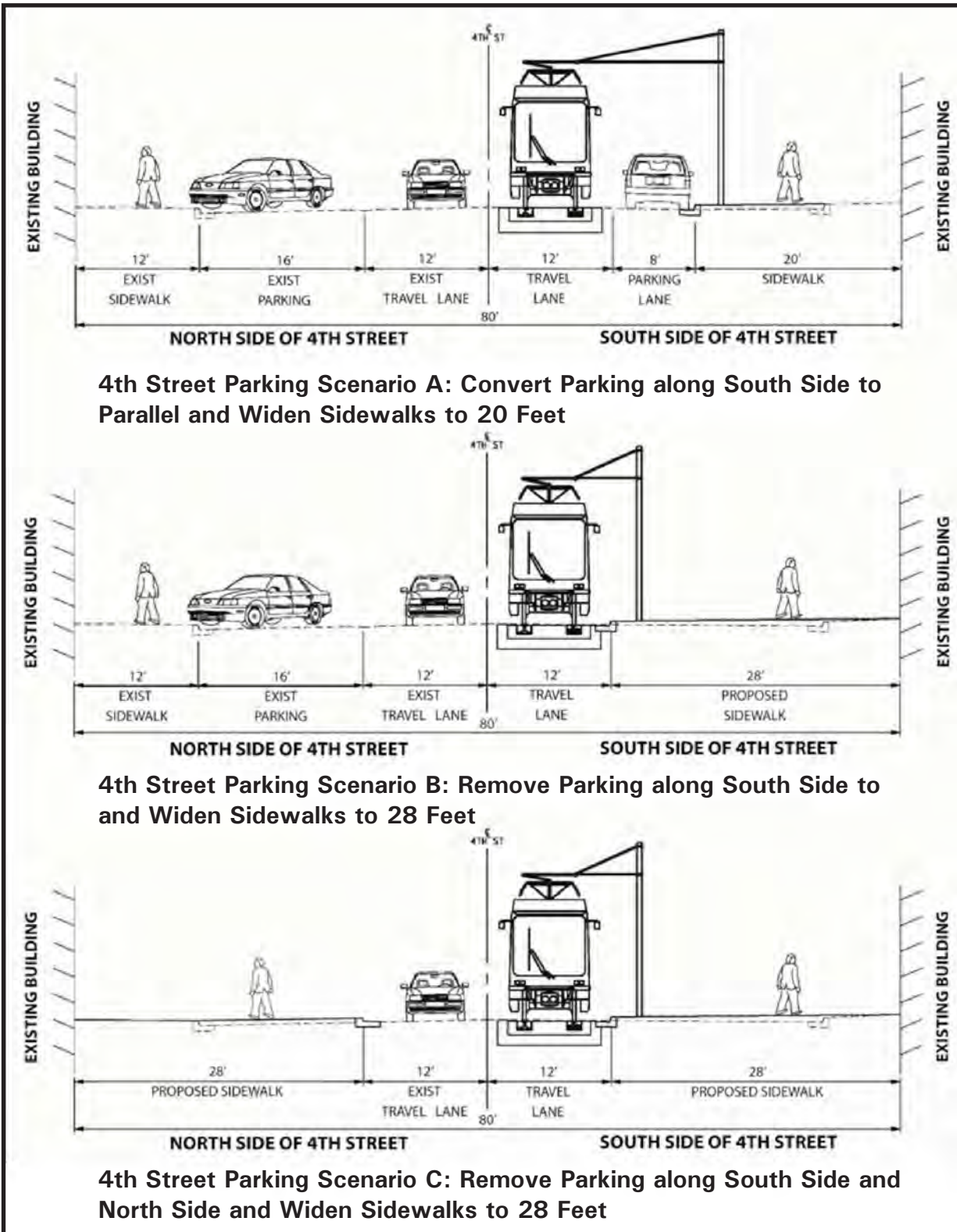


Operations and Maintenance Facility Site B - Concept Layout





4th Street Parking Scenarios



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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

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.

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- 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:
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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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