



FINAL REPORT

TECHNICAL MEMORANDUM – I-710 CORRIDOR PROJECT EIR/EIS BASELINE ALTERNATIVES ANALYSIS REPORT WBS ID:160.05.05

Prepared for



Los Angeles County
Metropolitan Transportation Authority

May 6, 2009

Prepared by:



2020 East First Street, Suite 400
Santa Ana, California 92705



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1.0 INTRODUCTION

1.1 PURPOSE OF THE I-710 CORRIDOR STUDY

Interstate 710 (I-710) is a major north-south interstate freeway connecting the City of Long Beach to central Los Angeles. Within the I-710 Corridor Project study area, the freeway serves as the principal transportation connection for goods movement between the Ports of Los Angeles (POLA)/Long Beach (POLB), located at the southern terminus of the freeway, and the BNSF/UPRR railyards in the cities of Commerce and Vernon.

As port activity levels have increased over the years, so has the number of Heavy Duty Trucks (HDTs) traveling along the corridor. This has resulted in high levels of pollution and negative impacts on the air quality and health of the I-710 communities. Additionally, when combined with recent population and employment growth within the study area, these high HDT volumes have lead to considerable congestion on the freeway and arterial systems. With such a large strain placed on the facility's capacity, I-710 is unable to accommodate current or future traffic demands.

The following issues are of particular concern and are included as components in the I-710 Corridor Project Draft Purpose and Need:

- Improve air quality and public health.
- Improve traffic safety.
- Address design deficiencies.
- Address projected traffic volumes
- Address projected growth in population, employment, and economic activities related to goods movement.

An Environmental Impact Report/Environmental Impact Statement (EIR/EIS) will be prepared to inform the public and governmental decision-makers of environmental effects associated with the proposed project and describe the measures that would be undertaken to avoid, minimize, or mitigate those effects. Additionally, federal, state, regional and local agencies will use this document to assess the environmental impacts of the project on resources under their jurisdiction, make discretionary decisions regarding the project, and exercise review or permit authority over the project.



1.2 PURPOSE OF THIS TECHNICAL MEMORANDUM

The purpose of this technical memorandum is to provide a preliminary description of all six I-710 Alternatives sufficient to characterize their benefits, impacts and costs at the screening level of the alternatives evaluation. The screening process, as described in the Alternatives Screening Methodology Report, will provide the information necessary to narrow down and identify the two build alternatives which best meet the project's Need and Purpose for environmental analysis in the EIR.



2.0 BACKGROUND

Interstate 710 (I-710) is a major north-south interstate freeway connecting the City of Long Beach to central Los Angeles. Within the I-710 Corridor Project study area, the freeway serves as the principal transportation connection for goods movement between the Ports of Los Angeles (POLA)/Long Beach (POLB), located at the southern terminus of the freeway, and the BNSF/UPRR railyards in the cities of Commerce and Vernon.

Currently, the POLA/POLB complex is the fifth largest container port in the world with projections showing a substantial increase in the volume of port activity within the I-710 study area over the next 25 years. As a result of current port activity levels, a high volume of Heavy Duty Truck (HDT) traffic has been traveling along the freeway, which was built prior to the containerization of oceangoing freight. Presently, on certain freeway segments within the City of Long Beach (between Ocean Blvd. and 9th St.), HDTs make up over thirty percent of the traffic stream during the day, as opposed to an average daily truck percentage of 6 to 13 percent on comparable freeways within Los Angeles County. In conjunction with a large growth in population and employment along the corridor, these HDT volumes have strained the facility's capacity, rendering it unable to accommodate current or future traffic demands. The congestion problem is compounded by the freeway's outdated design and the potential for accidents created by the commingling of HDTs and cars.

The immediate situation is not only disruptive to corridor residents and commuters, but to regional trucking, manufacturing and other commercial interests as shipments are delayed and trucks sit in traffic. In order to address these issues, various corridor studies have been conducted, including the I-710 Major Corridor Study (March 2005) which explored possible alternatives for transportation improvements. The outcome of this effort was a Locally Preferred Strategy (LPS) proposing ten general purpose lanes next to four separated freight movement lanes.

Most recently, the Los Angeles County Metropolitan Transportation Authority (Metro), in a cooperative effort involving Caltrans, the Gateway Cities Council of Governments (GCCOG), the Southern California Association of Governments (SCAG), the POLA, the POLB, and the I-5 Joint Powers Authority (JPA), has proposed to improve I-710 in Los Angeles County from Ocean Boulevard in the City of Long Beach, to SR-60 in East Los Angeles. To begin this process Caltrans and Metro have initiated an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed project to inform the public and governmental decision-makers of possible environmental effects associated with the project and describe the measures that would be undertaken to avoid, minimize, or mitigate those effects.



2.1 PROJECT LIMITS

The I-710 study area spans a distance of 18 miles from Ocean Boulevard in the City of Long Beach to SR-60. This includes northbound and southbound connectors and extends more than one mile east and west of I-710. **Figure 1** illustrates this study area.



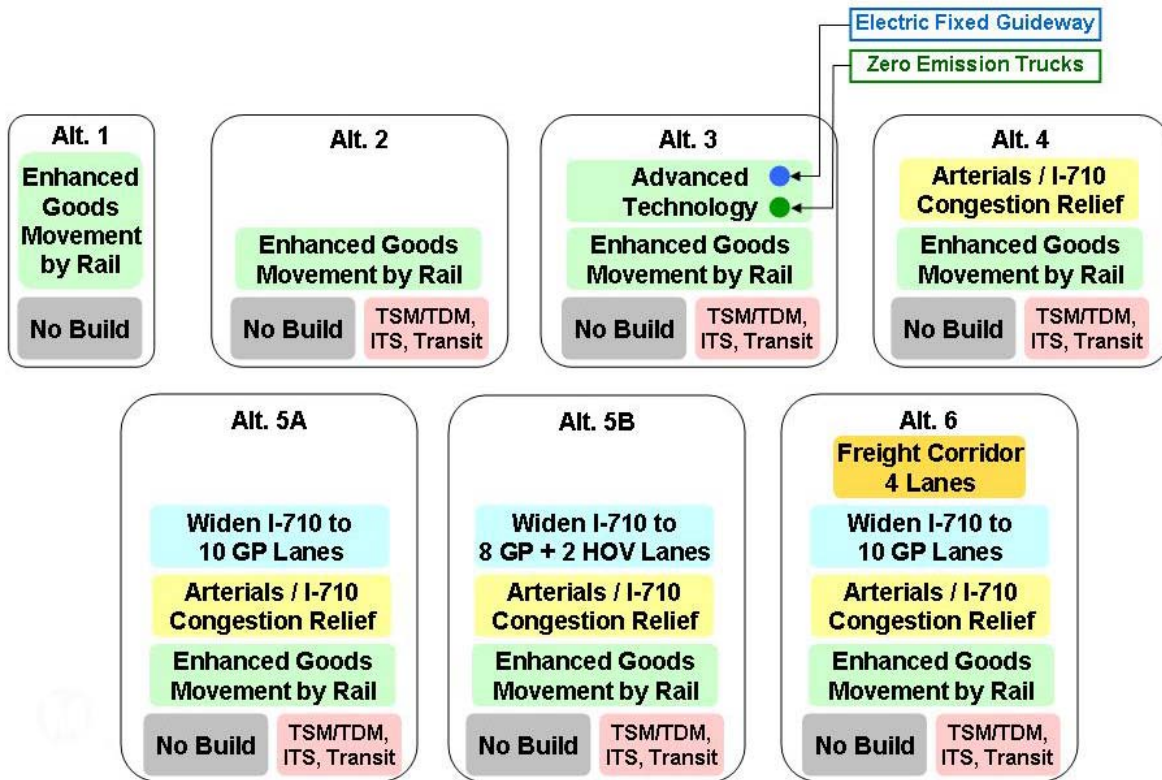
3.0 OVERVIEW OF INITIAL SET OF ALTERNATIVES

Currently, there are six proposed alternatives for the I-710 Corridor Project comprised of a No Build Alternative and five Build Alternatives, one of which (Alternative 6) is based upon the Locally Preferred Strategy identified in the Major Corridor Study which not only included the ten general purpose lanes plus four truck lanes, but the TSM and arterial elements as well. With the exception of Alternative 3, the initial set of alternatives is cumulative, meaning each alternative builds upon the last in the order listed below. For example, Alternative 6, in addition to its specific improvements, includes all the components of Alternatives 1 (including the enhanced goods movement by rail component, which is part of all subsequent alternatives), 2, 4 and 5A. Alternative 3, however, is not part of Alternatives 4, 5 and 6, but it does include the components of Alternatives 1 and 2. **Figure 2** illustrates the specific components which comprise each of the alternatives in the Initial Set. These six alternatives will be subject to review and screening in the I-710 Corridor Project EIR/EIS.

- Alternative 1: No Build (2035 Baseline)
- Alternative 2: Transportation Systems Management/Transportation Demand Management/Transit/ITS (TSM/TDM/Transit/ITS)
- Alternative 3: Goods Movement Enhancement by Rail and/or Advanced Technology
- Alternative 4: Arterial Highway and I-710 Congestion Relief Improvements
- Alternative 5A: Ten General Purpose Lanes
- Alternative 5B: Eight General Purpose Lanes Plus Two HOV Lanes
- Alternative 6: Alternative 5 with Addition of Four Separated Truck Lanes



Figure 2: Components of the Initial Set of Alternatives



Within this set of alternatives there is a wide variation in proposed improvements ranging from increased bus service to construction of a freight corridor. Based on **Table 1**, which gives the lane count for each alternative, it is evident that Alternatives 5 (both A and B) and 6 are the only alternatives that include freeway widening. **Table 2** provides the interchange configurations for Alternatives 1, 4, 5 and 6.

For the purposes of this report, Section 4 breaks down the elements of each alternative into five separate categories which include freeway improvements, arterial improvements, rail and transit improvements, improvements in goods movement and finally traffic systems and operation improvements. In this manner the specific components of the six alternatives can be clearly described and differentiated.



Table 1: Number of I-710 General Purpose Lanes and Special Purpose Lanes by Alternative

Segments on I-710		Total Number of General Purpose Lanes and Special Purpose Lanes in Both Directions															
		Alt 1		Alt 2		Alt 3		Alt 4		Alt 5a		Alt 5b			Alt 6		
From	To	GP ¹	AUX ²	GP	AUX	GP	AUX	GP	AUX	GP	AUX	GP	AUX	HOV ³	GP	AUX	Truck ⁴
Ocean/GD Bridge	Pico Ave.	5	1	5	1	5	1	5	1	6	0	4	0	2	6	0	2
Pico Ave.	Shoemaker Bridge	6	0	6	0	6	0	6	0	6	1	4	1	2	6	1	3
Shoemaker Bridge	Anaheim St.	7	2	7	2	7	2	7	2	6	0	4	0	2	6	0	4
Anaheim St.	Pacific Coast Hwy.	6	1	6	1	6	1	6	1	9	1	7	1	2	9	1	4
Pacific Coast Hwy.	Willow St.	6	0	6	0	6	0	6	0	10	2	8	2	2	10	2	4
Willow St.	Wardlow Rd.	6	1	6	1	6	1	6	1	10	2	8	2	2	10	2	4
Wardlow Rd.	I-405	6	0	6	0	6	0	6	0	8	0	6	0	2	8	0	4
I-405	Del Amo Blvd.	8	0	8	0	8	0	8	0	10	3	8	3	2	10	3	4
Del Amo Blvd.	Long Beach Blvd.	9	0	9	0	9	0	9	0	10	1	8	1	2	10	1	4
Long Beach Blvd.	Artesia Blvd.	8	3	8	3	8	3	8	3	10	3	8	3	2	10	3	4
Artesia Blvd.	SR-91	7	1	7	1	7	1	7	1	9	0	7	0	2	9	0	4
SR-91	Alondra Blvd.	9	3	9	3	9	3	9	3	10	1	8	1	2	10	1	4
Alondra Blvd.	Rosecrans Ave.	10	2	10	2	10	2	10	2	11	3	9	3	2	11	3	4
Rosecrans Ave.	I-105	8	0	8	0	8	0	8	0	10	0	8	0	2	10	0	4
I-105	MLK Blvd.	8	1	8	1	8	1	8	1	10	0	8	0	2	10	0	4
MLK Blvd.	Imperial Hwy.	8	2	8	2	8	2	8	2	10	1	8	1	2	10	1	4
Imperial Hwy.	Firestone Blvd.	8	0	8	0	8	0	8	0	10	1	8	1	2	10	1	4
Firestone Blvd.	Florence Ave.	8	0	8	0	8	0	8	0	10	1	8	1	2	10	1	4
Florence Ave.	Slauson Ave.	8	0	8	0	8	0	8	0	10	1	8	1	2	10	1	4
Slauson Ave.	Atlantic/Bandini	9	0	9	0	9	0	9	0	10	3	8	3	2	10	3	4
Atlantic/Bandini	Railroad Yards	9	0	9	0	9	0	9	0	11	1	9	1	2	11	1	4
Railroad Yards	Washington Blvd.	9	1	9	1	9	1	9	1	12	0	10	0	2	12	0	4

1. General Purpose Lanes: Traffic lane used by all vehicle types (includes single occupant autos, carpools, trucks and motorcycles), also called mixed flow lane
2. Auxiliary Lanes: Lane of typically short length added to help traffic merging onto or exiting off of the mainline highway, usually from one on-ramp to the following off-ramp.
3. High Occupancy Vehicle Lanes: Preferential lane reserved for use of high-occupancy vehicles (excludes heavy duty freight vehicles (i.e., heavy duty trucks)
4. Truck Only Lanes: Dedicated lane for the exclusive use of trucks.

**Table 2: I-710 Interchange Configurations**

Segment	Interchange	Interchange Configurations			
		Alternative 1	Alternative 4	Alternative 5	Alternative 6
1	Ocean Blvd./GD Bridge	Not Applicable	Not Applicable	Not Applicable	Not Applicable
1	Pico Ave.	Hook	Hook	Hook	Hook
1	Shoemaker Bridge /Downtown	Left Side Entrance/Exit	Left Side Entrance/Exit	Left Side Entrance/Exit	Left Side Entrance/Exit
1	Anaheim St.	Full Cloverleaf	Full Cloverleaf	Single Point Interchange	Single Point Interchange
1	Pacific Coast Highway	Full Cloverleaf	Full Cloverleaf	Single Point Interchange	Single Point Interchange
1	Willow St.	Full Cloverleaf	Full Cloverleaf	Single Point Interchange	Single Point Interchange
2	Wardlow Rd.	Partial Cloverleaf	Partial Cloverleaf	No Access	No Access
2	I-405	3-Loop	3-Loop	Stack	Stack
2	Del Amo Blvd.	3-Quadrant Partial Cloverleaf	3-Quadrant Partial Cloverleaf	NB = Partial Cloverleaf SB = Hook	NB = Partial Cloverleaf SB = Hook
3	Long Beach Blvd.	NB = Diamond SB = Partial Cloverleaf	NB = Diamond SB = Partial Cloverleaf	NB = Diamond SB = Partial Cloverleaf	NB = Diamond SB = Partial Cloverleaf
3	Artesia Blvd.	Half Diamond	Half Diamond	Half Diamond	Half Diamond
3	SR-91	1-Loop + Flyover	1-Loop + Flyover	Stack	Stack
3	Alondra Blvd.	NB = Diamond SB = Partial Cloverleaf	NB = Diamond SB = Partial Cloverleaf	Single Point Interchange	Single Point Interchange
4	Rosecrans Ave.	Partial Cloverleaf	Partial Cloverleaf	Partial Cloverleaf	Partial Cloverleaf
4	I-105	Stack	Stack	Stack	Stack
4	Martin Luther King Blvd.	SB = Diamond	SB = Diamond	SB = Diamond	SB = Diamond
4	Imperial Hwy.	Full Cloverleaf	Full Cloverleaf	Partial Cloverleaf	Partial Cloverleaf
4	Firestone Blvd.	Partial Cloverleaf	Partial Cloverleaf	Partial Cloverleaf	Partial Cloverleaf
5	Florence Ave.	Full Cloverleaf	Full Cloverleaf	Partial Cloverleaf	Partial Cloverleaf
5	Slauson Ave.	No Access	No Access	Single Point Interchange	Single Point Interchange
6	Atlantic Ave./Bandini Blvd.	Partial Cloverleaf	Partial Cloverleaf	NB = Partial Cloverleaf SB = Diamond	NB = Partial Cloverleaf SB = Diamond
6	Railroad Yards	No Access	No Access	Flyovers	Flyovers
6	Washington Blvd.	Folded Diamond	Folded Diamond	NB = Diamond	NB = Diamond



3.1 INTERCHANGE CONFIGURATION DEFINITIONS¹

Per the California Highway Design Manual (HDM), interchange types are characterized by the basic shapes of ramps: namely diamond, loop, directional, hook or variations of these types.

Hook: The freeway on- and off-ramps connect with a two-way parallel street or frontage roads

Left Side Entrance/Exit: On-ramps and off-ramps which connect to the freeway from the left side instead of the right

Full Cloverleaf: Provides loop on- and off-ramps in all four quadrants and has free-flow characteristics for all movements

Single Point Interchange: Combines two separate signalized diamond ramp intersections into one large signalized at-grade intersection

Partial Cloverleaf: Provides loop on- or off-ramps in addition to the typical four diamond-type ramps

3-Loop: Provides loop ramps in three of the four interchange quadrants to connect two freeways

3-Quadrant Partial Cloverleaf: Provides loop ramps in three of the four interchange quadrants

Flyovers: Freeway to freeway connectors which go over the freeway

Stack: Multiple flyover connections at different vertical alignments

Diamond: The simplest form of interchange that provides an on-ramp and off-ramp in both directions of the freeway

Half Diamond: Provides an on-ramp in one direction and an off-ramp in the opposite direction

Folded Diamond: Comprised of a half diamond interchange along with loop on- and off-ramps on the same side of the cross-street

1-Loop + Flyover: Provides a loop ramp and flyover to connect two freeways

¹ Caltrans Highway Design Manual Chapter 500 Traffic Interchanges, Sep. 2006. See pages 500-1 to 500-9.



4.0 DESCRIPTION OF ALTERNATIVES

The following provides a detailed baseline description of the Initial Set of Alternatives. It is important to note that the detailed descriptions of the project alternatives will evolve through the course of the I-710 Corridor Project EIR/EIS as a result of more detailed geometric, environmental and public review.

4.1 ALTERNATIVE 1: NO BUILD (2035 BASELINE)

The No Build Alternative consists of those transportation projects that are already programmed and/or committed to be constructed by or before the study's planning horizon year of 2035. Therefore, Alternative 1 represents future travel conditions in the I-710 Corridor and is the baseline against which the I-710 Corridor Project alternatives are assessed. The projects included in this alternative are based on SCAG's 2008 Regional Transportation Plan as well as the 2008 Regional Transportation Improvement Program (RTIP) project list. The major projects included in Alternative 1 in the study area, over and above current year (2008) conditions are listed below in Section 4.1.1.

4.1.1 Major Projects by Mode/System

This section describes the components of Alternative 1 2035 No Build and **Table 3** lists and explains the major elements of Alternative 1 over and above today's transportation system. **Table 3** is divided into five different categories. Category one describes the freeway elements, category two the arterial elements, category three the rail and transit elements, category four the goods movement elements and category five explains the traffic systems and operations elements.

Table 3: Alternative 1 – No Build

I-710 Study Area Freeway System	
Project	Description
I-710	Project Limits: At Firestone Blvd. <ul style="list-style-type: none"> • Modify the southbound on-ramp (For a List of Baseline I-710 Freeway State Highway Operations and Protection Program (SHOPP) Projects see Appendix A)
I-5	Project Limits: Orange County Line to I-605 (6.7 miles) <ul style="list-style-type: none"> • Widen by 1 HOV lane and 1 mixed flow lane in each direction (widen from 3 to 5 lanes each direction) • Reconstruct the Valley View Ave. interchange to a tight-diamond interchange • Reconstruct the Carmenita Rd. interchange by removing the existing 2 lane structure and constructing a new interchange with tight diamond ramps; construct a grade separation for the railroad crossing south of the freeway



Table 3: Alternative 1 – No Build, Continued

I-710 Study Area Freeway System, Continued	
Project	Description
I-10	Project Limits: Baldwin Ave. to I-605 (6 miles) <ul style="list-style-type: none"> Widen for new HOV lanes, 1 lane in each direction (widen from 4 to 5 lanes each direction) Traffic Operations System Projects
	Project Limits: Westbound-Santa Anita to I-710; Eastbound I-710 to Baldwin Ave. ² <ul style="list-style-type: none"> Expand capacity of the I-10 HOT lane (restriping to add a second lane for HOT lane on I-10 with buffer changes)
	Project Limits: Alameda St./Union Station to I-605 ² <ul style="list-style-type: none"> Conversion of HOV lanes to HOT lanes on the I-10 from Alameda Street/Union Station to I-605
SR-47	Project Limits: Terminal Island (Ocean Blvd.) to Pacific Coast Highway <ul style="list-style-type: none"> Replace Schuyler Heim Bridge over the Cerritos Channel with a fixed span bridge connecting to a new limited-access four-lane elevated highway that parallels Henry Ford Ave. and that merges with Alameda St. Construct new 2 lane flyover to divert eastbound Ocean Blvd. traffic directly to northbound SR-47 and across the new bridge
I-110	Project Limits: At John S. Gibson Blvd. interchange <ul style="list-style-type: none"> Extend the existing off-ramp at John S. Gibson Blvd. Modify to a 2-lane exit and re-stripe to accommodate 1 shared through and left-turn lane and 1 exclusive right lane Create an additional left turn lane on southbound John S. Gibson Blvd. for traffic destined to port terminals Enhances the operation and safety of the I-110/SR-47/Harbor Blvd. interchange connector
	Project Limits: 182 St./Artesia Transit Center to Adams Blvd. ² <ul style="list-style-type: none"> Conversion of HOV lanes to HOT lanes on the I-110 from St./Artesia Transit Center to Adams Blvd.
I-405	Project Limits: At Wilmington Ave./223 rd St. <ul style="list-style-type: none"> Add 1 lane on Wilmington Ave. northbound from 223rd St. to I-405 northbound off-ramp (widen from 3 to 4 lanes) Construct new 2 lane northbound on-ramp from southbound Wilmington Ave. Add 1 lane to I-405 southbound on and off ramps (widen from 2 to 3 lanes)
	Project Limits: At Avalon Blvd. <ul style="list-style-type: none"> Add 1 lane in northbound direction on Avalon Blvd. under I-405 (widen from 3 to 4 lanes) Construct new 2 lane on-ramp to southbound I-405 Add 2 lanes to northbound off-ramp (widen from 1 to 3 lanes), 2 lanes to southbound off-ramp (widen from 1 to 3 lanes) Construct 5 lane connector road from southbound off-ramp to Avalon Blvd. (widening from 2 to 3 lanes within existing Caltrans right of way)

² FastLanes: A one year congestion reduction demonstration project which will convert High-Occupancy Vehicle (HOV) lanes on I-10 (Alameda St to I-605) and I-110 (Adams Blvd to Artesia Transit Center) to High-Occupancy Toll (HOT) lanes starting December 31, 2010. Funding for this pilot program is provided through a US Department of Transportation grant financed by the federal government. Although this program is included in the No Build project list, it is unsure as to whether it will still be in effect in 2035.

**Table 3: Alternative 1 – No Build, Continued**

I-710 Study Area Roadway System	
Project	Description
Ocean Boulevard./Gerald Desmond Bridge	Project Limits: Gerald Desmond Bridge over entrance channel <ul style="list-style-type: none"> • Replace existing 5 lane Gerald Desmond Bridge with new 6 lane bridge (3 lanes in each direction) • Construct the Terminal Island East Interchange and I-710 connector ramps
Harry S. Bridges Boulevard	Project Limits: Figueroa St. to Alameda St. (1.4 miles) <ul style="list-style-type: none"> • Relocation/consolidation of streets, street intersections, traffic channelization and signalization • Widening will be accommodated (exact number of lanes yet to be determined)
C Street	Project Limits: At I-110 Fwy on/off-ramps <ul style="list-style-type: none"> • Consolidate two closely spaced intersections into one (Figueroa St./C St. and Figueroa St./Harry Bridges Blvd.)
Anaheim Street	Project Limits: Farragut Ave. to Dominguez Channel (0.5 miles) <ul style="list-style-type: none"> • Widen existing roadway from 4 to 6 lanes
Del Amo Boulevard	Project Limits: At I-405 <ul style="list-style-type: none"> • Construct new 6 lane overcrossing
Sepulveda Boulevard	Project Limits: Alameda St. to Eastern City Limits of Carson (4.6 miles) <ul style="list-style-type: none"> • Add 1 lane in each direction (widen from 2 to 4 lanes)
Firestone Boulevard	Project Limits: Firestone Blvd. Bridge over the Los Angeles River <ul style="list-style-type: none"> • Widen on the south side and add a lane in the eastbound direction • Retrofit the bridge for compliance with the latest seismic standards
Washington Boulevard	Project Limits: Commerce/Vernon city boundary (350 feet west of Indiana St.) to I-5 Fwy at Telegraph Rd. (3 miles) <ul style="list-style-type: none"> • Reconstruct and add 1 lane in each direction on Washington Blvd. from Commerce/Vernon city boundary at Vernon to I-5 fwy. at Telegraph Rd. (widen from 2 to 3 lanes) • Increase turn radius and medians • Upgrade traffic signals
I-710 Study Area Rail/Transit	
Project	Description
Exposition Line Light Rail Transit	Light rail transit project Phase I: from 7 th St./Metro Station to Venice/Robertson Station (Metro) Light rail transit project Phase II: from Venice/Robertson Station to Santa Monica (Metro)
Eastside Line Light Rail Transit	Union Station to Atlantic Blvd. via 1 st St. to Lorena St., then 3 rd St. via 3 rd St./Beverly Blvd. to Atlantic Blvd. (Metro)
Blue Line Light Rail Transit	<ul style="list-style-type: none"> • Build a parking structure on First St. near southerly terminus of the Long Beach Blue Line in downtown Long Beach • Construct a park and ride facility in Long Beach at 3rd St. and Pacific Ave. south of the Metro Blue Line Pacific Station—include 300 to 500 parking spaces and residential/commercial development • Torrance Transit Line #6—Blue Line feeder service



Table 3: Alternative 1 – No Build, Continued

I-710 Study Area Rail/Transit, Continued	
Project	Description
HOT Lane Bus Service	Implement new bus services to expand transit for I-10 and I-110 High Occupancy Toll (HOT) lanes ²
I-710 Study Area Goods Movement	
Project	Description
Clean Trucks Program	<ul style="list-style-type: none"> • Beginning October 1, 2008 the POLA and the POLB will ban all pre 1989 trucks from the port terminals • By January 1, 2010 all trucks from 1989 to 1993 will be banned along with all unretrofitted trucks from 1994 to 2003 • By January 1, 2012 all trucks that do not meet the 2007 federal clean truck emission standards will be banned
Truck Impacted Intersections	Phase I: Improve 14 intersections by installing new video detection cameras, restriping, and improving traffic signals (see Appendix B for detailed intersection improvements)
	Phase II: Improve 20 additional intersections by installing new video detection cameras, restriping, and improving traffic signals (see Appendix B for detailed intersection improvements)
Expanded Pier Pass	Adjust Pier Pass program to produce truck trip terminal gate temporal distribution of 60% day shift, 20% night shift, 20% hoot owl shift
Empty Container Management	Empty container management through policies and incentives (including virtual container yard)
Enhanced Goods Movement by Rail ³	<ul style="list-style-type: none"> • On-Dock Rail - San Pedro Bay Ports Rail Study Update (2008) on-dock rail improvements: <ul style="list-style-type: none"> - Increases operating efficiencies of existing on-dock rail facilities - Adds new on-dock rail facilities in tandem with Port terminal expansion - Includes supporting harbor district rail infrastructure - Results in an estimated increase in on-dock rail capacity from 3.8 million annual TEU (existing conditions) to an estimated 12.8 million annual TEU • BNSF / UP Mainline Capacity Improvements - freight railroad operational improvements and track capacity additions to accommodate increased levels of freight train traffic: <ul style="list-style-type: none"> - Colton Crossing - Grade separate the UP and BNSF tracks by building a fly over structure to carry the UP tracks over the BNSF tracks in the City of Colton. This 7,250 ft long UP grade separation would begin at Rancho Ave. and end at the Mount Vernon Ave. overpass. - Positive train control and electro-pneumatic braking technology applications to increase productivity and to permit significant increases in traffic density over existing operating practice. - BNSF triple track projects - Complete planned triple track construction on San Bernardino Subdivision between Norwalk and Fullerton and potential future triple tracking of all remaining double track segments from Los Angeles to San Bernardino. - UP double track projects - Complete planned addition of second main track on Alhambra Subdivision between Pomona and Colton and potential second main track on LA Subdivision between Mira Loma and Riverside.

³ At the April 1, 2009 I-710 Technical Advisory Committee Meeting, the TAC members chose to remove the Enhanced Goods Movement by Rail component from Alternative 3 given that these projects would not be completed as part of the I-710 Corridor Project. Instead it was decided that these rail projects would be assumed in Alternative 1 (No Build).

**Table 3: Alternative 1 – No Build, Continued**

I-710 Study Area Goods Movement	
Project	Description
Enhanced Goods Movement by Rail Continued³	<ul style="list-style-type: none"> • Intermodal Freight Rail Facilities: <ul style="list-style-type: none"> – Improve operational efficiencies at the existing intermodal yards in Vernon and Commerce to increase throughput. – Provide additional intermodal terminal capacity in Southern California. Options include expansion of the City of Industry Yard and construction of the Victorville Yard
I-710 Study Area Traffic Systems and Operations	
Project	Description
I-710 Communication System and Closed Circuit TV System (CCTV)	Project Limits: On I-710 from PCH to I-405 (2.5 miles) <ul style="list-style-type: none"> • Install facilities for traffic monitoring system and closed circuit TV system
Advanced Traffic Management Information System (ATMIS)	Project Limits: Ports of Long Beach and Los Angeles <ul style="list-style-type: none"> • Implement an Advanced Transportation Management System (ATMS) and Advanced Traveler Information System (ATIS) to improve traffic flow for the Ports and the adjacent regional transportation system
Atlantic Avenue Signal Synchronization and Enhancement Project	Project Limits: On Atlantic Avenue between Ocean Blvd. and Wardlow Rd. (3.5 miles) <ul style="list-style-type: none"> • Major reconstruction and minor upgrades of traffic signals along Atlantic improve traffic flow
Ocean Boulevard Signal Synchronization and Enhancement Project	Project Limits: On Ocean Boulevard between Alamitos Ave. and Livingston Dr./2 nd St. (2.6 miles) <ul style="list-style-type: none"> • Reconstruct, upgrade and synchronize traffic signals along the corridor to reduce traffic congestion
Gateway Cities Forum – Carson Street Signal Synchronization	Project Limits: On Carson Street between Long Beach Blvd. to Bloomfield Ave. (7.3 miles) <ul style="list-style-type: none"> • Provide time-based traffic signal synchronization and upgrades to improve the overall progression of traffic along and crossing these routes
Florence Avenue Traffic Signal Communications System	Project Limits: On Florence Avenue between Old River School Rd. and Fairford Ave. (3.6 miles) <ul style="list-style-type: none"> • Develop Ethernet based communication network
Southeast Los Angeles County (SELAC) - Traffic Signal Synchronization	Project Limits: I-710/Atlantic Boulevard Corridor; I-5/Telegraph Road Corridor; Lakewood/Rosemead Boulevard & Paramount Boulevard Corridor; I-105/Firestone Boulevard, Imperial Highway, Rosecrans Avenue Corridor <ul style="list-style-type: none"> • Implement a real-time traffic signal synchronization system to effectively managed high traffic volumes and reduce traffic congestion • Provide additional lane capacity through minor roadway widening and peak hour parking restrictions
Wilmington Automated Traffic Surveillance and Control System/ Adaptive Traffic Control System (ATSAC/ATCS) Project	Project Limits: Southern portion of the City of LA, bounded by Sepulveda Blvd. on the north, the City of Long Beach on the east, Seaside Ave./Ocean Blvd. on the south, Western Ave. on the west <ul style="list-style-type: none"> • Implement a real-time traffic signal synchronization system to effectively managed high traffic volumes and reduce traffic congestion at 70 signalized intersections



Table 3: Alternative 1 – No Build, Continued

I-710 Study Area Traffic Systems and Operations, Continued	
Project	Description
Harbor-Gateway Automated Traffic Surveillance and Control System/ Adaptive Traffic Control System (ATSAC/ATCS) Project	<p>Project Limits: Southerly portion of the City of LA, bounded by Manchester Ave. on the north, Alameda St. on the east, Imperial Highway on the south, Vermont Ave. on the west</p> <ul style="list-style-type: none"> Implement a real-time traffic signal synchronization system to effectively manage high traffic volumes and reduce traffic congestion at 109 signalized intersections
Gateway Cities Forum Traffic Signal Corridor Projects	<p>Phase II: Project Limits: On Pacific Boulevard/Long Beach Boulevard between Florence Ave. and Willow St. (7.1 miles)</p> <ul style="list-style-type: none"> Provide time-based traffic signal synchronization and upgrades to improve the overall progression of traffic along and crossing these routes
	<p>Phase III: Project Limits: On Artesia Boulevard between Alameda Blvd. and Valley View Ave. (10.8 miles); on Central Avenue between El Segundo Blvd. to Victoria St. (3.4 miles); on Gage Avenue between Central Ave. to Slauson Ave. (0.5 miles); on Whittier Boulevard between Paramount Blvd. to Valley Home Ave. (8 miles); on Wilmington Avenue between Imperial Highway to Sepulveda Blvd. (8.7 miles)</p> <ul style="list-style-type: none"> Provide time-based traffic signal synchronization and upgrades to improve the overall progression of traffic along and crossing these routes <p>Project Limits: I-105 Corridor ITS Project, Phase 3 (arterials within the Corridor include Firestone Blvd., Imperial Highway and Rosecrans Ave.)</p> <ul style="list-style-type: none"> Implement a traffic signal management and control system which allows jurisdictions to respond more efficiently to traffic congestion
	<p>Phase IV: Project Limits: On 38th Street/37th Street/Bandini Boulevard between Alameda St. and Garfield Ave. (6.2 miles); on Garfield Avenue between Olympic Blvd. and Eastern Ave. (4.6 miles); on Studebaker Road between Florence Ave. to Del Amo Blvd. (6.4 miles)</p> <ul style="list-style-type: none"> Provide time-based traffic signal synchronization and ITS improvements to enhance intersection operations, increase traffic mobility and relieve existing traffic congestion on surface arterials
	<p>Phase V: Project Limits: On Alameda Street between Nadeau St. to Auto Drive South (6.3 miles); on Florence Avenue/Mills Avenue from Central Ave. to Scout Ave. (6.5 miles); on South Street between Atlantic Ave. to Carmenita Rd. (8 miles); on Washington Boulevard between Atlantic Blvd. and Whittier Blvd. (8 miles)</p> <ul style="list-style-type: none"> Provide time-based traffic signal synchronization and ITS improvements to enhance intersection operations, increase traffic mobility and relieve existing traffic congestion on surface arterials

For a detailed list of Baseline Traffic Systems and Operations elements see **Appendix C**.



4.2 ALTERNATIVE 2: TRANSPORTATION SYSTEM MANAGEMENT/TRANSPORTATION DEMAND MANAGEMENT/TRANSIT/INTELLIGENT TRANSPORTATION SYSTEMS

Alternative 2 includes the projects in Alternative 1 plus operational investments, policies, and actions aimed at improving goods movement, passenger auto and transit travel, as well as reducing the environmental impacts of transportation for cities and operations in the I-710 study area, including improvements to transit in the I-710 corridor and implementation of ITS applications. A summary of proposed improvements is included in Section 4.2.1. For a detailed description of Alternative 2 refer to the *I-710 Multimodal Review (03.04.08)*.

4.2.1 Major Projects by Mode/System

This section describes the components of Alternative 2 TSM/TDM/Transit/ITS and **Table 4** lists and explains the major elements of Alternative 2 over and above today's transportation system. **Table 4** is divided into five different categories. Category one describes the freeway elements, category two the arterial elements, category three the rail and transit elements, category four the goods movement elements and category five explains the traffic systems and operations elements. Also included in this section is a listing of the 42 I-710 arterial intersections proposed for improvement under Alternative 2 (**Table 5**) along with a map depicting each of their locations (**Figure 3**).

Table 4: Alternative 2 – TSM/TDM/Transit/ITS

I-710 Study Area Freeway System	
Project	Description
	Includes all freeway system projects from Alternative 1 (No Build)
I-710	Additional ramp metering 1.) Eastbound Anaheim St. to northbound I-710 2.) Westbound Anaheim St. to northbound I-710 3.) Eastbound Willow St. to northbound I-710 4.) Westbound Willow St. to northbound I-710 5.) Eastbound Pacific Coast Highway to northbound I-710 6.) Westbound Pacific Coast Highway to northbound I-710 7.) Wardlow Rd. to northbound I-710 8.) Eastbound Anaheim St. to southbound I-710 9.) Westbound Anaheim St. to southbound I-710 10.) Eastbound Willow St. to southbound I-710 11.) Westbound Willow St. to southbound I-710 12.) Eastbound Pacific Coast Highway to southbound I-710 13.) Westbound Pacific Coast Highway to southbound I-710
	Improved signage on I-710 (added overhead signs, advanced notification)



Table 4: Alternative 2 – TSM/TDM/Transit/ITS, Continued

I-710 Study Area Roadway System, Continued	
Project	Description
	Includes all roadway system projects from Alternative 1 (No Build)
Atlantic Boulevard	Project Limits: On Atlantic Blvd. between Pacific Coast Highway and SR-60 <ul style="list-style-type: none"> • Parking restrictions during peak periods to increase capacity by one lane in each direction
Cherry Avenue/ Garfield Avenue	Project Limits: On Cherry Ave./Garfield Ave. between Pacific Coast Highway and SR-60 <ul style="list-style-type: none"> • Parking restrictions during peak periods to increase capacity by one lane in each direction
Eastern Avenue	Project Limits: On Eastern Ave. between Cherry Ave. and Atlantic Blvd. <ul style="list-style-type: none"> • Parking restrictions during peak periods to increase capacity by one lane in each direction
Long Beach Boulevard	Project Limits: On Long Beach Blvd. between San Antonio Dr. and Firestone Blvd. <ul style="list-style-type: none"> • Parking restrictions during peak periods to increase capacity by one lane in each direction
I-710 Arterial Intersections	Congestion Relief Projects: Improvements to 42 intersections within the study area which includes signal phasing/timing mitigation (See Table 13 and Figure 3) – This intersection evaluation is only a preliminary analysis and will be refined further pending the results of the detailed traffic forecasts to be developed after alternatives screening
I-710 Study Area Rail/Transit	
Project	Description
	Includes all rail/transit projects from Alternative 1 (No Build)
Blue Line Light Rail Transit	Approximately a 16% increase in peak period service (service frequency): reduce peak headways from 6 minutes to 5 minutes and off-peak headways from 15 minutes to 10 minutes
Green Line Light Rail Transit	Approximately a 16% increase in peak period service (service frequency)
Metrolink	Increase services, upgrade the Commerce Station to 100 percent of 91 Line Service (current service ~75 percent), new connection between the Green Line Norwalk station and the Metrolink Norwalk Station, expansion of existing Metrolink service (Riverside Line and Orange County/91 Lines)
Express Bus Service	Expansion of existing high speed bus service on freeways (e.g., I-605)
	Increase in corridor Metro Rapid service frequency by about 33 percent, reduce headways by 50 percent (from 10 minutes to 5 minutes) on all Metro Rapid routes in the study area
Local Bus Service	Increase corridor local bus service (service frequency) by about 68 percent: for bus routes in the study area (both Metro and Long Beach Transit) reduce headways greater than 20 minutes by 50 percent and headways less than 20 minutes to 10 minutes
	Expansion of existing community bus service (e.g. local circulators Montebello Transit, Compton Renaissance Transit System, East Los Angeles Shuttle)
I-710 Study Area Goods Movement	
Project	Description
	Includes all goods movement projects from Alternative 1 (No Build)



Table 4: Alternative 2 – TSM/TDM/Transit/ITS, Continued

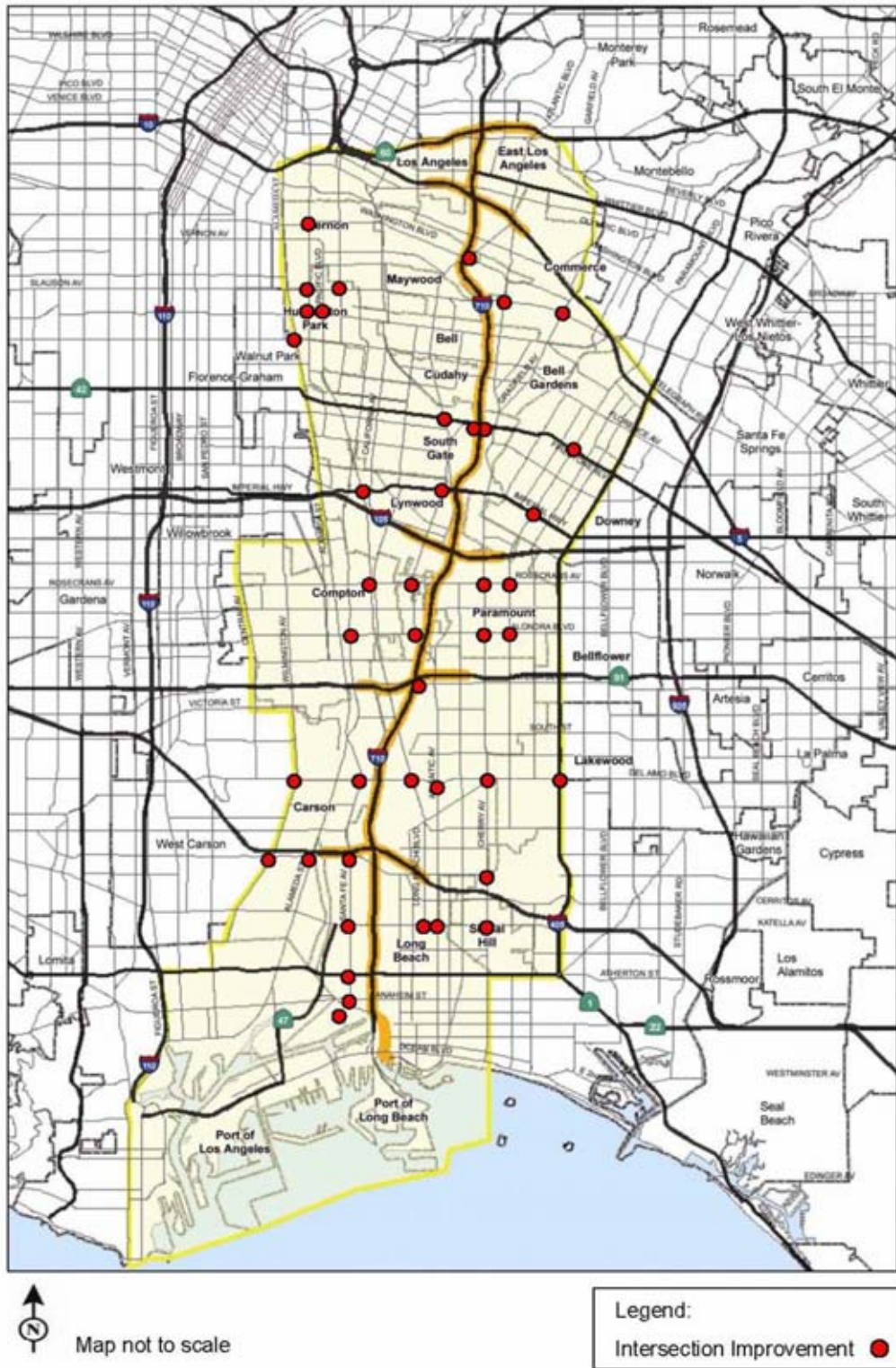
I-710 Study Area Traffic Systems and Operations	
Project	Description
	Includes all traffic systems and operations projects from Alternative 1 (No Build)
ITS	Project Limits: I-710 study area <ul style="list-style-type: none"> • Expanded ITS to include entire study area • Upgraded 2070 controllers, CCTV, system detection • Updated communications on arterial streets and TMS, CCTV, CMS and fiber optic Communications on the freeway mainline • TMC upgrades and interties necessary to control and monitor the system

**Table 5: Alternative 2 TSM/TDM/Transit/ITS – I-710 Arterial Intersection Improvements**

Main Street	Cross Street
Pier B St.	9th St.
Anaheim St.	Santa Fe Ave.
Pacific Coast Highway	Santa Fe Ave.
Willow St.	Santa Fe Ave.
Willow St.	Long Beach Blvd.
Willow St.	Atlantic Ave.
Willow St.	Cherry Ave.
Del Amo Blvd.	Wilmington Ave.
Del Amo Blvd.	Santa Fe Ave.
Del Amo Blvd.	Long Beach Blvd.
Del Amo Blvd.	Atlantic Ave.
Del Amo Blvd.	Cherry Ave.
Del Amo Blvd.	Lakewood Blvd.
Alondra Blvd.	Santa Fe Ave.
Alondra Blvd.	Atlantic Ave.
Alondra Blvd.	Garfield Ave.
Alondra Blvd.	Paramount Blvd.
Rosecrans Ave.	Long Beach Blvd.
Rosecrans Ave.	Atlantic Ave.
Rosecrans Ave.	Garfield Ave.
Rosecrans Ave.	Paramount Blvd.
Imperial Highway.	Long Beach Blvd.
Imperial Highway.	Atlantic Ave.
Imperial Highway.	Paramount Blvd.
Firestone Blvd.	Atlantic Ave.
Firestone Blvd.	Paramount Blvd.
Florence Ave.	Alameda St. (West Link)
Slauson Ave.	Soto St.
Slauson Ave.	Eastern Ave.
Garfield Ave.	Slauson Ave.
Bandini Blvd.	Atlantic Blvd.
I-710 Northbound Ramp	E. Artesia Blvd. (Off)
I-710 Northbound Ramp	Firestone Blvd. (Off)
I-710 Southbound Ramp	Firestone Blvd.
Santa Fe Ave.	223 rd St.
Wardlow Rd.	Cherry Ave.
Slauson Ave.	Santa Fe Ave.
Pacific Blvd.	Gage Ave.
Santa Fe Ave.	Gage Ave.
Wilmington Ave.	223 rd St.
Alameda St. (Ramp)	223 rd St.
38 th St.	Santa Fe Ave.



Figure 3: Alternative 2 TSM/TDM/Transit/ITS – I-710 Arterial Intersection Improvements





4.3 ALTERNATIVE 3: GOODS MOVEMENT ENHANCEMENT BY RAIL AND/OR ADVANCED TECHNOLOGY

Alternative 3 focuses on enhancing goods movement in and out of the Ports by implementing an alternative (zero emissions) goods movement technology. These enhancements would be accompanied by all the proposed improvements from Alternatives 1 and 2. The elements of Alternative 3 are discussed below and summarized in Section 4.3.1.

Alternative Technology:

Three families of alternative (zero emissions) technologies have been identified as responsive to the needs and goals of the I-710 Corridor Project. They would not only reduce emissions but serve a share of the projected 2035 near-dock and off-dock container markets furthering reducing traffic on the arterials and I-710 general purpose lanes. The first of these technology families is an exclusive guideway system which would operate on an elevated fixed guideway and run from the port terminals in the south to the BNSF and UP intermodal rail yards in Vernon/Commerce, 20 hours per day, 7 days per week and 360 days per year. It will be fully automated and controlled by a central operating system. Electric power for propulsion and all auxiliary purposes will be provided from the local electrical grid creating a zero emissions system.

To construct a unified system, the fixed guideway alternative technology utilized at the Port terminal will be a continuation of the alternative line-haul system for the I-710 Corridor. The line haul segment of this system will have between two to four guideways with no intermediate stops, while the line segments within the port and railyard terminals will have only two (one inbound and one outbound). These terminal guideways will then connect to the various Port and rail yard interfaces which are currently occupied by facilities that serve container movement by truck. The reduction in truck trips generated by the terminal guideways may or may not reduce port terminal space serving the remaining truck trips.

A typical fixed guideway alternative technology “station” would have three “station” tracks, each of which can handle 10 containers. This is based on a ratio of one rail-mounted gantry crane per “station” track and 20 lifts per hour per crane. Within each of the Port terminals, there will be 10 “stations” intentionally placed in locations to serve cargo container terminal operators. All fixed guideway “vehicles” would operate in consists (a group of vehicles connected together) and be completely loaded and unloaded at these stations. Under the Port scenario there would be 37 “station” tracks within the Ports, 19 tracks at Hobart Yard and 18 tracks in East Los Angeles.



In addition to the guideway system previously mentioned, a technology family consisting of electric/battery powered trucks will be studied as well. These electric powered trucks would operate in the proposed dedicated truck lane guideway with traction power delivered via overhead catenary, third rail or other power source. Two lanes in either direction would be assumed with no intermediate stops, but with intermediate access/egress points along the dedicated truck lanes. Although these trucks would be manually operated, there is potential to increase their capacity through implementation of an ITS application on the dedicated truck way. Specifically, continued advances in automated steering and vehicle spacing have already been tested in the field and could potentially be deployable in field trails within a few years.

Finally, during the alternative technology screening process a third technology family of electrified conventional freight rail was identified. These trains would receive power via overhead (catenary) wires and utilize existing tracks within the Port terminals and railyards (with the addition of overhead electric wires). Due to vertical and horizontal alignment constraints, this technology would be unable to use the freight corridor along I-710; therefore, a new line haul alignment will have to be determined between the Ports and the intermodal railyards in Vernon and Commerce with no intermediate stops.

For a more detailed description of the alternative technology component of Alternative 3 (automated fixed guideway and zero emission truck alternatives only) see the *Alternative Goods Movement Technology Analysis Initial Feasibility Study Report*.

4.3.1 Major Projects by Mode/System

This section describes the components of Alternative 3 Goods Movement Enhancement by Rail and/or Advanced Technology and **Table 6** lists and explains the major elements of Alternative 3 over and above today’s transportation system. **Table 6** is divided into five different categories. Category one describes the freeway elements, category two the arterial elements, category three the rail and transit elements, category four the goods movement elements and category five explains the traffic systems and operations elements.

Table 6: Alternative 3 – Goods Movement Enhancement

I-710 Study Area Freeway System	
Project	Description
All Freeways	Includes all freeway system projects from Alternatives 1 (No Build) and 2
I-710 Study Area Roadway System	
Project	Description
	Includes all roadway system projects from Alternatives 1 (No Build) and 2



Table 6: Alternative 3 – Goods Movement Enhancement, Continued

I-710 Study Area Rail/Transit	
Project	Description
	Includes all rail/transit projects from Alternatives 1 (No Build) and 2
I-710 Study Area Goods Movement	
Project	Description
	Includes all goods movement projects from Alternative 1 (No Build)
Electric Powered Advanced Technology Container Movement System	Project Limits: Operates between the Port marine terminals and near-dock (ICTF) and off-dock (Hobart and East L.A.) intermodal rail yards <ul style="list-style-type: none"> • Three families of technology defined: <ol style="list-style-type: none"> 1.) electric guideway family (magnetic levitation (maglev) or linear induction motors) 2.) electric/battery powered trucks 3.) electric freight rail
I-710 Study Area Traffic Systems and Operations	
Project	Description
	Includes all traffic systems and operations projects from Alternatives 1 (No Build) and 2 (and potential inclusion of an automated truck guidance system on the freight corridor)



4.4 ALTERNATIVE 4: ARTERIAL HIGHWAY AND I-710 CONGESTION RELIEF IMPROVEMENTS

Alternative 4 focuses on arterial highway and specific I-710 congestion relief projects which identify and improve existing freeway and arterial intersection deficiencies causing the greatest congestion and safety impacts. Included in Alternative 4 are all the components of Alternatives 1 and 2. Additionally, Alternative 4 includes the maximum arterial highway improvements that could be feasibly implemented in advance of any I-710 freeway improvements. This would incorporate the major north/south and east/west arterial highways within the study area, as well as the study area intersections identified for the project. The evaluation of Alternative 4 will also address congestion relief projects, including early action projects on I-710, by identifying existing freeway deficiencies causing bottlenecks, congestion and safety problems. A summary of the elements comprising Alternative 4 are listed below in Section 4.4.1 and are broken up into I-710 freeway and arterial improvements.

4.4.1 Major Projects by Mode/System

This section describes the components of Alternative 4 Arterial Highway and I-710 Congestion Relief Improvements and **Table 7** lists and explains the major elements of Alternative 4 over and above today’s transportation system. **Table 7** is divided into five different categories. Category one describes the freeway elements, category two the arterial elements, category three the rail and transit elements, category four the goods movement elements and category five explains the traffic systems and operations elements.

Table 7: Alternative 4 – Arterials and Congestion Relief Improvements

I-710 Study Area Freeway System	
Project	Description
	Includes all freeway system projects from Alternatives 1 (No Build) and 2
I-710	<p>Congestion Relief Projects: Operational improvements to 8 northbound I-710 interchanges and 9 southbound I-710 interchanges. Examples include extending deceleration lanes and adding auxiliary lanes</p> <p>Northbound I-710 Interchange Improvement Locations:</p> <ul style="list-style-type: none"> • Diverge to eastbound Willow St. • Merge from northbound I-405/Wardlow Rd. • Diverge to Rosecrans Ave. • Diverge to Firestone Blvd. • Diverge to northbound Atlantic Ave. • Diverge to southbound Atlantic Ave. • Diverge to Washington Blvd. • Diverge to Olympic Blvd. <p>Southbound I-710 Interchange Improvement Locations:</p> <ul style="list-style-type: none"> • Diverge to Florence Ave. • Diverge to Firestone Blvd. • Diverge to Wright Rd. • Diverge to eastbound Imperial Highway • Diverge to Susana Rd. • Diverge to westbound Willow St. • Merge from Pacific Coast Highway • Diverge to westbound Anaheim St. • Between Washington Blvd. merge and Atlantic Ave. diverge <p>See Table E-1 in Appendix E for a description of these interchange improvements</p>



Table 7: Alternative 4: Arterials and Congestion Relief Improvements, Continued

I-710 Study Area Roadway System	
Project	Description
I-710, Continued	<p>Project Limits: At Shoemaker Bridge/Anaheim St./Pacific Coast Highway Interchanges (Early Action Congestion Relief Project)</p> <ul style="list-style-type: none"> • Shoemaker Bridge: Realign and replace Shoemaker Bridge; realign Shoreline Dr. to Ocean Blvd.; modify connections to or from Shoreline Dr. to Ocean Blvd., Broadway, 3rd St., and 7th St.; remove connections to 6th St., 9th St. and 10th St.; construct frontage road system adjacent to the east levee of Los Angeles River between Shoreline Dr. and Pacific Coast Highway • Anaheim St.: Reconstruct all freeway ramps; replace the Anaheim St. overcrossing and river bridge; reconstruct Anaheim St.; replace existing four-quadrant cloverleaf configuration with a single point configuration; modify existing entrance and exit ramps; realign and replace entrance and exit ramps, realign and reconstruct freeway through the interchange • Pacific Coast Highway: Reconstruct all freeway ramps; replace Pacific Coast Highway overcrossing and river bridge; reconstruct Pacific Coast Highway; replace existing four-quadrant cloverleaf configuration with a single point configuration; modify existing entrance and exit ramps; remove, realign and replace northbound entrance and exit loops; realign and reconstruct freeway through the interchange
	<p>Project Limits: At Firestone Blvd. (Early Action Congestion Relief Project)</p> <ul style="list-style-type: none"> • Reconstruct all freeway ramps and replace the Firestone overcrossing to accommodate up to a ten-lane freeway section • Improve ramp alignments and increase spacing between ramp termini
	<p>Project Limits: At Atlantic Blvd./Bandini Blvd. (Early Action Congestion Relief Project)</p> <ul style="list-style-type: none"> • Replace northbound entrance and exit ramps and move the freeway ingress and egress locations south of their existing locations; realign Atlantic Blvd. between Los Angeles River and 26th St.; create new intersection at Bandini Blvd. and new undercrossing under the freeway; replace the southbound entrance and exit ramps; create new ramp terminus on Bandini Blvd. west of the freeway
I-710 Study Area Roadway System	
Project	Description
	Includes all roadway system projects from Alternatives 1 (No Build) and 2
I-710 Arterial Intersections	Congestion Relief Projects: Improvements to 42 intersections within the study area. Examples include adding turn lanes and changing through-right turn lanes into 1 through + 1 right turn lane (refer back to Table 13 and Figure 3) This intersection evaluation is only a preliminary analysis and will be refined further pending the results of the detailed traffic forecasts after alternatives screening
I-710 Study Area Rail/Transit	
Project	Description
	Includes all rail/transit projects from Alternatives 1 (No Build) and 2
I-710 Study Area Goods Movement	
Project	Description
	Includes all goods movement projects from Alternative 1 (No Build)



Table 7: Alternative 4: Arterials and Congestion Relief Improvements, Continued

I-710 Study Area Traffic Systems and Operations	
Project	Description
	Includes all traffic systems and operations projects from Alternatives 1 (No Build) and 2



4.5 ALTERNATIVE 5: TEN LANE FACILITY

The intent of Alternative 5 is to improve the I-710 mainline by widening the freeway to include ten lanes throughout the length of the corridor (including through the freeway-to-freeway interchanges) and modernizing its design. Included in this alternative are redesigns of the freeway to freeway and arterial interchanges. Two design options for this alternative are: 5A) ten general purpose lanes or 5B) eight general purpose lane plus two high occupancy vehicle (HOV) lanes. Also included in Alternative 5 are components of Alternatives 1, 2 and 4. The transportation elements that comprise Alternative 5 are listed below in Section 4.5.1.

4.5.1 Major Projects by Mode/System

This section describes the components of Alternative 5 Ten Lane Facility and **Tables 8** through **10** list and explain the major elements of Alternative 5 over and above today’s transportation system. **Table 8** describes the freeway elements for Alternative 5A and **Table 9** describes the freeway elements for Alternative 5B. **Table 10** is divided into four different categories which include the arterial elements, rail and transit elements, goods movement elements and traffic systems and operations elements of Alternative 5. These four categories are identical between Alternatives 5A and 5B, therefore, only one table is needed.

Table 8: Alternative 5A – Ten General Purpose Lanes

I-710 Study Area Freeway System	
Project	Description
	Includes all freeway system projects from Alternatives 1 (No Build)
I-710	Widen to 5 general purpose lanes in each direction throughout the corridor (add 1 to 2 additional general purpose lanes in each direction – varies by segment)
	Eliminate design deficiencies at the I-405 and SR-91 interchanges
	Reconfigure some local access interchanges throughout the corridor
	Construction of a single point interchange at Slauson Ave.
	Eliminate freeway access at various locations: <ul style="list-style-type: none"> • Wardlow Rd. to northbound I-710 • Southbound I-710 to Wardlow Rd. • Wardlow Rd. to westbound I-405
	Shift the freeway centerline at various locations to reduce right-of-way impacts

For more specific detail on the proposed I-710 mainline improvements see **Table F-1** in **Appendix F**.



Table 9: Eight General Purpose Lanes + Two High Occupancy Vehicle (HOV) Lanes

I-710 Study Area Freeway System	
Project	Description
	Includes all freeway system projects from Alternatives 1 (No Build)
I-710	Widen to 4 general purpose lanes and 1 HOV lane in each direction throughout the corridor (add 1 additional general purpose lane and 1 HOV lane in each direction – varies by segment)
	Eliminate design deficiencies at the I-405 and SR-91 interchanges
	Reconfigure some local access interchanges throughout the corridor
	Construction of a single point interchange at Slauson Ave.
	Eliminate freeway access at various locations: <ul style="list-style-type: none"> • Wardlow Rd. to northbound I-710 • Southbound I-710 to Wardlow Rd. • Wardlow Rd. to westbound I-405
	Shift the freeway centerline at various locations to reduce right-of-way impacts

Table 10: Alternative 5A/5B – Ten Lane Facility

I-710 Study Area Roadway System	
Project	Description
	Includes all roadway system projects from Alternatives 1 (No Build), 2 and 4
I-710 Study Area Rail/Transit	
Project	Description
	Includes all rail/transit projects from Alternatives 1 (No Build) and 2
I-710 Study Area Goods Movement	
Project	Description
	Includes all goods movement projects from Alternative 1 (No Build)
I-710 Study Area Traffic Systems and Operations	
Project	Description
	Includes all traffic systems and operations projects from Alternatives 1 (No Build) and 2



4.6 ALTERNATIVE 6: ALTERNATIVE 5 PLUS FREIGHT MOVEMENT CORRIDOR (4 TRUCK ONLY LANES)

Alternative 6 includes all the improvements from Alternative 5A (10 general purpose lanes) with the addition of four separated freight movement lanes for exclusive use by conventional trucks from the ports (Ocean Blvd.) to the intermodal rail yards in Commerce and Vernon. This alternative is the Locally Preferred Strategy (LPS) that resulted from the prior I-710 Major Corridor Study plus additional design concept refinements. The proposed improvements in Alternative 6 are combined with components of Alternatives 1, 2, 4 and 5A.

The purpose of the I-710 refined LPS is to provide I-710 infrastructure improvements focused on improving safety; increasing capacity for growing heavy duty truck demand; increasing capacity for high general-purpose traffic demand; improving reliability of travel times; and separating autos and trucks to the greatest extent possible while limiting direct and indirect right-of-way impacts.

Based on the refinement of the LPS performed under the initial highway engineering task of this project, Alternative 6 entails the proposed transportation improvements included in Section 4.6.1.

4.6.1 Major Projects by Mode/System

This section describes the components of Alternative 6 and **Table 11** lists and explains the major elements of Alternative 6 over and above today's transportation system. **Table 11** is divided into five different categories. Category one describes the freeway elements, category two the arterial elements, category three the rail and transit elements, category four the goods movement elements and category five explains the traffic systems and operations elements.



Table 11: Alternative 6 – Alt 5 + Freight Corridor

I-710 Study Area Freeway System	
Project	Description
	Includes all freeway system projects from Alternatives 1 (No Build)
I-710	Freight Movement Corridor: <ul style="list-style-type: none"> • At-grade and/or elevated truck only lanes (2 per direction) between Ocean Blvd. and the intermodal rail-yards in Vernon and Commerce • Provides direct access to/from the UP and BNSF rail yards in Vernon/Commerce Dedicated ingress/egress points for trucks at selected locations: <ul style="list-style-type: none"> • Pico Ave. to northbound freight corridor • Southbound freight corridor to Pico Ave. • Anaheim St. to northbound freight corridor • Southbound freight corridor to Anaheim St. • Northbound I-710 to northbound freight corridor (north of I-405) • Southbound freight corridor to southbound I-710 (north of I-405) • Northbound freight corridor to Garfield Ave. • Garfield Ave. to southbound freight corridor • Northbound freight corridor to 26th St. • 26th St. to southbound freight corridor • Optional direct connector ramps from the I-710 freight corridor truck lanes to SR-91
	Widen to 5 general purpose lanes in each direction throughout the corridor (add 1 to 2 additional general purpose lanes in each direction – varies by segment)
	Eliminate design deficiencies at the I-405 and SR-91 interchanges
	Reconfigure some local access interchanges throughout the corridor
	Construction of a single point interchange at Slauson Ave.
	Eliminate freeway access at various locations: <ul style="list-style-type: none"> • Wardlow Rd. to northbound I-710 • Southbound I-710 to Wardlow Rd. • Wardlow Rd. to westbound I-405 • Eastbound SR-91 to Cherry Ave. (with freight corridor connectors to SR-91)
	Shift the freeway centerline at various locations to reduce right-of-way impacts
	For more specific detail on the proposed I-710 mainline and freight corridor improvements see Table F-2 in Appendix F
I-710 Study Area Roadway System	
Project	Description
	Includes all roadway system projects from Alternatives 1 (No Build), 2 and 4
I-710 Study Area Rail/Transit	
Project	Description
	Includes all rail/transit projects from Alternatives 1 (No Build) and 2



Table 11: Alternative 6: Alt 5 + Freight Corridor, Continued

I-710 Study Area Goods Movement	
Project	Description
	Includes all goods movement projects from Alternative 1 (No Build)
I-710 Study Area Traffic Systems and Operations	
Project	Description
	Includes all traffic systems and operations projects from Alternatives 1 (No Build) and 2

The I-710 Alternative 6 Design Concept between Washington Boulevard and SR-60 is currently being studied by Caltrans as part of a separate EIR/EIS for the segment of I-5 north of I-605 through the I-5/I-710 interchange and therefore proposed improvements to this segment of I-710 are still under study. There are three alternative design concepts currently under consideration for the I-710/I-5 interchange which include 4 connectors, 6 connectors or 7 connectors.



**APPENDIX A: BASELINE I-710 FREEWAY STATE HIGHWAY
OPERATIONS AND PROTECTION PROGRAM (SHOPP) PROJECTS**



Table A-1: Alternative 1 – I-710 Freeway System

Project	Description
I-710	Project Limits: Pavement Improvement in City of Long Beach from northbound Harbor Scenic Dr. on-ramp to 0.8 km south of Pacific Coast Highway Separation <ul style="list-style-type: none"> • Improve pavement • Upgrade median barrier • Restore landscape • Install conduit and loop detectors for future ITS
	Project Limits: Highway Planting Restoration from Pacific Coast Highway to Wardlow Rd. Overcrossing <ul style="list-style-type: none"> • Restore landscaping to improving appearance of freeway
	Project Limits: Installation of Communication System and Closed Circuit TV System from Pacific Coast Highway to I-405 <ul style="list-style-type: none"> • Install facilities for traffic monitoring system and closed circuit TV system
	Project Limits: Pavement Rehabilitation from I-405 to Firestone Blvd. <ul style="list-style-type: none"> • Place long life pavement on freeway mainline • Widen structures from I-405 to Atlantic Ave.
	Project Limits: Pavement Rehabilitation from Firestone Blvd. to I-10 <ul style="list-style-type: none"> • Place long life pavement on freeway mainline • Widen structures from Atlantic Ave. to I-10
	Project Limits: Upgrade Median Barrier from Los Angeles River Bridge to I-10 <ul style="list-style-type: none"> • Replace existing double blocked metal beam barrier with concrete barrier between Los Angeles River Bridge and Vernona Ave. • Replace existing three beam barrier with concrete barrier between Vernona Ave. and I-10
	Project Limits: Slab Replacement and Grind – Firestone Blvd. to I-10 <ul style="list-style-type: none"> • Replace broken pavement slabs with new ones made of fast setting hydraulic concrete
	Project Limits: In Commerce from Washington Blvd. to 0.4 km north of Washington Blvd. <ul style="list-style-type: none"> • Construct soundwall in the northbound and southbound direction
	Project Limits: In Commerce – East Yard OH to I-710/I-5 Separation <ul style="list-style-type: none"> • Construct soundwall in the northbound and southbound direction



APPENDIX B: GATEWAY CITIES TRUCK IMPACTED INTERSECTIONS PHASES I AND II

**Table B-1: Gateway Cities Truck Impacted Intersections Phase I**

Project	Description
Artesia Blvd./Pioneer Blvd. (Artesia)	<ul style="list-style-type: none"> • Install vehicle detection system • Install new striping and pavement markings • Increase curb radii
Eastern Ave./Bandini Blvd. (Bell)	<ul style="list-style-type: none"> • Relocate existing signal system and associated loops • Install thermoplastic traffic stripe • Relocate and modify existing signal system to include left turn
Atlantic Ave./Florence Ave. (Bell)	<ul style="list-style-type: none"> • Relocate existing signal system and associated loops • Install thermoplastic traffic stripe
Slauson Ave./Telegraph Rd. (Commerce/Montebello)	<ul style="list-style-type: none"> • Remove existing AC pavement • Construct concrete intersection • Restripe crosswalks and entire intersection
Atlantic Ave./Patata St. (Cudahy/South Gate)	<ul style="list-style-type: none"> • Increase curb radius on SW and SE corners • Remove entire signal system and install new five section cluster head on N/S mast-arms for P/P signal indication • Restripe entire intersection with thermoplastic • Install new vehicle video detection cameras on all approaches
Florence Ave./Paramount Blvd. (Downey)	<ul style="list-style-type: none"> • Install new vehicle video detection camera and hub • Replace entire intersection with concrete • Restripe intersection (crosswalks, pavement markings) • Repair catch basin
Slauson Ave./State St./Boyle Ave. (Huntington Park/Vernon)	<ul style="list-style-type: none"> • Install curb ramp • Install new video detection camera • Install new pavement markings • Relocate and replace existing system
Santa Fe Ave./ Pacific Coast Hwy. (Long Beach)	<ul style="list-style-type: none"> • Install new vehicle video detection cameras • Relocate existing poles and install new five section heads • Restripe entire intersection
Imperial Hwy./Martin Luther King Blvd. (Lynwood)	<ul style="list-style-type: none"> • Install new vehicle video detection cameras on all approaches • Install protected left turn signal heads and concrete intersection approaches for Imperial Highway • Increase curb turning radius on SW corner
Atlantic Blvd./Slauson Ave. (Maywood)	<ul style="list-style-type: none"> • Install new vehicle video detection cameras on all approaches • Re-install entire intersection with concrete • Restripe entire intersection with thermoplastic
Whittier Blvd./Rosemead Blvd. (Pico Rivera)	<ul style="list-style-type: none"> • Install new vehicle video detection cameras on all approaches • Remove concrete median and replace with delineators • Replace entire intersection with thermoplastic

**Table B-2: Gateway Cities Truck Impacted Intersections Phase II**

Project	Description
Ajax Ave./Florence Ave. or Jaboneria Ave./Florence Ave. or Florence Ave./Scout Ave. (Bell Gardens)*	<ul style="list-style-type: none"> • Install new video detection cameras on all approaches • Install new LED pedestrian heads • Signing/stripping
Washington Blvd./Ayers Ave. (Commerce)	<ul style="list-style-type: none"> • Construct PCC pavement through the intersection and all approaches • Upgrade existing traffic signals, including poles and heads • Signing/stripping
Florence Ave./Studebaker Rd./Little Lake Rd. (Downey)	<ul style="list-style-type: none"> • Construct PCC pavement through the intersection and all approaches • Signing/stripping
Bickett St./Slauson Ave. (Huntington Park)	<ul style="list-style-type: none"> • Increase curb radius on all corners • Construct new curb, gutter and sidewalk • Relocate utilities • Construct new catch basins and connector pipes • Signing/stripping
Del Amo Blvd./Pioneer Blvd. (Lakewood)	<ul style="list-style-type: none"> • Install left turn phasing on both north and south approaches of Pioneer Blvd. • Install new video detection cameras on all approaches • Signing/stripping
Santa Fe Ave./Anaheim St. (Long Beach)	<ul style="list-style-type: none"> • Construct PCC pavement through the intersection and all approaches • Install new traffic signal interconnect cable on the east side of Santa Fe Ave. • Signing/stripping
Maywood Ave./Slauson Ave. (Maywood)	<ul style="list-style-type: none"> • Construct PCC pavement through the intersection and all approaches • Remove existing cross gutter across the north side of the intersection • Traffic signal improvements including new poles, new pedestrian and vehicular heads, new luminaries, new traffic controller, new illuminated street name signs • Install left turn phasing on Slauson Ave. • Install new video detection cameras on all approaches • Signing/stripping
Washington Blvd./Maple Ave. or Olympic Blvd./Vail Ave (Montebello)**	<ul style="list-style-type: none"> • Install new video detection cameras on all approaches • Improve sign coordination and timing • Signing/stripping
Imperial Hwy./Bloomfield Ave. (Norwalk)	<ul style="list-style-type: none"> • Construct concrete pavement through the intersection and all approaches • Install new video detection cameras on all approaches • Signing/stripping
Orange Ave./Willow St. (Signal Hill)	<ul style="list-style-type: none"> • Upgrade existing traffic signal equipments • Upgrade existing curb ramps at all corners • Install left turn phasing on both north and south approaches of Orange Ave. • Signing/stripping



Table B-2 Continued: Gateway Cities Truck Impacted Intersections Phase II

Project	Description
Firestone Blvd./Rayo Ave. (South Gate)	<ul style="list-style-type: none"> • Construct concrete pavement through intersection and all approaches • Increase curb radius on southwest corner • Signing and striping • Install new video detection cameras • Upgrade pedestrians and vehicular heads

*Only one or two of the intersections listed will be constructed.

**Only one of the intersections listed will be constructed.



APPENDIX C: DETAILED LIST OF I-710 CORRIDOR BASELINE TRAFFIC SYSTEMS AND OPERATIONS

**Table C-1: Alternative 1 – I-710 Study Area Traffic Systems and Operations**

Project	Description
I-710 Communication System and Closed Circuit TV System (CCTV)	Project Limits: On I-710 from Pacific Coast Highway to I-405 (2.5 miles) <ul style="list-style-type: none"> • Install facilities for traffic monitoring system and closed circuit TV system
Advanced Traffic Management Information System (ATMIS)	Project Limits: Ports of Long Beach and Los Angeles <ul style="list-style-type: none"> • Implement a Port Transportation Facility Security System/Emergency Response & Evacuation System; Advanced Transportation Management System (ATMS); Advanced Traveler Information System (ATIS); Communication System
Atlantic Avenue Signal Synchronization and Enhancement Project	Project Limits: On Atlantic Avenue between Ocean Blvd. and Wardlow Rd. (3.5 miles) <ul style="list-style-type: none"> • Major reconstruction of traffic signals along Atlantic at 1st St., Broadway, 3rd, 4th, 5th, 6th, 7th, 8th, 10th, 16th, 20th and Columbia Streets • Minor upgrade of existing traffic signals along Atlantic Ave. at Wardlow Rd., 33rd St., Willow St., Burnett St., Hill St., New York St., and Anaheim St. • Create new left-turn pockets at 6th St. and 7th St. to improve traffic flow and safety. Remove parking on eastside of street, adjust lane lines between 5th St. and 8th St. for two-way left-turn lane and install new signage, pavement markings, vehicle detection, and curb markings • Outfit all 27 traffic signals in corridor with wireless transit priority capabilities • Install new hard-wire interconnect in underground conduits to close two communication gaps from 10th St. to 16th St. and Spring St. to 20th St.; electronic message boards at key bus stops in corridor
Ocean Boulevard Signal Synchronization and Enhancement Project	Project Limits: On Ocean Boulevard between Alamitos Ave. and Livingston Dr./2 nd St. (2.6 miles) <ul style="list-style-type: none"> • Reconstruct traffic signals at Livingston Dr./2nd St., Ocean Blvd./Temple Ave., Ocean Blvd./Junipero Ave., and Ocean Blvd./Orange Ave. (includes, but not limited to, new poles, pedestrian indications, wiring, safety lighting, and vehicle detection) • Provide minor traffic signal upgrades to the existing traffic signals at Paloma Ave., Lindero Ave., Cherry Ave., and Alamitos Ave. (includes vehicle head replacements/additions, safety lighting upgrades, and installation of vehicle detection) • Install two new traffic signals at Coronado Ave. and Orizaba Ave.; new hard-wire interconnect in underground conduits; and real-time electronic transit message boards at each bus stop along the corridor (Alamitos Ave., Orange Ave., Cherry Ave., Redondo Ave., and Termino Ave.) • Reconfiguration of intersection curbs and medians to facilitate pedestrian access and bus operations • Synchronize traffic signals along corridor • Construct signal interconnect gap closure between Alamitos Ave. and Livingston Dr./2nd St.; and bulb-outs at five intersections

**Table C-1 Continued: Alternative 1 – I-710 Study Area Traffic Systems and Operations**

Project	Description
Gateway Cities Forum – Carson Street Signal Synchronization	Project Limits: On Carson Street between Long Beach Blvd. to Bloomfield Ave. (7.3 miles) <ul style="list-style-type: none"> • Upgrade each traffic signal • Provide additional vehicle detection to enable operation as a fully traffic actuated signal • Install the appropriate components to enable each signal to be capable of time-based coordination • Implement peak-period parking restrictions • Retime traffic signals along the route • Modify signal phasing, signing and striping • Provide for additional lanes through roadway widening • Upgrade equipment to ensure the operational safety of all traffic signals (may include upgrading highway safety lights, signal standards and mast arms)
Florence Avenue Traffic Signal Communications System	Project Limits: On Florence Avenue between Old River School Rd. and Fairford Ave. (3.6 miles) <ul style="list-style-type: none"> • Install fiber interconnect • Develop Ethernet based communication network which include 43 Video Detection Cameras and integrates into the City's Traffic Management Center (TMC)
Southeast Los Angeles County (SELAC)- Traffic Signal Synch.	Project Limits: I-710/Atlantic Boulevard Corridor; I-5/Telegraph Road Corridor; Lakewood/Rosemead Boulevard & Paramount Boulevard Corridor; I-105/Firestone Boulevard, Imperial Highway, Rosecrans Avenue Corridor <ul style="list-style-type: none"> • Implement signal systems and peak hour parking restrictions • Upgrade controllers • Provide for additional lanes through restriping and minor roadway widening • Develop timing plans
Wilmington Automated Traffic Surveillance and Control System/ Adaptive Traffic Control System (ATSAC/ATCS) Project	Project Limits: Located in the southern portion of the City of Los Angeles, bounded by Sepulveda Blvd. on the north, the City of Long Beach on the east, Seaside Ave./Ocean Blvd. on the south, and Western Ave. on the west <ul style="list-style-type: none"> • Improvements to 70 signalized intersections through implementation of computer based real time traffic signal monitoring and control system • Replacement of the existing obsolete traffic signal controllers and communications equipment at all 70 intersections • Installation of new traffic signal equipment; interconnect conduit and cable; vehicle loop detector; traffic surveillance cameras; central computer equipment; graphic display equipment; other peripheral hardware at ATSAC central computer facility; and system management services • Installation and/or modification of communications equipment • Provide transit priority infrastructure • Possible installation of changeable message signs
Harbor-Gateway Automated Traffic Surveillance and Control System/ Adaptive Traffic Control System (ATSAC/ATCS) Project	Project Limits: Located in the southerly portion of the City of Los Angles, bounded by Manchester Ave. on the north, Alameda St. on the east, Imperial Highway on the south, and Vermont Ave. on the west <ul style="list-style-type: none"> • Improvements to 109 signalized intersections through implementation of a computer-based real time traffic signal monitoring and control system



Table C-1 Continued: Alternative 1 – I-710 Study Area Traffic Systems and Operations

Project	Description
Gateway Cities Forum Traffic Signal Corridor Project	Phase II: Project Limits: On Pacific Boulevard/Long Beach Boulevard between Florence Ave. and Willow St. (7.1 miles) <ul style="list-style-type: none"> • Upgrade each traffic signal; and controllers for bus signal priority capabilities • Provide additional vehicle detection to enable operation as a fully traffic actuated signal • Install components to enable each signal to be capable of time-based coordination; and any warranted/feasible roadway improvements (may include implementation of peak period parking restrictions, modification of signing and striping, and providing for additional lanes through minor roadway widening)
	Phase III: Project Limits: On Artesia Boulevard between Alameda Blvd. and Valley View Ave. (10.8 miles); on Central Avenue between El Segundo Blvd. to Victoria St. (3.4 miles); on Gage Avenue between Central Ave. to Slauson Ave. (0.5 miles); on Whittier Boulevard between Paramount Blvd. to Valley Home Ave. (8 miles); on Wilmington Avenue between Imperial Highway to Sepulveda Blvd. (8.7 miles) <ul style="list-style-type: none"> • Upgrade each traffic signal, area wide coordination timing on arterials, and ensure the operational safety of all traffic signals along the route (may include upgrades of highway safety light, signal standards, and mast arms modification of signal phasing) • Provide additional vehicle detection to enable operation as a fully traffic actuated signal • Install appropriate components to enable each signal to be capable of time-based coordination; and any warranted/feasible roadway improvements (may include implementation of parking restrictions, modification of signing and striping, and providing for additional lanes through minor roadway widening) • Retime traffic signals along the route Project Limits: I-105 Corridor ITS Project, arterials within the Corridor include Firestone Blvd., Imperial Highway and Rosecrans Ave. <ul style="list-style-type: none"> • Implement traffic signal management and control system, traveler information and surveillance system, a communications system, and subregional transportation management center (TMC)
	Phase IV: Project Limits: On 38th Street/37th Street/Bandini Boulevard between Alameda St. and Garfield Ave. (6.2 miles); on Garfield Avenue between Olympic Blvd. and Eastern Ave. (4.6 miles); on Studebaker Road between Florence Ave. to Del Amo Blvd. (6.4 miles) <ul style="list-style-type: none"> • Upgrade each traffic signal and area wide coordination timing on arterial routes • Provide additional vehicle detection to enable operation as a fully traffic actuated signal • Install appropriate components to enable each signal to be capable of time-based coordination • Retimed traffic signals along the route • Install any warranted/feasible roadway improvements (may include implementation of parking restrictions, modification of signing and striping, and providing for additional lanes through minor roadway widening) • Implement ITS improvements (includes designing and implementing Advanced Transportation Management Systems (ATMS), Advanced Traveler Information Systems (ATIS))



Table C-1 Continued: Alternative 1 – I-710 Study Area Traffic Systems and Operations

Project	Description
Gateway Cities Forum Traffic Signal Corridor Project (Continued)	<p>Phase V: Project Limits: On Alameda Street between Nadeau St. to Auto Drive South (6.3 miles); on Florence Avenue/Mills Avenue from Central Ave. to Scout Ave. (6.5 miles); on South Street between Atlantic Ave. to Carmenita Rd. (8 miles); on Washington Boulevard between Atlantic Blvd. and Whittier Blvd. (8 miles)</p> <ul style="list-style-type: none"> • Upgrade each traffic signal and area wide coordination timing on arterial routes • Provide additional vehicle detection to enable operation as a fully traffic actuated signal • Install appropriate components to enable each signal to be capable of time-based coordination • Retimed traffic signals along the route • Install any warranted/feasible roadway improvements (may include implementation of parking restrictions, modification of signing and striping, and providing for additional lanes through minor roadway widening) <p>Implement ITS improvements (includes implementing Advanced Transportation Management Systems (ATMS) in jurisdiction that did not previously receive them, expand coverage of existing ATMS to include additional signals, and augment deployment of field devices such as system detectors and CCTV cameras)</p>



APPENDIX D: I-710 CORRIDOR ARTERIAL CONGESTION RELIEF IMPROVEMENT EVALUATION



Alternative 2 – Intersection Evaluation

The major arterial highway intersections within the corridor were evaluated to determine the maximum arterial highway intersection improvements that could feasibly be implemented in advance of any arterial highway widening or freeway improvements and hence included in the TSM/TDM Alternative. See **Table D-1** for the list of evaluated intersections.

These intersections were analyzed using existing traffic count volumes, HCM analysis methodologies, and Synchro 6 software, which accounts for the effects of signal coordination and platoon formation on intersection operations. Of the 115 intersections analyzed under existing conditions, 42 had at least one peak hour period (A.M., mid-day, or P.M.) operating at LOS E or worse. For a detailed listing of these intersections see **Table D-2** which includes the existing peak period levels of service, the intersection modifications required to improve operations and the resulting levels of service with the proposed signal phasing and timing improvements.

The intersection evaluation described above is only a preliminary analysis and will be refined further pending the results of the detailed traffic forecasts after alternatives screening.

Table D-1: List of Evaluated Intersections

ID	Main Street	Cross Street	ID	Main Street	Cross Street
1	Shoreline Dr.	Queens Way	59	Firestone Blvd.	California Ave.
2	Ocean Blvd.	Magnolia Ave.	60	Firestone Blvd.	Atlantic Ave.
3	Broadway	Maine Ave.	61	Firestone Blvd.	Garfield Ave.
4	Broadway	Magnolia Ave.	62	Firestone Blvd.	Paramount Blvd.
5	6th St.	Daisy Ave.	63	Florence Ave.	Alameda St (West Link)
6	6th St.	Magnolia Ave.	631	Florence Ave.	Alameda St. (East Link)
7	7th St.	Daisy Ave.	64	Florence Ave.	Atlantic Ave.
8	7th St.	Magnolia Ave.	65	Florence Ave.	Eastern Ave.
9	10th St.	Magnolia Ave.	66	Florence Ave.	Garfield Ave.
10	Pier B St.	9th St.	68	Slauson Ave.	Alameda St (West Link)
11	Anaheim St.	Alameda St.	681	Slauson Ave.	Alameda St. (East Link)
12	Anaheim St.	Santa Fe Ave.	69	Slauson Ave.	Soto St.
13	Anaheim St.	Magnolia Ave.	70	Slauson Ave.	Atlantic Blvd.
14	Anaheim St.	Pacific Ave.	71	Slauson Ave.	Eastern Ave.
15	Anaheim St.	Long Beach Blvd.	73	Garfield Ave.	Slauson Ave.
16	Anaheim St.	Cherry Ave.	74	Bandini Blvd.	Atlantic Blvd.
17	PCH	Alameda St. (O St.)	75	Bandini Blvd.	Eastern Ave.
18	Alameda St.	O St.	78	Washington Blvd.	Atlantic Blvd.
19	PCH	Santa Fe Ave.	79	Washington Blvd.	Eastern Ave.
20	PCH	Pacific Ave.	109	I-710 southbound	Golden Shore St. (Off)
21	PCH	Long Beach Blvd.	110	I-710 northbound	3rd St. (On @ Golden)
22	PCH	Atlantic Ave.	111	I-710 southbound	Del Amo (@ Susana)
23	PCH	Cherry Ave.	112	I-710 northbound	Long Beach (On/Off)
24	Alameda St.	Sepulveda Blvd (Ramp)	113	I-710 southbound	Long Beach (On/Off)

**Table D-1 Continued: List of Evaluated Intersections**

ID	Main Street	Cross Street	ID	Main Street	Cross Street
25	Sepulveda Blvd.	Alameda St. (Ramp)	114	I-710 northbound	E. Artesia Blvd. (Off)
26	Willow St.	Santa Fe Ave.	115	I-710 southbound	E. Artesia Blvd. (On)
27	Willow St.	Pacific Ave.	116	I-710 northbound	Alondra Blvd. (On/Off)
28	Willow St.	Long Beach Blvd.	117	I-710 southbound	Alondra Blvd. (On)
29	Willow St.	Atlantic Ave.	118	I-710 northbound	Rosecrans Ave. (Off)
30	Willow St.	Cherry Ave.	119	I-710 southbound	Rosecrans Ave. (Off)
31	Del Amo Blvd.	Wilmington Ave.	120	I-710 southbound	Imperial (Off@Wright)
32	Alameda St.	Del Amo Blvd. (Ramp)	121	I-710 northbound	Firestone Blvd. (Off)
33	Del Amo Blvd.	Alameda St. (Ramp)	122	I-710 southbound	Firestone Blvd.
34	Del Amo Blvd.	Santa Fe Ave.	124	I-710 southbound	Bandini Blvd. (Off)
35	Del Amo Blvd.	Long Beach Blvd.	125	I-710 northbound	Washington (On/Off)
36	Del Amo Blvd.	Atlantic Ave.	126	I-710 southbound	Washington (On/Off)
37	Del Amo Blvd.	Cherry Ave.	139	Shoreline Dr.	Golden Shore St. (On)
38	Del Amo Blvd.	Lakewood Blvd.	140	Ocean Blvd.	Golden Shore St.
39	Artesia Blvd.	Long Beach Blvd.	141	3rd St.	Magnolia Ave.
40	Alondra Blvd.	Alameda St. (West)	142	7th St.	Maine Ave.
401	Alondra Blvd.	Alameda St. (East)	144	Alameda St.	41 st St.
41	Alondra Blvd.	Santa Fe Ave.	146	Santa Fe Ave.	223 rd St.
42	Alondra Blvd.	Long Beach Blvd.	147	Wardlow Rd.	Magnolia Ave.
43	Alondra Blvd.	Atlantic Ave.	148	Wardlow Rd.	Cherry Ave.
44	Alondra Blvd.	Garfield Ave.	145	Alameda St.	Gage Ave. (West Link)
45	Alondra Blvd.	Paramount Blvd.	1451	Alameda St.	Gage Ave. (East Link)
46	Rosecrans Ave.	Willowbrook Ave.	149	Pacific Ave.	Florence Ave.
461	Rosecrans Ave.	Mona/Willowbrook Ave.	150	Firestone Blvd.	Compton Blvd.
47	Rosecrans Ave.	Alameda St. (West)	151	Slauson Ave.	Santa Fe Ave.
471	Rosecrans Ave.	Alameda St. (East)	152	Pacific Ave.	Gage Ave.
48	Rosecrans Ave.	Santa Fe Ave.	153	Santa Fe Ave.	Gage Ave.
49	Rosecrans Ave.	Long Beach Blvd.	154	Alameda St.	223 rd St. Ramp
50	Rosecrans Ave.	Atlantic Ave.	155	Wilmington Ave.	223 rd St.
51	Rosecrans Ave.	Garfield Ave.	156	Alameda (Ramp)	223 rd St.
52	Rosecrans Ave.	Paramount Blvd.	157	Garfield Ave.	Gage Ave.
53	Imperial Highway	Alameda St.	158	37th St.	Santa Fe Ave.
54	Imperial Highway	Long Beach Blvd.	159	38th St.	Santa Fe Ave.
55	Imperial Highway	Atlantic Ave.	160	Garfield Ave.	Washington Blvd.
56	Imperial Highway	Garfield Ave.	161	Del Amo Blvd.	Susana Rd.
57	Imperial Highway	Paramount Blvd.	162	Alameda St.	Carson St. (Ramp)
58	Firestone Blvd.	Long Beach Blvd.	163	Carson St.	Alameda St. (Ramp)



Table D-2: I-710 Corridor Project Alternative 2 (TSM/TDM/Transit) Intersection Improvements

ID	Main Street	Cross Street	Existing (2008)						Required Improvements	After Improvements		
			AM Peak		MD Peak		PM Peak			Peak Period	Delay	LOS
			Delay	LOS	Delay	LOS	Delay	LOS				
10	Pier B St.	9th St.	40.2	D	56.8	E	44.9	D	Change signal timing	MD	18.1	B
19	Pacific Coast Hwy	Santa Fe Ave.	62.5	E	--	--	116.2	F	EBL&WBL: change to pm+pt, NBL&SBL: change to perm	PM	88.2	F
25	Sepulveda Blvd.	Alameda St. (Ramp)	61.7	E	37.8	D	39.5	D	NB&SB: change split phase to left-turn perm	AM	38.2	D
26	Willow St.	Santa Fe Ave.	62.4	E	37.0	D	65.9	E	No feasible signal phasing/timing mitigation available	--	--	--
28	Willow St.	Long Beach Blvd.	63.9	E	61.7	E	96.1	F	No feasible signal phasing/timing mitigation available	--	--	--
29	Willow St.	Atlantic Ave.	73.3	E	48.5	D	86.6	F	No feasible signal phasing/timing mitigation available	--	--	--
30	Willow St.	Cherry Ave.	65.7	E	40.1	D	63.6	E	No feasible signal phasing/timing mitigation available	--	--	--
31	Del Amo Blvd.	Wilmington Ave.	63.2	E	36.0	D	48.0	D	Change WBR to pm+ov	AM	47.6	D
34	Del Amo Blvd.	Santa Fe Ave.	54.3	D	38.1	D	58.8	E	NBL&SBL: change to pm+pt, NBR: change to pm+ov	PM	49.7	D
35	Del Amo Blvd.	Long Beach Blvd.	57.5	E	35.4	D	45.8	D	NBL: change to pm+pt	AM	48.2	D
36	Del Amo Blvd.	Atlantic Ave.	45.8	D	28.6	C	94.3	F	No feasible signal phasing/timing mitigation available	--	--	--
37	Del Amo Blvd.	Cherry Ave.	50.7	D	33.0	C	78.6	E	No feasible signal phasing/timing mitigation available	--	--	--
38	Del Amo Blvd.	Lakewood Blvd.	67.1	E	48.8	D	179.9	F	No feasible signal phasing/timing mitigation available	--	--	--
43	Alondra Blvd.	Atlantic Ave.	58.8	E	30.8	C	34.8	C	NBL & SBL: change to pm+pt	AM	43.7	D
44	Alondra Blvd.	Garfield Ave.	38.3	D	46.5	D	81.9	F	No feasible signal phasing/timing mitigation available	--	--	--
45	Alondra Blvd.	Paramount Blvd.	34.3	C	34.8	C	58.0	E	NBL & SBL: change to pm+pt	PM	53.2	D
49	Rosecrans Ave.	Long Beach Blvd.	41.7	D	42.9	D	81.8	F	Change left turn to pm+pt for all directions	PM	53.7	D
50	Rosecrans Ave.	Atlantic Ave.	128.0	F	36.8	D	85.9	F	No feasible signal phasing/timing mitigation available	--	--	--
51	Rosecrans Ave.	Garfield Ave.	83.6	F	31.7	C	49.5	D	Change left turn to pm+pt for all directions	AM	54.5	D
52	Rosecrans Ave.	Paramount Blvd.	40.7	D	35.5	D	62.2	E	NBL & SBL: change to pm+pt	PM	52.0	D
54	Imperial Hwy.	Long Beach Blvd.	55.9	E	52.6	D	59.3	E	EBL & NBL: change to pm+pt	PM	55.0	D
55	Imperial Hwy.	Atlantic Ave.	67.6	E	35.4	D	68.1	E	Change left turn to pm+pt for all directions	PM	48.0	D
57	Imperial Hwy.	Paramount Blvd.	121.4	F	78.7	E	202.5	F	No feasible signal phasing/timing mitigation available	--	--	--
60	Firestone Blvd.	Atlantic Ave.	86.1	F	48.0	D	127.1	F	No feasible signal phasing/timing mitigation available	--	--	--
62	Firestone Blvd.	Paramount Blvd.	65.1	E	38.4	D	74.6	E	NBL & SBL: change to pm+pt	PM	53.9	D
63	Florence Ave.	Alameda St. (West)	59.2	E	48.9	D	59.8	E	Change left turn to pm+pt for all directions	PM	46.7	D
69	Slauson Ave.	Soto St.	46.9	D	31.8	C	60.9	E	Change NBL & SBL to pm+pt	PM	53.5	D
71	Slauson Ave.	Eastern Ave.	31.1	C	30.4	C	55.2	E	Change NBL & SBL to pm+pt	PM	44.2	D
73	Garfield Ave.	Slauson Ave.	64.7	E	30.4	C	74.6	E	EBL, NBL, SBL: change to pm+pt	PM	53.9	D
74	Bandini Blvd.	Atlantic Blvd.	48.8	D	47.7	D	64.3	E	Existing geometrics need clarifications	--	--	--
114	I-710 northbound	E. Artesia Blvd. (Off)	61.8	E	11.5	B	64.5	E	Change signal timing	AM	53.4	D
121	I-710 northbound	Firestone Blvd. (Off)	10.8	B	39.2	D	72.6	E	No feasible signal phasing/timing mitigation available	--	--	--
122	I-710 southbound	Firestone Blvd.	31.2	C	48.6	D	75.2	E	No feasible signal phasing/timing mitigation available	--	--	--
144	Alameda St.	41 st St.	71.0	E	7.5	A	12.8	B	Change cycle length to CL=60s	AM	27.8	C
146	Santa Fe Ave.	223 rd St.	32.7	C	30.7	C	99.1	F	EBL&WBL: change to pm+pt	PM	54	D
148	Wardlow Rd.	Cherry Ave.	71.8	E	41.9	D	72.0	E	EB&WB: change split phasing to permitted left, restripe through-left lane to through only lane	PM	66.4	E
151	Slauson Ave.	Santa Fe Ave.	61.5	E	42.2	D	114.0	F	Change left turn to pm+pt for all directions, EBR&WBR: change to pm+ov	PM	56.0	E
152	Pacific Ave.	Gage Ave.	68.4	E	28.5	C	33.1	C	EB&WB: change split phasing to permitted left	AM	21.8	C
153	Santa Fe Ave.	Gage Ave.	54.6	D	28.3	C	57.6	E	Change EBL&WBL to pm+pt	PM	52.0	D
155	Wilmington Ave.	223 rd St.	45.4	D	47.5	D	129.5	F	No feasible signal phasing/timing mitigation available	--	--	--
156	Alameda St Ramp	223 rd St.	16.8	B	15.7	B	90.9	F	No feasible signal phasing/timing mitigation available	--	--	--
159	38th St.	Santa Fe Ave.	23.3	C	8.9	A	91.9	F	Change cycle length to CL=60s	PM	27.4	C



Alternative 4 – Arterial Highway Evaluation

The major north/south and east/west arterial highways that were evaluated included Santa Fe Avenue, Long Beach Boulevard, Atlantic Boulevard, Eastern Avenue, Cherry Avenue, Paramount Boulevard, Slauson Avenue, Florence Avenue, Firestone Boulevard, Imperial Highway, Rosecrans Avenue, Alondra Boulevard, Del Amo Boulevard, Willow Street and Pacific Coast Highway.

The highest two-way peak hour volumes that were derived from existing peak hour approach/departure counts at intersections along the major arterials were compared to Level of Service E capacity volumes from the Florida Department of Transportation (FDOT) 2007 Generalized Q/LOS Tables. A V/C ratio greater than 1.0 indicates that the arterial link is operating over capacity.

None of the six major north/south arterials evaluated have links currently operating over capacity (V/C greater than 1.0); however, the following north/south arterials have links operating near capacity (V/C between 0.90 and 1.0):

- Atlantic Boulevard between Firestone Boulevard and Florence Avenue.
- Cherry Avenue between Willow Street and Del Amo Boulevard.

Two of the nine major east/west arterials evaluated currently have links operating over capacity;

- Florence Avenue between Atlantic Boulevard and I-710 Southbound Ramps.
- Firestone Boulevard between Atlantic Boulevard and Garfield Avenue.

The following east/west arterials have links operating near capacity:

- Firestone Boulevard west of Atlantic Boulevard.
- Del Amo Boulevard between Cherry Avenue and Lakewood Boulevard.

The arterial highway evaluation described above is only a preliminary analysis and will be refined further pending the results of the detailed traffic forecasts after alternatives screening.



Alternative 4 – Intersection Evaluation

The major arterial highway intersections within the corridor were evaluated to determine the maximum arterial highway intersection improvements that could feasibly be implemented in advance of any freeway improvements. See **Table D-1** for the list of evaluated intersections.

These intersections were analyzed using existing traffic count volumes, HCM analysis methodologies, and Synchro 6 software, which accounts for the effects of signal coordination and platoon formation on intersection operations. Of the 119 intersections analyzed under existing conditions, 42 had at least one peak hour period (a.m., mid-day, or p.m.) operating at LOS E or worse. For a detailed listing of these intersections see **Table D-3** which includes the existing peak period levels of service, the intersection modifications required to improve operations and the resulting levels of service with the proposed improvements.

The intersection evaluation described above is only a preliminary analysis and will be refined further pending the results of the detailed traffic forecasts after alternatives screening.



Table D-3: I-710 Corridor Project Alternative 4 (Arterial Highway and I-710 Congestion Relief Improvements) Intersection Improvements

ID	Main Street	Cross Street	Existing (2008)						Required Improvements	After Improvements		
			AM Peak		MD Peak		PM Peak			Peak Period	Delay	LOS
			Delay	LOS	Delay	LOS	Delay	LOS				
10	Pier B St.	9th St.	40.2	D	56.8	E	44.9	D	Change signal timing	MD	18.1	B
19	PCH	Santa Fe Ave.	62.5	E	--	--	116.2	F	EB&WB: change thru-right to thru+right-turn lane, change left-turn to pm+pt, NBL&SBL: change to perm	PM	79.7	E
25	Sepulveda Blvd.	Alameda St. (Ramp)	61.7	E	37.8	D	39.5	D	NB&SB: change split phase to left-turn perm	AM	38.2	D
26	Willow St.	Santa Fe Ave.	62.4	E	37.0	D	65.9	E	EBL: add 1 left-turn lane, NBL: change to pm+pt	PM	60.5	E
28	Willow St.	Long Beach Blvd.	63.9	E	61.7	E	96.1	F	Add additional left-turn lane in all directions	PM	54.8	D
29	Willow St.	Atlantic Ave.	73.3	E	48.5	D	86.6	F	NBL&SBL: change to pm+pt, All directions: replace thru-right lane with through and right-turn lanes with pm+ov	PM	53.4	D
30	Willow St.	Cherry Ave.	65.7	E	40.1	D	63.6	E	NBL: change to pm+pt, NBR: change pm+ov, EB&WB: replace thru-right lane with through and right-turn lanes	AM	54.4	D
31	Del Amo Blvd.	Wilmington Ave.	63.2	E	36.0	D	48.0	D	Change WBR to pm+ov	AM	47.6	D
34	Del Amo Blvd.	Santa Fe Ave.	54.3	D	38.1	D	58.8	E	NBL&SBL: change to pm+pt, NBR: change to pm+ov	PM	49.7	D
35	Del Amo Blvd.	Long Beach Blvd.	57.5	E	35.4	D	45.8	D	NBL: change to pm+pt	AM	48.2	D
36	Del Amo Blvd.	Atlantic Ave.	45.8	D	28.6	C	94.3	F	WB: replace thru-right lane with through and right-turn lanes with pm+ov	PM	55	D
37	Del Amo Blvd.	Cherry Ave.	50.7	D	33.0	C	78.6	E	EB: add additional left-turn lane, WB: replace thru-right lane with through and right-turn lanes	PM	51.3	D
38	Del Amo Blvd.	Lakewood Blvd.	67.1	E	48.8	D	179.9	F	No feasible mitigation available	--	--	--
43	Alondra Blvd.	Atlantic Ave.	58.8	E	30.8	C	34.8	C	Add one additional SBL lane	AM	41.5	D
44	Alondra Blvd.	Garfield Ave.	38.3	D	46.5	D	81.9	F	EB: replace thru-right lane with through and right-turn lanes; change left turn to pm+pt for all directions	PM	49.3	D
45	Alondra Blvd.	Paramount Blvd.	34.3	C	34.8	C	58.0	E	NBL & SBL: change to pm+pt	PM	53.2	D
49	Rosecrans Ave.	Long Beach Blvd.	41.7	D	42.9	D	81.8	F	EB & WB: replace thru-right lane with through and right-turn lanes; NBL&SBL: change to pm+pt	PM	42.5	D
50	Rosecrans Ave.	Atlantic Ave.	128.0	F	36.8	D	85.9	F	Add one SBL, EB&WB: replace thru-right lane to through and right-turn lanes with pm+ov; NBL: change to pm+pt	AM	53.5	D
51	Rosecrans Ave.	Garfield Ave.	83.6	F	31.7	C	49.5	D	Add one additional EBL lane; change SBL to pm+pt	AM	52.1	D
52	Rosecrans Ave.	Paramount Blvd.	40.7	D	35.5	D	62.2	E	Add one additional EBL lane	PM	52.7	D
54	Imperial Hwy.	Long Beach Blvd.	55.9	E	52.6	D	59.3	E	Add one additional WBL lane	PM	44.1	D
55	Imperial Hwy.	Atlantic Ave.	67.6	E	35.4	D	68.1	E	Add one additional SBL lane; EB: replace thru-right lane with through and right-turn lane	PM	47.5	D
57	Imperial Hwy.	Paramount Blvd.	121.4	F	78.7	E	202.5	F	EB&WB: replace thru-right lane with through and right-turn lanes with pm+ov; SB&WB: add additional left-turn lane	PM	49.9	D
60	Firestone Blvd.	Atlantic Ave.	86.1	F	48.0	D	127.1	F	NB,EB&WB; add additional left-turn lane, EB&SB: replace thru-right lane with through and right-turn lanes, WB: add additional through lane	PM	70.1	E
62	Firestone Blvd.	Paramount Blvd.	65.1	E	38.4	D	74.6	E	Add one additional EBL lane; NBL&SBL: change to pm+pt	PM	47.6	D
63	Florence Ave.	Alameda St. (West Link)	59.2	E	48.9	D	59.8	E	Add additional WBL lane, NB & WB: replace thru-right lane with through and right-turn lanes	PM	45.1	D
69	Slauson Ave.	Soto St.	46.9	D	31.8	C	60.9	E	NBL & SBL: change to pm+pt	PM	53.5	D
71	Slauson Ave.	Eastern Ave.	31.1	C	30.4	C	55.2	E	NBL & SBL: change to pm+pt	PM	44.2	D
73	Garfield Ave.	Slauson Ave.	64.7	E	30.4	C	74.6	E	NB & SB: change thru-right to through and right-turn lanes	PM	47.6	D
74	Bandini Blvd.	Atlantic Blvd.	48.8	D	47.7	D	64.3	E	No feasible mitigation available	--	--	--
114	I-710 northbound	E. Artesia Blvd. (Off)	61.8	E	11.5	B	64.5	E	Change signal timing	AM	53.4	D
121	I-710 northbound	Firestone Blvd.(Off)	10.8	B	39.2	D	72.6	E	No feasible mitigation available	--	--	--
122	I-710 southbound	Firestone Blvd.	31.2	C	48.6	D	75.2	E	No feasible mitigation available	--	--	--
144	Alameda St.	41 st St.	71.0	E	7.5	A	12.8	B	Change cycle length to CL=60s	AM	27.8	C
146	Santa Fe Ave.	223 rd St.	32.7	C	30.7	C	99.1	F	EBL&WBL: change to pm+pt	PM	54	D
148	Wardlow Rd.	Cherry Ave.	71.8	E	41.9	D	72.0	E	EB&WB: change split phasing to permitted left, replace thru-left lane with one through and one left-turn lanes	PM	39.5	D
151	Slauson Ave.	Santa Fe Ave.	61.5	E	42.2	D	114.0	F	SB: replace thru-right with through and right-turn lanes, change left turn to pm+pt for all directions	PM	45.3	D
152	Pacific Ave.	Gage Ave.	68.4	E	28.5	C	33.1	C	WB & NB: replace thru-right with through and right-turn lanes	AM	53.1	D
153	Santa Fe Ave.	Gage Ave.	54.6	D	28.3	C	57.6	E	EBL & WBL: change to pm+pt	PM	52.0	D
155	Wilmington Ave.	223 rd St.	45.4	D	47.5	D	129.5	F	EB&WB: add additional left-turn lane, EB: change right turn lane to thru-right lane, NBL&SBL: change to pm+pt	PM	54.5	D
156	Alameda Ramp	223 rd St.	16.8	B	15.7	B	90.9	F	No feasible mitigation available	--	--	--
159	38 th St.	Santa Fe Ave.	23.3	C	8.9	A	91.9	F	Change cycle length to CL=60s	PM	27.4	C



APPENDIX E: EARLY ACTION CONGESTION RELIEF PROJECTS



Alternative 4 – Interstate 710 Freeway Evaluation

This evaluation addresses congestion areas along I-710 by identifying existing freeway deficiencies causing bottlenecks, congestion and safety problems. The improvements considered were limited to the existing freeway footprint.

The existing (2008) traffic operating conditions of the I-710 freeway were evaluated from its southern termini in the City of Long Beach to the northern limits near Washington Boulevard. **Table E-1** lists the areas which have operational deficiencies (LOS E or worse during at least one peak period) and includes mitigation alternatives, if feasible, within the existing freeway footprint. The table also contains existing levels of service as well as the projected level of service after mitigation.

Alternative 4 – Early Action Congestion Relief Projects

Shoemaker Bridge Replacement and PCH and Anaheim Boulevard Interchange Improvements

This project entails reconstruction and reconfiguration of all freeway ramps at the Shoemaker Bridge, Anaheim Blvd., and PCH interchanges. The project may be accomplished in multiple phases with some elements advancing independently. Due to the close proximity of these interchanges, the staging required to construct some elements will affect all three interchanges. Early action elements by interchange are as follows:

- Shoemaker Bridge: The Shoemaker Bridge interchange configuration will remain comparable to the existing design with left-hand side ingress and egress to the freeway. Improvements will include a realignment and replacement of the Shoemaker Bridge as well as a realignment of Shoreline Dr. to Ocean Blvd. Modifications will be made to connections at Shoreline Dr., Ocean Blvd., Broadway, 3rd, and 7th, while connections to 6th, 9th and 10th will be removed.
- Anaheim Blvd: Improvements to the Anaheim Blvd. interchange will include reconstructing all freeway ramps and replacing the Anaheim Blvd. overcrossing and river bridge. The existing four-quadrant cloverleaf configuration will be replaced by a single point configuration. Reconstruction of this interchange can be conducted in two separate phases. The first phase would include replacing the freeway and river structures, reconstructing Anaheim Blvd., and modifying the existing entrance and exit ramps. The second phase would entail realigning and replacing the entrance and exit ramps as well as realigning and reconstructing the freeway through the interchange.



The second phase of this project would occur concurrently with the second phase of the PCH interchange project.

- PCH: Improvements to the PCH interchange entail reconstructing all freeway ramps and replacing the PCH overcrossing and river bridge. The existing four-quadrant cloverleaf configuration will be replaced by a single point configuration. Reconstruction of this interchange can be conducted in two separate phases. The first phase would include replacing the freeway and river structures, reconstructing PCH, and modifying the existing entrance and exit ramps. Additionally, the northbound entrance and exit loops would be removed. The second phase would entail realigning and replacing the entrance and exit ramps as well as realigning and reconstructing the freeway through the interchange. The second phase of this project would occur concurrently with the second phase of the Anaheim Blvd. interchange project.

Firestone Boulevard Interchange Improvements

This project entails reconstruction of all freeway ramps and replacement of the Firestone overcrossing to accommodate up to a ten-lane freeway section. The interchange configuration will remain a two-quadrant partial cloverleaf; however, ramp alignments will be improved and spacing between ramp termini will be increased. Right of way is required in all four quadrants.

Atlantic Boulevard / Bandini Boulevard Interchange Improvements

This congestion relief project, which may be accomplished in three phases, entails the reconstruction and reconfiguration of all freeway ramps and the realignment of Atlantic Boulevard. Phase 1 replaces the northbound entrance and exit ramps and moves the freeway ingress and egress locations south of their existing positions. For both ramps the terminus is located at the Bandini/26th Street intersection. Phase 2 realigns Atlantic Boulevard between the LA River and 26th Street creating a new intersection at Bandini Boulevard and a new undercrossing below the freeway. Phase 3 creates a new ramp terminus located on Bandini west of the freeway and replaces the southbound entrance and exit ramps. These entrance and exit ramps will serve both Atlantic Boulevard and Bandini Boulevard. To complete this project, additional right of way would be required for all three phases.

**Table E-1: Alternative 4 I-710 Operation Deficiencies and Proposed Mitigation**

Location Description	Type	Existing LOS (AM/MD/PM)	Alternative Mitigation	LOS After Mitigation (AM/MD/PM)
Northbound I-710				
Diverge to EB Willow St.	Off	(E/D/D)	Extend deceleration length to 300'	(D/D/D)
Merge from WB Willow St.	On	(F/D/D)	Mainline overflow, no feasible mitigation	--
Merge from NB I-405/Wardlow Rd.	On	(E/D/D)	Extend acceleration length to 700'	(D/D/D)
Diverge to Rosecrans Ave.	Off	(D/E/E)	Extend deceleration length to 400'	(D/D/D)
Merge from Imperial Hwy.	On	(F/F/F)	Mainline overflow, no feasible mitigation	--
Diverge to Firestone Blvd.	Off	(D/E/D)	Extend deceleration length to 700'	(D/D/D)
Diverge to Florence Ave.	Off	(F/F/F)	Mainline overflow, no feasible mitigation	--
Merge from Florence Ave.	On	(F/F/C)	Mainline overflow, no feasible mitigation	--
Diverge to NB Atlantic Ave.	Off	(F/F/B)	Change to one lane off ramp; upstream becomes five lane mainline segment matching downstream mainline lanes	(D/D/D)
Diverge to SB Atlantic Ave.	Off	(E/D/C)	Extend deceleration length to 300'	(D/D/C)
Diverge to Washington Blvd.	Off	(E/E/D)	Extend deceleration length to 300'	(D/D/D)
Diverge to NB I-5	Off	(D/D/F)	Mainline overflow, no feasible mitigation	--
Diverge to Olympic Blvd.	Off	(E/E/F)	Extend deceleration length to 400'	(D/D/F)
Between Southbound PCH Merge and Northbound PCH Diverge	Weave	(F/F/F)	No feasible mitigation	--
Between Eastbound Willow St. Merge and Westbound Willow St. Diverge	Weave	(F/E/E)	No feasible mitigation	--
Between I-105 Merge and Imperial Hwy. Diverge	Weave	(F/F/F)	No feasible mitigation	--
Between Eastbound Imperial Hwy. Merge and Westbound Imperial Hwy. Diverge	Weave	(F/F/F)	No feasible mitigation	--
Between SR-91 Merge and Alondra Blvd. Diverge	Weave	(D/F/F)	No feasible mitigation	--



Table E-1 Continued: Alternative 4 I-710 Operation Deficiencies and Proposed Mitigation

Location Description	Type	Existing LOS (AM/MD/PM)	Alternative Mitigation	LOS After Mitigation (AM/MD/PM)
Southbound I-710				
Diverge to Florence Ave.	Off	(D/F/E)	Change to two lane off ramp	(C/D/D)
Merge from Florence Ave.	On	(C/F/C)	Mainline overflow, no feasible mitigation	--
Diverge to Firestone Blvd.	Off	(E/F/F)	Change to two lane off ramp	(D/F/D)
Merge from Firestone Blvd.	On	(F/F/C)	Mainline overflow, no feasible mitigation	--
Diverge to Wright Rd.	Off	(F/F/E0)	Extend deceleration length to 700'	(F/F/D)
Diverge to Eastbound Imperial Hwy.	Off	(E/F/E)	Extend deceleration length to 675'	(D/F/D)
Diverge to Rosecrans Ave.	Off	(D/F/D)	Mainline overflow, no feasible mitigation	--
Merge from MLK Blvd.	On	(C/F/C)	Mainline overflow, no feasible mitigation	--
Diverge Susana Rd.	Off	(F/F/D)	Change to two lane off ramp	(F/D/C)
Merge from Northbound I-405	On	(F/F/D)	Mainline overflow, no feasible mitigation	--
Diverge to Westbound Willow St.	Off	(F/E/D)	Extend deceleration length to 400'	(F/D/D)
Diverge to Pacific Coast Highway	Off	(F/F/F)	Mainline overflow, no feasible mitigation	--
Merge from Pacific Coast Highway	On	(F/F/E)	Add auxiliary lane to Anaheim off ramp; operation becomes Type A weave	(F/E/E)
Diverge to Westbound Anaheim St.	Off	(F/F/F)	Add auxiliary lane from PCH on ramp, operation becomes Type A weave	(F/E/E)
Between SR-60 Merge and Eastern Ave. Diverge	Weave	(E/E/D)	No feasible mitigation	--
Between Washington Blvd. Merge and Atlantic Ave. Diverge	Weave	(D/E/D)	Add auxiliary lane, operation becomes Type C weave across 6 lanes	(C/C/C)
Between Imperial Hwy. Merge and MLK Blvd./I-105 Diverge	Weave	(F/F/F)	No feasible mitigation	--
Between Artesia Blvd./Eastbound SR-91 Merge and Long Beach Blvd. Diverge	Weave	(F/E/E)	No feasible mitigation	--
Between Northbound I-405 Merge and Southbound I-405 Diverge	Weave	(F/F/F)	No feasible mitigation	--
Between Westbound Willow St. Merge and Eastbound Willow St. Diverge	Weave	(F/F/E)	No feasible mitigation	--



APPENDIX F: ALTERNATIVES 5 AND 6 DETAILED PROPOSED IMPROVEMENTS TO I-710 BY FREEWAY SECTION



Table F-1: Alternative 5 Detailed Proposed I-710 Improvements

I-710	Description
Ocean Blvd. to Willow Ave.	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Modify Shoemaker Bridge alignment • Eliminate connections to 9th St. and 10th St. to/from Shoemaker Bridge • Eliminate 6th St. connection from Shoemaker Bridge • Reconfigure Anaheim St. interchange to single point and replace bridges (I-710 & Los Angeles River) • Reconfigure Pacific Coast Highway interchange to single point and replace bridges (I-710 & Los Angeles River) • Reconfigure Willow St. interchange to single point and replace bridges (I-710 & Los Angeles River)
Wardlow Rd. to Del Amo Blvd., including I-405 from Pacific Ave. to Santa Fe Ave.	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Provide 8-lane section on I-710 under existing I-405 • Replace westbound I-405 to southbound I-710 loop connector with fly-over connector • Realign and replace eastbound I-405 to northbound I-710 flyover connector • Realign and replace westbound I-405 to northbound I-710 connector • Add auxiliary lanes on southbound I-710 south of I-405 for I-405/I-710 connectors • Add auxiliary lanes on northbound and southbound I-405 • Realign and replace Hughes Way/Santa Fe Ave. exit and entrance ramps to and from I-405 • Realign and replace Wardlow Rd. entrance ramp to I-405 and close Wardlow Rd. exit ramp from I-405 • Realign and replace Pacific Ave. entrance and exit ramps to I-405. Close Pacific Ave. entrance ramp to northbound I-710 • Reconfigure Del Amo Blvd. interchange to one-quadrant cloverleaf (northbound)/hook-pair (southbound) • Relocate Del Amo Blvd./Susana Rd. intersection and realign Susana Rd.
Long Beach Blvd. to Alondra Blvd., including SR-91 from Atlantic Ave. to Long Beach Blvd.	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Realign freeway at Long Beach Blvd. to improve ramp intersection spacing on Long Beach Blvd. • Realign and extend northbound I-710 to westbound SR-91 connector past Long Beach Blvd. along westbound SR-91 • Make southbound I-710 to westbound SR-91 connector two lanes instead of one • Realign and reconstruct eastbound SR-91 to northbound I-710 connector to ensure viable clearance for northbound Alondra Blvd. exit ramp • Reconfigure Alondra Blvd. interchange to single point and replace bridges over I-710 and Los Angeles River • Added northbound exit to Alondra Blvd. from eastbound SR-91 to northbound I-710 connector • Realign northbound Alondra Blvd. exit ramp to avoid replace SR-91 separation • Realign southbound Alondra Blvd. entrance ramp to ensure constructability of braid over southbound I-710 to eastbound SR-91 connector
Rosecrans Ave. to Firestone Blvd.	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Reconfigure Imperial Hwy. interchange to two-quadrant partial cloverleaf and replace bridges (I-710 & Los Angeles River). Keep ramp connection to Wright Rd. • Revise freeway alignment closer to existing • Improve ramp geometry at Firestone Blvd. interchange



Table F-1 Continued: Alternative 5 Detailed Proposed I-710 Improvements

I-710	Description
<p>Florence Ave. to Slauson Ave.</p>	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Reconfigure Florence Ave. interchange to two-quadrant partial cloverleaf and replace bridges (I-710 & Los Angeles River) • Construct new single point interchange at Slauson Ave.
<p>Atlantic Ave. to Washington Blvd.</p>	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Realign Atlantic Blvd. between southbound I-710 ramp termini and 26th St. • Replace southbound Washington Blvd. ramps with flyover entrance and exit ramps at Oak St./Washington Blvd. terminus • Replace northbound Washington Blvd. ramps with flyover entrance ramp at Oak St./Washington Blvd. terminus and exit ramp near existing northbound ramp terminus



Table F-2: Alternative 6 Detailed Proposed I-710 Improvements

I-710	Description
<p>Ocean Blvd. to Willow St.</p>	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Modify Shoemaker Bridge alignment • Eliminate connections to 9th St. and 10th St. to/from Shoemaker Bridge • Eliminate 6th St. connection from Shoemaker Bridge • Reconfigure Anaheim St. interchange to single point and replace bridges (I-710 & Los Angeles River) • Reconfigure Pacific Coast Highway interchange to single point and replace bridges (I-710 & Los Angeles River) • Reconfigure Willow St. interchange to single point and replace bridges (I-710 & Los Angeles River)
	<p><u>Freight Corridor</u></p> <ul style="list-style-type: none"> • End southbound Freight Corridor at Anaheim St. • Add Pico Ave. connection to northbound Freight Corridor • Add flyover connection from eastbound Anaheim St. to northbound Freight Corridor • (Optional) Add flyover connection from eastbound Pacific Coast Highway to northbound Freight Corridor • Freight corridor mostly elevated, except Willow St. to I-405
<p>Wardlow Rd. to Del Amo Blvd., including I-405 from Pacific Ave. to Santa Fe Ave.</p>	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Provide 8-lane section on I-710 under existing I-405 • Replace westbound I-405 to southbound I-710 loop connector with fly-over connector • Realign and replace eastbound I-405 to northbound I-710 flyover connector • Realign and replace westbound I-405 to northbound I-710 connector • Add auxiliary lanes on southbound I-710 south of I-405 for I-405/I-710 connectors • Add auxiliary lanes on northbound and southbound I-405 • Realign and replace Hughes Way/Santa Fe Ave. exit and entrance ramps to and from I-405 • Realign and replace Wardlow Rd. entrance ramp to I-405 and close Wardlow Rd. exit ramp from I-405 • Realign and replace Pacific Ave. entrance and exit ramps to I-405. Close Pacific Ave. entrance ramp to northbound I-710 • Reconfigure Del Amo Blvd. interchange to one-quadrant cloverleaf (northbound)/hook-pair (southbound) • Relocate Del Amo Blvd./Susana Rd. intersection and realign Susana Rd.
	<p><u>Freight Corridor</u></p> <ul style="list-style-type: none"> • Provide southbound Freight Corridor exit to I-405 near Del Amo Blvd. via elevated ramp



Table F-2 Continued: Alternative 6 Detailed Proposed I-710 Improvements

I-710	Description
<p>Long Beach Blvd. to Alondra Blvd., including SR-91 from Atlantic Blvd. to Long Beach Blvd.</p>	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Realign freeway at Long Beach Blvd. to improve ramp intersection spacing on Long Beach Blvd. • Realign and extend northbound I-710 to westbound SR-91 connector past Long Beach Blvd. along westbound SR-91 • Make southbound I-710 to westbound SR-91 connector two lanes instead of one • Realign and reconstruct eastbound SR-91 to northbound I-710 connector to ensure viable clearance for northbound Alondra Blvd. exit ramp • Reconfigure Alondra Blvd. interchange to single point and replace bridges over I-710 and Los Angeles River • Added northbound exit to Alondra Blvd. from eastbound SR-91 to northbound I-710 connector • Realign northbound Alondra Blvd. exit ramp to avoid replace SR-91 separation • Realign southbound Alondra Blvd. entrance ramp to ensure constructability of braid over southbound I-710 to eastbound SR-91 connector
	<p><u>Freight Corridor</u></p> <ul style="list-style-type: none"> • Realigned and extended southbound I-710 to westbound SR-91 ramp one mile to ensure viable merge location on westbound SR-91 • Realigned and extended eastbound SR-91 to northbound I-710 ramp one mile to ensure viable diverge location on westbound SR-91
<p>Rosecrans Blvd. to Firestone Blvd.</p>	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Reconfigure Imperial Hwy. interchange to two-quadrant partial cloverleaf and replace bridges (Fwy and LA River). Keep ramp connection to Wright Rd. • Revise freeway alignment closer to existing • Improve ramp geometry at Firestone Blvd. interchange
	<p><u>Freight Corridor</u></p> <ul style="list-style-type: none"> • Freight corridor alignment is elevated over Firestone Blvd. and over UPRR • Freight corridor crosses Los Angeles River adjacent to northbound I-710, instead of southbound I-710
<p>Florence Ave. to Slauson Ave.</p>	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Reconfigure Florence Ave. interchange to two-quadrant partial cloverleaf and replace bridges (I-710 & Los Angeles River) • Construct new single point interchange at Slauson Ave.
	<p><u>Freight Corridor</u></p> <ul style="list-style-type: none"> • Realigned freight corridor to go over Clara St., Florence Ave., and Gage Ave. to ensure viable local interchange ramp connections



Table F-2 Continued: Alternative 6 Detailed Proposed I-710 Improvements

I-710	Description
Atlantic Ave. to Washington Blvd.	<p><u>Freeway Improvements</u></p> <ul style="list-style-type: none"> • Realign Atlantic Blvd. between southbound I-710 ramp termini and 26th St. • Replace southbound Washington Blvd. ramps with flyover entrance and exit ramps at Oak St./Washington Blvd. terminus • Replace northbound Washington Blvd. ramps with flyover entrance ramp at Oak St./Washington Blvd. terminus and exit ramp near existing northbound ramp terminus
	<p><u>Freight Corridor</u></p> <ul style="list-style-type: none"> • Provide three northbound connections to local streets, instead of one, at 26th St., Washington Blvd., and Indiana St. • Provide two southbound connections from local streets, instead of one, at 26th St. and Indiana St. • Freight corridor alignment has greater separation from northbound I-710 with higher speed curves • Connectors to Indiana St. from westbound Sheila St. • Add freight only ramps from southbound I-710 to railyards and from railyards to northbound I-710 • Provide a northbound and southbound freight corridor connector to the I-710 mainline which connects to I-710 just north of Washington Blvd.