PORT OF LOS ANGELES BASELINE TRANSPORTATION STUDY

Submitted to:

PORT OF LOS ANGELES

Submitted by:

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TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF TABLES

1. INTRODUCTION

Purpose of POLA Baseline Transportation Study

The existing transportation system within and adjacent to the Port of Los Angeles (POLA) is constrained under present conditions. Expected increases in cargo throughput in the next five to twenty years will generate a considerable amount of rail and vehicular traffic to the transportation system. To address existing and future deficiencies, a Baseline Transportation Study has been conducted and is described in this report. It includes analysis of existing and future vehicular traffic demand; transportation system deficiencies, and necessary improvements. Both transportation planning and traffic engineering analyses have been conducted as part of this study. The study included analyses within and immediately adjacent to the Port. Regional transportation system analyses have also been performed on the freeway system. early

This report describes the methodology, findings and recommendations of the POLA Baseline Transportation Study. The purposes for undertaking the Transportation Study include:

- Determine the growth in truck traffic that is projected to occur as a result of the forecast growth in cargo moving through the Port
- Develop transportation planning tools to address the technical challenges associated with Port growth
- Identify existing and future transportation system deficiencies in and around the Port
- Recommend physical and operational strategies to mitigate future system deficiencies

Scope of Work/Tasks

The POLA Baseline Transportation Study project included the following tasks:

- <u>Existing Conditions</u> – Assess current truck and auto traffic volumes at key intersections in and around the port for the base year of 2001

- <u>Trip Generation Forecasts</u> - Forecast container terminal truck trips by type (bobtail, chassis, container loads, empties) as well as container terminal auto trips and non-container terminal auto and truck trips, resulting from port growth.

- <u>Transportation System Operating Conditions</u> – This included the analysis of existing and future (Years 2010 and 2025) transportation system operating conditions for key intersections in and around the Port.

- <u>Port Focus Area Travel Demand Model</u> – This included the development of a comprehensive, detailed and fully dynamic computer-based travel demand modeling tool for use in assessing future travel patterns and projecting future deficiencies.

- <u>Deficiency Analysis</u> - Future transportation system deficiencies were identified in and around the Port.

- <u>Port of Los Angeles Improvement Recomm.</u> – This included recommended physical transportation system improvements and Intelligent Transportation Systems (ITS) improvements in the Port of Los Angeles.

- <u>Regional Analysis</u> – This included the identification of port truck traffic and deficiencies on the key regional access routes to the Port.

The Port Community Advisory Committee (PCAC) Traffic Subcommittee reviewed the progress of the POLA Baseline Transportation Study project. Regular meetings were held throughout the project to discuss progress and to make decisions regarding analytical procedures.

Organization of the Report

The POLA Baseline Transportation Study report contains sections which describe the technical methodology, findings and conclusions regarding trip generation, trip distribution, existing transportation system operating conditions, travel demand model development and 2010 and 2025 truck and auto forecasts. It also includes 2010 and 2025 deficiency forecasts, as well as the transportation improvement and concept mitigation program recommendations.

2. EXISTING TRANSPORTATION SYSTEM OPERATING CONDITIONS

Description of Study Area

The POLA Baseline Transportation Study area includes the Port of Los Angeles plus the roadway system surrounding the port. In addition, the regional analysis extends beyond the port area to include key freeway facilities that carry port traffic. A total of 92 key intersections have been analyzed within the study area. Exhibit 1 illustrates the study area and the location of the 92 study intersections.

Key roadways which serve port traffic are described below. It should be noted that I-710 and I-110 are part of the Eisenhower Interstate System of the National Highway System (NHS), while Seaside Avenue/Ocean Boulevard, Alameda Street, Harry Bridges Boulevard and SR-47/103 are classified as "other NHS routes." The portion of Sepulveda Boulevard from SR-103 to Alameda Street is classified as an approved intermodal connector on the NHS system.

Long Beach Freeway (I-710) and Harbor Freeway (I-110). The Long Beach Freeway (I-710) and the Harbor Freeway (I-110) both provide regional access to the Ports of Long Beach and Los Angeles. Both freeways are north-south highways that extend from the port area to downtown Los Angeles. They each have six lanes in the vicinity of the harbor and widen to eight lanes to the north.

Both provide regional freeway connections to the following freeways: San Diego Freeway (I-405), Riverside Freeway (SR-91), Century Freeway (I-105), the Santa Monica Freeway (I-10) and the Santa Ana Freeway (I-5).

Seaside Avenue/Ocean Boulevard. - Seaside Avenue/Ocean Boulevard runs east-west from downtown Long Beach, over the Gerald Desmond Bridge and connects to the terminus of the Terminal Island Freeway (SR 47/SR 103). Ocean Boulevard is designated State Route 710 between I-710 and SR 47. Ocean Boulevard/Seaside Avenue is designated State Route 47 between I-110 and the Terminal Island Freeway. Ocean Boulevard is constructed with six travel lanes and left-turn lanes at intersections. At the east city boundary, Seaside Avenue is renamed Ocean Boulevard in Long Beach and continues to the east to the Gerald Desmond Bridge.

Terminal Island Freeway (SR 47/SR 103) – The Terminal Island Freeway runs north-south, and connects Terminal Island with Wilmington, Carson and western Long Beach. It also provides direct access to the Intermodal Container Transfer Facility located north of Sepulveda Boulevard in the City of Carson. This freeway connector is constructed with six travel lanes between Ocean Boulevard and the Commodore Schyler F. Heim draw bridge. The Terminal Island Freeway is

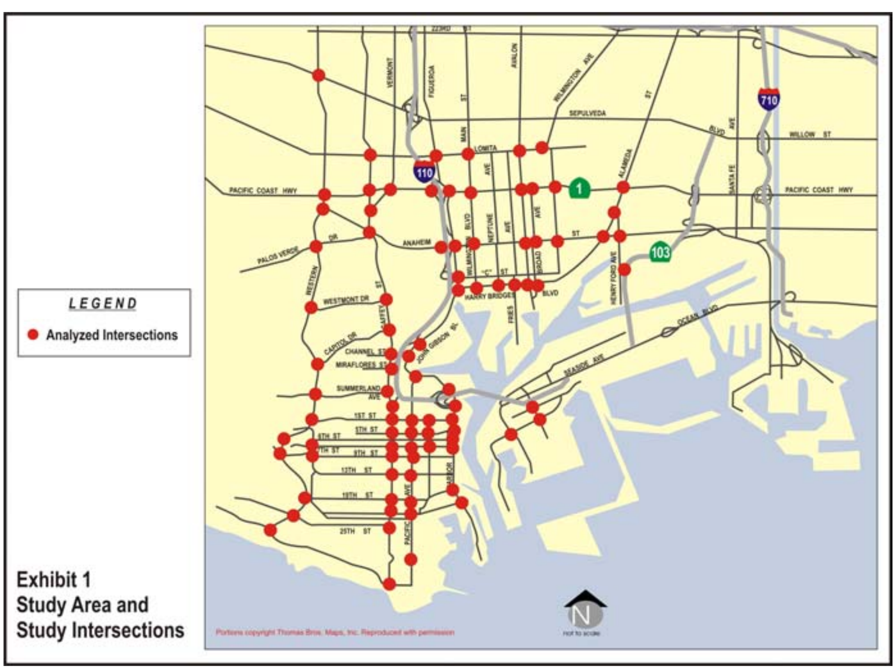


Exhibit 1
Study Area and Study Intersections

designated State Route 47 between Ocean Boulevard and the Henry Ford Avenue ramps. North of the Henry Ford Avenue ramps, it is designated State Route 103.

Navy Way – Navy Way runs north-south, has two lanes in each direction, and connects with Seaside Avenue and Terminal Way. It provides access to piers 300 and 400.

New Dock Street - New Dock Street runs east-west between the YTI terminal and the Terminal Island Freeway (southbound off and northbound on-ramps to SR-47 are provided), and it has two lanes in each direction.

Henry Ford Avenue – On Terminal Island, Henry Ford Avenue connects New Dock Street with Ocean Boulevard and has two lanes in each direction. North of Terminal Island, Henry Ford Avenue connects the Terminal Island Freeway with Alameda Street. This segment of Henry Ford Avenue was widened to provide three lanes in each direction.

Alameda Street – Alameda Street is a north-south street that runs parallel to the Union Pacific railroad tracks connecting the Port of Los Angeles to Downtown Los Angeles and several rail yards. Alameda Street has roadway width to provide three lanes in each direction between Henry Ford Avenue and SR-91, although it is striped for two lanes each way over most of its length. Alameda Street turns into Harry Bridges Boulevard near the Union Pacific Railroad tracks in Wilmington. Most intersections along Alameda Street are now grade separated however the PCH grade Separation project is underway.

Harry Bridges Boulevard – Harry Bridges Boulevard is a four-lane, east-west street on the southern edge of Wilmington. It is a designated truck route providing key access from the Port of Los Angeles West Basin terminals to I-110, Alameda Street and the various rail yards along Alameda Street. Currently, Harry Bridges Boulevard becomes John S. Gibson Boulevard to the west at Figueroa Street, and turns into Alameda Street to the east at the Union Pacific Railroad crossing. In the future, Harry Bridges Boulevard is planned to be realigned to the north to provide direct access to the Harbor Freeway at the C Street ramps.

John S. Gibson Boulevard – John S Gibson Boulevard is a four lane, north-south street that runs on the western edge of the Port of Los Angeles. John S. Gibson Boulevard becomes Pacific Avenue to the south at Channel Street, and turns into Harry S Bridges Boulevard to the north at Figueroa Street. In the future, John S. Gibson Boulevard is planned to be realigned as part of the Harry S. Bridges Boulevard realignment project.

Sepulveda Boulevard/Willow Street – Sepulveda Boulevard is an east-west street with four lanes. It provides direct access to the Intermodal Container Transfer Facility (ICTF), and links ICTF to the Harbor Freeway, Alameda Street, and the Terminal Island Freeway. Sepulveda Boulevard becomes Willow Street at the Terminal Island Freeway. Willow Street is a four lane east-west street in Long Beach. Trucks are not permitted on Willow Street between the Terminal Island Freeway and the Long Beach Freeway. Sepulveda Boulevard/Willow Street has interchanges with the Terminal Island Freeway, the Long Beach Freeway, and also the Harbor Freeway.

Pacific Coast Highway – Pacific Coast Highway (Route 1) is a four-lane, east-west street through Wilmington and Long Beach. Pacific Coast Highway has interchanges with the Terminal Island Freeway, the Long Beach Freeway, and the Harbor Freeway.

Anaheim Street – Anaheim Street is a four-lane, east-west street through Wilmington and Long Beach. Anaheim Street has interchanges with the Long Beach Freeway and the Harbor Freeway. It is designated as a no-truck route in Wilmington.

Terminal Way – Terminal Way is a four-to six-lane, generally east-west street providing, access to Pier 300 and the US Coast Guard Base. It turns into Ferry Street on its west end, and Navy Way on its east end, at Reeves Avenue.

Ferry Street – Ferry Street is a four-lane, north-south street providing direct access to the Vincent Thomas Bridge and Seaside Boulevard.

Figueroa Street – Figueroa Street is a four-lane, north-south street paralleling the Harbor Freeway from the Port of Los Angeles into Downtown Los Angeles. It is a designated truck route within the City of Los Angeles. Currently, Figueroa Street terminates at the Trans Pacific Container Terminal (TRAPAC).

Front Street/Harbor Boulevard/Miner Street – Front Street is a four-lane, east-west street from Pacific Avenue to the Vincent Thomas Bridge Ramps. At the ramps, Front Street becomes Harbor Boulevard. Harbor Boulevard is a north-south four-lane street that runs along the west side of the Port of Los Angeles. It provides access to the Catalina Terminal, the World Cruise Center and Ports 'O Call further south. Harbor Boulevard becomes Miner Street at Crescent Avenue. Miner Street is a two-to four-lane street running north-south. Miner Street provides access to the southwestern portion of the Port.

Overview of Analysis Methodology

The traffic analysis is based upon traffic counts conducted in July and August 2002. Since the study is based on 2001 conditions, the counts have been adjusted to reflect 2001 traffic flow. The morning peak (8 to 9 A.M.), Mid-Day peak (2 to 3 P.M.), and afternoon peak (4 to 5 P.M.) hours have been assessed. A description of the analysis methodology, findings and conclusions is provided below.

Existing (2001) Intersection Conditions Analysis

The existing intersection conditions analysis for signalized locations was conducted using the Critical Movement Analysis (CMA) methodology. Unsignalized intersections were analyzed using methodologies contained in the "Highway Capacity Manual (HCM), Special Report 209", Third Edition (Transportation Research Board, 1997). Basic input data for the intersection existing conditions analysis include: number of lanes by type, signal control or stop sign control, and peak hour traffic volumes (auto and truck). A series of exhibits in the appendix illustrate existing AM, Mid-Day and PM peak traffic volumes (total auto and truck).

Level of Service (LOS) is a qualitative indication of an intersection's operating conditions as represented by traffic congestion, delay, and volume to capacity (V/C) ratio. For signalized intersections, it is measured from LOS A (excellent conditions with little or no delay conditions) to LOS F (extreme congestion and intersection failure), with LOS D (V/C of 0.90) typically considered to be the threshold of acceptability. The relationship between V/C ratio and LOS for signalized intersections is as follows:

Level of Service Criteria for Signalized Intersections

V/C Ratio	LOS	Traffic Conditions
0 to 0.60	A	Little or no delay/congestion
0.61 to 0.70	B	Slight congestion/delay
0.71 to 0.80	C	Moderate delay/congestion
0.81 to 0.90	D	Significant delay/congestion
0.91 to 1.00	E	Extreme congestion/delay
1.01 +	F	Intersection failure/gridlock

Stop-controlled intersections were analyzed using methodologies contained in the Highway Capacity Manual in which level of service is based on average vehicular delay. The relationship between delay and level of service is as follows, for stop-controlled intersections (two-way and multi-way stops):

Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Delay (sec/vehicle)
A	$\leq$10
B	>10and $\leq$15
C	>15and $\leq$25
D	>25and $\leq$35
E	>35and $\leq$50
F	>50

The following special assumptions and methodology have been used to conduct the existing intersection analysis:

- Passenger Car Equivalent (PCE) factors for intersection operations have been assumed using previously applied factors used in Port studies of 2.0 for container trucks, 2.0 for chassis and 1.1 for bobtails. These PCE factors account for the greater capacity used by trucks and their slower acceleration rates. Thus, container trucks are counted as the equivalent of two automobiles in the analysis, and bobtails as the equivalent of 1.1 autos. For the Vincent Thomas Bridge analysis, higher PCE factors are applied to account for the grade of the bridge structure which slows trucks. This is explained separately.

- Table 1 summarizes the LOS results. The results indicate that 14 intersections currently operate at LOS E or F (considered deficient), while the rest operate at LOS D or better, the majority of the LOS E/F locations are along Gaffey Street, Western Avenue, Pacific Coast Highway, Figueroa Street or at freeway on/off ramps, including Harbor Blvd/Swinford Street/I-110/SR-47

.

Table 1
Existing Intersection Level-of-Service Summary

	Intersection	AM Peak Hour		PM Peak Hour	
		LOS	V/C or Delay	LOS	V/C or Delay
1	Western Ave & 9th St	A	0.444	A	0.582
2	Western Ave & 25th St	A	0.406	A	0.463
3	Gaffey Str & 9th St	B	0.633	C	0.752
4	Gaffey St & 25th St	A	0.513	A	0.542
5	Gaffey St & Channel St	B	0.645	E	0.975
6	John Gibson Blvd & Channel St	A	0.586	B	0.678
7	Western Ave & Sepulveda Blvd	E	0.996	F	1.260
8	Western Ave & Pacific Coast Highway	F	1.039	F	1.431
9	Western Ave & Anaheim St	A	0.563	C	0.774
10	Western Ave & Palos Verdes Dr	D	0.828	F	1.417
11	Normandie Ave & Lomita Blvd	C	0.727	D	0.872
12	Normandie Ave & Pacific Coast Highway	B	0.645	B	0.680
13	Normandie Ave & Vermont Ave	E	44.1	F	93.1
14	Figueroa St & Lomita Blvd	A	0.472	B	0.614
15	Figueroa St & Pacific Coast Highway	F	1.018	E	0.974
16	Figueroa St & Anaheim St	F	1.015	D	0.834
17	Figueroa St & Harry Bridges Blvd	A	0.397	A	0.472
18	Avalon Ave & Lomita Blvd	A	0.418	B	0.669
19	Avalon Ave & Pacific Coast Highway.	A	0.512	C	0.788
20	Avalon Ave & Anaheim St	A	0.352	A	0.501
21	Avalon Ave & Harry Bridges Blvd	A	0.253	A	0.394
22	Alameda St & Pacific Coast Highway	A	0.582	C	0.793
23	Alameda St & Anaheim St	B	0.642	C	0.769
25	Alameda St & Henry Ford Ave (1)	C	17.6	C	17.6
26	Anaheim St & Henry Ford Ave	B	0.642	A	0.590
27	Vermont Ave & Pacific Coast Highway	C	0.784	D	0.841
28	Wilmington Ave & Lomita Blvd (1)	B	12.7	C	17.3
30	Gaffey St & I-110 Southbound Ramp	A	0.516	C	0.760
31	Harbor Blvd & SR-47 Westbound On-Ramp (1)	A	9.5	B	10.2
32	Harbor Blvd & SR-47 Eastbound Off-Ramp/Swinford St	D	0.816	F	1.123
33	Gaffey St & Miraflores St & I-110 Southbound Ramps	E	0.940	D	0.854
34	John S. Gibson Blvd & I-110 Northbound Ramps	A	0.511	A	0.420
35	Pacific Coast Highway & I-110 Southbound Ramps	E	0.900	C	0.722
36	Anaheim St & Figueroa Pl & I-110 Ramps	E	0.992	F	1.232
37	Figueroa St & C-Street & I-110 Ramps (1)	B	12.0	C	18.1
38	Henry Ford Ave & TI Freeway Ramps	A	0.317	A	0.348
39	Western Ave & Westmont Dr	B	0.688	E	0.904
40	Western Ave & Capitol Dr	B	0.608	D	0.838
41	Western Ave & Summerland Dr	B	0.639	C	0.767
42	Western Ave & 1st St	B	0.695	C	0.725
43	Western Ave & 19th St	A	0.498	A	0.538
44	Western Ave & Paseo Del Mar (1)	B	10.0	B	13.4
45	Gaffey St & Westmont Dr	A	0.522	C	0.788
46	Gaffey St & Capitol Dr	A	0.415	B	0.631
47	Gaffey St & Summerland Dr	A	0.563	D	0.870
48	Gaffey St & 1st St	F	1.444	F	1.162
49	Gaffey St & 7th St	B	0.653	C	0.734
50	Gaffey St & 13th St	A	0.553	B	0.620
51	Gaffey St & 19th St	A	0.351	A	0.345
52	Gaffey St & Shepard St (1)	A	8.1	A	9.0
53	Front St & Pacific Ave	A	0.554	A	0.448
54	Harbor Blvd & 1st St	A	0.322	A	0.435
55	Harbor Blvd & 5th St	C	0.714	C	0.788
56	Harbor Blvd & 7th St	A	0.246	A	0.382
57	Crescent Ave & Harbor Blvd & Miner St (1)	B	13.0	C	16.4

Table 1
Existing Intersection Level-of-Service Summary

Intersection		AM Peak Hour		PM Peak Hour	
		LOS	V/C or Delay	LOS	V/C or Delay
58	9th St & Weymouth Ave	A	0.354	A	0.379
59	9th St & Pacific Ave	A	0.513	B	0.699
60	Gaffey St & 5th St	C	0.722	C	0.778
61	Harbor Blvd & 6th St	A	0.325	A	0.384
63	Lomita Blvd & Wilmington Blvd/Main St	A	0.578	B	0.697
64	Pacific Coast Highway & Wilmington Blvd	A	0.472	B	0.611
65	Pacific Coast Highway & Broad Ave (1)	D	33.9	F	234.1
66	Anaheim St & Wilmington Blvd	A	0.431	A	0.565
67	Anaheim St & Broad Blvd	A	0.301	A	0.434
68	Harry Bridges Blvd & Wilmington Blvd (1)	B	10.8	B	12.3
69	Harry Bridges Blvd & Broad Ave	A	0.204	A	0.266
70	Eubank Ave & Anaheim St	A	0.461	A	0.473
71	Eubank Ave & Pacific Coast Highway	A	0.433	A	0.552
72	Harry Bridges Blvd & Fries Ave	A	0.283	A	0.336
73	Harry Bridges Blvd & Neptune Ave	A	0.204	A	0.311
74	Weymouth Ave & 7th St	A	0.447	A	0.425
75	Pacific Ave & 1st St	A	0.411	A	0.555
76	Pacific Ave & 5thSt	A	0.341	A	0.396
77	Pacific Ave & 13th St	A	0.325	A	0.395
78	Pacific Ave & 19th St	A	0.176	A	0.250
79	Pacific Ave & 22nd St	A	0.326	A	0.542
80	Center St & 1st St (1)	A	9.5	B	10.2
81	Center St & 5th St (1)	B	11.9	B	10.5
82	Center St & 7th St (1)	A	8.0	A	8.6
83	Pacific Ave & Stephen M. White Dr	A	0.158	A	0.213
84	Pacific Ave & 7th St	A	0.586	B	0.697
85	22nd St & Miner St	A	0.255	A	0.340
86	22nd St & Gaffey St	A	0.363	A	0.432
87	Ferry St & Vincent Thomas Bridge Eastbound Ramp	A	0.261	A	0.429
88	Anaheim St & I-St/9th St	A	0.445	A	0.496
89	Ferry St & Terminal Way	B	0.625	A	0.472
90	Terminal Way & Earle St	A	0.394	A	0.400
91	Alameda St & Sepulveda Blvd	A	0.382	A	0.434
92	Sepulveda Blvd & ICTF Driveway #1	A	0.349	A	0.565
93	Sepulveda Blvd & ICTF Driveway #2	A	0.388	A	0.436
94	Anaheim St & Santa Fe Ave	A	0.376	A	0.491
95	Navy Way & Seaside Ave	A	0.516	A	0.589

(1) Indicates unsignalized intersection

Truck Traffic on Area Roadways

An important component of the POLA Baseline Transportation Study is the assessment of truck traffic impacts on area roadways. In order to identify locations where truck traffic impacts occur, a series of traffic counts were taken in the area surrounding the Port. Locations were selected based on the functional classifications of the roadways, and included the intersections of Major Arterials with other Major Arterials and also with Secondary arterials. Also included were all freeway ramp/arterial intersections along I-110 and SR-47 south of I-405, as well as other arterial street intersections with collector streets. Selected special truck trip generators were also counted in the Wilmington, Harbor City and San Pedro area. Manual traffic counts were taken at the selected locations during the AM and PM peak periods. The counts identified the vehicles by type and movement that the vehicle made in the intersection. The traffic counts conducted for the study stratified all vehicles by type, as follows:

- Container truck
- Bobtail-only truck
- Chassis-only truck (no container)
- All other trucks (flatbeds, dump truck, delivery, moving van, tanker, etc.)
- All other vehicles including passenger cars and other light duty trucks

Counting vehicles by type allows each intersection to be analyzed in terms of truck traffic impacts. Of the 92 intersections, some have high levels of truck traffic and also of port-related truck traffic. Conversely, many, have very low truck volumes and are therefore not adversely impacted by truck traffic intrusion. Each of the 92 study intersections was assessed to determine the level of truck traffic (containers, bobtails and chassis plus other trucks) during the critical AM and PM peak hours. The count data was ranked by the number of trucks that passed through each intersection, and the percentage of trucks within the intersection, as compared to all traffic through the intersection, was calculated. Table 2 shows the truck traffic at each study intersection for the AM and PM peak hours, and Exhibits 2 and 3 illustrate the results of the analysis in terms of the highest number of trucks at study intersection locations. The exhibits show intersections with between 200 and 400 trucks as of the 2001 traffic counts. The results indicate the following:

- AM Peak hour – During the AM Peak there are ten locations with 200 to 299 trucks, two locations with 300 to 399 trucks and seven locations with over 400 trucks. The seven locations with over 400 trucks are either on Terminal Island within the Port itself, or along Henry Ford Avenue/Alameda Street. Also, the intersection of Harry Bridges Boulevard/Figueroa Street has over 400 AM peak hour trucks.

- PM Peak hour – During the PM Peak, there three locations with 200 to 299 trucks, while seven locations have 300 to 399 trucks and four locations have over 400 trucks.

The remaining locations (of the 92 study intersections) have fewer than 200 trucks during the peak hours. It was determined, working with the PCAC traffic subcommittee, that the critical locations for further analysis will include those locations with over 50 peak hour Port trucks. That list includes 31 intersections within the City of Los Angeles. Therefore, the balance of this report focuses on those 31 critical locations that carry the highest truck traffic volumes. It is important to note that there may be capacity deficiencies at some of the 61 locations that have been excluded from further analysis, however, the deficiencies at those intersections are due to general traffic volumes and not due to truck volumes or port truck volumes. At those locations, improvements may be warranted, but they are not primarily related to port activities and therefore are not subject to further analysis as part of this effort. The problems at those locations should be addressed separately as part of on-going City of Los Angeles and Caltrans efforts to mitigate traffic congestion.

Truck Traffic on I-110

In order to evaluate the truck traffic volumes along I-110 freeway, automated count data was collected from Caltrans and manual traffic counts were taken to supplement the Caltrans data. Caltrans data consists of total vehicle volumes on I-110, with totals by lane, for each hour. The manual counts that were conducted distinguished, by type of vehicle (passenger car, container, chassis, bobtail and other trucks), volumes at specific locations along I-110. The two data sources were combined to determine the amount of port-related and non-port-related trucks on the freeway. The data is summarized in Exhibits 4 and 5. Exhibit 4 shows that in the AM peak hour, the southbound I-110 truck percentage ranges from 11% north of Pacific Coast Highway to 17% near C Street. Northbound truck percentages are lower in the AM peak, ranging from 3% to 5%, indicating

LEGEND

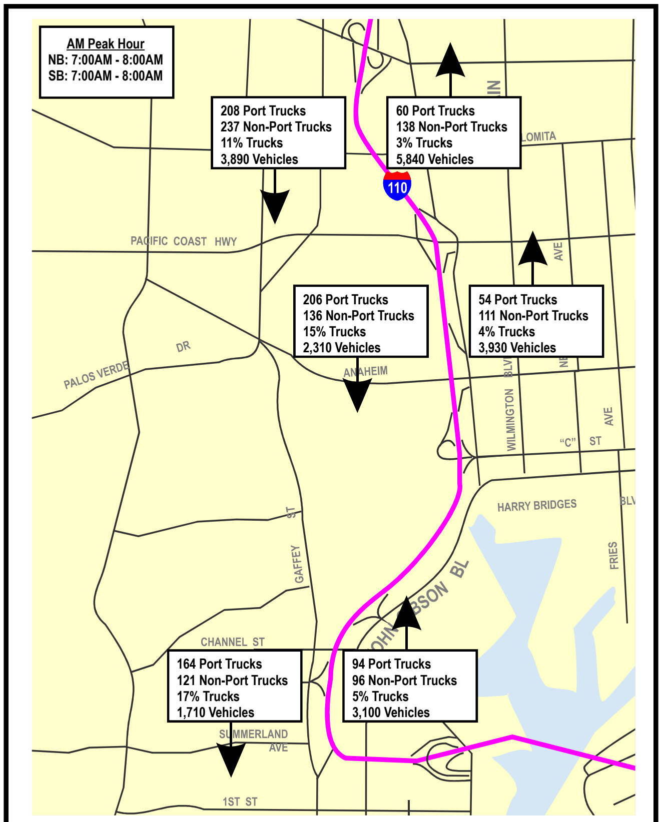
- 200 – 299 Truck Trips
- 300 – 399 Truck Trips
- Over 400 Truck Trips

Exhibit 2
Existing AM Peak
Hour Truck Volumes

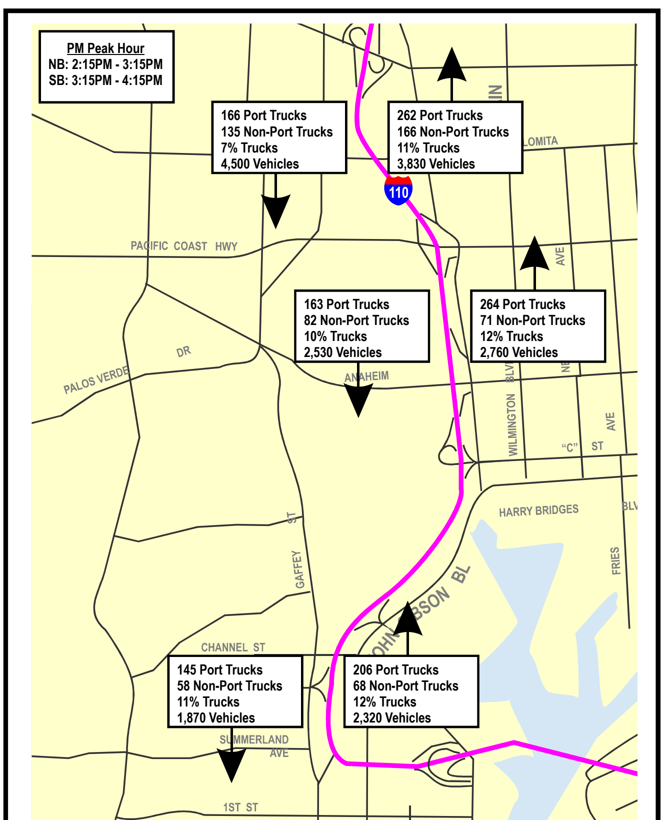
LEGEND

- 200 – 299 Truck Trips
- 300 – 399 Truck Trips
- Over 400 Truck Trips

Exhibit 3
Existing PM Peak
Hour Truck Volumes



I-110 Truck Counts - AM Peak Hour | Exhibit 4



I-110 Truck Counts - PM Peak Hour | Exhibit 5 that trucks tend to travel towards the port in the AM peak. It can also be noted that in the AM peak hour, a majority of the total vehicles are traveling northbound on I-110, showing the commuter peak direction. Exhibit 5 illustrates the PM peak hour. Analysis of the PM peak hour shows a higher overall truck percentage on I-110. In the northbound direction, the PM peak hour (2:15 PM to 3:15 PM) was calculated to occur earlier than the southbound PM peak hour (3:15 PM – 4:15 PM), again possibly showing the impact of the commuter peak traffic affecting I-110. Truck percentages in the PM peak ranged from 11% to 12% in the northbound direction and 7% to 11% in the southbound direction. In summary, that data shows that port trucks tend towards the port in the AM peak hour, and away from the port in the PM peak hour. In contrast, I-710 (Long Beach Freeway) peak truck percentage in the AM peak is 17% in the northbound direction and 22% in the southbound direction. The PM peak on I-710 shows 27% trucks in the northbound direction and 28% in the southbound direction.

Table 2
Ranking of Existing Truck Volume

INTERSECTION	AM PORT TRUCKS (2-4)	AM ALL TRUCKS (2-5)	AM ALL VEHICLES (1-5)	PERCENT ALL TRUCK VOLUME AM PEAK	PM PORT TRUCKS (2-4)	PM ALL TRUCKS (2-5)	PM ALL VEHICLES (1-5)	PERCENT ALL TRUCK VOLUME PM PEAK	RANK BY % ALL TRUCKS		RANK BY TOTAL ALL TRUCKS	
									AM PEAK	PM PEAK	AM PEAK	PM PEAK
Alameda St/ Anaheim St	330	462	2510	18%	518	624	2722	23%	20	15	6	1
Henry Ford Ave/ Anaheim St	326	437	2495	18%	545	611	2638	23%	21	14	7	2
Alameda St/ Pacific Coast Highway	333	539	2230	24%	501	599	3383	18%	18	19	2	3
Alameda St/ Sepulveda Blvd	338	484	1266	38%	497	595	1559	38%	6	4	4	4
ITCF Driveway #1 West/ Sepulveda Blvd	363	424	1119	38%	563	595	1565	38%	7	5	9	4
I St/ 9th St/ Anaheim St	415	570	2111	27%	429	528	2402	22%	15	17	1	6
Figueroa St/ Harry Bridges Blvd	438	526	1463	36%	376	418	1722	24%	10	13	3	7
Santa Fe Ave/ Anaheim St	271	425	2033	21%	329	414	2398	17%	19	20	8	8
ITCF Driveway #2 East/ Sepulveda Blvd	325	414	1117	37%	378	414	1482	28%	8	12	11	8
Ferry St/ Terminal Way	376	419	863	49%	355	378	983	38%	2	3	10	10
Fries Ave/ Harry Bridges Blvd	233	317	905	35%	320	362	1251	29%	11	11	13	11
Alameda St/ Henry Ford Ave	213	283	610	46%	305	357	1083	33%	4	7	16	12
Broad Ave/ Harry Bridges Blvd	194	263	673	39%	307	340	921	37%	5	6	18	13
Earle St/ Terminal Way	443	469	946	50%	309	326	811	40%	1	1	5	14
Avalon Ave/ Harry Bridges Blvd	193	301	817	37%	294	313	1063	29%	9	10	14	15
Figueroa St/ I-110 Ramps/C St	146	234	692	34%	244	312	952	33%	12	8	20	16
Ferry St/ Vincent Thomas Bridge EB Ramp	382	409	874	47%	287	306	994	31%	3	9	12	17
Neptune Ave/ Harry Bridges Blvd	187	233	837	28%	247	282	1236	23%	14	16	21	18
Wilmington Blvd/ Harry Bridges Blvd	175	233	902	26%	233	272	1273	21%	17	18	21	19
Henry Ford Ave/ T1 Freeway Ramps	211	252	772	33%	229	247	625	40%	13	2	19	20
Harbor Blvd/ SR 47 WB on ramp	195	273	1014	27%	163	186	1088	17%	16	21	17	21
John S. Gibson - Channel St	53	125	2048	6%	120	168	2269	7%	31	23	38	22
Western Ave/ Pacific Coast Hwy	25	189	4972	4%	17	163	6616	2%	49	40	28	23
Figueroa St/ Pacific Coast Hwy	54	215	3911	5%	40	162	4486	4%	33	32	23	24
Harbor Blvd/ SR 47 EB off Ramp/ Swinford St	168	287	2029	14%	114	160	2458	7%	22	26	15	25
Eubank Ave/ Anaheim St	80	120	1781	7%	129	158	2138	7%	29	24	40	26
Gaffey St/ I-110 SB Ramps	0	199	5002	4%	0	117	5282	2%	47	44	25	27
Wilmington Ave/ Lomita Blvd	52	114	966	12%	63	116	1359	9%	23	22	41	28
Broad Ave/ Pacific Coast Hwy	43	148	1870	8%	44	115	2597	4%	26	28	36	29
Vermont Ave/ Pacific Coast Hwy	57	166	4374	4%	55	111	4700	2%	50	42	31	30
Eubank Ave/ Pacific Coast Hwy	80	159	2129	7%	55	106	2914	4%	27	31	33	31
Pacific Ave/ Front St	38	90	1565	6%	70	106	1599	7%	32	25	44	31
John S. Gibson Blvd/ I-110 NB ramp	64	196	1687	12%	73	104	1654	6%	24	27	26	33
I-110 SB Ramp/ Pacific Coast Hwy	45	156	4380	4%	28	103	4896	2%	53	46	34	34
Normandie Ave/ Pacific Coast Hwy	35	175	3953	4%	10	97	4435	2%	41	45	29	35
Western Ave/ Sepulveda Blvd	7	214	6140	3%	8	93	7309	1%	55	66	24	36
Gaffey St/ Channel St	11	163	3164	5%	14	82	4792	2%	37	54	32	37
Figueroa St/ Lomita Ave	9	57	1994	3%	21	79	2803	3%	68	34	56	38
Wilmington Blvd/ Anaheim St	7	98	1973	5%	20	77	2830	3%	39	38	43	39
Western Ave/ Palos Verdes Dr.	15	71	4407	2%	2	67	5616	1%	84	68	48	40
Gaffey St/ Capitol Dr	2	61	1773	3%	11	60	2298	3%	57	39	52	41
Lomita Blvd/ Wilmington Blvd	20	61	2170	3%	10	54	3137	2%	70	52	52	42
Harbor - 7th St	18	54	1037	5%	27	52	1357	4%	35	29	60	43
Western Ave/ 25th St	1	48	1600	3%	2	50	2147	2%	63	43	65	44
Avalon Ave/ Lomita Blvd	12	61	1864	3%	5	47	2936	2%	58	59	52	45
Gaffey St/ Westmont Dr.	11	83	2079	4%	14	46	2678	2%	46	53	45	46
Gaffey St/ 5th St	1	121	2793	4%	0	45	3231	1%	42	62	39	47

Table 2
Ranking of Existing Truck Volume

INTERSECTION	AM PORT TRUCKS (2-4)	AM ALL TRUCKS (2-5)	AM ALL VEHICLES (1-5)	PERCENT ALL TRUCK VOLUME AM PEAK	PM PORT TRUCKS (2-4)	PM ALL TRUCKS (2-5)	PM ALL VEHICLES (1-5)	PERCENT ALL TRUCK VOLUME PM PEAK	RANK BY % ALL TRUCKS		RANK BY TOTAL ALL TRUCKS	
									AM PEAK	PM PEAK	AM PEAK	PM PEAK
Avalon Ave/ Pacific Coast Hwy	31	100	2721	4%	24	45	4139	1%	51	75	42	47
Normandie Ave/ Lomita Blvd	15	55	3291	2%	11	45	4091	1%	83	73	59	47
Pacific Ave/ 9th St	4	28	1354	2%	2	45	1600	3%	79	35	79	47
Wilmington Ave/ Pacific Coast Hwy	59	140	2801	5%	23	43	3885	1%	38	72	37	51
Western Ave/ Anaheim St.	9	60	2108	3%	1	43	3347	1%	69	65	55	51
Western Ave/ Summerland Dr.	0	30	2193	1%	0	42	3180	1%	87	64	76	53
Western Ave/ Westmount Dr.	1	57	2493	2%	5	40	3678	1%	77	74	56	54
Western Ave/ 1st St	0	50	2828	2%	1	40	3378	1%	81	70	63	54
Normandie Ave/ Vermont Ave	4	50	1305	4%	1	39	1393	3%	48	37	63	56
Gaffey St/ Miraflores/ I-110 SB Ramp	0	150	2137	7%	1	38	2456	2%	28	60	35	57
Harbor Blvd/ 5th St	64	196	1687	12%	9	37	1992	2%	24	48	26	58
Western Ave/ Capitol Dr.	1	69	2258	3%	3	37	3588	1%	62	77	49	58
Harbor Blvd/ 1st St	12	66	1558	4%	9	37	2083	2%	43	50	51	58
Harbor Blvd/ 6th St	7	76	1165	7%	6	35	1714	2%	30	47	46	61
Western Ave/ 9th St	0	31	1800	2%	0	34	2366	1%	82	61	75	62
Gaffey St/ 7th St	2	75	2617	3%	4	32	3275	1%	66	80	47	63
Pacific Ave/ 5th St	2	41	1434	3%	0	32	1785	2%	67	49	70	63
Figueroa Place/ I-110 Ramps/ Anaheim St	1	14	2650	1%	2	32	2970	1%	90	76	85	63
Pacific Ave/ 7th St	5	40	1445	3%	3	31	1908	2%	71	57	71	66
Gaffey St/ Summerland Dr.	1	51	1663	3%	3	30	2530	1%	61	69	62	67
Gaffey St/ 1st St	15	175	4971	4%	6	29	5347	1%	54	88	29	68
Pacific Ave/ 1st St	1	39	1412	3%	1	29	1712	2%	72	55	72	68
Western Ave/ 19th St	2	47	1750	3%	1	27	2422	1%	73	71	66	70
Gaffey St/ 19th St	0	44	1529	3%	0	27	1672	2%	65	58	68	70
Figueroa St/ Anaheim St	18	56	2767	2%	8	26	2993	1%	80	82	58	72
Gaffey St/ 13th St	4	52	2098	2%	2	26	2589	1%	76	79	61	72
Gaffey St/ 9th St	6	68	2538	3%	3	25	3072	1%	74	83	50	74
Miner St/ 22nd St	7	30	567	5%	12	25	657	4%	34	30	76	74
Pacific Ave/ 22nd St	3	39	1221	3%	2	24	1764	1%	59	63	72	76
Harbor Blvd/ Miner St/ Crescent Ave	2	33	640	5%	5	24	1006	2%	36	41	74	76
Gaffey St/ 22nd St	5	45	1247	4%	2	22	1340	2%	52	56	67	78
Center St/ 5th St	0	7	454	2%	0	14	419	3%	85	33	89	79
Center St/ 7th St	0	13	315	4%	0	13	464	3%	44	36	86	80
Broad Ave/ Anaheim St	0	29	1325	2%	0	12	1913	1%	78	87	78	81
Pacific Ave/ 19th St	4	24	937	3%	1	12	1186	1%	75	78	81	81
Gaffey St/ 25th St	3	42	1041	4%	1	10	1342	1%	45	84	69	83
Pacific Ave/ Stephen M. White Dr.	0	17	491	3%	0	10	565	2%	56	51	83	83
9th St./ Weymouth Ave	0	2	916	0%	0	10	1125	1%	91	81	91	83
Pacific Ave/ 13th St	5	18	1199	2%	1	8	1552	1%	86	89	82	86
Avalon Ave/ Anaheim St	19	25	1877	1%	3	7	2802	0%	88	90	80	87
Gaffey St/ Shepard St	0	16	330	5%	0	7	563	1%	40	67	84	87
Western Ave/ 7th St	0	9	913	1%	0	7	1090	1%	89	86	88	87
Western Ave/ Paseo Del Mar	0	10	343	3%	0	4	552	1%	64	85	87	90
Center St/ 1st St	0	6	193	3%	0	0	257	0%	60	91	90	91

3. MARINE TERMINAL TRIP GENERATION

The assessment of future operating conditions in and near the Ports was accomplished by first estimating future trip generation for all marine terminals and other land uses in the Ports as well as throughout the region. The trip generation estimates for the years 2010 and 2025 for the region were derived from data within the SCAG regional travel demand model. Trip generation for port land uses was estimated based on a comprehensive empirical data collection effort undertaken as part of previous studies and applied for this project. This section describes the data collection, analysis and results of the marine terminal trip generation analysis.

Intermodal Logistics Research and Overview

The development of the container terminal trip generation model entailed extensive research and data collection related to all facets and entities of the intermodal supply chain (e.g., steamship lines, terminal operators, cargo consolidators, trucking companies, warehouse, distribution facility operators, etc.). The following key issues related to intermodal logistics were reviewed as part of in the POLA Baseline Transportation Study:

- container drayage (who controls the move, timing/peaking, & gate hours)
- intermodal mode split (on-dock, off-dock rail, & transloading)
- empty container logistics

Container Drayage.
One of the greatest challenges in developing a trip generation model for a container terminal is defining how the container movements are controlled. For those containers that are not moved via on-dock rail, there are two aspects of control: the choice of draymen (who will move the container), and the choice of timing (when the container will be picked up or delivered). Import containers moved locally or regionally by truck are usually controlled by the customer (shipper, consignee, or third party), who chooses the drayman and the timing. Import containers that are drayed to off-dock railyards are usually controlled by the ocean carriers, who choose the drayman and the timing for those moves. Export containers from local shippers are picked up by the house drayman according to the customer's preferences. Intermodal (mini-landbridge - MLB) export and westbound empty containers are picked up at the rail ramp by the ocean carrier's house drayman.

Timing and Peaking.
Daily, weekly, and monthly peaking of truck arrivals at marine terminal gates is traceable to customer preferences, vessel and train schedules, and the limited windows for full terminal operation. The following briefly describes some of the movements of containers throughout a typical week and day, and the factors affecting the movements:

- Local Imports: Customers prefer to receive goods early in the morning, early in the week, and early in the month. Customers in a hurry want their goods as soon as possible after the vessel arrives, with pre-clearance from U.S. Customs, creating a second reason for peaking. At the other extreme, some customers are not ready for their goods and use terminal time allowances for free storage.

- Local Exports: Customers prefer to ship goods late in the day, late in the week, and late in the month.

- Intermodal (mini-landbridge) Imports/Exports: Customer desire to receive import goods quickly, coupled with the popularity of pre-clearance by U.S. Customs, has created a demand for inbound loaded boxes as soon as possible after vessel arrival. Dedicated eastbound double-stack train departures are also keyed to vessel arrivals, and some rail-bound containers are stowed to be the first off. Outbound export boxes typically "trickle in" for most of the week, then peak just before vessel departure. Rail exports come in larger batches on the same double-stack cars that must later be used for eastbound imports, so the MLB export and empty boxes typically arrive before the vessel.

Terminal Gate Hours.
Terminal operations affect the movement of containers throughout the day. Most Long Beach and Los Angeles marine terminals operate between 7 a.m. and 6 p.m. with the standard day shift of 8 a.m. to 5 p.m. Terminals terminate inbound processing prior to this closure time. Some terminals are open extended hours for several days a week. These extended hours consist of a second night shift (6 p.m. – 10 p.m.) or a "hoot" shift (3 a.m.- 8 a.m.). Extended hours are

rather variable throughout the year, and are not uniform for all terminals.

Intermodal Mode Split (On-Dock Rail, Off-Dock Rail & Transloading).

The intermodal mode split (intermodal defined as ship-to-rail movements rather than ship to truck for local delivery) for containerized cargo moving through the San Pedro Ports is estimated to be about 45%-50%, based upon extensive analysis of the Journal of Commerce PIERS data. Based upon recent data collected from the terminal operators, steamship lines, and railroads, it estimated that about 35%-40% of all containers that move through the Ports are transported by rail to inland destinations via on-dock and off-dock railyards.

Transloaded Intermodal Cargo.

Transloading is the practice of transferring goods from marine containers to domestic intermodal containers or trucks at a distribution center or warehouse. In transloading, the goods are sometimes transferred immediately (which is referred to as cross-docking), or after the goods are handled/stored for short period of time in the warehouse to accommodate value-added services (e.g., bar codes or labels/stickers are added; hangers added to apparel; mixing of products to make loads for specific retail stores; etc.). Many of the large shippers of intermodal cargo (such as Wal-Mart and Target) transload cargo from steamship line containers to domestic containers to then be transported via rail (or long-haul truck) to inland destinations.

Secondary trips that do not have one end in the Port are very difficult to identify. The overall logistics chain, and specifically, what happens to goods after they leave the port, is very complex and cannot be quantified as to how many trips are created, where the truck trips go or at what times of day. Such an effort, if even feasible, would require substantially more work that is outside the scope of this effort. Exhibit 6 illustrates the logistics chain and what happens to goods as they move throughout the region.

On-Dock Rail.

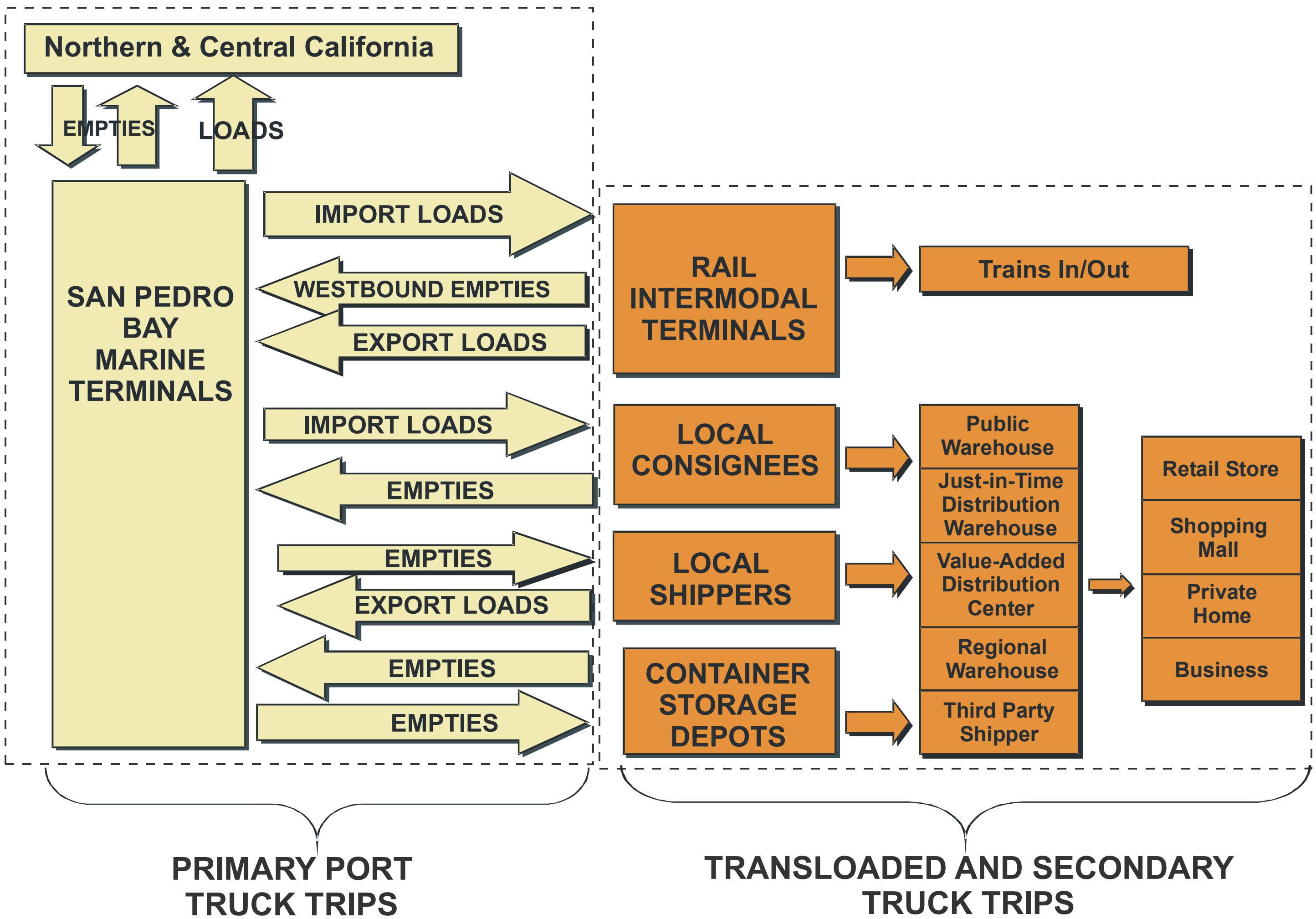
Several factors affect on-dock rail use, such as: shipper and steamship line logistics (e.g. transloading, transportation costs, etc.), railroad operations (equipment availability, train schedules, and steamship line contracts/arrangements), on-dock and off-dock railyard capacity, and marine terminal operations. The following briefly describes these various factors:

- Intermodal Logistics: On-dock rail operations are largely limited to “dedicated” trains or large blocks of traffic. Many intermodal (rail-bound) containers continue to be drayed to off-dock railyards. Each on-dock terminal has one or two major tenants who generate “dedicated” trains to Chicago or other major destinations. Intermodal containers for other tenants, even alliance partners, rarely make up sufficient volumes for dedicated trains, so these containers are almost always drayed. Containers that are bound for minor destinations, and overflow or late containers for major destinations are also drayed. However, it is expected that long-term growth in mini-landbridge (MLB) volumes may bring the volumes of smaller carriers closer to trainload equivalents and encourage more on-dock use.

- Railroad Operations: Railroads incur additional operating costs to serve on-dock terminals compared to their own ramps. The elimination of intermodal lift costs offsets this added operating cost in principle, but railroad operating budgets may not reflect the savings. It is also difficult for stevedores to block containers for multiple destinations according to railroad loading preferences. Accordingly, the two Class I railroads serving the San Pedro Ports, the Union Pacific (UP) Railroad and the Burlington Northern Santa Fe (BNSF) Railroad, prefer to handle only the largest trains on-dock, so that the train can move basically intact and not require further work at inland yards.

- On-Dock/Off-Dock Railyard Capacity: The on-dock terminals vary considerably in their capacity, efficiency, and ease of operation. Moreover, the numerous on-dock terminals are not presently operated as a system; i.e., most terminals do not share each other’s railyards. As intermodal volumes significantly increase over the next 20 years, and as roadway congestion worsens and impacts drayage, on-dock use will also increase. To accommodate this demand, the Ports will be expanding their railyards and it is speculated that terminals might share the use of their railyards to optimize capacity throughout the entire Ports complex. The new and expanded railyards, in concert with the Alameda Corridor will facilitate increased on-dock rail use. Off-dock railyard capacity also affects on-dock

Exhibit 6
PRIMARY AND SECONDARY (TRANSLOADED) PORT-RELATED TRUCK TRIPS



use: insufficient capacity at off-dock railyards could result in shifts to on-dock railyards.

Determining maximum potential capacity is important in estimating future on-dock rail mode use, which is a critical factor in the trip generation model discussed in the next section. The potential capacity of on-dock yards is compared to current on-dock use to then estimate future on-dock use.

<u>Empty Container Logistics.</u>
Empty container logistics is complex and variable, and thus poses challenges in developing a trip generation methodology. The Transpacific trade imbalance, which has significantly increased empty container volumes, compounds the difficulty in developing a methodology for modeling empty container flows and truck trips.

<u>Street Turns</u>
Street turns are defined as the interchange of local (for local market use) empty containers between importers and exporters outside the marine terminals. Import local containers are taken by trucking company drivers to the consignee and, when unloaded, the same trucking company returns most of the empty containers to the terminal/steamship line. The same or different trucking company picks up empty containers from the terminal/steamship line and delivers the empty container to the exporter for loading, to then be returned to the Port. Some of the empty import containers are not returned directly to the Port, but are subsequently used by exporters (i.e., street turns), thus reducing the number of empty container trips to the Ports. The opportunities for these street turns under current institutional constraints are very limited, but was nonetheless accounted for in the trip generation methodology.

An Internet system is currently in operation in the Ports area. Most Port of Los Angeles container terminals and numerous harbor trucking companies are currently using the system, provides a Web site wherein trucking companies can access information about containers at a single-source site. The system provides multiple fields of information for full and empty containers transiting through the Ports. The system provides a useful tool for the trucking companies to track information about containers to be picked-up or delivered as well as provides for more efficient operations at the terminal gates.

The container terminal trip generation methodology accounts for variability in street turns and peak hour volumes, to reflect improved truck dispatching through the use of an improved Internet system. The "Regional Goods Movement Efficiency Team" is currently working on a market driven all appointment system with a premium for daytime operations to help subsidize second and third shift operations.

Container Terminal Trip Generation

Percent of throughput moved each shift (for the day, second and hoot shifts)

<u>*Terminal Truck Generation Throughput Model –*</u>
Terminal trip generation was estimated using a model that considers existing terminal operation/ throughput. The model called "Quicktrip" was developed and validated against gate transaction data and gate counts. A more detailed description of the Quicktrip model is provided in the appendix to this document. Exhibit 7 illustrates the Quicktrip model process. The Quicktrip model was run and tested against the gate data (gate counts and historical gate data from the terminals).

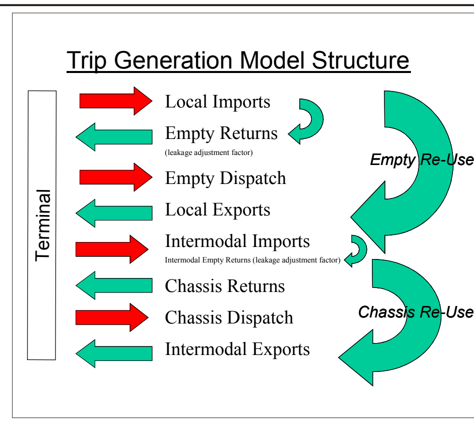


Exhibit 7
QuickTrip
Flow Chart

The truck trip generation model was used to develop year 2010 and 2025 container terminal truck trip volumes for various terminal operations scenarios. These scenarios were defined by changing operating parameters as follows: increased weekend activity; expanded terminal operating hours (more second shift and hoot shift activity); increased on-dock rail use; increased street turns as a result of the use of appointments altered arrival/departure curves as a result of more efficient truck dispatching. Also, for future conditions, trip generation for the peak day within the peak month was used, which is considered conservative for traffic forecasting and developing roadway improvements.

The Quicktrip model trip generation module requires the following input data for each terminal:

- Annual or monthly TEU throughput
- TEU-to-lift conversion factor
- Percent mode split (percent via on-dock rail, off-dock rail, local moves, empties and trans-shipments across the wharf)
- Number of operating days during the week
- The Quicktrip model produces the following forecasts:
- Monthly gate transactions
- Peak week truck trip volume
- Peak day truck trips
- Hourly truck trips throughout the day (each hour) by type of vehicle (bobtail, chassis, container, empty)

Quicktrip is used as the basis of the 2010 and 2025 container terminal truck trip forecasts, as described in other sections of this document. It is also used to test the trip generation reduction potential of various terminal operating changes such as increasing weekend terminal activity, changing shift patterns (more second shift and hoot shift activity), changes to the mode split such as increasing use of on-dock rail, and other terminal operations modifications.

<u>Marine Container Terminal Automobile Trips</u>
The auto trip rates were analyzed to determine appropriate trip generation rates to be used for the analysis of existing and future port auto trip generation. Using the auto driveway and gate counts, a series of trip generation rates was developed. Since the rates varied by terminal, and a few outliers were noted in the dataset, an analysis of the standard deviation was conducted. Individual terminal trip rates that fell outside of one standard deviation of the mean were then eliminated from the final calculation. The resulting recommended average rates are shown in the table below. The recommended rates are the average of both survey days, Monday and Tuesday, to represent the most typical case possible. The auto rates are in terms of peak hour trips per thousand monthly TEU to enable them to be applied to future forecasts, which are based on the monthly activity levels.

Auto/Employee Trip Rates
(auto trips per thousand TEU/month)

Time	Day	Mean Auto Trip Rate (all terminals)	Average Trip Rate for Observations within one Standard Deviation	Auto Trip Rates (auto trips/1000 TEU)		
				Total	In	Out
8-9 AM	Tues	1.68	1.40	1.35	0.81	0.54
	Wed	1.43	1.30			
2-3 PM	Tues	0.93	0.82	0.81	0.30	0.51
	Wed	1.05	0.79			
4-5 PM	Tues	1.99	1.54	1.96	0.50	1.46
	Wed	2.57	2.38			

The trip rates shown above reflect trips due to employees from not only the regular day work shift, but also from second and hoot (third) shifts, where they occur. For example, the morning peak hour outbound trips reflect the employees leaving from the hoot shift, while the afternoon inbound trips reflect employees arriving for the second shift. Therefore, the total number or employee trips will change not only based on TEU throughput, but also based upon the changes in shift patterns. If more cargo is moved in the future via hoot shifts relative to day shifts, there would be a proportionate increase in the AM outbound employee trips since few terminals have consistent hoot shifts currently. This expected change in operations is accounted for as follows:

- The trip rates reflecting second and hoot shift worker arrivals and departures were proportionately adjusted to reflect the potential increase in outbound morning peak hour trips to account for outbound hoot shift employees, and the afternoon inbound trips to account for the second shift employee arrivals. To determine this adjustment, the trip rates for the existing Hanjin terminal were reviewed, since that terminal is operating closest to the 60/20/20 shift proportions of the modified operation scenario. The adjustment factor for outbound AM trips and inbound PM trips was determined to be 50%. Therefore the outbound AM trip rate and the inbound PM trip rate are both increased by 50% to account for the other shift directional movements. The resulting rates are 0.81 outbound AM trips per 1000 monthly TEU for AM outbound (compared to 0.54 currently) and 0.75 Inbound PM Trips per 1000 monthly TEU (compared to 0.50 currently).

- A second adjustment involves the actual second shift employees that will likely arrive prior to the 4 to 5 PM peak. Although most would arrive before the 4 to 5 peak hour that is under analysis, to be conservative, it has been assumed that 20 percent of the employee arrivals would occur between 4 and 5 to account for later arrivals. This methodology yields a conservative analysis that covers all of the potential shift overlap effects.

- For 2025 scenarios with more equal work shifts, it is likely that the hoot shift workers will arrive prior to the 8 to 9 AM peak, and the second shift workers will arrive prior to the 4 to 5 peak hour under analysis. This assumes shifts of 7 AM to 4 PM, 4 PM to 11 PM and 11 PM to 7 AM.

Non-Container Terminal Trip Generation

Non-container terminal trip generation estimates were also developed for the port. This includes trips to and from all of the other types of marine terminals (automobile terminals, dry bulk terminals, liquid bulk terminals and break-bulk terminals). In addition, there are many non-terminal land uses located throughout the ports (e.g., administrative offices, recreation, commercial, government buildings) that generate automobile traffic.

The majority of truck and automobile trips in the ports are generated by the container terminals. While significant growth is expected in container terminal activity and throughput, relatively low growth is expected in most other commodity types that are handled by non-container terminals. Finally, little or no change is expected to other miscellaneous land use activities such commercial land uses, government offices and administrative offices. Therefore, it was decided that the use of growth factors applied to existing non-container trip volumes would be most appropriate for the POLA Transportation Study for all non-container terminal land uses. Growth factors were developed based on commodity level forecasts.

Existing non-container terminal trips were first isolated using a series of driveway and mid-block traffic counts throughout the ports. A number of specific terminals were counted at their driveways, while other terminals and miscellaneous land use activities were reflected via the use of downstream roadway traffic counts. In some cases, a roadway traffic count was used to represent the trip generation of a group of non-container terminals and other land uses. The appendix contains a summary of all non-container terminal data.

4. MARINE TERMINAL TRIP DISTRIBUTION

Overview of Methodology

The distribution of port automobile and truck trips is one of the most critical factors in the transportation analysis. Accurate assessment of trip distribution patterns is essential for developing reliable traffic forecasts. As part of the joint POLA/POLB Transportation Study (June 2001), a truck driver survey was previously conducted. The survey requested the following types of information from the drivers for both the inbound and outbound trip:

- Truck type (bobtail, chassis, container, other)
- Origin/destination of load (off-dock intermodal facility, industrial facility/warehouse, another port terminal, other)
- Origin/destination location (city or major cross streets)
- Specific streets/freeways that were used for the trip

The surveys were generally distributed over a 4-hour period two hours in the morning (generally 10 AM to noon) and two hours in the afternoon (generally 2 PM to 4 PM) on separate days at the marine container terminal gates. Some survey times varied because the terminals themselves handed out and collected the surveys throughout the day. The survey dates and times were also coordinated with the traffic data collection effort.

Origin/Destination Survey Results

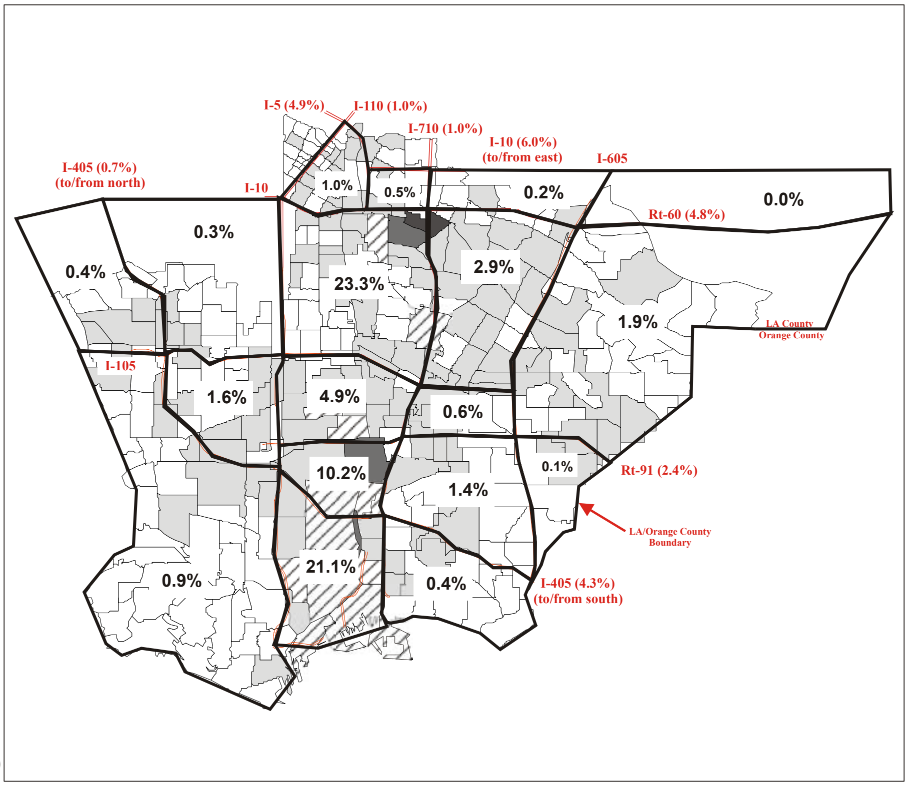
A total of approximately 10,000 survey forms were handed out to drivers. Of those, approximately 3,300 or 33 percent were returned, which represents a very high return rate. Wherever possible, valid survey responses were used even if a survey form was only partially completed. Surveys with invalid answers and those that were not legible were not included in the results. As indicated, approximately one quarter of the surveyed trucks were bobtails, over two-third were containers, and the balance were chassis (six percent). Trip distribution to the off-dock rail yards ranges from 40 to 50 percent, with 15 to 20 percent to other terminals and 35 to 40 percent to other private warehouse or industrial facilities.

The surveys were also used to develop detailed origin/destination "trip tables" for use in the Port area travel demand model. The stated trip origin and destination from every valid survey was correlated with the travel demand model traffic analysis zone (TAZ) system. The survey results were then used to develop a port truck origin/destination matrix for use in the model.

The matrix includes a unique trip interchange percentage between every port marine container terminal and each of the model's traffic analysis zones. This includes not only trips from marine terminals to land uses outside the ports, but also "inter-terminal" trips from one marine terminal to another marine terminal. Inter-terminal trips are primarily bobtail trips that occur after a load or empty has been dropped at another terminal. If the truck driver does not have a second load on the outbound trip, a linked trip to another marine terminal may be made to pick up another load. These linked trips are accounted for in the model based on the terminal to terminal interchanges that were observed from the truck driver data. Up to 20 percent of total truck trips may be to/from another terminal (and up to 50 percent of bobtail trips may be inter-terminal). These data are subsequently used to distribute port truck trips within the modeling area. Exhibits 8 and 9 illustrate the port truck trip distribution patterns.

Terminal Workers/Employees Distribution

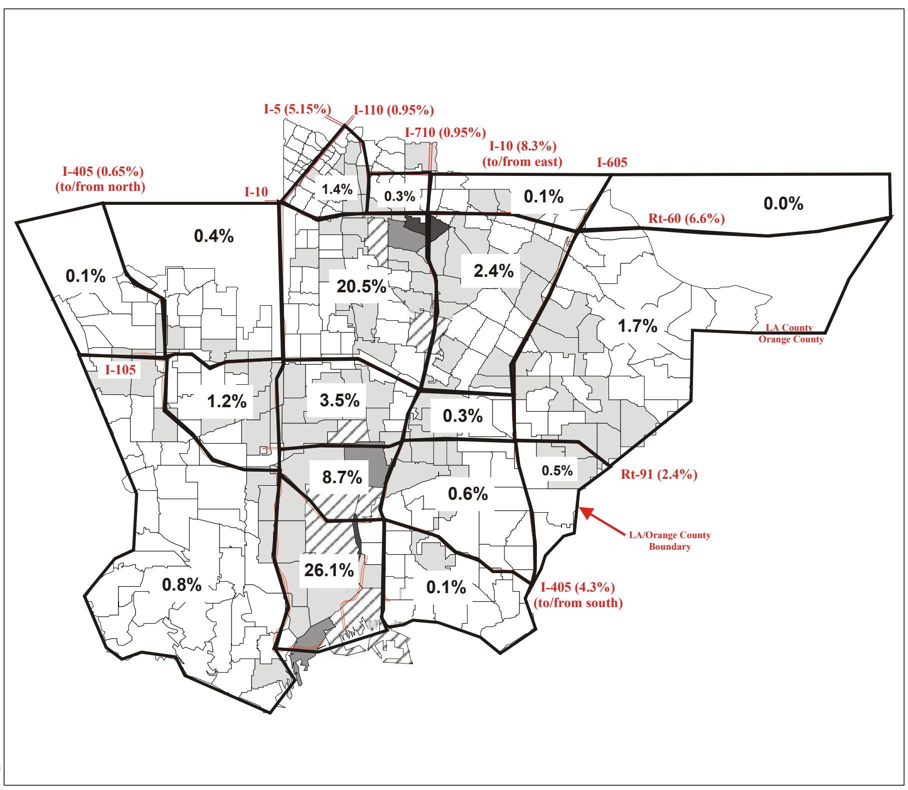
Place of residence zip code data for longshore workers was obtained for ILWU Locals 13, 63, 94 and the casual hall. That database includes the place of residence ZIP code for each worker. As with the truck driver survey data, the place of residence ZIP codes were correlated with the port travel demand model TAZ system. By correlating the employee residence data to the model TAZ system, the employee trip making patterns are precisely patterned in the model. Using traffic counts conducted at the union halls and also data obtained from the Pacific Maritime Association, those workers that are dispatched from the hall were distinguished from those that report directly to the terminals. Hence, the dispatched workers are reflected in the model as "linked" trips: one trip from their home to the hall, and then to the marine terminal. The union worker place of residence data indicates that a significant proportion of workers live in the San Pedro, Palos Verdes Peninsula, Long Beach and South Bay areas.



Legend

Truck Trip Distribution per Traffic Analysis Zone	Category Aggregate Total %
0%	0%
< 1%	40.3%
1% - 3%	28.0%
4% - 6%	0%
7% - 9%	21.1%
10% - 12%	10.6%

Exhibit 8
Driver Survey
Trip Origin
(Total POLB & POLA)



Legend

Truck Trip Distribution per Traffic Analysis Zone	Category Aggregate Total %
0%	0%
< 1%	40.4%
1% - 3%	19.0%
4% - 6%	20.7%
7% - 9%	0%
10% - 12%	19.9%

Exhibit 9
Driver Survey
Trip Destination
(Total POLB & POLA)

5. PORT AREA TRAVEL DEMAND FORECASTING MODEL

Model Development

This section describes the development and application of a fully dynamic travel demand forecasting (TDF) model for the Ports study area, generally based on the Southern California Association of Governments' (SCAG) Regional Travel Demand Forecasting Model. Elements of the SCAG Heavy Duty Truck (HDT) model were used, as well as input data from the City of Long Beach model and the City of Los Angeles Transportation Improvement Mitigation Program (TIMP) models for Wilmington and San Pedro. TRANPLAN is the software platform used for modeling.

The SCAG Regional Model, which was developed originally from the Caltrans LARTS model, is the basis and "parent" of most subregional models in the southern California five-county region, comprised of Ventura, Los Angeles, Orange, San Bernardino, and Riverside counties. At the regional level, this model has the most comprehensive and up to date regional data –for both existing and future conditions- on housing, population, employment, and other socio-economic input variables used to develop regional travel demand forecasts. The model has over 2000 zones and a complete network of regional transportation infrastructure, including over 1,000 miles of freeways and over 7,000 miles of major, primary, and secondary arterials.

For purposes of subregional transportation analysis, the SCAG model provides the most comprehensive and dynamic tool to forecast the magnitude of trips and distribution of travel patterns anywhere in the region. However, by virtue of its design and function, the Regional Model is not (and cannot be) very detailed and precise in any specific area of the region. This is also the case in the Ports of Long Beach and Los Angeles focus area. Therefore, the model has been comprehensively updated and detailed in the Port focus area.

Although the SCAG parent model was used as the basis for the Port focus-area model, considerable refinements and modifications were made in the focus area. The model focus area is generally bounded by State Route 91 to the north, the Pacific Ocean to the west and the Los Angeles/Orange County line to the east. Exhibit 10 displays the model flow chart and illustrates the relationship of the regional model to the Port area focus model. As shown, the SCAG regional model is maintained throughout the region, with specific refinements made in the focus area. The following major refinements were made to the model to provide accurate local area traffic forecasting capabilities:

Port Focus Travel Demand Model
Generalized Flow Chart

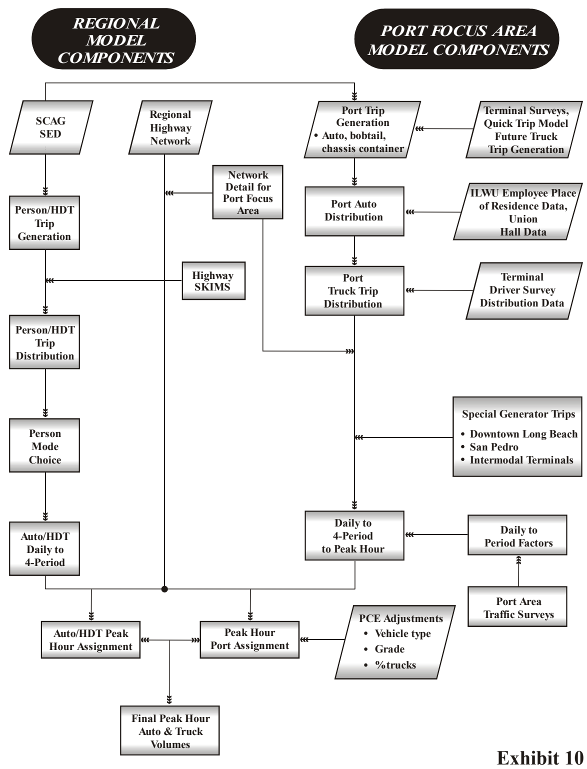


Exhibit 10

- Network refinements to the local roadway system and the freeway system in the focus area.
- Traffic model zone system refinement in the focus area to develop smaller and more discrete zones and loading points
- Trip generation refinements to provide more accurate assignment of special generator trips such as those in downtown Long Beach and San Pedro
- Development of highly detailed port network and zone system to provide localized accuracy in the port focus area.

These model refinements are described in more detail below.

Relationship With the Regional Heavy Duty Truck (HDT) Model

The HDT Model is developed as an adjunct component to the SCAG Regional Travel Demand Model. The HDT model develops explicit forecasts for heavy duty vehicles with a gross vehicle weight (GVW) of 8,500 pounds and higher. The HDT model includes trip generation, trip distribution and network traffic assignment modules for heavy duty trucks stratified by three heavy duty truck gross vehicle weight classifications, as follows:

Light-Heavy-- 8,500 to 14,000 GVW
Medium-Heavy-- 14,000 to 30,000 GVW
Heavy-Heavy-- over 30,000 GVW

The HDT Model utilizes the SCAG Regional Model network for its traffic assignment process without major refinements and additions to the network. However, several network modifications are implemented including: link capacity enhancements, truck prohibitions, and incorporation of truck PCE factors. All of these were carried forward into the port focus area model.

Highway Network. A highly detailed highway network structure was developed for the focus area. This network includes all arterial and major local access facilities within the ports, as well as precise representations of all study intersections. Separate networks were coded for AM and PM peak hour analysis. The network was coded such that it represents the vehicular access patterns to and from each terminal area. Freeway facilities within the focus area were coded in a double-line (one-way link) format and freeway interchanges were coded in a realistic format to simulate the actual ramp configurations as closely as possible. The highway network within the focus area was also refined to match to the sub-census tract level detail of the refined TAZs. Outside the focus area the model network remains at the SCAG regional network level with the exception of the freeways that were "double-lined". Roadway features which were reviewed, verified and refined included, number of lanes, posted and free-flow speeds, capacities, turn restrictions, additional features (e.g. delay) to simulate bridge tolls, highway/bridge grades and other geometric restrictions. Some of these are discussed in more detail below.

Coding of Highway Grades and Reduced Capacities. Another important feature which was explicitly accounted for and coded to the network are locations of steep uphill and downhill grades. These include the Gerald Desmond Bridge and the Vincent Thomas Bridge.

Implementation of Truck Passenger Car Equivalencies (PCEs). The presence of vehicles other than passenger cars in the traffic stream affects traffic flow in two ways: (1) these vehicles, which are much larger than passenger cars, occupy more roadway space (and capacity) than individual passenger cars, (2) the operational capabilities of these vehicles, including acceleration, deceleration and maintenance of speed, are generally inferior to passenger cars and result in formation of large gaps in the Traffic stream that reduce the highway capacity. On long, sustained grades, and segments with impaired capacities, where trucks operate considerably slower, formation of these large gaps can have a profound impact on the traffic stream.

The HDT Model has developed customized and detailed PCE factors for southern California conditions by the three heavy duty truck weight classes, as well as highway grades and percent of trucks in the traffic stream. These PCE factors are contained in a series of lookup tables, which are referenced and called up by special codes in the model's highway network, and are applied to the truck volumes in the assignment process. This process, which has been successfully tested as part of the HDT Model, has been applied to the Port Area model, with appropriate local customizations.

Trips From Other Non-Port Zones. Trips generated by other major developments within the focus study area, as described above, and for those for which specific trip rates were not calculated were added to the model at the appropriate TAZ locations. Those include Queens Way Bay, Cabrillo Marina, and the Port of Los Angeles Industrial Center.

Traffic Assignment. Daily trip tables from all different types of trips were be divided by SCAG's AM, PM, midday and off-peak periods. Daily to period conversion factors were derived from the SCAG model and the next step was to develop peak period to peak hour conversion factors for the focus area. Those factors were developed by reviewing local area traffic counts and they were modified to achieve the best model validation results. The resulting model includes unique hourly trip tables, which match the peak hour trip generation estimates that were developed for the Port zones. The hours for which trip tables have been developed include 8 to 9 AM, 2 to 3 PM, and

4 to 5 PM, representing the AM peak hour, mid-day peak hour and PM peak hour. Equilibrium type multi-class assignments are used for the peak hour traffic assignments.

Post-Processing of Model Assignment Results. To expedite processing and refinement of the model results a detailed intersection and highway link post-processor module was added to the assignment component. The post-processor is directly linked to the model to produce refined turning movement and link volumes in an automated format.

The model intersection volume post processor is a two-step procedure. First, intersection approach and departure volumes by traffic movement from the base (existing conditions) model are compared to actual approach and departure volumes from ground counts. Based on that comparison, adjustment factors (the difference in volumes by traffic movement) are developed for the model volumes so that they match the ground counts. That same adjustment factor (difference) is then carried forward to the future 2010 and 2025 models. For example, if the model underestimates a given intersection traffic movement by 150 vehicles, then an adjustment of 150 added vehicles is made to that movement volume for future model runs, where applicable. In this way, the localized micro-level inaccuracies in the model are accounted for and corrected at the intersection level. In some cases the adjustment should not be applied because so many other background changes to terminal operations and/or the roadway network will occur in the vicinity of the intersection that current turning movement patterns will not be carried forward to year 2010 and 2025 conditions.

The second element of the post-processor model is the balancing of approach, departure and the intersection turn movements. Travel demand model output from any model can be somewhat coarse based on the size of zones, location of zone centroid connectors, the accuracy of the distribution and assignment process and other factors. Because of this, models sometimes have a higher accuracy in producing link volumes than turning movements. Therefore some turning movements need further adjustments to reflect more likely patterns. A second model post-processing technique is applied at some intersections. This second adjustment uses the factored (corrected) turning movement volumes as described above, plus existing intersection turning movements. The post-processor model then balances the future approach, departure and turn movements to account for the generalized patterns that occur in the ground counts, as well as the growth patterns that are indicated by the travel demand model. The end result is a set of future turning movements that reflect the model output at the link (approach and departure) level, but also reflect reasonable turning movement patterns based on existing left, through and right turn splits. As with the turning movement adjustments, balancing adjustments are only applicable at some locations where general conditions are expected to remain similar to current operations. Where significant changes in turning movement splits are anticipated, this adjustment should not be applied or the future volumes will accurately not reflect future traffic patterns.

Future Baseline Projects

The following proposed and programmed changes/improvements to the base transportation network were assumed for purposes of the future base model runs and analysis (2010 and 2025):

<u>Terminal Island Freeway/Ocean Boulevard/Henry Ford Avenue Interchange</u> – The future model networks assume implementation of the interchange improvement project including grade separation of all east/west through movements and reconfiguration of turning movements at Henry Ford Avenue and Ocean Boulevard.

<u>Alameda Street</u> – Alameda Street will be restriped to three through lanes in each direction north of Henry Ford Avenue.

<u>Harry Bridges Boulevard Realignment</u> – The Harry Bridges Boulevard realignment project from I-110 to south of Alameda Street is included in the model network. This will include a new I-110 Freeway ramp intersection at Harry Bridges Boulevard where the current C Street ramps are located. In addition, there will be modifications to access along Harry Bridges Boulevard and the roadway will be shifted north to join a portion of the current alignment of C Street.

<u>Marine Terminal Access</u> – There are many changes to access points for various marine terminals due to terminal reconfiguration and the development of mega-terminals. For each future terminal, terminal design plans were reviewed where available and the terminal access was changed in the model to reflect the modified access points for existing terminals or the new access points for new terminals.

6. 2010 and 2025 TRIP GENERATION/TRAFFIC PROJECTIONS

Cargo Growth Forecasts

The most basic, and most critical, data driving the transportation forecasts is future Port throughput in terms of containers and TEUs (Twenty Foot Equivalent Units). To determine future container throughput for the Port's container terminal areas, two sources of information that relate to the container volume capacity and demand projections for the San Pedro Bay area were utilized.

The first source of information, the Mercer Management Consulting Study dated July 2001, evaluated the potential container throughput demand for the San Pedro Bay Ports including both the Port of Los Angeles and the Port of Long Beach. This market-based forecast was prepared by Mercer Management Consulting to project long-term trends for various types of waterborne cargo including containerized cargo. Mercer examined a wide range of market conditions, trade scenarios, demographics, trade barriers, and economic models for trading partners on a global basis. Although this forecast does examine general infrastructure and cargo handling capabilities of both the POLA and POLB, it is primarily a demand based market forecast that projects the volume of cargo that could be handled at the San Pedro Bay Ports provided the physical capacity to do so was unconstrained.

The second source of information utilized was the November 2002 JWD Capacity Analysis Report. This report evaluated the physical capacity of POLA's existing and planned container terminal expansion for the years 2002, 2005, 2010, and 2025. Unlike the previous forecast approach, this report examined the physical throughput capacity of each terminal based on a detailed analysis of berthing and backland operational criteria. Changes to operational labor practices, increased hours of operation, ship sizes, container stacking heights, and other factors were built into a capacity analysis model that calculated the future years throughput capacity for the berths and backland areas independently for each terminal. The report also determined whether the backland or berth was the limiting factor for each terminal and reported an overall terminal capacity for each of the analysis years.

The Mercer Forecast and the JWD Capacity Report resulted in a different range of throughput projections for each of the analysis years. This was expected since each study approached the future container volumes from different perspectives. However the results of each study were nevertheless useful in developing realistic projections for the Terminal areas for POLA. The POLA goal was to develop realistic thoughput projections that considered both the available market demand (Mercer) as well as the physical capacity of the terminals (JWD).

The technique used for each container terminal was to first apply a growth factor or 10% per year increase to the 2001/2002 actual throughput data and compare that to the JWD capacity for the year 2005 for each terminal. A growth factor of 10% per annum was considered to be at the high end of expectations. The lesser of these two numbers on a terminal-by-terminal basis was established as the projected throughput for year 2005. Next compared the 2025 Mercer port-wide demand value was compared with the JWD 2025 capacity. The lesser of these numbers was established as the projected 2025 throughput for each terminal. Finally a straight-line projection from 2005 to 2025 was performed to establish the 2010 projections for each terminal. Once added up, the sum total represents the total amount of throughout that is feasible in the POLA given the expected terminal configurations and terminal acreages.

Future Scenarios

Two 2010 and two 2025 scenarios have been developed. For the first 2010 scenario, for the Port of Long Beach, the difference between the Mercer projection and the POLA capacity projections was used. That is, the Mercer projections show total demand for both ports, and the previously described POLA methodology indicate how much the POLA container terminals will handle. The remainder, by default, is assumed to move through the POLB. Therefore, the POLA and the POLB have somewhat different estimates of throughput in 2010 however; the total is still consistent with the regional Mercer estimates. As indicated, the two ports are projected to carry 19,694,000 TEUs in 2010, and 47,184,000 TEUs in 2025. As a comparison, the throughput in 2002 was 9,908,787. Therefore, the growth rate between 2002 and 2010 is projected to be 99 percent, and 376 percent by 2025. It is important to note that the growth in truck trips is lower than the growth in throughput due to the increase in on-dock rail that will occur, as well of the operational changes. It is also important to note that both 2010 alternatives are considered to be very conservative. The assumed TEU throughout scenarios for 2010 are not likely to occur until later years beyond 2010, however they are assessed at these levels in order to ensure that the "worst case" is being studied for the interim year of 2010.

To summarize, the following 2010 and 2025 scenarios have been applied for purposes of analysis:

- 2010 "POLA Capacity/Mercer Constrained" Scenario – Assumes total of 19,692,000 TEU throughput in both ports, with POLA TEUs based on terminal capacity and POLB taking the remainder. Also assumes some changes to terminal operating parameters.

- 2010 "POLA/POLB Mercer Unconstrained" Scenario – Assumes total of 26,957,800 TEU throughput, with each port taking 50% of the throughput.

- 2025 "Modified 24-Hour Operations" Scenario 1 – Assumes 47,184,000 TEU throughput in both ports combined, split equally among the two ports. Assumes some changes to terminal operating parameters including expanded gate hours during weekdays, expanded use of weekend operations, more on-dock rail, etc. However, this scenario is more conservative in that it does not assume full use of expanded gate hours. The assumed Shift Split is 60% of throughput during the day shift and 20% in each of the night and hoot shifts.

- 2025 "Modified 24-hour Operations" Scenario 2– Assumes major changes to terminal operating parameters including maximum use of on-dock rail, maximum use of extended gate hours and full application of all other foreseeable operations changes to take port truck traffic away from the peak commute hours operation. This is the "best case" scenario, and it actually may result in reduced port trucks during peak hours at some locations as compared to 2010, when such drastic changes to terminal operations are not assumed. The assumed Shifts Split is 40% during the day, 40% night and 20% hoot Shift.

On-Dock Rail Capacities

The on-dock terminals vary considerably in their capacity, efficiency, and ease of operation. Moreover, the numerous on-dock terminals are not presently operated as a system; i.e., most terminals do not share each other's railyards. As intermodal volumes significantly increase over the next 20 years, and as roadway congestion worsens and impacts drayage, on-dock use will also increase. To accommodate this demand, the Ports are expanding their railyards.

Determining maximum potential capacity is important in estimating future on-dock rail mode use, which is a critical factor in the trip generation model. The potential capacity of on-dock yards is compared to current on-dock use to then estimate future on-dock use. Table 3 presents the assumed on-dock railyard capacities for 2010 and 2025.

Non-Container Cargo Forecasts

The non-containerized "High Growth" forecasts contained in the 1998 "San Pedro Bay Ports Long-Term Cargo Forecast" (Mercer Management Consulting, Inc.) were used. Like the container forecasts, 50% of each commodity type was allocated to both Ports. Subsequent to the allocation to both Ports, metric tonnage forecasts of specific commodities or commodity categories were allocated to as many individual terminals as possible. In particular, the following commodities were apportioned to specific terminals in one or both Ports: autos, cement, bauxite/other base metal ores (gypsum terminals), petroleum coke, coal, crude petroleum, general petroleum products, specialty chemicals, lumber, newsprint, and general break-bulk.

2010 Container Terminal Truck Trips

The Quicktrip model was used to estimate 2010 truck trips for each planned/proposed container terminal. The 2010 container forecasts are 19,694,000 and 26,957,800 TEUs for the two scenarios. As described previously, the total TEUs were allocated equally between the two ports for the larger scenario, and weighted toward the POLA for the smaller scenario. The terminal operations parameters for both 2010 scenarios are considered realistic given actual current terminal operations. For example, regarding the weekday second and hoot shift operations, the Hanjin.

Regarding intermodal logistics, it is expected that appointment systems will facilitate the shifting of truck trips to off-peak periods in concert with the extended gate hours. The increase in street turns has a very minor effect on trip generation because it is governed by local export volumes as opposed to import volumes. A modest increase in street

Table 3
Years 2010 and 2025 On-Dock Rail Percentage Assumptions

Terminal	Year 2010		Year 2025	
	Terminal Capacity	Balanced POLA/POLB	24-Hour Operations	Modified Operations
Port of Long Beach				
Pier A	59%	27%	27%	27%
Pier C	0%	0%	0%	0%
Pier D/E/F	19%	9%	27%	27%
Pier G/J	32%	15%	18%	18%
Pier J South	28%	13%	29%	29%
Pier S	26%	12%	12%	12%
Pier T	53%	25%	24%	24%
Mole Landfill	-----	-----	25%	25%
Total POLB	35%	16%	23%	23%
Port of Los Angeles				
Berth 100-131	15%	15%	27%	27%
Berth 136-147	13%	13%	31%	31%
Berth 206-209	0%	0%	0%	0%
Berth 212-225	31%	31%	37%	37%
Berth 226-236	23%	23%	25%	25%
Berth 302-305	25%	25%	40%	40%
Berth 401-406	23%	23%	38%	38%
Total POLA	21%	21%	32%	32%
Total Ports	26%	19%	27%	27%

to import volumes. A modest increase in street turns was assumed and it is envisioned that the appointment system would also facilitate this intermodal activity.

Table 4 illustrates 2010 container terminal truck trips and the percent growth compared to 2001.

As shown, daily trips are projected to increase 33% and 97% for the POLA/Mercer Constrained Scenario and POLA/POLB/Mercer Unconstrained, respectively, while peak truck trips are expected to increase from 25% to 94%, varying by scenario and time of day. Daily truck trips are expected to increase from almost 45,000 to 59,500 under the POLA/Mercer Constrained Scenario and 87,700 under the POLA/POLB/Mercer Unconstrained Scenario.

<u>2025 Container Terminal Truck Trips</u>

The Quicktrip model was used to estimate 2025 truck trips for each planned/proposed container terminal. The 2025 container forecast is 47,184,000 TEUs, which represents a growth of 37.3 million TEUs (376 percent increase) over 2002 container volumes. As described previously, the total TEUs were allocated equally between the two ports for the 2025 scenarios. Two trip generation scenarios have been analyzed for 2025, the Modified 24-hour Operations Scenario 1 and the 24-hour Operations Scenario 2.

Table 4
2010 Marine Container Terminal Truck Trip Generation Estimates POLB and POLA Combined
(average day during peak month using Quicktrip model)

Scenario (1)	Container Terminal Truck Trip Generation Estimates				Percentage Change from Existing			
	AM Peak (8-9 AM)	Mid-day Peak (2-3 PM)	PM Peak (4-5 PM)	Daily	AM Peak (8-9 AM)	Mid-day Peak (2-3 PM)	PM Peak (4-5 PM)	Daily
Existing	3,440	5,160	3,255	44,595	-	-	-	-
2010 POLA Capacity/Mercer Constrained Scenario	4.610	6,455	4,210	59,455	34%	25%	29%	33%
2010 POLB/POLA/Mercer Unconstrained Scenario	6,725	9,475	6,330	87,710	95%	84%	94%	97%

Notes: (1) Estimated truck trips represent total driveway truck trips at the terminals and are not adjusted for inter-terminal linked trips which will not reach the regional roadway system.

Considering the expected cargo growth in the next twenty years, it highly conceivable that most or all entities in the supply chain will expand their hours of operations. Also, the terminals will need to extend their gate hours simply to handle the expected volumes because of limits on gate sizes. Consequently, the 2025 Modified 24-hour Operations Scenario 2, entails more changes in terminal operations and intermodal logistics from the 2010 scenario. The 2025 Modified 24-hour Operations Scenario 2 represents the most changes assumed in operations and is the "best case," in terms of reduced truck trips. That scenario entails additional spreading of the gate movements throughout the entire day (almost representing a 24 hour weekday operation) and 20 percent weekend operations. Conversely, the 2025 Modified 24-hour Operations Scenario 1 represents the fewest operational changes and represents the "worst case" in terms of truck trip making. This scenario was analyzed for comparative purposes to present a conservative "what-if" scenario.

Using these input parameters, Quicktrip was used to estimate future truck trip generation for each terminal for each scenario. Table 5 illustrates the trip generation forecasts for the two 2025 scenarios as compared to existing estimates. As can be seen, the 2025 Modified 24-hour Operations Scenario 1 would result in an approximate 172 percent increase in daily truck trips and a 90% to 126% percent increase in peak hour trip generation (varies by time of day). This is compared to an increase in TEU throughput of approximately 375 percent. The 2025 24-hour Operations Scenario 2 would result in an approximate 149 percent increase in daily truck trips, but much lower increases during peak hours of only 16 to 46 percent. The reasons why the truck trip growth is lower than the TEU throughput growth (which is approximately 376 percent) is as follows: increased on-dock rail usage, increased weekend operations, and expanded hours of weekday operations (which translates to increased gate movements during the second and hoot shifts).

Table 5
2025 Container Terminal Truck Trip Generation POLB and POLA Combined

Scenario (1)	Container Terminal Truck Trip Generation Estimates				Percentage Change from Existing			
	AM Peak (8-9 AM)	Mid-day Peak (2-3 PM)	PM Peak (4-5 PM)	Daily	AM Peak (8-9 AM)	Mid-day Peak (2-3 PM)	PM Peak (4-5 PM)	Daily
Existing	3,440	5,160	3,225	44,595	-	-	-	-
2025 Modified 24-hour Operations Scenario 1	7,775	9,780	6,480	121,395	126%	90%	99%	172%
2025 Modified 24-hour Operations Scenario 2	5,035	5,970	3,845	110,995	46%	16%	18%	149%

Notes: (1) Estimated truck trips represent total driveway truck trips at the terminals and are not adjusted for inter-terminal linked trips which will not reach the regional roadway system.

Total Ports Area Trip Generation

Tables 6 and 7 summarize Ports area truck and auto trip generation for all facilities and include vehicle trips as well as passenger car equivalents (PCE). It should be noted that the non-container terminal facilities include all facilities within the Ports' districts, which is generally defined as follows: Harbor Scenic Drive/I-710 on the east, Anaheim Street/Alameda Street/Harry Bridges Boulevard on the north, and John S. Gibson Boulevard/Harbor Boulevard on the west. The non-container terminal facility trip generation forecasts listed in the tables exclude the following facilities: Cabrillo Marina, Ports of Call Village, Los Angeles World Cruise Center, Queen Mary Seaport Development, proposed new Carnival Cruises Terminal adjacent to the Queen Mary, Ports of Long Beach and Los Angeles Administration Buildings. These facilities are accounted for in the model, but are merely not listed in the summary tables because of the manner in which the model was developed and the difficulty in isolating certain facilities. The non-container terminal estimate includes all facilities on Terminal Island (i.e., Coast Guard Base, the federal prison, and the US INS facility is included). These facilities generated a nominal amount of traffic.

Table 6
Port Area 2010 Truck and Auto Trip Generation Forecasts

Trip Type	AM Peak		Mid-day Peak		PM Peak		Daily	
	Vehicles	PCE	Vehicles	PCE	Vehicles	PCE	Vehicles	PCE
Existing								
Container Truck	3,440	5,635	5,160	8,445	3,255	5,330	44,595	73,090
Container Auto	1,220	1,220	730	730	1,770	1,770	15,270	15,270
Non-Container Truck	850	1,700	840	1,680	1,280	2,560	4,980	9,960
Non-Container Auto	3,715	3,715	3,810	3,810	4,835	4,835	18,995	18,995
Total Existing Trips	9,225	12,270	10,540	14,665	11,140	14,495	83,840	117,315
2010 "POLA Capacity/Mercer Constrained"								
Container Truck (1)	3,680	6,555	5,155	9,195	3,370	6,010	47,505	84,680
Container Auto	1,765	1,765	1,060	1,060	2,565	2,565	27,625	27,625
2010 "POLA/POLB/Mercer Unconstrained"								
Container Truck (1)	5,370	9,570	7,570	13,495	5,060	9,025	70,080	124,925
Container Auto	2,415	2,415	1,450	1,450	3,510	3,510	37,815	37,815
2010 Non-Container Truck	1,330	2,660	1,110	2,220	800	1,600	8,510	17,020
2010 Non-Container Auto	2,135	2,135	2,325	2,325	2,850	2,850	18,995	18,995
2010 "POLA Capacity/Mercer Constrained" Truck	5,010	9,215	6,265	11,415	4,170	7,610	56,015	101,700
2010 "POLA Capacity/Mercer Constrained" Auto	3,900	3,900	3,385	3,385	5,415	5,415	46,620	46,620
Total 2010 POLA Capacity/Mercer Constrained	8,910	13,115	9,650	14,800	9,585	13,025	102,635	148,320
2010 "POLA/POLB/Mercer Unconstrained" Truck	6,700	12,230	8,680	15,715	5,860	10,625	78,590	141,945
2010 "POLA/POLB/Mercer Unconstrained " Auto	4,550	4,550	3,775	3,775	6,360	6,360	56,810	56,810
Total 2010 POLA/POLB/Mercer Unconstrained	11,250	16,780	12,455	19,490	12,220	16,985	135,400	198,755

Note: (1) Container truck trip forecasts exclude inter-terminal trips.

Table 7
Port Area 2025 Truck and Auto Trip Generation Forecasts

Trip Type	AM Peak		Mid-day Peak		PM Peak		Daily	
	Vehicles	PCE	Vehicles	PCE	Vehicles	PCE	Vehicles	PCE
Existing								
Total Existing Trips	9,225	12,270	10,540	14,665	11,140	14,495	83,840	117,315
2025 "Modified 24-Hour Operations Scenario 2"								
Container Truck (1)	4,180	7,620	4,955	9,035	3,195	5,830	92,120	167,920
Container Auto	2,115	2,115	1,270	1,270	3,070	3,070	66,185	66,185
2025 "Modified 24-hour Operations Scenario 1"								
Container Truck (1)	6,365	11,510	8,010	14,495	5,320	9,630	99,415	179,830
Container Auto	3,170	3,170	1,905	1,905	4,605	4,605	66,185	66,185
2025 Non-Container Truck	1,485	2,970	1,265	2,530	870	1,740	9,010	18,020
2025 Non-Container Auto	2,135	2,135	2,325	2,325	2,850	2,850	18,995	18,995
2025 "Modified 24-Hour Operations Scenario 2" Truck	5,665	10,590	6,220	11,565	4,065	7,570	101,130	185,940
2025 "Modified 24-Hour Operations Scenario 2" Auto	4,250	4,250	3,595	3,595	5,920	5,920	85,180	85,180
Total 2025 "24-Hour" Trips	9,915	14,840	9,815	15,160	9,985	13,490	186,310	271,120
2025 "Modified 24-hour Operations Scenario 1" Truck	7,850	14,480	9,275	17,025	6,190	11,370	108,425	197,850
2025 "Modified 24-hour Operations Scenario 1" Auto	5,305	5,305	4,230	4,230	7,455	7,455	85,180	85,180
Total 2025 "Modified" Trips	13,155	19,785	13,505	21,255	13,645	18,825	193,605	283,030
Note: (1) Container truck trip forecasts exclude inter-terminal trips								

Bridge to Breakwater Project

The POLA Baseline Transportation Study began before the Bridge-to-Breakwater project planning was underway. The traffic model for this study considered development based on the WATCH report. With approval from Port staff, approximately 300,000 square feet of retail and commercial development was added to the model to account for waterfront growth. At this time it appears that significantly more development than the 300,000 square feet may be included in the final plan, however, the project is not far enough along to have a recommendation or final conclusion. The Bridge-to-Breakwater planning project will have a separate traffic study, as development options are determined. In addition, the Transportation Master Plan will utilize the most up-to-date and accurate development estimates.

7. Year 2010 and 2025 Deficiency Analysis

The traffic model was run for the two 2010 and two 2025 scenarios, and the results are presented in this section. Presented in this section are the results of the traffic assignments in terms of where future increases in Port traffic are expected to occur, and the impacts of that traffic on the 31 study intersections. The results are presented for 2010 and 2025 separately.

<u>2010 Intersection Level of Service Analysis</u>

Table 8 presents the results of the LOS analysis for the two 2010 scenarios. Exhibits 11 and 12 illustrate the projected deficiency locations in terms of poor levels of service at critical intersections for the POLA Capacity/Mercer Constrained scenario and the POLA/POLB/Mercer Unconstrained scenario, respectively. An intersection deficiency is defined as a location where the projected level of service is LOS E or LOS F in the future. Also indicated is the relative magnitude of truck volumes at the deficient intersections. Intersections have been stratified into those with less than and greater than 20 percent trucks. As indicated, for the Constrained scenario, there are 12 locations with projected LOS E or F conditions, and for the Unconstrained scenario there are 13 locations projected to operate at LOS E or F.

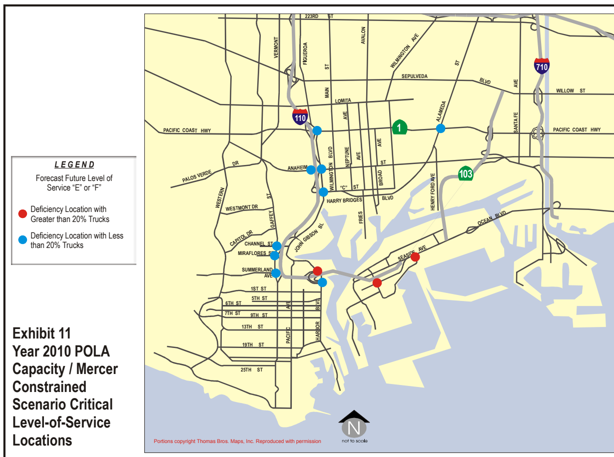


Exhibit 11
Year 2010 POLA Capacity / Mercer Constrained Scenario Critical Level-of-Service Locations

<u>2025 Intersection Level of Service Analysis</u>

Table 9 presents the results of the level of service analysis for the two 2025 scenarios. Exhibits 13 and 14 (on page 32) illustrate the added port auto volumes and Exhibits 15 and 16 (on page 33) illustrate added port truck volumes for the 2025 Modified Operations, scenario, which is considered the "worst case."

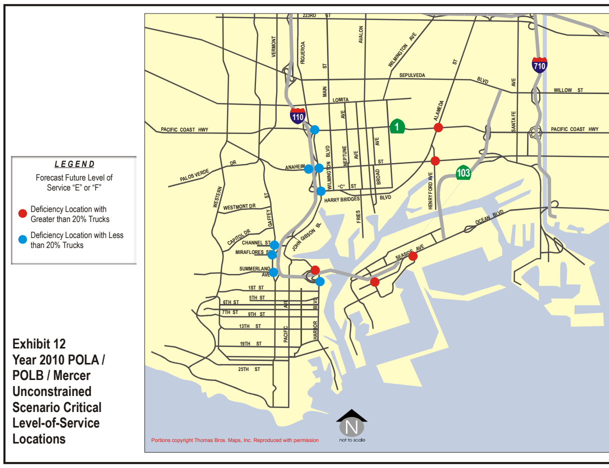


Exhibit 12
Year 2010 POLA / POLB / Mercer Unconstrained Scenario Critical Level-of-Service Locations

The purpose of the exhibits is to graphically illustrate the magnitude of added Port-related auto And truck trips on area roadways and intersections, and where Port growth will contribute the most added vehicles. As shown added trips are stratified into increments of 250 vehicles, into locations with up to 250 more peak hour trips, 250 to 499 trips, 500 to 749 trips and over 750 added trips. In each case, the only locations with over 750 added port trips are on Terminal Island and along Henry Ford Avenue and Alameda Street. Along Harry Bridges Boulevard, John S. Gibson Boulevard and Front Street. The Port growth is expected to add 230 autos during the AM peak hour to the I-110 Freeway just north of the port area, and 570 autos in the PM peak. Exhibits 17 and 18 (page 33) illustrate the projected deficiency locations for the 2025 24- hour and Modified Operations scenarios 1 and 2. As shown, 17 locations are projected to operate at LOS E or F under Scenario 2, and 21 under the Scenario 1.

<u>Vincent Thomas Bridge Analysis</u>

There are only three ways to access the Terminal Island container terminal facilities, the Gerald Desmond Bridge in Long Beach, the Heim Bridge in Long Beach, and the Vincent Thomas Bridge in the Los Angeles. Of those the three access routes, the Vincent Thomas Bridge is subject of analysis in this study as it is within the jurisdiction of the Port and City of Los Angeles.

Table 8
Year 2010 Intersection Level-of-Service Summary

Intersection		Existing				2010 POLA Capacity/Mercer Constrained Scenario				2010 POLA/POLB Mercer Unconstrained Scen.			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay
5	Gaffey St / Channel St	B	0.645	E	0.975	B	0.647	F	1.070	B	0.679	F	1.074
6	John S. Gibson Blvd / Channel St	A	0.586	B	0.678	A	0.575	C	0.744	B	0.642	C	0.733
15	Figueroa St / Pacific Coast Highway	F	1.018	E	0.974	F	1.117	F	1.213	F	1.126	F	1.240
16	Figueroa St / Anaheim St	F	1.015	D	0.834	F	1.043	E	0.939	F	1.109	E	0.974
21	Avalon Ave / Harry Bridges Blvd	A	0.253	A	0.394	A	0.347	A	0.468	A	0.368	A	0.492
22	Alameda St / PCH e/o Alameda St	A	0.582	C	0.793	C	0.736	D	0.841	D	0.812	D	0.884
22	Alameda St / PCH n/o PCH	A	0.582	C	0.793	C	0.717	E	0.970	D	0.805	F	1.014
23	Alameda St / Anaheim St	B	0.642	C	0.769	B	0.688	A	0.595	C	0.789	D	0.900
25	Henry Ford Ave / Deni St	C	17.6	B	8.4	A	0.184	A	0.594	A	0.193	A	0.577
26	Anaheim St / Henry Ford Ave	B	0.642	A	0.590	C	0.762	C	0.777	E	0.976	F	1.123
31	Harbor Blvd / SR-47 WB On-Ramp	A	9.5	B	10.2	B	12.7	F	98.1	C	15.3	F	138.5
32	Harbor Blvd / SR-47 EB Off-Ramp / Swinford St	D	0.816	F	1.123	F	1.072	F	1.736	F	1.036	F	1.653
33	Gaffey St / Miraflores St / I-110 SB Ramps	E	0.940	D	0.854	E	0.929	F	1.085	E	0.932	F	1.094
34	John S. Gibson Blvd / I-110 NB Ramps	A	0.511	A	0.420	B	0.606	B	0.694	B	0.667	B	0.682
36	Anaheim St / Figueroa Pl / I-110 Ramps	E	0.992	F	1.232	F	1.148	F	1.345	F	1.172	F	1.307
37	Figueroa St / I-110 Ramps / C St	B	12.0	C	18.1	D	0.872	F	1.245	E	0.968	F	1.286
38	Henry Ford Ave / TI Freeway Ramps	A	0.317	A	0.348	A	0.525	A	0.545	C	0.733	C	0.734
45	Gaffey St / Westmont Dr	A	0.522	C	0.788	A	0.520	D	0.871	A	0.541	D	0.880
46	Gaffey St / Capitol Dr	A	0.415	B	0.631	A	0.430	C	0.703	A	0.442	C	0.724
47	Gaffey St / Summerland Dr	A	0.563	D	0.870	B	0.644	F	1.124	B	0.615	F	1.142
53	Front St / Pacific Ave	A	0.554	A	0.448	B	0.639	B	0.698	B	0.690	C	0.717
69	Harry Bridges Blvd / Broad Ave	A	0.204	A	0.266	A	0.407	A	0.597	A	0.375	A	0.574
71	Eubank Ave / Pacific Coast Highway	A	0.433	A	0.552	A	0.434	B	0.629	A	0.426	B	0.648
72	Harry Bridges Blvd / Fries Ave	A	0.283	A	0.336	A	0.372	B	0.615	A	0.429	B	0.675
73	Harry Bridges Blvd / Neptune Ave	A	0.204	A	0.311	A	0.257	A	0.457	A	0.270	A	0.469
87	Ferry St / Vincent Thomas Bridge EB Ramp	A	0.261	A	0.429	A	0.592	E	0.920	A	0.590	E	0.972
89	Ferry St / Terminal Way	B	0.625	A	0.472	B	0.625	A	0.457	B	0.625	A	0.454
90	Earle St / Terminal Way	A	0.394	A	0.400	B	0.630	A	0.459	B	0.606	A	0.472
91	Alameda St / Sepulveda Blvd	A	0.382	A	0.434	A	0.540	A	0.533	A	0.536	A	0.533
92	ITCF Driveway / Sepulveda Blvd #1	A	0.349	A	0.565	A	0.354	A	0.562	A	0.559	B	0.629
95	Navy Way / Seaside Ave	A	0.516	A	0.589	C	0.784	F	1.106	D	0.809	F	1.119

Table 9
Year 2025 Intersection Level–of–Service Summary

Intersection		Existing				2025 Modified 24-Hour Operations Scenario 2				2025 Modified 24-hour Operations Scenario 1			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay	LOS	V/C or Delay
5	Gaffey St / Channel St	B	0.645	E	0.975	C	0.782	F	1.260	D	0.856	F	1.231
6	John S. Gibson Blvd / Channel St	A	0.586	B	0.678	E	0.918	E	0.940	E	0.930	E	0.920
15	Figueroa St / Pacific Coast Highway	F	1.018	E	0.974	F	1.488	F	1.364	F	1.600	F	1.420
16	Figueroa St / Anaheim St	F	1.015	D	0.834	F	1.441	F	1.182	F	1.606	F	1.220
21	Avalon Ave / Harry Bridges Blvd	A	0.253	A	0.394	A	0.426	A	0.497	A	0.461	A	0.511
22	Alameda St / PCH e/o Alameda St	A	0.582	C	0.793	F	1.042	F	1.046	F	1.150	F	1.077
22	Alameda St / PCH n/o PCH	A	0.582	C	0.793	E	0.992	F	1.171	F	1.098	F	1.202
23	Alameda St / Anaheim St	B	0.642	C	0.769	E	0.902	C	0.739	F	1.010	D	0.809
25	Henry Ford Ave / Deni St	C	17.6	B	8.4	A	0.243	A	0.588	A	0.249	A	0.567
26	Anaheim St / Henry Ford Ave	B	0.642	A	0.590	F	1.062	E	0.904	F	1.275	F	1.287
31	Harbor Blvd / SR-47 WB On-Ramp	A	9.5	B	10.2	D	25.8	F	63.5	F	85.6	F	137.7
32	Harbor Blvd / SR-47 EB Off-Ramp / Swinford St	D	0.816	F	1.123	F	1.561	F	2.100	F	1.540	F	2.083
33	Gaffey St / Miraflores St / I-110 SB Ramps	E	0.940	D	0.854	F	1.263	F	1.444	F	1.183	F	1.380
34	John S. Gibson Blvd / I-110 NB Ramps	A	0.511	A	0.420	F	1.048	F	1.011	E	0.998	E	0.962
36	Anaheim St / Figueroa Pl / I-110 Ramps	E	0.992	F	1.232	F	1.341	F	1.531	F	1.361	F	1.511
37	Figueroa St / I-110 Ramps / C St	B	12.0	C	18.1	F	1.372	F	1.496	F	1.644	F	1.711
38	Henry Ford Ave / TI Freeway Ramps	A	0.317	A	0.348	C	0.750	B	0.665	E	0.950	D	0.852
45	Gaffey St / Westmont Dr	A	0.522	C	0.788	C	0.775	F	1.163	C	0.791	F	1.133
46	Gaffey St / Capitol Dr	A	0.415	B	0.631	A	0.572	D	0.863	A	0.583	D	0.846
47	Gaffey St / Summerland Dr	A	0.563	D	0.870	D	0.845	F	1.341	D	0.851	F	1.354
53	Front St / Pacific Ave	A	0.554	A	0.448	D	0.871	C	0.788	E	0.939	C	0.780
69	Harry Bridges Blvd / Broad Ave	A	0.204	A	0.266	A	0.333	A	0.549	A	0.350	A	0.581
71	Eubank Ave / Pacific Coast Highway	A	0.433	A	0.552	A	0.536	C	0.754	B	0.612	C	0.764
72	Harry Bridges Blvd / Fries Ave	A	0.283	A	0.336	B	0.645	D	0.833	C	0.770	E	0.917
73	Harry Bridges Blvd / Neptune Ave	A	0.204	A	0.311	A	0.337	A	0.533	A	0.374	A	0.550
87	Ferry St / Vincent Thomas Bridge EB Ramp	A	0.261	A	0.429	B	0.607	D	0.827	C	0.727	F	1.133
89	Ferry St / Terminal Way	B	0.625	A	0.472	B	0.625	A	0.455	B	0.669	A	0.484
90	Earle St / Terminal Way	A	0.394	A	0.400	A	0.540	A	0.411	A	0.582	A	0.510
91	Alameda St / Sepulveda Blvd	A	0.382	A	0.434	B	0.665	B	0.645	B	0.674	C	0.708
92	ITCF Driveway / Sepulveda Blvd #1	A	0.349	A	0.565	A	0.389	A	0.578	A	0.500	A	0.490
95	Navy Way / Seaside Ave	A	0.516	A	0.589	F	1.009	F	1.186	F	1.045	F	1.276

LEGEND

- up to 250 Auto Trips
- 250 – 499 Auto Trips
- 500 – 749 Auto Trips
- Over 750 Auto Trips

Exhibit 13 Year 2025 Modified 24-Hour Operations Scenario 1 Port Auto Added Volumes - AM Peak Hour

LEGEND

- up to 250 Auto Trips
- 250 – 499 Auto Trips
- 500 – 749 Auto Trips
- Over 750 Auto Trips

Exhibit 14 Year 2025 Modified 24-Hour Operations Scenario 1 Port Auto Added Volumes - PM Peak Hour

LEGEND

- up to 250 Auto Trips
- 250 – 499 Auto Trips
- 500 – 749 Auto Trips
- Over 750 Auto Trips

Exhibit 15
Year 2025 Modified 24-Hour Operations Scenario 1 Port Truck Added Volumes - AM Peak Hour

LEGEND

- up to 250 Auto Trips
- 250 – 499 Auto Trips
- 500 – 749 Auto Trips
- Over 750 Auto Trips

Exhibit 16
Year 2025 Modified 24-Hour Operations Scenario 1 Port Truck Added Volumes - PM Peak Hour

LEGEND

Forecast Future Level of Service "E" or "F"

- Deficiency Location with Greater than 20% Trucks
- Deficiency Location with Less than 20% Trucks

Exhibit 17
Year 2025 Modified 24-Hour Operations Scenario 2 Critical Level-of-Service Locations

LEGEND

Forecast Future Level of Service "E" or "F"

- Deficiency Location with Greater than 20% Trucks
- Deficiency Location with Less than 20% Trucks

Exhibit 18
Year 2025 Modified 24-Hour Operations Scenario 1 Critical Level-of-Service Locations

The bridge has been assessed using projected future volumes for 2010 and 2025 using the 2000 Highway Capacity Manual techniques assuming grades and passenger car equivalent factors. The PCE factors for the bridge are higher than those used in the intersection analysis due to the six percent grade on the bridge and the fact that the grades are over one-half mile in length. Going up the longer grades such as on the bridge, large trucks have slower speeds and lower acceleration rates and therefore take more capacity. The inside and outside lanes operate differently, as heavy trucks tend to use the outer (right hand) lane and faster moving vehicles use the inside lane.

Therefore the analysis has been conducted separately for the two lanes to account for the different operational characteristics. Table 10 outlines the results of the analysis for existing conditions, for the 2010 projections and for the 2025 projections. As indicated, the bridge is currently operating at level of service D or better during all peak hours, the inside lane is at LOS C or better all hours except the AM peak eastbound, while the outside lane experiences LOS D during each peak hour. The reason mid-day operates better is that, although truck volumes are somewhat higher, the commute traffic is much lower. By 2010, the level of service is predicted to fall to LOS D/E under the POLA Capacity/Mercer Constrained scenario and LOS E/F under the POLA/POLB Mercer Unconstrained scenario in the outside, (truck) lane. By 2025, the LOS is predicted to fall to LOS F in the AM and PM peak hour under both scenarios.

The results of this analysis indicate that the Level of service on the Vincent Thomas Bridge outside lane will be approaching capacity by 2010, however the inside lane will still have excess capacity and operate well. The projected deficiency could likely be mitigated through operational improvements for the time horizon to 2010 and beyond. By 2025 however, LOS F conditions would indicate physical improvements or the need for additional capacity on the bridge or on alternative routes. Recently, the other major bridge to Terminal Island, the Gerald Desmond Bridge, was upgraded to provide 5 lanes including climbing lanes. This interim improvement has relieved some of the congestion. As such, interim improvements for the Vincent Thomas Bridge must also be considered as part of on-going planning efforts. The Transportation Master Plan will evaluate various options for improvement to the Bridge. This may include differential lane operations, tolls, capacity improvements, reversible lanes and other options.

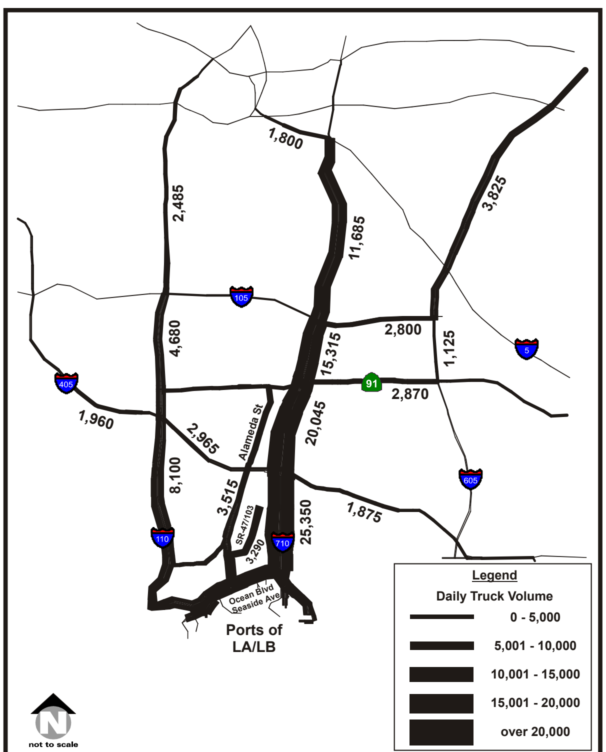
Table 10
Vincent Thomas Bridge Level-of-Service Summary

		Existing 2001		2010 POLA Capacity/Mercer Constrained		2010 POLA/POLB/ Mercer Unconstrained		2025 Modified 24-Hour Operations Scenario 1		2025 Modified 24-Hour Operations Scenario 2	
		Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
AM	Eastbound	D	D	D	E	D	F	E	F	E	F
	Westbound	B	B	C	D	C	D	D	E	D	E
MD	Eastbound	B	D	C	E	C	E	D	F	D	E
	Westbound	B	C	D	E	D	E	D	F	E	E
PM	Eastbound	C	C	D	D	D	E	D	E	D	E
	Westbound	C	D	E	E	E	F	F	F	F	F

8. REGIONAL ANALYSIS

An analysis of regional transportation facilities adjacent to and serving the Ports has been conducted to determine potential future Port truck impacts. Exhibit 19 illustrates the exiting daily port-related trucks on the regional system. The exhibit graphically depicts the volume of trucks that is directly related to the Ports (both Los Angeles and Long Beach combined). These are the direct truck trips to and from the Ports.

Note that the graphics do not include transloaded goods movement via truck. Thus, what is shown includes truck trips with one end at either Port. Many other container truck trips occur after the container has been moved to a warehouse and off loaded to other trucks, however, those "secondary" truck trips are not the subject of this study. The width of the lines illustrates the relative magnitude of Port-related truck traffic on the system.

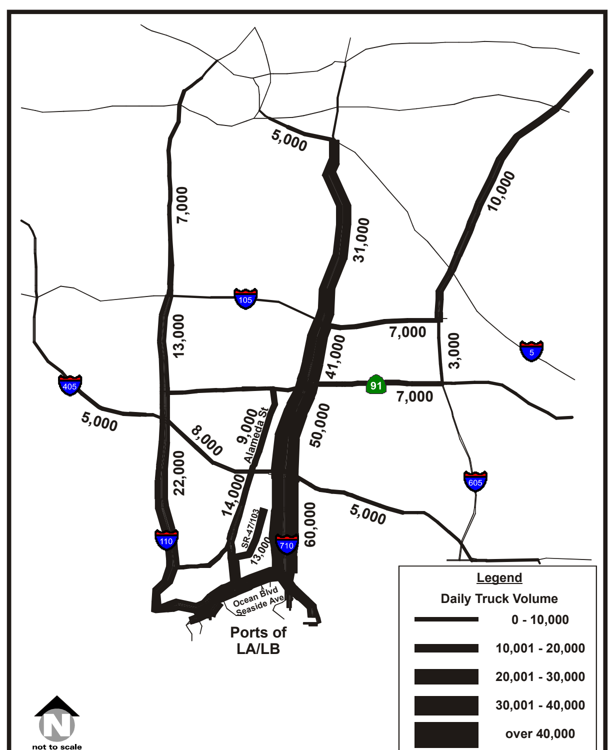


Daily Port Trucks on Regional System — Exhibit 19

Daily Port Trucks on Regional System

As shown, I-710 carries over 25,000 port truck trips per day currently near the Port, while I-110 carries approximately 8,100 port trucks per day. Thus, I-710 currently carries over three times the port truck volume as I-110. Moving further north, I-710 carries 20,000 port trucks north of I-405, 15,000 north of Route 91 and 11,600 north of I-105. I-110 carries 4,700 trucks north of Route 91 and 2,500 north of I-105. Other regional freeways carry far less port trucks, generally less than 3,000 per day. SR-47/103 carries 3,300 port trucks per day south of Sepulveda Boulevard, while Alameda Street carries 3,500 port trucks north of SR-47. I-605 is also shown to carry nearly 4,000 Port related truck trips per day north of I-105.

Exhibit 20 shows similar data projections for 2025. It is based on the year 2025 Modified 24-hour Operations Scenario 1, which is the "worst case' in terms of truck traffic and does not assume full utilization of expanded gate hours. As shown, the Port-related truck volume (both ports combined) is projected to reach 60,000 on I-710 just north of the Ports, compared to 25,300 currently. On I-110 just north of the Ports, Port truck traffic is projected to increase from 8,100 today to 22,000 by 2025. Other growth includes an added 5,000 trucks daily on I-405 north of the Ports, over 10,000 more trucks on Alameda Street south of I-405, 4,000 more trucks on Route 91 and 6,000 more on I-605.



2025 Daily Port Trucks on Regional System — Exhibit 20

Note: Scale not the same as Exhibit 19

Peak Hour Port Trucks on Regional System

Table 11 and Exhibit 21 illustrate the existing peak hour Port truck traffic on the regional system as well as the projected increase in peak hour Port trucks and the added passenger car equivalent on the regional system. The data is for the 2025 24-hour Modified Operations Scenario 1, which is the worst case. As shown, Port growth under this scenario would add 1,340 port trucks in the peak hour to I-710 near the Port (a 46 percent increase), while 895 port trucks would be added to I-110 near the Port (a 76 percent growth).

I-110 would increase by a greater proportion than I 710, however, I-710 would result in 4,245 port trucks during the peak hour in 2025, while I-110 would carry 2,080 port trucks. Thus, although I-110 would experience a greater percentage increase, I-710 is still expected to carry over two times the number of port trucks. This key finding is due to several factors, including the expected congestion on I-710 north of the ports, the current higher volume of trucks on I-710, the available capacity on I-110 and the continued presence of truck generating land uses along I-710. Although I-110 will gain more port trucks due to the congestion on I-710, clearly I-710 will continue to be the dominate facility to move trucks to and from the ports, with I-110 serving a significant number of trucks, but far fewer than I-710.

Other significant increases in port truck trips on regional facilities include 400 trucks on I-605, 365 on Route 57 and 205 on Route 60.

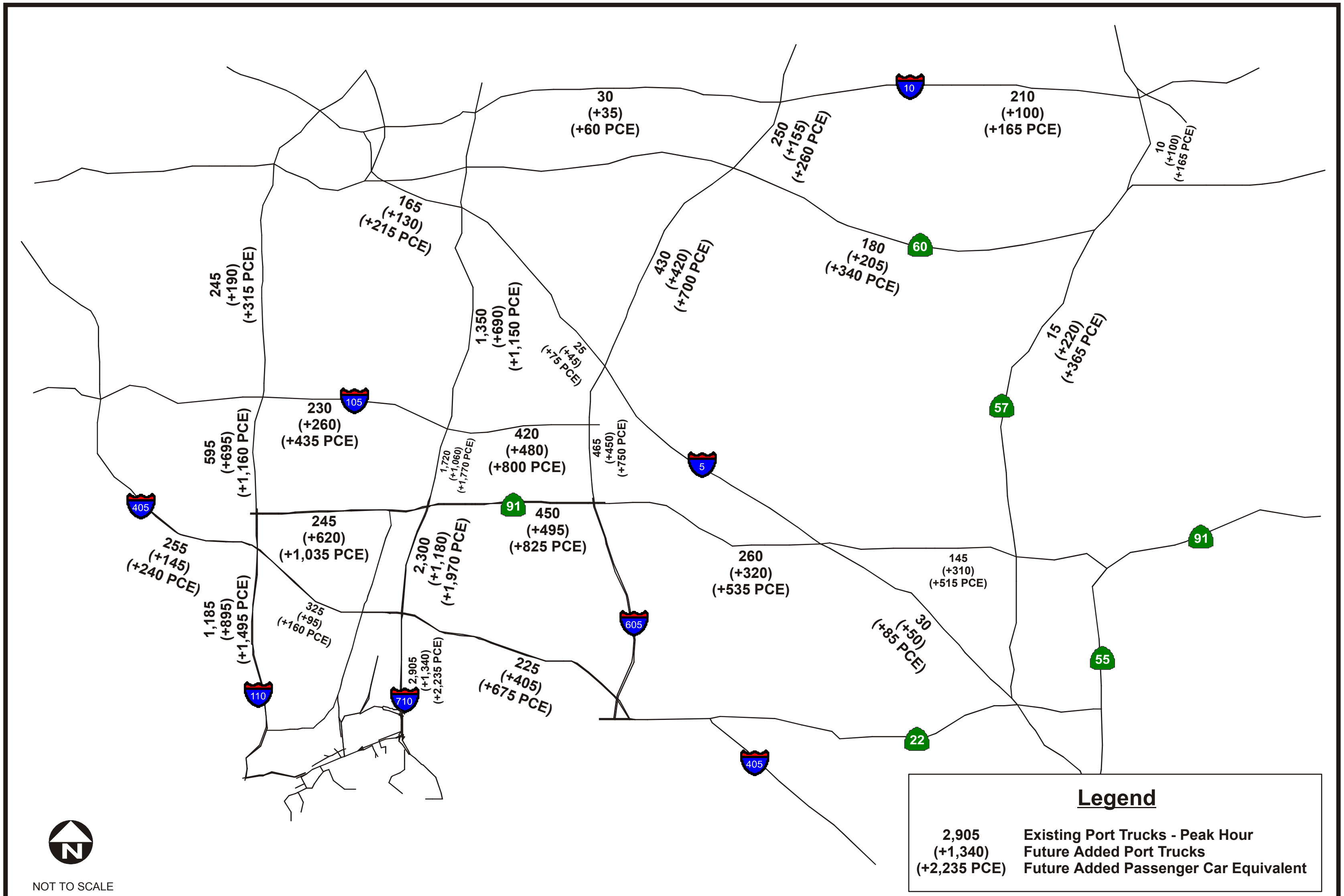
Considering that a freeway lane carries approximately 2,000 to 2,200 vehicles under ideal conditions in one hour, one can see the relative amount of capacity that will be taken by added Port traffic on the system. On I-110, Port growth will take up the equivalent of about three-quarters of a travel lane, while added port trucks will take over one lane of traffic on I-710. This is over and above the capacity that is used today by Port related truck trips.

On other regional facilities, the added port trucks will take up one-quarter to one-third of a lane of capacity. It is important to note that a combination of several routes serve as key transportation corridors for freight movement through southern California and to and from the ports, including I-710, I-110, I-405, Route 60 and Route 91. These facilities carry goods to distribution warehouse and rail yards with the region, and serve not only direct port truck trips, but also trips associated with transloaded goods on the second or third link of the goods movement chain.

A significant decrease in container truck activity was noted on the I-710 and I-110 freeways during recent labor actions, however, less of a reduction was noted on Route 60 and Route 91, likely due to the fact that those facilities carry a significant number of transloaded truck trips as opposed to direct trips to and from the Ports. This data suggests that direct Port-related truck trips on the regional system are very important, especially near the Ports themselves. In addition, secondary truck trips, those not directly to and from the Ports, but which carry goods moved through the ports, are just as important a consideration for future regional goods movement planning. This issue must be addressed as part of larger regional studies of truck movements.

Table 11
Regional System Analysis Port Related Truck

Regional Highway System Segment		Existing Total Daily Volume	Existing Daily Port Truck Volume	Port Truck as Percent of Total Traffic	Existing Peak Hour Port Trucks	2025 Peak Hour Port Trucks	2025 Peak Hour Passenger Car Equivalent	Growth in Port Trucks	Percent Growth in Port Trucks
I-110	SR-47 to Anaheim	94,000	8,100	9%	1,185	2,080	3,475	895	76%
	Anaheim to PCH	111,000	8,095	7%	1,185	2,080	3,475	895	76%
	PCH to Sepulveda	148,000	7,810	5%	1,185	2,010	3,355	825	70%
	Sepulveda to I-405	226,000	7,335	3%	1,040	1,920	3,205	880	85%
	I-405 to SR-91	266,000	6,015	2%	745	1,395	2,330	650	87%
	SR-91 to I-105	247,000	4,680	2%	595	1,290	2,155	695	117%
	I-105 to I-10	324,000	2,485	< 1%	245	435	725	190	78%
I-710	SR-47 to Anaheim	118,000	24,035	20%	2,905	4,245	7,090	1,340	46%
	Anaheim to PCH	133,000	25,350	19%	2,745	3,960	6,615	1,215	44%
	PCH to Willow	146,000	23,900	16%	2,660	4,160	6,945	1,500	56%
	Willow to I-405	161,000	23,235	14%	2,605	3,870	6,465	1,265	49%
	I-405 to SR-91	186,000	20,045	11%	2,300	3,480	5,810	1,180	51%
	SR-91 to I-105	227,000	15,315	7%	1,720	2,780	4,645	1,060	62%
	I-105 to I-5	237,000	11,685	5%	1,350	2,040	3,405	690	51%
	I-5 to SR-60	199,000	1,025	< 1%	105	195	325	90	86%
	SR-60 to I-10	132,000	845	< 1%	50	155	260	105	210%
I-405	SR-22 to I-605	380,000	1,770	< 1%	215	635	1,060	420	195%
	I-605 to I-710	289,000	1,875	< 1%	225	630	1,050	405	180%
	I-710 to I-110	283,000	2,965	1%	325	420	700	95	29%
	I-110 to SR-91	270,000	1,960	< 1%	255	400	670	145	57%
	SR-91 to I-105	294,000	1,810	< 1%	185	275	460	90	49%
	I-105 to I-10	310,000	1,590	< 1%	145	250	420	105	72%
SR-91	SR-57 to I-5	250,000	1,135	< 1%	145	455	760	310	214%
	I-5 to I-605	283,000	1,470	< 1%	260	580	970	320	123%
	I-605 to I-710	263,000	2,870	1%	450	945	1,580	495	110%
	I-710 to I-110	212,000	1,385	< 1%	245	865	1,445	620	253%
	I-110 to I-405	67,000	195	< 1%	15	50	85	35	233%
I-105	I-605 to I-710	212,000	2,800	1%	420	900	1,505	480	114%
	I-710 to I-110	231,000	1,605	< 1%	230	490	820	260	113%
	I-110 to I-405	243,000	390	< 1%	30	55	90	25	83%
I-5	SR-57 to SR-91	223,000	225	< 1%	30	80	135	50	167%
	SR-91 to I-605	199,000	160	< 1%	5	5	10	0	0%
	I-605 to I-710	249,000	195	< 1%	25	70	115	45	180%
	I-710 to SR-60	267,000	1,800	< 1%	165	295	495	130	79%
	SR-60 to I-10	247,000	710	< 1%	60	200	335	140	233%
SR-60	SR-57 to I-605	265,000	1,560	< 1%	180	385	645	205	114%
I-10	SR-57 to I-605	259,000	1,775	< 1%	210	310	520	100	48%
	I-605 to I-710	234,000	585	< 1%	30	65	110	35	117%
	I-710 to I-5	254,000	190	< 1%	15	45	75	30	200%
	SR-60 to I-110	284,000	300	< 1%	45	75	125	30	67%
I-605	I-405 to SR-91	245,000	20	< 1%	2	2	3	0	0%
	I-105 to I-5	297,000	4,100	1%	465	915	1,530	450	97%
	I-5 to SR-60	265,000	3,825	1%	430	850	1,420	420	98%
	SR-60 to I-10	224,000	1,815	< 1%	250	405	675	155	62%
SR-57	I-5 to SR-91	276,000	10	< 1%	1	15	25	14	1400%
	SR-91 to SR-60	296,000	135	< 1%	15	235	390	220	1467%
	SR-60 to I-10	139,000	40	< 1%	10	110	185	100	1000%



Port-Added Trucks on Regional System - Mid-day Peak Hour
2025 Modified 24-Hour Operations Scenario 1

Exhibit 21

9. CONCEPTUAL TRANSPORTATION IMPROVEMENT RECOMMENDATIONS

Concept level transportation system improvement recommendations have been developed to mitigate the projected future deficiencies in the Port of Los Angeles area. The improvement recommendations include concept design drawings (where applicable). The types of projects include: intersection re-striping/widening, intersection signalization, roadway re-alignment, roadway widening, interchange improvements, grade separations, and Intelligent Transportation Systems (ITS) measures.

The recommendations are at the concept level and are intended as a basis for further detailed review and analysis. Some of the project areas, including the Navy Way/Seaside Avenue intersection, the Harbor Boulevard/Swinford Street/I-110/SR-47 interchange and other locations, will be the subject of more detailed engineering in the near future as part of follow-on projects. Follow-on efforts will assess other alternatives, develop detailed plans and will include a detailed implementation plan.

The information presented herein regarding improvements is preliminary and concept in nature. Because of the conceptual nature of the associated drawings, no inferences regarding right of-way takes or structure removal should be taken. Subsequent engineering review may result in alternative concepts or may substantially change these concepts, resulting in fewer right-of-way impacts or no impacts. At this point in the planning process, no specific recommendations are made regarding physical improvements.

Port Area Transportation Improvements

Exhibit 22 illustrates the locations where concept improvements are identified to mitigate projected deficiencies. Concept plans for the improvements are provided in this section along with written description of each concept/alternative. As stated above, the concepts have been developed merely as a staring point from which to conduct further study of improvements at critical locations.

OPERATIONS IMPROVEMENTS

<u>Project Need and Description</u>

The results of the traffic studies have clearly indicated the need for operational changes and improvements in both ports. Operational improvements are required even if a full range of physical improvements are implemented. The improvement program must include both changes in how the Port terminals operate as well as increased capacity to the roadway system, in order to maintain adequate levels of service. The purpose of operational changes will include:

- Reduce truck traffic through maximum use of on-dock rail movements.
- Increase efficiency of trucking operations, avoid peak hours to the extent feasible, and avoid sensitive routes. Shift truck trips from the peak hours to off peak hours (second shift and night shift) and also to weekends.
- Improve communications between truckers and port terminal operators.
- Increase efficiency of longshore worker movements to and from the Port.

This effort must be an on-going cooperative effort of the two ports, the two city councils. terminal operators, drayage companies, cargo companies, unions and others. This issue involves two way flow of goods, therefore, simply opening terminal gates at off hours will not result in substantial changes. It must involve the entire logistics chain including inland warehouses that receive goods. Examples of successful programs include Walmart and Mattel, Inc., which have made commitments to using off-hour gates on a regular basis and have shifted a significant amount of drayage to non-peak hours.

The types of operations improvements to pursue will include, but not be limited to, the following:

- Maximize use of on-dock rail to shift containers to rail instead of drayage movement to off-dock rail yards.
- Implement better scheduling and management practices to avoid truck trips and truck queuing during peak commute traffic periods.
- Improve communications via on-road signage, changeable message signs, appointments for gate entrances.

LEGEND

● Intersection Improvement

▬ Interchange or Bridge Improvement

Exhibit 22 Conceptual Improvement Locations

PHYSICAL INFRASTRUCTURE IMPROVEMENTS

The following sections describe the concept level improvements that are required to the transportation system based upon the results of the transportation demand modeling results. Each improvement area is described and includes the type of anticipated deficiency and the concept type of improvement. Please note that the 2025 deficiency locations and recommended mitigation measures are based on the Modified Operations "worst case" scenario, with 60 percent of the terminal traffic remaining in the day shift. The other scenarios including "24/7" with more traffic on the second and night shifts, would result in fewer deficiencies. Therefore, the mitigation analysis is based upon the assumption that only some of the operational changes/improvements can be made by 2025. This is a conservative analysis.

Advanced Transportation Management and Information Systems (ATMIS)

The Ports have been seeking to implement and expand Intelligent Transportation Systems (ITS) applications in and around the Ports area for several years. An earlier version of the Ports Automated Traffic Management and Information System (ATMIS) was submitted to Caltrans in 1998 for inclusion in the federally designated "Southern California Priority Corridor - Los Angeles/Ventura Region ITS Deployment Plan." The Ports ATMIS has been identified in the Caltrans Statewide Goods Movement ITS Action Plan, and is contained in Caltrans' Global Gateways Development Program. The objectives of the program are to improve major freight gateways and improve access at seaports, inter-modal transfer facilities, and goods movement distribution centers.

The Ports ATMIS, which will improve traffic flow for both Ports as well as the adjacent regional transportation system, consists of the following components:

1. Port Transportation Facility Security System/Emergency Response & Evacuation System
2. Advanced Transportation Management System (ATMS)
3. Advanced Traveler Information System (ATIS)
4. Communication System

The following potential benefits of a Port ATMIS could be achieved:

- Improved security and safety
- Improved multimodal mobility
- Improved incident response time
- Enhanced goods movement
- Improved reliability and predictability of the transportation system
- Reduced travel delay and emissions

An ATMIS Project for the Ports involves regional, subregional and local agencies, planning authorities, emergency response agencies, private information providers and different modes of transportation, such as trucking companies and railroads. The Port of Long Beach, the Port of Los Angeles, and the Alameda Corridor Transportation Authority would be the primary partners for this project.

System Configuration

Several agencies, including Caltrans District 7, the Southern California Association of Governments (SCAG), LACMTA, Los Angeles County, City of Los Angeles Department of Transportation, South Bay Cities Council of Governments, and others, have been involved directly or indirectly in the development of a regional Intelligent Transportation System architecture. In order to be consistent with the regional ITS architecture, a proposed port-level ITS architecture, which is shown in Exhibit 23, has been developed.

This concept illustrates the relationship of the different agencies and systems as well as their roles in the ATMIS project. It also shows proposed links and interfaces to the following agencies and systems:

- Gateway Cities Subregional TMC
- South Bay Subregional TMC
- Caltrans District 7 TOC
- City of Los Angeles TMC
- Southern California Priority Corridor Showcase
- Corridor wide CVO ATIS

System Elements

Advanced Transportation Management System (ATMS): The ATMS component will control ITS field elements (CCTV and CMS), monitor traffic signals, and roadway traffic conditions. The ATMS component will include the following two main elements:

Terminal Gate Queue Detection Sensors (video or radar devices). The queue management will make use of changeable message signs to divert trucks to alternate routes or queue areas, and also facilitate the deployment of Ports traffic control officers.

Harry Bridges Boulevard/I-110/Figueroa Street/John S. Gibson Interchange

Project Need and Description

This interchange of surface streets and the I-110 freeway on/off ramps is scheduled for improvement in conjunction with the Harry Bridges Boulevard realignment project. At this time, the ultimate realignment project configuration is not known or finalized. With or without the realignment of Harry Bridges, the interchange will warrant improvement. The deficiencies result from heavy demand for southbound to eastbound through traffic coming off of I-110, heavy eastbound right turn movements and heavy southbound right turn movements onto the freeway. It is anticipated that the deficiency at the intersection could also impact the freeway mainline due to vehicle queues that would extend northward from the intersection onto the freeway for exiting traffic. This condition would pose a traffic hazard for freeway vehicles. This must be evaluated to determine additional improvements at the intersection as well as on the off-ramp itself. Alternatives such as additional on and off-ramp lanes, revised signal timing, exclusive turn lanes and direct connections for truck traffic should be evaluated as part of the next phase of study.

Two concept alternatives are proposed for this location. Alternative 1 includes improvements to the planned Harry Bridges alignment to provide additional capacity at the intersection. Truck and auto traffic would still use the same ramp system and all trucks would continue to flow through the intersection to reach the West Basin terminal gates. The second improvement concept, labeled Alternative 2, includes an exclusive truck ramp to provide direct access from southbound I-110 to the West Basin area. This would remove all incoming truck traffic from Harry Bridges Boulevard and from the intersection. Other improvements include widening the northbound on/off ramps and reconfiguration of the intersection at Figueroa/Harry Bridges Boulevard/I-110 ramps.

Harbor Boulevard/I-110/SR-47/Swinford Street Interchange

Project Need and Description

This interchange is impacted by a combination of San Pedro auto traffic destined to that area from the south on Harbor Boulevard, auto traffic destined for the cruise terminal and truck traffic destined to and from the West Basin area to the north. Currently, poor service levels are experienced at this location when the cruise terminal is active in combination with trucking activity and the normal San Pedro auto traffic demand. The “Bridge to Breakwater” waterfront development will also result in additional demand through this location. Traffic model forecasts for this location confirm level of service F in the future with buildout of the West Basin as well as the waterfront development. Additional details of the waterfront redevelopment activity will be known as that project proceeds.

The Port of Los Angeles is about to undertake a detailed design project for this interchange. A range of alternatives will be evaluated including modification of the intersection to better serve auto and truck traffic, as well as separation of auto and truck traffic through the interchange. In addition, better signage and better access to the San Pedro area will be evaluated.

Two improvement concepts were developed for this effort which show the following elements:

- Exclusive southbound truck access ramps to Front Street
- New westbound on ramp to I-110 aligned with terminal entrance
- New westbound off ramps from SR-47 to Front Street at the terminal entrance
- Improvements to the eastbound off-ramps at Harbor Boulevard
- New eastbound on ramp from Gaffey Street to improve weaving

The Phase 2 Alternative would most likely require taking part of Knoll Hill and would entail retaining walls or other engineering solutions. This alternative is under consideration only and is very preliminary and conceptual in nature; therefore, there are no recommendations as part of this study to remove Knoll Hill or any portion of it at this time. The Transportation Master Plan and design project for the Harbor Bouleard/I-110/SR-47 interchange will also carefully review all feasible alternatives. The TMP will also review improved curb radii to better facilitate truck turns at the interchange.

John S. Gibson Street Improvements

Project Need and Description

The model results indicate that background growth, combined with increased truck traffic due to the West Basin growth, could impact key John S. Gibson Street/Front Street intersections including Pacific Avenue, Channel Street and the I-110 ramps. Primarily, these deficiencies can be resolved via the addition of lanes at the key intersections, including some additional turning lanes and through lanes. The north/south through movements are not especially heavy, however, when combined with the turning movements to/from the freeway ramps and into and out of the terminals, the result is level of service E or F at the three locations. Also, signal coordination and interconnection and video surveillance is recommended for the length of John S. Gibson Boulevard, and it would tie into the Harbor/Swinford/I-110 ramp intersection signal system.

The Berths 121 – 131 Gate Improvements project was recently undertaken to improve the entrance and exit geometry at the terminal's main gate on John S. Gibson Boulevard, to allow for greater use of the gate and the adjacent on and off ramp to the northbound Interstate 110. The project also increased truck queue capacity at the gate, to reduce reliance on the Knoll Street entrance and access road as queue space.

The concept improvements for this location include intersection improvements at John S. Gibson Street at Channel Street (shown on sheet 1 of 2) to provide additional capacity for turning movements, improvements at John S. Gibson Street/I-110 northbound on and off ramps (sheet 2 of 2) provide additional turning lane capacity northbound left turns and south bound right turns.

Gaffey Street Improvements

Project Need and Description

The deficiencies along Gaffey Street are projected at 1st Street, Summerland, Miraflores, Channel Street and Westmont Street. All of those deficiencies are due to general background growth in auto traffic as opposed to port influence. Part of the deficiency is due to the adjacent transportation/warehouse complex, but most of the traffic is auto and not truck. At Channel Street, the deficiency is due to traffic accessing the northbound I-110 ramps. The other deficiencies are due to heavy turning movements onto and off of Westmont Drive and Miraflores Street and heavy north and southbound through traffic. As with John S. Gibson Street, these deficiencies would be mitigated through a combination of intersection lane improvements and signal system coordination and signal interconnect. Specifically, dual left turn lanes at Westmont Drive and Capitol would be warranted along with additional through lanes in the north and southbound directions. These mitigating measures need to be reviewed to determine physical feasibility. Improvement to the Gaffey Street/I-110 and the SR-47/Summerland/Gaffey terminal intersection will require improvement by this time as well, and the entire system should be reviewed to ensure that the improvements are coordinated.

Harry Bridges Boulevard at Fries Avenue

Project Need and Description

The travel demand model indicates that this intersection will be deficient due to lack of capacity primarily for northbound left turn and westbound right and left turn movements. This deficiency can be mitigated by intersection redesign to include a dual left turning lane from northbound Fries Avenue for the heavy traffic movements, along with improvement to the traffic signal. An eastbound right turn lane is also recommended. The concept improvement illustrates the dual northbound left turn lanes and exclusive eastbound right turn lanes alone with other geometric improvements, incorporated in the overall route widening.

Terminal Island Intersection Improvements

Project Need and Description

Two intersections are projected to operate with deficiencies on Terminal Island: Seaside Avenue at Navy Way and Ferry Street at the Vincent Thomas Bridge eastbound on- ramp. Both deficiencies result primarily from Terminal Island traffic destined to I-110. For the Navy Way/Seaside intersection, the recommended mitigation measure is to implement the flyover for northbound to westbound traffic. This improvement will be required to keep traffic operations along Seaside Avenue/Ocean Boulevard at acceptable levels. At the Ferry Street/ramp intersection, improvements to the northbound right turn movement will be required for traffic accessing the bridge. This improvement would be coordinated with any improvements to the Vincent Thomas Bridge itself.

The concept improvements show a flyover from northbound Navy Way to westbound Seaside Avenue as well as a potential new flyover for a westbound on-ramp to SR-47 from Ferry Street. That new ramp would allow improvement to the existing deficient turning radius for the at-grade hook ramp. Weaving is also improved by moving the westbound off-ramp farther west and away from the new merge from the Navy Way/Seaside flyover.

Anaheim Street and Pacific Coast Highway Interchanges at I-110

Project Need and Description

The projected deficiencies at both of these locations are due primarily to increased auto traffic accessing the freeway. The ramp configurations are modified "tight diamond" ramp systems that result in heavy turning moments due to the need for all traffic which accesses the freeway to turn through the adjacent intersections. Unlike other ramp systems such as partial cloverleaf systems, there are no "free" traffic moves and all traffic movements affect the intersection level of service and take some of the intersection capacity. Each intersection must be evaluated to determine if there are alternative configurations that may be feasible, given right-of-way and land use constraints. Other types of improvements may include modified traffic controls and additional turn lanes and ramp widening.

Three concept improvements have been considered as part of this effort. The first is to develop individual improvements at each interchange. The case of the Anaheim Street interchange, the concept (Alternative 1) is a single point urban interchange, while at Pacific Coast Highway it is modifications to the exiting configuration to improve flow, eliminate the on-ramp intersection north of PCH and improve capacity. Under this alternative, the two interchange improvements are independent.

Concept Alternative 2 consists of improvements to the Anaheim and Pacific Coast Highway interchanges as a single system. It includes new frontage/collector-distributor roadways which link the two interchanges so that they function together. Either one or two new bridges would be required for this alternative for southbound off-ramp traffic, and significant right-of-way for Figueroa Street would be required.

The third alternative (Alternative 3) would include single point urban interchanges at both Anaheim Street and Pacific Coast Highway, with new frontage roads connecting the two interchanges. In addition, the singe point urban interchanges would be built with the collector/distributor roads closer together so that the overall operations would be better than the interchange proposed in Alternative 1.

It is important to note that many of these concepts would require right-of-way takes and removal of existing structures. These alternatives are very conceptual in nature and do not imply in any way that specific structures should be removed. They are for illustrative purposes only to demonstrate the potential for different types of solutions to the design and operations issues at Anaheim and Pacific Coast Highway.

Vincent Thomas Bridge

Project Need and Description

The travel demand model forecasts indicate poor service levels on the Vincent Thomas Bridge during the peak hours by 2025. This is consistent with earlier studies and also consistent with similar findings for the Gerald Desmond Bridge at the other end of Terminal Island. The two bridges only provide a total of eight lanes of traffic, four on the Vincent Thomas Bridge and four on the Gerald Desmond Bridge (with a fifth climbing lane on the Gerald Desmond Bridge which merges at the crest), to serve not only port traffic but also a considerable amount regional traffic that crosses the Island. The larger issue is capacity onto and off of Terminal Island. There are only three routes, the third being SR-103/47 via the Heim Bridge.

A range of long-term alternatives must be evaluated for this deficiency, including modification/upgrade of the Vincent Thomas Bridge, replacement of the bridge with a facility with greater capacity, a "sister bridge" similar to the Tacoma Narrows, or other network improvements such as a new bridge connecting Seaside Avenue to Alameda Street, or the

"Alameda Corridor Expressway" project that is undergoing review at this time. The concept improvement illustrates a second parallel bridge to the north of the Vincent Thomas Bridge, which provides width for four additional lanes. This concept will require significant additional analysis to determine the location of a second facility and the number of lanes required. Clearly, any modification, addition or replacement of this bridge is a major project that will require careful review of all alternatives. At this time it is premature to suggest any one alternative. Significant additional analysis and discussion on this issue will be undertaken as the Port's evaluation of infrastructure improvements continues.

CCTV cameras – These pan-tilt-zoom (PTZ) cameras will initially be deployed at strategic locations to provide visual information as a method for operators to confirm traffic flow conditions, incidents and emergencies. The CCTV camera images may be shared via video and data links with non-Port law enforcement/emergency personnel.

Subregional System Integration - Links would occur with the following: Caltrans Traveler Information System via the Southern California Priority Corridor (Showcase), Priority Corridor Commercial Vehicle Operators (CVO) system, and private information service providers such as eModal and MTC Voyager.

ATIS: The ATIS component includes the use of electronic roadside signs and the internet to inform drivers, dispatchers, terminal operators, traffic engineers, systems operators and the public about real-time traffic conditions and travel information, and, where appropriate, direct them to alternative routes.

CMS – Changeable Message Signs displays will be placed in advance of major interchanges, intersections or other points at which driver routing decisions can be affected by the dissemination of traffic condition information. The CMS would also be placed at or adjacent to terminal gate exits to forewarn truck drivers of incidents on area freeways. Incident information could also be automatically retrieved from Showcase and other ITS systems , and appropriate messages could then be displayed on the CMSs.

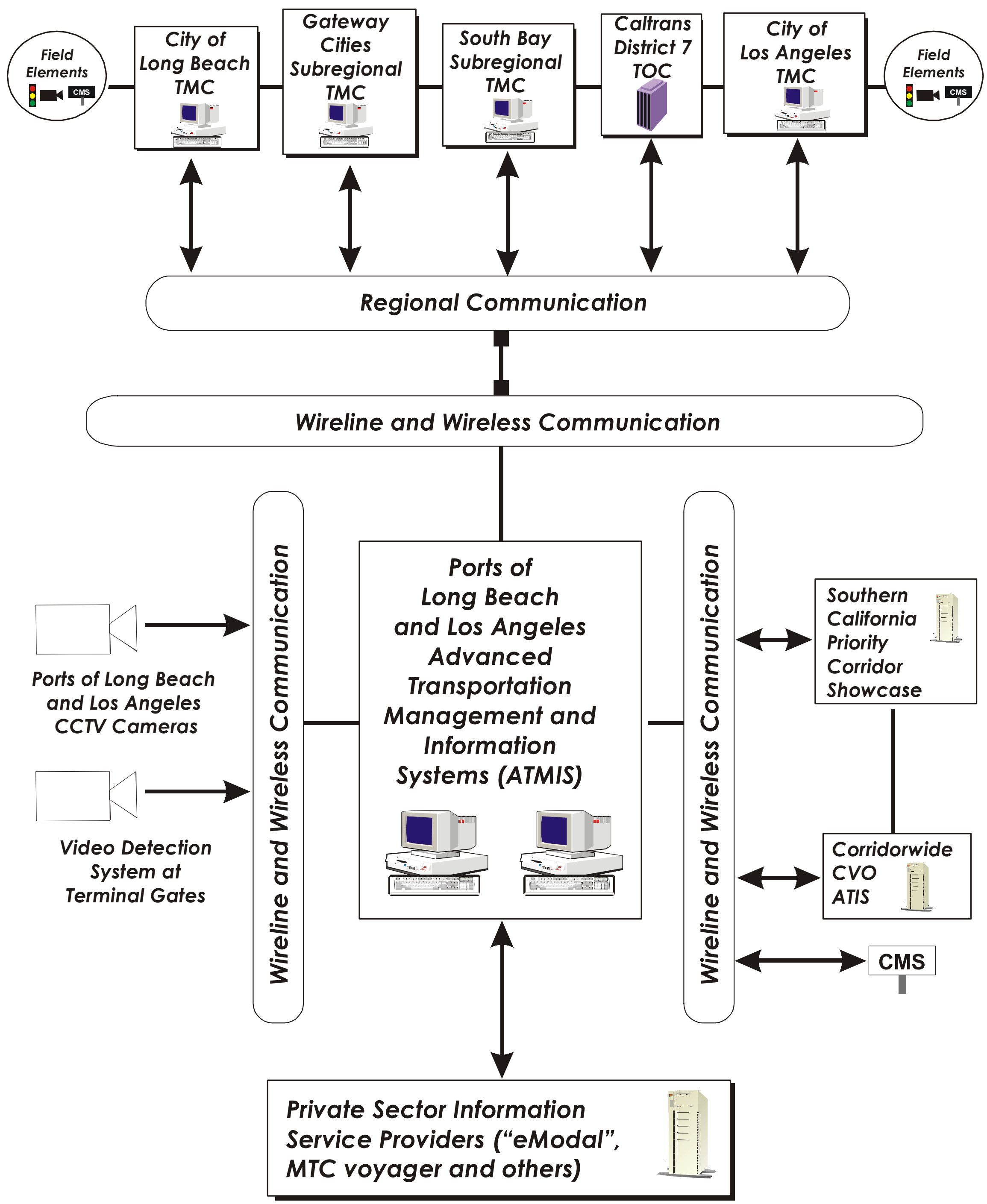
Southern California Priority Corridor Commercial Vehicle Operator (CVO) ATIS Link – The CVO ATIS project would provide a traveler information system that empowers users to achieve greater efficiency and safety in their operations. It is tailored to suit the needs of commercial vehicle operators, shippers, brokers, port operators and others that do business in and around the Southern California Priority Corridor area. Travel and route information tailored to CVO operation would be delivered using extranet, wire and wireless media. This information will allow dispatchers to have integrated information to improve fleet operations and management.

Link to Private Information Service Providers - The Port CMS messages, queue detector data, and CCTV camera video images could be transmitted to private information service providers. This type of information sharing will facilitate trip management

and could reduce the number of trips on the freeways and arterial streets, assist the shift of some peak period truck traffic to off-peak hours, and possibly improve air quality.

Communication: The communication system will be a high-speed digital communication system that will support the deployment of the proposed ITS elements. Fiber optic is suggested for CCTV and video detection signals, and wireless or leased lines may be suggested for CMS data transmission and links to other agencies.

Exhibit 23
Ports of Long Beach and Los Angeles ATMIS Architecture



10. Implementation Action Summary

Table 12 summarizes some of the key implementation issues and activities for each of the concept improvements. The summary includes a description of the key agencies and organizations that will be involved in implementation of each improvement, the required actions necessary to implement the concept and the general timeframe for implementation.

Implementing Agencies

The key agencies that will be responsible for implementing the concept improvements include the Port of Los Angeles, the City of Los Angeles Department of Transportation and Caltrans, for all of the physical infrastructure improvements. All of the physical improvements must be approved by the responsible agencies, including the City and State agencies, which operate the transportation systems. Therefore, LADOT will be involved in all surface street projects, and Caltrans will be involved in all projects that include the freeway system, the state highway system or freeway ramps where they intersect the local roadways system.

For the operational improvements, a wide range of stakeholders will be involved, including but not limited to, the following: POLA, City of Los Angeles, City of Long Beach and Port of Long Beach, marine terminal operators, steamship lines, trucking entities, labor unions, shippers, Caltrans, regional agencies such as the Gateway Cities Council of Governments and the Southern California Association of Governments, the California Highway Patrol, and other private organizations such as those providing internet services to the port industries.

Key Actions

The actions required to implement each concept improvement will vary depending on the complexity of the improvement, its location, what agencies are involved, the timeframe for implementation, environmental concerns and other issues. The first step in the implementation of each concept will be further study and refinement of the concepts, or development of alternative concepts. Once preferred alternatives are identified, the next steps will include environmental studies where appropriate, engineering design and finally construction. The more complex and costly projects such as interchange re-design will require specific environmental studies, the extent of which will be determined after choosing the preferred alternative. Some of the less complex projects, such as intersection widening that do not involve Caltrans, may not require environmental clearance and proceed directly to design and construction.

For major projects involving Caltrans, the State's Project Study Report (PSR)/Project Report (PR) process must be followed. Those processes will provide more information regarding project need and preliminary project design and environmental issues. Following completion of PSR/PR documents, the projects could proceed into detailed design and ultimately implementation. The set of actions for each project will vary depending on the factors noted above.

Time Frame for Implementation

It is premature at this time to accurately identify the time frame for implementation of each project since there are many unknowns and also since preferred concepts have not been developed. However, it is important to identify target timeframes for implementation and to identify the general order of implementation. The proposed time frame is broken down as follows:

- Short Term – within 5 years
- Medium Term – 5 to 10 years
- Longer Term – beyond 10 years

These timeframes reflect both project need as well as the feasibility of conducting the necessary actions and achieving the required approvals within the specified time period. For example, short-term improvements include operational improvements, which generally can be done without major infrastructure changes, and also ATMIS improvements, which are proposed as the first phase of improvement on the existing circulation system. Concepts involving interchange reconfiguration and bridge structures will take longer for environmental studies, clearance, design and construction. The relative time frames can, of course, be adjusted as priorities change or as individual projects move forward or are found to be required. Much more detail regarding implementation will be part of the follow-on Transportation Master Plan effort.

Table 12
Implementation/Action Summary and Preliminary Order of Magnitude Cost Estimates

Concept Improvement	Responsible Agencies / Organizations	Required Actions	Time Frame: 1 - Short-term – within 5 years; 2 - Mid-Term - 5-10 years; 3 – Long-term – beyond 10 years	Preliminary order-of-magnitude cost estimate (1)
Operations Improvements	POLA, Terminal Operators, Unions, Trucking Industry, Shippers, Steamship Lines, Other Stakeholders	• Implement operations improvements beginning with pilot project	1	Varies depending on type of operational improvements
Harry Bridges Boulevard/I-110 / Figueroa St. / John S. Gibson Interchange	POLA / City of Los Angeles DOT / Caltrans	• PSR / PR • Environmental Clearance • Design & Construction	2	Alternative 1 $3.8M Alternative 2 $7.0M
Harbor Boulevard / I-110 / SR-47 / Swinford St. Interchange	POLA / City of Los Angeles DOT / Caltrans	• PSR / PR • Environmental Clearance • Design & Construction	2	Alternative 1 $18.0M Alternative 2 $23.0M
John S. Gibson Street	POLA / City of Los Angeles DOT / Caltrans	• Design & Construction	1	$1.0M
Harry Bridges Blvd at Fries Avenue	POLA / City of Los Angeles DOT	• Design & Construction	1	$2.5M
Terminal Island Intersection Improvements	POLA / City of Los Angeles DOT / Caltrans	• PSR / PR • Environmental Clearance • Design & Construction	3	$19.0M
Anaheim St. and Pacific Coast Highway Interchanges at I-110	POLA / City of Los Angeles DOT / Caltrans	• PSR / PR • Environmental Clearance • Design & Construction	3	Alternative 1 $14.1M Alternative 2 $16.6M Alternative 3 $32.0M
Vincent Thomas Bridge	POLA / City of Los Angeles DOT / Caltrans	• PSR / PR • Environmental Clearance • Design & Construction	3	$250M to $500M
Advanced Transportation Management System (ATMIS)	POLA / City of Los Angeles DOT / Caltrans	• Design & Construction	1	$7.5M to $10.0M

Notes: (1a) Assumes 2004 dollars
(1b) Does not include right-of-way costs
(1c) Does not include utility relocation costs
(1d) Assumes 28 percent for engineering and design
(1e) Does not include costs of environmental clearance
(1f) For ATMIS, includes both POLA and POLB combined

Preliminary Order of Magnitude Costs

The table includes "order-of-magnitude" cost estimates for the improvement projects. As shown, the costs vary from approximately $1 million to $32 million, plus an unknown amount for Vincent Thomas Bridge improvements, which could be considerably more and possibly in the hundreds of millions of dollars. Note that these are preliminary order of magnitude costs, and they do not include right of way costs for land or utility relocation costs. Much more detailed analysis of improvements and costs will be completed a part of the Transportation Master Plan.

11. OTHER RELATED STUDIES AND INFORMATION

This section of the report summarizes some issues and analysis that are related to the Port of Los Angeles, including regional projects such as the alameda Corridor and I-710, and operations issues such as logistics associated with the movement of empty containers in and around the port.

Alameda Corridor Rail Capacity

The estimated train carrying capacity of the Alameda Corridor is generally considered to be approximately 150 trains per day (on three tracks). According to the joint Ports of Los Angeles and Long Beach Transportation Study, by 2020 the Ports would be expected to generate approximately 84 trains per day. Also, the Intermodal Container Transfer Facility (ICTF) will generate additional trains beyond the 84 that will use the corridor. Even with combined Port and ICTF trains, the three-track Alameda Corridor is expected to have excess capacity to handle the number of anticipated train movements. Current studies are underway to update both the anticipated corridor capacity as well as the anticipated number of train trips generated by the Ports. Also, it should be noted that the "Alameda Corridor East" planning is also underway which will address issues associated with train movements and impacts on the east/west rail connections east of downtown Los Angeles and leading out of the state to the rest of the destinations in the County.

SR-47 Alameda Truck Expressway Project

The SR-47 Alameda Truck Expressway project is a proposed expressway that would connect existing the SR-47 freeway in the port area to Alameda Street just south of Pacific Coast Highway (PCH). The expressway would carry trucks and autos from Terminal Island to Alameda Street via an elevated viaduct structure. The project would facilitate port truck and auto movements from Terminal Island by eliminating three existing rail at-grade crossings, and eliminating the need for truck and autos to traverse several intersections. The project would provide an efficient alternative route for trucks to and from the north, and to more easily access the improved Alameda Street, which has been improved to three lanes in each direction with grade separations at all major intersections from the Ports to SR-91. The goal of the project would be to enhance truck access to the Intermodal Container Transfer Facility, PCH, I-405, SR-91 and the Carson industrial area. If constructed, it would provide some relief for the congested portions of I-710 by providing another desirable route for truck traffic in and out of the ports, and could also provide mitigation for I-710 traffic impacts during construction of major improvements along that corridor. At this time, preliminary planning, design and environmental studies are on going related to the SR-47 truck expressway project. It is also being reviewed in conjunction with the proposed replacement of the Heim Bridge, which is a Caltrans project. Key stakeholders include both ports, the Alameda Corridor Transportation Authority, Caltrans, the Coast Guard, the cities of Los Angeles, Long Beach, Carson and private business that would utilize the corridor. As with the I-710 project, this project have important transportation implications for the Port of Los Angeles by facilitating truck movements to and from the north and potentially reducing future truck traffic growth on I-110.

I-710 Corridor Major Investment Study

A Major Investment Study (MIS) of the I-710 (Long Beach Freeway) corridor from the Port of Long Beach to I-5 near downtown Los Angeles has been undertaken as a joint effort of Caltrans and MTA, with participation by all affected cities, the County of Los Angeles, the Gateway Cities Council of Governments, the Ports and other stakeholders. The study led to a series of alternative improvement concepts that were presented for public comment. Following receipt of public comments, the initial effort was suspended while more focused efforts, including studies by the Gateway Cities COG and the City of Long Beach, were conducted.

At the present time, alternative improvement concepts are being reviewed by the public, leading to the adoption of a "locally preferred" alterative. Although that alternative is not currently finalized, it appears that it will likely include a four-lane truckway (two lanes each way) from the Port of Long Beach to I-5, along with ten mixed flow lanes (five in each direction). Before this or any other alternative is finalized, further public review and engineering refinement will occur. Upon adoption of a locally preferred alternative, the next steps would be more detailed engineering analysis, environmental studies, cost and funding analysis.

The implications of the I-710 improvement project, and a locally preferred alternative, on the Port of Los Angeles, are extremely significant. If I-710 is not improved beyond today's capacity, it will become increasingly congested, with hours of congestion spreading beyond the morning, mid-day and afternoon periods, to all-day long. This would increase the likelihood of port trucks and autos utilizing alternative routes, primarily including Alameda Street and I-110. In addition, there would be increased pressure on all arterial roadways leading into and out of the Port, as truckers and employees of the Ports seek more attractive routes to and from terminals.

Analysis has shown that I-710 will continue to be the most heavily used route by port traffic, however, without improvement, I-110 would certainly bear a greater proportion of the load of port traffic in the future. This would be inefficient, as a majority of the truck origins and destinations are either along the I-710 corridor, or to the east. Therefore, increased use of I-110 by trucks other than those destined for the West Basin or western portions of Terminal Island, would increase truck vehicles miles traveled, and would increase truck air emissions due the use of the more circuitous routes to the terminals.

Wilmington Area Driveway Truck Counts

Driveways to selected special truck trip generating land uses were counted in the Port area and in Wilmington. Special generators may include sites such as container storage yards, empty container depots, truck staging facilities, union halls, manufacturing/industrial facilities, rail yards or other locations of interest.

After reviewing a land use map for the Wilmington area that was provided by the Port, two areas were field reviewed where truck activity was anticipated to be significant. The first area is generally bounded by Opportunity Street on the north, Alameda Street on the east, C-Street on the south, and Broad Avenue on the west; and the second area is generally bounded by Lomita Boulevard on the north, Drumm Avenue/Blinn Avenue on the east, M-Street on the south, and Eubank Avenue on the west. Fieldwork identified the special driveway count locations where truck activity was anticipated to be significant. A list of eight locations was developed, and with PCAC Traffic Subcommittee approval, traffic counts were taken for use in the study. The locations selected are:

Location No.	Business Name	Address
1	Refrigerated Container and Martin Container, Inc.	1304 and 1402 E. Lomita Boulevard – both businesses share the same driveway
2	Harbor Division Inc.	Southwest corner of PCH and Sanford Avenue
3	Roadway Express (distrib. center)	1531 Blinn Avenue
4	Swift Container Division	Entrance along north side of D St. at Lakme Av. Exit along west side of Quay just north of D St.
5	Meat Exporters Corporation	505 East G Street
6	Harbor Express Inc.	501 Quay Avenue
7	International Cargo Equipment	1540-1550 North Eubank Avenue
8	Distribution and Auto Service Inc.	1500 E. Lomita Boulevard (next to Item 1)

Driveway trips (inbound and outbound) occurring during the peak hour range from 3 truck trips (Roadway Express) to 60 truck trips (International Cargo Equipment) at the eight locations.

Empty Container Logistics Summary

After a container ship unloads its cargo at the port, a full, imported container and chassis will leave the port for delivery. The chassis must then be returned to port and the truck leaves as a bobtail (the ocean carriers have a pressing need to reuse the chassis rather than the container). Often, an empty container is also returned to the terminal. The port then acts as an empty container storage area. Later, a bobtail comes to the port to pick up an empty container and chassis, and takes them to a location where container is filled. The truck and chassis return to the port and later, a truck and chassis pick up the full container. The full container and chassis return to port so container can be exported. A container that leaves the port comes back to the port refilled locally and ready to export occurs only 2% of the time.

If the extra steps of returning an empty container and chassis to the port, then having it picked up later to be refilled can be eliminated, many port truck trips can be reduced. Strategies to eliminate empty trips to and from the port include:

- Increase number of containers that are delivered full and returned full (container makes less trips). This may be via receiver refilling a container, or delivery of just emptied container directly to another local company that refills it.
  - Advantages: Eliminates and/or reduces empty container trips
  - Disadvantages: Empty chassis still makes trips; ownership mismatch (receive goods from one ocean carrier, but ship out goods on another); timing mismatch (goods may not be ready to ship out); lack of ocean carrier incentives.
- Create container storage depots away from the port
  - Advantages: Eliminates trips to/from the port; facilitates empty returns when terminals are closed; adds capacity to terminals; shorter trips for drivers save money
  - Disadvantages: Chassis are still needed at terminals and must be returned; storage costs; less control by ocean carriers and liability issues.

Any solution will require extensive container, chassis and goods coordination and tracking. Computer applications are available, but the costs to implement these systems would be borne by carriers, deliverers, and goods receivers/shippers. Some of the possible solutions also would require changes to union contracts.

The table below summarizes the combined impact of full containers from and to the port (assuming an increase from 2% today, to either 5% or 10%), and container storage depots. The combined scenario, incorporating both strategies, would maximize the net truck trip reduction.

Table 13
Number of Trips and Trip Reductions Due to Empty Containers Strategy

	2000	2010	2015	2020
Future Base Trips	**2,725,390**	**5,067,144**	**7,335,344**	**10,849,368**
With 5% of Containers Refilled	2,638,933	4,909,453	7,103,034	10,501,376
Annual Trips Saved	**86,457**	**157,691**	**232,310**	**347,992**
With 10% of Containers Refilled	2,494,838	4,646,635	6,715,850	9,921,389
Annual Trips Saved	**230,552**	**420,508**	**619,494**	**927,980**
With Storage Depot 10% of Containers	2,599,206	4,841,966	6,997,993	10,338,710
Annual Trips Saved	**126,184**	**225,178**	**337,351**	**510,659**
With Combined Scenario	2,376,091	4,435,022	6,398,482	9,440,665
Annual Trips Saved	**349,299**	**632,122**	**936,862**	**1,408,703**

Source: Empty Ocean Container Logistics Study, The Tioga Group, May 2002

Technical References

The following technical reference materials and reports were used during the conduct of the POLB/POLA Transportation Study project:

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"TRAFFIX Traffic Analysis Software for Windows Release 7.5 Users Manual," Dowling Associates, Oakland, CA, 2002

"TRANPLAN and NIS Version 9.0 Users Manual," Urban Analysis Group, Hayward, CA, 1998

"Potential Terminal Island Freeway – San Diego Freeway Connector", Southern California Association of Governments, February, 1999

Harry Bridges Boulevard/I-110 Ramps/Figueroa St/John S. Gibson Interchange Improvement Concept – Alternative 1

Harry Bridges Boulevard/I-110 Ramps/Figueroa St/John S. Gibson Interchange Improvement Concept – Alternative 2

Harbor Boulevard/I-110/SR-47/Swinford Street Interchange Concept - Alternative 1

Harbor Boulevard/I-110/SR-47/Swinford Street Interchange Concept - Alternative 2

John S. Gibson Street Improvement Concept

Harry Bridges Boulevard at Fries Avenue Improvement Concept

Anaheim Street and Pacific Coast Highway Interchanges at I-110 Improvement Concept Alternative 1

Anaheim Street and Pacific Coast Highway Interchanges at I-110 Improvement Concept Alternative 2

Anaheim Street and Pacific Coast Highway Interchanges at I-110 Improvement Concept Alternative 3

Terminal Island Intersections Improvement Concept

Vincent Thomas Bridge
Concept Improvement