SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

Comprehensive Regional Goods Movement Plan and Implementation Strategy

Industrial Space in Southern California:

Future Supply and Demand for Warehousing and Intermodal Facilities (Task 5 Report)

June, 2010

FREIGHTWORKS

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Table of Contents

List of Tables

List of Figures

Executive Summary

The *Industrial Space in Southern California: Future Supply and Demand for Warehousing and Intermodal Facilities* is intended to forecast industrial land needs in the region. Its purpose is to understand both the existing supply and demand for industrial/warehouse and intermodal facility space and to forecast growth to determine whether land use in the general plan allocated to warehousing needs will be sufficient in the Los Angeles basin.

Based on research conducted through interviews, data analysis of assessor data from 2009 in all six counties in the Los Angeles area, the application of a methodology to forecast future demand for space, and a survey of warehousing facilities, the study established the following summary results.

- **Existing and Future Supply of Total Warehousing Space**.
    - The analysis show that there are 4,700 existing warehousing facilities in the SCAG region, amounting to 838 million square feet of occupied and available warehousing space.
    - In addition, there is 185 million square feet of undeveloped land currently zoned industrial that could accommodate warehousing and distribution buildings.
- **Existing and Future Demand for Warehousing Space.**
    - Port-related warehouse square footage in 2008 was estimated at 102 million square feet. Based on projections of port cargo, it was estimated that 307 million square feet of port-related warehousing space would be needed in the year 2035.
    - Non port-related warehouse square footage in 2008 was estimated at 591 million square feet. By 2035, the demand for non port-related warehousing is projected to reach 943 million square feet based on domestic cargo shipments in the SCAG region.
    - This amounts to 1,250 million square feet of port and non port-related warehouse square footage demanded in 2035.
- **Distribution of Warehousing Space Over Time.**
    - According to assumed growth rates, the region will run out of suitably zoned vacant land in about the year 2028. At that time, forecasts show that the demand for warehousing space will be approximately 1,023 million square feet.

- During the year 2035, there will be a projected shortfall of space of about 228 million square feet, unless other land not currently zoned for warehousing becomes available.

1.0 Introduction

The objective of Task 5 is to conduct a needs assessment of industrial/warehouse and intermodal facilities in the Southern California Association of Governments (SCAG) region. The goal is to understand the demand for facility space and to determine if the supply will be sufficient. The study also attempts to project where and when warehousing will develop over time. The analysis includes warehousing demand for port related cargo, as well as non-port related cargo.

Section 2.0 describes the current supply of warehouse facilities in the SCAG region and provides an inventory of existing supply through cataloguing the undeveloped land in the SCAG region. This analysis also maps the location of undeveloped property that is zoned in a way that would permit development of future goods movement facilities.

Section 3.0 determines the current demand for industrial/warehousing facilities and then estimates future aggregate demand for warehouse space to support port related cargo storage and processing needs.

Section 4.0 provides a theory for future growth and how the supply of land will evolve over time based on economic forces in the Southern California region. Since World War II, Southern California's history has been dominated by the impact of its rapid population growth on its land use pattern. With no policies in place or under consideration to stop population growth, the region will continue to develop outward. Various policy scenarios are tested to determine what could change this trajectory.

Section 5.0 takes the aggregate forecasts of warehousing demand described in Section 3.0 and allocates growth to subregions. It is assumed that growth will occur in a logical sequence (i.e., as subregions closer to the urban core become saturated, future development will jump to the next logical subregions until the supply of vacant industrial-zoned land runs out).

Section 6.0 documents the existing and planned intermodal (IM) rail facilities in the region. Fortunately, a similar analysis was completed by Cambridge Systematics in February 2009 for the I-710 Environmental Impact Report (EIR)/Environmental Impact Statement (EIS)[1], and the following information is taken largely from that study.

[1] Cambridge Systematics, Inc., *Final technical Memorandum, I-710 Railroad Goods Movement Study*, prepared for Los Angeles Metropolitan Transportation Authority, February 3, 2009.

2.0 Existing Supply of Warehousing Space

This section describes the current supply of warehouse facilities in the SCAG region and has been covered by the previous two-part technical memorandum provided to SCAG on September 22, 2009 and presented in Appendices A and B.

A database has been created showing the locations of the warehouses, their square footage, the land area covered, and whether the facilities are occupied or available (*vacant or occupied but tenants are leaving*). The data in this report are from the six county assessor's offices in the SCAG region and Lee & Associates, a major commercial real estate firm. The data include facilities that are 50,000 square feet and above that have been classified as "warehousing" plus facilities more generally classified as "industrial", however, their size and location would indicate that they are most likely warehouses.

2.1 FINDINGS FOR OCCUPIED AND AVAILABLE SPACE

Summary of Existing Space

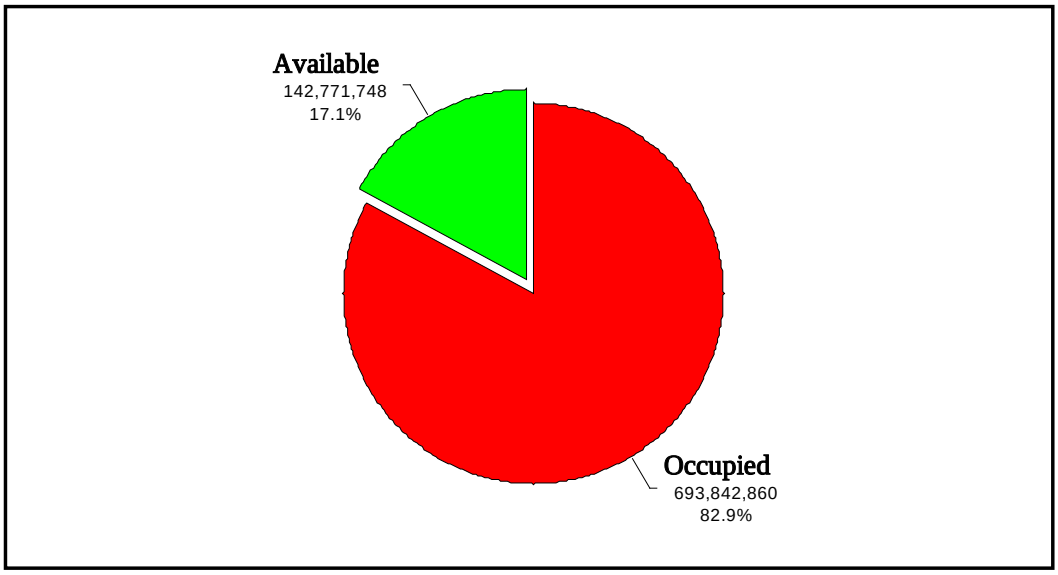
There are currently a total of 4,695 warehousing facilities in the SCAG region (*Table 2.1 and Figure 2.1*). Of these, 84.8 percent (*3,983*) are occupied and 15.2 percent (*712*) are available (*vacant or occupied and becoming vacant*). The 4,695 facilities represent 837,689,768 square feet (square feet) of warehouse space. They cover 1,463,925,978 square feet of land representing an average 57.1 percent floor area ratio (FAR). A total of 693,842,860 square feet, or 82.8 percent, are occupied and 143,846,908 square feet., or 17.1 percent, are available (*Table 2.1 and Figure 2.1*).

Table 2.1 Profile of Warehousing Facilities in the SCAG Region

Status	Facilities (Number)	Percentage Share	Facilities (Square Feet)	Percentage Share	Land (Square Feet)	Percentage Share
Occupied	3,983	84.8%	693,842,860	82.8%	1,164,574,572	79.6%
Available	712	15.2%	143,846,908	17.2%	299,351,406	20.4%
Total Existing	**4,695**	**100.0%**	**837,689,768**	**100.0%**	**1,463,925,978**	**100.0%**

Source: Cambridge Systematics Technical Memorandum, *Existing Supply of Warehouse Facilities*, Task 5, Deliverable #1, Part 1, September 22, 2009. Slight correction made to account for additional space in Imperial County.

Figure 2.1 Occupancy of Warehousing Facilities in the SCAG Region
In Square Feet



Occupied Space

Of the 3,983 occupied warehouse facilities, the largest shares are in Los Angeles (*51.8 percent*) and San Bernardino (*16.5 percent*) counties, followed by Riverside (*12.8 percent*) and Orange counties (*9.3 percent*) (*Table 2.2 and Figure 2.2*). As a share of the regional total of warehousing square footage,

San Bernardino County and Riverside County represent 23.7 percent and 19.7 percent, respectively, while Los Angeles County accounts for 44.8 percent (*Table 2.2 and Figure 2.3*). The facilities in San Bernardino and Riverside Counties tend to be larger, newer, and built with more recent technology.

Table 2.2 Occupied Warehousing Facilities by County

County	Number of Facilities		Facilities (by Square Feet)		Land Area (by Square Feet)	
Imperial	47	1.2%	7,273,270	1.0%	11,364,491	1.0%
Los Angeles	2,063	51.8%	310,696,717	44.8%	471,368,956	40.5%
Orange	369	9.3%	34,488,034	5.0%	77,493,686	6.7%
Riverside	508	12.8%	136,421,050	19.7%	213,157,898	18.3%
San Bernardino	657	16.5%	164,716,871	23.7%	328,323,740	28.2%
Ventura	339	8.5%	40,246,918	5.8%	62,885,801	5.4%
Total	**3,983**	**100.0%**	**693,842,860**	**100.0%**	**1,164,574,572**	**100.0%**

Source: Cambridge Systematics Technical Memorandum, *Existing Supply of Warehouse Facilities*, Task 5, Deliverable #1, Part 1, September 22, 2009.

Figure 2.2 Occupied Warehousing Facilities by County, Number

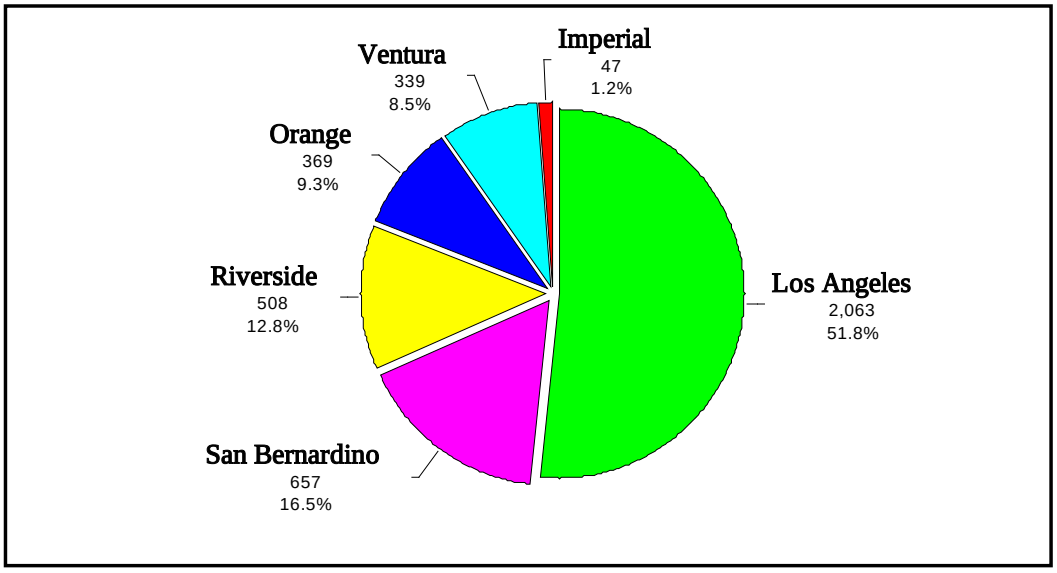
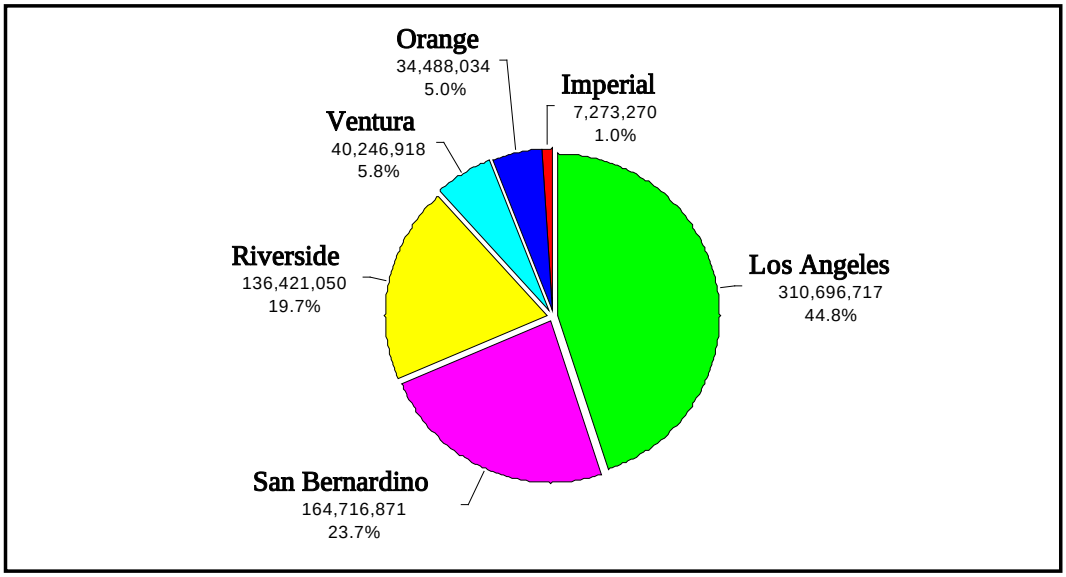


Figure 2.3 Occupied Warehousing Facilities by County
In Square Feet



Currently Available Space

Of the 712 warehouse facilities, either available or occupied but now on the market, the largest shares are in Los Angeles (*40.3 percent*) and San Bernardino (*29.2 percent*) Counties, followed by Riverside (*14.7 percent*) and Orange (*12.6 percent*) (*Table 2.3 and Figure 2.4*). In terms of square footage, the inland counties again had higher shares with San Bernardino at

37.1 percent and Riverside at 22.9 percent, while Los Angeles had 28.0 percent and Orange had 9.1 percent (*Table 2.3*).

Table 2.3 Available Space for Warehousing by County

County	Number of Facilities		Facilities (by Square Feet)		Land Area (by Square Feet)	
Imperial	N/A	0.0%	1,075,160	0.7%	N/A	0.0%
Los Angeles	287	40.3%	40,289,109	28.0%	75,446,297	25.2%
Orange	90	12.6%	13,116,570	9.1%	25,718,467	8.6%
Riverside	105	14.7%	32,958,011	22.9%	63,032,998	21.1%
San Bernardino	208	29.2%	53,316,426	37.1%	126,910,023	42.4%
Ventura	22	3.1%	3,091,632	2.1%	8,243,620	2.8%
Total	**712**	**100.0%**	**143,846,908**	**100.0%**	**299,351,406**	**100.0%**

Source: Cambridge Systematics Technical Memorandum. Existing Supply of Warehouse Facilities (Task 5, Deliverable #1, Part 1). September 22, 2009. Slight correction made to account for additional space in Imperial County.

Note: Assessor data from Imperial County did not include "vacant" parcels. See Data Manipulation and Assumptions.

Figure 2.4 Available Warehousing Facilities by County, Number

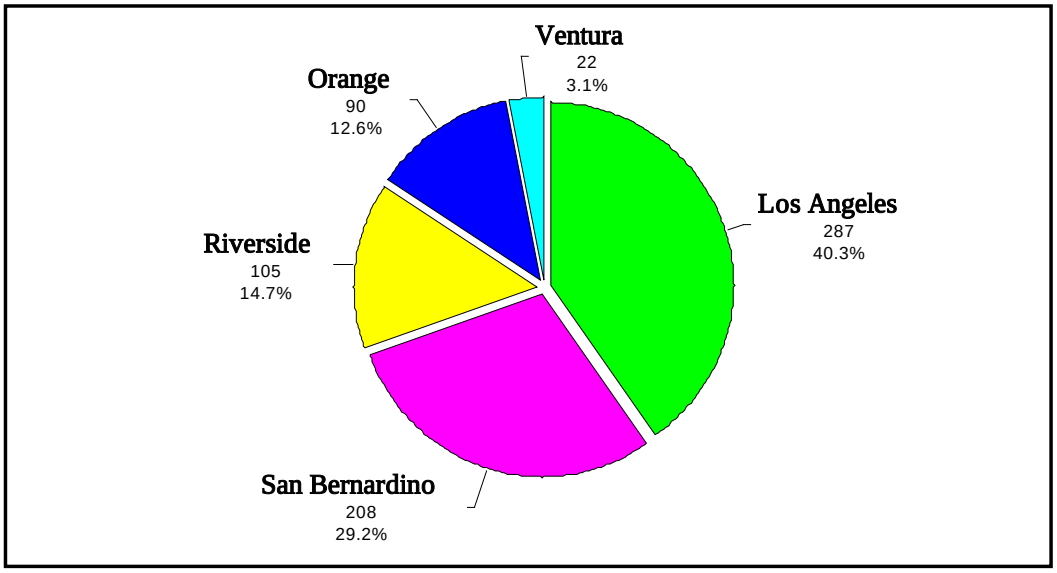


Table 2.4 Summary of Occupied, Available, Total Space by County, 2009
Includes Facilities of 50,000 Square Feet and Larger

	Occupied Space		Available Space		Total Space	
County	**Square Feet**	**% of County**	**Square Feet**	**% of County**	**Square Feet**	**% Available**
Imperial	7,273,270	1.0%	1,075,160	0.7%	8,348,430	12.9%
Los Angeles	310,696,717	44.8%	40,289,109	28.0%	350,985,826	11.5%
Orange	34,488,034	5.0%	13,116,570	9.1%	47,604,604	27.6%
Riverside	136,421,050	19.7%	32,958,011	22.9%	169,379,061	19.5%
San Bernardino	164,716,871	23.7%	53,316,426	37.1%	218,033,297	24.5%
Ventura	40,246,918	5.8%	3,091,632	2.1%	43,338,550	17.1%
Total	**693,842,860**	**100.0%**	**143,846,908**	**100.0%**	**837,689,768**	**17.2%**

Source: Cambridge Systematics Technical Memorandum. Existing Supply of Warehouse Facilities (Task 5, Deliverable #1, Part 1). September 22, 2009. Slight correction made to account for additional space in Imperial County. [2]

Table 2.4 summarizes, for each county, the facilities that the Assessor's Offices found were occupied and the facilities that Lee & Associates lists as available (*vacant or occupied and becoming vacant*). The total is the sum of these two. Table 2.4 is not comparable to commercial brokerage data for several reasons. It only looks at facilities of 50,000 square feet and above; brokerage data starts at 5,000 square feet. It also includes build-to-suits,

[2] There is a slight deviation in total vacant space from earlier work in that 1,075,160 square feet of vacant space was found in Imperial County (*149,915 square feet in north end of the County nearer the Salton Sea; 925,245 square feet in south end near the Mexican border*). That number had been assumed at zero due to lack of information. The total of vacant space was thus 143,846,908; not 142,771,748, as previously reported. Data in this final report reflect corrected values.

which are often excluded from commercial brokerage data. It provides data on "available" square footage, and thus an availability rate, not a "vacancy rate". It mixes sources with the occupied from the assessor's offices and the available from Lee & Associates. Table 2.4 seeks to measure warehousing facilities; brokerage data is for all industrial facilities.

In 2009, brokerage data found that all industrial facilities in the Inland Empire, regardless of size down to 5,000 square feet, had a 12.3-percent vacancy rate. Availability rates run higher. A study of that area in second quarter 2008 found the availability rate was 4-percent higher. Also, the data in Table 2.4 are for facilities of 50,000 square feet and above. The slowdown in international trade worldwide has affected large warehouses very hard, with a growing number of firms abandoning operations.

Figure 2.6 and Figure 2.7 are maps of the SCAG region showing the location of occupied and available warehouses in Southern California.

Figure 2.5 Map of Occupied Warehousing Space in the SCAG Region

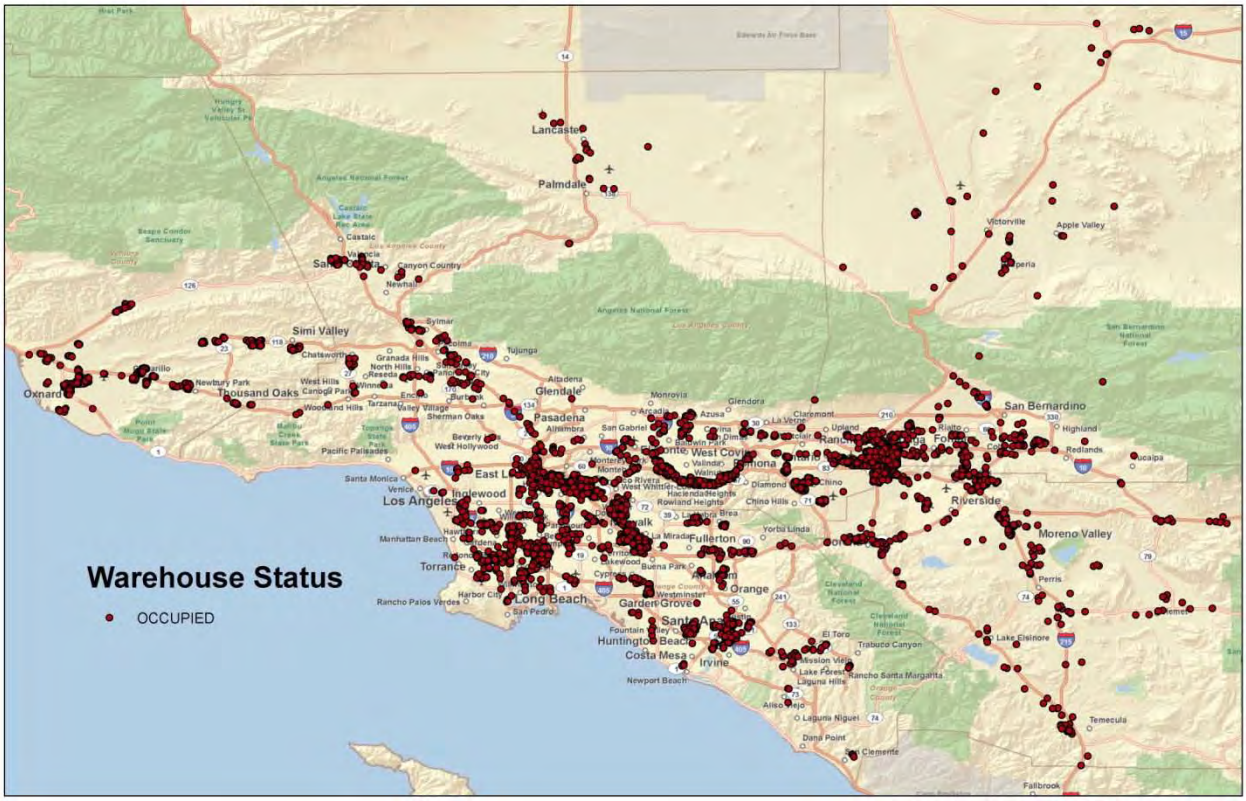
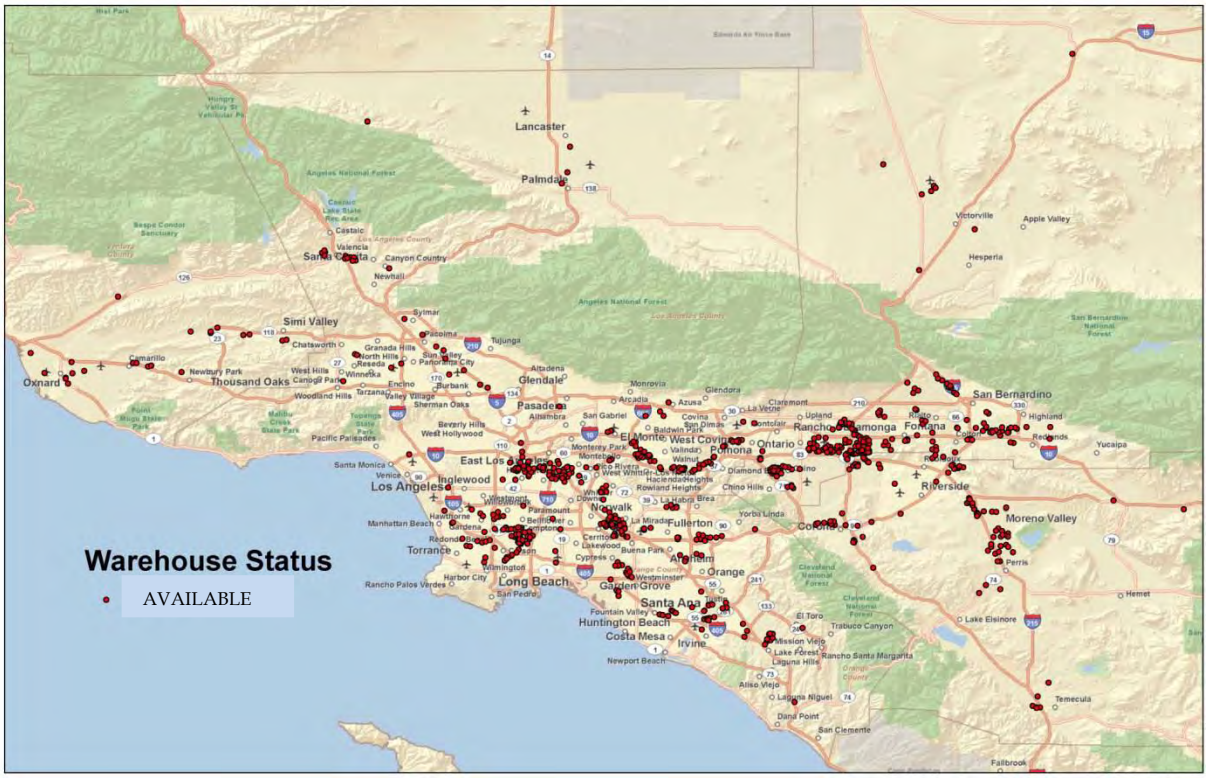


Figure 2.6 Map of Available Warehousing Space in the SCAG Region



2.2 FINDINGS FOR UNDEVELOPED LAND

Based on a review of available land that is zoned industrial, the analysis indicated that the SCAG region (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties) could hold another 186.2 million square feet of warehousing and distribution buildings (*Table 2.5 and Figure 2.8*).

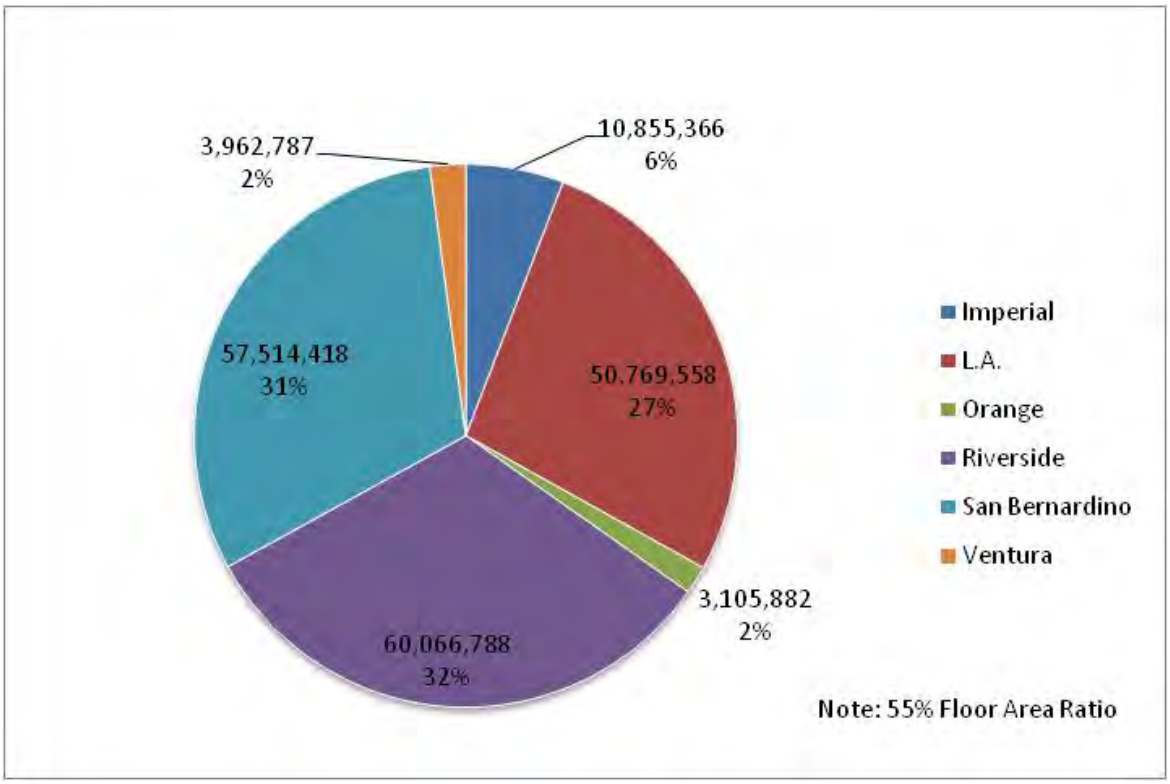
This assumes no other land, such as agricultural sites, is converted to industrial. The largest share of these potential facilities would be in Riverside County (60.0 million square feet, 32.2 percent) and San Bernardino County (57.5 million square feet, 30.9 percent). Next would be Los Angeles County (50.8 million square feet, 27.3 percent). Imperial County ranked fourth (10.9 million square feet, 5.8 percent), followed by Ventura County (4.0 million square feet, 2.1 percent) and Orange County (3.1 million square feet, 1.7 percent). Importantly, within each county, the vast majority of the potential space is in outlying desert areas: San Bernardino (74.9 percent), Los Angeles (71.5 percent), Riverside (67.5 percent), and Imperial (100.0 percent). Here, there is also some bias for large tracts that could be potential mining or solar fields.

Table 2.5 Summary of Undeveloped and Total Space by County, 2009
Includes Facilities of 50,000 Square Feet and Larger

	Undeveloped Suitable Space		Total Existing Space	
County	**Square Foot**	**% by County**	**Square Foot**	**% Available**
Imperial	10,855,366	5.8%	8,348,430	12.9%
Los Angeles	50,769,558	27.3%	350,985,826	11.5%
Orange	3,105,882	1.7%	47,604,604	27.6%
Riverside	60,066,788	32.2%	169,379,061	19.5%
San Bernardino	57,514,418	30.9%	218,033,297	24.5%
Ventura	3,962,787	2.1%	43,338,550	17.1%
Total	**186,274,798**	**100%**	**837,689,768**	**17.2%**

Source: Cambridge Systematics Technical Memorandum. Existing Supply of Warehouse Facilities (Task 5, Deliverable #1, Part 2). September 22, 2009. Slight adjustment for Imperial County data.

Figure 2.7 Warehouse Development Potential (Square Feet) on Vacant But Suitable Industrial Land in SCAG Region (186.2 Million)



If **Riverside County's** available industrial land were to be developed with logistics facilities, it would have the potential to add 60.0 million square feet, the SCAG region's largest share. Most of this potential space (29.6 million square feet) would be on unincorporated land outside of a census-designated place (CDP), with most of that likely in outlying deserts. Of the cities in Riverside County, Perris (3.7 million square feet) and Riverside (3.4 million square feet) have the most potential, followed by Coachella (3.3 million square feet), Corona (3.3 million square feet), and Palm Springs (3.1 million square feet.). Including unincorporated property, 67.5 percent of Riverside County's available sites are in its deserts.

San Bernardino County has the potential to add 57.5 million square feet of warehousing and distribution facilities, the second largest share in the SCAG region. Adelanto has the greatest potential (20.3 million square feet), followed by unincorporated non-CDP locations (12.9 million square feet) and Victorville (7.0 million square feet). Two urban valley cities are next: San Bernardino (4.4 million square feet) and Redlands (2.3 million square feet). Including unincorporated property, 74.9 percent of San Bernardino County's available sites are in its deserts.

Maintaining the theme of outlying areas having the bulk of the SCAG area's potential future warehousing and distribution space, Lancaster (23.0 million square feet) and Palmdale (12.9 million square feet) have 71.5 percent of **Los Angeles County's** 50.8 million square feet of potential space. The only substantial potential sites clearly in urbanized areas were in Santa Clarita (3.7 million square feet), Los Angeles (2.4 million square feet), and Industry (2.1 million square feet).

Imperial County is generally not on the list of major sources of urban development potential. That is not true with regards to potential future logistics space. Land identified as industrial that could hold warehousing and distribution facilities has the ability to handle 10.9 million square feet of space. The number would, of course, be much higher if agricultural sites were ultimately converted to industrial use. This is more than either Orange or Ventura Counties.

Ventura County still has some potential to handle warehousing and distribution facilities. It could see 4.0 million square feet with 44.5 percent of that in Oxnard (1.7 million square feet), not too far from the Port of Hueneme.

In the SCAG region, **Orange County** is nearly out of undeveloped industrially-zoned land. It has the potential for just 3.1 million square feet Of this, Irvine (1.4 million square feet) is where 49 percent of this space could locate.

Figure 2.8 Map of Undeveloped Warehousing Space in the SCAG Region

2.3 DATA SOURCES

The location and facility characteristics of warehouses were obtained from the six county assessor's offices in the SCAG region. A listing of the types of data received is shown in Table 2.5. Each office was asked to provide a list of facilities that could be classified as warehousing and distribution, including the following use classification or facility type:

- **Industrial/Warehouse.** General category where we had insufficient information to differentiate between a warehouse or a manufacturing operation. Based on the size of facilities, and elimination of facilities that were clearly manufacturing operations by looking at the names of the owners, the overwhelming majority would be warehouses.
- **Distribution Facility.** A warehousing operation or a trucking operation.
- **Cross Dock Trucking Terminal.** A facility where trucks of one size or from one geographic location are unloaded on one side of the facility and move across to the other side, where they are loaded into other trucks of different sizes or going to different places.

- **Bulk Warehouse.** Large warehousing facilities.

Table 2.6 Assessor Data Received, Properties of All Sizes

Data Type	Los Angeles	Ventura	San Bernardino	Riverside	Orange*	Imperial
Assessor Parcel Code	✓	✓	✓	✓	✓	✓
Use Code	✓	✓	✓	✓	✓	✓
Street Address	✓	✓	✓	✓	✓	✓
City, Zip	✓	✓	✓	✓	✓	✓
Lot and Tract No.	✓	✓	✓	✓	✓	✓
Site square feet (% of facilities where data were provided)	98.6 %	93.5 %	90.0%	80.2%	100%	91.8 %
Building sq ft (% of facilities where data were provided	99.3 %	0%	99.4%	0%	100%	0%
Owner	✓	✓	✓	✓	✓	✓
Owner's Address	✓	✓	✓	✓	✓	✓
Valuation	✓	✓	✓	✓	✓	✓
Longitude/Latitude	✓	✓	✓	✓	✓	✓

*Orange County provided all industrial buildings of 50,000 or more square feet, but did not specify whether they were manufacturing or warehousing facilities. It was assumed they were warehousing.

Lee & Associates, a major commercial brokerage firm, obtained data on available space, which the assessors' data did not include. This data was provided in exchange for sponsorship acknowledgment on the reports. They included:

- Address, city, zip;
- Building total square footage;
- Available square footage;
- Height;
- Lot size;
- Number of land parcels comprising the lots; and
- Longitude and latitude.

Data Manipulation and Assumptions

This raw data set was manipulated using the following rules and assumptions:

- Assessor data and Lee & Associates vacancy data were matched by determining the longitude and latitude of the assessor's data. If a Lee & Associates facility, using its Geographic Information System (GIS) location, was within 500 feet of an assessor's facility, it was counted as the same facility.
- If there was conflicting information for a given facility, the Lee & Associates data were assumed to be accurate. The assumption is that brokerage data is of higher quality and more up to date, because clients count on the brokers to use accurate information to market the facilities.
- If a Lee & Associates vacant building was not on the assessor's files or was more than 500 feet from an assessor's building, it was added to the database with the Lee & Associates information.
- Buildings with less than 50,000 square feet were removed from the database, as they were assumed unlikely to be involved in goods movement activities.
- An equation was developed relating lot size to building square footage, where that was available under the rules outlined above and described in greater detail in Section 2.4. This was then applied to the blank land square footage to estimate the square footage of buildings, where data was not available. Extreme cases and outliers for illogical data were removed from the database.
- An external check was run on the result. The SCAG region showed roughly 694,000,000 square feet of occupied warehousing space and roughly 143,000,000 square feet of available (vacant or soon to be vacant) space. This is within reason for the commercial data published about the warehousing sector. The commercial data includes buildings of 5,000 square feet and above, and is therefore not strictly comparable.
- Except for Orange County, the available data included vacant parcels regarded as future industrial sites. Of these, the most accurate appears to be San Bernardino County. The least accurate appears to be Riverside County. More analysis, outlined below, is needed on vacant parcels.
- After the database was completed, a line-by-line review was undertaken of occupied sites to judge whether the data appeared to be accurate in cases where the assessors' codes did not allow specificity to goods movement facilities, as opposed to other industrial uses. In particular, an effort was made to remove:

- Named self-storage facilities;
- Named very large manufacturing facilities (*e.g., Amgen, Ventura County*);
- Named manufacturing facilities less than 200,000 square feet.;
- Industrial-coded sites under 200,000 square feet in areas known to contain few, if any, warehousing facilities (*e.g., Hunter Park, Riverside County*); and
- Named agricultural facilities of any size in outlying areas (*e.g., Coachella Valley*).

Data Dictionary

The warehousing information is provided in the following two ArcGIS file (.shp) titled "Occupied" and "Vacant (Available)." These files include the following fields and description of contents:

- **ALLCOUNTY.** County where the warehouse is located. This is derived from one of the six county assessor files.
- **OWNER1.** Name of the facility, as provided by the county assessor.
- **SITUSADDRE.** Address of the facility, as provided by the county assessor.
- **PLACE_NAME.** City where the warehouse is located.
- **PARCELNO.** Parcel number, as provided by the county assessor. These correspond to various use codes. Each county has a separate series of use codes, which can be provided if needed.
- **FIELD7.** Same as PARCELNO.
- **X and Y.** Latitude and Longitude location of facilities, as coded by GIS.
- **TOTALVALUE.** Total assessed value (land and structures) per the county assessor.
- **WAREVAC.** Status of warehouse, per county assessor (intermediary calculation).
- **OCCUPIED.** Status of warehouse, per county assessor (intermediary calculation).
- **GIS_SQFT.** Square footage details calculated with parcel information (intermediary calculation).
- **ASSESSORSF.** Square footage details provided by county assessor (intermediary calculation).
- **BROKERSF.** Square footage details provided by Lee & Associates (intermediary calculation).

- **COUNT.** Number of records per parcel (intermediary calculation).
- **STATUS.** Vacant (Available), Occupied, or Undeveloped.
- **BUILDING.** Actual Building Square Footage per above methodology developed by John Husing. This field provided the actual building square footage in subsequent analyses and calculations.
- **CODE.** Assessors' codes.
- **DEFINITION OF CODE.** The Assessor's explanation of the meaning of the code.

3.0 Determining Current and Future Demand for Warehousing Space

This part of the task determines the current demand for industrial/warehouse facilities, and then estimates future demand for warehouse space to support port related and non-port related cargo storage and processing.

3.1 FINDINGS ON WAREHOUSING SPACE DEMAND

Port related warehouse square footage in 2008 was estimated to be 102 million square feet. The existing 2008 warehouse space in the region (836.6 million square feet, occupied and available) will meet the growth demand until 2021 (see Table 3.2 on Page 3-5). Based on projections of port cargo, it was estimated that 307 million square feet of port related warehousing would be needed in 2035.

It has been estimated that 591 million square of warehousing in 2008 is occupied by non-port related cargo. By 2035, the need for non-port related warehousing is projected to reach 943 million square feet, based on projections of domestic cargo shipments in the SCAG region.

In Section 5.0, we present forecasts of future demand for warehousing by year and by subregional zone for both port related and non-port related uses.

3.2 DATA SOURCES

The first step was to develop a list of variables required to estimate warehouse demand, including the economic drivers behind this demand, such as growth in cargo through the ports and growth in the domestic economy. These variables were compiled through literature review, interviews, and a warehousing survey that was conducted for this task. To gain an understanding of current demand for warehousing space, interviews were conducted with warehouse distribution specialists in the SCAG region.

Interviews with Industry Professionals

For this task, Cambridge Systematics interviewed industry professionals from ProLogis, Watson Land Company, Majestic Realty Company, California

Cartage, as well as the Distribution Management Association of Southern California and International Warehouse Logistics Association.

Warehousing Survey

To gain a better understanding of the variety of warehousing functions and characteristics in the SCAG region, we conducted a survey of warehouse tenants from November 2009 to January 2010. Results of this survey were used as one of the data sources for the findings in this section. A full summary of the warehousing survey can be found in Appendix C, including background on survey methodology, pre-test, questionnaire, and results.

3.3 METHODOLOGY

Avison Young Methodology

To forecast demand for warehouse space to support port growth, we adapted an approach developed by Avison Young for a study of industrial space needs associated with container cargo growth at the Port of Vancouver, British Columbia.[3] The Vancouver report is provided as Appendix D. The methodology converts estimates of port container volumes in local distribution into cubic footage and square footage of warehousing.

Using the Avison Young approach, Cambridge Systematics developed a spreadsheet model to predict the amount of warehouse space that would be required to accommodate future growth of containerized cargo through the Ports of Los Angeles and Long Beach. The methodology starts with assumptions about the percentage of port Twenty-Foot Equivalent Units (TEU) requiring warehouse space. It is assumed that loaded containers in the "local distribution" and "transload" market segments need warehouse space in the SCAG region, but that containers in the "direct long-haul intermodal" segment do not, since they are loaded onto trains for shipment out of the region. In 2008, the Ports handled a total of 14,337,801 TEUs, 75 percent of which were loaded. In 2009, they handled 11,816,592 TEUs, 77 percent of which were loaded.

Based on the Ports' container truck trip generation model, known as "QuickTrip", 26.4 percent of total TEUS (including empties) are loaded local import containers, including transload containers. A total of 8.5 percent TEUs are loaded local export containers. It is assumed that 100 percent of the loaded local imports need warehousing space, but that only 30 percent of the loaded local exports are warehoused, as they often move direct from

[3] Avison Young, Container Shipping Growth and Industrial Real Estate Demand in Greater Vancouver: 2005-2020, June 2005.

their origin to the ports. Multiplying these factors would indicate that in 2008, 4,150,793 loaded TEUs needed warehousing space. This number of TEUs, shown as *L* in Equation 1, represents 29 percent of all TEUs through the Ports that needed warehousing space.

The analysis used these additional simplifying assumptions:

- Ten percent of the cargo needing warehouse space are moved twice in the region (i.e., a container that is sent from the port to a warehouse, and then is later sent to another warehouse in the region);
- Ninety percent of a TEU is actually filled with cargo; and
- The dimensions of a TEU are 8 feet by 8.5 feet by 20 feet.

This implies that the cargo needing warehousing in 2008 would require more than 5.6 billion cubic feet of space for storage. However, not all of the cubic space in a warehouse is devoted to cargo storage, since there are hallways, offices, etc. Based on a schematic for a typical warehouse, only about 23 percent of the actual cubic footage inside a warehouse are used for cargo storage. It is also assumed that, on the average, warehouses operate at 75 percent of capacity. Based on the recent warehouse survey conducted as part of this study, the average ceiling height used for cargo storage inside a warehouse is 27 feet. Also, the higher the cargo turnover rate per year, the more cargo can be processed through the facility. Based on the survey, the average turnover rate is 12 times per year.

To calculate the warehouse space needed to accommodate 2008 port container volumes from the loaded TEUs needing warehousing space, the following equation was used.

Equation 1

$$W = L * (1+m) * d * e * (1/u_1*u_2) * (1/t) * (1/h)$$

Where:

W = Warehouse space needed to accommodate port container volumes;

L = Loaded TEUs needing warehousing space;

m = Percentage of cargo moved twice within the region;

d = Dimension of container (i.e., length x width x height);

e = Efficiency of container (i.e., percent of TEU filled with cargo);

u_1 = Warehouse cubic space utilization ratio and used for cargo at full capacity;

u_2 = Average percentage capacity utilization annually;

t = Turnover of cargo in warehouse per year; and

h = Ceiling height used for cargo storage.

Combining these factors yields an estimate of 102 million square feet of warehouse space needed to accommodate 2008 port container volume. The resulting square feet of warehouse space per loaded TEU per year needing space is 22.4.

As shown in Table 3.1, the Ports expect to be at capacity of 43,158,000 TEUs per year by 2035. Using the same analytical procedures, it was estimated that 12.5 million loaded TEUs would need regional warehouse space in 2035. This cargo would require about 307 million square feet of warehouse space, or 205 million square feet more than what was needed in 2008.

Table 3.1 Estimated Container Volumes for San Pedro Bay Ports
2008 to 2035

Year	Inbound Loads	Outbound Loads	Total Loads	Empties	Total TEUs
2008 actual	7,327,953	3,469,553	10,797,507	3,540,295	14,337,801
2009 actual	6,059,283	3,020,964	9,080,247	2,736,345	11,816,592
2010	6,620,000	3,071,000	9,691,000	3,123,000	12,814,000
2015	8,780,000	3,768,000	12,548,000	4,410,000	16,958,000
2020	11,333,000	4,343,000	15,676,000	6,151,000	21,827,000
2025	14,417,000	4,897,000	19,314,000	8,377,000	27,691,000
2030	18,039,000	5,415,000	23,454,000	11,109,000	34,563,000
2035	22,571,000	5,988,000	28,559,000	14,599,000	43,158,000

Source: Ports of Los Angeles and Long Beach, 2009. Total inbound loads, total outbound loads, empties, and total TEU forecasts for 2015, 2020, 2025, and 2030 from The Tioga Group and IHS Global Insight, *San Pedro Bay Container Forecast Update*, July 2009. Ports assumed to be operating at capacity by 2035.

Subtracting the 102 million square feet of port related space from the estimated total occupied warehouse space in the region in 2008 of 694 million square feet implies that about 591 million square feet is used for non-port related cargo.

Table 3.2 shows projections of aggregate warehouse demand for port related and non-port related warehousing. In forecasting required port related warehouse space to 2035, it was assumed that port related needs would

grow according to the recent IHS Global Insight/Tioga forecasts for containerized cargo through the San Pedro Bay Ports. Total TEUs are projected to grow at the following compound annual rates:

- **2010 to 2015.** 5.8 percent;
- **2015 to 2020.** 5.2 percent;
- **2020 to 2025.** 4.9 percent;
- **2025 to 2030.** 4.5 percent; and
- **2030 to 2035.** 4.5 percent.

Another IHS Global Insight product is the cargo tonnage database known as TRANSEARCH. This database shows projections of cargo tonnage for domestic and international goods movement through 2040. Non-port related warehouse needs in the SCAG region were assumed to grow according to the TRANSEARCH forecasts for domestic cargo in the SCAG region. This sector is projected to grow at the following compound annual growth rates, including negative growth through 2012:

- 2007 **to 2012.** -2.2 percent;
- **2012 to 2017.** 3.0 percent;
- **2017 to 2023.** 2.6 percent;
- **2023 to 2030.** 2.1 percent; and
- **2030 to 2035.** 2.2 percent.

Over time, both the port related and non-port related demand would absorb the "available" 143 million square feet, but at different annual rates, as listed above.

Table 3.2 Estimates of Warehouse Supply and Demand, 2008 to 2035
In Square Feet

Year	TEUs/Year	TEUs/Yr Using Warehouse Space in Region*	Total Port-Related Warehouse Square Feet Required	Percentage Port Related	Non-Port Occupied Square Feet	Total Occupied Port and Non-Port Square Feet
2008 actual	14,337,801	4,565,873	102,082,701	15%	591,760,159	693,842,860
2009 actual	11,816,592	3,762,994	84,132,118	13%	578,615,852	662,747,971
2010	12,814,000	4,080,618	91,233,496	14%	565,763,510	656,997,007
2011	13,550,015	4,315,002	96,473,797	15%	553,196,647	649,670,444
2012	14,329,677	4,563,286	102,024,858	16%	540,908,922	642,933,780
2013	15,155,647	4,826,316	107,905,626	16%	557,214,315	665,119,941
2014	16,030,754	5,104,993	114,136,234	17%	574,011,224	688,147,458
2015	16,958,000	5,400,275	120,738,070	17%	591,314,468	712,052,538
2016	17,829,867	5,677,921	126,945,612	17%	609,139,307	736,084,919
2017	18,749,827	5,970,882	133,495,571	18%	627,501,466	760,997,037
2018	19,720,669	6,280,047	140,407,800	18%	643,520,270	783,928,070
2019	20,745,348	6,606,356	147,703,346	18%	659,948,000	807,651,346
2020	21,827,000	6,950,808	155,404,521	19%	676,795,096	832,199,616
2021	22,883,394	7,287,217	162,925,869	19%	694,072,263	856,998,132
2022	23,994,893	7,641,174	170,839,546	19%	711,790,479	882,630,026
2023	25,164,507	8,013,637	179,167,005	20%	729,961,006	909,128,011

Year	TEUs/Year	TEUs/Yr Using Warehouse Space in Region*	Total Port-Related Warehouse Square Feet Required	Percentage Port Related	Non-Port Occupied Square Feet	Total Occupied Port and Non-Port Square Feet
2024	26,395,422	8,405,622	187,930,909	20%	745,471,649	933,402,558
2025	27,691,000	8,818,199	197,155,201	21%	761,311,872	958,467,073
2026	28,937,941	9,215,287	206,033,208	21%	777,488,677	983,521,885
2027	30,245,459	9,631,667	215,342,517	21%	794,009,216	1,009,351,733
2028	31,616,627	10,068,315	225,104,994	22%	810,880,794	1,035,985,788
2029	33,054,674	10,526,261	235,343,644	22%	828,110,869	1,063,454,513
2030	34,563,000	11,006,587	246,082,670	23%	845,707,058	1,091,789,729
2031	36,145,182	11,510,433	257,347,537	23%	864,320,511	1,121,668,047
2032	37,804,983	12,038,997	269,165,037	23%	883,343,633	1,152,508,669
2033	39,546,363	12,593,539	281,563,363	24%	902,785,441	1,184,348,804
2034	41,373,488	13,175,387	294,572,183	24%	922,655,150	1,217,227,333
2035	43,158,000	13,743,665	307,277,606	25%	942,962,179	1,250,239,785
Growth 2008-2035	**28,820,199**	**9,177,792**	**205,194,904**		**351,202,020**	**556,396,925**
Ratio: 2035/2008	**3.0**	**3.0**	**3.0**		**1.6**	**1.8**
Growth 2020-2035	**21,331,000**	**6,792,857**	**151,873,085**		**266,167,083**	**418,040,169**

*Including TEUs moving twice (i.e., a container that is sent from the ports to a warehouse, and then is later sent to another warehouse in the region).

4.0 "Dirt Theory" and Scenarios for How Warehouses Locate

In 2009, Southern California's urban core spreads from Los Angeles County in the center through Orange and San Diego Counties to the south and Ventura County in the north, as shown in Figure 4.1. To the east, it includes the valley portions of San Bernardino and Riverside Counties. In this vicinity, development has recently moved north into the Victor Valley area of the Mojave Desert, east to San Gorgonio Pass on the way towards the Coachella Valley. It has also entered the Antelope Valley of Los Angeles County, and most recently, it has begun to migrate from San Diego County into Imperial County.

Figure 4.1 SCAG Region

While covering this immense seven–county area, Southern California's economy has expanded by turning a succession of submarkets into "hot zones," characterized by rapid housing and population growth, dramatic

increases in commuting, and much hand-wringing about "sprawl." Over time, the same forces have eventually turned these "hot zones" into job generators, ultimately creating a balance between local workers and jobs. Since World War II, several high-profile areas have completed this process. These have included the San Fernando Valley (*1950 to 1960s*), San Gabriel Valley (*1960 to 1970s*), Simi Valley (*1970 to 1980s*), and Orange County (*1980 to 1990s*). The next area on track to complete this cycle is the western Inland Empire.

This long-term pattern has occurred despite repeated attempts to stop it. Thus, in 1980, San Bernardino County found Adriana Gianturco, Secretary of Transportation under Governor Jerry Brown, trying to sell the right-of-way for the I-210 freeway from San Dimas to Redlands. The theory was to make movement so difficult that the outflow of growth would be forced to stop. After numerous bureaucratic decisions, lawsuits, and funding delays, that extension was finally completed in 2007. Meanwhile, without the freeway, the County's population grew by 2.24 times from 1980 (*895,016*) to 2007 (*2,008,800*), up 1,113,784 people.[4] Clearly, the policy of making life difficult for the movement of people and goods failed to stop the outward migration.

That lesson is important, because today lawmakers are considering policies, fees, and taxes aimed at altering Southern California's horizontal growth. This could impact distribution facilities if penalties, fees, or taxes applied to them, as "trip generators" slow down the tendency for industrial facilities to migrate to outlying areas. Framed as air quality measures, the unintended consequence would be to lessen the speed that blue collar jobs migrate to where people who need them have chosen to live. This would force workers to commute long distances for longer time periods, clogging freeways, punishing families, and contributing to air quality difficulties.

That impact can be found in the unintended consequence of Ventura County's 1998 Save Open space and Agricultural Resources (*SOAR*) initiative, which essentially halted the conversion of agricultural land and open space. The unintended result has been to make Ventura County a source of long-distance commuting with 22.3 percent of its workers leaving the County for jobs[5] and 17.5 percent commuting 90 minutes a day *round trip*.[6] Among Southern California's suburban markets, only the Inland Empire had higher levels (*29.1% percent; 23.4 percent*). Rates were much lower in Orange

[4] *E-2 Report*, California Department of Finance, Demographic Research Unit, 2009.

[5] *Table B08007 Sex and Place of Work*, American Community Survey, Census Bureau, 2008.

[6] *Table B08012 Sex of Worker by Time Travel to Work*, American Community Survey, Census Bureau, 2008.

County (*15.3 percent; 11.7 percent*) and San Diego County (*2.5 percent; 11.4 percent*).

In 2008, the Census Bureau showed that 71,714 Ventura County workers indicated they worked in the warehousing, distribution and manufacturing sectors. However, the county had just 50,400 jobs in those sector. The other 21,300 had to be commuters (*29.7 percent*).

Given the conflict between the desire to have Southern California stay more compact, the potential impact of that impulse on jobs-housing balance and the fact that only banning development has stopped the region's outward migration, it is important to understand the underlying market forces that drive the Southland's development pattern. For the full "Dirt Theory" report, please see Appendix E.

4.1 FINDINGS ON "DIRT THEORY"

Since World War II, Southern California's history has been dominated by the impact of its rapid population growth on its land use pattern. With no policies in place or under consideration to stop population growth, the region will continue to development outward with a three-stage process affecting each new area caught up in its expansion. Stage #1, residential developers seeking affordable land move outward; they bring families wanting affordable homes and population-serving firms. A huge jobs-housing deficit is created in these areas, as well as massive commuting. Stage #2, industrial developers needing available land for their large facilities are ultimately forced outward. Their tenants follow due to lower lease rates and the lower labor costs brought on by workers who want to stop commuting. Stage #3, younger, better educated workers migrate outward when they too are priced out of core markets. Their skills allow a higher end to be added to the economy.

Stage #2 of this scenario will apply to the migration of warehousing facilities to outlying industrial markets in the High Desert, North Los Angeles County, the Pass Area/Coachella Valley, and Imperial County. This will occur as lack of space and rising lease rates in today's "hot zones" ultimately force developers and their clientele to migrate to the next available land. The rates required to bring about this result are simply an extension of the pattern of the past six decades. Four of the objections to this pattern continuing (*developer skepticism, distance to outlying facilities, competition from current Stage #2 markets, policies to stop "sprawl"*) have existed throughout the outward migration of the region. In recent years, it has continued despite difficulties with funding or approvals for infrastructure projects. Fuel prices have gone through several surges without preventing it. The one difficulty that might not be overcome is that the lease rates of facilities throughout the region will reach a level that diverts trade from Southern California.

In this section, we estimate the likelihood that the excess demand for each intermodal channel will be accommodated by each of these alternatives. We will aggregate these channel-specific scenarios into a future county scenario, which will include estimates of the amount of land redeveloped for industrial use, and the amount of freight diverted to other counties presented in Section 6.0.

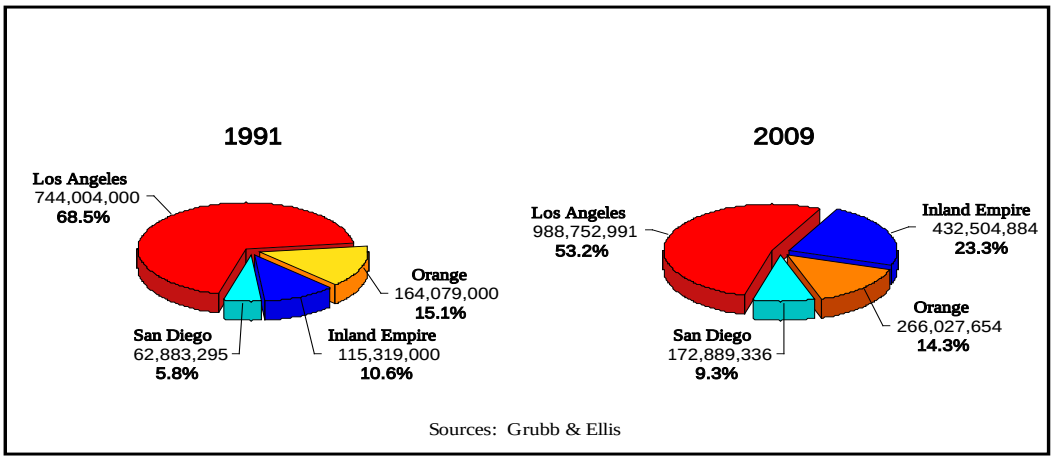
4.2 THE LOCATIONAL EVOLUTION OF WAREHOUSES

The manner in which Southern California has developed over the past 70 years holds important messages for the current and future location of distribution facilities within the region. Based on the information presented in Section 2.0, it is estimated that there are 693.8 million square feet of warehousing and distribution facilities in Southern California.

A Short History

In 1991, Los Angeles County dominated the industrial market with 744.0 million square feet of space, a 68.5-percent share. This occurred as there had been land available in that County, and firms chose to locate in the midst of what was then center of the region's population and labor pool. This also put them close to the Ports of Los Angeles and Long Beach, as well as Los Angeles International Airport (LAX) and the region's major railroad yards. Next was Orange County with 164.0 million square feet or 15.1 percent, and the Inland Empire with 115.3 million square feet or 10.6 percent. San Diego County trailed with 62.9 million square feet or a 5.8-percent share, as shown in Figure 4.2.

Figure 4.2 Industrial Space in Southern California, 1991 and 2009



By 2009, Los Angeles County still had the largest share of industrial facilities with 988.7 million square feet, but its share fell from 68.5 percent to a 53.2 percent. This occurred as development had previously saturated South Bay and the San Gabriel Valley and activity moved out as far as Santa Clarita, up the I-5 freeway. Orange County's rank fell to fourth (*14.3 percent*) from second (*15.1 percent*) with 266.0 million square feet as it had become essentially built-out. The major change was in the Inland Empire as its share soared to a second placed 23.3 percent from 10.6 percent with 432.5 million square feet. This occurred because Los Angeles and Orange Counties were running short of space. The importance of San Diego County also increased, going from 5.8 percent to 9.3 percent as its inventory reached 172.9 million square feet.

Here, the price in Los Angeles County was 80.0 percent higher than in the inland area. Orange County was 117.5 percent more expensive and San Diego County 147.5 percent more costly. The timing, geographic pattern, and relative pricing exhibited in these changes correspond exactly to Stage #2 of the process by which outlying "hot zones" have historically matured.

Meanwhile, from 1991 to 2009, while the Stage #2 growth was affecting the Inland Empire, an important change was occurring in Southern California's industrial economy. Manufacturing activity has been shrinking, while logistics activity related to international trade and goods movement has been strengthening. Thus, in Southern California, from 1990 to 2008:[7]

[7] Wage and Salary Employment, Metropolitan Areas, California Employment Development Department, 1990 to 2008.

- Manufacturing employment dropped from 1,280,000 to 855,100, down 424,900 (*-33.2 percent*); and
- Logistics employment increased from 561,700 to 691,500, up 129,800 (*+23.1 percent*).

With industrial space migrating into the Inland Empire, its industrial performance was stronger:

- Manufacturing employment rose from 78,300 to 107,000, up 28,700 (*+36.7%*), though this was down from a peak of 123,400 in 2006 (*1990 to 2006: up 45,100 or 57.6 percent*); and
- Logistics employment increased from 44,400 to 119,600, up 75,200 (*+164.9 percent*), though this was down from a peak of 120,600 in 2007 (*1990 to 2007: up 76,200 or +171.6 percent*).

These data underscore three facts about the warehousing market. Southern California's industrial economy has moved from being based on manufacturing to being dependent on international trade. The Stage #2 development has put the bulk of the new growth in "hot zone" areas like the Inland Empire. As a result, industrial growth in the outlying area has been much more about warehousing than manufacturing facilities. This is why the inland area now has 23.3 percent of Southern California's industrial space, but 43.4 percent of its warehousing space.

- Los Angeles County:
  - There is a mass of facilities in central Los Angeles County. This is where warehousing first grew up as it is near the Ports of Los Angeles and Long Beach and LAX, as well as next to the intermodal rail yards at the I-710 and SR 60 junction.
  - Later, warehousing activity intensively traced a path along the SR 60 through the San Gabriel Valley towards the Inland Empire. To a lesser extent, this is also seen along the I-10.
  - Moving north, warehouses traced a lighter path along the I-5 going through the San Fernando Valley. More recently, a cluster has emerged in Santa Clarita.
- Inland Empire:
  - Starting in 1985, the movement of warehouses eastward along the I-10 and SR 60 led to development of a large concentration of facilities at their junction with I-15.
  - Since 2000, a mass of warehouses has developed farther inland at the junction of the I-10 and SR 60 with the I-215, and most recently south along that corridor.

  - A smaller group of facilities has shown up in Corona as growth came to it from Orange County along the SR 91 freeway.

- Orange County:
  - The southward migration of facilities is seen with a mass of warehouses in and near Irvine close to John Wayne Airport.
- Ventura County:
  - There is a light tracing of warehouses along SR 101 with a small aggregation in Oxnard near Port Hueneme.

Available Land for Future Warehouses

Given the logic of a Stage #2 outward migration of Southern California's economy, the starting point for understanding where future warehouses will locate is to identify the vacant land that is currently industrial. Note that nearly all of this space is in outlying areas.

- Los Angeles County:
  - The overwhelming bulk of the County's remaining sites are in the High Desert near Palmdale and Lancaster.
  - There is a cluster of sites north of the junction of the I-5 and SR 14 freeways near Santa Clarita.
- Inland Empire:
  - The overwhelming bulk of the Inland Empire remaining sites are in the High Desert near Adelanto and Victorville near Southern California Logistics Airport.
  - Along the I-10 corridor, east of the I-15, several sites remain, mostly in San Bernardino and Redlands near San Bernardino International Airport and Burlington Northern Santa Fe Railway's (BNSF) intermodal rail yard.
  - On the SR 60, near the I-215 and along that freeway as it moves south, there is a significant amount of available industrial land, particularly in Moreno Valley, Perris, and near March Air Reserve Base.
  - Space still is available on I-215 near its junction with the I-15 in north San Bernardino.
  - There are a few sites remaining along the I-15 freeway, mainly in Chino and south of Corona.
- Elsewhere. There is smattering of small sites near John Wayne Airport in Orange County and Port Hueneme in Ventura County.

Given Southern California's historic Stage #2 development pattern, it is not surprising to find that its remaining industrial land is distributed in this fashion. As indicated, preferences for coastal locations, land availability, and relative prices have meant that areas near to major port, airport, rail, or production activities have naturally developed first. Later, growth begrudgingly migrated outward as sites in this area disappeared. That put development in a sequence of "hot zones," where lower land and lease costs lured developers and companies. These same areas also had lower labor costs because in Stage #1 people moved to them and have been willing to work for less to quit commuting.

Today, this process left most of Southern California's remaining developable industrial land in the desert areas of the Inland Empire and Los Angeles County. To the south, a similar condition exists in Imperial County. Altogether, the potential new facilities that could be built in Southern California, if all the remaining industrially zoned land was used for warehousing with a 55-percent FAR, is 185.1 million square feet, as described in Section 2.0.

Table 4.1 Developable Industrial Land

Area	Available Land (Square Feet)	Percentage of Available Land
High Desert Inland Empire	43.0 million	23.2%
North Los Angeles County	42.7 million	23.1%
Riverside Unincorporated/Coachella	40.4 million	21.8%
Imperial County	10.9 million	5.9%
Scattered Urban Locations	48.1 million	26.0%
Total	**185.1 million**	**100.0%**

The Development of Vacant Sites

Given the logic of "dirt theory," Southern California's warehouse market should eventually migrate to those areas currently being impacted by Stage #1 of the development cycle. This should occur aggressively once the valley portions of San Bernardino and Riverside Counties are built-out. At that time, the current outlying areas will be the places with the available land, lower-priced facilities, and a labor force willing to work for less to avoid

commuting. Importantly, the data indicates that 74.0 percent (*137.0 of 185.1 million square feet*) of this potential additional warehousing space are located in four outlying areas of the Southern California.

- **High Desert** (*Adelanto, Apple Valley, and Hesperia, Victorville*) has 74.9 percent of San Bernardino County's available industrially zoned land. The 43.0 million square feet of facilities that could be built in this area represent 23.2 percent of Southern California's potential capacity.
  - ***Stage #1.*** Of the four areas, the High Desert is currently feeling the greatest pressure from the Stage #1 migration of population. It was shown to have had a 4.24-percent compounded population growth rate from 2000 to 2009, reaching 420,516 people. The area's 2006 jobs-housing ratio was just 0.67, indicating a heavy dependence on commuter employment. In surveys conducted in 2006 and 2007, 27 percent of commuters indicated a willingness to take 10 percent less pay for a local job; 39 percent would take at least 5 percent less. These are not surprising results, given that commutes average 70.5 minutes a day round trip, with workers driving an average of 49 miles each way.[8]
  - ***Advantages.*** Besides the local labor force and vast amounts of land, the High Desert's key asset is Southern California Logistics Airport (SCLA), named this because the area's development strategy is based around goods movement. SCLA is the 2,300-acre former George Air Force Base that is owned by the Victor Valley Economic Development Agency made up of leaders from San Bernardino County and the four local cities.

    Of almost equal importance to SCLA is the fact that BNSF's mainline, which moves up Cajon Pass, traverses the High Desert and moves north to Barstow. There it joins BNSF's line that runs from the Bay Area to Arizona and points east. The High Desert also is the route for Union Pacific (UP) Railroad, which moves up Cajon Pass, and then goes on to Barstow along BNSF's right-of-way. From there, the line joins UP's route that goes to Las Vegas and points north and east. Meanwhile, warehousing operations in the High Desert have access to the I-15 freeway along which goods entering and leaving Southern California are connected to states to the east and the north.
  - ***Local Attitude About Warehousing.*** Today, the High Desert's political leadership is acutely aware of the adverse impact that commuting is having on the people who have moved to their

[8] Inland Empire Annual Survey, Institute of Applied Research and Policy Analysis, California State San Bernardino, 2006 to 2007.

communities. They recognize the importance that the Stage #2 migration of industrial facilities to their area could have on their jobs-housing balance. Already, they have been successful in using SCLA to develop a major aircraft servicing and repair center that has attracted firms, including Boeing, General Electric, Pratt & Whitney, and Leading Edge Aviation Services. Though SCLA has no scheduled air service, it does have its own U.S. Customs operation and handles flights for troops involved in war games at Fort Irwin.

Another prong in the High Desert strategy to jump start the migration of Stage #2 industrial activity has been the attempt to convince BNSF to build its second inland intermodal facility on SCLA's property. To date, Victorville has gained an exclusive right to negotiate for that operation from BNSF. It has acquired the right-of-way and is willing to fund a rail spur from BNSF's main line to this proposed site. Looking longer term, there is the hope that such a facility would serve as an "inland port" to which cargo could be moved from the sea ports by rail, reducing truck trips.

Recognizing that the desert can serve a major logistics function, San Bernardino and Los Angeles Counties, plus the Cities of Adelanto, Victorville, Apple Valley, Lancaster, and Palmdale, have formed a Joint Power Authority to develop a new freeway/expressway from SR 14 to I-15. Victorville has received Federal funds for starting this work, and the corridor has been officially designated in Section 1305 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) as a High Priority Corridor on the National Highway System. Meanwhile, the High Desert's leaders have gotten SANBAG to make the expansion of the SR 58 to four lanes to Kern County a priority project. This route allows cargo to reach Northern California from the High Desert without passing through urbanized Southern California.

- ***Difficulties.*** For the High Desert, the greatest barrier to Stage #2 development is the existence of undeveloped industrial land in inland valley places like San Bernardino and Moreno Valley. That is a natural difficulty for an outlying market that time can heal. A second difficulty is the fact that Victorville is 186 miles round trip from the Ports, much farther than Moreno Valley (*150 miles*), San Bernardino (*112 miles*), or Ontario (*60 miles*). Typically, this has been an issue only as long as closer areas have had available developable land. Perhaps more difficult for the High Desert is the fact that it is up the 3,000 grade of Cajon Pass. This has help create the perception among logistics facility developers that the market will never move that far away. More recently, the fluctuations in fuel prices have added to the

question of whether warehousing operations can locate at such great distance from the Ports or the bulk of Southern California's market.

- **North Los Angeles County** (*Lancaster, Palmdale, and Santa Clarita*) has 78.9 percent of the industrially-zoned land available in Los Angeles County. The 42.7 million square feet of facilities that could be built in this area represent 23.1 percent of the region's potential capacity.
  - ***Stage #1.*** For Los Angeles County, the northern zone has seen very rapid population growth. From 2000 to 2009, its three cities (*Lancaster, Palmdale, and Santa Clarita*) went from 386,519 to 473,570 people, up 22.5 percent, a compound rate of 2.3 percent. That compared to just 1-percent compounded for the County.[9] According to SCAG's 2008 adopted Regional Transportation Program, Northern Los Angeles County had a 0.92 job to housing ratio, indicating the need for high levels of commuting down the SR 14. The average 2008 two-way commute from the area's three cities was 69.6 minutes.[10]
  - ***Advantages.*** Besides abundant land and a rising labor force, Northern Los Angeles County's competitive advantages include the I-5 freeway. This is Southern California's principal connection to Northern California. Santa Clarita sits at the junction of the I-5 and the Antelope Valley freeway (*SR 14*). Warehouses located in that City can serve both Southern California and the State's Central Valley. The SR 14 connects Palmdale and Lancaster to I-15 and the balance of Southern California. Trucks moving from those Cities can also access the SR 58 to Northern California by going up the SR 14 to Mojave.

    There are three rail connections in Northern Los Angeles County. Some of UP Railroad's trains leave its Colton yard and move up Cajon Pass before bending west along the "Palmdale Cutoff" to that City. Eventually, in Lancaster, these trains can connect with the UP's main north-south line traveling the length of California. UP also has rights to move freight along the Metrolink line that travels through Santa Clarita and Soledad Canyon to Palmdale and Lancaster.

    Northern Los Angeles County has a potential for an air cargo connection via Palmdale Regional Airport. The facility is owned by the U.S. Air Force (USAF) and has been leased to Los Angeles World Airports (LAWA), the agency that runs LAX. The airport is closely

[9] E-5 Reports, 2000 and 2009, Demographic Research Unit, California Department of Finance.

[10] American Community Survey, 2008, U.S. Census Bureau.

associated with USAF Plant 42, where planes like the SR-71, B-1 and F-119 have been secretly developed. As a result, Palmdale is home to major operations by Lockheed Martin, Northrop Grumman, Boeing, and Delta Scientific. Several attempts to keep air service at Palmdale Regional Airport have been unsuccessful, and LAWA has plans to surrendered certification to operate the facility. Palmdale is considering taking over the lease.

- ***Local Attitude About Warehousing.*** In 2008, the Multi-County Goods Movement Study indicated, "there is currently very limited development of warehousing in the North Los Angeles County Subregion. This area has potential to serve as a warehousing hub, primarily due to its large tracts of available land at costs less than the more urbanized portions of the County."[11] The area has begun to take advantage of this possibility. In Santa Clarita, 6.8 million square feet of facilities have been built and 5.0 million square feet are occupied. In Lancaster, three large distribution centers have opened, and Palmdale has acquired a 115-acre Fairway Business Park to encourage firms to migrate to it. Among others, FedEx, Michael's, Rite Aid, and Sygma have opened in these communities.
- ***Difficulties.*** For the Northern Los Angeles County, the current barrier for Stage #2 development is the existence of undeveloped industrial land in inland valley cities like San Bernardino. This is not true of Santa Clarita, where a round trip from the Ports (*116 miles*) is roughly equal to one to San Bernardino (*112 miles*). It is true for the more distant Cities of Palmdale (*160 miles*) and Lancaster (*178 miles*). Again, this has only been an issue until land in the closer areas has been exhausted. A second issue is the 1,800-foot grade up Soledad Canyon that must be traversed along the SR 14. Though less a difficulty than Cajon Pass, it is still a time and cost barrier for truckers. As with other outlying areas, Northern Los Angeles County cities now face the open question of how fuel prices might affect the willingness of warehousing operations to locate at great distance from the Ports. This has added to the perception by some developers that Palmdale and Lancaster are too remote for them to successfully market facilities.

- **Pass Area** (*Beaumont, Banning, and Calimesa*), **Coachella Valley** (*Cathedral City, Coachella, Desert Hot Springs, Indio, and Palm Springs*), and unincorporated areas have 67.5 percent of Riverside County's available

[11] Multi-County Goods Movement Action Plan, Los Angeles County Action Plan, April 30, 2008.

industrially-zoned land. The 40.4 million square feet of facilities that could be built on it represent 21.8 percent of the region's potential capacity.

- ***Stage #1.*** In Riverside County, Stage #1 population growth reached the Pass Area connecting the urban Inland Empire to the Coachella Valley in the last housing cycle. From 2000 to 2009, it went from 42,085 to 68,358 people, up 26,273 or 62.4 percent, a compound rate of 5.5 percent. This is typical of what happens when a place is first hit by housing developers needing affordable land. Thus, Beaumont's 2000 to 2009 population growth ranked second in the State, up 184.6 percent. In 2008, the Pass Area had an estimated 29,749 occupied homes and 16,202 jobs, giving it a 0.54 job to housing ratio. It, therefore, has very high levels of commuting down the I-10,[12] with its average two-way commute taking 60.8 minutes.[13]

  Meanwhile, the Coachella Valley is a special case. Largely, it is a self-contained economy based mainly on retirees, conventioneers, and tourism. However, just as Stage #1 growth hit the Pass Area, it recently entered the Valley's western edge. There, Desert Hot Springs emulated the Pass Area. From 2000 to 2009, it went from 16,582 to 26,552 people, up 9,910 or 60.1 percent, a compound rate of 5.2 percent.[14] The City's two-way average commute of 56.2 minutes was far higher than the Valley's 43.2 minutes.[15] The full Coachella Valley has a 0.86 job to housing ratio. That would normally indicate an area with a commuting problem. However, 19.4 percent of its residents are 65 or older, compared to Southern California's average of 10.8 percent. As a result, the area's jobs to housing balance overstates any commuter problem.

- ***Advantages.*** In addition to abundant low-cost land and a labor force willing to work for less to not commute, the Pass Area/Coachella Valley competitive advantages include the I-10 freeway. This route bisects this combined area and is Southern California's truck route to Arizona and points east. In addition, the route is joined by the SR 86

[12] Adopted 2008 Regional Transportation Program housing data averaged for 2005 and 2010, SCAG; job base from ES 202 data, California Employment Development Department, 2008.

[13] American Community Survey, 2008, U.S. Census Bureau.

[14] E-5 Reports, 2000 and 2009, Demographic Research Unit, California Department of Finance.

[15] American Community Survey, 2008, U.S. Census Bureau.

in Indio/Coachella. That is the principal route for goods moving between northern Mexico and Southern California. Warehouses located along the I-10, whether in the Pass Area, Desert Hot Springs, North Palm Springs, Cathedral City, Indio or Coachella, can serve both Southern California, Arizona, and Mexican trade.

There is one rail route through the Pass Area/Coachella Valley. That is UP Railroad's mainline, which passes through them before going south into Imperial County. From there, it turns east into Arizona and points to the east. In Imperial County, the UP Railroad route divides with a major spur going south to Calexico at the Mexican border. There have been off and on discussions by UP of locating an intermodal facilities, either in the Pass Area or in Indio, but to date, no concrete action has occurred.

Another potential advantage for the Coachella Valley is Palm Springs International Airport, which is owned and operated by that City. The facility is served by 10 airlines and served 1,542,925 passengers in 2008. It also handled 26 tons of cargo. The southeastern end of the Coachella Valley is served by Desert Resorts Regional Airport. It is owned by Riverside County, which has recently invested heavily in upgrading the facility.

- ***Local Attitude About Warehousing.*** While industrial land in the Pass Area is constrained by its narrow width, the Cities of Beaumont and Banning, as well as the Morongo Band of Mission Indians in Cabazon, have developed plans to host industrial facilities. To date, 2.8 million square feet of space have been developed.[16] This does not include the 383,000 square feet water bottling plant operated by Arrowhead Mountain Springs Water on Indian land. There is also room for another 1.4 million square feet of facilities.

  Farther inland, the Coachella Valley Economic Partnership has formally made development of warehousing one of that Valley's economic priorities. Their recently completed economic strategy cites one of their key targets is "to link the Valley in the minds of external companies and site-selection professionals with the dynamic logistics economies of the Inland Empire," and "to integrate messages related to positioning the Valley as a destination for warehousing,

[16] Industrial Snap Shot, Inland Empire, Grubb & Ellis, Third Quarter 2009.

distribution, wholesale trade, and supply-chain management companies."[17]

One possibility being entertained for the Pass Area or the Coachella Valley is the development of a combined intermodal rail and truck transfer station. The intermodal rail site could serve an "inland port" for goods moving along the I-10 corridor. Should California eventually ban dirty trucks from its air basin, the truck transfer depot could serve as a place where older trucks from Mexico or the rest of the U.S. could transfer goods to clean burning local vehicles.

- ***Difficulties.*** For the Pass Area/Coachella Valley, the main barrier to the migration of Stage #2 development is again the existence of undeveloped industrial land in inland valleys. Distance is a real factor as a round trip from the Ports to San Bernardino (*112 miles*) or Moreno Valley (*150 miles*) is less than Beaumont (*170 miles*), and much less than Desert Hot Springs/North Palm Springs (*226 miles*) or Indio/Coachella (*290 miles*). Again, this issue may disappear as the inland valley areas closer run out of developable land. Though less of a difficulty than Cajon Pass or Soledad Canyon, trucks moving up through the Pass Area on the I-10 must traverse a 1,250-foot grade from Redlands to the summit of San Gorgonio Pass. This takes time and fuel. Finally, as with other outlying areas, the impact of fuel prices on warehousing development in the Pass Area/Coachella Valley area is an open question. As of today, developers have built projects in the Pass Area, but the Coachella Valley has not, as yet, figured in their calculations.

- **Imperial County** has 10.9 million square feet of possible industrial facilities. This would represent 5.9 percent of Southern California's potential warehousing capacity.

  - ***Stage #1.*** After a long period of dormancy, Imperial County began to be affected by Stage #1 growth late in the current decade. From 2000 to 2009, its population went from 142,361 to 179,254 people, up 36,893 or 25.9 percent, a 2.6-percent compound rate. This occurred as residentially-zone land in San Diego County became scarce and expensive, pushing affordable development east into Imperial County. In early 2009, Imperial County's median priced home was $131,000. That was $200,000 less than for San Diego County (*$331,000*). That said, by 2006, the County had not yet had a commuter problem as its jobs to housing balance was a strong 1.26. However, the ratio will

[17] Coachella Valley Economic Blue Print, Market Street, J. Mac. Holladay for Coachella Valley Economic Partnership, October 2009.

likely decrease in the next housing cycle, as Stage #1 growth causes population to accelerate.

- ***Advantages.*** Imperial County has vast quantities of land. As its population grows, it will acquire a labor force which likely will want blue collar jobs. In addition to these advantages, the County has two major highway routes. The I-8 connects its main population centers around El Centro to San Diego County and the Port of San Diego. The SR 86 and SR 111 routes are links that connect the County to Mexico to the south and the Coachella Valley to the north. It is along these highways that the North American Free Trade Agreement (NAFTA) trade moves between Southern California and Mexico. Importantly, the Calexico-Mexicali border area is where many of Mexico's maquiladoras production facilities are located.
- Like Southern California's other high-growth areas, Imperial County has rail service. UP Railroad's main line from Southern California travels south through the County from the Coachella Valley, running adjacent to SR 111. At Nyland, it splits. The main line curves east and exits the County into Yuma, Arizona. The other route continues south through the center of Imperial County's population centers ending at Calexico. There, it interfaces with Mexico's Ferromex railroad.
- ***Local Attitude About Warehousing.*** One of the priorities for the Imperial Valley Economic Development Corporation (IVEDC) is the development of a warehousing and logistics node to take advantage of Imperial County's highway and rail connections plus its location adjacent to Mexico's maquiladoras facilities. In particular, IVEDC cites the recent formation of an international committee and two specific planned areas for international logistics: Mesquite Lake in Imperial (*5,100 acres*) and Gateway to the Americas in Calexico (*1,700 acres*).
- ***Difficulties.*** For Imperial County, distance will be a serious difficulty for the development of a warehousing industry related to the Port of San Diego. It is 226 miles round trip from the Port to El Centro and 264 miles to Brawley. Another problem is the 4,000-foot grade to traverse the In Ko Pah mountain area on the I-8. For this reason, the greater long-term opportunity would appear to be warehousing related to north-south international trade from Mexico. Still, a round trip from Calexico to Indio is 180 miles. Finally, as with other outlying areas, the issue of fuel prices will most definitely be a issue for this remote location.

4.3 LIKELIHOOD OF FOLLOWING "DIRT THEORY" TRAJECTORY

Given these situations in the four areas with the space to accommodate significant increases in warehousing square footage, what is the likelihood that Stage #2 of Southern California's growth process will cause development and firms to migrate into them? Certainly, the conditions that have caused this to happen in the past still exist:

- Southern California's future population increase of 5.9 million people, largely driven by births over deaths, will force residential development to migrate horizontally, with the pricing system causing people to migrate outward. That is why each of the four areas is already experiencing some level of Stage #1 surges in growth.
- Eventually, this population growth will create a mass of outlying workers willing to work for less to stop commuting. The High Desert, North Los Angeles County, and the Pass Area already have the jobs to housing balance and commuting issues that underlie this condition. The Coachella Valley and Imperial County will see it emerge as their populations surge further.
- If the Ports reach the level of trade that is the basis for this study, recent history has shown that warehousing facilities will be developed where there is industrially-zoned land to accommodate them. This has been seen most recently with the development of major nodes of space significantly east of the I-15 freeway in the Inland Empire and out the I-5 freeway in Santa Clarita.
- The lower costs of operations from outlying facilities will ultimately cause firms to move into this new space. There are three major expenses for warehousing operations: lease rates, labor cost, and transportation costs. To date, the lower costs of the first two have overwhelmed the cost of moving goods to and from distant facilities. Firms have been willing to migrate as a result.

Difficulties and Challenges

An issue is whether there are location characteristics relative to these newest "hot zones" that will cause this pattern to severely changed. There are many ways this might happen, with several of these possibilities mentioned above under the category of difficulties.

Competition from Existing Stage #2 Markets

As indicated repeatedly, an outlying market cannot compete with a market closer to the Ports if that competitor still has significant amount of

industrially-zoned land available for new facilities. Until that land is used, developers will not have a financial incentive to look farther out for lower priced land. In addition, firms will not be forced to absorb higher transportation costs for hauling longer distances to an outlying market.

These tendencies were seen in the development of the western Inland Empire market. As long as firms could locate in a series of markets from the I-710 through the San Gabriel Valley, there was no incentive for developers to move over Kellogg Hill into the inland area. However by 1985, land to the west had largely disappeared. As a result, the continuing demand for more space forced developers into the inland area. At the same time, lower lease and labor costs caused customers to accept the higher transportation costs and move to the new market. Today, Ontario alone has just under 100 million square feet of facilities, most of which are occupied.

Conclusion. Once the competitive Stage #2 areas run out of space, the availability of land will cause developers to move farther out. Lower lease and labor costs will make it in the interest of their customers to follow.

Developer Skepticism

In interviews with major developers, all but one expressed great skepticism that the warehousing market would ever move into the four areas where most of Southern California's vacant industrially-zone land are currently located.

Here, the most that can be currently said is that historically developers likely were saying the same thing about building in the series of markets that they have heretofore been forced to enter. Put simply, if demand exists, and there is no room in the current markets, builders will go farther away once they have no choice. The key is whether their customers will find that the lower lease and labor costs of the new market are low enough to overwhelm the added transportation costs. If they are, companies needing space will follow. The fact that since 2000, developers began building east of the I-215 freeway is the latest iteration of this situation. True, vacancy rates in the new facilities in this area are currently high (*roughly 20 percent*). However, that has been a short-term function of the current recession, not a long run difficulty.

Conclusion. Developers never want to go farther away, but will if they have no choice. If lease and labor costs are below their added transportation costs, their customers will ultimately follow.

Distance and Passes

While the economic logic of Stage #2 industrial development has held up long enough to push the warehousing market out as far as Redlands and Perris in the Inland Empire and Santa Clarita on the I-15, there is a significant

difference between migration to these markets and moving over mountain passes into desert areas. The distances to those sites are greater by an order of magnitude, and in every case, trucks must move up and down steep grades to reach them. Thus, transportation costs to these markets will be significantly higher. As a result, though clients will save on labor costs, their lease costs savings will have to be very large to justify moving their operations to these places. As a result, unless developers can get land at extraordinarily low prices, they will be unable to offer facilities at lease rates that will justify the increased transportation costs of their potential tenants. Firms locating in these markets will also find that their inventories are far from Southern California's core markets.

This argument points to the critical importance of costs in determining where and when Southern California's new outlying markets will become viable. Stage #1 residential development did not reach these areas until lack of land and the cost of housing in closer markets reached levels that forced developers to move out to land on which they could build homes that families could still afford. In buying these houses, families had to weigh the time and cost of long commutes against their desire for homeownership. The fact that 420,516 people now live in the High Desert and 473,570 people live in Northern Los Angeles County indicates that the relative price of housing achieved this result.

For this same calculation to occur for the outward movement of Stage #2 industrial development, a similar situation has to be created. It will require increased demand and very low vacancy rates for existing facilities to push their lease costs to much higher levels. Only when the lack of facilities becomes sufficiently acute and lease rates become high enough will the market dictate that development can afford to move into the deserts. Unlike past moves, the severe distances and passes that must be crossed to reach the desert markets will perhaps mean that existing markets must become much more expensive to force this solution. However, unless demand is cut off, the housing market shows that such a solution will ultimately occur. In this light, it is important to note that even with today's severe recession, the industrial vacancy rate for Los Angeles County was only 3.6 percent in third quarter 2009, up from an almost nonexistent 1.5 percent in third quarter 2007.[18]

Conclusion. Throughout Southern California's history, warehousing facilities have sought to remain as close to the Ports and LAX as possible. When demand has increased beyond the carrying capacity of nearby land, the pricing system has ultimately forced the wider dispersion of facilities and

[18] Industrial Market Snapshot Los Angeles Third Quarter 2007 and 2009, Grubb & Ellis.

firms. The migration to the deserts would simply be an extension of that market logic. The difference will be in how low existing vacancy rates must become, and how high existing lease rates must go, to create the price differentials necessary to make the desert markets a viable option.

Changes in Aging Facility Usage

Warehouses began being built in the South Bay area near the Ports and LAX in the 1950s. Development in places like Vernon, Commerce, Industry, and Santa Fe Springs followed. In today's terms, these facilities are often small, with low ceilings, limited gates, insufficient parking, and inadequate fire suppression systems. They may lack fiber optic capability or 440 watt electrical systems. While it is expensive to replace these aging facilities with modern buildings, there is a price point at which that might prove to be feasible. To the extent this happens, warehouses closer to the ports would have expanded capacity and obviate the need for developers to migrate to far way locations. Even without new facilities, the use of better, more efficient systems inside of the existing buildings can increase their effective capacity.

Discussions with major developers have indicated that in occasional situations, they have found it in their interest to raze existing facilities and replace them with larger, more modern buildings.[19] However, with vacancy rates at just 2.8 percent in South Bay and 2.5 percent in Central Los Angeles,[20] despite today's economic difficulties, the incentive for owners to undertake a mass change in their inventory of buildings is lacking.

One nuance of the existing market is that facilities closer and farther from the Ports have evolved to being used for different functions. The smaller facilities near the Ports tend to be used for more labor-intensive functions, such as pick and pack, knitting, or product repairs. The larger outlying facilities undertake more bulk activities, such as transloading and sorting of containers and packages. The more efficient technologies have tended to be those that can be used in the larger outlying facilities.[21]

Conclusion. Even with unemployment at 12.2 percent in Los Angeles County,[22] and port import volume down 29.2 percent from its 2006 peak,[23]

[19]Discussions with Watson Land Company and Majestic Realty.

[20]See note #38.

[21]See note #39.

[22]Monthly Employment Reports by County, November 2009, California Employment Development Department.

there remains very high demand for older facilities in Los Angeles County, and no incentive to massively renew the facilities. Meanwhile, the facilities most capable of adapting to new technology are those in today's outlying markets.

Antagonistic Policies

There is powerful sentiment in regulatory agencies, the environmental movement, and among NIMBYs to stop "sprawl." One way is to outlaw new distribution facilities or zone them out of existence. Another is to put severe fees and taxes on them to the point that lease costs are not competitive with facilities closer to the Ports.

To the extent that jurisdictions elect to ban warehousing facilities, the effect is to decrease the potential supply that can be built in closer-in markets. The pricing system is then forced to push up prices in existing markets to the point where it makes economic sense for them to be built in outlying markets. In effect, this solution has been a contributing factor to the horizontal development of Southern California.

Higher fees charged on the construction of new facilities in outlying markets can slow down the pace at which new facilities migrate to them. This will occur as the market will tend to require lower vacancy rates and higher lease rates in existing markets before facilities migrate. It does not, however, prevent the eventual outward migration of those buildings. For example, Riverside County has imposed a $1.73 per gross floor area fee on industrial buildings in that County under its Transportation Uniform Mitigation Fee program. That amounts to $692,000 on a 400,000-square foot building. Despite that fact, from 2006 to 2009, the County saw the square footage of facilities in its most outlying markets (*Perris-Moreno Valley, Pass Area, and Temecula*) increase by 12.6 million square feet or 53.2 percent to 36.3 million square feet from third quarter 2006 to 2009.[24]

Strategies such as this raise another question. To the extent they are imposed to slow down the horizontal development of Southern California for worthy purpose, such as decreasing congestion and increasing air quality, leaders must be aware of unintended consequences. In this case, that consequence is to lengthen the time when jobs will migrate to where people have been forced to live. That means increased pressure on those families and longer commuting pressure on the transportation system.

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[23] Loaded In-Bound Containers, TEUs, 2006 and 2009e based on 11 months, Ports of Los Angeles and Long Beach.

[24] Industrial Market Snapshot Inland Empire Third Quarter 2006 and 2009, Grubb & Ellis.

Conclusion. As long as there is a demand for facilities, the market will make price adjustments and distribute them to where they can be built. The unintended consequence of policies meant to prevent the market from moving to new areas is to cause jobs to housing imbalances and their attendant difficulties to persist for longer periods of time.

Inadequate Transportation Infrastructure

Southern California already faces severe congestion on its transportation routes with truck traffic as one of the major culprits. Funding for a major expansion of transportation facilities is currently not available. Even if it was, communities along potential right-of-ways may furiously oppose expansions because trucks and trains cause diesel pollution, which is a proven cause of cancer and asthma. This is certainly the case in the San Gabriel Valley, where virtually every community has opposed creating truck lanes or a train corridor to move cargo from the I-710 to the Inland Empire.[25]

There is no question that the lack of a Federal government policy to help fund infrastructure related to goods movement has caused truck traffic to contribute to transportation congestion in Southern California. To the extent this issue is not solved, congestion will ultimately make the area uncompetitive for handling increased trade through the Ports of Los Angeles and Long Beach. This will result in inhibiting the creation of jobs for blue collar workers in the logistics field. Yet, until the current worldwide recession, that has been the one stable source of blue collar job growth for marginally-educated workers in Southern California, where 42.6 percent of adults have not had a single college class.[26] Thus, from 1990 to 2008, the region's manufacturing sector lost 424,900 jobs (*-33.2 percent*), while construction added 69,550 (*19.7 percent*) and logistics added 129,800 (*23.1 percent*). Those unworried by these figures need to remember that blue collar jobs are the best paying work for the region's marginally-educated workers. To the extent such jobs are not available, it puts income and health pressures on their families.

Meanwhile, to the extent funding is available, but the communities between the I-710 and outlying markets do not wish to see added infrastructure to facilitate either truck or train movement through their areas, there will be a cost in terms of severe congestion. In the case of the San Gabriel Valley, there is currently 117.3 million square feet of undeveloped-industrially zone land to the east. If it is developed, it would raise the region's supply of warehousing space from 387.4 million square feet to 504.7 million square

[25] Testimony at California Public Infrastructure Advisory Commission.

[26] American Community Survey, 2008 U.S. Census Bureau.

feet, a 30.3-percent increase. It is not unreasonable to suggest that this would not occur without a commensurate increase in cargo movement from the I-710 freeway eastward to these facilities. The level of truck traffic on the existing freeways, without either dedicated truck lanes or a connecting rail solution, would likely cause those corridors to resemble the I-710 of recent years.

Conclusion. Without a dedicate truck lane or rail solution to moving goods between the I-710 and outlying markets, the cost of moving goods through Southern California may severely inhibit job growth in the logistics field. This would have severe impact on the region's large base of workers without college training and the financial and personal health of their families. Meanwhile, if development of outlying facilities does occur, but community opposition stops dedicated truck lanes or a rail solution from being built even if funding is available, the congestion on truck connecting freeways will likely become intolerable.

Fuel Costs

Today, diesel prices average $3.032 per gallon. A year ago, the price was $2.334 per gallon. The one-year increase was $0.698 or 29.9 percent.[27] Given the shifts in worldwide supply and demand, there is speculation that prices could double, triple, or more by 2035. In addition, the move toward green trucks may ultimately force the goods movement industry to move to natural gas or hybrid engines. In any case, transportation costs are expected to be much higher than they are today. At some point, the contention is that the cost of transportation may be such that it overwhelms any realistic lease and labor costs savings in outlying markets.

However, market logic dictates that if there is an unmet demand for facilities, the pricing system will lower vacancy rates and raise lease costs in existing markets until it becomes economically feasible for developers to build and lease buildings in outlying areas. This is what happened in the middle 1980s, when development moved from cities like Industry to places like Ontario. This occurred despite the fact that petroleum prices in 1985 (*$29.00 per barrel*) were 2.8 times as high as they were during the Arab oil embargo in 1975 (*$10.46 per barrel*). It happened again when development left the western Inland Empire and moved inland starting in 2000, despite the fact that oil prices from 2000 to 2005 averaged $31.99 per barrel, which was nearly double the average from 1995 to 1999 (*$16.67*).

[27] Weekly Retail On-Highway Diesel Prices, U.S. Energy Information Administration, January 12, 2010.

If soaring oil prices are an issue, it would appear to be because they could be a serious obstacle to the long-term growth of international trade through Southern California. That would be the case if increased transportation costs push the lease payments necessary to allow development to migrate to outlying areas, so high that trade must find other ways to enter or leave the U.S. Then, the 42.5 million TEUs assumption underlying this study would be called into question. To understand that dynamic, it would be necessary to compare the internal dynamics of the Southern California region to other U.S. regions.

5.0 Distribution of Warehouse Space Over Time

This section takes the estimates on demand developed from Section 3.0, and makes an estimate of the number of TEUs of containers of various types that are anticipated to be flowing into and out of Southern California in 2035. Given that demand, and the existing inventory and available space in such facilities collected in Section 2.0, as well as the acreage of industrial vacant land, an estimate will be made of the extent to which various types of facilities will need to be built and where they can be built. The challenge is to figure out whether obsolete space closer to the Ports will be converted to more viable uses due to future demand.

According to assumed growth rates, the region would run out of suitably zoned vacant land in about the year 2028. For the year 2035, there would be a shortfall of space of about 228 million square feet, unless other land not currently zoned for warehousing becomes available.

This section places future supply and future demand side by side to identify any gaps in industrial/warehousing/intermodal space needs in Southern California. See Appendix F for the full report.

5.1 FINDINGS ON THE DISTRIBUTION OF SPACE

Over time, warehousing space directly or indirectly impacted by activities at the Ports of Los Angeles and Long Beach will affect 25 Southern California submarkets as shown in Table 5.1. These are shown in priority order, together with the amount of occupied space, vacant existing space, and developable space from previous iterations of this project. Priority order refers to the rough sequence in which increases or decreases in port and off-port activity will impact each of these submarkets. Thus, South Bay will likely be impacted before the I-710 corridor, and certainly Imperial County would be the last place to feel any activity. The term "rough" is used because the market does not always work in a smooth geographic fashion with the excess demand for space in one area overflowing exactly into the next priority subregion.

There was 693,842,860 million square feet of occupied space; 143,846,908 square feet of available space; and 186,274,798 square feet of developable space on land zoned for industrial activity, but currently without buildings.

Table 5.1 Submarkets in Priority Order of Occupied, Vacant, and Developable Space

Priority	County	Submarket	Occupied	Vacant	Developable	Total Available
1	Los Angeles	South Bay	55,222,927	5,730,730	1,723,183	62,676,840
2	Los Angeles	Mid-I–710	21,339,348	3,145,870	500,273	24,985,491
3	Los Angeles	Central Los Angeles	78,121,132	10,064,154	503,966	88,689,252
4	Los Angeles	605	55,174,480	8,571,933	100,298	63,846,711
5	Los Angeles	San Gabriel	74,710,961	9,570,002	3,641,972	87,922,935
6	San Bernardino	Westend SB	83,553,302	21,204,109	3,480,113	108,237,524
7	Orange	West Orange	6,844,239	2,664,637	414,432	9,923,308
8	Los Angeles	I-5	20,674,648	2,231,773	5,783,759	28,690,180
9	Ventura	Port Hueneme	18,362,615	976,845	2,169,614	21,509,074
10	Riverside	West Riverside	77,666,478	10,408,022	9,528,375	97,602,875
11	San Bernardino	East SB Valley	66,182,417	28,816,656	13,879,760	108,878,833
12	Riverside	March JPA	27,412,126	20,007,359	21,649,981	69,069,466
13	Orange	Orange Airport	13,976,430	4,846,335	1,516,831	20,339,596
14	Orange	North Orange	12,018,265	5,349,334	373,668	17,741,267
15	Ventura	118	8,934,654	1,027,942	932,849	10,895,445
16	Ventura	101	10,540,5	1,004,70	702,738	12,248,02

			81	4		3
17	Orange	South Orange	1,649,100	256,264	800,951	2,706,315
18	Riverside	SW Riv. County	15,457,595	446,294	6,270,262	22,174,151
19	Riverside	Pass	3,543,654	2,025,336	2,870,080	8,439,070
20	San Bernardino	High Desert	14,981,152	3,295,661	40,154,546	58,431,359
21	Los Angeles	North Los Angeles	5,453,221	974,647	38,516,107	44,943,975
22	Ventura	126	2,409,068	82,141	157,585	2,648,794
23	Riverside	Coachella	12,341,197	71,000	19,748,090	32,160,287
24	Imperial	South Imperial	6,789,246	925,245	10,303,800	18,018,291
25	Imperial	North Imperial	484,024	149,915	551,565	1,185,504
Total			**693,842,860**	**143,846,908**	**186,274,798**	**1,023,964,566**

The analysis conducted on the demand for warehousing space was used to push the total year by year demand for port and non-port demand space through this geographic spread of warehousing locations, as shown in Table 5.2. The basis for this annual growth is found Section 3.0.

Table 5.2 Aggregate Port and Non-Port Demand for Warehousing Space

Year	Port Demand	Change	Non-Port Demand	Change	Total Demand	Change
2008 actual	102,082,701		591,760,159		693,842,860	
2009 actual	84,132,118	(17,950,583)	578,615,853	(13,144,306)	662,747,971	(31,094,889)
2010	91,233,496	7,101,378	565,763,510	(12,852,342)	656,997,006	(5,750,964)
2011	96,473,797	5,240,301	553,196,647	(12,566,863)	649,670,444	(7,326,562)
2012	102,024,858	5,551,061	540,908,922	(12,287,725)	642,933,780	(6,736,664)
2013	107,905,626	5,880,768	557,214,315	16,305,393	665,119,941	22,186,161
2014	114,136,234	6,230,608	574,011,225	16,796,910	688,147,459	23,027,518
2015	120,738,070	6,601,836	591,314,468	17,303,243	712,052,538	23,905,079
2016	126,945,612	6,207,542	609,139,307	17,824,840	736,084,919	24,032,382
2017	133,495,571	6,549,959	627,501,467	18,362,159	760,997,038	24,912,118
2018	140,407,800	6,912,229	643,520,270	16,018,803	783,928,070	22,931,032
2019	147,703,346	7,295,546	659,948,000	16,427,730	807,651,346	23,723,276
2020	155,404,521	7,701,175	676,795,096	16,847,096	832,199,617	24,548,271
2021	162,925,869	7,521,348	694,072,263	17,277,167	856,998,132	24,798,515
2022	170,839,546	7,913,677	711,790,480	17,718,217	882,630,026	25,631,894
2023	179,167,005	8,327,459	729,961,006	18,170,526	909,128,011	26,497,985

2024	187,930,909	8,763,904	745,471,649	15,510,643	933,402,558	24,274,547
2025	197,155,201	9,224,292	761,311,872	15,840,223	958,467,073	25,064,515
2026	206,033,208	8,878,007	777,488,677	16,176,805	983,521,885	25,054,812
2027	215,342,517	9,309,309	794,009,217	16,520,539	1,009,351,734	25,829,848
2028	225,104,994	9,762,477	810,880,794	16,871,578	1,035,985,788	26,634,055
2029	235,343,644	10,238,650	828,110,869	17,230,075	1,063,454,513	27,468,725
2030	246,082,670	10,739,026	845,707,059	17,596,190	1,091,789,729	28,335,216
2031	257,347,537	11,264,867	864,320,511	18,613,452	1,121,668,048	29,878,319
2032	269,165,037	11,817,500	883,343,633	19,023,122	1,152,508,670	30,840,622
2033	281,563,363	12,398,326	902,785,441	19,441,808	1,184,348,804	31,840,134
2034	294,572,183	13,008,820	922,655,151	19,869,710	1,217,227,334	32,878,530
2035	307,277,606	12,705,423	942,962,180	20,307,029	1,250,239,786	33,012,452

The year 2027 is highlighted in yellow as the last year in which there is sufficient space available to fully allow the distribution of the demand for space in the various submarkets. In 2028, there is space to distribute the demand, but it requires unrealistically low vacancy rates and heavy dependence on Imperial County locations. As will be discussed later, the accommodation of demand includes adding developable square footage in the High Desert (*10,000,000 square feet*) and North Los Angeles County (*10,000,000 square feet*) during 2024, and in the Coachella Valley (*5,000,000 square feet*) during 2025.

The resulting modeling of the distribution of all warehousing demand to vacant and developable space concludes that a there is a total shortfall of 228,358,907 square feet of space in the region by year 2035 unless other land currently not zoned for warehousing is converted to industrial uses.

Table 5.3 shows the distribution of all warehousing demand to vacant and developable space by until 2035.

Table 5.3 Distribution of All Warehousing Demand to Vacant and Developable Space
(in Square Feet)

Year	Total Demand (Square Feet)	Change	Amount Allocated for Year Demanded
2008 actual	330,121,706		
2009 actual	361,216,596	31,094,889	0
2010	366,967,560	5,750,964	0
2011	374,294,122	7,326,562	0
2012	381,030,786	6,736,664	0
2013	358,844,625	(22,186,161)	0
2014	335,817,107	(23,027,518)	0
2015	311,912,028	(23,905,079)	0
2016	287,879,647	(24,032,382)	0
2017	262,967,529	(24,912,118)	0
2018	240,036,496	(22,931,032)	0
2019	216,313,220	(23,723,276)	0
2020	191,764,949	(24,548,271)	0
2021	166,966,434	(24,798,515)	0
2022	141,334,540	(25,631,894)	0
2023	114,836,555	(26,497,985)	0
2024	110,562,008	(4,274,547)	20,000,000
2025	90,497,493	(20,064,515)	5,000,000
2026	65,442,681	(25,054,812)	0
2027	39,612,833	(25,829,848)	0
2028	29,570,387	(10,042,446)	16,591,609
2029	28,347,052	(1,223,335)	26,245,390
2030	28,153,494	(193,558)	28,141,658
2031	27,948,746	(204,748)	29,673,571

Year	Total Demand (Square Feet)	Change	Amount Allocated for Year Demanded
2032	27,739,491	(209,254)	30,631,368
2033	27,525,631	(213,860)	31,626,274
2034	27,307,065	(218,567)	32,657,963
2035	27,083,687	(223,377)	32,789,074
		Unallocated	**228,358,907**

Note: "Yellow" is the last year of sufficient vacant space to handle all of the demand for that period (2027).

5.2 METHODOLOGY

The demand for port related space was distributed as follows:

1. Demand was initially allocated according to shares of space shown in Table 5.4. This allocation was based on submarket location in relationship to the ports, as well as the amount of vacant space it initially had available.
2. As each market, in turn, reached a vacancy rate of 2.5 percent in the space that was available at the beginning of a year, any demand for square footage that would take that initial space below that 2.5-percent vacancy level was passed on to the next priority market able to accommodate it.
3. From the next year on, that next market's share included the share that had been assigned to its now saturated neighbor.
4. As each priority submarket, in turn, became saturated, the share of the total market passed on to the next priority area represented by the cumulative share of all previously saturated submarkets.
5. Note that the outlying Ventura County SR 126, Coachella Valley, and two Imperial County markets were not allocated any port related demand.
6. This process continued until 2027, when there was insufficient available space above a 2.5-percent vacancy rate to accommodate demand (*917,913 square feet was left unallocated*). This is shown in Table 5.5.

Table 5.4 Initial Shares of Port Demand by Submarket

Priority	County	Submarket	Beginning Share
1	L.A. County	South Bay	20.0%
2	L.A. County	Mid-I 710	6.0%
3	L.A. County	Central L.A.	15.0%
4	L.A. County	I-605	10.0%
5	L.A. County	San Gabriel	7.5%
6	San Bernardino County	Westend SB	12.5%
7	Orange County	West Orange	3.5%
8	L.A. County	I-5	1.5%
9	Ventura County	Port Hueneme	0.4%
10	Riverside County	West Riverside	6.3%
11	San Bernardino County	East SB Valley	5.6%
12	Riverside County	March JPA	5.3%
13	Orange County	Orange Airport	2.0%
14	Orange County	North Orange	1.6%
15	Ventura County	SR 118	0.5%
16	Ventura County	SR 101	0.2%
17	Orange County	South Orange	0.1%
18	Riverside County	SW Riverside County	0.1%
19	Riverside County	Pass	0.3%
20	San Bernardino County	High Desert	1.2%
21	L.A. County	North L.A.	0.5%
22	Ventura County	SR 126	0.0%
23	Riverside County	Coachella	0.0%
24	Imperial County	South Imperial	0.0%
25	Imperial County	North Imperial	0.0%
Total			**100.0%**

Table 5.5 Distribution of Port Related Space to Vacant Warehousing Facilities (square feet)

Year	Total Available (Square Feet)	Change	Amount Allocated for Year Demanded
2008 actual	143,846,908		0
2009 actual	161,797,491	(17,950,583)	0
2010	154,696,113	7,101,378	0
2011	149,455,812	5,240,301	0
2012	416,904,751	5,551,061	0
2013	138,023,983	5,880,768	0
2014	131,793,375	6,230,608	0
2015	125,191,539	6,601,836	0
2016	118,983,997	6,207,542	0
2017	112,434,038	6,549,959	0
2018	105,521,809	6,912,229	0
2019	98,226,263	7,295,546	0
2020	90,525,088	7,701,175	0
2021	83,003,740	7,521,348	0
2022	75,090,063	7,913,677	0
2023	66,762,604	8,327,459	0
2024	57,998,700	8,763,904	0
2025	48,774,408	9,224,292	0
2026	39,896,401	8,878,007	0
2027	30,587,092	9,309,309	0
2028	21,742,528	8,844,564	917,913
2029	21,742,528		10,238,650
2030	21,742,528		10,739,026
2031	21,742,528		11,264,867
2032	21,742,528		11,817,500
2033	21,742,528		12,398,326
2034	21,742,528		13,008,820

2035	21,742,528		12,705,423
		Unallocated	**83,090,025**

Note: In Appendix F, Exhibit 4, "Green" designates at 2.5-percent vacancy rate. "Blue" designates a transfer of demand occurred from a prior submarket.

By allocating port demand for warehousing space to the existing vacant space, the model begins filling up existing space geographically, submarket by submarket. Areas nearer the harbors feel the effects before those farther out. The farthest markets do not receive this impulse. The effect of this modeling is to ultimately reduce vacancy rates to a low of 2.5 percent in nearly every submarket.

Meanwhile, there is also demand for space coming from non-port related increases in goods movement activity. These are much larger than port related activity in terms of the warehousing required. According to estimates in Section 3.0, 14.7 percent of the demand for space were from port related demand in 2008. Over time, that share increases because port trade is expected to grow faster than the general economy. By 2027, when space of all types has begun to disappear, the port related share is up to 21.3 percent. That said, non-port related demand required an estimated 85.3 percent of warehousing space in 2008, and would still represent 78.7 percent of demand in 2027.

The demand for non-port related space was distributed as follows:

7. Non-port related demand was treated as the key driver for the development of new warehousing space since vacant space was sufficient to accommodate all of the port demand. That ceased to be true in 2027, just when non-port demand was also exhausting the supply of developable sites.
8. Demand for non-port related space was initially spread across priority zones using the shares in Table 5.6. It is based on each submarket's location in relationship to the Los Angeles County's population center. A second consideration was the amount of developable land available for warehouse construction in each submarket.
9. As the non-port related demand for warehousing space in each submarket exceeded the supply of developable space in that market, the excess demand was moved to the nearest submarket able to accommodate it. This was not always the adjacent market, and sometimes required the demand to be split between several markets.
10. As the markets became tighter, excess warehouse space demand for a submarket was transferred to whatever market could absorb the

additional square footage. In later years, this process began to bring accelerated development into outlying markets, such as the High Desert, Northern Los Angeles County, the Coachella Valley, and finally even Imperial County.

11. No lower limit was set on vacancy rates for developable property (*unlike the vacant property*) since the key for a market is the combination of vacancy rates for both groups. However, the combined totals were held to the 2.5 percent rule.

Table 5.6 Initial Shares of Non-Port-Related Demand by Submarket

Priority	County	Submarket	Beginning Share
1	Los Angeles County	South Bay	0.00%
2	Los Angeles County	Mid-I-710	1.00%
3	Los Angeles County	Central L.A.	2.00%
4	Los Angeles County	I-605	0.60%
5	Los Angeles County	San Gabriel	3.20%
6	San Bernardino County	Westend SB	7.00%
7	Orange County	West Orange	3.90%
8	Los Angeles County	I-5	4.00%
9	Ventura County	Port Hueneme	1.00%
10	Riverside County	West Riverside	8.00%
11	San Bernardino County	East SB Valley	15.00%
12	Riverside County	March JPA	15.00%
13	Orange County	Orange Airport	2.00%
14	Orange County	North Orange	0.30%
15	Ventura County	SR 118	0.90%
16	Ventura County	SR 101	1.00%
17	Orange County	South Orange	1.00%
18	Riverside County	SW Riv. County	2.50%
19	Riverside County	Pass	2.00%
20	San Bernardino County	High Desert	12.00%
21	Los Angeles County	North Los Angeles	10.00%
22	Ventura County	SR 126	0.50%
23	Riverside County	Coachella	6.00%
24	Imperial County	South Imperial	1.00%
25	Imperial County	North Imperial	0.10%
Total			**100.0%**

12. Non-port related warehousing demand was not used in South Bay due to that submarket's proximity to the harbors.
13. A total of 25,000,000 square feet of developable warehousing square footage were added in the High Desert (*10,000,000 square feet*) and North Los Angeles County (*10,000,000 square feet*) during 2024, and in the Coachella Valley (*5,000,000 square feet*) during 2025. This was done since these are the areas most able to handle such growth. In a sense, doing this replaces the more complex task of adding bits of extra space (*e.g., brownfields*) in highly saturated markets that would be unlikely to satisfy much of the demand for space.

By allocating the space in this manner, the market again begins filling up space submarket by submarket. When a market cannot handle the extra demand, it is transferred to areas that can accommodate it. Once the markets began to saturate, the allocations process was undertaken by hand so that judgment could be exercised as to where it would logically go and where it would best fit. By 2027, even with 25,000,000 extra square feet of new developable land added in the outlying markets, the ability for the market to continue handling added demand was exhausted.

In 2028, the non-port demand represented 15,673,696 square feet of space, when taking all markets to zero would only handle 7,827,259 square feet. No allocation was made.

Finally, bringing together the demand for vacant and developable space for port and non-port uses makes it possible to see the pace at which facilities start to be aggressively used in each submarket and when the market will essentially be exhausted.

The resulting modeling of the distribution of all warehousing demand to vacant and developable space concludes that there is a total shortfall of 228,358,907 square feet of space in the region by year 2035, unless other land currently not zoned for warehousing is converted to industrial uses. Table 5.8 shows the distribution of all warehousing demand to vacant and developable space by each subregion modeled.

Given the location of the vacant and developable space, and the fact that port demand is anticipated to come from the Ports of Los Angeles and Long Beach, and non-port demand will be centered in central Los Angeles County, it is not a surprise to find the market is performing in the following way:

- Approaching saturation in the harbor areas of Los Angeles County first (*South Bay, mid-I-710, Central Los Angeles, and I-605 south of SR 60*).
- This is followed by the second tier of areas, including the San Gabriel Valley, the I-5 through the San Fernando Valley, western Orange County

near the Ports, the western edges of San Bernardino County and Riverside County, and around Port Hueneme in Ventura County.

- This is followed by build-out starting to occur in the third tier of areas, including the eastern San Bernardino Valley, the March Air Reserve Base area of Riverside County, the airport and northern Orange County areas, and the SR 101 and SR 118 portions of Ventura County.
- The last areas to start receiving demand and the last to start reaching saturation are the desert areas, including San Bernardino County's High Desert, Riverside County's Coachella Valley, Los Angeles County's Northern areas, and Imperial County.

Table 5.7 Distribution of Non-Port-Related Demand to Developable Space
(in Square Feet)

Year	Total Demand (Square Feet)	Change	Amount Allocated for Year Demanded
2008 actual	186,274,798		0
2009 actual	199,419,105	13,144,306	0
2010	212,271,447	12,852,342	0
2011	224,838,310	12,566,863	0
2012	237,126,035	12,287,725	0
2013	220,820,642	(16,305,393)	0
2014	204,023,732	(16,796,910)	0
2015	186,720,489	(17,303,243)	0
2016	168,895,650	(17,824,840)	0
2017	150,533,491	(18,362,159)	0
2018	134,514,687	(16,018,803)	0
2019	118,086,957	(16,427,730)	0
2020	101,239,861	(16,847,096)	0
2021	83,962,694	(17,277,167)	0
2022	66,244,477	(17,718,217)	0
2023	48,073,951	(18,170,526)	0
2024	52,563,308	4,489,357	20,000,000
2025	41,723,085	(10,840,223)	5,000,000

Year	Total Demand (Square Feet)	Change	Amount Allocated for Year Demanded
2026	25,546,280	(16,176,805)	0
2027	9,025,741	(16,520,539)	0
2028	7,827,859	(1,197,882)	15,673,696
2029	6,604,523	(1,223,335)	16,006,740
2030	6,410,965	(193,558)	17,402,632
2031	6,206,217	(204,748)	18,408,704
2032	5,996,963	(209,254)	18,813,868
2033	5,783,103	(213,860)	19,227,948
2034	5,564,536	(218,567)	19,651,143
2035	5,341,159	(223,377)	20,083,651
Total		**Unallocated**	**145,268,381**

Table 5.8 Distribution of All Warehousing Demand to Vacant and Developable Space
(in Square Feet)

	1	2	3	4	5	6	74	8	9	10	11	12	13	14
	Los Angeles					San Bernardino	Orange	Los Angeles	Ventura	Riverside	San Bernardino	Riverside	Orange	
Vacant	South Bay	Mid-I 710	Central Los Angeles	I-605	San Gabriel	Westend	W Orange	I-5	P Hueneme	W Riverside	E SB Valley	March JPA	Airport	N Orange
2008 actual	7,453,913	3,646,143	10,568,120	8,672,231	13,211,974	24,684,222	3,079,069	8,015,532	3,146,459	19,936,397	42,696,416	41,657,340	6,363,166	5,723,002
2009 actual	8,169,048	4,170,157	12,086,907	9,820,784	14,826,828	28,250,373	3,924,215	8,819,806	3,399,802	22,286,753	48,264,078	46,125,694	7,230,824	6,429,976
2010	6,748,772	3,872,598	11,278,747	9,187,760	14,705,499	28,262,365	4,176,908	9,227,379	3,499,920	22,867,554	49,794,252	47,677,172	7,345,843	6,354,911
2011	5,700,712	3,683,848	10,744,039	8,739,131	14,714,616	28,487,008	4,483,606	9,651,450	3,604,627	23,542,764	51,385,824	49,284,466	7,492,374	6,308,767
2012	4,590,500	3,473,662	10,157,134	8,257,752	14,691,494	28,653,266	4,768,540	10,059,693	3,705,300	24,176,065	52,918,124	50,833,418	7,627,108	6,256,813
2013	3,414,346	2,957,762	8,948,911	7,571,843	13,728,664	26,776,792	3,926,802	9,319,265	3,518,723	22,501,145	50,142,992	48,075,929	7,183,384	6,113,804
2014	3,247,024	1,337,157	7,678,382	6,848,000	12,723,867	24,822,183	3,053,652	8,553,930	3,325,832	20,764,864	47,274,541	45,226,170	6,722,834	5,963,724
2015	3,247,024	1,116,860	4,672,829	6,083,997	11,675,026	22,785,726	2,147,761	7,762,773	3,126,392	18,964,689	44,309,352	42,280,786	6,244,732	5,806,185
2016	2,444,906	938,611	2,361,015	4,873,468	10,639,065	20,762,045	1,930,497	6,956,666	2,923,313	17,147,627	41,288,004	39,278,060	5,764,085	5,653,390

2017	1,967,490	663,179	2,361,015	1,696,633	8,680,461	18,657,949	1,701,248	6,123,930	2,713,492	15,266,007	38,166,882	36,176,589	5,265,842	5,493,504
2018	1,967,490	663,179	2,361,015	1,600,520	3,643,641	17,793,920	1,459,320	3,553,351	2,525,655	13,549,032	35,376,977	33,407,420	4,807,222	5,334,852
2019	1,967,490	663,179	2,361,015	1,600,520	2,206,020	12,852,479	1,203,976	1,636,867	1,691,514	11,775,194	32,504,267	30,556,597	4,332,756	5,168,840
2020	1,630,548	663,179	2,361,015	1,600,520	2,206,020	7,030,856	934,435	1,521,350	953,131	7,432,035	28,872,053	27,621,370	4,178,733	4,995,080
2021	1,630,548	663,179	2,361,015	1,600,520	2,206,020	2,734,108	393,101	652,822	636,998	6,958,190	28,105,314	18,739,650	4,028,306	4,822,907
2022	1,630,548	663,179	2,361,015	1,600,520	2,206,020	2,734,108	393,101	652,822	622,962	2,240,043	25,672,537	17,965,860	3,763,723	4,643,133
2023	1,630,548	663,179	2,361,015	1,600,520	2,206,020	2,734,108	393,101	652,822	622,962	2,240,043	18,319,391	17,524,505	3,597,174	4,509,894
2024	1,584,016	663,179	2,267,951	1,600,520	2,128,467	2,734,108	253,505	652,822	622,962	2,240,043	10,580,864	17,060,018	3,421,896	4,369,671
2025	1,552,336	663,179	2,267,951	1,600,520	2,128,467	2,639,067	253,505	605,301	543,761	2,240,043	2,400,868	16,495,195	3,237,410	4,222,083
2026	1,552,336	663,179	2,219,421	1,600,520	2,128,467	2,639,067	253,505	605,301	495,231	2,240,043	2,400,868	8,185,381	3,059,850	4,080,035
2027	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	1,099,744	3,931,086
2028	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	482,641	447,767
2029	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	482,641	447,767
2030	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	482,641	447,767
2031	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	482,641	447,767

2032	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	482,641	447,767
2033	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	482,641	447,767
2034	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	482,641	447,767
2035	1,542,424	638,398	2,219,421	1,600,520	2,128,467	2,639,067	253,505	595,389	495,231	2,220,219	2,381,043	1,191,269	482,641	447,767
Vacancy Rate	2.5%	2.6%	2.5%	2.5%	2.4%	2.4%	2.6%	2.1%	2.3%	2.3%	2.2%	1.7%	2.4%	2.5%

Table 5.8 Distribution of All Warehousing Demand to Vacant and Developable Space (continued)
(in Square Feet)

	15	16	17	18	19	20	21	22	23	24	25			
	Ventura		Orange	Riverside		San Bernardino	Los Angeles	Ventura	Riverside	Imperial				Was Demand for Year Allocated
Vacant	SR 118	SR 101	S Orange	SW Riverside Co.	Pass	High Desert	North Los Angeles	SR 126	Coachella	South Imperial	North Imperial	Total Demand	Change	
2008 actual	1,960,791	1,707,442	1,057,215	6,716,556	4,895,416	43,450,207	39,490,754	239,726	19,819,090	11,229,045	701,480	330,121,706		
2009 actual	2,207,366	1,964,262	1,220,637	7,100,856	5,411,043	45,438,787	40,926,810	315,698	20,616,608	11,475,949	733,332	361,216,596	31,094,889	0
2010	2,287,531	2,078,583	1,342,059	7,418,614	5,646,786	46,895,852	42,180,088	379,960	21,387,749	11,604,473	746,185	366,967,560	5,750,964	0
2011	2,374,431	2,193,771	1,462,488	7,730,166	5,882,402	48,340,992	43,413,193	442,794	22,141,760	11,730,141	758,752	374,294,122	7,326,562	0
2012	2,457,265	2,305,546	1,579,814	8,034,583	6,111,504	49,748,906	44,616,986	504,233	22,879,024	11,853,019	771,039	381,030,786	6,736,664	0
2013	2,281,113	2,130,730	1,410,879	7,624,008	5,767,753	47,721,690	42,959,983	422,706	21,900,700	11,689,965	754,734	358,844,625	(22,186,161)	(0)
2014	2,098,787	1,950,300	1,236,679	7,200,970	5,413,123	45,631,293	41,252,255	338,721	20,892,886	11,521,995	737,937	335,817,107	(23,027,518)	0
2015	1,910,049	1,764,064	1,057,045	6,765,088	5,047,253	43,475,682	39,492,222	252,205	19,854,691	11,348,963	720,634	311,912,028	(23,905,079)	0
2016	1,718,588	1,573,400	872,589	6,316,363	4,672,134	41,262,211	37,681,804	163,081	18,785,201	11,170,715	702,809	287,879,647	(24,032,382)	0
2017	1,520,579	1,376,679	682,418	5,854,034	4,285,240	38,980,152	35,816,113	163,081	17,683,471	10,987,093	684,447	262,967,529	(24,912,118)	(0)

2018	1,341,848	1,202,666	515,317	5,450,108	3,944,128	36,974,949	34,183,128	163,081	16,722,343	10,826,905	668,428	240,036,496	(22,931,032)	(0)
2019	1,157,521	1,023,798	343,745	5,035,767	3,593,686	34,916,075	32,507,525	163,081	15,736,679	10,662,628	652,000	216,313,220	(23,723,276)	0
2020	967,391	1,008,396	336,043	4,610,739	3,233,641	32,802,009	30,788,160	163,081	14,725,853	10,494,157	635,153	191,764,949	(24,548,271)	0
2021	774,290	993,353	328,522	2,015,403	2,865,534	30,638,493	29,026,598	163,081	13,689,223	10,321,385	617,876	166,966,434	(24,798,515)	(0)
2022	734,722	977,526	320,608	523,116	2,150,782	18,725,478	27,219,164	163,081	12,626,130	10,144,203	600,158	141,334,540	(25,631,894)	0
2023	693,084	960,871	312,281	518,953	2,071,288	13,283,414	15,697,918	163,081	11,535,899	9,962,498	581,987	114,836,555	(26,497,985)	0
2024	649,265	943,343	303,517	514,571	2,044,996	18,881,799	15,902,286	163,081	10,605,260	9,807,391	566,477	110,562,008	(4,274,547)	20,000,000
2025	603,143	924,894	215,092	462,438	2,017,324	14,716,011	12,866,975	115,560	7,526,747	9,648,989	550,636	90,497,493	(20,064,515)	5,000,000
2026	558,753	907,138	206,214	457,999	1,942,159	9,254,952	6,356,301	115,560	4,388,447	8,597,497	534,460	65,442,681	(25,054,812)	0
2027	512,207	888,520	186,992	453,344	1,914,231	2,353,299	1,440,850	115,560	2,364,680	5,929,430	517,939	39,612,833	(25,829,848)	0
2028	261,105	309,492	77,593	414,560	169,011	677,819	1,095,721	115,560	1,352,386	5,760,714	501,067	29,570,387	(10,042,446)	16,591,609
2029	261,105	309,492	77,593	414,560	169,011	677,819	1,095,721	115,560	318,581	5,588,413	483,837	28,347,052	(1,223,335)	26,245,390
2030	261,105	309,492	77,593	414,560	169,011	677,819	1,095,721	115,560	318,581	5,412,451	466,241	28,153,494	(193,558)	28,141,658
2031	261,105	309,492	77,593	414,560	169,011	677,819	1,095,721	115,560	318,581	5,226,317	447,628	27,948,746	(204,748)	29,673,571
2032	261,105	309,492	77,593	414,560	169,011	677,819	1,095,721	115,560	318,581	5,036,085	428,605	27,739,491	(209,254)	30,631,368

2033	261,105	309,492	77,593	414,560	169,011	677,819	1,095,721	115,560	318,581	4,841,667	409,163	27,525,631	(213,860)	31,626,274
2034	261,105	309,492	77,593	414,560	169,011	677,819	1,095,721	115,560	318,581	4,642,970	389,293	27,307,065	(218,567)	32,659,963
2035	261,105	309,492	77,593	414,560	169,011	677,819	1,095,721	115,560	318,581	4,439,900	368,986	27,083,687	(223,377)	32,789,074
Vacancy Rate	**2.4%**	**2.5%**	**2.9%**	**1.9%**	**2.0%**	**1.2%**	**2.4%**	**4.4%**	**4.2%**	**32.0%**	**42.3%**	**2.9%**	**Unallocated**	**228,358,907**

Note the desert areas will be unlikely to directly handle much port traffic, even as the region builds out. However, they will see strong levels of demand as space disappears in the Valley. This will occur because it will be economical for cargo that must be near the ports and airports take valley space to be near those facilities. This means that domestic cargo headed into Southern California will be increasingly handled by warehouses in the deserts and brought in as needed. Later, the deserts will see a second competitive advantage appear as operations that handle non-port related cargo find that they are being outbid for valley space and must move farther out to find facilities.

The current tendency of the market to move outward to build space where land is available and port and non-port users following as their need for space grows. To date, there has been no tendency for non-port users to give up space near the Ports and move out, or for port users to outbid them for it. This could be due to the cubic footage advantage of the newer outlying facilities, their technological superior for throughput, or simply the reluctance of non-port users to give up existing space to move to the hinterland.

Calculations were made of the share of each submarket's internal space usage that went to port and non-port activities (Table 5.9). This shows the degree of specialization in each area:

Overall, the shares begin at 14.7 percent port cargo handled in warehouses and 85.3 percent non-port. This shifts to 21.9 percent port and 78.1 percent non-port by 2027 when space begins to disappear. This is the case as port cargo was shown to grow faster than non-port cargo.

Extreme specialization is shown in South Bay. There, the shares begin at 100 percent port and 0 percent non-port. The warehousing uses drift away from this specialization only very slightly by 2027 (97.2 percent vs. 2.8 percent). The reverse is true in the outlying deserts, which largely remain at 0 percent port and 100 percent non-port.

In areas nearest to the Ports, their share of port cargo increases between 2008 and 2027. Examples include: Mid-I-710 (22.1 percent to 29.7 percent); Central Los Angeles (11.1 percent to 19.1 percent).

Further from the Ports, but not in the desert areas, the increases in the share of port cargo tends to be even faster as more land is available to accommodate cargo of all kinds and port cargo is growing more quickly (e.g., San Bernardino County's Westend (7.1 percent to 23.2 percent); East San Bernardino Valley (7.1 percent to 29.2 percent); March JPA (6.0 percent to 28.6 percent).

The current tendency of the market is to move outward to build space where land is available, and port and non-port users following as their need for

space grows. To date, there has been no tendency for non-port users to give up space near the ports and move out, or for port users to outbid them for it. This could be due to the cubic footage advantage of the newer outlying facilities, their technological superior for throughput, or simply the reluctance of non-port users to give up existing space to move to the hinterland.

Table 5.9 How Each of the 25 Submarkets' Space is Used in the Future
Port vs. Non-Port (in Percentage)

	1		2		3		4		5		6		7		8		9		10		11		12		13	
	Los Angeles										San Bernardino		Orange		Los Angeles		Ventura		Riverside		San Bernardino		Riverside		Orange	
Vacant	South Bay		Mid-I–710		Central Los Angeles		I-605		San Gabriel		Westend		W Orange		I-5		P Hueneme		W Riverside		E SB Valley		March JPA		Airport	
2008	100	-0.0	22.1	77.9	11.1	88.9	7.1	92.9	7.1	92.9	7.1	92.9	10.6	89.4	7.1	92.9	7.1	92.9	7.1	92.9	7.1	92.9	6.0	94.0	7.1	92.9
2009	100	-0.0	20.7	79.3	9.7	90.3	5.3	94.7	5.6	94.4	4.1	95.9	6.6	93.4	6.0	94.0	6.5	93.5	5.6	94.4	1.8	98.2	-2.0	10 2	3.0	97.0
2010	100	-0.0	22.5	77.5	10.9	89.1	6.5	93.5	6.3	93.7	5.2	94.8	11.2	88.8	6.7	93.3	6.7	93.3	6.2	93.8	2.5	97.5	-0.7	101	4.1	95.9
2011	100	-0.0	23.7	76.3	11.9	88.1	7.4	92.6	6.9	93.1	6.0	94.0	15.2	84.8	7.2	92.8	6.9	93.1	6.7	93.3	3.1	96.9	0.4	99.6	4.9	95.1
2012	100	-0.0	25.1	74.9	12.8	87.2	8.3	91.7	7.4	92.6	6.9	93.1	19.8	80.2	7.8	92.2	7.0	93.0	7.3	92.7	3.8	96.2	1.7	98.3	5.9	94.1
2013	100	-0.0	26.1	73.9	13.8	86.2	9.3	90.7	7.9	92.1	7.7	92.3	20.5	79.5	8.0	92.0	7.1	92.9	7.6	92.4	4.1	95.9	2.7	97.3	6.6	93.4

2014	100	-0.0	30.4	69.6	14.7	85.3	10.3	89.7	8.5	91.5	8.4	91.6	21.0	79.0	8.1	91.9	7.2	92.8	7.9	92.1	4.5	95.5	3.6	96.4	7.2	92.8
2015	100	-0.0	30.3	69.7	17.3	82.7	11.3	88.7	9.0	91.0	9.2	90.8	21.6	78.4	8.3	91.7	7.2	92.8	8.3	91.7	4.9	95.1	4.4	95.6	7.9	92.1
2016	98.7	1.3	30.1	69.9	19.1	80.9	13.1	86.9	9.5	90.5	9.9	90.1	23.7	76.3	8.4	91.6	7.3	92.7	8.6	91.4	5.2	94.8	5.0	95.0	8.5	91.5
2017	97.9	2.1	29.8	70.2	19.1	80.9	17.5	82.5	10.1	89.9	10.6	89.4	25.8	74.2	8.5	91.5	7.3	92.7	8.9	91.1	5.5	94.5	5.5	94.5	9.1	90.9
2018	97.9	2.1	29.8	70.2	19.1	80.9	17.5	82.5	14.3	85.7	11.4	88.6	27.9	72.1	8.1	91.9	7.4	92.6	9.2	90.8	5.8	94.2	6.0	94.0	9.7	90.3
2019	97.9	2.1	29.8	70.2	19.1	80.9	17.5	82.5	14.9	85.1	15.5	84.5	30.1	69.9	7.9	92.1	7.2	92.8	9.6	90.4	6.1	93.9	6.5	93.5	10.4	89.6
2020	97.4	2.6	29.8	70.2	19.1	80.9	17.5	82.5	14.9	85.1	20.0	80.0	32.2	67.8	8.3	91.7	7.1	92.9	9.6	90.4	6.4	93.6	7.0	93.0	11.2	88.8
2021	97.4	2.6	29.8	70.2	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	33.1	66.9	11.1	88.9	8.5	91.5	10.1	89.9	6.8	93.2	6.6	93.4	12.0	88.0
2022	97.4	2.6	29.8	70.2	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	33.1	66.9	11.1	88.9	8.6	91.4	14.4	85.6	9.5	90.5	7.2	92.8	12.8	87.2
2023	97.4	2.6	29.8	70.2	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	33.1	66.9	11.1	88.9	8.6	91.4	14.4	85.6	16.9	83.1	8.0	92.0	13.7	86.3
2024	97.3	2.7	29.8	70.2	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.6	91.4	14.4	85.6	23.4	76.6	8.7	91.3	14.6	85.4
2025	97.2	2.8	29.8	70.2	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.6	91.4	14.4	85.6	29.2	70.8	9.6	90.4	15.5	84.5
2026	97.2	2.8	29.8	70.2	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	21.0	79.0	16.3	83.7
2027	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	24.7	75.3

2028	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	27.0	73.0
2029	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	27.0	73.0
2030	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	27.0	73.0
2031	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	27.0	73.0
2032	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	27.0	73.0
2033	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	27.0	73.0
2034	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	27.0	73.0
2035	97.2	2.8	29.7	70.3	19.1	80.9	17.5	82.5	14.9	85.1	23.2	76.8	32.6	67.4	11.1	88.9	8.5	91.5	14.4	85.6	29.2	70.8	28.6	71.4	27.0	73.0

Table 5.9 How Each of the 25 Submarkets' Space is Used in the Future (continued)
Port vs. Non-Port (in Percentage)

	14		15		16		17		18		19		20		21		22		23		24		25		
	Orange		Ventura				Orange		Riverside				San Bernardino		Los Angeles		Ventura		Riverside		Imperial				Total
Vacant	North Orange		SR 118		SR 101		S. Orange		SW Riverside Co.		Pass		High Desert		North Los Angeles		SR 126		Coachella		S. Imperial		N. Imperial		Total
2008	3.5	96.5	1.4	98.6	1.2	98.8	1.9	98.1	0.5	99.5	7.1	92.9	2.7	97.3	2.2	97.8	0.4	99.6	0.1	99.9	1.6	98.4	34.0	66.0	**14.7**	**85.3**
2009	-2.1	102	0.0	100	0.0	100	0.0	100	0.0	100	0.0	100	0.0	100	0.0	100	0.0	100	0.0	100	0.0	100	0.0	100	**12.7**	**87.3**
2010	-1.1	101	0.4	99.6	0.1	99.9	0.5	99.5	0.0	100	0.8	99.2	0.7	99.3	1.2	98.8	0.0	100	0.0	100	0.0	100	0.0	100	**13.9**	**86.1**
2011	-0.4	100	0.7	99.3	0.2	99.8	1.0	99.0	0.1	99.9	1.4	98.6	1.5	98.5	3.6	96.4	0.0	100	0.0	100	0.0	100	-0.0	100	**14.8**	**85.2**
2012	0.4	99.6	1.1	98.9	0.4	99.6	1.6	98.4	0.1	99.9	2.3	97.7	2.5	97.5	24.6	75.4	0.0	100	0.0	100	0.0	100	-0.0	100	**15.9**	**84.1**
2013	1.2	98.8	1.4	98.6	0.5	99.5	1.8	98.2	0.1	99.9	2.7	97.3	2.7	97.3	5.4	94.6	0.0	100	0.0	100	0.0	100	0.0	100	**16.2**	**83.8**
2014	2.0	98.0	1.7	98.3	0.6	99.4	2.0	98.0	0.1	99.9	3.0	97.0	2.8	97.2	3.7	96.3	0.0	100	0.0	100	0.0	100	0.0	100	**16.6**	**83.4**
2015	2.9	97.1	2.0	98.0	0.7	99.3	2.2	97.8	0.2	99.8	3.2	96.8	2.9	97.1	3.0	97.0	0.0	100	0.0	100	0.0	100	0.0	100	**17.0**	**83.0**

2016	3.7	96.3	2.3	97.7	0.8	99.2	2.3	97.7	0.2	99.8	3.4	96.6	3.0	97.0	2.7	97.3	0.0	100	0.0	100	0.0	100	0.0	100	**17.2**	**82.8**
2017	4.5	95.5	2.6	97.4	0.9	99.1	2.4	97.6	0.2	99.8	3.6	96.4	3.0	97.0	2.4	97.6	0.0	100	0.0	100	0.0	100	0.0	100	**17.5**	**82.5**
2018	5.3	94.7	2.9	97.1	1.0	99.0	2.6	97.4	0.2	99.8	3.8	96.2	3.1	96.9	2.4	97.6	0.0	100	0.0	100	0.0	100	0.0	100	**17.9**	**82.1**
2019	6.2	93.8	3.3	96.7	1.1	98.9	2.7	97.3	0.3	99.7	3.9	96.1	3.2	96.8	2.3	97.7	0.0	100	0.0	100	0.0	100	0.0	100	**18.3**	**81.7**
2020	7.1	92.9	3.6	96.4	1.3	98.7	3.0	97.0	0.3	99.7	4.1	95.9	3.3	96.7	2.3	97.7	0.0	100	0.0	100	0.0	100	0.0	100	**18.7**	**81.3**
2021	7.9	92.1	3.9	96.1	1.4	98.6	3.3	96.7	0.3	99.7	4.2	95.8	3.4	96.6	2.2	97.8	0.0	100	0.0	100	0.0	100	0.0	100	**19.0**	**81.0**
2022	8.8	91.2	4.3	95.7	1.5	98.5	3.6	96.4	0.3	99.7	4.1	95.9	2.6	97.4	2.2	97.8	0.0	100	0.0	100	0.0	100	0.0	100	**19.4**	**80.6**
2023	9.7	90.3	4.7	95.3	1.7	98.3	4.0	96.0	0.3	99.7	4.5	95.5	2.5	97.5	1.5	98.5	0.0	100	0.0	100	0.0	100	0.0	100	**19.7**	**80.3**
2024	10.6	89.4	5.1	94.9	1.8	98.2	4.3	95.7	0.3	99.7	4.9	95.1	3.1	96.9	1.6	98.4	0.0	100	0.0	100	0.0	100	0.0	100	**20.6**	**79.4**
2025	11.6	88.4	5.5	94.5	2.0	98.0	4.5	95.5	0.3	99.7	5.3	94.7	3.1	96.9	1.6	98.4	0.0	100	0.0	100	0.0	100	0.0	100	**21.1**	**78.9**
2026	12.5	87.5	5.9	94.1	2.1	97.9	4.9	95.1	0.4	99.6	5.6	94.4	3.0	97.0	1.4	98.6	0.0	100	0.0	100	0.0	100	0.0	100	**21.5**	**78.5**
2027	13.5	86.5	6.3	93.7	2.3	97.7	5.2	94.8	0.4	99.6	6.0	94.0	2.8	97.2	1.4	98.6	0.0	100	0.0	100	0.0	100	0.0	100	**21.9**	**78.1**
2028	30.9	69.1	8.5	91.5	7.0	93.0	9.2	90.8	0.6	99.4	25.9	74.1	5.6	94.4	2.1	97.9	0.0	100	0.0	100	0.0	100	0.0	100	**22.5**	**77.5**
2029	30.9	69.1	8.5	91.5	7.0	93.0	9.2	90.8	0.6	99.4	25.9	74.1	5.6	94.4	2.1	97.9	0.0	100	0.0	100	0.0	100	0.0	100	**22.5**	**77.5**
2030	30.9	69.1	8.5	91.5	7.0	93.0	9.2	90.8	0.6	99.4	25.9	74.1	5.6	94.4	2.1	97.9	0.0	100	0.0	100	0.0	100	0.0	100	**22.5**	**77.5**

2031	30.9	69.1	8.5	91.5	7.0	93.0	9.2	90.8	0.6	99.4	25.9	74.1	5.6	94.4	2.1	97.9	0.0	100	0.0	100	0.0	100	0.0	100	**22.5**	**77.5**
2032	30.9	69.1	8.5	91.5	7.0	93.0	9.2	90.8	0.6	99.4	25.9	74.1	5.6	94.4	2.1	97.9	0.0	100	0.0	100	0.0	100	0.0	100	**22.5**	**77.5**
2033	30.9	69.1	8.5	91.5	7.0	93.0	9.2	90.8	0.6	99.4	25.9	74.1	5.6	94.4	2.1	97.9	0.0	100	0.0	100	0.0	100	0.0	100	**22.5**	**77.5**
2034	30.9	69.1	8.5	91.5	7.0	93.0	9.2	90.8	0.6	99.4	25.9	74.1	5.6	94.4	2.1	97.9	0.0	100	0.0	100	0.0	100	0.0	100	**22.5**	**77.5**
2035	30.9	69.1	8.5	91.5	7.0	93.0	9.2	90.8	0.6	99.4	25.9	74.1	5.6	94.4	2.1	97.9	0.0	100	0.0	100	0.0	100	0.0	100	**22.5**	**77.5**

6.0 Intermodal Facilities

Part of Task 5 of the SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy is to document the existing and planned intermodal (IM) rail facilities in the region. Fortunately, a similar analysis was completed by Cambridge Systematics in February 2009 for the I-710 EIR/EIS[28], and the following information is taken largely from that study. Mainline track capacity was also evaluated in the I-710 study, but for Task 5 of the present study, only the rail yard information is presented.

A critical part of the analysis is to quantify intermodal lift capacity and compare the capacity to estimated demand. There are three types of IM facilities: on-dock, near-dock, and off-dock. The following three main designations are described as follows, taken from definitions from the Ports of Los Angeles and Long Beach:

1. **On-dock IM Terminal.** IM facility situated inside a marine terminal;
2. **Near-dock IM Terminal.** IM facility situated within five miles off the Ports; and
3. **Off-dock IM Terminal.** IM facility situated more than five miles from the Ports.

All the containers that are handled by any of the three types of IM facilities are known as "direct intermodal" containers, because they are sent by rail "intact" using marine containers without any transloading of cargo into larger domestic containers.

Through 2030, there will be a major construction program of on-dock and near-dock IM terminals. Two new on-dock terminals will be added to existing marine terminals, where there is no on-dock loading facility at this time. Those terminals are TRAPAC in the Port of Los Angeles and the Middle Harbor project in the Port of Long Beach. In addition, Pier S in the Port of Long Beach is under construction. The Pier S project includes an on-dock loading facility. All existing on-dock terminals will be enlarged. Two near-dock projects are in the process of going through an EIR. The development and use of on-dock IM facilities and their estimated capacity include the infrastructure (yard and lead tracks) to support projected volumes.

[28] Cambridge Systematics, Inc., *Final Technical Memorandum, I-710 Railroad Goods Movement Study*, prepared for the Los Angeles Metropolitan Transportation Authority, February 3, 2009.

In combination, the success of IM facility development and the mainline track investment will determine the potential impact on the Basin freeway system. If the IM lift demand is met by constructing all planned facilities in a timely way, or even ultimately, the direct intermodal component of port container traffic will be loaded at on-dock and near-dock IM facilities. In this scenario, all present and future freeway impact on the I-710 involving direct intermodal container moves will be neutralized, such that the overflow container traffic, that which is not loaded on-dock, will be drayed outside the Port to near-dock facilities situated along SR 47 and SR 103, the Terminal Island Freeway. The San Pedro Bay Ports Rail Study Update (Plan), dated December 2006, concludes that if all proposed on-dock and near-dock rail facilities are constructed, there will be no need for off-dock railroad IM facilities to load direct intermodal container traffic. Assuming all IM facilities are constructed, the analysis then shifts to the sufficiency of mainline capacity to haul what has been loaded, over the railroad corridors in the Basin.

This study also examined the volume of rail traffic associated with transloaded and warehoused container traffic. This segment of rail traffic will not be loaded at either on-dock or near-dock IM rail facilities. The pattern for this segment of container traffic will be to move directly by truck from the Port to a warehouse or transload facility situated somewhere in the Basin. If this cargo ultimately moves by rail it will be loaded on a rail car at an off-dock rail facility. To the extent that transloaded and warehoused marine cargo moves out of the Basin, by rail or truck, the freeway system will be impacted.

The railroad IM facilities are shown in Figure 6.1.

Figure 6.1 Intermodal Rail Facilities in the SCAG Region

Source: Multi-County Goods Movement Action Plan.

6.1 FINDINGS ON THE DEMAND FOR INTERMODAL OPERATIONS

The following summarizes the variables associated with direct intermodal operations at or near the Ports:

- It is likely that new port terminals will be constructed. A better perspective on that will be available as the TRAPAC project moves forward. If the negotiated mitigation package is not challenged, the pact will become a template for future port development.
- The rail infrastructure projects will probably be constructed, as they promote the efficient use of existing "in-port" facilities.
- The construction or modernization of near-dock IM facilities is uncertain. Due to perceived community impact, the construction of these facilities is not assured.
- The fragmented nature of port rail operations will degrade the efficiency of on-dock terminals, thus making the likelihood of loading 33 percent of all marine containers on-dock after 2020 improbable.

The fragmentation of on-dock facilities spread over 10 marine terminals will undermine the optimization of port operations. An anecdotal but real situation regarding this observation is the Maersk terminal (Pier 400) in the Port of Los Angeles. The Pier 400 on-dock capacity is estimated at 650,000 containers annually. In 2007, 232,000 containers were loaded at Pier 400. In 2006, 450,000 were loaded. Obviously, there is real capacity at Pier 400. Yet, those terminals without on-dock facilities drayed their containers over the region.

6.2 ON-DOCK IM FACILITIES

The Ports have 10 on-dock IM facilities. Five of these are situated in the Port of Los Angeles. They are the West Basin ICTF (operated by China Shipping and Yang Ming); the Terminal Island Container Intermodal Facility, operated by NYK and Evergreen (considered to be two terminals as each operator has a designated lease of tracks for its exclusive use and operation); Pier 400, operated by Maersk; and Pier 300, operated by American President Lines.

The Port of Long Beach has five IM facilities. They are Pier T, operated by Hanjin; Pier A, operated by Mediterranean Shipping Company; Pier F, operated by Long Beach Container Terminal on behalf of OOCL; Pier G, operated for K-Line; and Pier J, operated for COSCO. Pier J has two separate IM terminals. For the purposes of this report, it is assumed that they operate in tandem as one facility to serve the needs of COSCO.

Three major port tenants do not have on-dock IM facilities. They are TRAPAC in Port of Los Angeles, which is operated for Mitsui. Cal United Terminal, Piers D and E in the Port of Long Beach, operated for Hyundai; and Pier C in the Port of Long Beach, which is operated for Matson.

The EIR for the expansion of TRAPAC, which includes an on-dock IM facility, has been approved by the Port of Los Angeles Board of Harbor Commissioners. The process awaits approval by the City Council of Los Angeles. If approved, it will be the first port expansion project cleared for construction in the past seven years, and according to the plan, it will be operational by the end of 2009.

The Port of Long Beach has plans to develop a Middle Harbor Terminal Rail Yard. This project would combine Piers D, E (Hyundai), and F (OOCL) into a mega-terminal; and provide an on-dock IM facility for Hyundai. According to the plan, this project has a completion date of late 2015. It is worth noting that the Pier F (OOCL) has an on-dock facility in Port of Long Beach that is inadequate to meet the volume demand of OOCL for on-dock loading. The Middle Harbor project will satisfy this demand too, in addition to meeting the needs of Hyundai.

According to BNSF, the largest customer at the BNSF's off-dock Hobart Yard is Hyundai. The second largest is OOCL. Mitsui is the largest customer at the near-dock IM facility of UP.

The construction of the facilities described herein will greatly lessen the need for off-dock rail IM facilities, provided new and modernized near-dock terminals are constructed.

In addition to the projects shown above, the Port of Long Beach is in the process of constructing a new facility at Pier S on Terminal Island. The plan shows this project being completed in 2009. Pier S will have an on-dock IM facility.

The plan estimates the aggregate construction cost of new and enlarged terminals at $482.8 million.

Table 6.1 shows the trend in on-dock rail loadings for the past five years.

Table 6.1 On-Dock Rail Volume by Year

Year	Container Volume	Percentage of Total Port Throughput
2003	1,049,781	15.9 %
2004	1,290,716	18.1 %
2005	1,599,658	20.7 %
2006	2,116,429	24.2 %
2007	2,044,753	23.5 %

Source: BNSF and UP Railroads.

Note: The plan forecasts that the volume of direct intermodal containers will be 40 percent in 2030. The plan projects that 30 percent of all port containers will be loaded on-dock in 2030. The balance or 10 percent will be loaded at near-dock facilities. To convert TEUs (20-foot equivalent unit) to containers requires a factor of 1.80 TEUs to account for the composite average marine container length. TEU is a marine metric and not used by the railroads in describing volume. The metric used by the railroads to describe volume and capacity is based on container units. Thus, the conversion of TEUs to containers is needed to understand capacity and volume as seen through the eyes of railroad managers.

Shown below is a partial list of reasons containers are not all loaded by the marine terminals at on-dock IM facilities. The list is representative and not complete.

1. There are five wells on a typical double-stack rail car. Each well can be loaded with two 40-foot containers (stacked one on the other), or with two 20-foot containers on the bottom and one 40-foot containers on top. All wells must be loaded with containers to the same destination. Often, the marine terminal does not have enough containers destined to the same destination. In that case containers will be drayed to a railroad IM facility, which has the critical mass from all marine terminals to fill the rail car with common destination containers. The utilization of well capacity is a metric of efficiency. BNSF has a goal of filling 96 percent of all slots on a train, and will not pull a car (or train) from a marine terminal that does not meet its loading criteria.
2. Containers may miss the train schedule because of a custom hold. Rather than being delayed at the marine terminal for the next scheduled train (schedules are often weekly), the container will be drayed to a railroad facility from which a train to a given destination may be operated daily.
3. Overflow containers are drayed to railroad facilities. An example would be the situation where a train is scheduled for operation once each week. If the marine terminal has 350 containers and the train size is limited to 300 containers, the balance are drayed to a railroad facility rather than be delayed for a week at the marine terminal. Once more, the railroad facility has the mass of containers from all terminals. In addition, the railroad may operate a train mixed with domestic and international containers. This creates even more mass to operate trains more frequently to a single destination.
4. Many small markets never generate enough containers to operate a train. The necessary volume to operate a train comes from combining small market containers from all marine terminals with domestic boxes at off-dock facilities.
5. Marine terminals rarely operate daily schedules to any destination, even those as large as Chicago. They may operate a single schedule weekly to some destinations (Memphis, Dallas, Houston are examples); and the train to some markets may be operated several days after the arrival of a ship. The marine terminal sequences train loading consistent with shipper directions. Some containers are urgently needed by the consignee business and cannot be held at the marine terminal for several days before being transported. In such an instance, the container will be drayed to a rail terminal which has daily service to the destination.

Railroad facilities generate the mass needed to operate frequent trains to a given destination. They combine the containers from all marine terminals

and can mix this traffic with domestic containers or trucks. The port on-dock facilities are proprietarily operated for a single steamship company or vessel sharing alliance. Thus, the port container volume is distributed between 10 marine terminals. The port facilities do not load domestic containers, so this element is missing with respect to the creation of mass.

6.3 NEAR–DOCK IM FACILITIES

The Intermodal Container Transfer Facility (ICTF) is operated by UP for its exclusive use. The facility is situated about 5 miles north of the Ports. Access is from the Terminal Island Freeway, SR 47/103. The original facility footprint of 148 acres was constructed on Port of Los Angeles property. The property lease is for 50 years and expires in 2034. The terminal opened in November 1986. Since the opening of ICTF, UP has expanded the operation to 233 acres by purchasing and leasing adjacent property. In its first full year of operation (1987), ICTF loaded 303,056 containers. In 2007, the lift volume was 710,460 containers. A moderating influence on growth has been the construction of on-dock facilities. When ICTF opened, there were no on-dock IM facilities. As noted above, there are 10 such facilities situated in the Port Complex now. Each time an on-dock terminal has begun operation, volume at ICTF declines for a short time, then begins to grow again. There are no other near-dock IM facilities at this time.

ICTF Modernization Plan

UP submitted an application for project development to the Governing Board of the Intermodal Container Transfer Facility, Joint Powers Board, on December 26, 2007. The project is titled, "Intermodal Container Transfer Facility (ICTF), Modernization Project". UP stated in an earlier application dated January 30, 2007, that the capacity of ICTF is 760,000 containers annually, and the current throughput is about 725,000 units. The proposed modernization plan is expected to increase the capacity of ICTF to 1.5 million containers annually. The project is designed to convert the overhead straddle cranes from diesel to electric, eliminate hostler activity, reduce congestion on the Terminal Island Freeway, and actually shrink the operational size from 233 to 177 acres. The key to the UP plan is to employ overhead, rail-mounted, wide-span lift cranes. ICTF is a wheeled operation at this time. By this, it is meant that all containers are loaded onto a chassis and are stored on chassis. None of the containers is grounded or stacked vertically. The modernization plan will convert the facility from a wheeled operation to one where the containers are stacked vertically. This operational change greatly reduces the land required for the operation. Additionally, the need to have chassis stored on site is eliminated. More than 50 acres of property are used in the current operation to store chassis. The wide-span cranes described in the modernization plan can span six tracks,

and they will stack containers to the side of working tracks vertically as trains are unloaded. Inbound containers from the Ports will be live loaded. In rare cases, the inbound containers will be grounded for later loading. UP describes this project as a "green overhaul" of an existing facility. Nevertheless, community opposition will be fierce, and the likelihood of the plan becoming a construction reality is uncertain. The Port of Los Angeles has contracted with the South Coast Air Quality Management District (SCAQMD) to prepare the EIR. The SCAQMD has never prepared an EIR, and there is a lot of speculation as to why the Port of Los Angeles contracted with them for the document preparation. Over the past several years, the SCAQMD has made several attempts to regulate railroad emissions. These attempts have failed, as the railroads have prevailed in court with the argument that the Federal government is the only level of government with jurisdiction to regulate railroad locomotive emissions. Given their previous and continuing adversarial positions on emission regulations, the EIR for ICTF will be worthwhile monitoring. Community opposition to this project will be brisk, and the likelihood of construction is problematical.

Table 6.2 shows the IM volume at ICTF for the past 5 years.

Table 6.2 Near-Dock (ICTF) IM Volume for the Past Five Years

Year	Volume
2003	558,993
2004	569,349
2005	640,746
2006	726,622
2007*	710,460

Source: UP Railroad.

*Represents eight percent of port volume.

Southern California International Gateway (SCIG)

The Southern California International Gateway (SCIG) is a proposed near-dock IM facility. It is planned to be developed on Port of Los Angeles property, situated approximately 4 miles north of the Ports, and immediately south of ICTF. Access to the facility will be from the Terminal Island Freeway at Pacific Coast Highway. The Port of Los Angeles has designated BNSF as the exclusive operator and user of the facility. It is thought that this designation will bring competitive parity among the railroads and choice for port tenants. The current plan is to have a draft EIR completed by September 2008, with an approval date of December 2008. BNSF estimates SCIG capacity at 1.5 million containers annually. The design plan is to construct two clusters

of six working tracks, with each track being about 4,000 feet in length. The working tracks will be connected to a lead track, which in turn will connect to the Alameda Corridor. The facility will be "green," and as with ICTF, use wide-span electric lift cranes, and eliminate hostler activity. BNSF has pledged to purchase a clean fleet of diesel trucks for the dray between the Ports and SCIG. BNSF has stated that the SCIG operation will eliminate the need to use Hobart Yard, situated in Commerce, as a container loading facility, thus eliminating immediately 1.2 million truck trips annually on the I-710. When at full capacity, SCIG will eliminate more than 2 million truck trips annually. Community opposition to the SCIG project will be intense, and there is considerable risk that the facility will not be constructed.

6.4 OFF-DOCK IM FACILITIES

There are five off-dock IM facilities in the Basin. The off-dock facilities process a mix of international and domestic containers and trucks. Most of the international containers loaded off-dock are concentrated at the Hobart Yard of BNSF and UP's East Los Angeles Yard. Both are situated in the City of Commerce and sit astride from each other along Washington Boulevard.

Hobart Yard

Hobart is the largest IM facility in the U.S., dwarfing all other such facilities in terms of throughput. The main terminal site constitutes 285 acres of property. BNSF supports the operation from several remote yards, which are situated near the main facility. The plan estimates the capacity of Hobart to be 1.7 million lifts annually. BNSF estimates the capacity at 2.5 million containers, if the facility is converted to a wide span crane operation.

Table 6.3 Off-Dock International Lifts
2006

Facility	Total Lifts
BNSF Hobart	808,096
BNSF San Bernardino	0
UP East Los Angeles	80,108
UP LATC	32,912
UP City of Industry	2,254
Total Off-Dock	**923,370***

Source: BNSF and UP Railroads.

*10.55 percent of all international containers.

As BNSF does not operate a near-dock IM facility, Hobart is used to serve its marine customers as support for the on-dock operation. By volume, about 60 percent of all containers passing through Hobart are international containers, with the balance being domestic boxes. The number of international containers processed at Hobart in 2007 was 789,656 units. This makes the throughput of international containers at Hobart greater than ICTF, with more international volume than any IM facility in the U.S. The balance of throughput at Hobart was about 584,824 units of domestic containers and trucks.

Very few trailers move by rail compared to a few years ago when it was a common practice to ship trailers. The economics of double-stack transport, where containers are stacked two-high, has made the haulage of trailers cost prohibitive (they cannot be stacked two-high).

East Los Angeles (ELA)

ELA is a UP-operated IM facility. The facility is situated on approximately 120 acres. The plan estimates the capacity of East Los Angeles to be 510,000 lifts annually. Of the 358,769 containers and trucks processed at ELA in 2007, 80,253 were international and the balance, domestic. Obviously, ICTF is the primary UP facility utilized for loading international containers. International containers loaded at ELA are combined with domestic containers to make a solid train, which is likely destined for small IM markets, such as Salt Lake City and Denver. The UP's operating scheme is to operate a daily train to Denver with domestic (including UPS service) and international containers. This train sets out traffic destined for Salt Lake City on its route to Denver.

Los Angeles Transportation Center (LATC)

LATC is situated on the east side of the Los Angeles River across from the Los Angeles Union Passenger Terminal. This facility is the only Basin IM terminal from which Pacific Northwest service is operated. LATC is located on about 110 acres of property. The plan estimates the capacity of LATC to be 340,000 lifts annually.

City of Industry (CofI)

CofI is another UP-operated IM facility. It is situated on a 90-acre parcel of property. The plan estimates the capacity to be 220,000. UP has long-term plans to expand the terminal to 160 acres by combining two contiguous pieces of property. UP forecasts that the build out will increase the facility's capacity to 600,000 domestic trailers and containers annually.

San Bernardino (SB)

SB is operated by BNSF. The IM facility is the only IM facility in the Inland Empire. The plan estimates that the capacity of SB is 660,000 annually. SB is situated on 150 acres of land. Expansion of this facility is unlikely as it would require the taking of residential property. San Bernardino does not process any international containers.

Victorville

BNSF has announced plans and signed an Memorandum of Understanding with the City of Victorville to construct an IM facility there.[29] For now, construction has been placed on hold as the demand for lift capacity has not materialized due to a weak IM market. BNSF plans describe Victorville as a domestic facility.

Table 6.4 shows IM volume for all Basin facilities since 2001.

[29] BNSF web site. http://www.bnsf.com/employees/communications/bnsf_today/2007.

Table 6.4 Railroad Intermodal Volume
LA Basin

Year	LATC	City of Industry	East LA	ICTF	On-Dock	Total
Union Pacific						
2000	226,424	163,400	407,636	630,636	N/A	**1,428,096**
2001	193,526	193,584	386,209	679,879	366,250	**1,819,488**
2002	188,752	240,592	438,209	689,432	394,240	**1,951,225**
2003	206,532	252,320	470,927	558,993	458,483	**1,947,255**
2004	228,361	242,428	466,540	569,349	507,127	**2,013,805**
2005	207,056	222,245	357,738	640,746	621,704	**2,049,489**
2006	202,384	191,018	340,003	726,622	831,314	**2,291,341**
2007	186,393	191,892	358,769	710,460	873,106	**2,320,620**

Year	Hobart Yard*	San Bernardino	On-Dock	Total
BNSF				
2001	1,040,601	410,922	421,084	**1,872,607**
2002	1,069,602	449,906	423,404	**1,942,912**
2003	1,216,652	494,777	591,298	**2,302,727**
2004	1,318,583	557,151	783,589	**2,659,323**
2005	1,338,374	554,904	977,954	**2,871,232**
2006	1,366,535	569,047	1,285,115	**3,220,697**
2007	1,374,480	499,974	1,171,647	**3,046,101**

Year	Union Pacific	BNSF	Total	Year	Volume
Total Intermodal Volume by Railroad – LA Basin				**On-Dock Volume**	
2001	1,819,448	1,872,607	**3,692,055**	2001	786,334
2002	1,951,225	1,942,912	**3,894,137**	2002	817,644
2003	1,947,255	2,302,727	**4,249,982**	2003	1,049,781
2004	2,013,805	2,659,323	**4,673,128**	2004	1,290,716
2005	2,049,489	2,871,232	**4,920,721**	2005	1,599,658
2006	2,291,341	3,220,697	**5,512,038**	2006	2,116,429
2007	2,320,620	3,046,101	**5,366,721**	2007	2,044,753

Source: BNSF and UP Railroads

*2003 to 2007 includes Commerce.

Note: These numbers are based on operating data. Other reports are based on billing information. For operating convenience, containers may be unloaded at a facility other than the billing address. In this case, the railroad will dray the container to its billed point. There may be a small volume variance in reports because of these disparate data sources.

Table 6.5 Overview of IM Rail Terminal Capacity (TEUs)

	Current (2005)	Projected (2030)
On-Dock IM Terminals		
Pier J – PCT @ 2IYs (POLB)	377,023	1,879,404
Pier G – ITS (POLB)	119,415	605,265
Pier F – LBCT (POLB)	187,157	–
Pier DE – CUT (POLB)	–	–
MHT	–	1,508,401
Pier A – MSL (POLB)	258,086	1,641,446
Pier S (POLB) – not operational	–	524,613
Pier T – Hanjin (POLB)	571,526	1,264,786
Pier C – Matson (POLB)	–	–
Pier W	–	–
Pier 300 – APL (POLA)	614,022	1,259,786
TICTF – YTI/Evergreen (POLA)	613,645	1,346,440
Pier 400 – APM	747,602	2,642,847
WB West – YML/CSL (POLA)	262,207	893,079
WB East – Trapac (POLA)	–	700,546
Total On-Dock	**3,750,683**	**14,266,613**
Near-dock IM Terminals		
ICTF (UP)	1,600,000	3,500,000
SCIG (BNSF)	0	1,800,000
Total Near-Dock	**1,600,000**	**5,300,000**
Off-dock IM Terminals*		
Hobart (BNSF)	1,805,400	2,655,000
San Bernardino (BNSF)	–	–
East Los Angeles (UP)	144,455	144,455
LATC (UP)	612,000	612,000
City of Industry (UP)	4,000	10,800

Victorville	–	–
Total Off-Dock	**2,565,856**	**3,422,255**

Source: San Pedro Bay Ports Rail Study Update and BNSF and UP Railroads.

* Off-dock terminals handle both domestic and international containers. Only international container capacity is considered in this table. The conversion factor used to convert international containers to TEUs is 1.8.

6.5 TRANSLOADED IM

The plan states that an Alameda Corridor Transportation Authority (ACTA) study 2004 calculated that the railroads hauled the cargo from 12 percent of the port-generated TEUs in domestic boxes. This is traffic which had been transloaded out of the marine container or warehoused in the Basin before being transported to the hinterlands in a 53-foot domestic container. Though looking like a container with domestic product, many of the nonmarine containers are actually loaded with international cargo.

Container Lengths

International containers are 20 feet, 40 feet, and 45 feet in length, with 40-foot containers being most prevalent. Domestic containers are 28 feet, 48 feet, and 53 feet in length. The domestic industry is rapidly transitioning to all 53-foot containers. Rather than return empty marine containers from the hinterlands, the steamship companies try to fill the box with westbound domestic product. This strategy resulted in about 125,000 international containers moving back to the West Coast loaded with domestic goods in 2006. Likewise, even though a container is sized at 53 feet, and thence a domestic box, the cargo may be international. Transloaded and warehoused cargo is restuffed into 53-foot containers. All domestic containers are loaded at off-dock IM facilities.

The transloaded cargo will be transported from any of the five off-dock IM facilities. Most will migrate to the Inland Empire as that is where most new warehouse construction is occurring. One 53-foot container will convert to three TEUs by volume. If the railroad market share is 12 percent of the port TEUs, 5.1 million TEUs will be transloaded and shipped by rail. This equates to 1.7 million domestic containers (53 feet), and will generate 21 trains each day (assumes an average of 220 containers per train). Assuming a 50/50 market split between BNSF and UP, not more than five of these trains will operate out of Hobart Yard. BNSF'S facility at San Bernardino will load and operate the other five to six trains.

The plan estimates that 40 percent of all marine containers will be transported direct intermodal in 2030. At this time, the percent moving ship to rail is about 42 percent. The plan estimates that the on-dock IM facilities are theoretically capable of loading 30 percent of the containers passing through the Ports. This percentage is based on a "perfect world" scenario deemed to be unrealistic by most observers, including the railroads. But assuming the estimate is reality and 40 percent is the direct intermodal number, this leaves 10 percent of the containers to be loaded elsewhere. This represents 4.25 million TEUs, or 2.361 million containers. As previously noted, according to UP, the capacity of ICTF is 760,000 containers annually. This leaves a lift demand of 1.691 million, which will be loaded at modernized or new near-dock IM facility, or to an off-dock terminal.

For each percent, the demand for direct intermodal is greater than 40 percent, and/or the on-dock facilities do not aggregately load 30 percent of the marine containers, a lift demand outside the Port Complex of 420,500 TEUs (233,600 containers) is created. Recall that about 42 percent of all containers are now moving direct intermodal, and the highest percent of total port throughput ever loaded on-dock has been 24.2 percent (2006). The percentage loaded on-dock in 2007 actually fell to 23.5 percent. If today's reality becomes reality in 2030, the Regional freeway system will be seriously and negatively impacted.

A rule of thumb is that for every container loaded at off-dock and near-dock IM facilities, 1.5 truck trips are generated. The ratio is accounted for by bobtail (tractor only) and chassis without container movements.

6.6 PORT INFRASTRUCTURE PROJECTS (NONTERMINAL)

To support the forecasted growth in volume of planned on-dock IM facilities, the plan describes numerous track construction projects. The plan estimates the cost of these projects at $643.6 million. Construction of all projects is forecasted for completion by 2020. The EIR process has recently begun for three projects, including the Pier B rail yard in the Port of Long Beach. The plan states that this yard will be used to support all on-dock terminal operations in the Port of Long Beach.

In addition to new projects, the plan describes the need to lock the Badger Avenue Bridge in the down position. The normal position at present is up. The Bridge is situated on the access route to Terminal Island. More than 50 percent of all containers loaded at on-dock facilities will be on Terminal Island in 2030. According to the plan, a seamless train operation to and from Terminal Island is essential. Since the Bridge spans a navigable waterway (Cerritos Channel), the U.S. Coast Guard has jurisdiction over the Bridge's

normal or at rest position. The importance to the change of the Bridge's normal position is underscored by what is written in the plan, "In 2010, lifting the Bridge increases the delay ratio on Terminal Island by 35 percent". Greater delays will occur as on-dock capacity increases and volume grows on Terminal Island. The Ports have petitioned the Coast Guard to change the normal Bridge position to down. The Coast Guard proposes that the change be implemented as a pilot program for eight weeks. Port of Los Angeles is the lead agency.

The train movement simulation shown in the plan makes several operational assumptions which are not practical. The objective of the rail modeling was to develop a template for success. Success in this instance means that trains can move at an acceptable speed without serious delay. These comments were provided at the request of consultant after a presentation of the simulation findings, including the operating assumptions attendant thereto, in May 2006.

All the infrastructure projects described in the plan require Board approval, funding, and an EIR. None of the projects directly generate port revenue.

6.7 2030 CAPACITY ISSUES

As described earlier, there are major variables that will determine whether there is sufficient rail capacity to meet the plan's objective of:

- Loading all direct intermodal container traffic at on-dock or near-dock facilities;
- The sufficiency of rail support yards and tracks to operate all trains efficiently in the Port Complex; and
- The capacity of the Basin main tracks, including the Alameda Corridor, to haul what has been loaded at the on-dock and near-dock IM facilities. (This issue is evaluated in the I-710 Rail Goods Movement report, but omitted here.)

6.8 NEAR-DOCK IM FACILITIES

The modernization of ICTF and the construction of SCIG face a great deal of community opposition. The railroads are likely to have conditions imposed on them that they will reject. The Ports will no doubt force adherence to the Clean Air Action Plan (CAAP) on the railroads in return for supporting these projects. The Ports will use the permitting process of these projects to enforce port-wide adherence to CAAP. The railroads will not accept this proposition.

Standing alone, the ICTF modernization project seems to be good for the Region. ICTF is a reality. It cannot be stopped from operating. The modernization plan will "green" the operation. Nevertheless, many local residents are aggressively opposed to the modernization plan, as it will bring additional container volume to ICTF.

SCIG is a new project, so therefore it is not an existing polluter like ICTF. The project has significant regional benefits, including the removal of more than 2 million truck trips annually from the I-710 when at full capacity. The project faces formidable community opposition.

The development of both of these projects is outside railroad control. That is a major barrier to the likelihood of project success. Moving forward to construction will require public approval.

On-Dock

The Port's plan to construct new terminals and enlarge others is likely to occur. The Port of Los Angeles recently negotiated a mitigation arrangement with the Los Angeles City Council to move the TRAPAC project forward for approval by the Council. This settlement could serve as a template for future projects.

A major barrier to on-dock productivity is the terminal/international longshore and warehouse union (ILWU) work rule, which restricts terminal switching to times when the IWLU employees are not working. This rule alone will undermine the notion that trains will be able to go directly to spot (a major assumption in the rail simulation) for loading/unloading on arrival at the port terminals. Track turnover (switching) is critical to the efficient use of terminal tracks. Simply, this means that when a track(s) is loaded or unloaded, it must be made accessible to the railroad for replacement. Marine Terminal work rules and productivity are not controlled by the railroads.

6.9 PORT INFRASTRUCTURE DEVELOPMENT (NONTERMINAL)

The port development of new terminal lead and storage tracks is likely to move forward without much difficulty. Few of these projects are specific to port growth. They mostly support what has been built. They are complementary to the efficient use of the on-dock facilities. There is little to be gained by the environmental community in opposing these projects. Stopping the infrastructure projects would merely degrade the efficiency of the marine terminals. This would force the loading of ship to rail containers outside the Ports and onto the regional freeway system for movement to a near-dock or off-dock IM facility.

As with the discussion regarding on-dock terminal throughput, the use of port infrastructure is somewhat independent of railroad control. In a typical railroad IM operation, all aspects of the operation are railroad controlled. The railroad operates the terminal, spots and pulls rail cars randomly, internally coordinates the use of complementary yard tracks, and randomly operates trains into and out of the facility without restriction.

The difference between a railroad and port IM operation is striking. The Ports have 10 on-dock terminals and no operational coordination between them. They are served by two railroads that, through a joint coordination effort, try to optimize their collective efficiency. In large part, however, the operating domain is outside the direction of one party.

Although plans to construct new tracks including storage yard are important, their efficient use is not assured.

Table 6.6 Project Control of Direct Intermodal Capacity

Project	Control
ICTF Modernization	**POLA Board**
	Political Process (LA City Council)
	Public (Community Groups)
	Environmental Groups (NRDC)
SCIG	**POLA Board**
	Political Process (LA City Council)
	City of Long Beach
	Public (Community Groups)
	Environmental Groups (NRDC)
On-Dock Rail	**POLA/POLB Board Depending on port**
	Political Process (City Council)
	Public (Community Groups)
	Environmental Groups (NRDC)
Port Infrastructure	**POLA/POLB Board Depending on port**
	Political Process (LA City Council)
	Public (Community Groups)
	Environmental Groups (NRDC)
Main Trunk Capacity	**Railroads**
	Ports
	Political Process (City Council)
	Public (Community Groups)
	Environmental Groups (NRDC)
Impact on Project Shown By Color	
Approval Required	
Leverage Over Project High	
Leverage Over Project Moderate	
No Leverage Over Project	

Source: George R Fetty & Associates.