Attachment 7:

I-710 Alternatives Screening Analysis Final Report

Prepared by URS, May 29, 2009

FINAL

TECHNICAL MEMORANDUM – ALTERNATIVES SCREENING ANALYSIS
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1.0 INTRODUCTION

1.1 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[1]. In conjunction with a large growth in population and employment along the I-710 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 The congestion problem is compounded by the freeway's outdated design and the potential for accidents created by the commingling of HDTs and passenger vehicles.

The immediate situation is not only disruptive to I-710 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 I-710 Corridor studies have been conducted, including the I-170 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 (GP) lanes next to four separated freight movement lanes.

Most recently, the Los Angeles County Metropolitan Transportation Authority (Metro), in a cooperative effort involving the California Department of Transportation (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

[1] Draft Purpose and Need Statement I-710 Corridor Project, April 2008.

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, and/or mitigate those effects.

1.2 Purpose of the I-710 Corridor Project Environmental Impact Report/Environmental Impact Statement (EIR/EIS)

The I-710 Corridor Project Environmental Impact Report/Environmental Impact Statement (EIR/EIS) is being prepared to inform the public and governmental decision-makers of possible 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.

1.3 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[2]. This includes northbound and southbound connectors and extends more than one mile east and west of I-710. **Figure 1** illustrates this study area.

1.4 Purpose of This Technical Memorandum

The purpose of this Alternatives Screening Analysis Technical Memorandum is to describe the process and key technical findings used to identify a reduced set of alternatives for the I-710 Corridor Project. In this screening phase, a conceptual level of analysis was performed on an initial set of six alternatives to provide comparative information on their relative benefits, costs, and impacts. The measures used to distinguish the differences between these alternatives addressed areas such as improvements to traffic mobility, traffic safety, air quality and health effects, impacts to environmental resources, and right of way impacts.

Although this screening analysis was fairly broad, the level of detail on the comparative analysis of alternatives will increase after the number and range of alternatives has been narrowed through this screening analysis to ensure that the bulk of the study effort is devoted to the most feasible and practicable alternatives for transportation improvements.

[2] Section 1.3 is only a general description of the I-710 study area.

Figure 1: I-710 Corridor Project Study Area

The key factor in determining the outcome of this screening process was identifying those alternatives which best meet the project Purpose and Need as described in the following section.

1.5 I-710 CORRIDOR PROJECT PURPOSE AND NEED

The ten goals listed below were developed to focus on key issues and priorities within the I-710 Corridor and gauge each alternative's relative performance. The first five are included in the project's Purpose and Need Statement (see **Appendix A** of this report for the I-710 Corridor Project Purpose and Need Statement), while the remaining five have been brought forward in preceding I-710 studies. For a full explanation of each goal and its corresponding objectives, see the *I-710 Alternatives Screening Methodology Report (12/16/08)*.

- Improve Air Quality and Public Health
- Improve Traffic Safety
- Eliminate Highway Design Deficiencies
- Increase Mobility
- Accommodate Growth in Population, Employment and Activities Related to Goods Movement
- Minimize Right of Way Impacts
- Minimize Impacts to Section 4(f) Properties
- Reduce Energy Consumption
- Ensure Environmental Justice
- Promote Cost Effectiveness

In order to evaluate each alternative's ability to achieve the established goals, listed above, a number of screening measures were developed. Using these measures it was possible to compare the performance of the alternatives and narrow down those alternatives in the initial set which should move forward in the environmental process. In particular, those measures associated with the project Purpose and Need played a large role in determining the outcome of the screening process.

2.0 INITIAL SET OF ALTERNATIVES

The first step in the environmental process and screening analysis was developing a broad range of conceptual alternatives called the Initial Set of Alternatives.

2.1 ALTERNATIVES DEFINITION

The initial set of six proposed alternatives for the I-710 Corridor Project was comprised of a No Build Alternative and five Build Alternatives, one of which (Alternative 6) was based upon the Locally Preferred Strategy (LPS) identified in the Major Corridor Study (MCS). Listed below are summary descriptions of the alternatives considered during the screening process. A full description of the initial set of alternatives can be found in the *I-710 Corridor Project EIR/EIS Baseline Alternatives Analysis Report (04/29/09)*.

- **Alternative 1: No Build:** 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 (RTP) as well as the 2008 Regional Transportation Improvement Program (RTIP) project list.

- **Alternative 2: Transportation Systems Management/Transportation Demand Management (TSM/TDM)/Transit/Intelligent Transportation Sytems (ITS):** 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.

- **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 advanced zero emissions container movement technology within the I-710 Corridor. Two families of technologies were originally defined in the *Alternatives Goods Movement Technology Analysis Initial Feasibility Study Report (01/06/09)*, for this component of Alternative 3; an automated fixed guideway family and zero emission truck family. During a separate technical workshop that was held to evaluate these alternative goods movement technologies, a third technology family of electrified conventional freight rail was added for consideration.

For the purpose of alternatives screening the automated fixed guideway family is assumed as representative of these advanced technology zero emission container movement systems; however, other advanced technology families may be assessed in the subsequent EIR/EIS phase.

These goods movement enhancements in Alternative 3 are accompanied by all of the proposed improvements from Alternatives 1 and 2.

- **Alternative 4: Arterial Highway & 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.

- **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 lanes plus two high occupancy vehicle (HOV) lanes. Also included in Alternative 5 are the components of Alternatives 1, 2 and 4.

- **Alternative 6: Alternative 5 with Addition of Four Separated Freight Movement 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.

3.0 SCREENING OF ALTERNATIVES

3.1 APPROACH / SCREENING CRITERIA

Each of the alternatives in the Initial Set was taken through a preliminary screening analysis. This analysis applied screening criteria to distinguish between the relative benefits, impacts and costs of the alternatives. These criteria measured the performance of the alternatives relative to the project goals designated in the *Alternatives Screening Methodology Report* and multiple measures were used to elicit comparative information. The screening objectives and measures used to narrow the range of alternatives are outlined as follows (For purposes of presenting the screening results, the outline below and Section 3.2 have been organized slightly different from the screening matrix and established goals in Section 1.5.):

Mobility Measures
- Screenline Volume/Capacity (V/C) Ratio on I-710 General Purpose Lanes by Time Period
- Screenline Volume/Capacity (V/C) Ratios on Arterials
- I-710 Travel Time
- Screenline Volume/Capacity (V/C) Ratios by Time Period

Air Quality Measures
- Daily Freeway Diesel Particulate Matter (DPM) Emissions
- Daily Freeway Oxides of Nitrogen (NOx) Emissions
- Number and Percent of Daily Truck Trips Eliminated on I-710 by Clean Energy Powered Transporting Vehicles

Reduction in Energy Consumption
- Percent Reduction in Daily Study Area Freeway Fuel Consumption Compared to No Build

Traffic Safety Measures
- Percent of P.M. Peak Period Traffic on I-710 General Purpose Lanes Consisting of Heavy Duty Trucks
- Number of Existing Design Deficiencies Reduced or Eliminated

Right of Way Measures
- Number of Impacted Residential Properties
- Number of Impacted Non-Residential Buildings
- Potential Relocations of Regionally Significant Utilities – Power Transmission

Environmental Impacts Measures
- Right of Way Impacts on Waters of the U.S.
- Number of Right of Way Impacts on Section 4(f) Properties
- Environmental Justice Assessment

Capital Cost Measure

- Total Capital Cost

3.2 SCREENING ANALYSIS

The screening analysis was performed at a conceptual level to provide comparative results of the benefits, impacts and cost of the initial set of six alternatives. The evaluative information produced during screening was then used to provide the technical rationale for narrowing the initial range of alternatives to a reduced set of alternatives that best meet the Purpose and Need of the proposed project. This reduced set of alternatives will then be analyzed in detail during the subsequent EIR/EIS phase of the project. The following discussion summarizes some of the key technical findings from the screening analysis.

3.2.1 Mobility Measures

I-710 is unable to accommodate current, much less future, traffic demand resulting in a serious decline in the performance of the freeway and severe traffic congestion. This not only impacts traffic flow on the freeway but the operation of surrounding arterials as well; therefore, a goal of the proposed project is to improve mobility within the I-710 Corridor allowing for a more effective utilization of the entire roadway system. In an effort to assess the various alternatives in their ability to achieve this goal, a set of mobility measures was developed. In particular, these measures evaluated 2035 travel times along the freeway from Ocean Blvd. to SR-60, and screenline volume/capacity (V/C) ratios (a measure of traffic congestion) on I-710, I-110, I-605 and selected study area arterials.

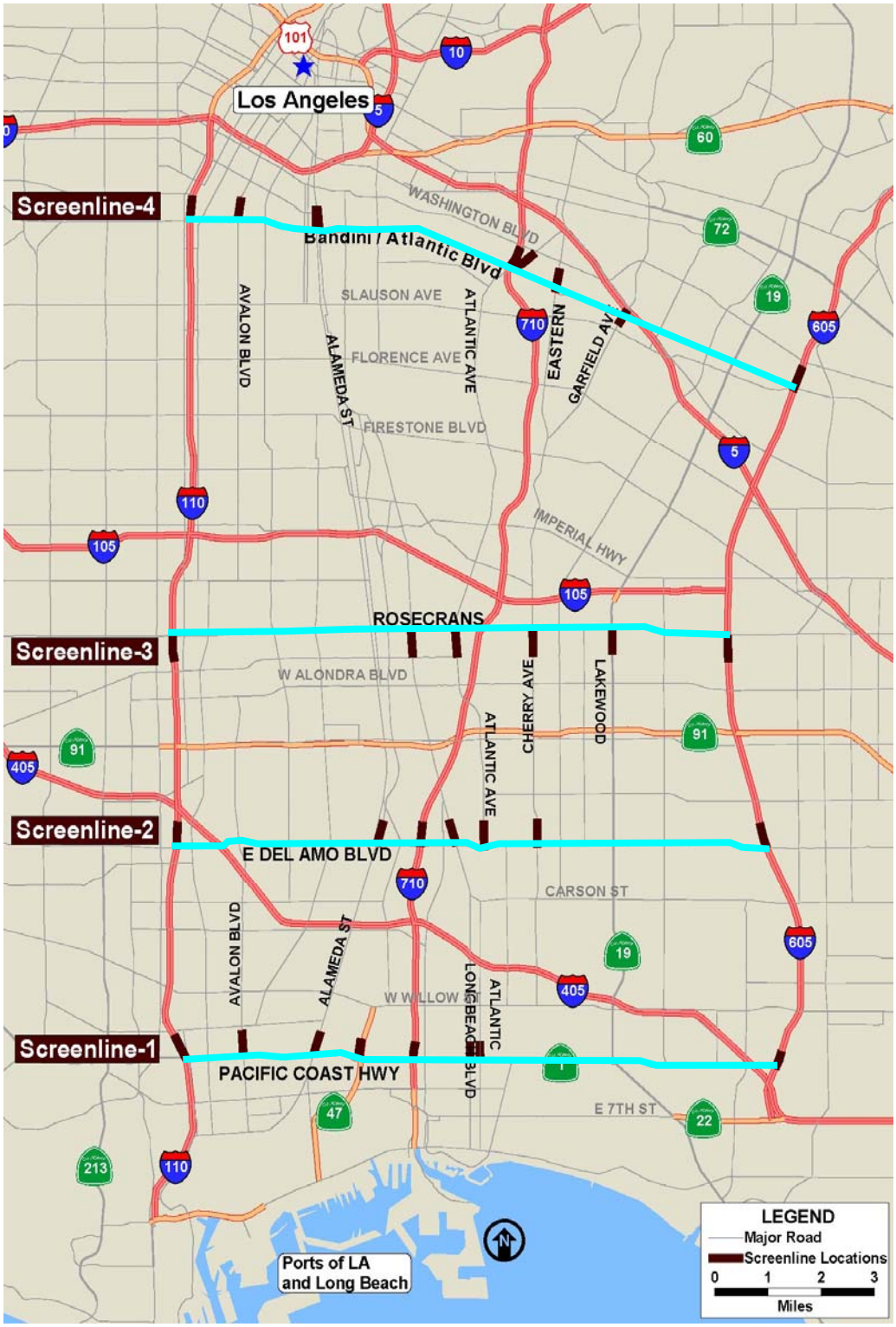
For the purpose of this screening analysis, four east-west screenlines were defined to summarize traffic measures for each alternative in the north-south direction. These four screenlines, also used in the *Initial Feasibility Analysis*, are positioned in the following locations along the I-710 Corridor:

- Screenline 1: Just north of Pacific Coast Highway (PCH);
- Screenline 2: Just north of Del Amo Blvd (between I-405 and SR-91);
- Screenline 3: Just south of Rosecrans Ave. (between SR-91 and I-105); and
- Screenline 4: Just north of the Atlantic Blvd/Bandini Blvd Intersection (close to the Vernon/Commerce intermodal rail yards).

Figure 2 illustrates the locations of the screenlines.

It is important to note that these screening measures are for comparative purposes only and are not to be taken as precise estimates of forecast traffic volumes.

Figure 2: Screenlines Selected for Alternatives Screening Analysis

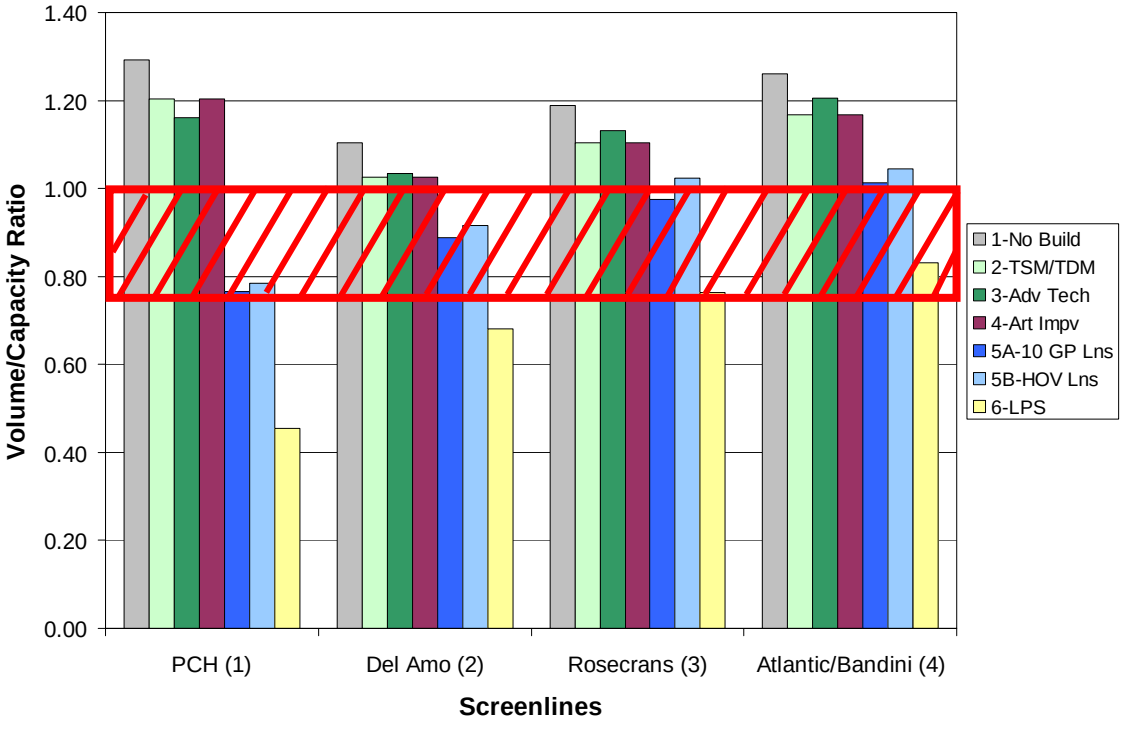


Screenline Volume/Capacity (V/C) Ratio on I-710 General Purpose Lanes by Time Period

Derived from year 2035 screenline model traffic forecasts, the screenline V/C ratio reflects the effects of each alternative on the forecast traffic congestion levels for the I-710 general purpose lanes in the A.M. Peak Period (6:00 A.M. to 9:00 A.M.), midday (9:00 A.M. to 3:00 P.M.) and P.M. Peak Period (3:00 P.M. to 7:00 P.M.) at the four screenline locations shown in **Figure 2**. The V/C ratio measures the vehicle demand compared to the available roadway capacity, averaged over a specific time period. Higher V/C ratios equate to lower traffic speeds and higher traffic densities (e.g. traffic congestion). These volume estimates include the conversion of heavy duty trucks (HDT) into passenger car equivalents (PCEs), to account for a HDT's greater utilization of roadway capacity as compared to a passenger vehicle.

Although the P.M. Peak Period generally has the highest V/C ratios among the three time periods, the patterns between the alternatives stay the same across the time periods. Therefore, the P.M. Peak Period was chosen to be representative of the screenline findings for this measure and is shown in **Figure 3**. Additionally, the northbound direction was chosen given that it has the highest traffic volumes during the P.M. Peak Period.

Figure 3: Screenline V/C Ratios on I-710 General Purpose Lanes (PM Peak Period, NB Direction)



To interpret the results in **Figure 3**, those alternatives with a Peak Period V/C ratio below 0.75 are considered to be operating at an acceptable level of service with lower levels of traffic congestion. V/C ratios between 0.75 and 1.0 denote screenline locations where the level of service is poor and approaching unacceptable as identified in the hatched area. V/C values over 1.0 indicate that traffic volumes are exceeding roadway capacity and the level of service is considered unacceptable.

The results in **Figure 3** indicate that there is a substantial need for additional capacity on I-710 as demonstrated by the No Build (Alternative 1) V/C ratio. None of the first four alternatives are forecast to be operating with a V/C ratio below 1.0. Alternatives 5A and 5B (10 lanes on I-710) offer a slightly better performance with V/C ratios around 0.75 at Screenline 1 (Pacific Coast Highway).

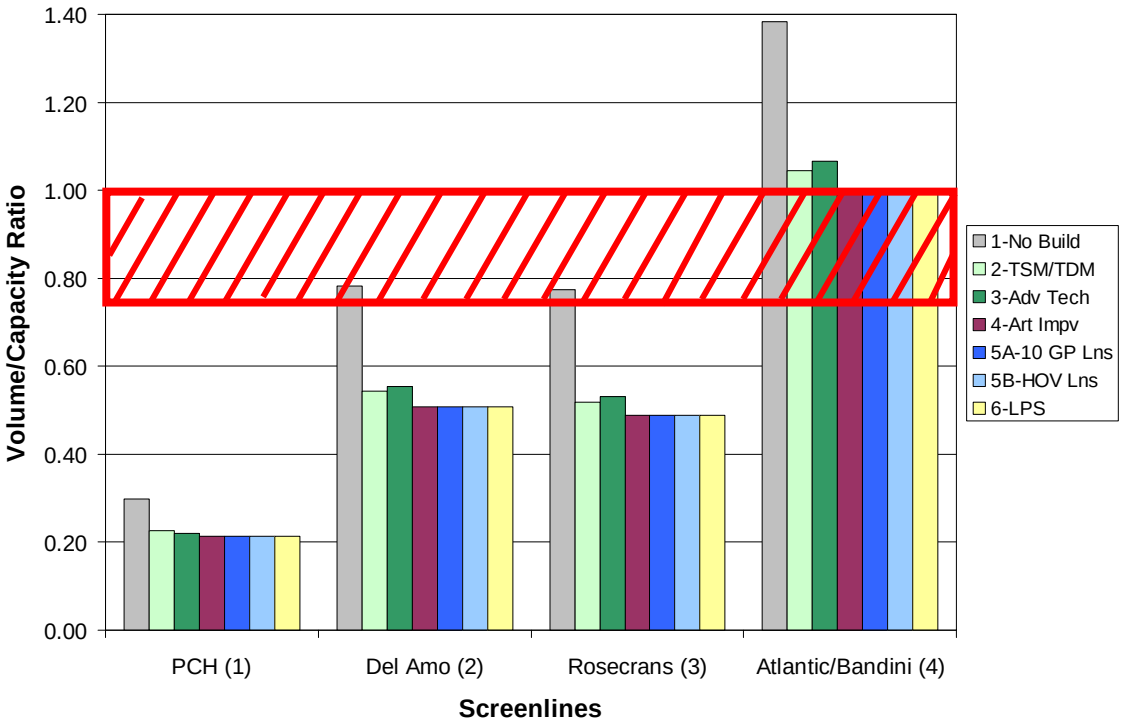
Only Alternative 6 (LPS) provides sufficient capacity to reduce Peak Period I-710 V/C ratios below 1.0 across all four screenlines. These results identify Alternative 6 as the top performer compared to the other alternatives on this measure.

Screenline Volume/Capacity (V/C) Ratios on Arterials

Derived from year 2035 screenline model traffic forecasts, the screenline V/C ratio measures the effects of each alternative on congestion levels for selected north/south arterials in the A.M. Peak, midday and P.M. Peak Periods. Just as with the V/C ratios on the I-710 general purpose lanes, the lower the V/C ratio, the less the aggregate traffic congestion on the arterial roadway assessed at each of the screenlines.

As illustrated in **Figure 4**, Alternatives 4, 5A, 5B and 6 perform equally well across the first three screenlines since they all include the arterial highway improvements contained in Alternative 4, which cover all the major north/south and east/west arterial highways within the study area, as well as the study area intersections identified for the project. (Refer to the *I-710 Corridor Project EIR/EIS Baseline Alternatives Analysis Report (04/29/09)* for a detailed description of these arterial improvements.) Despite their good performance at the first three screenlines, however, these four alternatives are estimated to operate with V/C ratios of 0.97 at the Atlantic/Bandini screenline which is very close to capacity. Alternative 2 is the second best alternative, with a slightly better performance than Alternative 3 at screenlines 2 through 4.

Figure 4: Average Screenline V/C Ratios on Arterial Network (PM Peak Period, NB Direction)



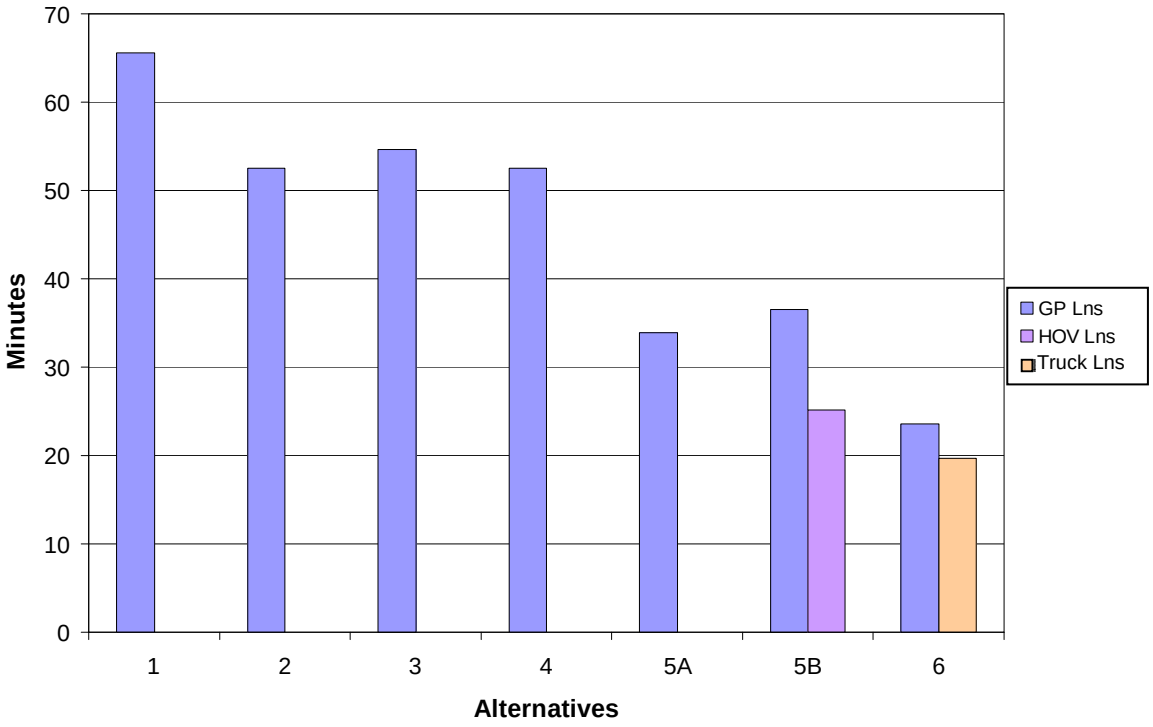
I-710 Travel Time

This measure of mobility is estimated as the average time it would take a vehicle to travel on I-710 from Ocean Blvd., at the south end of the corridor, to SR-60, at the north end of the corridor, in the northbound direction in the P.M. Peak Period. **Figure 5** shows the travel time related to each of the initial set of alternatives broken out into general purpose lanes, high occupancy vehicle (HOV) lanes and truck lanes where only Alternative 5B includes HOV lanes and only Alternative 6 includes truck lanes. Those alternatives that perform the best have the lowest estimated travel times (i.e., the shorter the bar, the better the alternative.)

As illustrated by **Figure 5**, under the No Build condition (Year 2035) it would take a vehicle 65 minutes to travel the full length of the I-710 Corridor in the PM Peak Period. In contrast, Alternative 6, the best performing alternative on this measure, has a forecast average travel time of 24 minutes. This reduction in travel time in Alternative 6 is due not only to a greater amount of capacity improvements as compared to the other alternatives, but also the separation of a high fraction of trucks onto the proposed freight movement lanes. Alternatives 5A and 5B are estimated to have the next best travel times; the difference between the two is attributable to

Alternative 5B's HOV lanes. Given that Alternative 5B has two HOV lanes, traffic densities on its eight general purpose lanes will be higher, resulting in an increased V/C ratio and longer travel time compared to Alternative 5A's ten general purpose lanes.

Figure 5: Travel Times on I-710 from Ocean Blvd. to SR-60 (PM Peak Period, NB Direction)



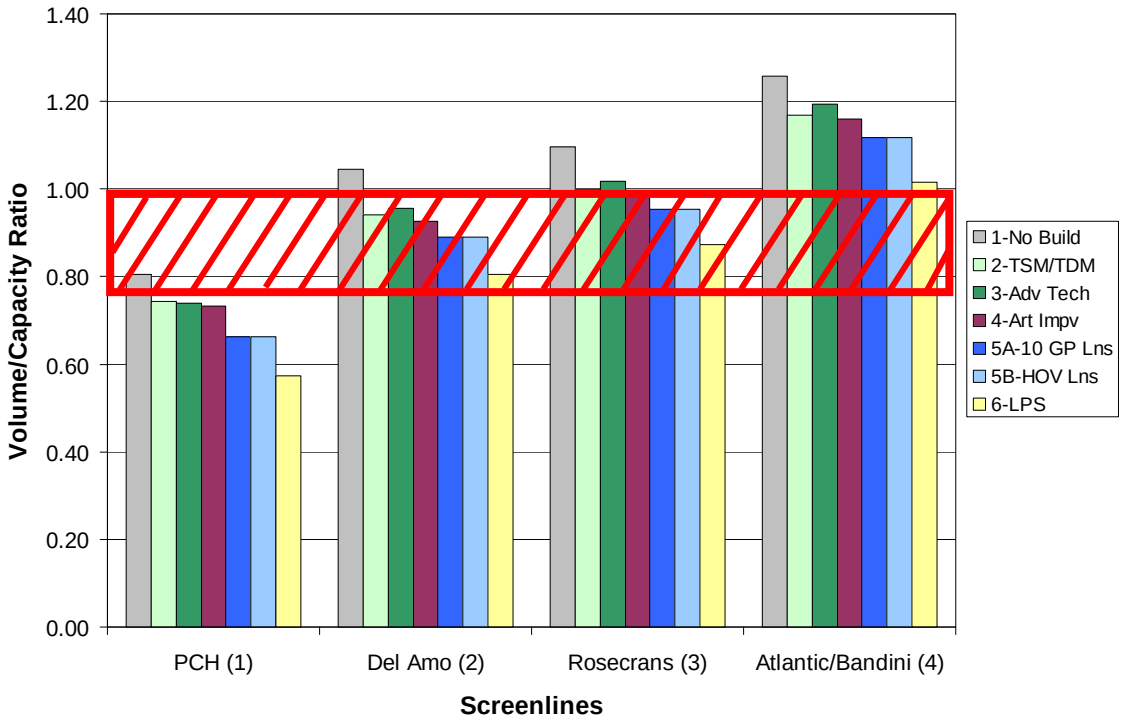
Average Screenline Volume/Capacity Ratios - Full Network

Just as with the V/C ratios on the I-710 general purpose lanes, this measure reflects the effects of each alternative on the forecasted traffic congestion levels during the A.M. Peak, midday and P.M. Peak Periods at the four screenline locations for I-710, I-110, I-605 and designated arterials combined. Given the propensity of traffic to shift amongst parallel routes trying to minimize their travel times, this measure captures the performance of the overall I-710 Corridor roadway network for each alternative. **Figure 6** shows each alternative's V/C ratio during the P.M. Peak Period in the northbound direction.

Based on the findings illustrated in **Figure 6,** Alternative 6 has the lowest estimated V/C ratios across all four screenlines, due to its high level of capacity improvements and designated freight movement lanes. This reduction in total screenline V/C also suggests potential for traffic congestion reduction on arterials in Alternative 6 as compared to other alternatives. Alternatives

5A and 5B perform second best, as they too provide significant increases in freeway and arterial capacity, but lack the additional capacity provided by the freight movement lanes in Alternative 6.

Figure 6: Average Screenline V/C Ratios – Full Network (PM Peak Period, NB Direction)



3.2.2 Air Quality Measures

For the screening analysis, two air quality metrics were chosen to compare the alternatives. The air quality screening analysis utilized traffic volumes and speeds at specific screenline locations during the three daytime travel periods (AM Peak, mid-day, and PM Peak) provided through the mobility analysis, focusing in on the study area freeway corridors (I-710, I-110, and I-605) to isolate and thus better capture the major air quality effects of the different alternatives. Using this freeway traffic information as inputs, estimates of average vehicle speeds and vehicle miles travelled along those freeways were calculated. (The screening analysis did not include information on any arterials, other non-freeway roadways, or east-west freeways.) Since diesel particulate matter (DPM) is the major air quality health risk driver in the South Coast Air Basin and in the I-710 area, the first air quality metric is daytime freeway DPM emissions. Similarly, since oxides of nitrogen (NO_x) are the area's dominant precursor for key non-attainment criteria pollutants such as ozone and $PM_{2.5}$, the second air quality metric is daytime freeway NO_x emissions.

As briefly described above, the relative level of freeway (I-710, I-110 and I-605) pollutant emissions in the year 2035 was estimated by using screenline information, including vehicle volumes and average speeds for the three time periods (A.M. Peak, midday and P.M. Peak), to calculate a total daytime emission for each alternative. Emission estimates for the all alternatives except Alternative 1 (No Build) were then subtracted from the emission estimates of Alternative 1 (No Build); this difference indicates the emission change of the alternative compared to the No Build scenario (all analysis for year 2035). The following information and caveats should be considered when assessing the results of the screening analysis:

- Alternative 3 is estimated to eliminate approximately 20% of the port truck trips (22,400 daily truck trips) from the I-710 freeway as compared to Alternative 1 (No Build);
- 2035 per-vehicle emission factors are 80 to 90% lower than 2008 per-vehicle emissions;
- The analysis does not include additional emission reductions that will occur due to recent port and non-port truck regulations; and
- The screening analysis does not account for emission reductions resulting from an alternative's improvement in mobility on the arterials compared to Alternative 1 (No Build), since the arterials and other surface streets are not included in this screening analysis.

The relative level of study area freeway DPM (the health risk metric) and NO_x emissions (regional ozone, $PM_{2.5}$ and NO_2 metric) for each alternative in the year 2035 was estimated based on screenline traffic estimates as described above. These results were then compared against Alternative 1 (No Build). The results of the screening analysis are shown in **Figure 7**.

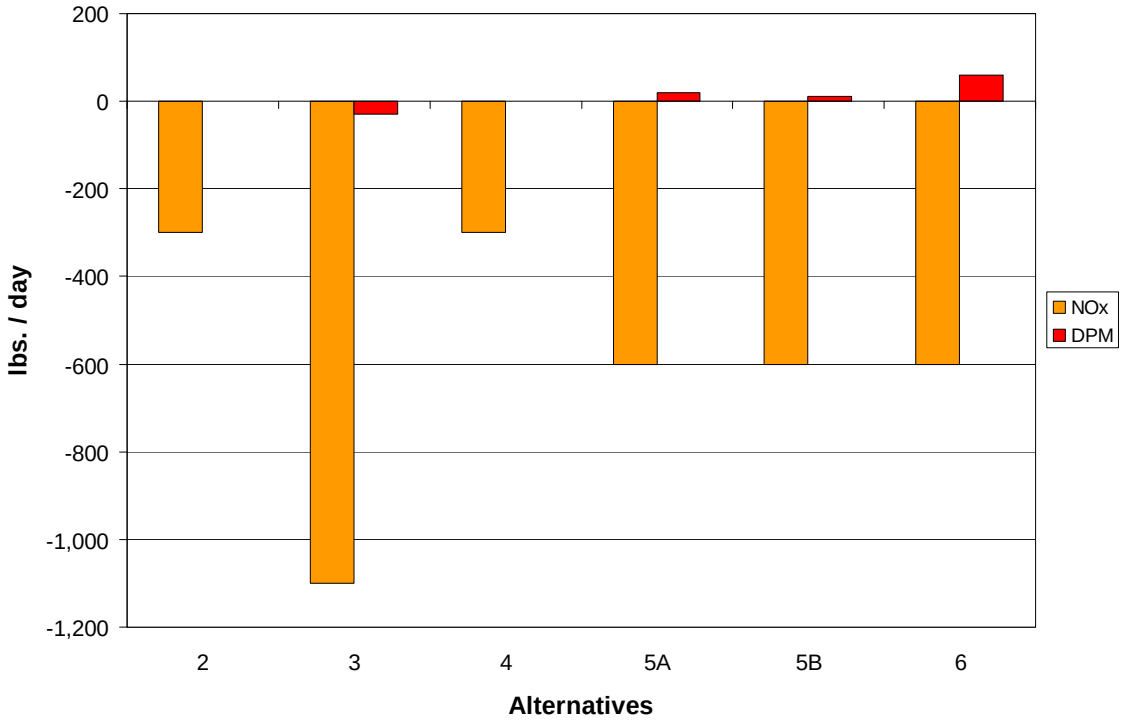
Daytime Freeway Diesel Particulate Matter (DPM) Emissions

For the health risk metric, DPM, Alternative 3 shows the greatest reduction in DPM emissions compared to Alternative 1 (No Build), with a reduction of ~ 25 lbs/day of daytime freeway emissions. This is attributable to the advanced (zero-emissions) technology transporting containers from the ports included in Alternative 3, which would result in an estimated 20 percent reduction of port truck trips on the I-710 Corridor compared to Alternative 1 (No Build). Most of the reduction seen in **Figure 7** is likely due to the reduced number of trucks traveling on the study area freeways in this alternative.

Alternatives 5A, 5B and 6 all show slight increases in DPM emissions with Alternative 6 being the highest, at 60 lbs/day compared to the 2035 No Build Alternative. This behavior, which was not originally expected since emissions generally decrease as vehicle speeds increase (at least in the range of speeds under consideration), is due to an artifact of the 2035 heavy-heavy-duty truck DPM emission vs. speed curve. Unlike the 2008 DPM emission vs. speed curve for these

vehicles, where DPM emissions drop dramatically as speeds increase from 5 mph to 50 mph, the 2035 DPM emission vs. speed curve is relatively flat with little change in emissions over that range of speeds except for a slight dip at around 25 mph. (As noted above, the 2035 emission factors are also significantly lower than the 2008 emission factors.) Given this assumed relationship between future DPM emissions and truck speeds, the increased average speed prediction these alternatives is the major contributor to the small increase in DPM emissions seen in **Figure 7**.

Figure 7: Daytime Freeway-Only (I-710, I-110, I-605) Emissions Compared to 2035 No Build (lbs./day)



Compared to the 2035 Alternative 1 (No Build), Alternative 3 (advanced technology) shows the greatest relative reduction in daytime freeway DPM. This is due in large part to the fact that this alternative assumes that over 20% of the port diesel truck trips (~22,400 daily truck trips) are replaced by the containers being transported by zero-emission technologies. Alternatives 5A, 5B and 6 show slight increases in daytime freeway DPM emissions. It should be noted that the screening analysis does not include any reductions that would occur due to improved mobility on the arterials, potentially underestimating the benefits for alternatives that improve mobility on the arterials. In addition, DPM emissions for Alternative 5A, 5B, and 6 could be reduced by combining them with advanced (zero-emission) container transport technologies.

Daytime Freeway Oxides of Nitrogen (NOx) Emissions

For the criteria pollutant metric, NO_x, Alternative 3 shows the greatest reduction in NO_x emissions at -1,100 lbs/day. This is attributable to the inclusion of advanced (zero-emissions) technology in transporting a share of the containers from the ports which would result in an estimated 20 percent port diesel truck trip reduction (~22,400 daily truck trips).

Alternatives 5A, 5B and 6 also show appreciable reductions in NO_x emissions with each at -600 lbs/day. These reductions are due to the freeway capacity improvements associated with Alternatives 5A, 5B and 6, which would increase average speeds along corridor freeways. As would be expected, the faster the freeway speeds, the lower the NO_x emissions.

Although not expressed as a separate screening measure, greenhouse gases (in particular, CO_2) follow an emission vs. speed curve pattern similar to NO_x, so it is expected that the differences amongst the alternatives would be relatively similar for greenhouse gases as those for NO_x (see **Figure 7**)

Compared to the 2035 Alternative 1 (No Build), Alternative 3 (advanced technology) shows the greatest relative reduction in daytime freeway NO_x. Alternatives 5A, 5B, and 6 also show appreciable relative reductions in daytime freeway NO_x emissions. It should be noted that the screening analysis does not include any reductions in NO_x emissions that would occur due to improved mobility on the arterials, potentially underestimating the benefits for alternatives that improve mobility on the arterials. In addition, NO_x emissions for Alternative 5A, 5B, and 6 could be reduced with advanced (zero-emission) container movement technologies.

Number and Percent of Daily Truck Trips Replaced by Clean Energy Powered Transporting Vehicles in the I-710 Corridor

Since Alternative 3 is the only alternative to include a zero emission container movement system component, it would have a lower number and percentage of daily port diesel truck trips compared to the other alternatives, as a measurable volume of containers would be carried by the advanced technology. In total, Alternative 3 would eliminate approximately 22,400 diesel trucks trips daily in the I-710 Corridor, a 20 percent reduction compared to the No Build.

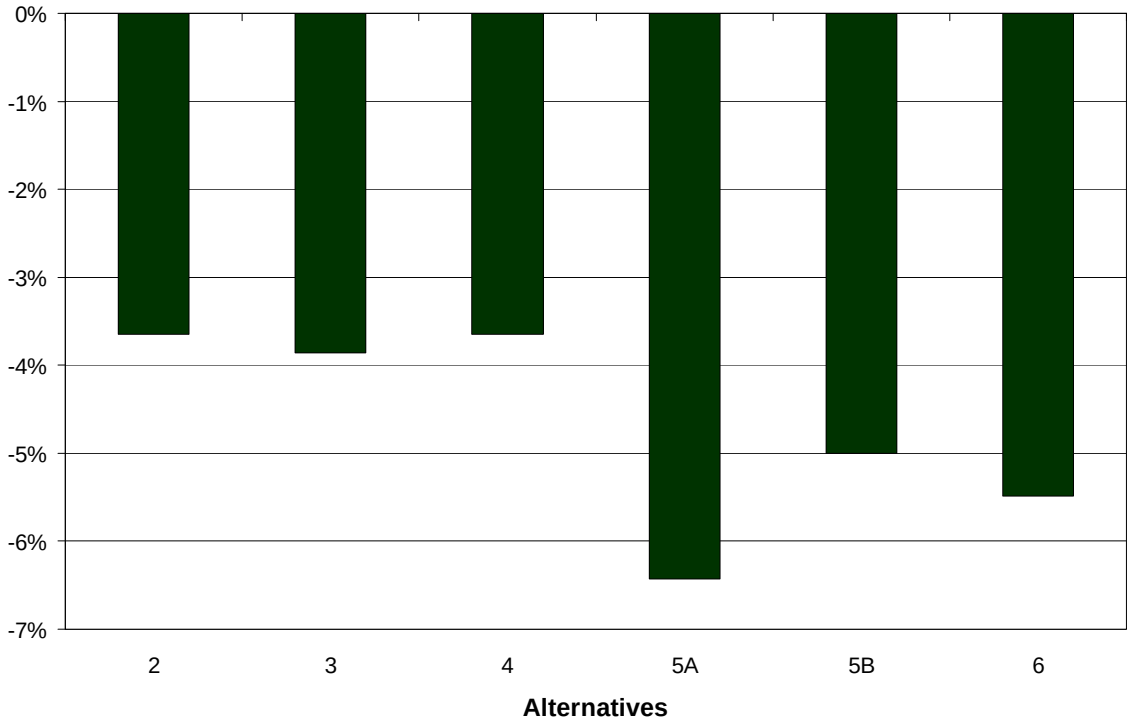
3.2.3 Energy Consumption Measures

Percent Reduction in Daily Study Area Freeway Fuel Consumption Compared to No Build

The average daily fuel consumption for each alternative was calculated using the fuel consumption factors obtained from the South Coast Air Basin portion of Los Angeles County using EMFAC2007 and the A.M. Peak, mid-day and P.M. Peak traffic volumes and average

speed for each alternative. Once calculated, the results for Alternatives 2 through 6 were then compared against No Build (Alternative 1) to determine their percent reduction in fuel consumption. These findings are displayed in **Figure 8**.

Figure 8: Percent Reduction in Daily Study Area Freeway Fuel Consumption Compared to No Build



Based on the traffic analysis completed for this screening process, it was determined that all five of the proposed build alternatives would improve operations along I-710 and other study area freeways (I-110 and I-605) to varying degrees. These operational improvements would in turn enhance traffic flow conditions and thereby reduce vehicle fuel consumption. However, just as with the DPM emissions described in Section 3.2.2, there is a fuel consumption vs. speed curve, which shows that above a given speed vehicle fuel efficiency starts to decrease.

For example, based on the mobility results in Section 3.2.1, some might assume that Alternative 6 would provide the highest reduction in fuel consumption since it clearly offers the greatest mobility benefits. As illustrated by **Figure 8**, however, Alternative 5A performs slightly better, since it allows for an increase in vehicle speeds but not above the point at which fuel efficiency declines.

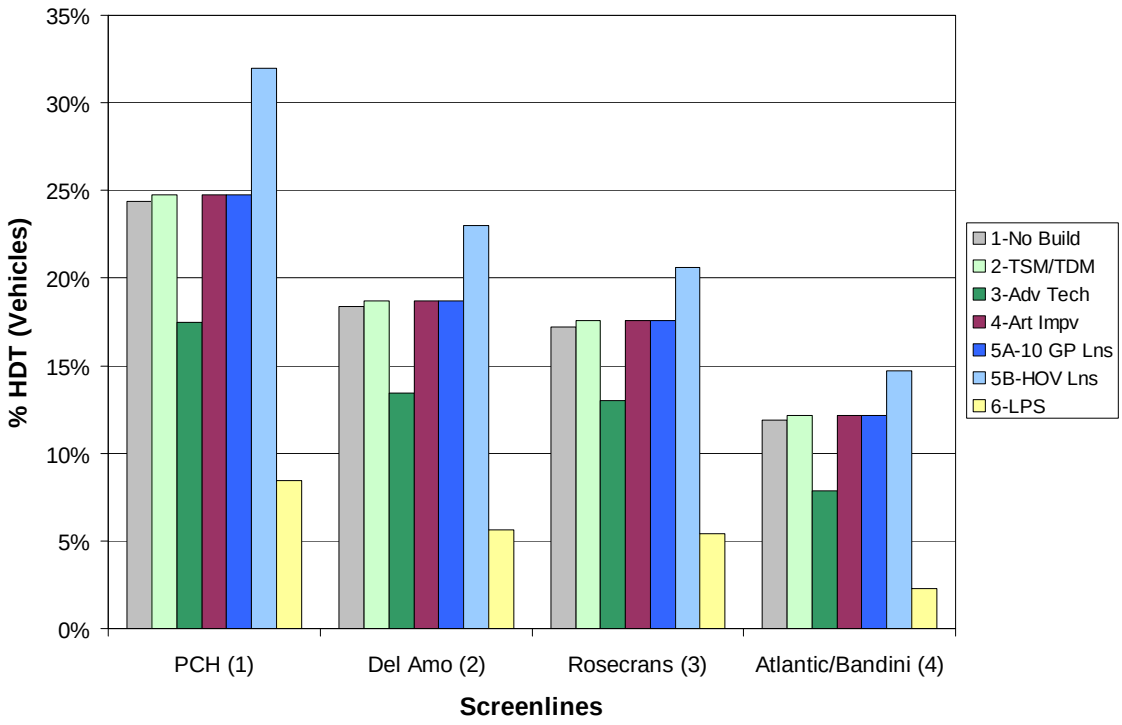
3.2.4 Traffic Safety Measures

Percent of P.M. Peak Period Traffic on I-710 General Purpose Lanes Consisting of Heavy Duty Trucks

A key concern of the I-710 Corridor communities is the intermingling of Heavy Duty Trucks (HDTs) and passenger vehicles along the freeway. Not only can these trucks contribute to congestion, but the mix of HDTs and autos is one of the leading causes of traffic accidents on I-710. In order to address the issue, this measure reflects the effects of alternatives on the volume of P.M. Peak Period HDT traffic in the I-710 general purpose lanes. The lower the percentage of HDTs, the greater the presumed level of traffic safety offered by an alternative as there would be less intermingling of trucks and passenger vehicles.

As illustrated in **Figure 9**, Alternative 6 has the lowest forecast percentage of HDTs traveling in the general purpose lanes on I-710. This would have a positive effect on traffic safety concerns during the P.M. Peak Period due to the reduction in potential truck/auto collisions. Additionally, when compared to Alternatives 1, 2, 4, 5A and 5B, the screening analysis shows that Alternative 3 would have a lower percentage of HDTs traveling in the general purpose lanes as a measurable volume of containers would be carried by the automated fixed guideway family of advance technology assumed for Alternative 3 in this screening analysis. However, Alternative 3 does not perform as well as Alternative 6 on this measure due to the fact that the number of HDTs shifted onto the freight movement lanes is estimated to outnumber the amount of truck trips that would be eliminated through the use of an automated fixed guideway technology.

Figure 9: Heavy Duty Trucks as a Percentage of Total Traffic on I-710 General Purpose Lanes (PM Peak Period, NB Direction)



Number of Existing Design Deficiencies Eliminated or Improved

A preliminary assessment was conducted of I-710, which led to the identification of hundreds of design deficiencies within the project limits of the I-710 Corridor that did not meet current federal and state design standards. These deficiencies include issues such as poor weaving and merging conditions, poor sight distance and sharp curvatures of ramp alignments. When combined with exceedingly high traffic volumes and increasing levels of HDT traffic, design issues are a contributing factor to accident risk for the I-710 Corridor. In addition, the need to correct the existing design deficiencies on the I-710 freeway is an important aspect of the I-710 Corridor Purpose and Need.

This measure evaluates the level of improvements proposed under each alternative by estimating the number of existing design deficiencies eliminated through freeway reconstruction. For the purpose of the screening analysis, representative segments and interchanges were examined to identify those types of design deficiencies which were judged to be especially problematic for freeway operations and safety. This step led to an estimate of over five hundred existing design deficiencies for the I-710 Corridor, including interchanges as well as the freeway mainlines. Estimates were then developed of the number of deficiencies eliminated or improved

by applying standard interchange configurations and standard ramp design associated with the different alternatives. On average, three geometric deficiencies are eliminated or improved per ramp or connector and three operational issues are eliminated or improved per mile of freeway. Results are shown in **Table 1**.

Table 1: Number of Existing Design Deficiencies Improved

Alternatives						
1	**2**	**3**	**4**	**5A**	**5B**	**6**
0	0	0	135	420	420	420

The top performing alternatives for this measure are Alternatives 5A, 5B and 6. Given that both variations of Alternative 5 include all the same physical improvements to the freeway mainline as Alternative 6, the number of design deficiencies eliminated are identical. In contrast to these top alternatives, Alternatives 1, 2 and 3 provide very limited potential for safety improvements based on this measure. This is not to say that no increase in traffic safety would result from their implementation, but rather their safety benefits are highly constrained given that no physical improvements are made to the existing design condition of the freeway.

3.2.5 Right of Way Impact Measures

During the right of way analysis three different right of way impacts were evaluated within the I-710 Corridor (Ocean Blvd. to SR-60), which included impacts to residential properties, non-residential buildings and regionally significant utilities. The number of right-of-way impacts determined in this analysis however, is only preliminary and subject to change given that the I-710 freeway and freight corridor designs are still being refined at this time.

Number of Impacted Residential Properties

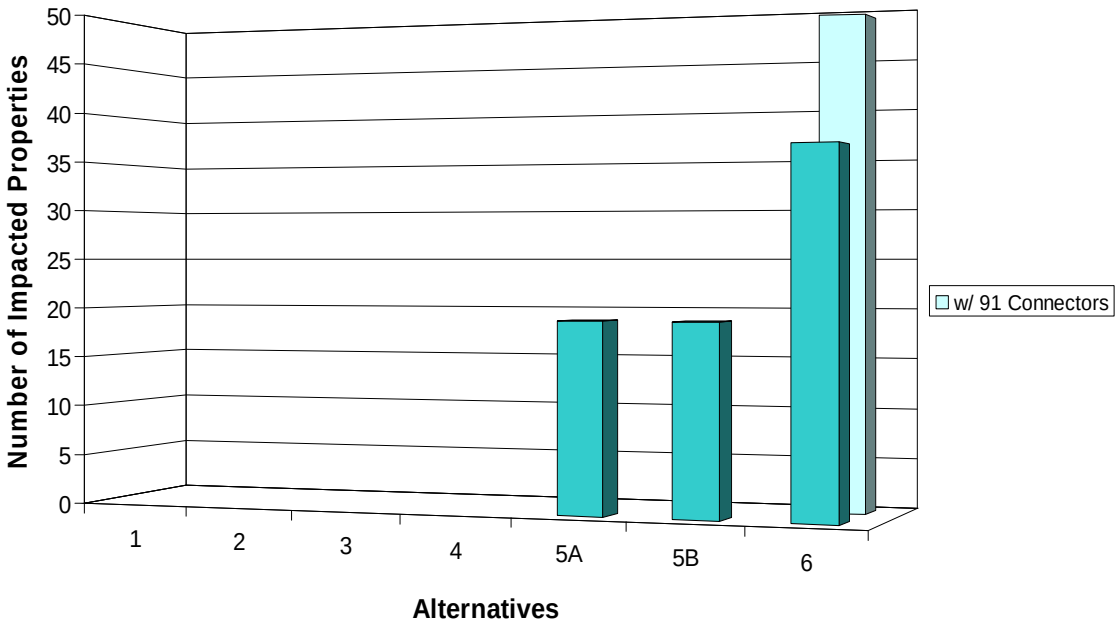
For this screening process, the number of right of way impacts on residential properties was estimated by developing footprints based on the conceptual design plans for the proposed features inherent to each build alternative. The term footprint is used to describe the area of potential impact associated with a project or improvement. By overlaying the various footprints on aerial mappings of existing study area land uses, impacted residential parcels and access restrictions can be identified. A property is defined as impacted when an alternative's footprint overlaps part or all of a parcel. Based on this analysis, the estimated number of impacted residential parcels along the length of the I-710 Corridor within the project limits (Ocean Blvd. to SR-60) can be compared for each alternative.

Although some alternatives incur more impacts than others, all are consistent with one of the project's objectives of minimizing impacts, particularly those that require relocations of

residents. Additionally, the current design of each alternative has been updated to meet requirements based upon standard design and protocol.

As illustrated in **Figure 10**, at this level of screening analysis, Alternatives 1 through 4 would have no residential property impacts, since their proposed features do not include any widening of the I-710 mainline. Alternatives 5A and 5B have the second lowest number of impacts at 19 parcels each. These impacts are associated with the SR-91 interchange safety and capacity enhancements which would be required as part of the additional safety improvements.

Figure 10: Number of Impacted Residential Properties



Alternative 6, which is the refined LPS from the Major Corridor Study (MCS), has the highest number of estimated residential property impacts of all the alternatives. During the MCS it was determined that the LPS would generate no residential property impacts, however this was based upon an assumption that several non-standard highway design features would be able to gain approval. However, based upon additional, refined conceptual highway design conducted as an early task of the I-710 Corridor Project EIR/EIS, some of the non-standard designs features in the LPS had to be revised to provide a required level of traffic safety, which resulted in some residential impacts.

Based on the results in **Figure 10**, the number of residential impacts associated with Alternative 6 range from 36 to 49 parcels. Both numbers include the impacts from Alternative 5 plus those

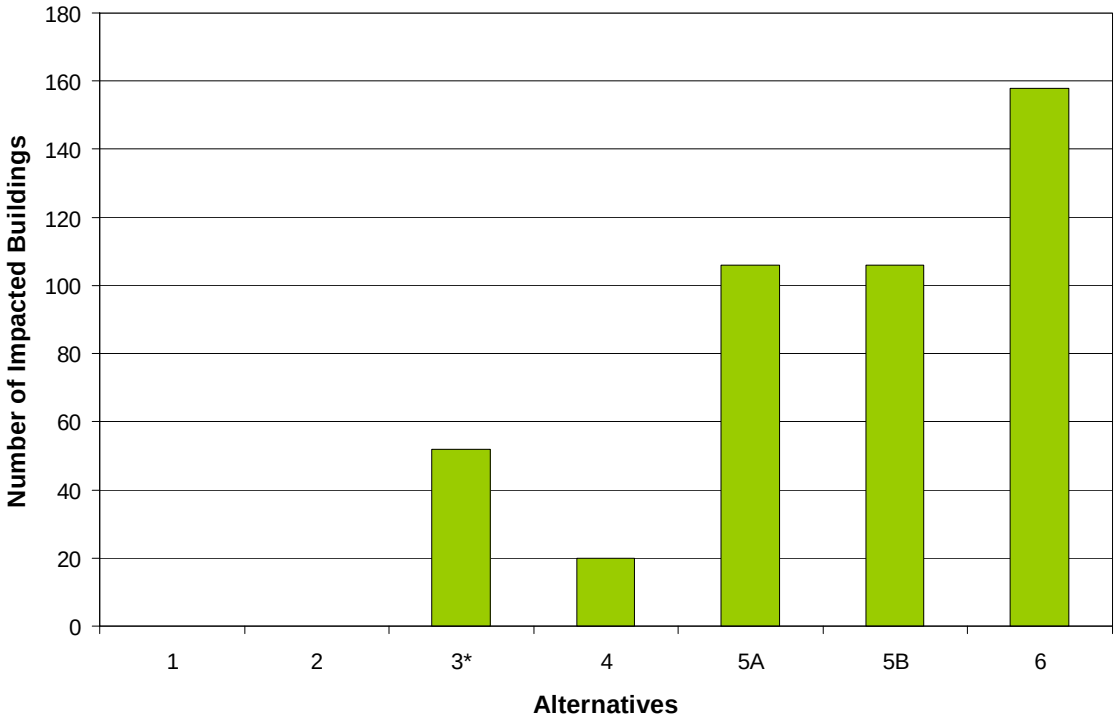
that will occur at the I-405 interchange due to the freight movement lanes. The difference, however, depends on whether freight movement lane connections at the SR-91 interchange are included. Although Alternative 6 is the lowest performing alternative in terms of right of way impacts, this reflects the "trade-offs" associated with Alternative 6's high ranking relative to improved mobility and traffic safety.

Number of Impacted Non-Residential Buildings

Just as with the impacts to residential properties, this measure estimated the number of impacted non-residential buildings by developing footprints based upon the conceptual design plans developed for the proposed features inherent to each build alternative. By overlaying the footprint of each alternative on aerial mapping of existing study area land uses, impacted non-residential structures and land impacts can be identified. In this case, an impacted property is defined as when the footprint of the alternative encompasses an existing non-residential structure or would take so much of the parcel on which the structure sits that the functioning of the activities on that parcel would no longer be possible. Based on this analysis, the number of impacted structures along the length of the I-710 Corridor (Ocean Blvd. to SR-60) can be estimated and compared for each alternative.

Figure 11 illustrates that other than Alternatives 1 and 2, Alternative 4 has the lowest number of potential impacts to non-residential buildings as compared to Alternatives 3, 5A, 5B and 6. These impacts are attributable to the safety improvements associated with the proposed congestion relief projects included in Alternative 4. The alternative with the highest number of impacts is Alternative 6, with a total of 158 impacted non-residential properties. This total is made up of the impacts from the safety and capacity improvements of Alternative 5 and the right of way required for the truck lanes (same amount of right of way required in Alternative 3). Once again, the mobility and traffic safety benefits of the Alternative 6 design result in trade-offs with respect to right of way impacts.

Figure 11: Number of Impacted Non-Residential Buildings



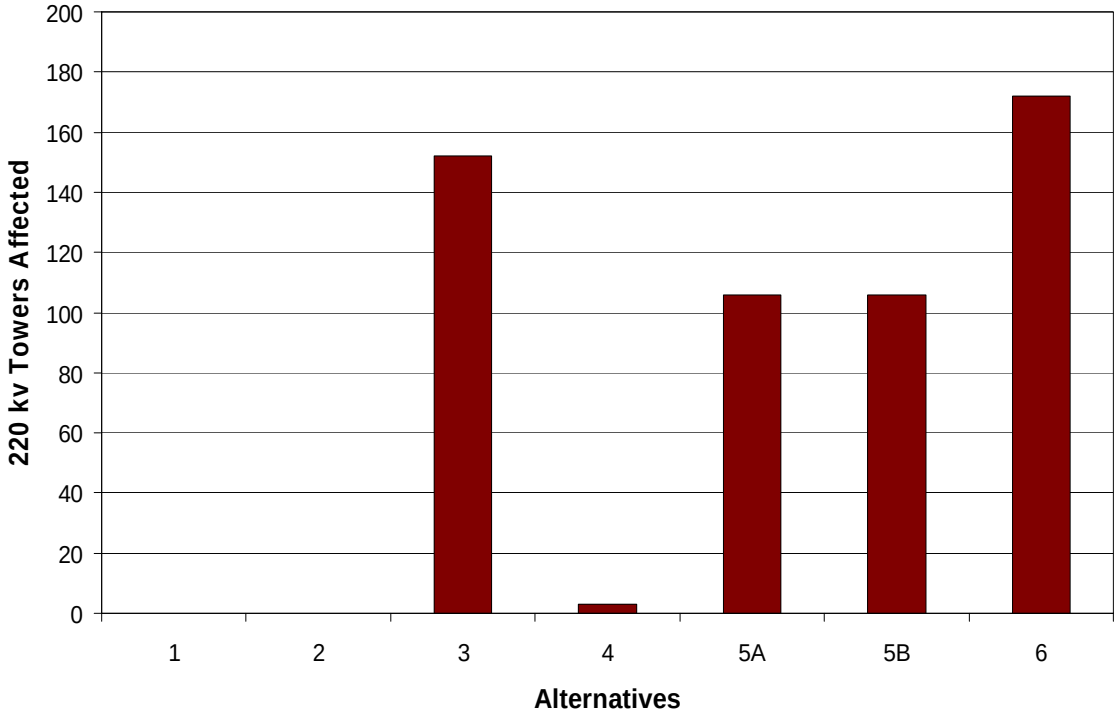
*Alternative 3 does not include land required for guideway terminals and terminal connectors (approx. 3 acres/marine terminal)

Potential Relocations of Regionally Significant Utilities – Power Transmission (towers affected)

The most regionally significant utilities potentially impacted by the I-710 Corridor improvement are the power transmission lines within the Southern California Edison (SCE) and City of Los Angeles Department of Water and Power (DWP) utility corridors that run adjacent to I-710. For this reason, potential impacts to the transmission tower were carefully examined in this analysis.

Based on the results in **Figure 12**, Alternative 6 has the highest number of potential relocations at 172 220 kv towers. The greatest impacts are located at the SR-91 and I-405 freeway to freeway interchanges with I-710, which also holds true for both Alternatives 5A and 5B. Additionally, Alternative 3 also has a substantial number of estimated relocations as it is located within the transmission corridor.

Figure 12: Potential Relocations of Power Transmission Utilities



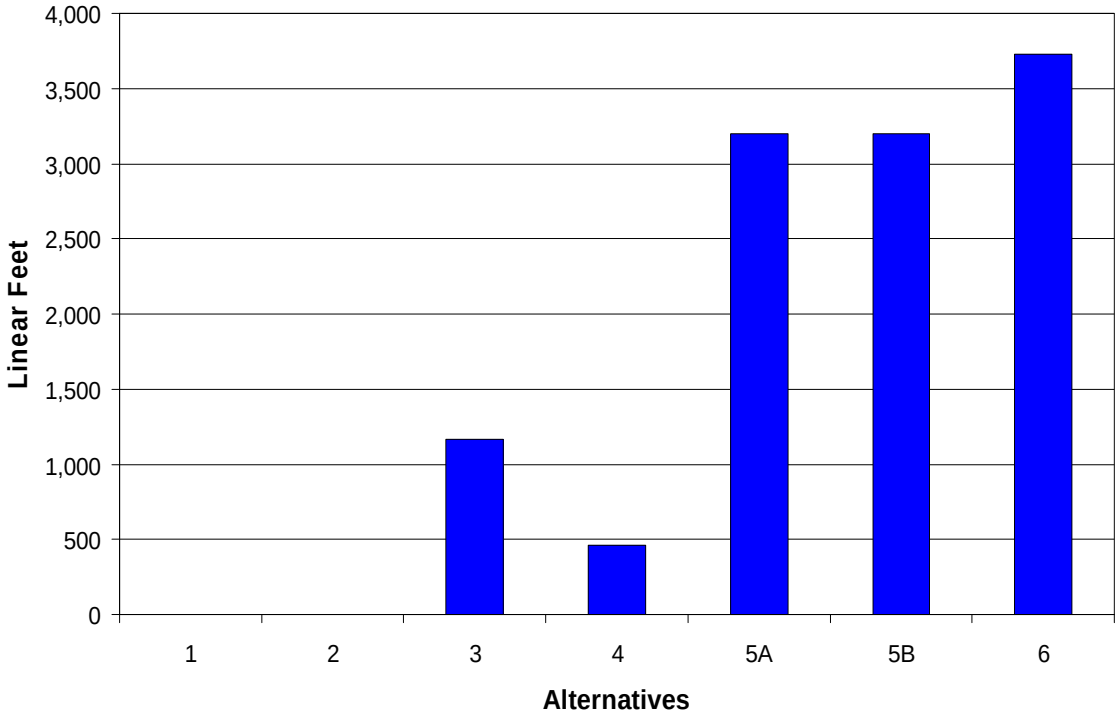
3.2.6 Environmental Impacts Measures

Right of Way Impacts on Waters of the U.S. (linear feet)

Using the footprints developed for each alternative and preliminary GIS data on waters of the U.S. within the I-710 corridor, an estimate of the extent of right of way impacts to jurisdictional waters was made for each alternative. The footprint was "pared down" further with use of the conceptual design plans for each alternative to indicate where physical elements of the alternative would impinge on waters of the U.S. (e.g. bridge crossings). In the case of the I-710 Corridor (Ocean Blvd. to SR-60), the Los Angeles River runs alongside the freeway increasing the likelihood of an impact. The measure used is expressed in total linear feet of the waters of the U.S. intersected by the new footprint in order to develop an order of magnitude estimate of the amount of encroachment posed by the physical elements included in each alternative.

As shown in **Figure 13**, Alternative 6 results in the highest level of impacts to waters of the U.S. (over 3,700 linear feet) due to its physical capacity enhancements and the additional freight movement lanes; however, Alternative 6 does meet the Purpose and Need of the proposed project. Alternatives 5A and 5B have the next highest impacts at a little over 3,000 linear feet each since they include the same freeway widening impacts as Alternative 6 minus those associated with the freight movement lanes.

Figure 13: Right of Way Impacts on Waters of the U.S.



Number of Right of Way Impacts on Section 4(f) Properties

Under Section 4(f) of the Department of Transportation Act of 1966, codified in federal law as 49 U.S.C. 303, federal funds may not be used on projects that use Section 4(f) properties unless it can be demonstrated that no feasible and prudent avoidance alternatives exist and all possible planning to minimize harm to the Section 4(f) property has been conducted. Section 4(f) properties include publicly owned parklands and other recreation resources, wildlife refuges, and historic sites on or eligible for listing on the National Register of Historic Places. Estimates on the number of I-710 Corridor (Ocean Blvd. to SR-60) impacts associated with each alternative were made by determining where an alternative's physical footprint overlapped the boundary of an identified 4 (f) property.

The results show that only one Section 4(f) property, Cesar Chavez Park near downtown Long Beach, is directly affected by Alternatives 3, 4, 5A, 5B, and 6, none of which would require full acquisition of the park. It should be noted that although Cesar Chavez Park is impacted under these alternatives, it would also experience benefits as a result of project implementation such as an increase in park size by up to 40% and improved public access. Alternatives 1 and 2, will not impact any Section 4(f) properties.

Environmental Justice Assessment

Executive Order 12898 requires that federal actions not result in disproportionate adverse effects to low income or minority populations. As there is a high concentration of these populations in the I-710 Corridor, potential adverse effects are of concern in this project. Therefore, steps must be taken to ensure that any unavoidable effects borne by these populations are not disproportionate and will be minimized or mitigated.

Using U.S. Census data on low income and minority populations within the I-710 Corridor, an estimate of impacts was made for each alternative. The results were based on community right of way impacts for each alternative (based on its proposed physical footprint and a 1,500-foot radius); and the emission estimates for each. Due to similarities in the footprints, the environmental justice screening analysis did not distinguish meaningfully between the various alternatives. Additionally, at this level of screening the analysis did not account for the potential benefits (e.g. travel time savings, NOx/DPM reductions, etc.) resulting from project implementation. For these reasons, the environmental justice screening analysis did not yield results that would assist in either screening an alternative out from being carried forward into the EIR/EIS technical studies, or in identifying specific alternatives to carry forward.

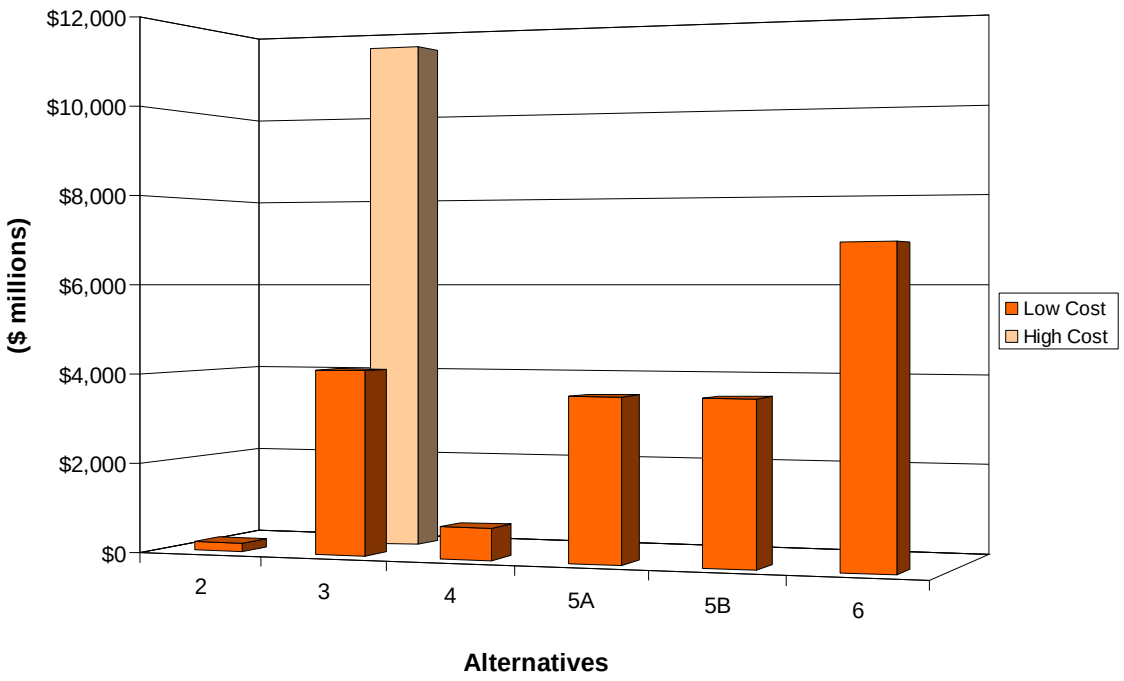
3.2.7 Capital Cost Measure

Total Capital Cost ($ millions)

The estimated capital costs associated with each alternative were calculated based on their sketch level design concepts and approximate unit costs for the major physical elements included in each alternative which encompasses improvements to the freeway, arterials, rail and bus transit, goods movement facilities and traffic systems and operations.

As mentioned in Section 2.1 two families of technologies, which include an automated fixed guideway option and zero emission trucks, have been considered for Alternative 3's advanced technology component. The automated fixed guideway alternative was assumed for this screening analysis, but cost figures were developed for both families. As illustrated in **Figure 14**, the automated fixed guideway has the highest total capital cost at $11.5 billion, followed by Alternative 6 at $6.9 billion, and the zero emission truck alternative at $4.1 billion.

Figure 14: Estimated Capital Costs Above No Build



4.0 SCREENING RESULTS

4.1 SCREENING MATRIX

In order to narrow down the initial set of alternatives, a screening matrix was first applied so that the alternatives could be evaluated against the full array of screening measures. The screening analysis and findings described in Section 3 of this report were summarized and compiled in the matrix for comparative purposes.

For those measures which had multiple results, such as the Screenline V/C Ratios on the I-710 GP Lanes, separate tables were attached to the screening matrix. The screening matrix and its corresponding tables can be found in **Appendix B** of this report.

The summary tables of screening results were used to identify the top performing alternatives according to each screening measure. Additionally, this process allowed each alternative's performance trade-offs to be observed, acknowledged, and explicitly discussed among advisory committee members and study participants. An important aspect of this preliminary evaluation and screening process was to pinpoint key features of the alternatives that were critical to their relative performance and that could be selected and recombined to form the reduced set of alternatives selected to move forward for further analysis in the I-710 Corridor Project EIR/EIS.

4.2 SCREENING RECOMMENDATIONS

Based on the screening results and on guidance received from the advisory committees, which include the I-710 Technical Advisory Committee (TAC) and I-710 Corridor Advisory Committee (CAC), a recommendation was developed, which identified certain alternatives (and key features or components) to be carried forward in the technical studies for the EIR/EIS and those that should be eliminated at this stage of study. It is important to note that there is a great deal of overlap in the key features and components that comprise the initial alternatives, which proved to be a factor in the technical recommendations. The screening evaluation favored those alternatives that best responded to a multiple set of criteria – such as mobility, safety, and air quality concerns – over those initial alternatives that could only respond to a limited number of objectives for the I-710 Corridor Project. In most cases, alternatives that were included as a component of other, larger alternatives were screened out as a stand alone alternative as they did not adequately address the I-710 Corridor Purpose and Need.

The following discussion summarizes the initial alternatives, including their relative performance, key trade-offs, and the critical factors which led to the technical screening recommendation for each alternative.

- **Alternative 1: No Build:** Alternative 1 is recommended to be carried forward. The No Build Alternative is a requirement of the CEQA and NEPA process as it provides the future environmental baseline against which other alternatives are compared.

- **Alternative 2: Transportation Systems Management/Transportation Demand Management (TSM/TDM)/Transit/Intelligent Transportation Systems (ITS):** Alternative 2 is not recommended to be carried forward into the environmental process as a stand alone alternative. While Alternative 2 is comprised of transit, policy, ITS applications and operational improvements that have a beneficial effect on mobility in the project area, the screening analysis demonstrated that these transportation improvements did not go far enough in resolving the worst of the congestion problems, air quality issues, design deficiencies, and safety concerns that affect motorists and residents within the overall I-710 Corridor. At best, Alternative 2 provides a 6% - 7% improvement in service levels on I-710 in terms of improved VC ratios and approximately 5% improvement in NOx emissions, with a negligible effect in diesel particulate matter emissions, compared to the No Build Alternative. Alternative 2 also does not eliminate design deficiencies on I-710 nor does it provided the needed separation between trucks and general purpose traffic. However, the screening results did confirm that the TSM/TDM/Transit/ITS improvements included in Alternative 2 would provide value to the project. For this reason, Alternative 2 was recommended for inclusion in the reduced set of alternatives as a component of the other alternatives selected to be carried forward for more detailed environmental studies.

  For a detailed description of the TSM/TDM/Transit/ITS improvements included in Alternative 2, refer to the I-710 *Technical Memorandum – Multimodal Review*.

- **Alternative 3: Goods Movement Enhancement by Rail / Advanced Technology[3]:** Alternative 3 is not recommended to be carried forward as a standalone alternative.

  Alternative 3 is focused on goods movement enhancement by advanced technology, which represents an array of "zero emissions" technologies, including fixed guideway, electrified freight rail, or electric/battery powered trucks. For the purpose of the screening analysis, it was assumed that the advanced technology was a fixed guideway technology family (e.g. electric powered magnetic levitation or linear induction motor system). This assumption provided the full range of the potential benefits and costs of the different zero emissions technologies and design options.

[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).

Additional screening analysis of the advanced technology options (see **Appendix C**) concluded that the electric/battery truck option is the preferred option at this time as it offers more flexibility in serving multiple trip destinations, seamlessly interfaces with existing container terminal and intermodal railyard container loading and unloading systems, utilizes proven technology components and has the lowest capital cost compared with the fixed guideway and electrified rail options. The electric/battery (zero emissions) truck advanced technology option is recommended for inclusion in one of the screened alternatives.

While key features of Alternative 3 demonstrated needed emissions reduction benefits as well as the ability to markedly reduce HDT traffic in the I-710 general purpose lanes, as a stand alone alternative, Alternative 3 did not sufficiently relieve traffic congestion on I-710 according to several of the mobility measures nor did it address the existing safety and design deficiencies on I-710 compared to other alternatives. Therefore, the electric/battery (zero emissions) truck advanced technology component of Alternative 3 was selected for its positive air quality benefits and integrated with another recommended alternative (see following discussion of Alternative 6B).

- **Alternative 4: Arterial Highway & I-710 Congestion Relief Improvements:** Alternative 4 is not recommended to be carried into the environmental process as a stand alone alternative. Just as with Alternative 2, Alternative 4 does not provide adequate improvements on its own to fully address the project's Purpose and Need. This alternative cannot accommodate the high future traffic volumes generated by population and employment growth and the forecast cargo growth. When compared to the other alternatives, Alternative 4 does slightly outperform Alternatives 2 and 3 with regard to mobility and safety benefits. But since its physical improvements to the freeway are not as extensive as Alternatives 5A, 5B and 6, it is not a top performing alternative according to these key objectives. However, the screening analysis found that the arterial highway improvements and the I-710 freeway congestion relief elements of Alternative 4 would be valuable components to include in the alternatives recommended to be carried forward for more detailed environmental studies.

- **Alternative 5A: Ten General Purpose Lanes:** Alternative 5A is recommended to be carried forward in the environmental process as a stand alone alternative. It has the second highest overall performance on the mobility measures of the Purpose and Need. More specifically, Alternative 5A has the second best performance on measures of congestion reduction (volume/capacity ratio) and I-710 freeway travel time. It also is second among the screened alternatives in air emissions and is ranked first in reduction in energy consumption. Alternative 5A also performs well in the screening measures related to traffic safety, tied for the second lowest percent of HDTs in the general

purpose lanes and tied for the highest number of design deficiencies improved. It has lower right-of-way impacts than Alternative 6 due to the absence of the freight corridor in this alternative and its capital cost is third lowest overall. Therefore Alternative 5A was recommended for inclusion in the reduced set of alternatives to be carried forward for more detailed environmental studies.

- **Alternative 5B: Eight General Purpose Lanes and Two HOV Lanes:** Alternative 5B is not recommended to be carried forward into the environmental process. From a physical standpoint Alternative 5B closely resembles Alternative 5A, only two of the proposed lanes would operate as HOV lanes rather than general purpose lanes. The screening analysis demonstrated that Alternative 5B as has lower benefits compared to Alternative 5A because the HOV lanes in 5B would not be utilized as much as the proposed general purpose lanes in 5A, most likely due to the parallel HOV lanes on both I-110 and I-605. Yet Alternative 5B contains the drawbacks with regard to potential right of way impacts as Alternative 5A without the corresponding level of mobility benefits. Therefore, Alternative 5A is recommended over Alternative 5B.

- **Alternative 6: Alternative 5A with Addition of Four Separated Freight Movement Lanes:** It is recommended that Alternative 6 be carried forward in the environmental process as a stand alone alternative, along with a new variation of Alternative 6 that includes Alternative 3's advanced technology component.

  As the highest performing alternative for mobility and traffic safety measures, Alternative 6 is the only alternative which is estimated to reduce the peak period volume/capacity ratio on I-710 below the level indicating congested conditions. It also is estimated to generate the lowest percentage of heavy duty trucks (HDT) that share the general purpose lanes with autos and have the greatest reduction in design deficiencies, both key indicators of improved traffic safety. The screening analysis demonstrated that Alternative 6 included the full complement of improvements needed to respond to the numerous transportation problems and deficiencies throughout the I-710 Corridor. However, the benefits of Alternative 6 do come with the trade-off of right-of-way impacts it would have on residential and non-residential properties in selected locations within the I-710 Corridor, as well as small increase in DPM emissions depending upon the technology used to power the trucks using the freight movement lanes. It is also estimated to have the second highest capital cost. Alternative 6 is recommended for inclusion in the reduced set of alternatives because it is the only alternative that is estimated to fully address the mobility problems in the corridor and responds best to improving traffic safety.

Alternative 6 is recommended to have two variations: Alternative 6A (previously labeled Alternative 6) includes 10 General Purpose lanes and four separated freight movement lanes for use by all heavy duty trucks whether powered by diesel engines or engines with lower or zero emissions. Alternative 6B includes 10 General Purpose lanes and incorporates Alternative 3's advanced technology component by including four separated freight movement lanes that are designed to provide electric power to electric/battery powered (zero emissions) trucks, which are the only type of truck permitted to use the freight corridor in this variation.

4.3 DESCRIPTION OF THE REDUCED SET OF ALTERNATIVES RECOMMENDED TO BE CARRIED FORWARD INTO DRAFT EIR/EIS TECHNICAL STUDIES

As a result of the screening process, the following alternatives are recommended for inclusion in the Reduced Set of Alternatives. In some cases, the screened alternatives contain modifications and/or design options that were shown to improve their relative performance in terms of benefits, costs, and impacts as a consequence of the screening analysis. The Reduced Set of Alternatives are described as follows:

Alternative 1 (No Build): Required to be evaluated under CEQA and NEPA.

Alternative 5A (Widen to 10[4] general purpose lanes without the freight corridor): Recommended as a less impacting alternative than Alternative 6, but one which still provides measurable benefits. The number of general purpose lanes will be evaluated and modified, if necessary, for each segment of I-710 based upon refined traffic forecasting. Study of this alternative at the same level of detail as Alternative 6 will also allow for a meaningful comparison of the benefits, costs and impacts of the freight movement corridor in Alternatives 6A and 6B. Alternative 5A (without the freight corridor) **also includes** the projects identified for **Alternative 1** and the improvements determined for **Alternatives 2, 3 (maximum goods movement component by rail) and Alternative 4** as follows:

- Alternative 1 projects
- Alternative 2 improvements for TSM/TDM/Transit/ITS
- Alternative 3 – Maximum Goods Movement by Rail component
- Alternative 4 – Arterial Highways and freeway congestion relief projects

[4] See Section 4.3.1 for number of general purpose lanes subsequent evaluations.

Alternative 6A (Widen to 10^4 general purpose lanes + 4 Freight Movement lanes [conventional trucks*]): Recommended due to the high level of benefits and consistency with the original community-based LPS and Purpose and Need. The number of general purpose lanes will be evaluated and modified, if necessary, for each segment of I-710 based upon refined traffic forecasting.

* - Conventional Trucks – Assumes newer (post -2007) projected diesel-/fossil-fueled trucks (new or with retrofitted engines required per new regulations and standards and normal fleet turnover with a mix of CNG and LNG trucks assumed as well)

Alternative 6A **also includes** the projects identified for **Alternative 1** and the improvements determined for **Alternatives 2, 3 (maximum goods movement component by rail), Alternative 4 and Alternative 5A** as follows:

- Alternative 1 projects
- Alternative 2 improvements for TSM/TDM/Transit/ITS
- Alternative 3 – Maximum Goods Movement by Rail component
- Alternative 4 – Arterial Highways and freeway congestion relief projects
- Alternative 5A – Freeway improvements with 10^4 general purpose lanes

This alternative will assume design and usage of the freight movement corridor by conventional trucks.

Alternative 6B (Widen to 10^4 general purpose lanes + 4 Freight Movement lanes [zero emissions trucks]): Recommended due to the high level of benefits and consistency with the original community-based LPS and Purpose and Need. The number of general purpose lanes will be evaluated and modified, if necessary, for each segment of I-710 based upon refined traffic forecasting.

Alternative 6A **also includes** the projects identified for **Alternative 1** and the improvements determined for **Alternatives 2, 3 (maximum goods movement component by rail), Alternative 4 and Alternative 5A** as follows:

- Alternative 1 projects
- Alternative 2 improvements for TSM/TDM/Transit/ITS
- Alternative 3 – Maximum Goods Movement by Rail component
- Alternative 4 – Arterial Highways and freeway congestion relief projects
- Alternative 5A – Freeway improvements with 10^4 general purpose lanes

This alternative will assume design and usage of the freight movement corridor by zero emission trucks. This technology would include, but not be limited to, battery powered trucks as well as trucks powered by overhead electrical lines, linear induction motor or linear synchronous motor systems (or other concepts), or future zero emission technologies to be developed designed as part of the Freight Movement corridor. The design of the freight corridor will also assume possible future conversion, or initial construction, as feasible, (which may require additional environmental analysis and approval) of a fixed track guideway family of alternative technologies eg. Maglev.

Alternatives Not Recommended (as "Stand–Alone Alternatives)

Alternatives 2 (TSM/TDM/Transit), 4 (Arterial Highway and I-710 Congestion Relief Improvements) and 5B (8 general purpose lanes + 2 HOV lanes) are not recommended to be carried into the engineering and environmental technical studies for the EIR/EIS as "stand alone" projects or alternatives. Alternatives 2 and 4 do not provide adequate improvements by themselves to address the purpose and need for the project as required by future traffic generated by population growth and the selected cargo forecast. However, the referenced studies indicated the value of the improvements identified for Alternatives 2 and 4 and, therefore, they are included as part of the recommended Alternatives 5A, 6A, and 6B. Alternative 5B is not recommended as it has similar impacts as 5A and lower benefits.

Alternative 3 (Goods Movement Enhancement by Rail and/or Advanced Technology) is not recommended to be carried forward as a "stand alone" alternative for the EIR/EIS.

The design of the freight corridor will also assume possible future conversion, or initial construction, as feasible, (which may require additional environmental analysis and approval) of a fixed track guideway family of alternative technologies eg. Maglev. The I-710 Funding Partners wish to continue to encourage the goods movement industry to explore different options for Advanced Technology for Zero Emissions Container Movements Systems (ZECMS) that can serve the minimum required future container volumes to be moved in the Freight Movement lanes using fixed track guideway family of alternative technology systems as an initial element of the project, or as a future option with zero emission trucks (or zero emission transportation methods to move trucks) assumed at this time. New ZECMS concepts or methods that are adequately developed or demonstrated by other agencies or others in the future may be considered for subsequent analysis as part of a supplemental environmental report (including other alignments) to be prepared in the future for application and effects for the I-710 Corridor Project.

Maximum goods movement (or enhancements) by rail projects are assumed in the no-build alternative and included in all subsequent alternatives.

Therefore, the maximum goods movement by rail component of Alternative 3 is recommended to be included in Alternatives 5A, 6A and 6B but not as a “stand alone” alternative and the use of zero emission technologies (zero emission trucks with an option for adding a fixed track guideway alternative technology system at a later date) is recommended to be included in Alternative 6B.

Appendix D provides a more detailed description of each of these alternatives.

4.3.1 Technical Details to be Included in the Reduced Set of Alternatives

Listed below are additional technical details that are to be included with the Recommended Alternatives:

1. The list of projects that was previously developed for Alternative 1 should be updated.
2. The maximum rail components of Alternative 3 should be included in the analysis of the recommended alternatives, excluding the expansion or addition of new near dock intermodal facilities.
3. The freight corridor design should include the following design factors:
    a. Use of highway design standards
    b. The freight corridor should be designed so as not to preclude conversion to a fixed guideway system in the future.
    c. Performance criteria should be established for the design and operation of the freight corridor.
4. The Alternative Technology Report is recommended to be sent to the industry representing the technologies evaluated in the Ports' Zero Emissions/Electric Container Systems (or other interested parties) study for the purposes of providing them an opportunity to comment and make subsequent presentations on how their technologies would operate and fit within the I-710 freight corridor.
5. That the consultants contact other industries concerning zero emission trucks (or technologies to move trucks with zero emissions) and request information, comments and presentations.
6. An analysis of arterial highway improvements should be identified early in the environmental process as possible for review by the staffs of the local communities.
7. A phasing plan should be developed for the alternatives (this would include an analysis of population and cargo forecast capacities).
8. Projects are requested to be identified for early implementation that would address existing congestion and safety issues.
9. The recommended alternatives should be presented to the relevant Subject Working Groups and Corridor Advisory Committee.
10. The number of general purpose lanes be evaluated and adjusted (up or down), if necessary, for each segment of I-710 based upon subsequent refined traffic forecasting and other studies that reflects only the general purpose lanes needed to satisfy the Purpose and Need for the project.

APPENDIX A: PURPOSE AND NEED STATEMENT

NEED AND PURPOSE/ALTERNATIVES

Interstate 710 (I-710) is a major north-south interstate freeway in Los Angeles County connecting the City of Long Beach, the Port of Los Angeles, and the Port of Long Beach to central Los Angeles with connections to Interstate 405, State Route 91, Interstate 105, Interstate 5, State Route 60, and Interstate 10. Metro in cooperation with the California Department of Transportation District 7 (Caltrans) the Gateway Cities Council of Governments, the Port of Los Angeles, the Port of Long Beach, the Southern California Association of Governments, and the Interstate 5 Joint Powers Authority is performing the I-710 Corridor project EIR/EIS to analyze alternatives for improving I-710 from Ocean Boulevard in the City of Long Beach to SR-60, a distance of 18 miles.

Air Quality and Public Health

Diesel particulates are a major contributor to carcinogenic risk from toxic air contaminants in the South Coast Air Basin. According to the South Coast Air Quality Management District (SCAQMD), approximately 33 percent of diesel particulate emissions in the South Coast Air Basin come from exhaust produced by heavy-duty diesel trucks. The I-710 freeway experiences high heavy-duty truck volumes resulting in high concentrations of diesel particulate emissions within the I-710 corridor.
A purpose of the proposed I-710 Corridor project is to improve air quality and public health.

Traffic Safety

I-710 experiences an accident rate that is well above the statewide average for freeways of this type. Over one-third of the accidents that occur on I-710 involve a heavy-duty truck. The mixing of cars with the relatively high volume of heavy-duty trucks increases the likelihood of accidents.
A purpose of the proposed I-710 Corridor project is to improve traffic safety.

Highway Design Deficiencies

In many cases along I-710, the curves of on- and off-ramps are too tight and the length available for vehicles to enter and leave the freeway is too short. The increase in truck traffic carrying containers to and from the ports, along with the growth in auto traffic, has resulted in traffic volumes that have overwhelmed the existing design capacity of I-710, particularly at the interchanges. The design deficiencies along the I-710 contribute to the higher than average accident rate.

A purpose of the proposed I-710 Corridor project is to address existing design deficiencies of the I-710 freeway.

Future Traffic Conditions (2035)

High volumes of both trucks and cars have lead to traffic congestion throughout most of the day (6 a.m. to 7 p.m.) on I-710 as well as the connecting freeways. This is projected to worsen over the next 25 years.

A purpose of the proposed I-710 Corridor project is to more efficiently accommodate projected traffic volumes forecast for 2035.

Growth in Population, Employment, and Activities Related to Goods Movement

Increases in population, employment, and goods movement between now and 2035 will lead to more traffic demand on I-710 and on the streets and roadways within the I-710 corridor as a whole. Within the I-710 study area, these increases are estimated as follows:

- Population is forecast to grow from approximately 1.2 million today to 1.4 million in 2035.
- Employment is forecast to grow from approximately 503,000 today to 537,000 in 2035
- Goods movement is forecast to grow from 16.0 million TEUs today to anywhere from 28.5 million to 42.7 million TEUs in 2035.

A purpose of the proposed I-710 Corridor project is to address the increased traffic volumes resulting from projected growth in population, employment, and economic activities related to goods movement within the I-710 corridor

ALTERNATIVES IDENTIFIED TO DATE

The proposed project includes the following alternatives:

- No Build
- Transportation Systems Management/Transportation Demand Management (TSM/TDM) and Transit – may include up to eight new ramp meters, improved signage, parking restrictions on major arterials, empty container management through policies and incentives, implementation of truck emission/safety enforcement facilities, expanded public transportation, and an expanded Intelligent Transportation System (ITS) to include entire study area.
- Goods Movement Enhancement by Rail and/or Advanced Technology
- Arterial Highway and I-710 Congestion Relief Improvements
- Mainline I-710 Improvements
    - Option A – 10 general-purpose lanes with no carpool lanes
    - Option B – eight general-purpose lanes with one carpool lane in each direction (total of 10)
- Locally Preferred Strategy Hybrid Design (I-710 Mainline Improvements with the addition of a separated four lane freight movement facility) - Includes ten general purpose lanes next to a separated four lane freight movement facility from the Ports of Los Angeles and Long Beach (Ocean Boulevard) to the UP and BNSF intermodal yards southeast of the I-710/I-5 interchange. This alternative is a community-based recommendation from the previous I-710 Major Corridor Study: Major Opportunity/Strategy Recommendations and Conditions.

APPENDIX B: ALTERNATIVES SCREENING RESULTS

I-710 Corridor Project EIR/EIS

Alternatives Screening Summary Matrix

Screening Measures	Alternatives						
	1	2	3	4	5A	5B	6
	No Build	TSM/TDM	Alt Technology/Max Rail	Arterials and I-710 Congestion Relief	10 General Purpose Lanes	8 GP Lanes + 2 HOV Lanes	10 GP Lanes + Freight Corridor (4 Lanes) (LPS)
Improve Air Quality and Public Health							
Daily Freeway Diesel Particulate Matter Emissions (grams/pounds)	85,000	87,000	73,000	87,000	95,000	93,000	113,000
	190	190	160	190	210	200	250
Daily Freeway Oxides of Nitrogen (NOx) Emissions (grams/pounds)	3,240,000	3,100,000	2,720,000	3,100,000	2,940,000	2,960,000	2,950,000
	7,100	6,800	6,000	6,800	6,500	6,500	6,500
Improve Traffic Safety							
% of PM Peak Period Traffic on I-710 GP Lanes Consisting of Heavy Duty Trucks (see attached table)							
Eliminate Highway Design Deficiencies							
Number of Existing Design Deficiencies Eliminated	0	0	0	135	420	420	420
Increase Mobility							
Screenline V/C Ratio on I-710 General Purpose Lanes by Time Period (see attached table)							
Screenline V/C Ratios on Arterials (see attached table)							
I-710 Travel Time (see attached table)							
Accommodate Growth in Population, Employment, and Activities Related to Goods Movement							
Screenline V/C Ratios by Time Period (see attached table)							
Minimize Right of Way Impacts							
Number of Impacted Residential Properties	0	0	0	0	19	19	36
							49 - with 91 connectors
Number of Impacted Non-Residential Buildings	0	0	52	20	106	106	158
Right of Way Impacts on Waters of the US (in linear feet)	0	0	1,165	458	3,198	3,198	3,732
Potential Relocations of Regionally Significant Utilities - Power Transmission (towers affected)	0	0	152	3	106	106	172
Minimize Impacts to Section 4(f) Properties							
Number of Right of Way Impacts on Section 4(f) Properties	0	0	0	0	1 Park	1 Park	1 Park
Reduce Energy Consumption							
Number and Percent of Daily Truck Trips Replaced by Clean Energy Powered Transporting Vehicles in I-710 Corridor			22,440				
			20%				
% Reduction in Daily Freeway (I-710, 1-110, I-605) Fuel Consumption Compared to No Build	575,109	554,870	553,730	554,870	540,343	544,501	545,176
		-4%	-4%	-4%	-6%	-5%	-5%
Ensure Environmental Justice							
Environmental Justice Assessment	54,459	54,459	53,672	54,459	59,921	59,921	62,561
	2	2	1	2	5	5	6
Promote Cost Effectiveness							
Total Capital Cost ($ Millions)		$200	$4,100 - low	$700	$3,600	$3,600	$6,900
			$11,500 - high				

Summary of Daily DPM Emissions (grams) for Freeways Across all Screenlines

	DPM Emissions for all Screenlines (grams)				
	AM Peak	Mid-Day	PM Peak	Total	% Diff NB
Alt 1 - No build	17,897	47,237	20,016	**85,150**	
Alt 2 - TSM/TDM	17,844	49,407	19,417	**86,668**	2%
Alt 3 - Alternate Technology	14,753	41,484	16,427	**72,663**	-15%
Alt 4 - Additional Arterial/Interchange Improvements	17,844	49,407	19,417	**86,668**	2%
Alt 5a - 10 GP Lanes	19,460	55,531	20,070	**95,061**	12%
Alt 5b - GP+HOV	19,472	53,616	19,947	**93,035**	9%
Alt 6 - GP+Truck Lanes (LPS)	23,885	63,428	25,525	**112,837**	33%

Notes:

Total DPM Emissions calculated by multiplying Trucks VMT by Emission Factors directly 'Looked-up' from 1 mph increment table (No MOD Calculations)

Summary of Daily NOx Emissions (grams) for Freeways Across all Screenlines

	NOx Emissions for all Screenlines (grams)				
	AM Peak	Mid-Day	PM Peak	Total	% Diff NB
Alt 1 - No build	768,390	1,499,406	977,024	**3,244,821**	
Alt 2 - TSM/TDM	723,718	1,461,691	911,703	**3,097,112**	-5%
Alt 3 - Alternate Technology	630,869	1,255,855	835,320	**2,722,044**	-16%
Alt 4 - Additional Arterial/Interchange Improvements	723,718	1,461,691	911,703	**3,097,112**	-5%
Alt 5a - 10 GP Lanes	682,654	1,411,597	847,412	**2,941,663**	-9%
Alt 5b - GP+HOV	672,669	1,431,155	858,804	**2,962,628**	-9%
Alt 6 - GP+Truck Lanes (LPS)	674,486	1,453,066	825,477	**2,953,028**	-9%

Notes

Total NOx Emissions calculated by multiplying Trucks VMT by Emission Factors directly 'Looked-up' from 1 mph increment table (No MOD Calculations)

HDT Volumes as Percent of Total Traffic PM Peak Period (NB)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5A	Alt 5b	Alt 6
	%HDT Veh	%HDT Veh	%HDT Veh	%HDT Veh	%HDT Veh	%HDT Veh	%HDT Veh
SL1	24%	25%	17%	25%	25%	32%	8%
SL2	18%	19%	13%	19%	19%	23%	6%
SL3	17%	18%	13%	18%	18%	21%	5%
SL4	12%	12%	8%	12%	12%	15%	2%

Screenline V/C Ratio on I-710 General Purpose Lanes by Time Period

Screenline 1 - Pacific Coast Highway

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1 - No Build	1.12	1.20	1.14	1.05	1.29	1.15
Alt. 2 - TSM/TDM	1.05	1.12	1.07	0.98	1.20	1.06
Alt. 3 - Alternative Technology	1.06	0.94	1.00	0.82	1.16	1.05
Alt. 4 - Arterial Improvements	1.05	1.12	1.07	0.98	1.20	1.06
Alt. 5a - 10 GP Lanes	0.67	0.71	0.68	0.62	0.77	0.68
Alt. 5b - 8 GP Lanes + HOV	0.69	0.77	0.71	0.66	0.78	0.66
Alt. 6 - GP Lanes + Freight Corridor	0.45	0.48	0.44	0.40	0.46	0.45

Screenline 2 - Del Amo

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1 - No Build	0.89	0.89	0.82	0.79	1.10	0.82
Alt. 2 - TSM/TDM	0.83	0.83	0.77	0.74	1.02	0.76
Alt. 3 - Alternative Technology	0.84	0.76	0.77	0.66	1.03	0.77
Alt. 4 - Arterial Improvements	0.83	0.83	0.77	0.74	1.02	0.76
Alt. 5a - 10 GP Lanes	0.72	0.72	0.67	0.64	0.89	0.66
Alt. 5b - 8 GP Lanes + HOV	0.74	0.76	0.69	0.67	0.92	0.68
Alt. 6 - GP Lanes + Freight Corridor	0.55	0.54	0.48	0.46	0.68	0.53

Screenline 3 - Rosecrans

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1 - No Build	0.91	1.16	0.83	1.02	1.19	0.99
Alt. 2 - TSM/TDM	0.85	1.08	0.78	0.95	1.10	0.92
Alt. 3 - Alternative Technology	0.91	1.00	0.88	0.83	1.13	0.96
Alt. 4 - Arterial Improvements	0.85	1.08	0.78	0.95	1.10	0.92
Alt. 5a - 10 GP Lanes	0.75	0.95	0.69	0.84	0.98	0.81
Alt. 5b - 8 GP Lanes + HOV	0.77	0.98	0.71	0.88	1.02	0.84
Alt. 6 - GP Lanes + Freight Corridor	0.54	0.76	0.49	0.65	0.76	0.69

Screenline 4 - Atlantic/Bandini

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1 - No Build	1.15	1.10	0.86	1.07	1.26	1.22
Alt. 2 - TSM/TDM	0.89	1.20	0.80	1.00	1.17	1.13
Alt. 3 - Alternative Technology	0.97	1.13	0.88	0.95	1.20	1.19
Alt. 4 - Arterial Improvements	0.89	1.20	0.80	1.00	1.17	1.13
Alt. 5a - 10 GP Lanes	0.77	1.04	0.70	0.86	1.01	0.98
Alt. 5b - 8 GP Lanes + HOV	0.77	1.07	0.72	0.90	1.04	0.99
Alt. 6 - GP Lanes + Freight Corridor	0.64	0.87	0.53	0.70	0.83	0.89

Screenline V/C Ratios on Arterials by Time Period

Screenline 1 - Pacific Coast Highway

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1 - No Build	0.30	0.27	0.28	0.22	0.36	0.30
Alt. 2 - TSM/TDM	0.23	0.21	0.21	0.17	0.27	0.23
Alt. 3 - Alternative Technology	0.21	0.19	0.20	0.15	0.27	0.22
Alt. 4 - Arterial Improvements	0.21	0.20	0.20	0.16	0.26	0.21
Alt. 5a - 10 GP Lanes	0.21	0.20	0.20	0.16	0.26	0.21
Alt. 5b - 8 GP Lanes + HOV	0.21	0.20	0.20	0.16	0.26	0.21
Alt. 6 - GP Lanes + Freight Corridor	0.22	0.20	0.20	0.16	0.26	0.21

Screenline 2 - Del Amo

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1 - No Build	0.59	0.60	0.47	0.48	0.78	0.78
Alt. 2 - TSM/TDM	0.41	0.42	0.32	0.33	0.54	0.54
Alt. 3 - Alternative Technology	0.42	0.43	0.33	0.34	0.55	0.55
Alt. 4 - Arterial Improvements	0.39	0.39	0.30	0.31	0.51	0.51
Alt. 5a - 10 GP Lanes	0.39	0.39	0.30	0.31	0.51	0.51
Alt. 5b - 8 GP Lanes + HOV	0.39	0.39	0.30	0.31	0.51	0.51
Alt. 6 - GP Lanes + Freight Corridor	0.39	0.39	0.30	0.31	0.51	0.51

Screenline 3 - Rosecrans

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1 - No Build	0.50	0.53	0.37	0.39	0.77	0.77
Alt. 2 - TSM/TDM	0.33	0.36	0.25	0.27	0.51	0.52
Alt. 3 - Alternative Technology	0.34	0.36	0.25	0.27	0.53	0.53
Alt. 4 - Arterial Improvements	0.31	0.33	0.23	0.25	0.48	0.49
Alt. 5a - 10 GP Lanes	0.31	0.33	0.23	0.25	0.48	0.49
Alt. 5b - 8 GP Lanes + HOV	0.31	0.33	0.23	0.25	0.48	0.49
Alt. 6 - GP Lanes + Freight Corridor	0.31	0.33	0.23	0.25	0.48	0.49

Screenline 4 - Atlantic/Bandini

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1 - No Build	1.02	1.04	0.64	0.68	1.35	1.38
Alt. 2 - TSM/TDM	0.78	0.79	0.57	0.60	1.02	1.04
Alt. 3 - Alternative Technology	0.79	0.80	0.58	0.61	1.04	1.07
Alt. 4 - Arterial Improvements	0.74	0.76	0.54	0.57	0.97	1.00
Alt. 5a - 10 GP Lanes	0.74	0.76	0.54	0.57	0.97	1.00
Alt. 5b - 8 GP Lanes + HOV	0.74	0.76	0.54	0.57	0.97	1.00
Alt. 6 - GP Lanes + Freight Corridor	0.74	0.76	0.54	0.57	0.97	1.00

Year 2035 Average Weekday I-710 Travel Times (Between Ocean Blvd. and SR-60) by Alternative and Time of Day

	I-710 Travel Times (in minutes)					
	AM Peak		Mid-day		PM Peak	
	North	South	North	South	North	South
Alt 1 - No build	41	48	32	38	66	46
Alt 2 - TSM/TDM	31	47	28	33	53	38
Alt 3 - Alternate Technology	34	38	30	28	55	41
Alt 4 - Additional Arterial/Interchange Improvements	31	47	28	33	53	38
Alt 5a - 10 GP Lanes	23	32	22	25	34	28
Alt 5b - GP+HOV Lanes						
GP Lanes	24	34	22	27	36	28
HOV Lanes	22	25	20	21	25	25
Alt 6 - GP+Tuck Lanes (LPS)						
GP Lanes	20	24	19	20	24	23
Truck Lanes	19	19	19	19	20	18

Total Screenline V/C Ratio by Time Period

Screenline 1

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1	0.77	0.74	0.66	0.62	0.81	0.81
Alt. 2	0.71	0.69	0.61	0.58	0.74	0.74
Alt. 3	0.71	0.65	0.59	0.55	0.74	0.75
Alt. 4	0.70	0.68	0.60	0.57	0.73	0.73
Alt. 5a	0.64	0.61	0.54	0.52	0.66	0.66
Alt. 5b	0.64	0.61	0.54	0.52	0.66	0.66
Alt. 6	0.55	0.53	0.47	0.45	0.57	0.57

Screenline 2

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1	0.94	0.94	0.77	0.77	1.04	1.01
Alt. 2	0.85	0.85	0.69	0.69	0.94	0.91
Alt. 3	0.87	0.84	0.70	0.68	0.96	0.92
Alt. 4	0.84	0.84	0.68	0.68	0.93	0.89
Alt. 5a	0.81	0.81	0.66	0.65	0.89	0.86
Alt. 5b	0.81	0.81	0.66	0.65	0.89	0.86
Alt. 6	0.73	0.73	0.59	0.59	0.81	0.78

Screenline 3

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1	0.95	1.04	0.77	0.84	1.10	1.09
Alt. 2	0.87	0.95	0.70	0.76	1.00	0.99
Alt. 3	0.89	0.94	0.73	0.74	1.02	1.01
Alt. 4	0.86	0.94	0.69	0.76	0.99	0.98
Alt. 5a	0.83	0.91	0.67	0.73	0.95	0.94
Alt. 5b	0.83	0.91	0.67	0.73	0.95	0.94
Alt. 6	0.76	0.83	0.61	0.67	0.87	0.86

Screenline 4

	AM Peak		MD Peak		PM Peak	
	North	*South*	*North*	*South*	*North*	*South*
Alt. 1	1.08	1.14	0.86	0.96	1.26	1.22
Alt. 2	1.01	1.07	0.81	0.85	1.17	1.13
Alt. 3	1.04	1.06	0.84	0.84	1.19	1.17
Alt. 4	1.00	1.06	0.80	0.84	1.16	1.12
Alt. 5a	0.96	1.02	0.78	0.81	1.12	1.08
Alt. 5b	0.96	1.02	0.78	0.81	1.12	1.08
Alt. 6	0.88	0.92	0.70	0.73	1.01	0.98

Estimated Capital Costs Above No Build
($ Millions)

	Alternatives						
	2	**3 Low**	**3 High**	**4**	**5A**	**5B**	**6**
	TSM/TDM	**Alt Technology / Max Rail**	**Alt Technology / Max Rail**	**Arterials and I-710 Congestion Relief**	**10 General Purpose Lanes**	**8 GP Lanes + 2 HOV Lanes**	**10 GP Lanes + 4 Truck Lanes (LPS)**
I-710 Freeway System	$2.0	$1.5	$1.5	$480	$3,400	$3,400	$6,700
I-710 Study Area Roadway System	$1.5	$1.5	$1.5	$2.2	$2.2	$3.0	$3.0
Rail/Transit	$150	$150	$150	$150	$150	$150	$150
Goods Movement Low		$3,900					
Goods Movement High			$11,300				
Traffic Systems and Operations	$40	$40	$40	$40	$40	$40	$40
Total	**$200**	**$4,100**	**$11,500**	**$700**	**$3,600**	**$3,600**	**$6,900**

APPENDIX C: ALTERNATIVE TECHNOLOGY SCREENING ANALYSIS

C. ALTERNATIVE TECHNOLOGY SCREENING ANALYSIS

C.1 ALTERNATIVE TECHNOLOGY DESCRIPTIONS

In an attempt to both remove heavy duty truck traffic from the I-710 general purpose lanes and improve corridor air quality, the concept of a zero emission alternative technology to move cargo containers from the Ports was introduced as a component of Alternative 3 Enhanced Goods Movement by Rail and/or Advanced Technology. In order to explore possible options for zero emission container movement three families of zero emission container movement technologies were identified for analysis. Summary descriptions of these alternative technologies are provided as follows:

- **Automated Fixed Guideway:** The automated fixed guideway family is a zero emission alternative technology which will be fully automated, operating on its own fully grade separated guideway and controlled by a central operations center. These vehicles could be connected to the guideway by either rubber tires, steel wheel on steel rail or suspended by magnetic levitation (maglev). Electric power will be utilized for propulsion and all auxiliary purposes, and will be delivered to the guideway or vehicle from an outside (typically commercial) source, via a powered rail, wire or surface contact system. The guideway will always be elevated to separate the system from conventional rail, street, highway or pedestrian traffic, and to allow for the movement of terminal and rail yard equipment, such as container top picks, to continue serving their respective locations. Contact surfaces and structural elements may be steel, concrete, or other suitable durable materials. Vehicles will therefore never operate outside a definable 'dynamic envelope' as they move along the guideway. In order to interface with the ports and intermodal rail facilities, the automated fixed guideway will require specialized loading and unloading stations.

- **Electric/Battery Trucks:** This zero emission alternative technology family will employ electric/battery-powered trucks on dedicated truck only lanes adjacent to I-710 with the trucks drawing their electric power from an overhead (catenary) wire, third rail, or conductor embedded in the roadway while on the dedicated lanes. When traveling off the electrified truck lanes, these trucks would operate on existing roads using internal auxiliary power units employing battery, flywheel, or some other electrical energy storage technology. The electric/battery trucks would interface with the Port terminals and the intermodal rail facilities in the same way conventional trucks currently operate, using existing container handling equipment for loading and unloading.

- **Conventional Freight Rail – Electrified:** The electrified conventional freight rail alternative technology family would receive power via overhead (catenary) wires. Within the Port terminals no additional dedicated rail tracks will be required, as the system will utilize existing tracks with the addition of overhead (catenary) electric power wires. Loading and unloading requirements would be the same as those necessary for conventional freight rail. Due to vertical and horizontal alignment constraints, this alternative technology family would be unable to use the freight corridor along I-710. Therefore, this analysis assumes that a new line haul alignment will have to be determined between the Ports and the intermodal railyards in Vernon and Commerce.

C.2 Alternative Technology Screening Process

The purpose of this alternative technology screening process is to provide comparative information on the three alternative technology families under consideration for the I-710 Corridor Project EIR/EIS. In doing so, the most feasible and effective alternative(s) can be identified to assist in determining which technology family(ies) to analyze in more detail in the EIR/EIS.

To begin the alternative technology screening process, a set of measures was developed to compare the relative benefits, costs and impacts of each alternative technology. For each of the measures, the alternative technology families were ranked on a scale of 1 to 3 (1 being the highest-ranked response and 3 being the lowest) and the rankings summarized in a screening matrix for comparison (**Table C-1**). The rankings are not weighted and are based upon both qualitative and quantitative assessments. Compilation of the rankings enables identification of the zero emission container transport alternative technology family with the lowest aggregate score, indicating the highest ranking. The evaluative information developed to support the screening was then used to provide the technical basis for recommending an alternative technology family to be considered for additional analysis in the EIR/EIS, as part of the reduced set of alternatives.

C.3 Screening Results

The following discussion defines the measures used in the screening analysis and summarizes the technical findings of the performance of each of the alternative technology families against each of the measures.

Meets Purpose and Need

Ability to Reduce Mixing of Container Trucks and Autos: The extent to which an alternative technology can reduce the number of container trucks mixing with autos by removing them from the general purpose lanes.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

Given that the electric/battery truck alternative not only provides dedicated truck lanes along I-710, but also offers the greatest system capacity, it produces the highest reduction in the number of container trucks traveling in the I-710 general purpose lanes followed by the automated fixed guideway and the electrified freight rail. (See discussion of traffic safety screening measure in Section 3.2.4 of the report.)

Air Quality Benefits (potential for zero emissions): The ability of an alternative technology to provide air quality benefits for the surrounding community by serving a share of the projected 2035 near-dock and off-dock container markets. The technology family that serves the largest portion of these markets will have the greatest reduction on the number of diesel trucks needed to transport containers from the Ports and have the greatest air quality benefits.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

The air quality benefits that a system produces are directly related to its capacity and the size of the container markets that can be served. Therefore, the electric/battery trucks provide the greatest benefits followed by the automated fixed guideway and finally the electrified freight rail. (See measure on market demand.)

Operational Characteristics:

Capacity: The maximum number of containers an alternative technology can transport in both directions between the Ports and the Hobart and East Los Angeles intermodal rail yards per year.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

The maximum line haul capacity of the electric/battery truck alternative is estimated to be 25.4 million standard 40' containers per year, the highest capacity of all three alternatives. Additionally, given that the freight corridor is assumed to be open 24 hours per day, terminal operators may take advantage of the existing roadway system to extend operating times, thereby, further increasing the system capacity of the electric/battery trucks to 47.0 million TEU/year. Although both the electrified freight rail and the automated fixed guideway alternatives assume four tracks (two per direction), the automated fixed-guideway has a higher capacity of 22.4 million TEU/year. This is mainly due to the significantly higher frequencies of container trains or consists per hour assumed to be achievable by the automated fixed-guideway system. The electrified freight rail alternative, despite being able to operate longer trains which carry more TEU's per trip, has a maximum capacity of only 8.9 million TEU/year, due to much lower maximum operational frequencies of the trains.

Efficiency: The efficiency of an alternative technology, or its cost effectiveness, is measured as the operating cost per container transported between the Ports and the intermodal railyards.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

The electric/battery truck alternative would be the most efficient system to implement since it transports the greatest number of containers per cost to operate the system. The next most efficient system would be the automated fixed guideway as it has a considerably higher capacity and a lower operating cost than the electrified freight rail.

Reliability: Reliability is represented by the estimated relative likelihood of a systems' ability to deliver its rated capacity as needed. Power failures are not included as factors in this measure since each alternative is assumed to have a 100 percent reliable back up system to protect from short-duration power interruptions, and because power system failure is considered an event independent from the characteristics of each of the alternative technologies.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**3**	**2**	**1**

Considering that the electrified freight rail is an existing technology used around the world, the frequency of system breakdowns is assumed to be lower than that of the other two alternatives, which are still untried in day-to-day service. The electric/battery trucks would be the next most reliable system as they are a synthesis of existing technologies which have already been tested and deployed commercially (e.g. electric trolley buses). The automated fixed guideway alternative, on the other hand, is a completely new technology family which gives it a higher level of uncertainty and a greater likelihood of system failure, at least in the initial years of operation.

Compatibility with Port and Railroad Operations: Compatibility of an alternative technology with current Port and railroad operations is the extent to which new infrastructure is not required to accommodate a system within these facilities, as well as whether the alternative would conflict with existing container transport operations.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**3**	**1**	**2**

Ranked the most compatible alternative, electric/battery trucks would interface with existing container handling systems at the Ports and intermodal rail facilities in the same way as conventional trucks operate now. Using the I-710 freight corridor and the proposed truck ramps between the freight corridor and the railyards, these trucks would move through the Ports and intermodal yards on their own power, and would be loaded and unloaded by the same container handling equipment as used to load and unload conventionally powered trucks. Other than impacting roadway capacity, the electric/battery trucks would have the least conflicts with existing port and railroad operations.

Although the electrified freight rail alternative would be loaded and unloaded in the same manner as conventional freight trains, and it is assumed that no additional or dedicated tracks would be required, this alternative is less compatible with existing facilities than the electric/battery trucks due to its need for overhead (catenary) wires and support structures within the ports and intermodal rail yards. These structures would constitute potential new obstacles and hazards, since some container handling equipment may be too large to maneuver underneath these electrical wires.

Unlike the electric/battery trucks and electrified freight rail, the automated fixed guideway technology would require an extensive new network of elevated collection and distribution guideways, power distribution structures at the port terminals and rail yards, as well as specialized loading and unloading "stations". The terminal space required by the automated fixed guideway system would be dedicated to serving a specific subset of containers (only those moving directly between the port terminals and the Commerce/Vernon railyards), and would be taken from the limited terminal area available to serve all container moves. This may ultimately constrain the ports' expansion needs and the functionality of their existing terminal facilities. The automated fixed guideway family is therefore the least compatible alternative.

Potential for Automation: The ability to fully automate an alternative technology to increase productivity and reduce operating costs.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**1**	**2**	**3**

The automated fixed guideway is the highest ranked alternative for this measure as its operation is by definition fully automated and under the control of an automated vehicle operations system and control center the entire length of the corridor and within the port terminals and railyards. The electric/battery truck alternative, although it utilizes drivers to operate the vehicles, would have the next highest potential for automation given that the trucks would travel for part of the trip on dedicated truck lanes. These lanes could in the future, as technology advances, allow for the possible implementation of a truck guidance and control application. This computerized vehicle control system, which has been field tested, would provide "hands-off" computer controlled driving of the trucks on the dedicated lanes. This could raise the potential of increasing the number of trucks (containers) per hour that could be accommodated by each lane on the freight corridor. Within the port and railyard terminals, however, the automation of these electric/battery trucks would be limited

as they are not separated from other port/yard operations (conventional non-automated rail, surface traffic, etc.) and would require the same standards and controls.

Similar to the electric/battery trucks, the electrified freight rail would not be automated within the port and railyard terminals as its intent is to make use of existing infrastructure within the terminals and therefore would not be separated from other port/yard operations. This only leaves the possibility of automating the system along the line haul segment, which is technically feasible, but highly unlikely due to federal regulations requiring the presence of an engineer during operation. Therefore, the electrified freight rail has the lowest potential for automation.

Cost

Capital Cost: The cost per mile for an advanced technology system including loading/unloading equipment, sorting/storage facilities, guideways, vehicles and other components required by each specific system.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

Assuming that the electrified freight rail alternative would require a new line haul alignment outside the proposed I-710 freight corridor due to strict horizontal and vertical constraints, the number of right-of-way impacts necessary to accommodate this technology would be higher than either the electric/battery trucks or the automated fixed guideway. As such the electrified freight rail would have the highest estimated capital cost of the three alternatives.

Compared to the automated fixed guideway, the electric/battery truck has a lower estimated capital cost since the trucks would utilize dedicated truck lanes on the I-710 freight corridor and existing roads for the rest of their trip in the port terminals and railyards. As such, less infrastructure would be required to accommodate this system as opposed to the automated fixed guideway which would require the construction of a separate elevated guideway, not just along the I-710 freight corridor, but connecting the port terminal to the freight corridor and serving the specialized container loading/unloading stations.

Operating Cost: The cost per mile to operate an alternative technology system, only including staffing requirements.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**1**	**3**	**2**

Since the automated fixed guideway would be fully automated or driverless, it would only require enough staff to monitor the system from a central operations center which lowers its operating costs below those of the other alternative technologies. In contrast, the electric/battery truck alternative technology family would have the highest operating cost given that each truck traveling between Ports and intermodal railyards requires a driver to operate it. Since the amount of trucks expected to travel on the I-710 freight corridor is higher than the number of electrified locomotives, electric/battery trucks have higher labor requirements and a higher operating cost.

Technology Risk: Depending on the stage or level of development (i.e., in use/testing prototypes/active development/active concepts) certain alternative technologies may pose a greater financial risk to implement than others.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**3**	**2**	**1**

Given that the electrified freight rail alternative is an existing technology used around the world, it is the most developed option presented and therefore, incurs the lowest financial risk. In contrast, the automated fixed guideway family, as applied to cargo container transport, is still in the research and development phase and the electric/battery truck alternative, while conceived as a synthesis of existing proven technologies, is still only a concept that has not yet been advanced by any developer or supplier. Based on this reasoning the automated fixed guideway would be considered more mature, in that there exist parties who purport to be on the verge of its commercialization, however, it would be more of a financial risk the electric/battery truck alternative given that the technologies proposed are completely new and untested in the container transport application.

Funding Potential: The ability of an alternative technology to attract funding based on available funding sources as well as the amount of funding needed based upon capital costs.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

The electric/battery truck alternative has the greatest funding potential not only because it has the lowest capital cost, but because it also would qualify for federal and state highway funds. Additionally, it could attract private sector funding if a project revenue source were to be created from tolling or container fees.

Although the automated fixed guideway does not qualify for any existing public funding source, the technologies proposed for this system thus far have included proposals for joint public-private financing. When combined with the second lowest capital cost, the possibility of joint public-private financing gives the automated fixed guideway greater funding potential than the electrified freight rail alternative technology.

Environmental Impacts

Right-of-Way Impacts: The number of property acquisitions necessary to accommodate the requirements of an alternative technology.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

It is assumed that, regardless of the technology selected, property must be acquired to accommodate the guideway, fixed wayside facilities and relocations of existing infrastructure. However, depending on the technology chosen, the amount of right-of-way required would vary.

Since both the electric/battery truck and automated fixed guideway alternatives are assumed to use highway design criteria, they have greater alignment flexibility, allowing their alignment design to reduce the amount of required right-of-way. The electric/battery truck technology alternative has the fewest right-of-way impacts as the truck only lanes follow the I-710 freight corridor alignment. The automated fixed guideway technology can be designed to fit into the I-710 freight corridor for the majority of its alignment, however,

there would be additional right-of-way impacts due to the guideway segments needed to connect the system between the port terminals and the I-710 freight corridor. The electrified freight rail would have the greatest right-of-way impacts, due to its strict horizontal and vertical geometric constraints that would force it outside the I-710 freight corridor alignment.

Visual Impacts: The extent to which the physical attributes of an alternative technology system (i.e., an elevated guideway) visually impact the surrounding community.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**3**	**2**	**1**

Since the automated fixed-guideway system must be grade-separated from other modes for safety reasons, this alternative will be mostly elevated, resulting in the greatest visual impacts. The freight corridor that the electric/battery trucks will utilize would impose slightly lesser impacts than the automated fixed guideway alternative, since it would only be elevated in some segments and no "guideway" would be need other than in the I-710 freight corridor. The electrified freight rail alternative would have the least visual impacts as it would necessarily be at-grade along a new alignment due to its heavy structural loading requirements.

Construction Impacts: Impacts associated with the amount of construction required to complete an alternative technology system, which can be estimated by comparing the systems capital costs. The more construction required to complete a system, the greater its capital cost and presumably, its construction impacts.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

Due to its strict alignment constraints, the electrified freight rail alternative would be unable to follow the I-710 freight corridor alignment which would likely increase the number of right-of-way impacts. Therefore, the electrified freight rail alternative would have the greatest construction impacts. The automated fixed guideway, which has a higher capital cost than the electric/battery trucks, would have next highest construction impacts due to the required construction of separate elevated guideway connections between the port terminals and the I-710 freight corridor as well as the guideway stations within the port terminals, which the electric/battery trucks would not need. The automated fixed guideway alternative would

further impose construction impacts on the port and rail yard properties that would affect the normal operation of those facilities.

Given that the electric/battery truck alternative technology family not only has the lowest estimated capital cost, but does not impact the port terminals and railyards, or incur additional right-of-way impacts, it would have fewer construction impacts compared to either the electrified freight rail or automated fixed guideway.

Accommodate Growth in Goods Movement

Ability to Serve Varying Geographic Markets (expansion outside the I-710 Corridor): The ability to expand an alternative technology system beyond the I-710 Corridor to serve a future larger regional network, including warehousing, distribution and intermodal facilities elsewhere in the Los Angeles Basin and Inland Empire.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**3**	**1**	**2**

It is assumed that regardless of the alternative technology family chosen environmental clearance would be required.

Although new infrastructure would be required to expand the electric/battery truck alternative beyond the I-710 Corridor, this system has the greatest flexibility due to its ability to utilize existing highway alignments. At a minimum, an electric power distribution system would need to be added to existing freeways. In contrast, the automated fixed guideway would be the least flexible as it would require new right-of-way as well to extend the guideway beyond the I-710 corridor. Compared to the automated fixed guideway the electrified freight rail has a greater ability to expand assuming that it could utilize existing conventional freight rail tracks if these were to be electrified. However, unlike the I-710 freight corridor utilized by the electric/battery trucks, these tracks would not be solely dedicated to use by the electrified freight rail, which reduces its flexibility. Additionally, rail tracks are unable to go as many places as roads do, which further limits the ability of the electrified freight rail to serve varying geographic markets.

Potential for Broader Market Application Beyond the Los Angeles Basin: Measures the scalability of the different alternative technologies by determining their attractiveness to other cities and the potential for system implementation in other markets.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**3**	**1**	**2**

Given that the electric/battery truck alternative offers the greatest system capacity, the lowest operating cost and the greatest flexibility in alignment selection, it has the greatest potential for broader market application. The electrified freight rail alternative has the next greatest potential as existing infrastructure can be utilized; however, electrification can be quite expensive and mostly likely this system would be incompatible with most other Port and railyard operations. The automated fixed guideway has the least potential as there has not yet been a commercial deployment of such a system, and the first such application is likely to be unique. It also requires its own new alignment which could result in the most right-of-way acquisitions

Flexibility in Serving Fluctuating Container Volumes: The ability of an alternative technology to adapt to fluctuating container volumes and distributions by accommodating a greater or lesser amount of cargo if needed.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**3**	**1**	**2**

Of the three alternative technology options, the electric/battery trucks have the greatest flexibility in serving fluctuating container volumes and distributions. For example, to serve increased container volumes the freight corridor may be expanded to include additional dedicated truck lanes, operating hours can be extended beyond 21 hours per day, and vehicle guidance and control systems can be implemented for closer vehicle spacing. Additionally, the electric/battery trucks are more feasible to serve lower volumes by reducing truck trips. Although the electrified freight rail does not have all the same abilities as the electric/battery trucks, it still provides greater flexibility than the automated fixed guideway as it is not limited to the number of cars it can include in a single consist.

Technology Capabilities

Stage of Development of Technology: Depending on the stage or level of development (i.e., in use/testing prototypes/active development/active concepts) certain alternative technologies may be closer to full operational deployment than others.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**3**	**1**

Given that the electrified freight rail alternative is an existing technology used around the world, it is the most developed option presented. In contrast, the automated fixed guideway family, as applied to cargo container transport, is still in the research and development phase. The electric/battery truck alternative, while conceived as a synthesis of existing technologies, is still only a concept that has not been advanced by any developer or supplier. Therefore, when comparing the two, the automated fixed guideway is more mature, in that there exist parties who purport to be on the verge of commercialization, or at least have researched this idea. There is yet no such vendor for the electric/battery truck technology family, although this technology may be closer to implementation as it would utilize a combination of existing technologies.

Design and Implementation

Capability of Phased Implementation: The ability to construct an alternative technology in phases to meet varying future levels of demand and geographic locations.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**3**	**1**	**2**

When comparing the phasing of the electric/battery truck to the other two technologies, the electric/battery trucks perform better since the current generation of battery powered trucks can be deployed, as of today, to transport containers to/from the Ports as far as the Vernon/Commerce intermodal railyards without having to wait for the construction of the freight corridor. Additionally, the construction of the freight corridor as well as its electrification can be accomplished separately in two different phases, just as could be done with the electrified freight rail.

In contrast, the construction of the automated fixed guideway could not be phased, given that this system would run from the Ports to the intermodal railyards without any intermediate stops. This means that before the automated fixed guideway can begin service the entire length of the alignment must be constructed and electrified. As a result, it is the lowest ranking alternative in terms of phasing capabilities.

Design Compatibility with I-710 Freight Corridor Alignment: The extent to which an alternative technology can utilize the alignment of the I-710 freight corridor and minimize additional right-of-way impacts.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

Given that the electric/battery trucks could utilize the proposed I-710 freight corridor truck lanes for travel to and from the Ports, it is the most compatible with the design parameters of Alternative 6 (LPS). In contrast, the electrified freight rail system is the least compatible due to its vertical and horizontal alignment constraints. Although the automated fixed guideway could utilize an alignment similar to the I-710 truck lanes, the design features would be different as the entire system would have to be elevated, making this alternative less compatible than the electric/battery trucks but more compatible than the electrified freight rail.

Interest of Established Suppliers in Development, Deployment and Support: The level of interest by established suppliers to participate in providing an alternative technology for the I-710 Corridor. The higher the level of interest, the greater the probability that a deployable system will be developed.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**3**	**1**

As the only technology alternative for which there is current procurement, construction and operating experience, there are commercial interests capable of developing and building an electrified freight rail system for the I-710 Corridor. Therefore, this alternative is ranked above the others, even though proponents of the automated fixed guideway have shown a great deal of interest. The electric/battery truck alternative is currently ranked the lowest simply because it is a new concept in terms of packaging existing technologies and no commercial interests have yet advanced such a proposal.

Public-Private Partnership Potential: The potential for an alternative technology to be funded through a public-private partnership depends on their capital costs and ability to generate a revenue stream.

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Ranking	**2**	**1**	**3**

The alternative technology with the greatest potential for a public-private partnership is the electric/battery truck family, not only because it offers the lowest capital cost of all three alternatives, but because more tolling or container fees can be collected on the I-710 freight corridor given the system's higher cargo capacity. Therefore, a greater revenue stream can be generated. The automated fixed guideway would have the next highest potential as it has lower capital cost and higher system capacity than the electrified freight rail.

C.4 TECHNOLOGY SCREENING RECOMMENDATIONS

Based on an analysis of the technology screening results, the zero emission electric/battery truck alternative is the preferred alternative zero emission container movement technology given its ranking compared with the other two technology families. This technology would be able to serve the largest share of the projected Port container market, at the lowest capital cost, making it the preferred zero emission container movement system presented. Additionally, it would impose the least environmental impacts compared to the electrified freight rail and automated fixed guideway alternatives.

Overall Ranking

Technology Alternative	Automated Fixed Guideway	Electric/Battery Truck	Electrified Freight Rail
Total Score	**50**	**32**	**50**

Unlike the other alternatives presented, the electric/battery truck alternative would not require special accommodations, such as an extensive network of distribution and collection guideways or overhead catenary wires, to function within the terminals, therefore, this alternative is the most compatible with existing and planned Port and railroad operations. The electric/battery trucks would also enable the greatest flexibility in serving potential growth in goods movement, and would be able to evolve as the technology is advanced and refined. The electrified freight rail and automated fixed guideway, however, are much more restricted given their designs and expansion constraints.

Finally, the ability of an alternative technology to fulfill the Purpose and Need was a key consideration. In particular this screening process focused on the air quality benefits provided by the three alternative technologies as well as their ability to reduce interactions between container trucks and other vehicles. Upon analysis of these measures, it was determined that because of their available capacity and use of separate lanes along I-710 the electric/battery trucks not only provide the highest improvement in air quality but the greatest reduction in interactions between container trucks and autos.

With the highest ranking on just under 3/4 of the technology screening measures, the electric/battery trucks, while still a new concept, are the best proposed zero emission container movement technology for the I-710 freight corridor. As has been done for the automated fixed guideway technology, industry outreach is necessary to assess the market's interest in developing and providing a zero emission truck container transport system. It is expected, however, that potential supporters of this technology will be eager to take advantage of this opportunity, as well as the larger market an initial deployment of it will create.

APPENDIX D: DESCRIPTIONS OF THE REDUCED SET OF ALTERNATIVES

D. DESCRIPTION OF THE REDUCED SET OF ALTERNATIVES

D.1 ALTERNATIVE 1 (NO BUILD) DESCRIPTION:

Alternative 1: No Build

I-710 Study Area Freeway System	
Project	Description
I-710	Project Limits: At Firestone Blvd. • Modify the southbound on-ramp
I-5	Project Limits: Orange County Line to I-605 • 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
I-10	Project Limits: Baldwin Ave. to I-605 • 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.[a] • 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[a] • 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 • 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

[a] 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.

Alternative 1: No Build, Continued

I-710 Study Area Freeway System, Continued	
Project	**Description**
I-110	Project Limits: At John S. Gibson Blvd. interchange • 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.[a] • 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./223rd St. • 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. • 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)
I-710 Study Area Roadway System	
Project	**Description**
Ocean Boulevard/Gerald Desmond Bridge	Project Limits: Gerald Desmond Bridge over entrance channel • 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. • 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 • 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 • Widen existing roadway from 4 to 6 lanes
Del Amo Boulevard	Project Limits: At I-405 • Construct new 6 lane overcrossing

Alternative 1: No Build, Continued

I-710 Study Area Roadway System, Continued	
Project	**Description**
Sepulveda Boulevard	Project Limits: Alameda St. to Eastern City Limits of Carson • Add 1 lane in each direction (widen from 2 to 4 lanes)
Firestone Boulevard	Project Limits: Firestone Blvd. Bridge over the Los Angeles River • 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 (just west of Indiana St.) to I-5 Fwy at Telegraph Rd. • 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 7th 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 1st St. to Lorena St., then 3rd St. via 3rd St./Beverly Blvd. to Atlantic Blvd. (Metro)
Blue Line Light Rail Transit	• 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
HOT Lane Bus Service	• Implement new bus services to expand transit for I-10 and I-110 High Occupancy Toll (HOT) lanes[a]
I-710 Study Area Goods Movement	
Project	**Description**
Clean Trucks Program	• As of 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

Alternative 1: No Build, Continued

I-710 Study Area Goods Movement, Continued	
Project	**Description**
Truck Impacted Intersections	Phase I: Improve 14 intersections by installing new video detection cameras, restriping, and improving traffic signals
	Phase II: Improve 20 additional intersections by installing new video detection cameras, restriping, and improving traffic signals
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, Continued	• On-Dock Rail - San Pedro Bay Ports Rail Study Update (2008) on-dock rail improvements: – 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: – 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. • Intermodal Freight Rail Facilities: – 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 • Install facilities for traffic monitoring system and closed circuit TV system

Alternative 1: No Build, Continued

I-710 Study Area Traffic Systems and Operations, Continued	
Project	**Description**
Advanced Traffic Management Information System (ATMIS)	Project Limits: Ports of Long Beach and Los Angeles • 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. • 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./2nd St. • 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. • 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. • 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 • 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 • Implement a real-time traffic signal synchronization system to effectively managed high traffic volumes and reduce traffic congestion at 70 signalized intersections
Harbor-Gateway Automated Traffic Surveillance and Control System/ Adaptive Traffic Control System (ATSAC/ATCS) Project	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 • Implement a real-time traffic signal synchronization system to effectively manage high traffic volumes and reduce traffic congestion at 109 signalized intersections

Alternative 1: No Build, Continued

I-710 Study Area Traffic Systems and Operations, Continued	
Project	Description
Gateway Cities Forum Traffic Signal Corridor Projects	Phase II: Project Limits: On Pacific Boulevard/Long Beach Boulevard between Florence Ave. and Willow St. • Provide time-based traffic signal synchronization and upgrades to improve the overall progression of traffic along and crossing these routes
	Phase III: Project Limits: On Artesia Boulevard between Alameda Blvd. and Valley View Ave.; on Central Avenue between El Segundo Blvd. to Victoria St.; on Gage Avenue between Central Ave. to Slauson Ave.; on Whittier Boulevard between Paramount Blvd. to Valley Home Ave.; on Wilmington Avenue between Imperial Highway to Sepulveda Blvd. • Provide time-based traffic signal synchronization and upgrades to improve the overall progression of traffic along and crossing these routes Project Limits: I-105 Corridor ITS Project, Phase 3 (arterials within the Corridor include Firestone Blvd., Imperial Highway and Rosecrans Ave.) • Implement a traffic signal management and control system which allows jurisdictions to respond more efficiently to traffic congestion
	Phase IV: Project Limits: On 38th Street/37th Street/Bandini Boulevard between Alameda St. and Garfield Ave.; on Garfield Avenue between Olympic Blvd. and Eastern Ave.; on Studebaker Road between Florence Ave. to Del Amo Blvd. • Provide time-based traffic signal synchronization and ITS improvements to enhance intersection operations, increase traffic mobility and relieve existing traffic congestion on surface arterials
	Phase V: Project Limits: On Alameda Street between Nadeau St. to Auto Drive South; on Florence Avenue/Mills Avenue from Central Ave. to Scout Ave.; on South Street between Atlantic Ave. to Carmenita Rd.; on Washington Boulevard between Atlantic Blvd. and Whittier Blvd. • Provide time-based traffic signal synchronization and ITS improvements to enhance intersection operations, increase traffic mobility and relieve existing traffic congestion on surface arterials

D.2 ALTERNATIVE 5A (WIDEN TO TEN GENERAL PURPOSE LANES) DESCRIPTION:

Alternative 5A: Ten General Purpose Lane Facility

I-710 Study Area Freeway System	
Project	**Description**
	Includes all freeway system projects from Alternative 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)[b]
	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: • 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
I-710 Study Area Roadway System	
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 • 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 • 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.: • 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.: • Parking restrictions during peak periods to increase capacity by one lane in each direction
I-710 Arterial Intersections	Congestion Relief Projects: Improvements to approximately 42 intersections within the study area which includes signal phasing/timing upgrades and intersection capacity improvements (e.g. added turn lanes). This list of proposed intersection improvements will be refined pending the results of the detailed traffic forecasts to be completed after alternatives screening

[b] The number of GP lanes will be evaluated and modified, if necessary, for each segment of I-710 within the project limits based upon refined traffic forecasting.

Alternative 5A: Ten General Purpose Lane Facility, Continued

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)
I-710 Study Area Traffic Systems and Operations	
Project	Description
	Includes all traffic systems and operations projects from Alternative 1 (No Build)
Intelligent Transportation Systems (ITS)	Project Limits: I-710 study area • Expanded ITS to include entire study area • Upgraded 2070 controllers, Closed Circuit TV (CCTV), system detection • Updated communications on arterial streets and Transportation Management Systems (TMS), CCTV, Congestion Management Systems, and fiber optic Communications on the freeway mainline • Traffic Management Center upgrades and inter-ties necessary to control and monitor the system

D.3 ALTERNATIVE 6A (WIDEN TO TEN GENERAL PURPOSE LANES + FOUR FREIGHT MOVEMENT LANES) DESCRIPTION:

Alternative 6A: Ten GP Lanes + Four Freight Movement Lanes

I-710 Study Area Freeway System	
Project	Description
	Includes all freeway system projects from Alternative 1 (No Build)
I-710	Freight Movement Corridor: • At-grade and/or elevated truck-only lanes (2 per direction) between Ocean Blvd. and the intermodal rail-yards in Vernon and Commerce • Serves conventionally-powered (diesel) trucks • Provides direct access to/from the UP and BNSF rail yards in Vernon/Commerce
	Dedicated ingress/egress points for trucks at selected locations: • 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 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)[b]
	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: • 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

[b] The number of GP lanes will be evaluated and modified, if necessary, for each segment of I-710 within the project limits based upon refined traffic forecasting.

Alternative 6A: Ten GP Lanes + Four Freight Movement Lanes, Continued

I-710 Study Area Roadway System	
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 • 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 • 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.: • 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.: • Parking restrictions during peak periods to increase capacity by one lane in each direction
I-710 Arterial Intersections	Congestion Relief Projects: Improvements to approximately 42 intersections within the study area which includes signal phasing/timing upgrades and intersection capacity improvements (e.g. added turn lanes). This list of proposed intersection improvements will be refined pending the results of the detailed traffic forecasts to be conducted 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)

Alternative 6A: Ten GP Lanes + Four Freight Movement Lanes, Continued

I-710 Study Area Traffic Systems and Operations	
Project	Description
	Includes all traffic systems and operations projects from Alternatives 1 (No Build)
Intelligent Transportation Systems (ITS)	Project Limits: I-710 study area • Expanded ITS to include entire study area • Upgraded 2070 controllers, Closed Circuit TV, system detection • Updated communications on arterial streets and Transportation Management Systems, Closed Circuit TV, Congestion Management Systems and fiber optic Communications on the freeway mainline • Traffic Management Center upgrades and interties necessary to control and monitor the system

D.4 ALTERNATIVE 6B (WIDEN TO TEN GENERAL PURPOSE LANES + FOUR FREIGHT MOVEMENT LANES [ZERO EMISSION TRUCKS]) DESCRIPTION:

Alternative 6B: Ten GP Lanes + Four Freight Movement Lanes (Zero Emission Trucks)

I-710 Study Area Freeway System	
Project	Description
	Includes all freeway system projects from Alternative 1 (No Build)
I-710	Freight Movement Corridor: • At-grade and/or elevated, zero emissions, truck-only lanes (2 per direction) between Ocean Blvd. and the intermodal rail-yards in Vernon and Commerce • Acts as electrified freight corridor to serve electric/battery powered trucks • Provides direct access to/from the UP and BNSF rail yards in Vernon/Commerce
	Dedicated ingress/egress points for trucks at selected locations: • 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)[b]
	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: • 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

[b] The number of GP lanes will be evaluated and modified, if necessary, for each segment of I-710 within the project limits based upon refined traffic forecasting.

Alternative 6B: Ten GP Lanes + Four Freight Movement Lanes (Zero Emission Trucks), Continued

I-710 Study Area Roadway System	
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 • 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 • 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.: • 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.: • Parking restrictions during peak periods to increase capacity by one lane in each direction
I-710 Arterial Intersections	Congestion Relief Projects: Improvements to approximately 42 intersections within the study area which includes signal phasing/timing upgrades and intersection capacity improvements (e.g. added turn lanes). This list of proposed intersection improvements will be refined pending the results of the detailed traffic forecasts to be conducted 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)

Alternative 6B: Ten GP Lanes + Four Freight Movement Lanes (Zero Emission Trucks), Continued

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 • Electric/battery powered trucks operating on I-710 freight movement lanes
I-710 Study Area Traffic Systems and Operations	
Project	Description
	Includes all traffic systems and operations projects from Alternative 1 (No Build)
Intelligent Transportation Systems (ITS)	Project Limits: I-710 study area • Expanded ITS to include entire study area • Upgraded 2070 controllers, Closed Circuit TV, system detection • Updated communications on arterial streets and Transportation Management Systems, Closed Circuit TV, Congestion Management Systems and fiber optic Communications on the freeway mainline • Traffic Management Center upgrades and inter-ties necessary to control and monitor the system

DATE: PROJECT NAME: **I-710 EIR/EIS Corridor Project** REVIEWER:

PROJECT EA # 249900 (Subjob : 3OVST) TECHNICAL DISCIPLINE:

PROJ SUBMITTAL: Draft Alternatives Screening Analysis Report 165.05.15

CODES : A - Accept/will comply, B - Basic input req'd from others, C - Clarify/discuss, D - Different submittal applies, N - Comment not applicable

No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Code	Response/Actions	Initial (a)	Initial (b)
1		Chaves	1	Update the description of alternative 3 and the recommendations per the TACs modifications	A	Revised text to reflect the TAC's modifications.	CD	
2	21- 22	Chaves	2	Somewhere in Section 3.2.5 we should add a qualifier explaining that the design is still being refined and that the number of impacted properties is therefore preliminary and subject to change.	A	Added statement at the end of the first paragraph in Section 3.2.5 which reads, "The number of right-of-way impacts determined in this analysis is, however, only preliminary and subject to change given that the I-710 freeway and freight corridor designs are still being refined at this time."	CD	
3	24	Chaves	3	First paragraph, insert "City of Los Angeles" before DWP.	A	Revised text.	CD	
4	29	Chaves	4	First sentence in Section 4.2 has a reference to the "advisory committees". I believe this is the first reference to these committees in the document. We should probably clarify that these are the TAC and CAC.	A	Added text to the first sentence to clarify, "...advisory committees, which include the I-710 Technical Advisory Committee (TAC) and I-710 Corridor Advisory Committee (CAC),…"	CD	
5	30	Chaves	5	The heading for Alt. 2 has an asterisk but no footnote.		Removed asterisk.	CD	
6	C-2	Chaves	6	First sentence in Section C-1: …the concept of ~~an~~ zero ~~study area~~ emission alternative technology…	A	Revised text.	CD	
7	5	J. Wood	1	Include in the description of Alternative 2 that it includes ITS.	A	Revised text to include ITS components.	CD	

Please give reasons if comments are not incorporated or no action is taken. Use additional sheet as necessary.

(a) Responder's initials. Responder's name

(b) Reviewer's initials. The Reviewer concurred with the Response/Actions.

DATE: PROJECT NAME: **I-710 EIR/EIS Corridor Project** REVIEWER:

PROJECT EA # 249900 (Subjob : 3OVST) TECHNICAL DISCIPLINE:

PROJ SUBMITTAL: Draft Alternatives Screening Analysis Report 165.05.15

CODES : A - Accept/will comply, B - Basic input req'd from others, C - Clarify/discuss, D - Different submittal applies, N - Comment not applicable

No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Code	Response/Actions	Initial (a)	Initial (b)
8	29	J. Wood	2	Section 4.2 - When the report is finalized, recommend that the descriptions match the recommendations coming out of the TAC for the alternatives that are recommended, need to be consistent.	A	See response to comment 1.	CD	
9	30	J. Wood	3	Include in the descriptions and discussion for Alternative 2 on this page that it includes ITS.	A	See response to comment 7	CD	
10	34	J. Wood	4	Recommend that the descriptions for Alternatives 5A, 6A and 6B match the TAC recommendations for these alternatives with the additional detail included with those TAC recommendations.	A	Replaced Section 4.3 with the final adopted TAC recommendation.	CD	
11	D-2	J. Wood	5	I believe Metro had previously commented that the list of “no-build” projects was out of date. Has the list that starts on page D-2 been updated and, if it has not, it needs to be in order to feed the correct information into the traffic model.		The list in Appendix D has been updated to reflect the changes made in the I-710 Baseline Alternatives Analysis Report which incorporates all comments received on the No Build Alternative.	CD	
12	13	Balanza	1	The discussion under Screening Analysis mentions the reason for choosing the PM peak period. Similarly, it should also state why the NB direction was selected over the SB direction to represent the screenline findings.	A	Added sentence to the end of the second paragraph on page 10 which states, "Additionally, the northbound direction was chosen given that it has the highest traffic volumes during the P.M. Peak Period".	CD	
13		Balanza	2	Appendix D: Shouldn't the addition of Slauson Ave. interchange be included in the list of improvements for the freeway system under Alternatives 5A, 6A and 6B?	A	The construction of Slauson Ave. interchange has been included in all three alternatives.	CD	

Please give reasons if comments are not incorporated or no action is taken. Use additional sheet as necessary.

(a) Responder’s initials. Responder’s name

(b) Reviewer’s initials. The Reviewer concurred with the Response/Actions.

DATE: PROJECT NAME: **I-710 EIR/EIS Corridor Project** REVIEWER:

PROJECT EA # 249900 (Subjob : 3OVST) TECHNICAL DISCIPLINE:

PROJ SUBMITTAL: Draft Alternatives Screening Analysis Report 165.05.15

CODES : A - Accept/will comply, B - Basic input req'd from others, C - Clarify/discuss, D - Different submittal applies, N - Comment not applicable

No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Code	Response/Actions	Initial (a)	Initial (b)
14		Balanza	3	Request a copy of calculation worksheets for all Screenline V/C ratio analyses to validate V/C ratio outputs.		Worksheet to be sent.	CD	
15	5 to 6	Rahmat. Khargheh poush	1	If there have been analyses and evaluations for enhancing transit access and rail alternatives for passengers and freight please describe and include them as a rail and transit on the Alternatives Definition.	N	The purpose of this initial alternatives screening analysis was to provide comparative information on the relative benefits, costs, and impacts of each alternative at a relatively high level of analysis, as appropriate for screening a larger number of alternatives. The I-710 Baseline Alternative Analysis Report, I-710 Railroad Goods Movement Study and I-710 Multimodal Review Report describe the current and future assumptions and analyses for transit and rail enhancements.	CD	
16	7	Rahmat. Khargheh poush	2	The discussed environmental impact measures should be expended and complied with the guidance elements that are requested by environmental agencies which some of them are addressed by USEPA on AQ/HRA review comments.	N	The purpose of this initial alternatives screening analysis was to provide enough "sketch planning level" analysis to compare the benefits, costs and impacts of a relatively large number of initial alternatives. The reduced set of alternatives that are recommended from this screening step will be analyzed in much more detail in the DEIR/DEIS.	CD	

Please give reasons if comments are not incorporated or no action is taken. Use additional sheet as necessary.

(a) Responder's initials. Responder's name

(b) Reviewer's initials. The Reviewer concurred with the Response/Actions.

DATE: PROJECT NAME: **I-710 EIR/EIS Corridor Project** REVIEWER:

PROJECT EA # 249900 (Subjob : 3OVST) TECHNICAL DISCIPLINE:

PROJ SUBMITTAL: Draft Alternatives Screening Analysis Report 165.05.15

CODES : A - Accept/will comply, B - Basic input req'd from others, C - Clarify/discuss, D - Different submittal applies, N - Comment not applicable

No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Code	Response/Actions	Initial (a)	Initial (b)
17	8	Rahmat. Khargheh poush	3	Mobility Measures:Please identify how the Freight Studies and also Freight and Passenger Rail Studies are considered as part of the technical memorandum alternative screening.	N	See response to comment 15.	CD	
18	19	Rahmat. Khargheh poush	4	The screeing alternatives should contain a comperhensive traffic saftey studies and analyses.	N	See response to comment 16.	CD	
19	14	Rahmat. Khargheh poush	5	3.2.2 Air Quality Measures: it is mentioned that (The screening analysis did not include information on any arterials, other non-freeway roadways, or east-west freeways.) I am just wondering if the Air Quality Measures are conducted based on the Resouces Area Study (air quality basin) stablished by California Air Resources Board. I alsoI uderstand that EPA required to comply with cumulitive impacts and is included in chapter 1-CEQ underr the NEPA (1997) see the USPEA comments dated Feb. 25, 2009. Please categorize and identify the steps for assessing the cumulative impacts.	N	See response to comment 16.	CD	
20	17	Rahmat. Khargheh poush	6	Please categoraize and disclose the appropriate Air Quality mitigation measures.	N	See response to comment 16.	CD	

Please give reasons if comments are not incorporated or no action is taken. Use additional sheet as necessary.

(a) Responder's initials. Responder's name

(b) Reviewer's initials. The Reviewer concurred with the Response/Actions.

DATE: PROJECT NAME: **I-710 EIR/EIS Corridor Project** REVIEWER:

PROJECT EA # 249900 (Subjob : 3OVST) TECHNICAL DISCIPLINE:

PROJ SUBMITTAL: Draft Alternatives Screening Analysis Report 165.05.15

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21	23	Rahmat. Khargheh poush	7	is there any land use & Economy report considered for this project. Many subjects related to this issues should be discussed for each alternative such as permanent effects of the land use on the porject area, number of possible population relocations, how economy would be effectd by each alternative, what are the construction effects, what should be done to avoid relocating businesses and residences or how it should be mitigated.	N	See response to comment 16.	CD	
22	30-31	Rahmat. Khargheh poush	8	What type of specification is considered for the electric/battery (zero emissions) truck advanced technology does the available specification such as payloads, gross weight or top expected speed comply with the required fright and traffic analyses requirements.	N	Thank you for your comment. It will be taken into consideration during the detailed alternative technology analysis to be accomplished as part of the analysis of the Reduced Set of Alternatives in the current DEIR/DEIS phase of the project.	CD	

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23	39	Rahmat. Khargheh poush	9	Traffic safety: analyses should include and not limited to the folowing subjects: 1- Highway Features Inventory: curves, grades, intersections, etc. 2-Identify potential geometry problems 3- Focus on locations/areas that are safety concerns 4- Identified high-accident locations 5- Locations which are selected for further examination based on number of accidents, accident types, severity, truck involvement, public input 6-advance studies on high-accident locations	N	Thank you for your comment. It will be taken into consideration during the subsequent detailed analyses in the DEIR/DEIS phase of the project.	CD	
24	7	BM	1	Outline headers in Section 3.1 are inconsistent with section headings thorughout		For purposes of presenting the screening results, the outline below and Section 3.2 have been organized slightly different from the screening matrix and established goals in Section 1.5.	CD	
25	21-22	BM	2	What other utilities would be impacted by the I-710 Corridor Project other than power transmission? Oil pipelines, Natural Gas Pipelines, Cable, Fiber optics and/or Phone lines?	D	These utilities and others will be identified in the Utility Impact Report.	CD	
26	21 - 22	BM	3	What are the cost, impacts associated with utilities relocation (Gas, power, oil pipeline) and the various alternatives?	D	Cost estimates will be prepared and included in the Draft Project Report to be developed during the more detailed preliminary engineering and DEIR/DEIS phase of the project.	CD	

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DATE: PROJECT NAME: **I-710 EIR/EIS Corridor Project** REVIEWER:

PROJECT EA # 249900 (Subjob : 3OVST) TECHNICAL DISCIPLINE:

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27	15	AM	1	Once the alternative technology that would be included in alternative 3 is decided upon, it may be prudent to clarify whether the technology is zero emissions or zero local emissions.		Thank you for the comment. This will be addressed in the DEIR/DEIS analysis.	CD	
28	20	AM	2	Please edit to read: "…within the project limits of the I-710 corridor that **do not meet current** federal and state design standards."	A	Revised text.	CD	
29	30	AM	3	It may be a NEPA requirement that a standalone TSM/TDM alternative is analyzed in the environmental document, per CT annotated outline.		Caltrans senior environmental staff have concurred with the Reduced Set of Alternatives which incorporates TSM/TDM into the three build alternatives.	CD	
30	34	AM	4	It is my understanding that Caltrans must design our facilities with the horizon year in mind and not further out than that. Is it possible that we can receive approval for a facility that will accommodate future conversion for use of the alternative technology, even if that implementation may be further out than the horizon year for the project?		This question will be addressed during the subsequent DEIR/DEIS phase of the project.	CD	

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