Tioga

SF Bay Area Containerized Cargo Outlook

The Tioga Group, Inc.

Prepared for:

SF Bay Conservation and Development Commission

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Foreword

This Containerized Cargo Outlook report was prepared by The Tioga Group, Inc. on behalf of the San Francisco Bay Conservation and Development Commission (BCDC), with support from the Port of Richmond. The report draws heavily from reports prepared by and for the Ports of Oakland and San Francisco, on the industry knowledge of Tioga staff, and on trade and economic forecasts by IHS Global Insight.

The Tioga Group is a specialized freight transportation consulting firm with over 100 years of combined staff experience. Tioga serves ports, freight transportation carriers, shippers, suppliers, public agencies, and industry organizations. Tioga personnel have extensive qualifications and experience in trucking, rail, ports, intermodal, and logistics projects for both the public and private sectors. Tioga has completed assignments of national, regional, and local scope including numerous studies for the Port of Oakland, Richmond, and Redwood City, and for Bay Area planning agencies.

IHS Global Insight (IHSGI) provides comprehensive economic, financial, and political coverage to support planning and decision making. Using a unique combination of expertise, models, data, and software within a common analytical framework, IHSGI covers over 200 countries and more than 170 industries. IHS Global Insight has over 3,800 clients in industry, finance, and government, IHSGI has 700 employees and 25 offices in 14 countries covering North and South America, Europe, Africa, the Middle East, and Asia. The West Coast ports of Los Angeles, Long Beach, Seattle, and Tacoma all rely on forecasts using IHSGI analysis and data.

Tioga teamed with DRI-WEFA, a predecessor of IHSGI, to prepare the *Seaport Plan Waterborne Bulk Cargo Forecast Update* in 2002. Use of the same forecasting framework for this report provides consistency in definitions and approach.

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I. Executive Summary

Background

The *San Francisco Bay Area Seaport Plan* (Seaport Plan) is a key component of both the San Francisco Bay Conservation and Development Commission's (BCDC) *San Francisco Bay Plan*, and the Metropolitan Transportation Commission (MTC) *Regional Transportation Plan*.

The key focus of the Seaport Plan has been to preserve suitable port sites for foreseeable cargo needs. The Seaport Plan designates shoreline area as "port priority" where deemed necessary for future port use. To do so, the Seaport Plan must match forecasts of cargo flows with existing and potential port capacity. SF Bay ports handle both traditional bulk cargoes and containerized cargoes. The Seaport Plan forecast for bulk and other non-containerized cargoes was updated in 2003.

Forecast

The forecast for containerized cargo and container terminal capacity dates from 1988, and until recently was sufficiently accurate for the purposes of the Seaport Plan. The existing forecast was prepared by Manalytics, Inc. and WEFA, under contract to the SF Metropolitan Transportation Commission. Their report, *San Francisco Bay Area Cargo Forecast to 2020 and the Future Demand for Marine Container Terminals*, was competed in October 1988. That the forecast remained usably accurate until recently is a testimony to the original analysis.

There were actually two forecasts for containerizable cargo, one in metric tons and one in twenty-foot equivalent units (TEU). The current Seaport Plan uses the metric tonnage forecast, in keeping with metric tonnage forecasts for break bulk, neo-bulk, dry bulk, and liquid bulk cargoes. That forecast is shown in the first line of Exhibit 1. Exhibit 1 also shows the TEU forecast, which was not used in the current Seaport Plan.

Exhibit 1: Seaport Plan Forecasts and Actual TEU Volumes

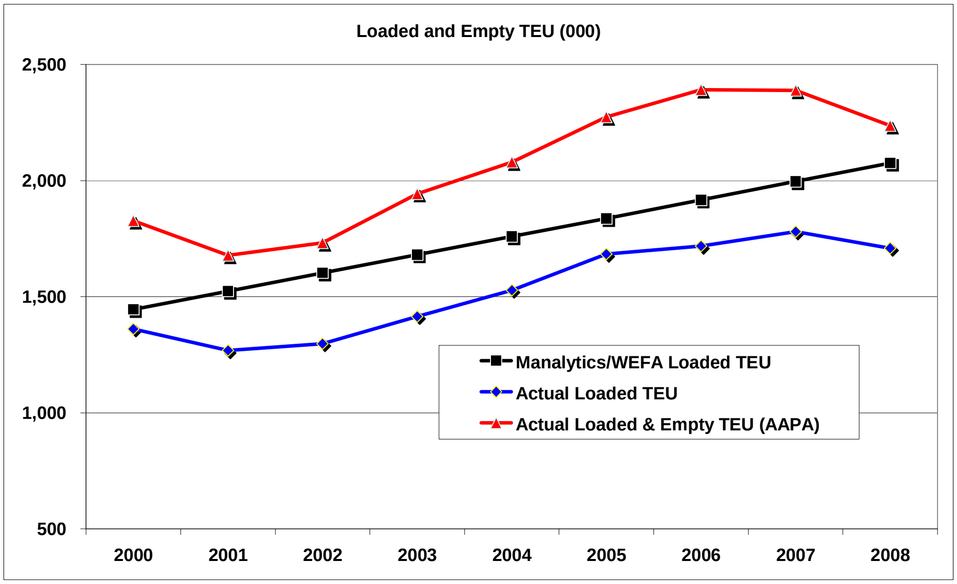
Measure	**Containerized Cargo (000)**									**CAGR**
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**00-08**
Loaded Containers										
Seaport Plan Metric Ton Forecast (000)	14,334	15,049	15,799	16,587	17,414	18,282	19,010	19,766	20,553	4.6%
Manalytics/WEFA Loaded TEU	1,446	1,524	1,602	1,681	1,759	1,837	1,917	1,997	2,076	**4.6%**
Actual Loaded TEU	1,361	1,268	1,298	1,415	1,528	1,683	1,718	1,780	1,707	**2.9%**
Oakland	1,322	1,245	1,280	1,399	1,508	1,683	1,718	1,780	1,707	3.2%
San Francisco	39	23	18	16	20					
Richmond										
Loaded and Empty Containers										
Seaport Plan @ 6.4 mtons/TEU	2,240	2,351	2,469	2,592	2,721	2,857	2,970	3,088	3,211	4.6%
Actual Loaded & Empty TEU (AAPA)	1,827	1,678	1,732	1,944	2,080	2,274	2,392	2,388	2,234	**2.5%**
Oakland	1,777	1,644	1,708	1,923	2,048	2,274	2,392	2,388	2,234	2.9%
San Francisco	50	35	24	21	32	-	-	-	-	na
Richmond	-	-	-	-	-	-	-	-	-	na

Source: Manalytics/WEFA 1988, AAPA, Port of Oakland

Exhibit 1 also summarizes the recent containerized cargo history for the SF Bay Area. Oakland is presently the only port handling containerized cargo. Richmond ceased handling containers in 1997, and San Francisco stopped in 2004. The total TEU volume has grown by 76.8% since 1990, and by 22.4% since 2000. Since 2000, however, containerized cargoes have not grown as rapidly as expected in the 1988 forecast. Against a forecast compound annual growth rate of 4.6% for both metric tons and loaded TEU, the Bay Area actuals grew at 2.9%.

The cumulative divergence between the existing forecast and the current recession-induced decline in containerized cargo, both shown in Exhibit 2, suggest that the forecast should be revisited.

Exhibit 2: Forecast and Actual Bay Area TEU (000)



Source: Manalytics/WEFA 1988, AAPA

Accordingly, Exhibit 3 presents a revised cargo forecast for both loaded and empty containers. This forecast was developed by applying long-term trade growth rates developed by IHS Global Insights to recent Port of Oakland actual loaded TEU counts, and then forecasting empties as a percentage of loaded movements.

Exhibit 3: SF Bay/Port of Oakland Container Forecast – 000 TEU

Segment	Actuals				Forecast*				
	2005	2006	2007	2008	2010	2015	2020	2025	2030
Import Loads									
Actual/Forecast TEU	836	878	870	796	734	998	1,314	1,693	2,152
Export Loads									
Actual/Forecast TEU	847	840	910	911	827	1,065	1,282	1,484	1,687
Empties									
Actual/Forecast TEU	591	674	608	526	500	660	831	1,017	1,228
Total TEU	**2,274**	**2,392**	**2,388**	**2,234**	**2,061**	**2,723**	**3,427**	**4,194**	**5,067**

Exhibit 4 compares the revised forecast with the Seaport Plan forecast.

Exhibit 4: TEU Forecast Comparisons

Measure	Containerized Cargo (000 TEU)						
	2000	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Loaded Containers							
Manalytics/WEFA Loaded TEU	1,446	1,837	2,236	2,724	3,303		
Actual Loaded TEU	1,361	1,683					
Revised Forecast Loads	**1,361**	**1,683**	**1,562**	**2,063**	**2,596**	**3,177**	**3,839**
Loaded and Empty Containers							
Seaport Plan @ 6.4 mtons/TEU	2,240	2,857	3,472	4,212	5,087	-	-
Actual Loaded & Empty TEU (AAPA)	1,827	2,274					
Revised Forecast Loaded & Empty	**1,827**	**2,274**	**2,061**	**2,723**	**3,427**	**4,194**	**5,067**

There are two major differences between the previous forecast and the revised forecast.

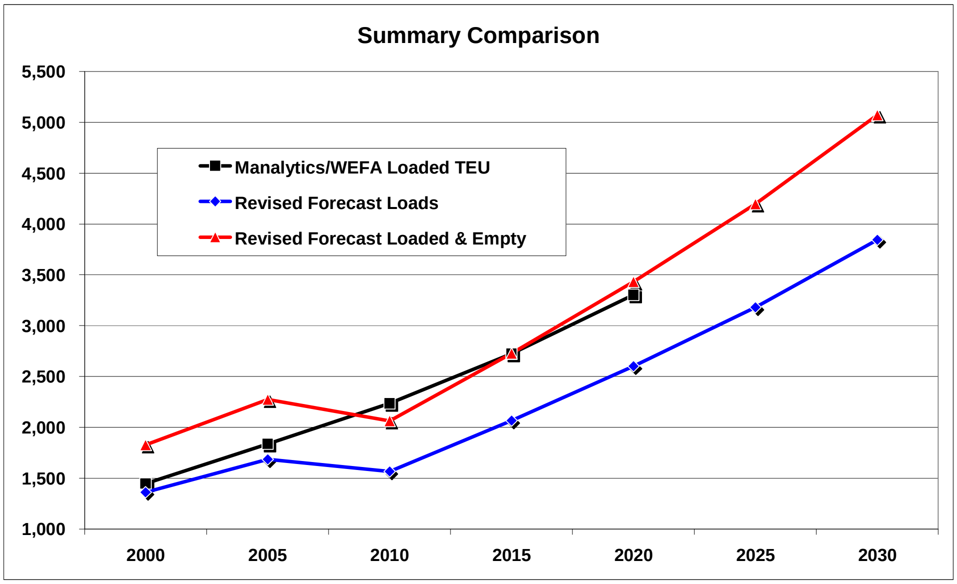
- A multi-year "set back". The 2009 volume will be approximately the same as it was in 2003, so growth has been set back by about 6 years due to the recession.

- Faster growth in 2010-2020. The growth rates in the previous forecast appear very conservative. Although the 2010-2020 period is not expected to see the rapid growth experienced in 1995-2005, it is still expected to see growth at a bit over 5% annually versus 3.9-4.0% in the previous forecast. Part of this growth will be the recovery from the recession.

The net result of these changes is an estimated demand for **3.4 million TEU of containerized cargo and empty containers via SF Bay Area ports in 2020, and 5.1 million TEU in 2030**.

The three forecasts from Exhibit 4 are shown graphically in Exhibit 5. The lines show the impact of the current recession clearly. The revised loaded and empty TEU forecast is coincidentally quite close to the 1988 Manalytics/WEFA forecast for loads only. The revised forecast for loads, which is a more relevant comparison, is well below the Manalytics/WEFA forecast.

Exhibit 5: Forecast Comparison Chart (000 TEU)



Capacity

The Seaport Plan currently anticipates that SF Bay Area container cargo would be handled at three ports, as shown in Exhibit 6. However, the Ports of San Francisco and Richmond have stopped handling containers and do not have plans to resume in the near future. In addition, the San Francisco and Richmond container facilities are becoming outdated, and these ports are now constrained by draft, inland transport, and other issues. It is therefore reasonable to ask whether the Port of Oakland by itself has or could have the capacity to meet the SF Bay Area's demand for container cargo handling by itself.

Exhibit 6: Seaport Plan Container Port Capacities

Seaport Plan 2020				Equivalent TEU
Port	**Acres**	**Berths**	**Metric Tons**	**@ 6.4 mtons/TEU**
Oakland	1,000	19	24,525,000	3,817,995
Richmond	190	5.5	2,802,500	436,287
San Francisco	185	6	4,494,000	699,615
Total	**1,375**	**30.5**	**31,821,500**	**4,953,897**

Container port capacity is a function of the terminal space available and the throughput per acre. Exhibit 7 relates several throughput averages to three different Port of Oakland acreages: 770 acres (current), 866 acres (planned), and 1,000 acres (Seaport Plan). The most authoritative and recent throughput estimates are found in the Maritime Development Alternatives Study (MDAS) completed in 2004. The MDAS estimates would yield port capacities of 4.6 to 6.7 million annual TEU, depending on the acreage.

Exhibit 7: Port of Oakland Container Terminal Capacity Comparisons

TEU/Acre		Annual TEU at Acreage		
		770	**866**	**1000**
Oakland 2000 (513 acres)	513	395,010	444,258	513,000
Oakland 2008 (770 acres)	2,904	2,236,244	2,515,048	2,904,213
BCDC 2020 @ 6.4 mtons/TEU	**3,832**	**2,950,664**	**3,318,539**	**3,817,995**
LALB 2005	4,612	3,551,008	3,993,732	4,611,699
MDAS 2004	**6,667**	**5,133,590**	**5,773,622**	**6,667,000**
LALB Theoretical	10,477	8,067,411	9,073,218	10,477,157

Forecast versus Capacity

A comparison of the containerized cargo forecast developed in Section II and the capacities estimated in Section III indicates that the Port of Oakland has existing and potential capacity to handle the demand for containerized cargo through the SF Bay Area (Exhibit 8). At its present size of about 770 acres of terminal space and existing rail infrastructure, the Port of Oakland should have adequate capacity through at least 2014, and possibly up to 2021. At its planned size of about 866 acres with rail and road infrastructure improvements Oakland would have sufficient capacity to meet forecast demand through 2030. Expansion to the Seaport Plan total of 1000 acres would enable the Port of Oakland to handle expected growth well beyond 2030.

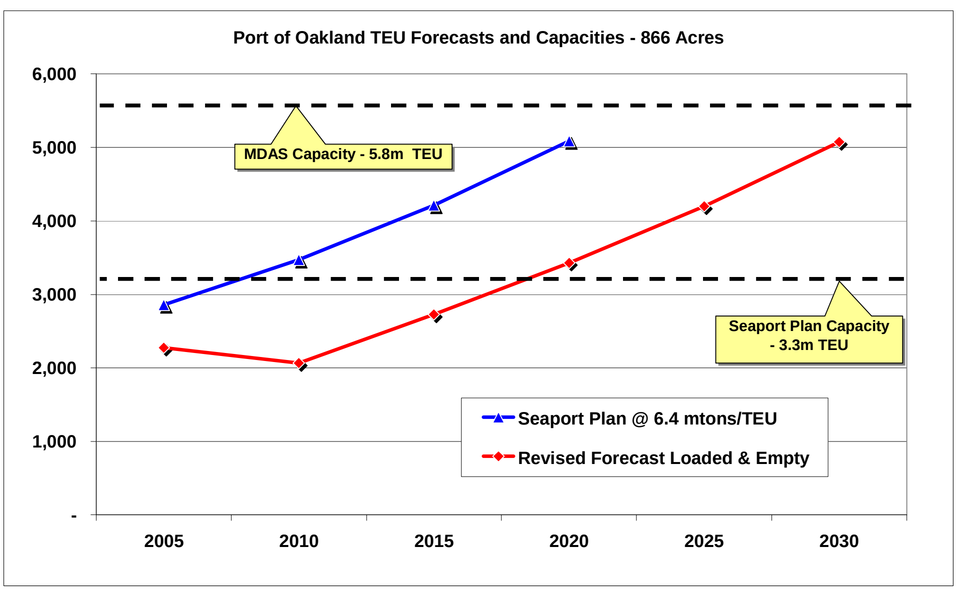
Exhibit 8: Forecast TEU versus Capacity

Measure	Containerized Cargo (000 TEU) 2005	2010	2015	2020	2025	2030
Forecast Demand						
Manalytics/WEFA Loaded TEU	1,837	2,236	2,724	3,303		
Seaport Plan @ 6.4 mtons/TEU	2,857	3,472	4,212	5,087	-	-
Revised Forecast Loaded & Empty	**2,274**	**2,061**	**2,723**	**3,427**	**4,194**	**5,067**
Capacity at 770 Acres						
Seaport Plan @ 6.4 mtons/TEU	2,951	2,951	2,951	2,951	2,951	2,951
MDAS Estimate	**5,134**	**5,134**	**5,134**	**5,134**	**5,134**	**5,134**
Capacity at 866 Acres						
Seaport Plan @ 6.4 mtons/TEU	3,319	3,319	3,319	3,319	3,319	3,319
MDAS Estimate	**5,774**	**5,774**	**5,774**	**5,774**	**5,774**	**5,774**
Capacity at 1000 Acres						
Seaport Plan @ 6.4 mtons/TEU	3,818	3,818	3,818	3,818	3,818	3,818
MDAS Estimate	**6,667**	**6,667**	**6,667**	**6,667**	**6,667**	**6,667**

Source: Seaport Plan, IHSGI, MDAS

Exhibit 9 provides a comparison based on planned terminal space of 866 acres. With that much space devoted to terminals, the productivity and capacity estimates in the MDAS report yield a total capacity of roughly 5.8 million TEU. This build-out capacity gives the port and the region a comfortable margin over the forecast volume of about 5.1 million TEU in 2030. The MAQIP indicates that the Port expects to meet environmental objectives at that same forecast volume.

Exhibit 9: Port of Oakland TEU Forecast and Capacities at 866 Acres



The existence of excess potential capacity, as shown in Exhibit 9, also implies that the Port of Oakland can meet expected demand even if some improvement projects are delayed or must be built in stages. This observation adds a safety factor to the findings.

Critically, the MDAS noted that the Port of Oakland's effective capacity is currently constrained by intermodal rail capacity, not by the marine terminals. To attain the higher throughputs in Exhibit 8 will require the Port and the railroads to complete several key infrastructure projects, some of which have received support through the Trade Corridor Improvement Fund (TCIF).

The Seaport Plan has implicitly assumed that ports, terminal operators, and other involved parties will make the required financial and organizational commitments to port and terminal capacity. That is still a critical assumption, particularly in the current recession. In the long run, however, the parties involved generally agree that the investments are a necessary part of their investment and business plans. While the exact timing and nature of the investments will remain uncertain, the assumption that they will be made is consistent with a prudent approach to capacity planning.

II. Containerized Cargo Forecast

Background

The *San Francisco Bay Area Seaport Plan* (Seaport Plan) is a key component of both the San Francisco Bay Conservation and Development Commission's (BCDC) *San Francisco Bay Plan*, and the Metropolitan Transportation Commission (MTC) *Regional Transportation Plan*. These plans together provide a framework for transportation and land use planning throughout the greater Bay Area.

San Francisco Bay is a major natural harbor, and would be expected to play a major role in West Coast maritime shipping. To do so, however, the Bay needs modern ports facilities capable of handling expected trade efficiently and in keeping with the sensitive nature of the marine environment. Suitable sites for modern port facilities are extremely limited, as much of the Bay's shoreline consists of either land developed for other uses, tidal flats, or other areas where port development would be difficult or undesirable.

The primary focus of the Seaport Plan has been to preserve suitable port sites for foreseeable cargo needs. The Seaport Plan designates shoreline area as "port priority", where deemed necessary for future port use. To do so, the Seaport Plan must match forecasts of cargo flows with existing and potential port capacity. SF Bay Ports handle both traditional bulk cargoes and containerized cargoes. The Seaport Plan forecast for bulk and other non-containerized cargoes was updated in 2003.

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1988 Seaport Plan Forecast

The current Seaport Plan forecast for containerized cargo was prepared by Manalytics, Inc. and WEFA under contract to the San Francisco Metropolitan Transportation Commission.

At the time, containerization of eligible marine cargo was not complete, so Manalytics concentrated on "containerizable" cargo that may or may not be handled in containers at the time, but whose characteristics were suitable for containerization. The Manalytics/WEFA database used included a measure of "containerizability" in percent, under the assumption that some shipments would never be containerized. The forecast encompassed both the increase in cargo volume and the increase in the share containerized, so the relative share of containerized and breakbulk cargo shifted over the forecast period.

There were actually two forecasts for containerizable cargo, one in metric tons and one in twenty-foot equivalent units (TEU). The current Seaport Plan uses the metric tonnage forecast, in keeping with metric tonnage forecasts for break bulk, neo-bulk, dry bulk, and liquid bulk cargoes. That forecast is shown in the first line of Exhibit 10. Exhibit 10 also shows the TEU forecast, which was not used in the current Seaport Plan. The two forecasts have the same growth rate, as one was derived from the other.

Exhibit 10: Seaport Plan Forecasts and Actual TEU Volumes

Measure	Containerized Cargo (000)									CAGR
	2000	2001	2002	2003	2004	2005	2006	2007	2008	00-08
Loaded Containers										
Seaport Plan Metric Ton Forecast (000)	14,334	15,049	15,799	16,587	17,414	18,282	19,010	19,766	20,553	4.6%
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Oakland	1,777	1,644	1,708	1,923	2,048	2,274	2,392	2,388	2,234	2.9%
San Francisco	50	35	24	21	32	-	-	-	-	na
Richmond	-	-	-	-	-	-	-	-	-	na

Source: Manalytics/WEFA 1988, AAPA, Port of Oakland

SF Bay Area containerizable cargoes were expected to grow substantially. The 1988 report effectively forecast two trends: the increase in trade by commodity and the increase in containerization of those commodities. As of 1987, Manalytics estimated that just 52.3% of the containerizable cargo was actually containerized. Growth in container cargo was thus a product both of trade growth and increasing containerization. The 1988 report also presented a separate forecast for domestic trades.

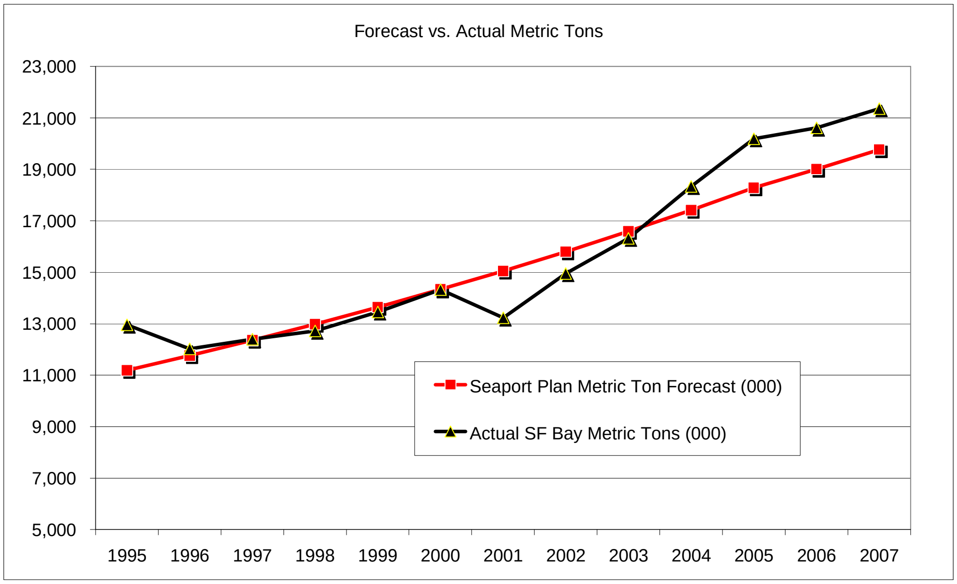
Since 2000, containerized cargoes have not grown as rapidly as expected in the 1988 forecast. Against a forecast compound annual growth rate of 4.6% for both metric tons and loaded TEU, the Bay Area actuals grew at 2.9%.

The 1988 forecast was based on the joint Manalytics/WEFA Multi-Client Bilateral Forecasting Service. WEFA (originally Wharton Economic Forecasting Associates) was at that time one of two major economic and trade forecasting firms, and is a predecessor firm to IHS Global Insight. The containerizability (in percent) and density (in metric tons per TEU) of each commodity was determined using proprietary Manalytics/WEFA software. The *forecast* conversion of metric tons to TEU thus varied by commodity, ranging from about 8-10 metric tons per TEU. The overall average was 9.8 to 9.95 metric tons per TEU. As explained in a later section, the capacity analysis used a different conversion method.

Neither forecast included empty containers. By definition, a forecast of trade in metric tons does not include empty containers. The Manalytics report did not explicitly forecast empty container movements. At the time of the 1988 Manalytics report, state-of-the-art trade forecasts did not yet include empty container movements because empty containers are not “trade”. On the West Coast, the first empty container forecasts the current study team could locate were the 1998 San Pedro Bay Long-term Cargo Forecast and the 1999 Marine Cargo Forecast for the Washington Public Ports Association both a decade after the Manalytics/WEFA report.

Exhibit 11 compares the forecast and actual metric tons of container cargo at SF Bay ports. The forecast was very close in 1996-2000, but has since diverged both higher and lower than forecast. By 2007, the actuals were significantly above the forecast. Data are provided in Exhibit 12.

Exhibit 11: Metric Tonnage Comparison



Source: BCDC, Manalytics/WEFA Report Table 26

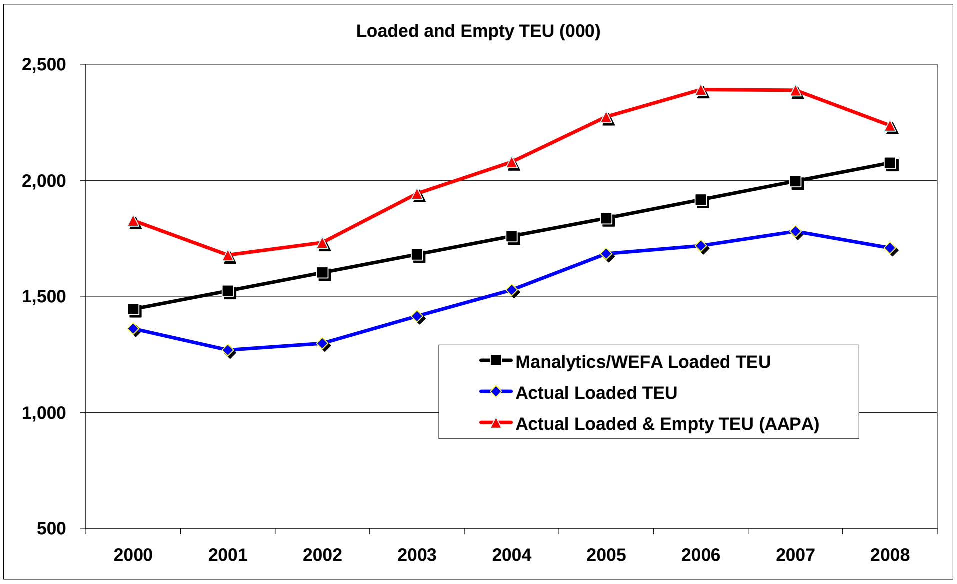
Exhibit 12: Metric Ton Comparison Data

Measure	1995	1996	1997	1998	1999	2000	2001
Seaport Plan Metric Ton Forecast (000)	11,191	11,759	12,356	12,983	13,642	14,334	15,049
Actual SF Bay Metric Tons (000)	12,959	12,020	12,390	12,715	13,459	14,319	13,229
Measure	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	
Seaport Plan Metric Ton Forecast (000)	15,799	16,587	17,414	18,282	19,010	19,766	
Actual SF Bay Metric Tons (000)	14,953	16,323	18,339	20,194	20,613	21,360	

Exhibit 13 compares the 1988 TEU forecast with actual loaded TEU and total (loaded plus empty) TEU. The Manalytics WEFA forecast is actually *higher* than the actual loaded TEU and *lower* than the combined loaded and empty TEU. That the actual metric tons were above forecast and the loaded TEU count lower implies that the average container load in metric tons per TEU has risen compared to the Manalytics/WEFA averages.

The forecast loads were very close to the actual loads in 2000, and again in 2005. The recession years of 2001-2002 brought the combined actual close to the forecast loads, and the current (2007-2009) recession has brought the total close to the forecast loads again.

Exhibit 13: Forecast and Actual Bay Area TEU (000)



Source: Manalytics/WEFA 1988, AAPA

There was essentially no growth in Bay Area containerized trade in 2007, nor in US containerized trade as whole. Containerized trade declined markedly in 2008 and continues to decline in 2009, leading to a sharp divergence between actuals and previous forecasts.

The need for a revised forecast is therefore two-fold:

- To provide a TEU forecast of both loaded and empty container movements against which to measure capacity; and
- To create a better match between forecast and actual cargo volumes.

TEU are the worldwide standard units for comparing port capacity and volume. Given that multiple factors affect the average metric tons per container and that TEU are the most useful units for measuring port throughput and capacity, the balance of this report uses TEU exclusively.

Containerized Cargo History

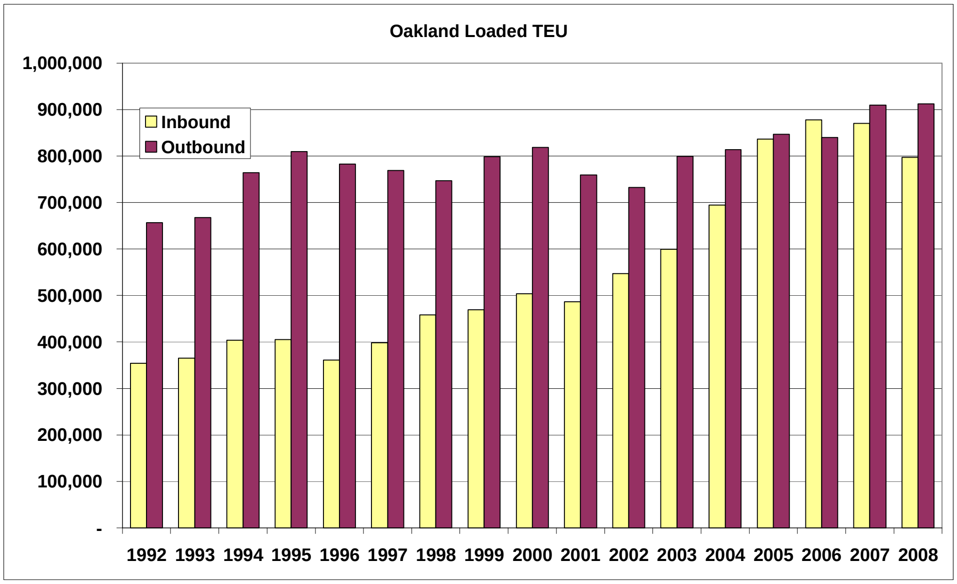
Exhibit 14 summarizes the containerized cargo history for the SF Bay Area from 1990 through 2008. Oakland is presently the only port handling containerized cargo. Richmond ceased handling containers in 1997, and San Francisco stopped in 2004. The total TEU count grew by 76.8% over the eighteen years shown, a compound average annual growth rate (CAGR) of 3.2%.

Exhibit 14: SF Bay Container Cargo in 000 TEU

Port	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Oakland	1,124	1,291	1,491	1,498	1,575	1,777	1,708	2,043	2,390	2,234
San Francisco	140	152	66	6	18	50	24	32	0	0
Richmond	0	0	2	14	0	0	0	0	0	0
SF Bay Total	**1,264**	**1,443**	**1,560**	**1,518**	**1,594**	**1,827**	**1,732**	**2,075**	**2,390**	**2,234**

Exhibit 15 shows the inbound and outbound loaded Port of Oakland container flows, in TEU, from 1992 through 2008.

Exhibit 15: Port of Oakland Loaded TEU History



Source: Port of Oakland

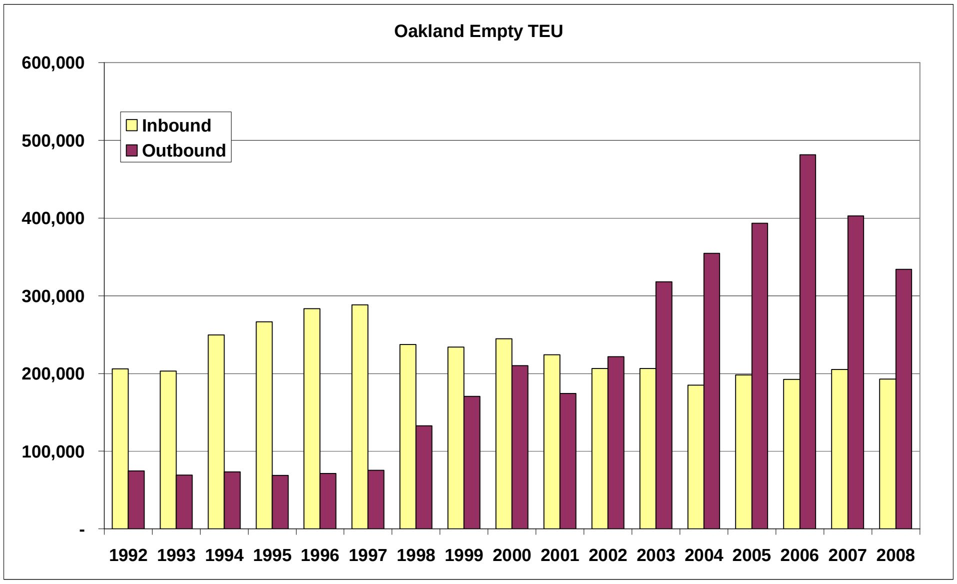
The export side shows relatively slow, uneven growth at a compound rate of 2.1% for the whole 16-year period. US export growth in general has been suppressed by the relatively strong dollar and the difficulty US producers have had competing in foreign markets. Oakland has long been considered an export port, uncommon in the US container port industry where the overall balance favors imports. Oakland's heavy export volume has been due to the high volume of exports originating in Northern and Central California, and to vessel rotations that typically featured Oakland as the last outbound port on the West Coast.

The inbound history is much different, and shows a stronger upward trend. The 16-year average growth rate is 5.2%, but between 1996 and 2006 Oakland's inbound business was growing at a compound average rate of 9.3%. This rapid growth is in keeping with the rapid growth of US containerized trade in general, and with expansion of warehousing and distribution centers in Northern California, Reno/Sparks (Nevada), and the Central Valley. As Exhibit 15 shows, Oakland's loaded container business was nearly balanced in 2005, a rarity among US ports.

The near parity between inbound (import) and outbound (export) loaded container flows distinguishes Oakland from other West Coast ports. The San Pedro Bay ports of Los Angeles and Long Beach, in contrast, have much heavier inbound imbalances with almost half of the outbound container being empty. The larger share of exports also makes Oakland more dependent on the ability of US producers to compete in foreign markets, and on the value of the dollar. Oakland also has a much larger share of local cargo versus intermodal cargo.

The movement of empty containers, shown in Exhibit 16, is much more variable, and harder to predict. The 1988 forecast did not include a separate empty container forecast.

Exhibit 16: Port of Oakland Empty TEU History



Source: Port of Oakland

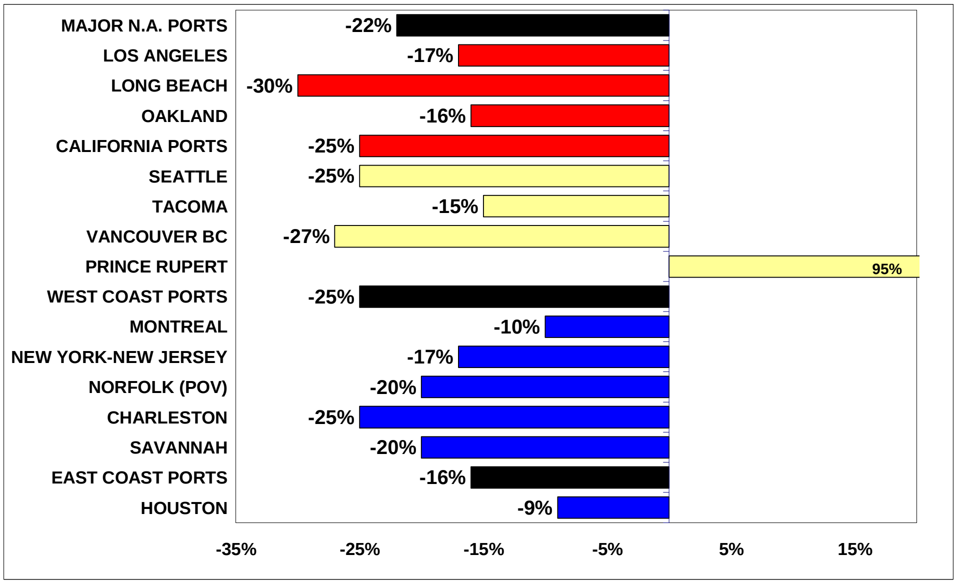
Oakland has been an exception among West Coast Ports in having a strong *inbound* flow of empty containers. This inbound flow has been driven by the need for empty containers for export loads, and specifically by the need for empty refrigerated containers that are not commonly used for imports. As Exhibit 16 shows, the flow of inbound empties has declined somewhat as the flow of import loads has risen, because some of those import containers can be emptied and reused for exports. For logistical and institutional reasons, however, only a minority of the import containers are actually reused for exports, so most of the import containers are returned empty to Asia. The flow of outbound empties has therefore risen strongly.

Short-term Outlook

Because no other SF Bay port will be handling containers for the immediate future, an SF Bay container forecast is essentially an Oakland forecast. Oakland's 2009 volume is likely to be 1.9 to 2.0 million TEU, about the same level as in 2003-2004. In effect, containerized trade growth has been set back 6-7 years.

As shown in Exhibit 17, containerized trade at major North American ports fell by 22% in the first quarter of 2009 compared to the same period in 2008. Oakland's trade fell 16%, a better than average performance.

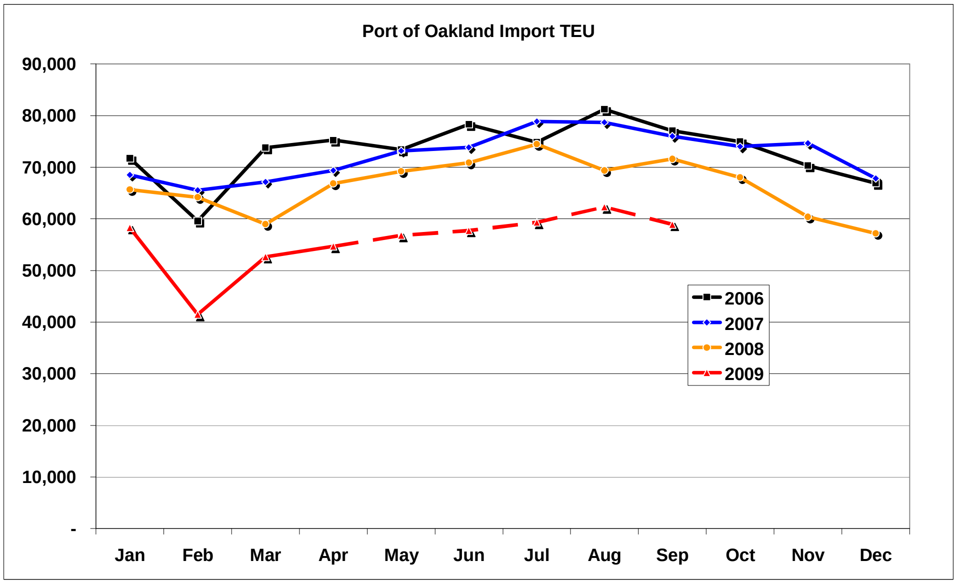
Exhibit 17: First Quarter 2009 Container Trade Shifts



Source: AAPA data, Tioga analysis

Exhibit 18 shows the near-term outlook for loaded movements through the port, which drive the overall total.

Exhibit 18: Port of Oakland Loaded Container Cargo



Source: IHS Global Insight PortTracker

A further divergence from previous forecasts is on the horizon. The US is currently in a severe recession, the worst since World War II. US and world-wide economic downturns have bitten deeply into containerized trade. The recession and international container trade are expected to hit bottom in late 2009, with modest growth resuming in 2010. This forecast is consistent with current thinking in the container industry.

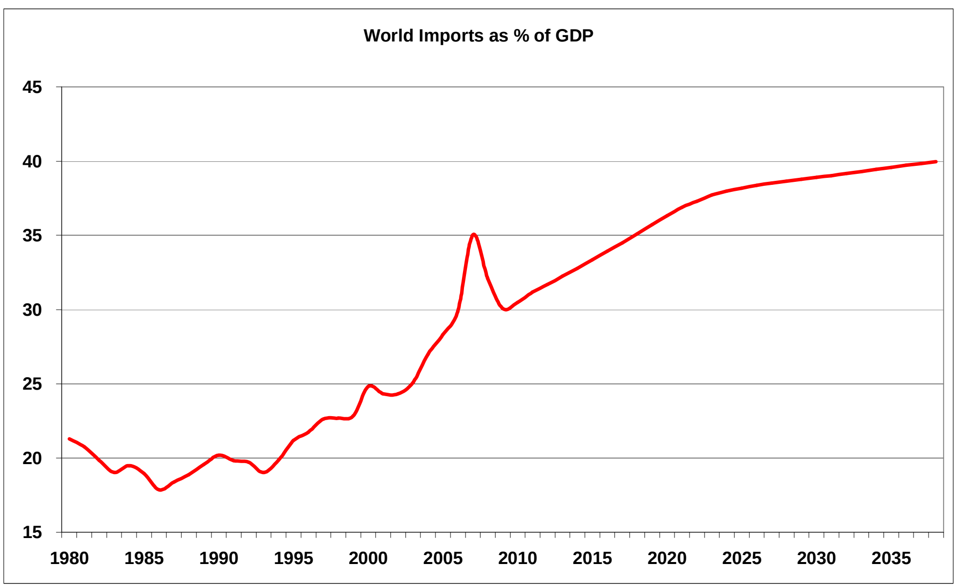
Recovery is expected to be slow, probably without the sharp rebound that has characterized some previous recessions. Most previous recessions have had specific root causes (e.g. the dot com bust, or the 9/11 terrorist attacks), and ended when those issues were resolved. In those cases pent-up demand resulted in rapid short-term growth, and a quick return to trend. The current recession has multiple causes, and has been greatly exacerbated by the inability of the financial industry to provide needed liquidity to facilitate trade. These multiple causes will be resolved slowly over time, and not necessarily on the same timetable. The housing industry, for example, will take years to work off the inventory of unsold property. The auto industry will likewise take years to reorganize and recover.

The timing and strength of the trade recovery will depend on rising consumer confidence, the willingness of importers to replenish dwindling inventory, and the ability of the financial industry to support growing trade. These factors depend in turn on the success of government stimulus efforts here and abroad, and on the success of unprecedented government intervention in key business sectors. The results of those efforts are outside the ability of econometric models to predict, and are subject to significant uncertainty.

Long-Term Outlook

World trade is still expected to grow over the long term, as shown in Exhibit 19. As noted above a drop is expected in 2009 due to lower demand and prices. A long-term trend towards increased trade will return with recovery next year.

Exhibit 19: Long-Term Trade Growth



Source: IHS Global Insight

Future trade growth in containerized merchandise and consumer goods, however, is expected be slower than before the recession for a number of reasons.

- The expanded role of governments as they cope with the recession and crises in the financial and manufacturing sectors will increase annual deficits and restrain the expansion of trade and consumer spending.

- Lower values of homes, stock portfolios, and other assets will reduce wealth and disposable income, leading to reduced spending on imports.

- A rising savings rate in the US and a lower propensity to spend will likewise reduce demand for imports.

- Higher fuel prices, faster inflation, higher food prices, and higher unemployment will also dampen trade growth.

The result is that forecasts of containerized trade growth are starting from a lower point due to the recession, and anticipating slower post-recovery growth.

Regional Outlook

The analysis below draws on recent work by Beacon Economics, the State of California Budget Office, the State Business, Transportation and Housing Agency, various University forecasts, the Wells Fargo economics department, the LAEDC Economic Forecast, and the Federal Reserve Bank of San Francisco, as well as on Tioga staff knowledge.

Near-Term

The region most relevant to this forecast includes not only the San Francisco Bay Area, but Northern and inland Central California. Although related, each of these regions has its own major trends that create differences in outlooks.

The convergence of falling real estate prices, financial market turmoil, and higher fuel prices had the same effects in Northern and Central California as those experienced nationally. The overall trend for 2009 calls for a continued drop, with any significant recovery unlikely before 2010. The drop in housing prices, which began in the inland and northern areas and has been spreading south and west, will continue in 2009. This will cause not only increased foreclosures, but decreased consumer spending.

The recession should follow the more traditional path, rather than the relatively unique problems and responses the region experienced in the 2001 downturn. In general, this forecast anticipates the following trends:

- The Bay Area is less likely to lose as much as the Central Valley or the California economy generally. The area has a highly-educated and skilled work force, and its fundamental economy remains sound.

- The largest impact of the downturn will fall on the inland and northern areas, because they will feel the greatest effects from the housing downturn. The decline in housing prices will nonetheless cause a decrease in economic activity throughout the region, because it will lessen consumer spending, which is important everywhere within the region.

- The central and southern San Joaquin Valley will experience greater economic difficulty than the rest of the region because of the long-term water issues. This will adversely affect the production of the specialty crops normally exported from there.

- This downturn will show greater effects in unemployment and loss of household income than the 2001 downturn, because the ability to work multiple jobs will be less available, and the job losses will be spread more widely across almost all economic sectors.

- The overall decline in housing prices will actually help the Bay Area economy in the long run, by resolving what has been historically a significant barrier to growth.

As mentioned earlier, this recession is, in many ways, a classic correction, particularly of housing prices but also of certain financial market excesses. As these areas fall to more sustainable levels, the long-term growth trend will resume.

Likely Recovery

The decline in housing prices is likely to continue throughout 2009. Many homeowners took out loans in the last few years whose adjustment or refinance dates have yet to occur. As these come up for adjustment or renewal, additional homeowners will face foreclosure or distress sales. Prices are unlikely to rise until the bulk of these loans have passed their review or renewal dates. This will most likely occur somewhere in the first half of 2010. This would place the bottom of the trough sometime around that period.

The overall employment and output for 2010 will likely represent the low point, on an annual basis, for the regional economy. 2011, however, should show an improvement in overall employment not only over 2010, but over 2009 as well.

Unfortunately, the improvement will likely be slower for manufacturing and agricultural production and employment. While inventories remain relatively low for a recession, the overall drop in demand has been so sharp that 2011, while likely to exceed 2010 production levels, probably will not be as high as those of 2009.

Statewide, overall farm production should rise in 2010, assuming a normal water year, but the water constraints mentioned below will make the recovery in the San Joaquin Valley less robust than it otherwise would be. The sharp decline in farm output there in 2009 came about from supply problems, not just demand reduction. A recovery in personal discretionary incomes, and consequent demand for San Joaquin Valley specialty crops, should increase employment and output in both 2010 and 2011, but the overall output is unlikely to reach the 2007 peak levels for some time, if at all.

Thus, the regional scenario is largely the same as that which underlies the containerized shipping forecast. The economy is contracting, but the fundamental strength of the region and the underlying demand for the goods and services it produces should lead to a resumption of growth by the middle of 2010, and a return to the long-term growth trend thereafter.

Long-Term Prospects

The long-term prospects for the San Francisco Bay Area remain positive, particularly if the current recession helps to make housing more affordable. The advantages in location and work force that make the area thrive in the past remain, so that part of the regional economy should also return to substantial growth.

Combining these projections leads to anticipated growth in total real income averaging about five percent per annum over the next twenty years for the region as a whole. This will lead to greater demand for imported goods and, once the current financial and real estate markets resolve, steady growth in that demand.

In addition to all of the other factors affecting the regional economy, the San Joaquin Valley faces a serious water shortage that cannot be resolved in the short run. Increased water demands from urban users, and increased flows to save fisheries required by several recent lawsuits left farmers with a significantly smaller supply. Except in the most extraordinarily wet years, surface irrigation water will not be available to farmers in the amounts previously used.

Increased use of subsurface water remains problematic. Not only has past use deepened the water table substantially, increased fuel costs and environmental concerns about "mining" subsurface water have further increased the cost of pumping water. Lack of water will remain a major impediment to farm production and, consequently, exports from the San Joaquin Valley during this forecast period may not grow as quickly as in the recent past.

Although water will limit future agricultural production increases, it will not prevent the continuing expansion of urban areas in the northern San Joaquin Valley and the southern Sacramento Valley and the surrounding foothills. The continued population growth alone should be sufficient to return this area to an upward trend, which should be quite vigorous over the next twenty years.

Container Trade Forecast

Forecasting Loads

The movement of containers though Oakland and the SF Bay Area depends on the demand for the import and export goods within. That demand is driven by short-term and long-term economic conditions in the Bay Area, in the Northern and Central California regions served by the ports, in the US as a whole, and in trading partner nations.

The forecast derived in this study is based on world and US trade forecasts developed by IHS Global Insight (IHSGI) as part of their World Trade Service. IHSGI is the successor firm to WEFA, who supported the 1998 seaport plan forecast, and is now the best known and most widely used trade forecasting firm. IHS Global Insight provided container trade forecasts for the US as of March 2009, broken down into coastal and sub-coastal regions. The econometric trade forecast does not project individual port volumes, since the cargo flow through a given port is a product of competition with other ports and customer/carrier preferences as well as overall trade conditions and regional demand. The outcomes of port competition and the preferences of carriers and customers are not predictable through econometric modeling. Thus, the forecast applies to the regional market.

The relevant IHS Global Insight forecast region for SF Bay is the South Pacific. The South Pacific region includes Hawaii and Guam, as well as all the California ports. The applicability of the IHS Global Insight South Pacific growth rates to SF Bay/Oakland container cargo depends on the stability of Oakland's share within the region (Exhibit 20). Oakland's share within this region declined between 1995 and 2000 with the growth of double-stack intermodal service through San Pedro Bay, but has been relatively stable since then. Overall, Oakland's trade has grown a bit more slowly than at other South Pacific ports.

Exhibit 20: Oakland versus South Pacific TEU and Share

	TEU (000)						CAGRs		
	1995	2000	2005	2006	2007	2008	95-00	00-06	06-08
LALB	5,399	9,480	14,194	15,759	15,668	14,200	9.8%	8.8%	-5.1%
Oakland	1,550	1,777	2,273	2,390	2,388	2,234	2.3%	5.1%	-3.3%
Other California	46	67	131	135	129	122	6.6%	12.4%	-4.7%
Hawaii & Guam	1,175	740	1,572	1,631	1,668	1,666	-7.4%	14.1%	1.1%
South Pacific	**8,169**	**12,064**	**18,170**	**19,915**	**19,853**	**18,221**	**6.7%**	**8.7%**	**-4.3%**
Oakland Share	**66.1%**	**78.6%**	**78.1%**	**79.1%**	**78.9%**	**77.9%**			

Source: American Association of Port Authorities (AAPA)

Oakland's main competition within the South Pacific is Los Angeles and Long Beach. Most of the containerized cargo at San Diego and Port Hueneme is specialized refrigerated trade, principally imported fruits and vegetables.

Exhibit 21: SF Bay and Southern California – 000 TEU 1990-2008

	1990	1995	2000	2005	2006	2007	2008
SF Bay	**1,264**	**1,588**	**1,827**	**2,273**	**2,390**	**2,388**	**2,234**
Oakland	1,124	1,550	1,777	2,273	2,390	2,388	2,234
Richmond	-	5	-	-	-	-	-
San Francisco	140	33	50	-	-	-	-
Southern California	**3,721**	**5,407**	**9,497**	**14,325**	**15,894**	**15,797**	**14,322**
Long Beach	1,598	2,844	4,601	6,710	7,289	7,312	6,350
Los Angeles	2,116	2,555	4,879	7,485	8,470	8,355	7,850
Hueneme	-	-	17	29	32	36	32
San Diego	6	8	-	102	103	94	90

Source: American Association of Port Authorities (AAPA)

Exhibit 22 compares Oakland with the LALB total for each of the three containerized cargo segments.

- Oakland's inbound loads (imports plus inbound domestic) actually grew faster than at the San Pedro Bay ports, although from a relatively small base.
- Oakland's outbound loads (exports plus outbound domestic) have been fairly flat, growing at a compound rate of less than 1% from 2000 through 2006.
- Oakland's empties (including both inbound and outbound) have grown more slowly than at the San Pedro Bay ports.

In the aggregate, Oakland has not grown as fast as its competitors to the south, but is gaining ground in the critical import segment.

Exhibit 22: Oakland vs. LALB by Segment

	TEU (000)						CAGRs	
	1995	**2000**	**2005**	**2006**	**2007**	**2008**	**00-06**	**06-08**
Inbound Loads								
LALB	2,605	4,949	7,146	8,128	8,115	7,328	8.6%	-5.0%
Oakland	**405**	**504**	**836**	**878**	**870**	**796**	**9.7%**	**-4.7%**
Share	13.5%	9.2%	10.5%	9.7%	9.7%	9.8%		
Subtotal	3,010	5,453	7,983	9,006	8,985	8,124	8.7%	-5.0%
Outbound Loads								
LALB	1,861	2,029	2,338	2,714	3,182	3,470	5.0%	13.1%
Oakland	**810**	**819**	**847**	**840**	**910**	**911**	**0.4%**	**4.1%**
Share	30.3%	28.7%	26.6%	23.6%	22.2%	20.8%		
Subtotal	2,670	2,848	3,184	3,555	4,092	4,380	3.8%	11.0%
Empties								
LALB	933	2,502	4,499	4,918	4,371	3,540	11.9%	-15.2%
Oakland	335	455	591	674	608	527	6.8%	-11.6%
Share	26.4%	15.4%	11.6%	12.1%	12.2%	13.0%		
Subtotal	1,268	2,957	5,090	5,592	4,979	4,067	11.2%	-14.7%
Totals								
LALB	5,399	9,480	13,983	15,760	15,668	14,338	8.8%	-4.6%
Oakland	**1,550**	**1,777**	**2,274**	**2,392**	**2,388**	**2,234**	**5.1%**	**-3.4%**
Share	22.3%	15.8%	14.0%	13.2%	13.2%	13.5%		
Total	6,949	11,257	16,257	18,152	18,055	16,572	8.3%	-4.5%

Source: American Association of Port Authorities (AAPA)

For the Port of Oakland to maintain its overall share of the South Pacific region it will have to grow faster than it has relative to other ports. This faster growth and growth of market share is consistent with recent LALB cargo forecasts and the current thinking of industry participants. The LALB long-term cargo forecast completed in December 2007 and released in March 2008 anticipates limited but significant diversion of intermodal imports to Oakland and the Pacific Northwest ports. That expectation was based in part on expected congestion at San Pedro Bay that has not materialized due to the recession, but is still consistent with observed trends (see Exhibit 17). Moreover, numerous carrier and importer representatives have publicly expressed concern over rising costs at Los Angeles and Long Beach and the complexity of continuing to do business there, coupled with an intention to establish additional import routing through other West Coast ports.

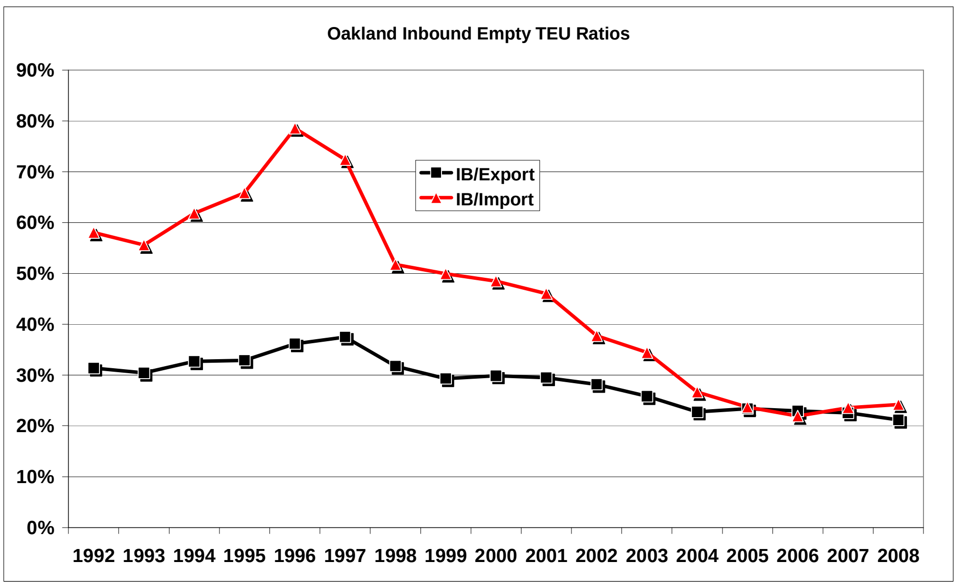
These observations imply that the use of South Pacific region growth rates for SF Bay Area cargo would be slightly optimistic, an appropriate approach for determining the required capacity.

Forecasting Empties

Forecasting the future flow of empty containers is less certain than forecasting loads. The flow of empties is a function of the loaded movement, the deployment of vessels and their capacities, and ocean carrier container logistics strategies. To develop a workable relationship between the movement of loads and the movement of empties, Tioga examined the ratios between inbound and outbound empties and inbound and outbound loads.

Exhibit 23 shows the shifting ratios of inbound empties to outbound (export) loads and to inbound (import) loads. Both ratios have declined markedly in the last decade, and the apparent downward trend, if followed, would have inbound empties disappearing within the forecast horizon – an unlikely result. Both ratios are currently averaging about 24%, but the volatility of the relationship suggests that such stability may not endure.

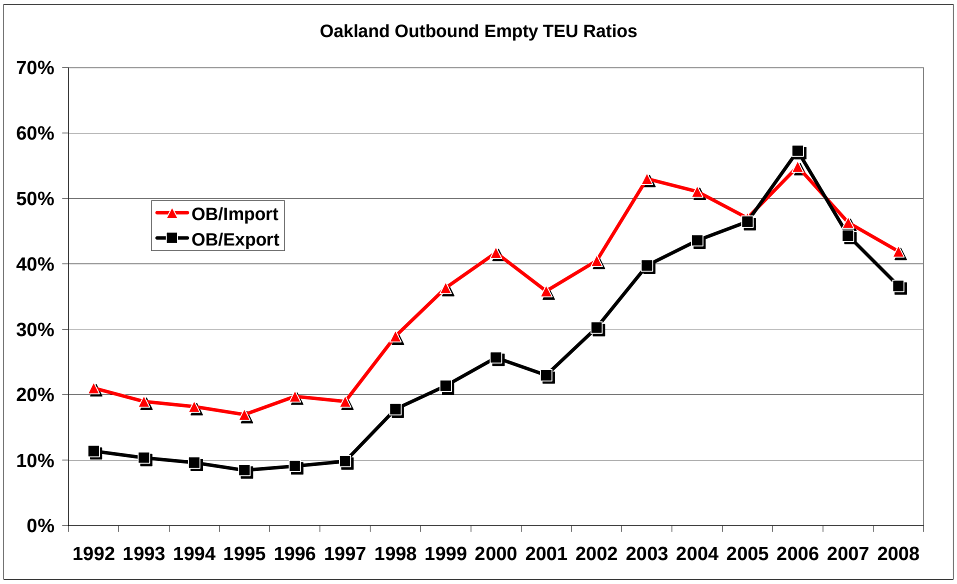
Exhibit 23: Oakland Inbound Empty Container Ratios



Source: Port of Oakland

Exhibit 24 shows the comparable ratios for the outbound empties, and an almost completely opposite pattern of change. Fairly stable in the last decade, the ratios have risen and fallen since. A trend line based on these ratios would predict continued increase, which seems unlikely given the most recent downturn in both ratios.

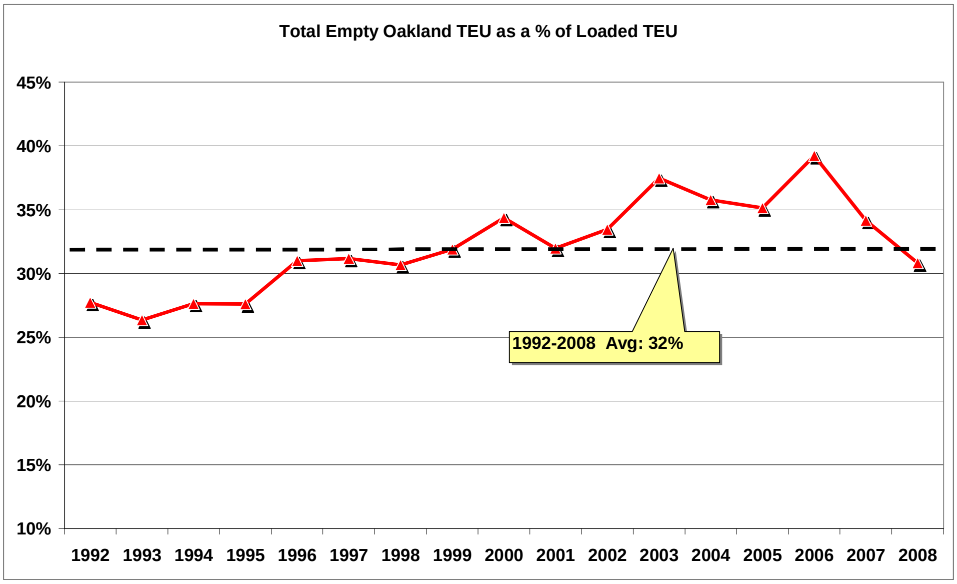
Exhibit 24: Oakland Outbound Empty Container Ratios



Source: Port of Oakland

Given the offsetting behavior of inbound and outbound empty flows, Tioga examined the overall ratio of empties to loads, as shown in Exhibit 25. Although the ratio has changed over time, it is more stable and exhibits a narrower range of variation than the separate inbound and outbound ratios. Between 1992 and 2008, empties averaged 32% of the loaded volume.

Exhibit 25: Overall Oakland Empty to Load Ratio

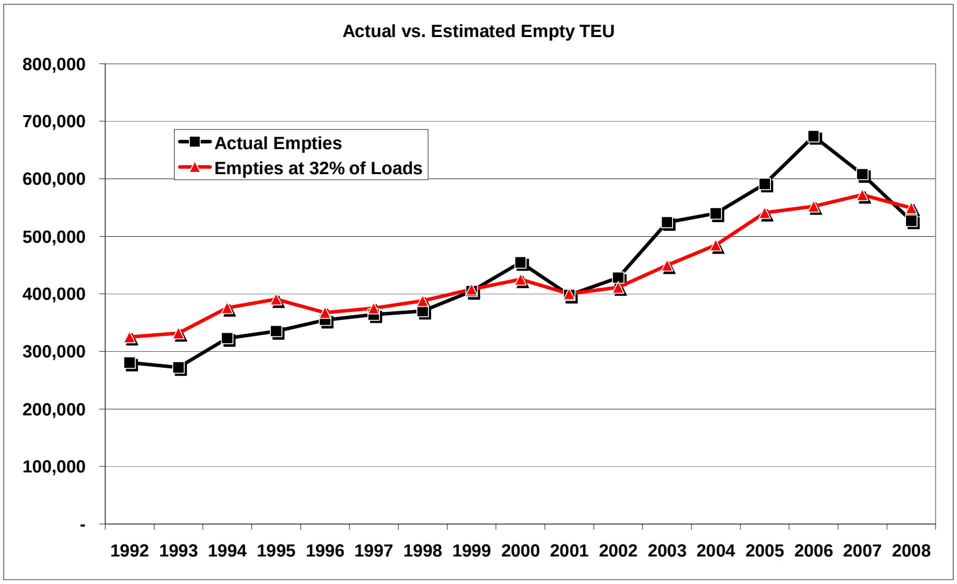


Source: Port of Oakland

Exhibit 26 compares the actual empty TEU counts with estimates based on 32% of the loaded count. This relationship appears to capture the offsetting nature of inbound and outbound empty flows while reflecting the overall increase, and was therefore used for the forecast.

Mathematically, at 32% of the loaded import and export total, empties will account for 24% of total growth.

Exhibit 26: Actual Versus Estimated Empty TEU at 32% of Loads



Source: Port of Oakland

SF Bay/Oakland Container Forecast

Exhibit 27 displays a SF Bay Area/ Port of Oakland forecast using the March 2009 South Pacific Region forecast from IHS Global Insight. That forecast goes to 2028, and was extended to 2030 using the 2027-2028 growth rates. The empties are forecast at 32% of the loaded flow

The striking feature of the data and forecast in Exhibit 27 is the "lost" years of the recession: 2009 volume is expected to be roughly the same as in 2003. The peak volume of 2006 is not expected to be reached again until after 2012. In effect, Oakland (and other U.S. container ports) will have lost five to six years of growth.

Exhibit 27: SF Bay/Port of Oakland Container Forecast - TEU

Segment	Actuals				Forecast*					
	2005	2006	2007	2008	2009	2010	2015	2020	2025	2030
TEU										
Import Loads	836,258	877,649	870,284	796,906	690,434	734,814	998,502	1,315,307	1,693,734	2,153,006
Export Loads	846,579	840,127	909,633	912,480	792,130	828,820	1,067,365	1,284,066	1,487,266	1,690,517
Empties	591,153	673,822	607,994	526,858	474,420	500,363	661,077	831,799	1,017,920	1,229,928
Total TEU	**2,273,990**	**2,391,598**	**2,387,911**	**2,236,244**	**1,956,984**	**2,063,996**	**2,726,944**	**3,431,172**	**4,198,920**	**5,073,451**

* 2029 and 2030 at 2027-2028 growth rate

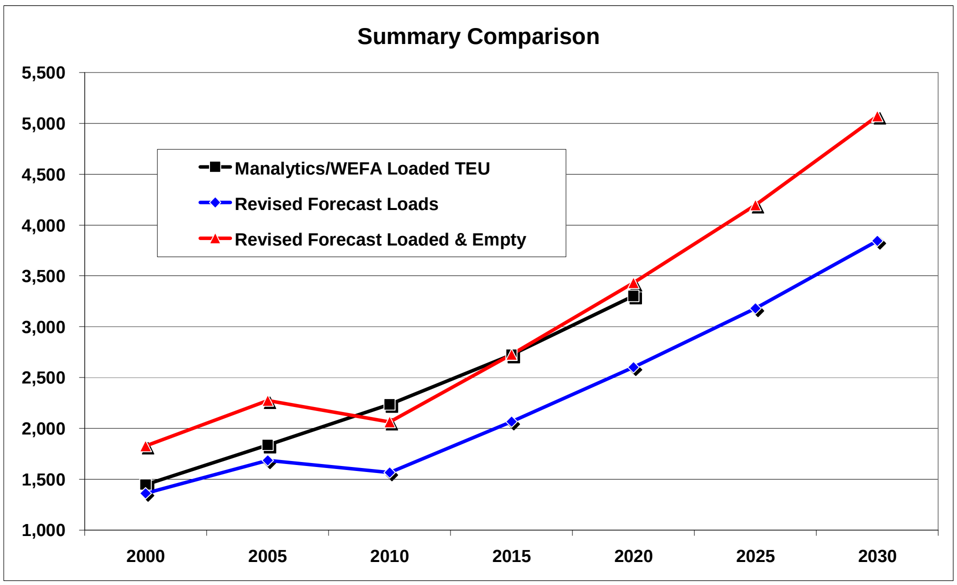
Exhibit 28 compares the Manalytics/WEFA TEU forecast from Exhibit 10 with the Revised Forecast. The Revised Forecast is higher than the Manalytics/WEFA TEU forecast due to the inclusion of empties. As Exhibit 28 shows, however, the revised forecast for loaded TEU – which is the containerized cargo itself – is lower than the 1988 forecast due to slower growth to date and the impact of the current recession.

Exhibit 28: TEU Forecast Comparisons

Measure	Containerized Cargo - 000 TEU 2000	2005	2010	2015	2020	2025	2030	CAGR 00-05	05-10	10-20	20-30
Loaded Containers											
Manalytics/WEFA Loaded TEU Forecast	1,446	1,837	2,236	2,724	3,303			4.9%	4.0%	4.0%	-
Actual Loaded TEU	1,361	1,683						4.3%	na	na	
Revised Forecast Loads	**1,361**	**1,683**	**1,564**	**2,066**	**2,599**	**3,181**	**3,844**	**4.3%**	**-1.5%**	**5.2%**	**4.0%**
Loaded and Empty Containers											
Actual Loaded & Empty TEU (AAPA)	1,827	2,274						4.5%	na	na	
Revised Forecast Loaded & Empty	**1,827**	**2,274**	**2,064**	**2,727**	**3,431**	**4,199**	**5,073**	**4.5%**	**-1.9%**	**5.2%**	**4.0%**

The three forecasts from Exhibit 28 are shown graphically in Exhibit 29. The lines show the impact of the current recession clearly. The revised loaded and empty TEU forecast is coincidentally quite close to the 1988 Manalytics/WEFA forecast for loads only. The revised forecast for loads, which is a more relevant comparison, is well below the Manalytics/WEFA forecast.

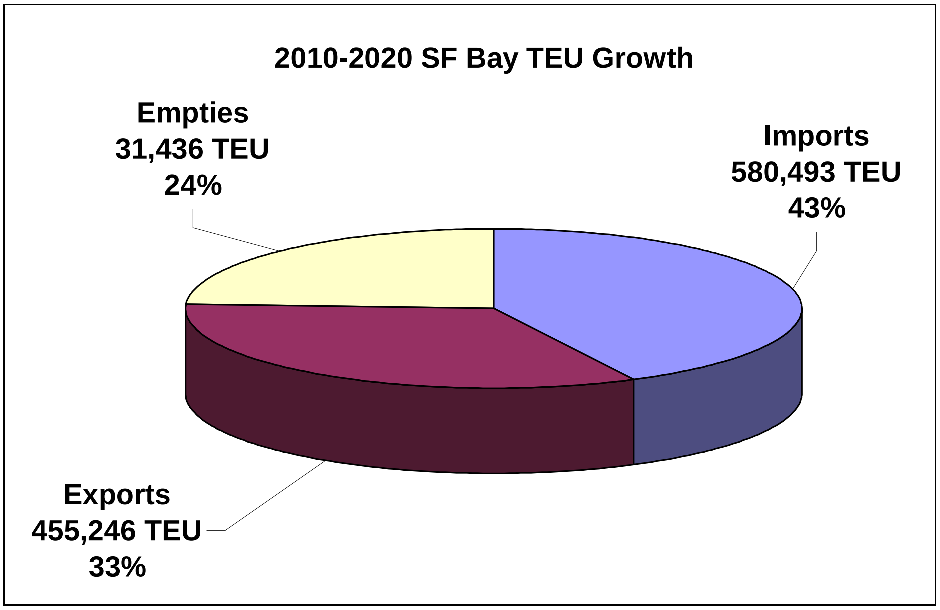
Exhibit 29: Forecast Comparison Chart (000 TEU)



The revised forecast line shows the downturn due to the recession, ending in 2010. The compound average annual growth rate between 2010 and 2020 is 5.2%, somewhat higher than the 4.0% growth rate in the Seaport Plan forecast. As noted above this growth rate is shared by the South Pacific port region and anticipates some shift of market share from the San Pedro Bay ports. For 2020-2030, the revised forecast anticipates almost the same growth rate as in the Seaport Plan forecast between 2010 and 2020. This slightly optimistic approach is appropriate for a forecast used to plan for adequate port capacity. The revised forecast yields the estimates of 3.4 million TEU in 2020, and 5.1 million in 2030.

Exhibit 30 splits the 2010-2020 growth forecast into imports, exports, and empties. The largest part of the growth is expected to be imports, which is consistent with the history shown in Exhibit 15, the Port of Oakland's general expectations, and the emphasis on providing for rail intermodal growth. Exports will account for about a third of the additional volume, and empties will account for 24% as noted above.

Exhibit 30: SF Bay TEU Growth Segments



Source: Exhibit 28, Tioga Analysis

For comparison purposes, Exhibit 31 displays a forecast developed for the Washington Public Ports Association (WPPA) earlier in 2009. The 2005-2010 and 2010-2020 growth rates for the combined international and domestic TEU counts are almost identical to those in Exhibit 28, although the 2020-2030 growth rate is lower.

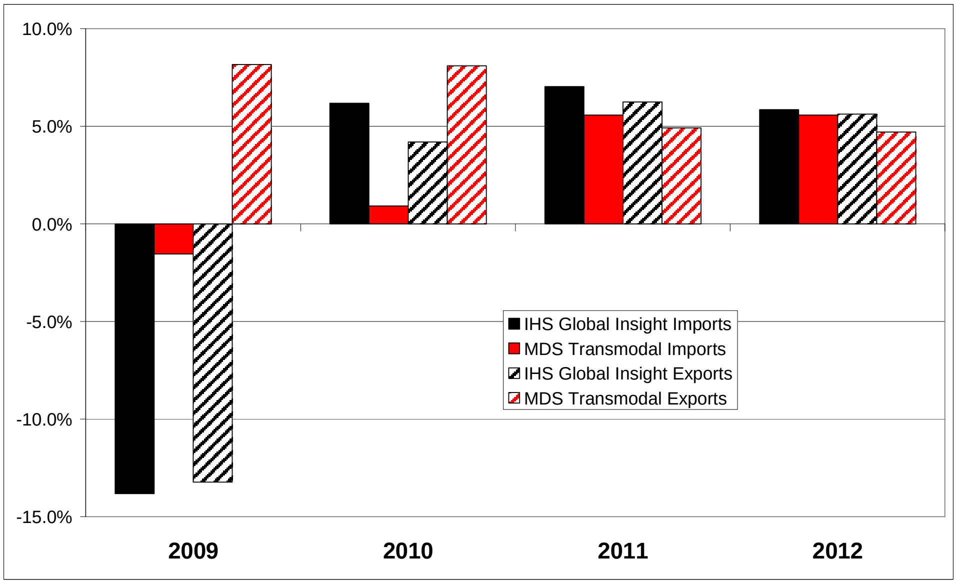
Exhibit 31: WPPA Pacific Northwest Container Forecast

	(000 TEU)						CAGRs		
	2005	**2010**	**2015**	**2020**	**2025**	**2030**	**05-10**	**10-20**	**20-30**
Imports	1,655	1,463	1,984	2,609	3,364	4,281	-2.4%	6.0%	2.4%
Exports	822	1,070	1,233	1,397	1,544	1,682	5.4%	2.7%	0.9%
Empty	820	393	750	1,212	1,820	2,599	-13.7%	11.9%	3.6%
Int'lTotal	**3,297**	**2,926**	**3,967**	**5,218**	**6,728**	**8,562**	**-2.4%**	**6.0%**	**2.4%**
Domestic	857	871	939	1,011	1,089	1,174	0.3%	1.5%	0.8%
Int'l and Dom	**4,154**	**3,797**	**4,906**	**6,229**	**7,817**	**9,736**	**-1.8%**	**5.1%**	**2.2%**

Source: WPPA March 2009 (BST Assoc/IHSGI)

Exhibit 32 compares the IHSGI US trade forecasts for Asia, India, and the Mideast with the MDS Transmodal forecasts for North American trade with the same general regions. The two forecast differ in the very near term, with the MDS Transmodal forecast being more optimistic, perhaps due to the inclusion of Mexico and Canada, whose trades have not been so hard hit by the recession. By 2012, the forecasts look very similar.

Exhibit 32: Asian and Mideast Forecast Comparisons



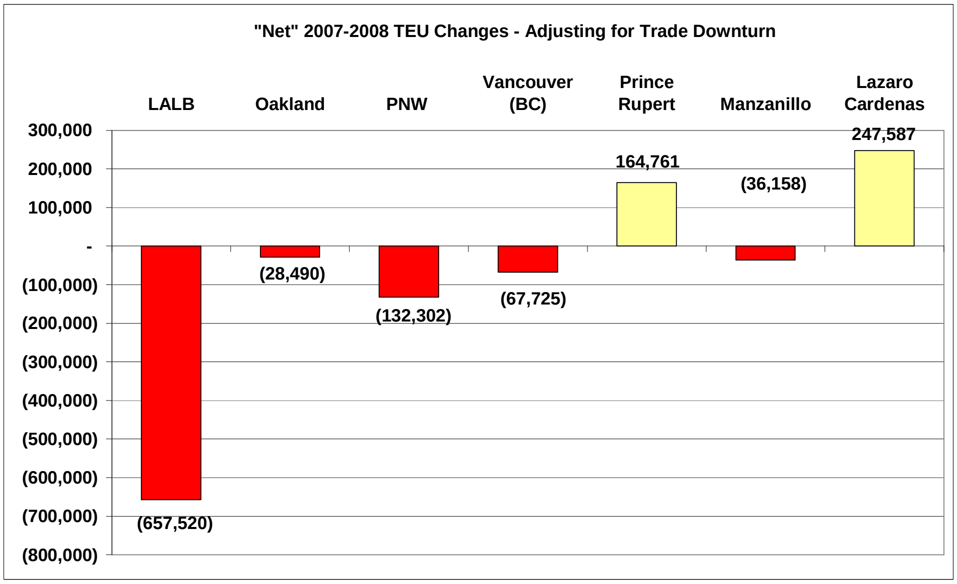
Competitive Factors

The forecast in Exhibit 27 implicitly assumes a relatively stable market share for the Port of Oakland and the SF Bay Area. In recent years, however, the West Coast as a whole has lost market share to East Coast and Gulf ports. There have also been market share shifts within the West Coast ports, as noted in Exhibit 17. Under these circumstances it is reasonable to ask whether the revised forecast in Exhibit 27 is too optimistic.

Competition from Canada and Mexico

The development of the new British Columbian port at Prince Rupert and the expansion of Lazaro Cardenas in Mexico have been heralded in the trade press as major threats to US West Coast ports. As shown in Exhibit 33, Prince Rupert and Lazaro Cardenas did indeed gain business and market share in 2008.

Exhibit 33: 2008 TEU Shifts, Net of Trade Impacts



Source: AAPA Data, Tioga analysis

At present, however, the gains at Prince Rupert appear to have come at the expense of other Pacific Northwest ports. Prince Rupert is new, and in 2008 COSCO, for example, shifted vessel calls away from Puget Sound and up to Prince Rupert.

It would be tempting to conclude that Lazaro Cardenas also pulled a significant share away from U.S. West Coast ports, but that is not the case. The double-stack train that links Lazaro Cardenas to the US can carry a maximum of about 10,000 TEU annually, and it likely carried far less than that in 2008. Lazaro Cardenas's growth was due, instead, to Mexico's own 8.3% trade growth in 2008, and a shift of share from Manzanillo.

In the long run Prince Rupert will compete with Oakland and other West Coast ports for intermodal business to and from the upper Midwest. This competition could result in slightly slower growth rates than those shown in Exhibit 27. Neither Lazaro Cardenas nor other Mexican ports are likely to have a significant impact on SF Bay Area cargo growth since they would be competing primarily with LALB for business to and from the Southwest and Southeast.

After the 2004 port congestion in Southern California, there arose numerous proposals for new or expanded ports in Mexico. The most prominent proposal was for an entirely new port at Punta Colonet, near Ensenada. Punta Colonet would require an entirely new rail line to the East and would compete with the "congested" San Pedro Bay ports for intermodal cargo to the Midwest and point beyond. The Punta Colonet project, however, has encountered serious financial, environmental, and feasibility issues and is currently stalled. Other Mexican port proposals have faded away as the expected Southern California congestion has failed to materialize.

Shifting Import and Export Trading Partners

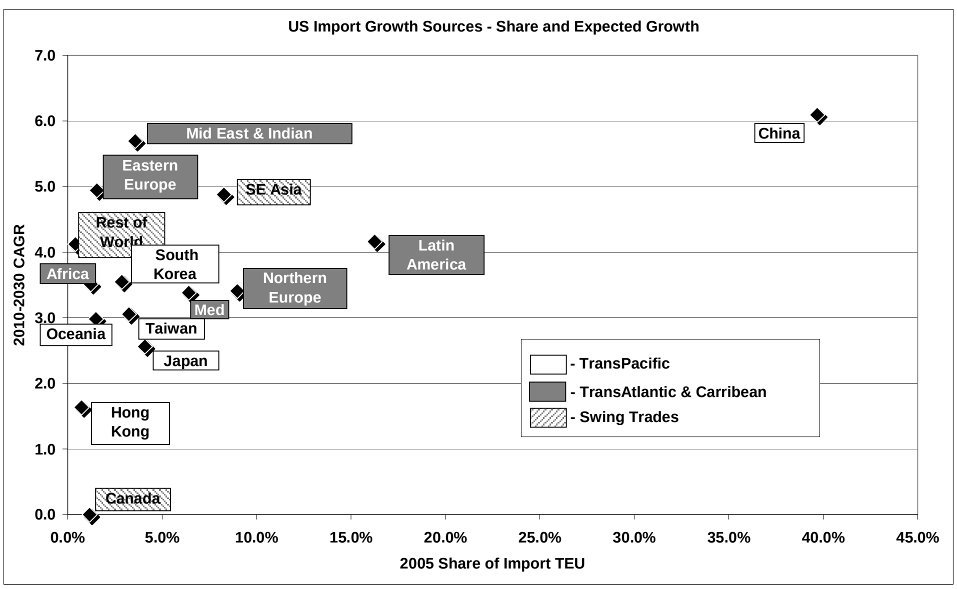
For both imports and exports, the East and Gulf coasts will likely benefit from trade shifts even without diverting Transpacific cargo from the West Coast. These trade shifts are already reflected in the US trade forecasts underlying Exhibit 27.

US sources of imports are shifting. Exhibit 34 plots the 2005 US import trade share against the expected 2010-2020 growth rate. The transpacific trading partners are shown here in green. China is still the most important by a large margin, but the other Asian regions are now less important with smaller shares and less growth potential.

The Transatlantic and Caribbean partners such as Europe and Latin America are shown in orange. They are in the middle ground, with significant trade shares and higher growth potential. Those trading partners favor the East and Gulf Coasts.

The regions shown in yellow, notably South East Asia, are the "swing" trades that can use the Suez Canal as well as the Transpacific. To the extent that the Suez routing gains favor, the East Coast ports could benefit from growing trade with these partners.

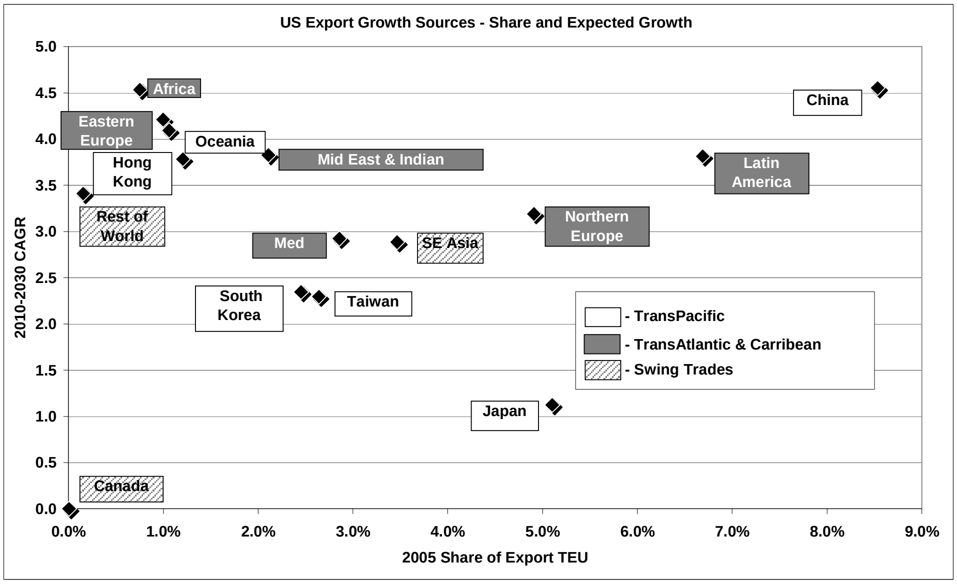
Exhibit 34: Shifting Import Sources



Source: IHSGI Data, Tioga Analysis

The export situation is similar, although China is not so dominant (Exhibit 35). Latin America, Northern Europe, the Mideast, and India are important and growing export destinations, and their trade favors the East and Gulf Coasts. The Asian export customers are still important, although Japan's economy has been stalled and is not expected to grow very fast. Here again South East Asia is the swing trade, and is more important and growing faster than the traditional North Asian partners.

Exhibit 35: Shifting Export Destinations



Source: IHSGI Data, Tioga Analysis

Exhibit 36 shows the result of the disparate growth potentials shown in the charts. The West Coast will gain most of the growth from Asia and from other small trades, but the East Coast will capture the dominant share of the growth from India and the Mideast, Europe and the Mediterranean, Africa, and Latin America. These shares are a fundamental result of population distribution and geography, not of port competition or shipper routing preferences.

Exhibit 36: 2005-2030 Growth Sources and Coastal Shares

Source	TEU			%	
	05-30 Growth	**West Coast**	**East Coast**	**West Coast**	**East Coast**
Imports					
Asia	15,036,178	9,636,976	5,399,202	64%	36%
India & Mideast	1,135,321	13,292	1,122,029	1%	99%
Europe & Med	2,715,417	675,501	2,039,915	25%	75%
Africa	80,068	-716	80,785	-1%	101%
Latin America	2,321,640	89,171	2,232,468	4%	96%
Other	1,294,422	1,101,835	192,588	85%	15%
Subtotal	**22,583,045**	**11,516,059**	**11,066,987**	**51%**	**49%**
Exports					
Asia	5,938,398	4,149,425	1,788,974	70%	30%
India & Mideast	846,827	187,240	659,588	22%	78%
Europe & Med	1,660,679	182,145	1,478,534	11%	89%
Africa	389,435	21,558	367,878	6%	94%
Latin America	2,396,182	109,778	2,286,404	5%	95%
Other	288,981	180,431	108,551	62%	38%
Subtotal	**11,520,503**	**4,830,575**	**6,689,927**	**42%**	**58%**
Total					
Asia	20,974,576	13,786,400	7,188,175	66%	34%
India & Mideast	1,982,148	200,531	1,781,617	10%	90%
Europe & Med	4,376,096	857,646	3,518,450	20%	80%
Africa	469,504	20,842	448,662	4%	96%
Latin America	4,717,821	198,949	4,518,872	4%	96%
Other	1,583,403	1,282,265	301,138	81%	19%
Total	**34,103,548**	**16,346,634**	**17,756,914**	**48%**	**52%**

Source: IHSGI, Tioga Analysis

Exhibit 37 shows the forecast *trade-based* share shifts within the Asian trade. East Coast versus West Coast shares of the China and Hong Kong trades are expected to remain the same over the forecast period. The East Coast will gain share slightly in the Japan, South Korea, and Taiwan trades. The most significant East Coast gain is in the South East Asia trade, one of the “swing” trades where Suez routes might be fully competitive. As a consequence, the East Coast will get 15% of its growth from SE Asia while the West Coast will get only 2% of its growth from that trade.

Exhibit 37: Coastal Shares of Asian Imports

IMPORTS ORIGIN	2005 Share	2030 Share	05-30 Growth TEU	05-30 Growth SHARE
East Coast				
NEAsia - China	97%	98%	4,421	82%
NEAsia - Hong Kong	43%	19%	(6)	0%
NEAsia - Japan	27%	17%	49	1%
NEAsia - South Korea	89%	85%	73	1%
NEAsia - Taiwan	43%	33%	56	1%
SEAsia	72%	80%	807	15%
Total	**77%**	**81%**	**5,399**	**100%**
West Coast				
NEAsia - China	3%	2%	68	6%
NEAsia - Hong Kong	57%	81%	115	10%
NEAsia - Japan	73%	83%	554	50%
NEAsia - South Korea	11%	15%	21	2%
NEAsia - Taiwan	57%	67%	204	18%
SE Asia	28%	20%	143	13%
Total	**23%**	**19%**	**1,106**	**100%**

Source: IHSGI Data, Tioga Analysis

Panama and Suez Canals

Potential growth in ocean trade via the Panama and Suez Canals has received much attention in the trade press, and East Coast ports have announced marketing agreements and other efforts aimed at maximizing their cargo via those routes. The impact on Oakland and the SF Bay Area, however, will likely be minimal.

The Panama Canal expansion program will increase capacity and allow much larger ships with better scale economies. With the exception of Norfolk, however, East Coast ports cannot accommodate the largest vessels without extensive dredging programs. The Port of New York-New Jersey is prevented from handling those "mega ships" due to insufficient clearance under the Bayonne Bridge. The ability of the East Coast ports to benefit from the greater capacity is therefore limited.

The cargo that already moves through the Canal will also grow, and the Canal will need most of that new capacity just to keep up. The Canal Authority's forecast calls for container traffic growth at just 3%, which is not enough to grow existing traffic and also divert a large share from the West Coast. The Canal Authority's goal is to maximize revenue, not maximize share, and cutting rates or postponing increases would jeopardize the bond sale that finances the expansion program.

The Suez Canal is a competitive route from India and parts of Southeast Asia to the US East and Gulf Coasts, but not to the Midwest or other inland points. As the rough transit times in Exhibit 38 show, the Suez Canal is competitive from the East Coast of India at Chennai, but not from Singapore to Chicago for example.

Exhibit 38: TransPacific vs. Suez Transit Times

@ 20 knots	TransPacific		Suez	
	LALB	Chicago	NYNJ	Chicago
Chennai	19 days	23 days	19 days	21 days
Singapore	16 days	19 days	21 days	23 days

Source: Tioga Analysis

Oakland and other West Coast ports will not be significantly affected by increased use of the Suez Canal. They have virtually no trade from India or Pakistan, where the Suez Canal is most advantageous. Almost all such trade is handled on the East or Gulf Coast already, so Oakland and other West Coast ports have little to lose. Economic growth in India has been rapid at times, but very uneven, and there is no sign of India displacing China as the major US trading partner. Growth in Suez routings has recently stalled, due not only to piracy off Somalia but also to higher fuel costs and the need for Mediterranean stops to fill the huge ships.

III. Containerized Cargo Capacity

Background

The effective throughput capacity of a container port is determined by several factors.

- Availability of sufficient berth space.
- Availability of sufficient water depth for large container ships.
- Throughput capability of the container cranes.
- Storage and handling capabilities of the marine terminal container yards.
- Capacity of rail intermodal terminals and mainline routes serving the port.
- Adequacy of the local and regional road and highway system.

Any one of these factors can be a binding constraint limiting effective annual throughput even if adequate capacity is available elsewhere in the system.

Ports generally attempt to build capacity slightly ahead of demand to avoid congestion. Incremental capacity additions such as new cranes, new information systems, and improved container yard technology are within the control of the port and the marine terminal operators. These improvements typically improve throughput through existing facilities. Larger projects such as new or expanded terminals have lead times of up to a decade and must pass stringent environmental and regulatory tests with uncertain outcomes. The ability to complete and fund these larger projects can be an institutional limit on port capacity, especially in the near term.

Other factors such as water depth, rail capacity, and highway capacity are not under the sole control of the port.

- Increasing and maintaining sufficient water depth requires dredging. Dredging programs are costly, typically requiring participation by the Federal government through the US Army Corps of Engineers. Dredging programs are often controversial, raising major environmental issues that add to the cost and time required.
- At SF Bay Area ports, the rail terminals are a mix of rail-owned and port-owned facilities. The ports have direct influence over those they own, but only indirect influence over rail-owned facilities. The rail mainlines are privately owned and ports ordinarily have little influence over their capacity.
- The ports likewise have influence over roads and connections within the immediate port area, but little influence over highway capacity to local and regional markets.

Effective port capacity also depends on the nature of the container trade being handled. For example, export cargo typically has longer terminal dwell times than import cargo, and therefore takes more terminal space for the same annual volume. In another example, refrigerated containers require special terminal facilities and take up more space than ordinary containers.

Realistically, container ports are systems rather than single, self-contained facilities. In the early decades of containerization, functions such as empty container storage, container repair, and container freight stations were incorporated in marine terminals. Those functions have by and large been moved off-terminal to free up scarce berthside space. Yet those functions are still necessary as recognized in the Port of Oakland's *Port Services Location Study* (2001). Assessments of port throughput capacity implicitly assume that such ancillary facilities will be available to support the direct cargo-handling functions.

Ports can also face short-term constraints. In 2004, the San Pedro Bay ports experienced a shortage of Longshore labor and a rail service interruption that resulted in serious congestion. After the 1989 Loma Prieta earthquake the Port of Oakland had to operate at reduced capacity due to crane rail damage. Incidents such as these are usually resolved quickly. Such short-term constraints are not considered in this analysis.

1988 Seaport Plan Capacity Estimates

The 1988 Manalytics/WEFA report also provided the container terminal capacity estimates used in the current Seaport Plan. As of 1988 some of the SF Bay Area container terminals were actually combination terminals that might handle break bulk or ro-ro cargo as well. The 1988 capacity analysis focused on requirements for berths, and then estimated the acreage required to support each berth depending on terminal type. There is thus no simple relationship between metric tons and terminal acres in the Seaport Plan.

The Manalytics study team surveyed Bay Area marine terminal operators to determine realistic averages for terminal throughput. Considering the responses, Manalytics used averages of 1,400 containers per acre (2,380 TEU) for wheeled terminals and 2,000 containers per acre (3,400 TEU) for stacked terminals. The latter average of 3,400 TEU per acre is very close to the actual Oakland average in recent years. The close match between forecast and actual numbers is likely due in part to the expertise of the Manalytics team. However, the current average of 3,400+ TEU per acre is now only about 51% of the estimated capacity.

It appears that the 1988 Seaport Plan *forecast* only covered loaded containers while the *capacity* estimates implicitly included both loads and empties. The forecast started with metric tons and used proprietary software to estimate the potential TEU volume from the containerizable portion. The capacity estimate for container terminals started with estimates of containers per acre and then derived the estimated metric tonnage at an average of 12 short tons per container. The main reference to empty containers in the report is as follows.

> *"The Port Handbook specifies that the national default value for the average amount of cargo per container is an extremely high 20 short tons – over all container sizes as well as full and empty containers. Bay Area ports' experience, by contrast, indicates the actual number is only 12 short tons per container. Thus we used an average of 12 short tons per container in this update."* (Manalytics 1988, p. 61)

The text implies that the 12 short tons per container average applies to both full and empty containers. If so, the equivalent would be 6.4 mtons/TEU (Exhibit 39).

Exhibit 39: Equivalent Metric Tons per TEU Conversion Factor

Short tons per Container	Metric tons per short ton	Metric tons per container	Avg. TEU per container	Metric tons per TEU
12.0	**0.9**	**10.9**	**1.7**	**6.4**

As shown in Exhibit 40, the Seaport Plan (as amended through January 2007) anticipates 1,375 acres of terminal space with 30.5 berths handling up to 31.8 million metric tons of containerized cargo. Using the Manalytics conversion factor this total would translate into 4.95 million annual TEU, or a average of 3,603 TEU/acre. The Port of Oakland approached that average in 2000, but since then capacity has increased faster than the cargo so the average TEU per acre has actually declined.

Exhibit 40: Seaport Plan Container Port Capacities

	Seaport Plan 2020			**Equivalent TEU**
Port	**Acres**	**Berths**	**Metric Tons**	**@ 6.4 mtons/TEU***
Oakland	1,000	19	24,525,000	3,817,995
Richmond	190	5.5	2,802,500	436,287
San Francisco	185	6	4,494,000	699,615
Total	**1,375**	**30.5**	**31,821,500**	**4,953,897**

** Equal to 12 short tons per container*

The capacity totals were based on estimates of annual throughput capacity per berth, which in turn varied by port and terminal as shown in Exhibit 41. There was a wide range of unit throughputs, with the most modern terminals, those proposed for the Naval Fleet and Industrial Supply Center Oakland (FISCO), having over three times the throughput of the Richmond terminals.

Exhibit 41: Seaport Plan Throughput per Berth

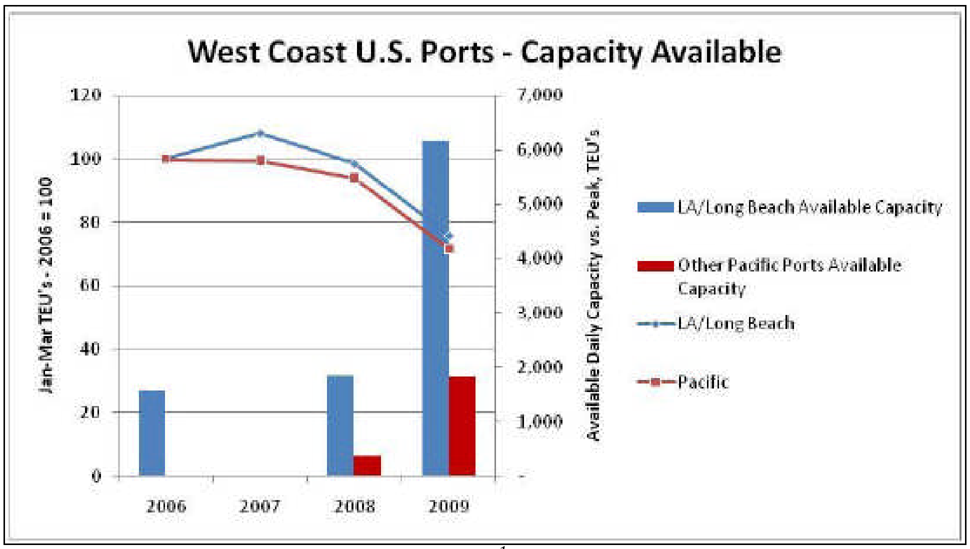
Port	**000 metric tons/berth**	**000 TEU @ 6.4 mtons/TEU***
Oakland	**1,291**	**202**
Outer Harbor	1,447	226
7th Street Harbor	1,005	157
FISCO	1,619	253
APL	1,484	232
Inner Harbor	601	94
Richmond	**510**	**80**
San Francisco	**749**	**117**
SF Bay Area	**1,043**	**163**

Recent developments at the Port of Oakland and elsewhere suggest that using berths as a unit of capacity may not be the best long-term approach. The figures in Exhibit 41 were developed by assessing the backland throughput capabilities associated with the berths at each terminal or group of terminals. Development of new terminals at Oakland, however, has changed the terminal/berth relationship. A more flexible and useful approach would be to assess the combined berth/terminal throughput as a system, recognizing that either could be the limiting factor.

Current Excess Capacity

Until recently, rapid growth in container trade and slow progress in port expansion led to legitimate concerns over container port capacity up and down the West Coast, including in the SF Bay Area. The recession-induced trade decline and recent capacity additions, however, have now resulted in excess capacity. The chart in Exhibit 42 illustrates this relationship for first quarter volumes in 2006-2009.

Exhibit 42: Excess West Coast Container Port Capacity



Source: Gross Transportation Consulting[1]

The Port of Oakland now has substantial excess capacity. In the last decade the Port of Oakland has completed three major capacity projects: the Hanjin Terminal, the Oakland International Terminal, and the Oakland Intermodal Gateway. As anticipated in the Seaport Plan, these projects enable Oakland to handle substantial cargo growth – growth that the recession has postponed. This excess capacity has allowed the Port to take some container terminal property out of service while it is being reconfigured and redeveloped, facilitating future capacity increases.

As the analysis below indicates, the Port of Oakland's present and potential capacity appears sufficient to meet the SF Bay Area's demand for containerized cargo through and beyond the present forecast horizon.

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[1] *Gross Transportation Consulting provides strategic and marketing analysis services for members of the freight transportation industry, including service providers, shippers and equipment suppliers .These data were derived from Port websites and independent capacity analyses.*

Port of San Francisco

The Seaport Plan anticipates that the Port of San Francisco would have 185 acres of container terminals handling up to 4,494,000 metric tons by 2020.

- Pier 80 at 65 acres, would handle up to 1,498,000 tons.
- Pier 94-96, at 80 acres, would handle up to 2.2 million metric tons.
- Pier 94N (undeveloped), at 40 acres including 10 acres of fill, would handle up to 749,000 metric tons.

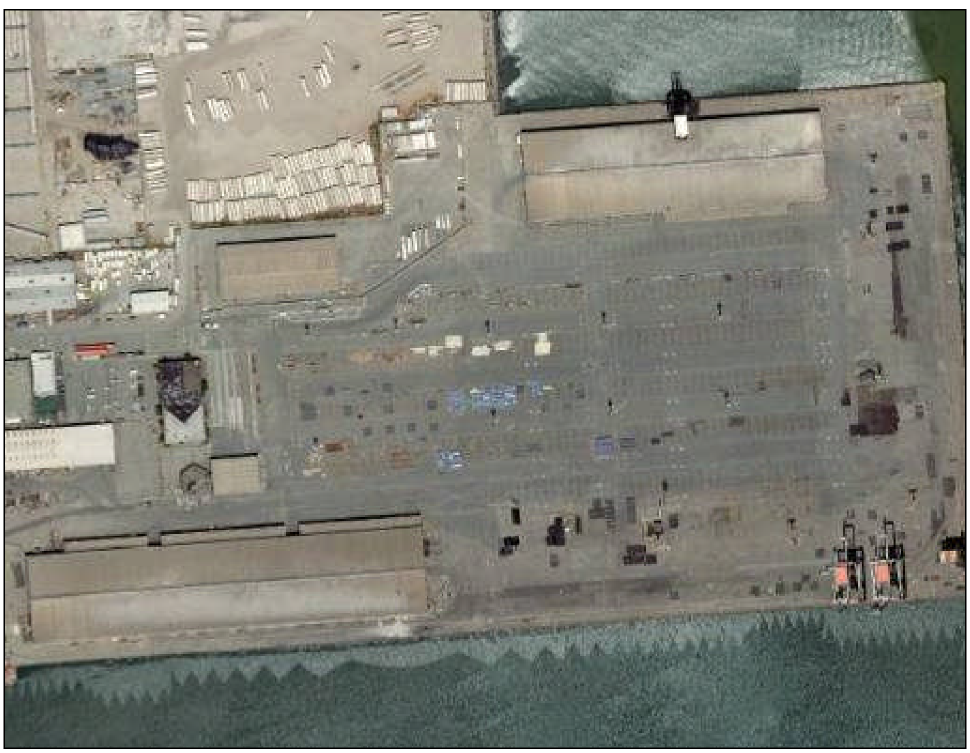
Total capacity would be 699,615 TEU at 6.4 metric tons/TEU (Exhibit 40). The corresponding throughput capacity would average 3,782 TEU per acre depending on the conversion factor.

Although either used for break bulk or dormant, San Francisco's container handling capabilities are essentially intact.

Pier 80

Pier 80 (Exhibit 43) has five cranes (two with 130 ft. outreach) and 69 acres served by 3 berths with 40 ft. draft. Pier 80 is served by freight rail via an Intermodal Cargo Transfer Facility (ICTF) on the south side of Islais Creek and the recently completed Illinois Street Intermodal Bridge over the creek. The Pier 80 "Omni" terminal now handles break bulk and neo-bulk, notably paper, steel, and lumber. Break bulk cargo more than doubled at Pier 80 between 2003 and 2004, and has grown since.

Exhibit 43: Port of San Francisco Pier 80



Source: Google Earth

Pier 94-96

Pier 94-96 has four container cranes, 76 acres, 3 berths with 40' draft, and rail access (Exhibit 44). This terminal handled containers until 2004. The southernmost portion also previously handled Lighter Aboard Ship ("LASH") cargo. The container handling capabilities are essentially intact, although the cranes would not be able to handle the larger post-Panamax vessels and the draft would have to be increased. The complex now handles mostly dry bulk. The tenants include Hanson, Bode, RMC, and Tidewater Sand & Gravel.

Exhibit 44: Port of San Francisco Pier 94-96

Source: Google Earth

Pier 94N

"Pier 94N" refers to the undeveloped northern corner of the Pier 94-96 complex shown in Exhibit 45. With 10 acres of fill this area would total 40 acres, expanding the area and capacity of Pier 94-96. There is presently no plan to fill this area in the near future.

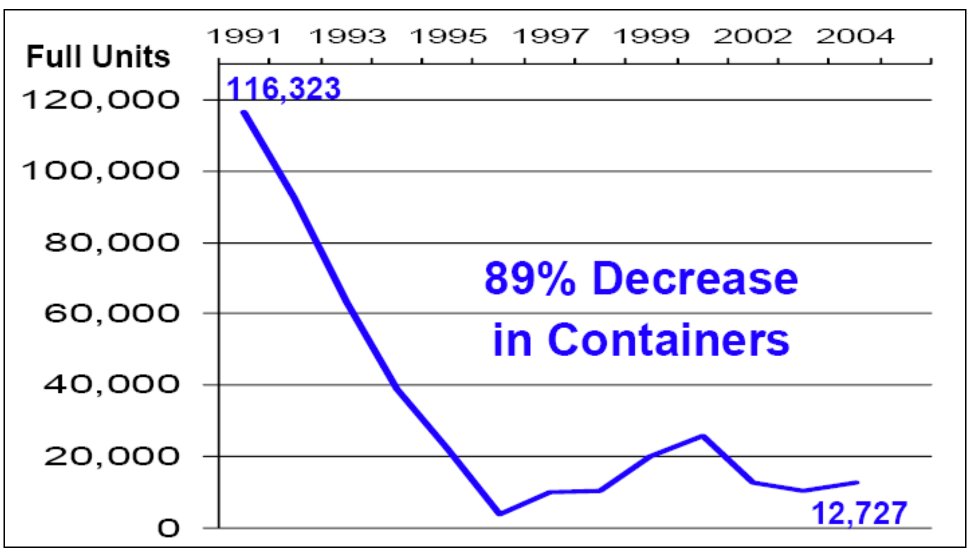
Exhibit 45: Port of San Francisco Pier 94N Area

Source: Google Earth

San Francisco Constraints

Despite having theoretical capacity, the Port of San Francisco is unlikely to handle a significant part of future SF Bay Area container cargo. The Port of San Francisco ceased container operations at its two terminals in 2005, and has no immediate plans to resume handling containers. Exhibit 46 shows the decline in container cargo that led to this decision.

Exhibit 46: Decline in SF Container Cargo



Source: Port of SF 2004-2005 Annual Report Presentation

As a direct competitor for container business San Francisco has three long-term handicaps.

- Geographic isolation. The additional time and mileage required to dray containers to and from San Francisco is unavoidable. As very little industrial or distribution infrastructure remains in San Francisco, it is no longer an import or export market in itself.

- Poor rail access. San Francisco's isolation at the end of the peninsula rail line, the dominant use of that line for passengers, and the lack of double-stack clearances through tunnels on that route all put San Francisco at a severe disadvantage for rail intermodal business.

- Political and community opposition. Resumption of high-volume container handling, particularly night and early-morning operations, would likely face serious political and community opposition in San Francisco.

The Port of San Francisco recently commissioned the *Port of San Francisco Maritime Cargo and Warehouse Market Analysis*, completed for the Port by CBRE Consulting, Inc. and Martin Associates in January 2009. This report addressed the full range of cargo opportunities for San Francisco and concluded that the outlook for significant container cargo was limited.

> *"The trends in carrier consolidation, vessel sharing agreements and the use of larger vessels that require deeper water, more productive container handling equipment and larger terminal areas make it increasingly more difficult for a smaller, niche port such as San Francisco to compete with Oakland for container traffic. Also, intermodal rail access to Midwest destinations and excellent highway access to East Bay distribution centers (DCs) also benefit Oakland and keep it at the forefront of the Bay Area container market."*

> *"Given these conditions, and the isolated geographic location of the Port of San Francisco on a peninsula, limits the potential for container activity – via regular liner service – through the Port to serve East Bay markets and DCs. Further exacerbating the Port's container limitations, rail clearance issues at Tunnels #3 and #4 prohibit double-stack service to inland markets."*

The report concluded that, lacking competitive access to inland markets, the theoretical market reach for the Port of San Francisco is limited to San Francisco, San Mateo, and Marin counties. This market is insufficient to sustain regular liner service to the Port. The report did hold out the possibility of niche cargoes such as refrigerated produce. If such opportunities do develop, they could substitute for part of Oakland's capacity.

Port of Richmond

The Seaport Plan currently anticipates that the Port of Richmond will have 190 acres of land devoted to container terminals with 5.5 berths handling up to 2.8 million metric tons of containerized cargo by 2020. The combined total implies an average capacity of 2,296 annual TEU per acre, a very modest figure. The 190 acres would include three terminal complexes.

Terminals 2 and 3

Terminals 2-3 are expected to handle container and neo-bulk cargo on 80 acres with 2 container berths handling 418,000 metric tons of containerized cargo. Implicitly, the plan envisions Terminals 2 and 3 supplying 40 acres of container terminal space.

Terminal 2 presently consists of 7 acres and is occupied by a tank farm, pipelines connecting the tanks to the pier, and a shed covering the piping and part of the quay (Exhibit 47). The terminal is leased through 2016 to California Oils, which imports liquid bulk vegetable oil and stores it in the tanks. California Oils' main facility is adjacent to Terminal 2. The "terminal" itself is minimal, and it appears improbable that the pier and pipelines now used to unload vegetable oils would be used for anything else in the foreseeable future. A portion of Terminal 2 could conceivably be made part of Terminal 3 in conformance with the Seaport Plan.

Exhibit 47: Port of Richmond Terminal 2

Source: Google Earth

Terminal 3 (Exhibit 48) is a general cargo terminal suitable for break bulk, roll-on/roll-off (ro-ro), or containerized commodities. It covers about 22 acres. There are two container cranes and an office building that houses the Port offices. Terminal 3 was designed for Matson's container business, but proved inefficient and is now too small to compete with more modern terminals. Terminal 3 is currently leased to Stevedoring Services of America's SSA/Matson unit, which handles roll on-roll off vehicles there for Matson's Hawaiian service using combination container/ro-ro vessels. SSA/Matson has a twenty-year lease agreement dating from January 2002 and renegotiable at five-year increments.

Exhibit 48: Richmond Terminal 3

Source: Google Earth

ARCO Terminal

The ARCO liquid bulk terminal was anticipated to eventually have 10 acres devoted to container operations (presumably adjacent to Terminals 5/6/7) handling 104,500 metric tons.

Exhibit 49: Richmond ARCO Terminal

Source: Google Earth

Terminals 5/6/7 (Point Potrero)

Under the Seaport Plan Terminals 5/6/7, together constituting Point Potrero, would be expanded to 140 acres by adding 15 acres of fill at Terminal 5 and 18 acres at Terminal 6. The 140 acres would have capacity for 2,280,000 metric tons, or 356,250 annual TEU at 2,545 TEU per acre.

Exhibit 50: Point Potrero Terminals 5-7

Source: Google Earth

"Terminal 5" includes the two finger piers on the west side of Point Potrero. These piers are being used by spill response firms and tug and barge operators and have no cargo potential in their existing state. The BCDC Seaport Plan, however, envisions fill in this area to increase the total size of the Point Potrero complex for use as a container terminal.

Terminal 6 includes the five dry/graving berths of "Richmond Shipyard #3" and associated buildings that have become part of the Rosie the Riveter National Historical Park. Although these facilities are used by commercial tenants and generate revenue for the Port, there is no longer a realistic possibility of significant cargo flows through Terminal 6 in its current configuration.

Terminal 7 is the working cargo facility at Point Potrero, currently used by Auto Warehousing Company (AWC) to handle import autos in roll on-roll off (ro-ro) service. The Port has signed a 15-year lease with AWC for future ro-ro operations. The working area is 120 acres, and includes the backlands of Terminals 5 and 6.

Richmond Constraints

The practical development of container cargo at the Port of Richmond as envisioned in the Seaport Plan now faces some significant barriers.

- A 40-acre container terminal, as envisioned for Terminals 2 and 3, is no longer commercially viable for mainstream containerized cargo. Besides the small overall footprint, the site is too narrow for modern handling methods. Such sites, in common with the San Francisco terminals, would best be considered candidates for niche cargoes such as containerized fruit or autos.

- The Point Potrero site currently has about 120 working acres. The Graving Dock area now includes the Rosie the Riveter National Historical Park, and filling that area for use as a container yard is no longer practical. Adjacent residential development would also pose substantial obstacles to high-density container operations, particularly with on-dock rail operations.

- The Port of Richmond has 35 nominal feet of available draft. While sufficient for many bulk or neo-bulk vessels and older containerships, this depth is not adequate for larger post-Panamax vessels used in the transpacific container trades. Creating adequate access to Port of Richmond container terminals would require dredging the Port from 35 feet to 45-50 feet, and additional dredging in the Bay channel leading to Richmond. The cost and environmental impacts of such a project would be formidable barriers, and the feasibility has not been determined.

As discussed more extensively with reference to the Port of Oakland, container throughput capacity is also a function of rail intermodal capability. The Port of Richmond has two options for rail intermodal terminals. The existing BNSF terminal at Richmond, about 2 miles from Point Potrero, is inactive as of early 2009. This terminal was BNSF's primary intermodal facility in the area until supplanted by the Oakland Intermodal Gateway (OIG) for international traffic and the North Bay and Mariposa (Stockton) terminals for domestic business. The other option would be to develop the current auto-loading facility adjacent to Point Potrero as a near-dock intermodal terminal. Either option would likely face local opposition over truck traffic. There are other rail facilities in the area to the east of Terminals 2 and 3, but those facilities are used exclusively for carload fright business and are not suited to intermodal transfer. Beyond the port area, Port of Richmond rail service would use the same mainlines as the Port of Oakland.

Overall, development of container capacity at the Port of Richmond faces significant obstacles. Such development is unlikely to take place unless the Port of Oakland becomes seriously congested.

"North Shore" Potential

There has been speculation regarding the potential development of a wholly new container terminal at an area known as the "North Shore". This is a very large "brownfield" site associated with the Chevron refinery. As shown in Exhibit 51, the potential site could encompass a number of undeveloped and formerly developed parcels to the north of the existing Port of Richmond, reportedly a total of some 500 acres. This site, however, is not designated as port priority in the Bay Plan, and abuts a large area of tidal marsh. Development of the area for container handling would appear to face insurmountable environmental, regulatory, and financial obstacles, and there is not longer any active interest in such a development.

Exhibit 51: "North Shore" Site for Potential Container Terminal (Approximate)

Source: Google Earth

Port of Oakland

There are two recent key documents that together provide definitive insights into container cargo capacity at the Port of Oakland.

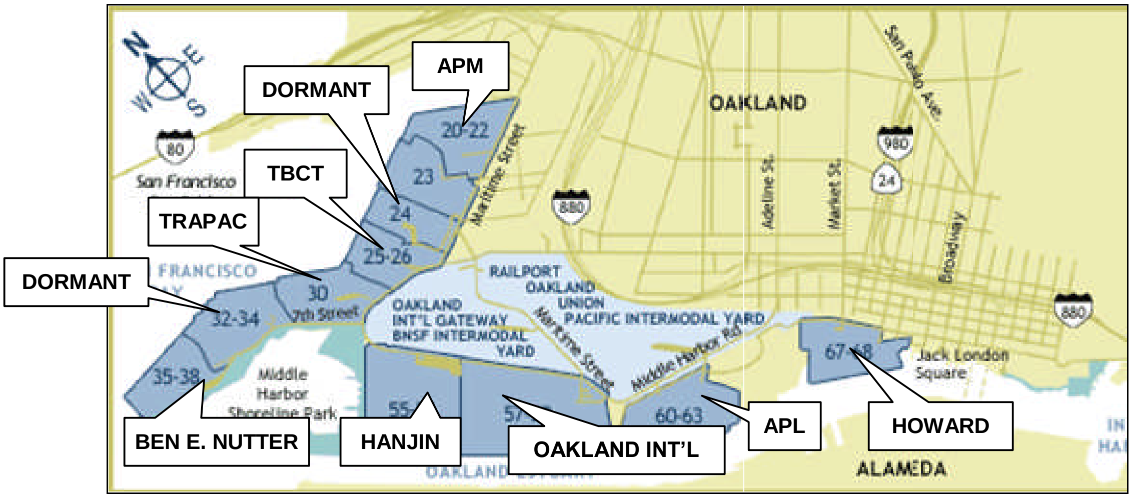
- The Maritime Development Alternatives Study (MDAS) completed by a consultant team in August 2004, presents an extensive analysis of the Port's present and future container cargo capacity in terms of berths, terminals, rail capacity, and highway capacity. This study is the basis for much of the analysis that follows.

- The Maritime Air Quality Improvement Plan (MAQIP), completed in April 2009, provides a master plan for air quality improvements deemed necessary for growth. The MAQIP analyzes the Port's ability to achieve target TEU throughputs while meeting air quality and health impact goals.

MDAS found that within the 2030 forecast horizon, the Port of Oakland's capacity is not constrained by its maritime facilities, but rather by the capacity and performance of the road and rail intermodal connectors. Those road and rail connections and facilities will need substantial improvement before reaching the capacity of the port terminals themselves.

The Port of Oakland currently has eight active marine terminals, as shown in Exhibit 52. The discussion below divides them into the same groups used in the Seaport Plan.

Exhibit 52: Port of Oakland Terminals and Berths



Source: Port of Oakland website

Outer Harbor Terminals

The Outer Harbor terminals (Exhibit 53) consist of Berths 20-23, currently used by APM Terminals (Maersk), Berth 24 (Maersk's former site, currently being redeveloped), and Berths 25-26, the TransBay Container Terminal (TBCT). The 30-acre Berth 20-21 fill site, also shown on Exhibit 53, is anticipated to be used for container operations in the Seaport Plan, although there are no current fill plans or proceedings.

Exhibit 53: Oakland Outer Harbor Terminals

Source: Google Earth

Ports America will begin operating and renovating the combined APM and former Maersk terminals in January of 2010 under a long-term agreement with the Port. Their combined area is 158 acres, or 202 acres with the Berth 20-21 fill site. Ports America also has first refusal on the 44-acre TBCT terminal site starting in 2018 (or 2013 if TBCT does not renew). With the 30-acre fill, the combined Outer Harbor area would reach 232 acres, and could be under a single operator if Ports America takes over TBCT.

The Seaport Plan allows for 295 acres of land in the Outer Harbor area, which includes a larger portion of the former Oakland Army Base than under present plans. The Outer Harbor terminals are divided from the former Oakland Army Base Property by Maritime Street (Exhibit 53). The Seaport Plan apparently anticipated that a portion of the land east of Maritime Street would become part of the Outer Harbor Terminals, concurrent with reconfiguration of the port-area rail intermodal terminals. The MDAS capacity analysis leaves Maritime Street in place, in conformance with various environmental impact documents.

Present plans appear to leave Maritime Street in place, reducing the potential acreage enclosed in marine terminal boundaries but increasing the size of the rail intermodal terminals. As noted elsewhere, the Port's overall capacity depends on sufficient rail capacity to support the marine terminals.

The Port and Ports America have explored ways of linking land on the other side of Maritime Street to the Outer Harbor Terminals. Overpasses, underpasses, or other methods that allowed transfer of rail-bound containers to the Outer Harbor Intermodal Terminal (OHIT, discussed in more detail below) or storage areas without over-the-road trucking would increase the effective working area of the marine terminals. The alternative to crossing Maritime Street would be to move Maritime Street to the southeast, farther from the water. This would expand the terminal area but still separate the terminals from the OHIT site.

Seventh Street Terminals

The Seventh Street terminals (Exhibit 54) include TRAPAC at Berths 30-32 (66 acres) and Ben E. Nutter at Berths 35-38 (58 acres). The Seventh Street peninsula also includes space that is not technically part of either terminal but on short-term lease for their use. Additional acreage now dormant makes a total of 205 acres, as given in the Seaport Plan.

Exhibit 54: Oakland Seventh Street Terminals

Source: Google Earth

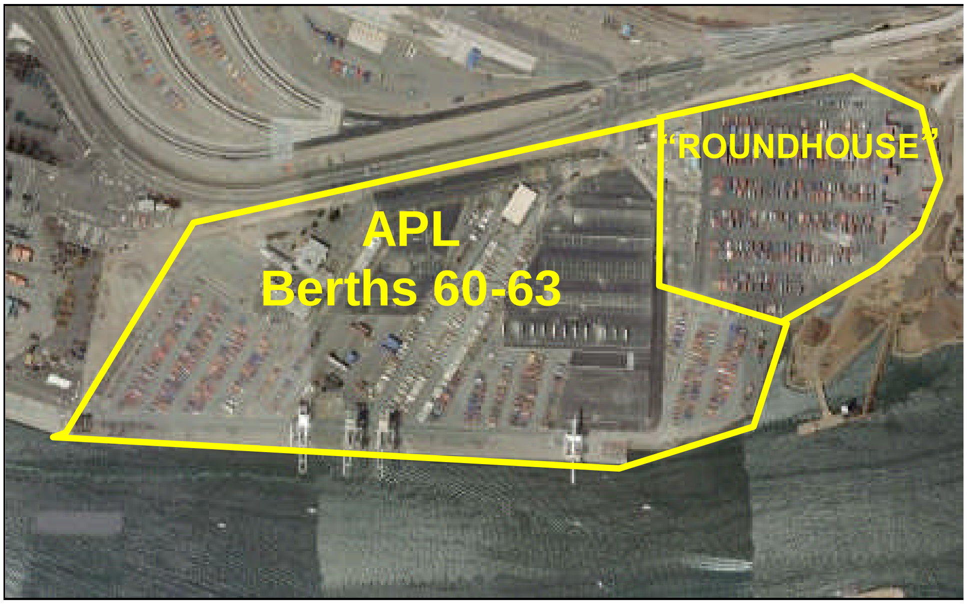
Middle Harbor (FISCO) Terminals

The newest Oakland terminals are the two developed on the Middle Harbor site formed from the FISCO property and the Western Pacific/Union Pacific intermodal terminal (Exhibit 55). The Hanjin terminal at Berths 55-56 covers 120 acres and the Oakland International terminal at Berths 57-59 covers 150 acres, a total of 270 acres versus 330 acres in the Seaport Plan. Part of the terminal area envisioned in the Seaport Plan is occupied by the Oakland International Gateway (OIG) rail terminal served by BNSF (formerly described as the Joint Intermodal Terminal). Depending on the development of the Outer Harbor Intermodal Terminal (OHIT), all or part of the OIG would be available for marine terminal expansion.

Exhibit 55: Oakland Middle Harbor ("FISCO") Terminals

The Middle Harbor terminals also include APL at Berths 60-63 (79 acres). Exhibit 56 also shows the so-called "Roundhouse" site (named for the former Western Pacific roundhouse located there). The Seaport Plan lists the APL terminal at 121 acres, which would include the Roundhouse site. This parcel has been used for container storage and other purposes but is not part of the current terminal.

Exhibit 56: Oakland Middle Harbor APL Terminal



Source: Google Earth

Inner Harbor Terminal

The Inner Harbor terminals include the Charles P. Howard terminal at Berths 67-68 (50 acres). Exhibit 57 also shows the Schnitzer Steel site, an active dry bulk terminal exporting scrap metal. The Seaport Plan notes that if this site is no longer needed for dry bulk that it should be considered for conversion to container terminal space. As there is no reason at present to expect this site to become available, neither the Seaport Plan nor this report include it in container terminal acreage.

Exhibit 57: Oakland Inner Harbor Terminal and Schnitzer Steel Site

Source: Google Earth

Port of Oakland Terminal Capacity

Exhibit 58 lists the Oakland terminals and their sizes as they exist in early 2009.

Exhibit 58: Port of Oakland Terminals and Acreage

Terminal	Berths	Acres
APL	60-63	79.4
APMT	20-23	106.8
Ben E Nutter	35-37,38	58.1
Charles P Howard	67-68	50.3
Hanjin (TTI)	55-56	120.0
OICT(SSA)	57-59	150.0
Outer Harbour	33-34	44.6
TransBay	25-26	44.3
TraPac	30-32	65.7
ITS/Ports America	24	51.0
Total		**770.1**

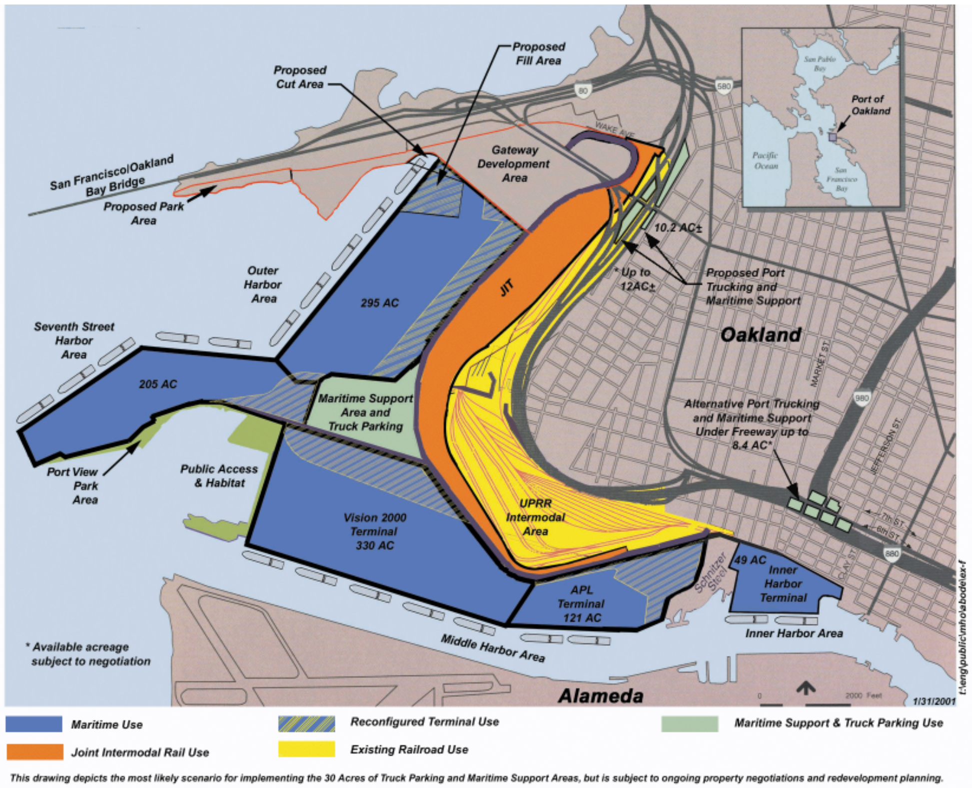
Source: Port of Oakland

The Seaport Plan anticipates an eventual total of 1000 acres, which includes:

- the 30-acre Berth 20 site;
- an additional portion of the Oakland Army Base discussed above;
- the “Roundhouse” site of about 40 acres; and
- part of the 85 acres now used as the OIG rail terminal.

Exhibit 59 shows the approximate location and configuration of the relevant acreage that was anticipated after conveyance of the Oakland Army Base and development of the Joint Intermodal Terminal (which became OIG). The total adds up to the 1000 acres shown in the Seaport Plan

Exhibit 59: Port of Oakland Acreage (planned as of 2001)



Source: Port of Oakland

The striped areas in Exhibit 59 show acreage that was anticipated to be included in the marine terminals. A comparison with Exhibit 52 and the aerial photos of the terminals reveals the following differences.

- The Berth 20 fill has not yet occurred.
- What is shown as the Joint Intermodal Terminal (JIT) site is now the planned OHIT site. The JIT (now called OIG) was built in the striped area adjacent to the "Vision 2000" terminals, and that land would only become part of the marine terminals if the OIG were completely replaced by OHIT.
- The 295 acres of the Outer Harbor terminals includes the shaded area on the east of the present Maritime Street. Present plans do not anticipate moving Maritime Street, so that land would become part of OHIT instead.
- The striped area at the east of the Seventh Street peninsula has not been incorporated into marine terminals as yet.
- The Roundhouse area east of the APL terminal is likewise still not part of the marine operation.

Near-term plans for Oakland terminals are not that aggressive, adding up to about 866 acres of marine terminals. In the long-term, completion of the full OHIT plan could free up additional land for marine terminal use.

Near-term Capacity

The MDAS project team concluded that Oakland's maritime terminals can handle between 5.5 and 6.0 million annual TEU on the current (2004) maritime space, including the Berth 21 fill. According to the capacity model developed for the MDAS, the limiting factor at this throughput would be berth space at Berths 21 to 26 and 55 to 59, and container yard space at other facilities.

In both the near term and the long term the effective capacity of the Port of Oakland depends on the ability of the road and rail system to move containers to and from the port as well as the capacity of the marine terminals.

At present the port's capacity is constrained by the rail system. The MDAS concluded that existing Oakland port rail infrastructure can handle about 640,000 intermodal rail lifts per year, a portion of which is consumed by non-maritime traffic. The MDAS estimated that the *existing* rail system would constrain Port capacity at between 2.5 and 3.5 million TEU per year, depending on how much of the Port's growth moves via rail. Historically, the portion of containerized cargo that moves by rail at Oakland has been smaller than at the competing ports of Los Angels, Long Beach, Seattle, and Tacoma. Oakland has anticipated that a large portion of its growth would come in the form of intermodal cargo diverted from those ports due to congestion or attracted by Oakland's expanded intermodal capacity. When the MDAS was prepared in 2004, about 28% of Oakland's cargo used the intermodal rail terminals, compared to almost half in Southern California and as much as 75% at Tacoma. At 28%, the rail share of 2.5 million TEU at Oakland would require about 411,000 annual lifts, roughly two thirds of existing capacity. Were the rail share to rise to 40%, the same 2.5 million TEU would require almost 600,000 lifts, straining the existing terminals.

The 3.5 million TEU upper capacity estimate would provide sufficient capacity for the revised forecast of 3.4 million TEU in 2020. Planned and proposed improvements to the rail capacity, discussed below, would increase this capability and support further port growth.

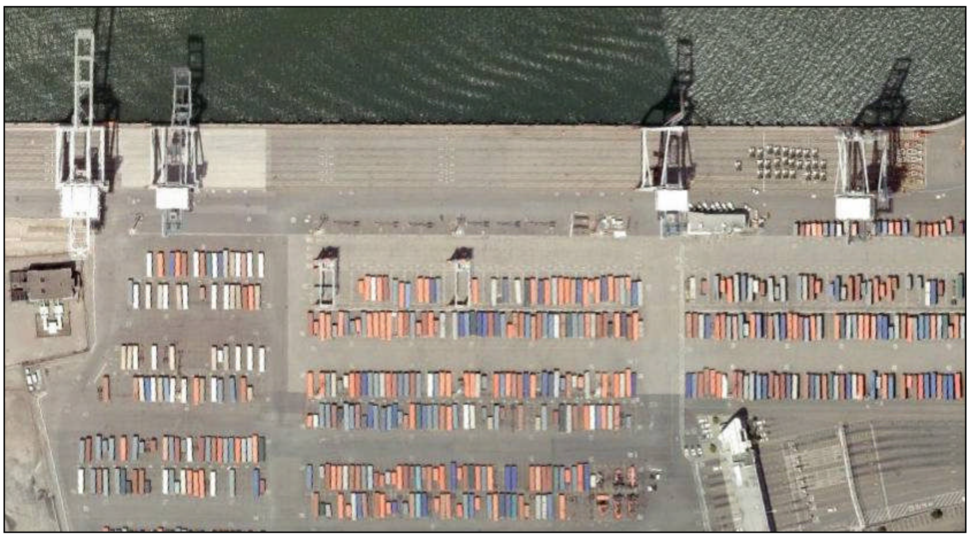
The Port is served by a legacy road system that predates the current marine and rail terminal configuration, and which could become a bottleneck when cargo volumes recover. With what the MDAS calls "modest improvements to perimeter roadway intersections" (discussed in greater detail in a following section), the Port's road system would be able to support annual cargo volumes of between 3.3 and 3.9 million TEU before becoming congested (e.g. provide an unacceptable level of service).

Subject to the ability of the Port, City of Oakland, and state to make the planned improvements, the road network should also be able to support projected growth through 2020.

The ability of the Port to handle cargo increases beyond about 3.3 to 3.5 million annual TEU will depend on the willingness and ability of all parties involved to invest in infrastructure, handling equipment, and systems, and to incur higher unit operating costs. As the MDAS notes, marine terminal operators can substantially increase the operating storage density of their facilities if they are willing to spend more capital and operating money per lift.

The wheeled terminal operating system, in which containers are usually parked in rows on their chassis, is the least expensive way to run a marine container terminal but results in low storage densities and relatively inefficient use of land. Where land has been in adequate supply, as in most West Coast ports, the wheeled system still predominates (Exhibit 60).

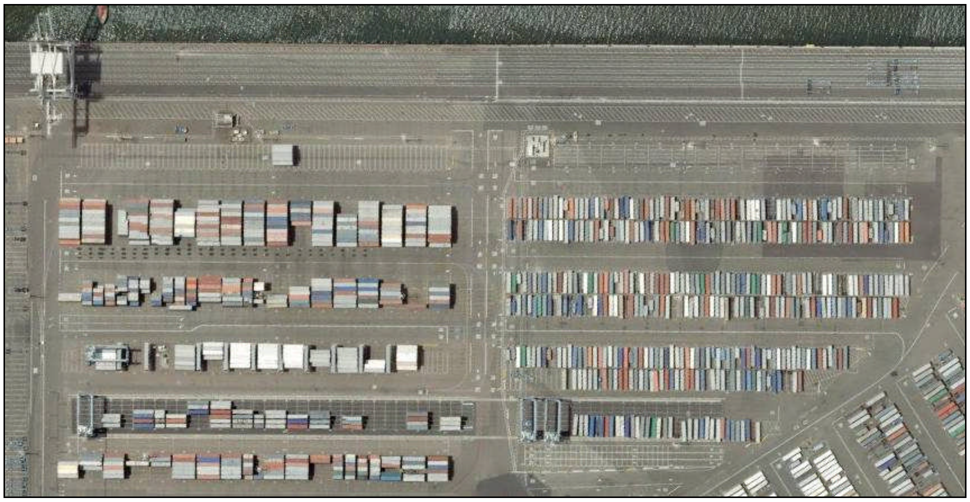
Exhibit 60: Wheeled Operations, Oakland TRAPAC Terminal



Source: Google Earth

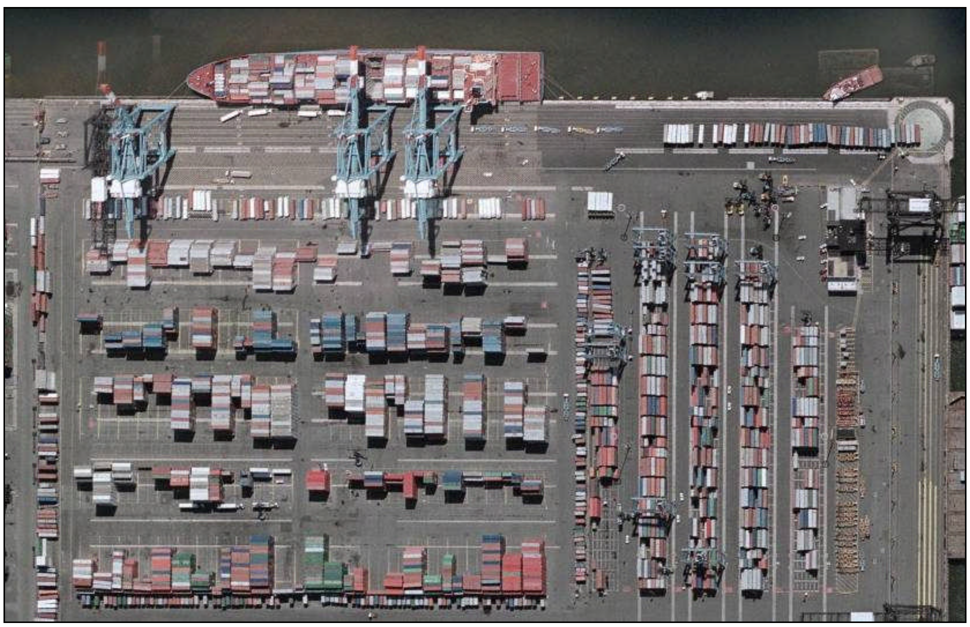
Where volumes per acre exceed the capability of the wheeled system and the terminals are land-constrained, it becomes necessary to start stacking the containers as in some US and most European and Asian terminals. Stacked terminals have higher throughputs as measured in annual TEU per acre, but also higher unit capital and operating costs. Stacking is therefore usually undertaken in stages, starting with stacking empty containers using inexpensive mobile equipment (Exhibit 61 and Exhibit 62) and eventually progressing to complete high-density stacking using rail-mounted cranes and automated systems (Exhibit 63).

Exhibit 61: Mixed Wheeled and Stacked Operations, Oakland APM Terminal



Source: Google Earth

Exhibit 62: Stacked Terminal, APM New York -New Jersey



Source: Google Earth

Exhibit 63: High Density Stacking, Modern Terminals Ltd., Hong Kong

Source: Modern Terminals Limited website

The upper MDAS capacity estimate of 6.0 million TEU is consistent with the "high growth" scenario in the MAQIP, which would reach that volume by 2020. The Port of Oakland has operated at averages of around 3,000-3,500 annual TEU per acre, which is substantially less than current capacity. The upper MDAS estimate of 6.0 million TEU on about 900 acres at Oakland (including the Berth 21 fill) implies a capacity of about 6,667 TEU per acre. By way of comparison, the San Pedro Bay ports were operating at an average of about 4,612 TEU per acre in 2005, and a recent report estimated that the long-term maximum there was about 10,477 TEU per acre using conventional technology. These observations suggest that the MDAS estimate of about 6,667 TEU/acre may be somewhat conservative.

Using higher-density technologies pioneered since the MDAS was prepared could enable at least some of the Oakland terminals to reach much higher throughputs and accommodate further growth. Exhibit 64 shows the new APM terminal at Portsmouth, VA. This terminal uses rail-mounted gantry cranes over closely spaced container stacks to maximize the capacity of the container yard. Yard tractors move containers between the ship-side cranes and the gantries. Highway trucks do not enter the container yard, but are loaded and unloaded at the far end of the stacks.

Exhibit 64: APM Portsmouth, VA Terminal

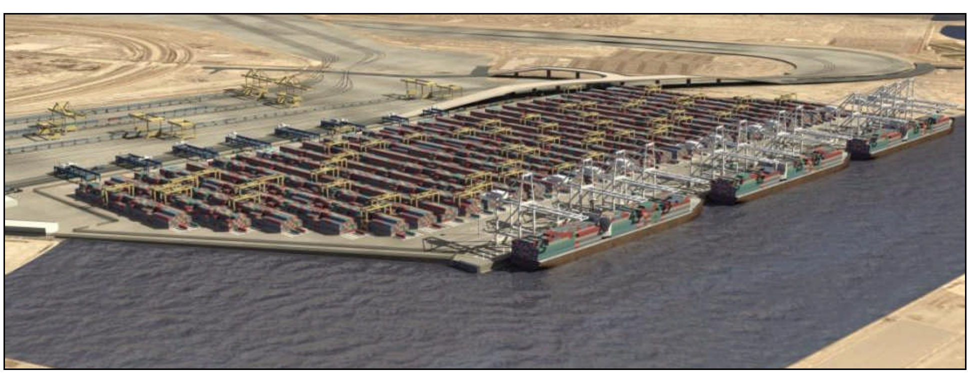
Source: Google Earth

Exhibit 65 shows the Port of Oakland Outer Harbor area reconfigured as a single 232-acre terminal, and Exhibit 66 shows that area developed using similar concepts as the APM Portsmouth Terminal.

Exhibit 65: Port of Oakland Berths 20-26 Reconfiguration

Source: Ports America

Exhibit 66: High Density Outer Harbor Terminal Concept



Source: Ports America

Ports America, who developed the concept in Exhibit 66, reports that such a terminal could achieve throughputs exceeding 16,000 TEU per acre if matched with sufficient road and rail capacity. The concept shown in Exhibit 66, in fact, shows a fully developed rail terminal (OHIT) on the other side of Maritime Street. Not all Port of Oakland terminals, however, have the potential for such high density and high throughput. The older Seventh Street Terminals, the APL terminal, and the Howard terminal may not have the appropriate size and configuration for such an intense application of technology.

Marine Terminal Capacity Findings

Exhibit 67 applies a range of unit capacity and throughput estimates to three acreage totals for the Port of Oakland.

- 770 acres, the approximate total of existing active terminals (Exhibit 58).
- 866 acres, the approximate total of planned terminal acreage (Exhibit 58).
- 1,000 acres, the total from the Seaport Plan, which includes land that may eventually be used for rail terminals or other purposes.

Exhibit 67: Port of Oakland Container Terminal Capacity Comparisons

TEU/Acre		Annual TEU at Acreage		
		770	866	1000
Oakland 2000 (513 acres)	3,464	2,667,145	2,999,672	3,463,824
Oakland 2008 (770 acres)	2,904	2,236,244	2,515,048	2,904,213
BCDC 2020 @ 6.4 mtons/TEU	**3,832**	**2,950,664**	**3,318,539**	**3,817,995**
LALB 2005	4,612	3,551,008	3,993,732	4,611,699
MDAS 2004	**6,667**	**5,133,590**	**5,773,622**	**6,667,000**
LALB Theoretical	10,477	8,067,411	9,073,218	10,477,157

Oakland's actual average in 2000, with about 513 active acres, was 3,464 TEU/acre. In 2008, with about 770 active acres, Oakland averaged 2,904 TEU per acre. The reduction in the average is the product of terminal expansion and the recession-induced cargo downturn.

The Seaport Plan capacity estimate of 24,525,000 metric tons at the original average of 6.4 mtons/TEU (12 short tons per container) applied to 1,000 acres yields an average of 3,832 TEU/acre, slightly more than the Port of Oakland has been averaging.

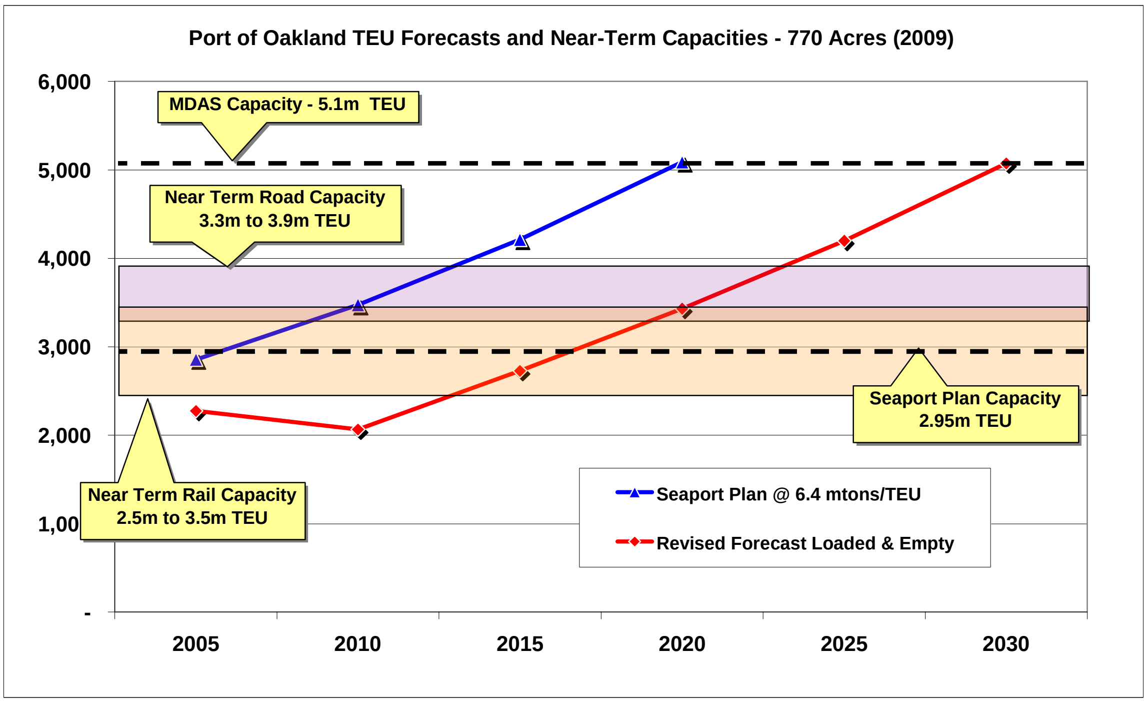
Los Angeles and Long Beach together averaged 4,612 TEU/acre in 2005 using basically the same operating methods as Oakland's terminals (and, for the most part, being operated by the same firms). The current estimates of the LALB maximum under conventional technology is 10,477 per acre. These comparisons require caution, however, as some of the LA and LB terminals include on-dock rail facilities while Oakland's are near-dock and not included in terminal sizes.

The MDAS estimate of about 6,667 TEU per acre is almost midway between the current and theoretical LALB performance under conventional technology assumptions, and therefore appears relatively conservative.

At the present working total of 770 acres the MDAS capacity equivalent would yield a throughput of about 5.1 million TEU. However, as note above, current capacity is limited to 2.5 to 3.5 million TEU by rail infrastructure, and to 3.3 to 3.9 million TEU by road infrastructure. The current capacity therefore ranges from a minimum of 2.5 million TEU (lower rail limit) to a maximum of 3.5 million TEU (upper rail limit, and within the road limit range.

Exhibit 68 shows this complex set of estimates compared to the Seaport Plan and updated forecast. At a minimum of 2.5 million TEU the Port appears to have sufficient capacity for expected growth to about 2014 with existing terminals and rail infrastructure. At a current maximum estimate of 3.5 million TEU, the Port as it exists would have capacity for expected growth through about 2021.

Exhibit 68: Current Port of Oakland Capacity Estimates



- At 866 acres (with the Berth 20-21 fill, the Roundhouse property, and the current redevelopment acreage), the MDAS average would yield almost 5.8 million TEU, which exceeds the revised SF Bay Area forecast for 2030 (Exhibit 27). To reach this level the more ambitious rail and road infrastructure improvements would have to be completed.
- If the Port of Oakland aggressively develops all available land to reach 1,000 terminal acres, the MDAS average would yield a capacity of about 6.7 million TEU. At the growth rates shown in Exhibit 27 this capacity would support SF Bay Area cargo growth to about 2037, again assuming successful road and rail infrastructure improvements.

Rail Intermodal Capacity

The Port commissioned the Maritime Development Alternative Study (MDAS) in 2004 to help guide it through infrastructure decisions. The MDAS reviewed the marine terminals, intermodal yards and roadway network in the Port complex, and made recommendations on improvement projects.

Long-term rail intermodal capacity for the Port of Oakland depends on the future capacity of the existing BNSF OIG and UP Railport terminals (general outlines in Exhibit 69), and on six major interrelated projects proposed for funding under the Trade Corridor Improvement Fund (TCIF, the Infrastructure Bonds).

Exhibit 69: Oakland Rail Intermodal Terminals

Source: Google Earth

Exhibit 70 summarizes the six TCIF projects.

- Outer Harbor Intermodal Terminal (OHIT). This new facility would augment or supplant OIG and increase total port-area intermodal terminal capacity.
- 7th Street Grade Separation. This project would relieve a current port-area rail bottleneck and facilitate OHIT development.
- Martinez Subdivision Rail Capacity Improvements. UP, BNSF, and passenger trains share UP's tracks from the Port to Stege (where BNSF branches off) and then to Martinez. This project would add capacity to alleviate this bottleneck.
- Donner Pass Rail Clearances and Capacity. This project would have provided stack train clearances and more capacity on UP's preferred Central Corridor route to Chicago. The project was withdrawn by UP, and UP now proposes to undertake some of the same improvements themselves.
- Tehachapi Route Capacity Improvements. The UP-owned Tehachapi line is used by BNSF for intermodal and carload service to Northern and Central California, and has become a bottleneck.

- Sacramento Station Bypass. This project does not directly involve the Port, but would increase capacity by allowing UP freight trains (and BNSF train on the UP line) to bypass the Sacramento Amtrak station.

Exhibit 70: TCIF Project Summary[2]

Project	Full Cost	TCIF Funds	Matching Funds	Match Sources	Issues	Alternative
7th Street Grade Separation (7SGS)	$427m	$175m	$252m	Port User Fee (?)	Funding Shortfall	West end overpass only
Outer Harbor Intermodal Terminal (OHIT)	$220m	$100m	$110m	Railroads? Ports?	Funding? Needs 7SGS. Developer role?	Densified OIG
UP Martinez Sub Capacity	$215m	$74m	$141m	Union Pacific?	Funding, Community Issues	Smaller project, phased
Donner Pass Tunnel & Track	$86m	$43m	$43m	Union Pacific	Withdrawn	UP may implement
Tehachapi Line Capacity	$112m	$54m	$58m	BNSF	UP Control?	Smaller project, phased
Sacramento Station Bypass	$52m	$20m	$32m	City of Sacramento	Community acceptance	None

As Exhibit 70 notes, some of these projects face significant obstacles and one, the Donner Project, has been withdrawn by UP. In the current context of reduced port business, slower volume growth, reduced revenue, and tight bond markets, some of these projects have already been postponed or scaled back, and it is likely that others will have to be adjusted as well. The alternatives outlined in Exhibit 70 would allow Oakland to achieve much of the needed capacity with different timing and cost, although some obstacles remain even for those more modest alternatives.

Rail Intermodal Terminal Capacity

The MDAS estimated the current capacity of the OIG and Railport at 640,000 lifts per year. The MDAS also proposed a series of expansion options for the rail intermodal system, all of which were based on terminal layouts incorporating the best available technology (Exhibit 71). These produced total capacities in the range of 640,000-1,622,000 lifts per year on a maximum of 480 acres. The maximum capacity would be reached with a consolidated rail facility (RR9 in Exhibit 71).

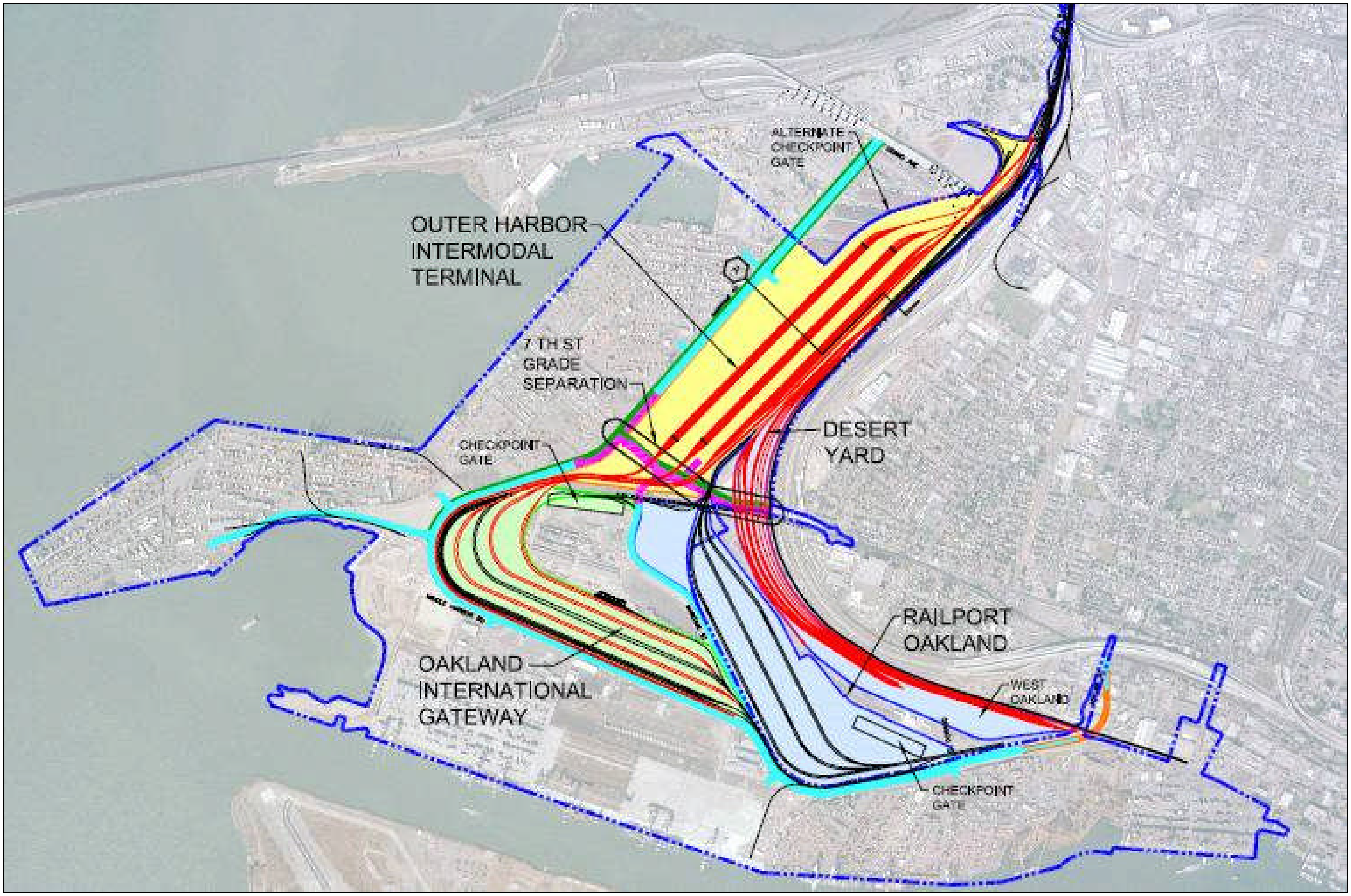
[2] Different planning documents show different costs and scopes for these projects. There are the most recent set of figures Tioga located, but the projects continue to evolve.

Exhibit 71: MDAS Intermodal Rail Terminal Options

Railroad Plan	Acres	Lifts	Lifts/Ac	Lifts/TF
RR1 - Existing Conditions	195	640,000	3282	8.5
RR2 - Build-out OIG	270	755,000	2796	8.8
RR2.1 - Phase 1 Knight Yard	290	829,000	2859	7.8
RR3 - Knight Yard Storage Expansion	340	1,158,000	3406	6.7
RR4 - Densified OIG	390	1,459,000	3741	7.7
RR5 - OHIT with OIG as Storage Track	460	1,300,000	2826	7.5
RR6 - Densified OHIT with OIG as Storage Track	450	1,297,000	2882	7.8
RR7 – OHIT with Tail Track Through OIG Site	370	1,096,000	2962	9.1
RR8 - OHIT with Straight Tail Track	370	1,005,000	2716	8.0
RR8a - OHIT with Straight Tail / Expanded Railport	450	1,317,000	2927	5.9
RR8b - OHIT with Straight Tail / Build-out Railport	460	1,499,000	3259	7.3
RR9 - Consolidated Intermodal Facility	480	1,622,000	3379	7.5

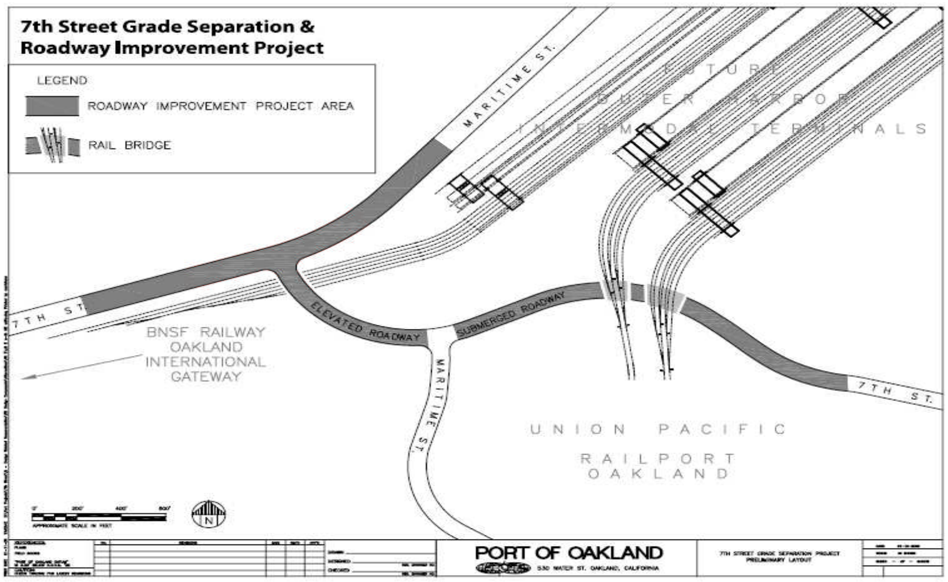
Outer Harbor Intermodal Terminal (OHIT). The Outer Harbor Intermodal Terminal (OHIT) would be located on 160 acres of the former Oakland Army Base. The OHIT project would extend Port rail intermodal facilities onto land at the former Oakland Army Base, allowing the railroads to load and unload containers more efficiently. The project also relieves congestion on rail main lines adjacent to the Port. This would allow for the ability to build longer trains to move more cargo. The OHIT project was originally estimated to cost $220 million and to begin construction in 2011 for completion in 2014. As of mid-2009 the Port is offering this land on a long-term leases; proposals from potential developers all commit to building OHIT but the timing and details vary.

Exhibit 72: OHIT Plan as of November, 2007



7th Street Grade Separation. The 7th Street underpass beneath the UP right of way is seriously deficient. While OHIT would provide expanded capacity for the rail intermodal transfer, OHIT's functionality would be severely limited without a safe, grade-separated crossing of 7th Street and an improved OHIT entrance. Exhibit 73 shows the 7th Street project in relationship to the proposed OHIT facility. Rail access to the southern part of OHIT (on the right in the diagram) depends on the 7th Street project.

Exhibit 73: 7th St Project



The 7th Street Grade Separation (7SGS) project would rebuild and enlarge grade-separated rail crossings at the heart of the Port to allow uninterrupted flow of goods by road and rail. The 7SGS project would also improve traffic operations and expand roadway capacity through the reconstruction of 7th Street along a new alignment in a deeper trench section between Cedar Street and Maritime Street.

The total cost was estimated at $427 million, with $175 million from TCIF and a $252 match from the Port or other sources. The project was expected to start construction in mid-2010 for completion at the end of 2012.

Implementation of the 7SGS project is likely to be delayed relative to the original TCIF schedule. As of early 2009 the Port does not have the $252 million in matching funds. Originally the Port planned to assess a user fee to fund this and other projects, but the fee has not been implemented. The Port will try to tap Federal and state programs, but coming up with the matching funds for such a large project is a major obstacle. It is possible that a more modest first-stage OHIT project might emerge that does not require such a huge expenditure to reroute 7th Street.

OIG Densification. Since the MDAS was prepared in 2004 new, denser intermodal terminal technology based upon nested wide-span cranes has been introduced and accepted in the industry. That technology is now working at the Seattle Intermodal Gateway and is being included in several proposed facilities, including the OHIT configuration proposed as a part of the Trade Corridor Improvement Fund Program.

"Densification" of the OIG using similar technology is shown as Option RR4 in Exhibit 71. It would allow up to 1,459,000 annual lifts, 97% of the OHIT capacity, and 90% of the Consolidated Terminal capacity. This option may be easier and less expensive for the Port to implement in the near future.

Rail Intermodal Terminal Findings

Due to the downturn in trade, the Port of Oakland's rail intermodal capacity is currently (2009) underutilized. Both railroads believe it will be at least five years before more capacity is needed. Union Pacific can act more or less independently, but BNSF's capacity depends on the Port.

The Port reportedly has sufficient marine terminal capacity to reach about 6 million TEU by 2025-2030. At that time about half the total, 3 million TEU, is expected to be intermodal. At an average of 1.8 TEU per container, the rail terminals would need capacity for 1.7 million annual lifts. As outlined in the MDAS report, the OHIT project would have barely reached that capacity in the largest conceptual buildout (a combined UP/BNSF intermodal facility). Since 2004, working experience with wide-span rail mounted gantries (RMGs) has increased expected lifts per acre, making it possible to achieve the necessary 1.7 million lifts in multiple yard configurations with less aggressive development assumptions.

If the Port of Oakland succeeds in building the OHIT and 7th Street Grade Separation (7SGS) projects as currently planned, the Port will have more than enough rail intermodal terminal capacity through 2030. Alternatively, a densified OIG option would provide most, if not all, of the needed capacity.

The 7SGS project is a necessary precursor to the full OHIT project, and the 7SGS project alone requires $252 million in matching funds that the Port does not have. OHIT needs another $110 million. Both projects also entail institutional issues that could raise costs or postpone implementation.

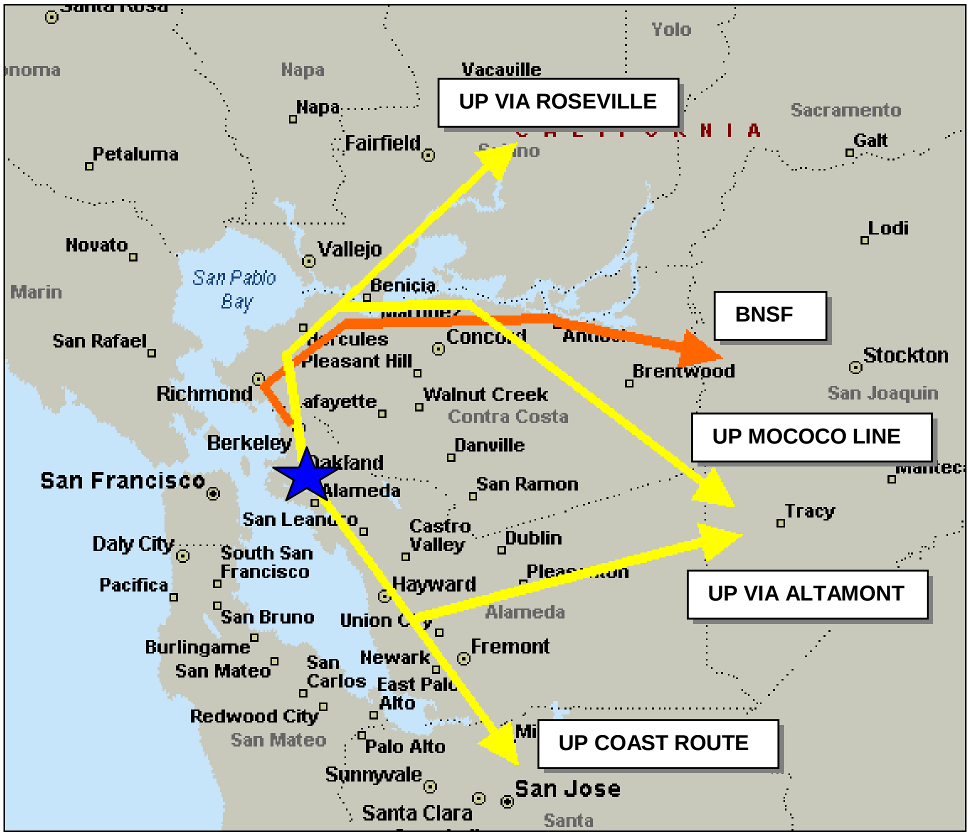
Wide-span crane technology and densification strategies together create sufficient productivity that the Port should have sufficient rail terminal capacity, even if full buildout is not possible, or timely. A densified OIG together with a partial OHIT buildout would, for example, probably yield sufficient capacity for growth through the planning horizon.

In addition BNSF's inactive Richmond terminal represents more than 120,000 lifts of unused terminal capacity near the Oakland Port area, as discussed in reference to the Port of Richmond. BNSF, however, does not consider drayage to Richmond as a viable option to near-dock capacity.

Mainline Rail Capacity

As shown on the map (Exhibit 74), there are rail routes leaving the SF Bay Area and the Port of Oakland to the north and south. Both routes split, creating five basic route options.

Exhibit 74: Port of Oakland Mainline Rail Routes



- UP north over the Martinez Subdivision and east via UP's own lines to Roseville, then via either the Feather River or Donner Pass routes over the Sierra Nevada to points east (or south through the Central Valley to Southern California and then east to Texas). This route handles most of UP's share.

- UP north over the Martinez Subdivision and east via the Mococo line to Tracy and beyond. This line has recently been reactivated.

- UP east through Niles Canyon, connecting up with UP's other routes near Stockton. This route is regularly used for intermodal trains.

- UP south along the coast to Southern California, connecting with other routes there. This route is essentially dormant for through service.

- BNSF north and east via UP's Martinez Subdivision to Stege (near Richmond), then via BNSF's own line though Franklin Canyon to Stockton, south to Barstow (using UP's line over Tehachapi Pass), and east to Chicago, etc. BNSF has carried most of Oakland's intermodal traffic on this route[3].

[3] BNSF was using UP's route through Sacramento as far south as Barstow, but this practice has been eliminated by an STB ruling.

There are currently three bottlenecks restricting long-term mainline capacity for double-stack trains to and from the port, although none of them constrain capacity during the current recession. . Each is addressed by an infrastructure improvement project.

Martinez Subdivision. UP's Martinez Subdivision ("Martinez Sub") is used by UP, BNSF, and Amtrak between Oakland and Stege (near Richmond) where BNSF branches off. The portion immediately north of the port through Oakland, Emeryville, Berkeley, and other cites has been congested and has multiple at-grade crossings. The portion north of Stege can also be congested, although not as badly.

The Martinez subdivision project would reduce congestion and expand capacity along this critical approach to the Port. The project has been approved as part of the TCIF. The total cost is estimated at $215 million, with construction originally planned to start in 2010 and finish in 2015.

Donner Summit. UP's line over Donner Pass would be the preferred route for UP double-stack train service in the Central Corridor, but does not have clearances for double-stacked high-cube containers[4]. The route was also downgraded from double to single track in some places in a past cost-cutting measure. As a result, most UP double-stack trains use the Feather River Canyon, a slower and longer route with higher maintenance costs.

The project to increase tunnel clearances and restore double track over Donner Summit would shorten the movement of containers to and from Oakland by approximately one day, by allowing unrestricted double-stacked trains to take this shorter route across the Sierra Nevada. The Donner Pass route is steeper and higher, but shorter (by about 65 miles) than the Feather River Canyon route. This project would have started in 2009, but has been withdrawn by UP. UP has reportedly plans started portions of the project with its own funds.

Tehachapi Route. The Tehachapi line between Bakersfield and Mojave is owned by UP but used by both BNSF and UP. UP, the owner, runs fewer trains and lower priority trains than BNSF, the tenant. The jointly used portion is about 75 miles and with a mix of double and single track and tight curves. The central portion of the Tehachapi line has sections of single track and a mix of signaling systems that restrict its capacity, especially as BNSF attempts to increase train lengths from 5000' up to 8000' or longer. UP has not increased the capacity of the line.

The TCIF Tehachapi project would add 7-15 miles of double track, remove three tunnels, extend a siding, and bring all the signaling system up to a common high standard. The Tehachapi TCIF project is a Caltrans-BNSF effort, with UP as the gate keeper and administrator. The total cost is estimated at $112 million, and BNSF has committed to funding slightly more than half ($58 million) to match the TCIF grant ($54 million).

Mainline Capacity Findings. It appears that the planned TCIF and UP capacity enhancements address the proper issues, and if carried out would create enough mainline capacity to handle the

[4] The tunnels on Donner Pass allow some double-stacked container combinations, but the restrictions make it difficult for the railroad to load permissible combinations and the route is rarely used for double-stack trains.

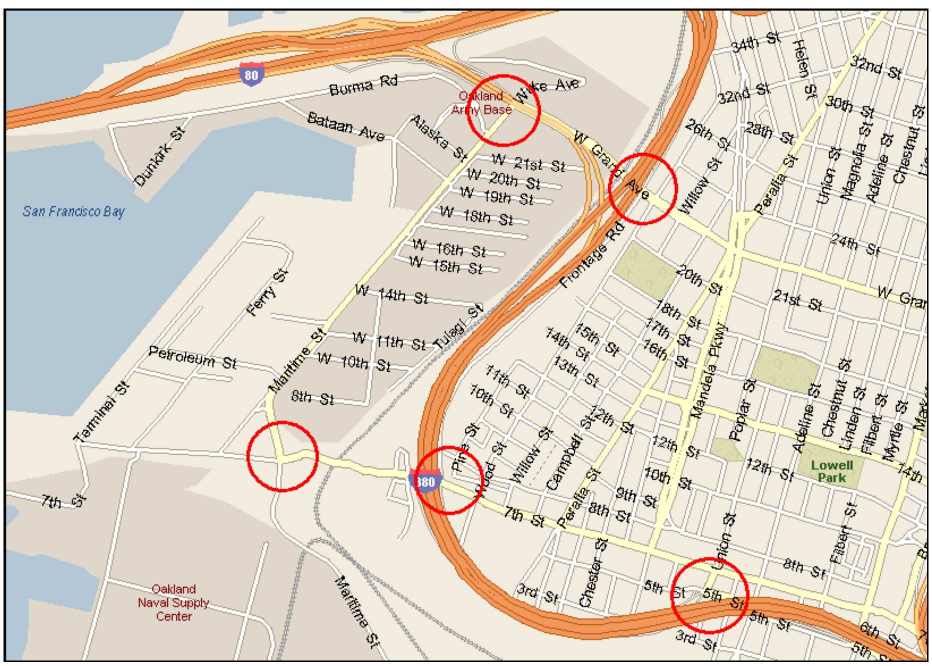
expected intermodal volume. Due to the recession, however, there is no urgency from the demand side.

Road and Highway Capacity

The MDAS indicates that the local and regional road and highway network could become a constraint on Oakland's throughput under certain circumstances. With what the MDAS calls "modest improvements to perimeter roadways and intersections" (Plan elements 0 and 1 in Exhibit 76), the local road system could support an annual port volume of between 3.3 and 3.9 million TEU before reaching unacceptable levels of service (i.e. severe congestion), depending on how much went by rail. These improvements would include minor widening, restriping, and signal modifications to the following intersections (Exhibit 75) at a total cost estimated in 2004 at $800,000.

- 5th Street and Union Street (Southbound I-880 off-ramp)
- 7th Street and I-880 northbound ramp
- W. Grand Avenue and Frontage roads (I-880 ramps)
- W. Grand Avenue and Maritime Street
- 7th Street and Maritime Street

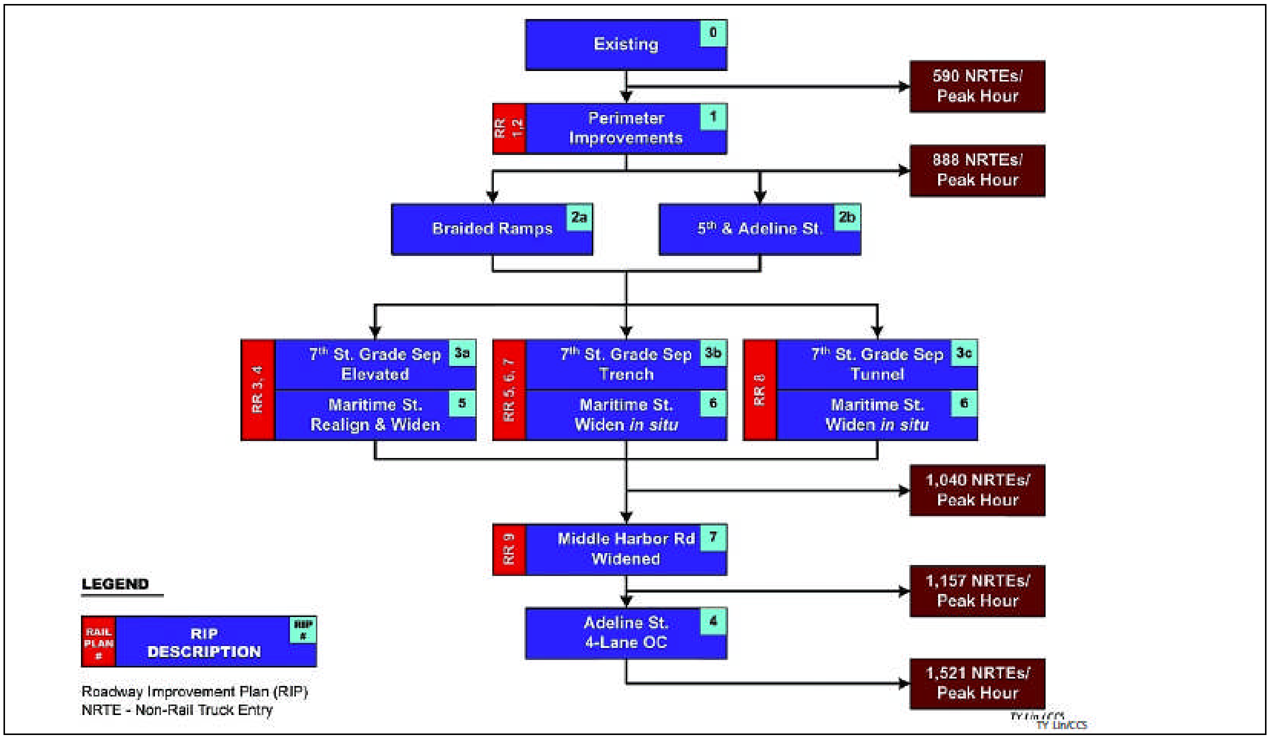
Exhibit 75: Port of Oakland Perimeter Intersections



More extensive improvements, some of which are incorporated in the 7SGS plan noted above, would yield capacities of 4.7 to 5.2 million TEU, at which point they would not be binding constraints.

In Exhibit 76, plan elements 0-2b would yield a capacity of up to 4.7 million TEU. To attain a capacity of 5.2 million TEU elements 3a-6 would be needed, which overlap the 7SGS plan above. Element 7, additional widening of Middle Harbor Road, would yield a port capacity of 6.7 to 8.6 million TEU, exceeding the marine terminal capacity.

Exhibit 76: Sequence of Port of Oakland Roadway Improvements.



Source: MDAS page 121

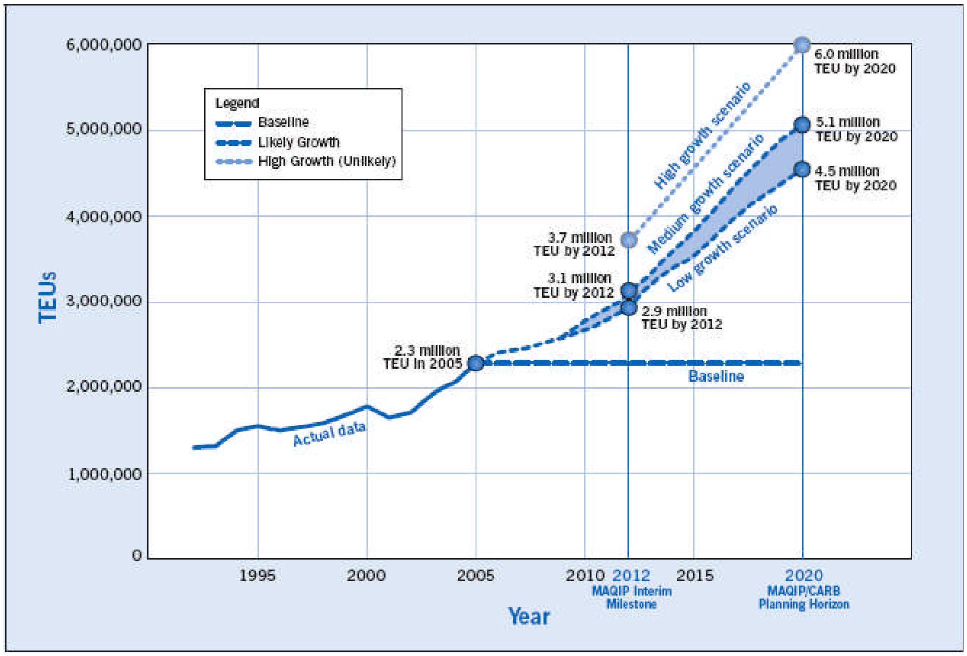
While by no means a certainty, the implementation of these roadway improvements is part of the Port long-term planning and has been funded in part by the TCIF, as noted above. The need for roadway improvements, along with the need for rail and marine terminal improvements, can be considered an integral part of the capacity improvement process.

Environmental Constraints

The Port of Oakland's 2009 *Maritime Air Quality Improvement Plan* (MAQIP) provides reasonable assurance that the Port of Oakland's capacity will not be constrained by environmental or related regulatory issues up to the Port's planning horizon of 5.1 million TEU in 2020, which exceeds the forecast in Exhibit 27.

As Exhibit 77 shows, the MAQIP considered multiple growth scenarios. Starting from a 2005 base year total of 2.3 million TEU, the MAQIP considered a range of 2.9 to 3.7 million by 2012 and a range of 4.5 to 6.0 million TEU by the 2020 planning horizon. The study notes that even the lower figure of 4.5 million TEU in 2020 may overstate the likely volume if key marine, rail, and road projects are not completed. The high growth scenario of 6.0 million TEU in 2020 was considered an upper bound on port capacity, and unlikely to be reached. The Port chose the medium growth scenario at 5.1 million TEU in 2020 for the MAQIP projections. All the forecast emissions and reductions in the MAQIP are therefore based on 5.1 million TEU in 2020.

Exhibit 77: Future Port of Oakland Cargo Growth Scenarios



Source: MAQIP, April 2009

IV. Forecast/Capacity Comparisons

Forecast vs. Capacity

The essential task of the Seaport Plan is to match capacity with demand. A comparison of the containerized cargo forecast developed in Section II and the capacities estimated in Section III indicates that the Port of Oakland has existing and potential capacity to handle the demand for containerized cargo through the SF Bay Area (Exhibit 78). At its present size of about 770 acres of terminal space and with need rail improvements, the Port of Oakland should have adequate capacity through 2025. At its anticipated size of about 866 acres it would have sufficient capacity to meet forecast demand through 2030. Expansion to the Seaport Plan total of 1000 acres would enable the Port to handle expected growth well beyond 2030.

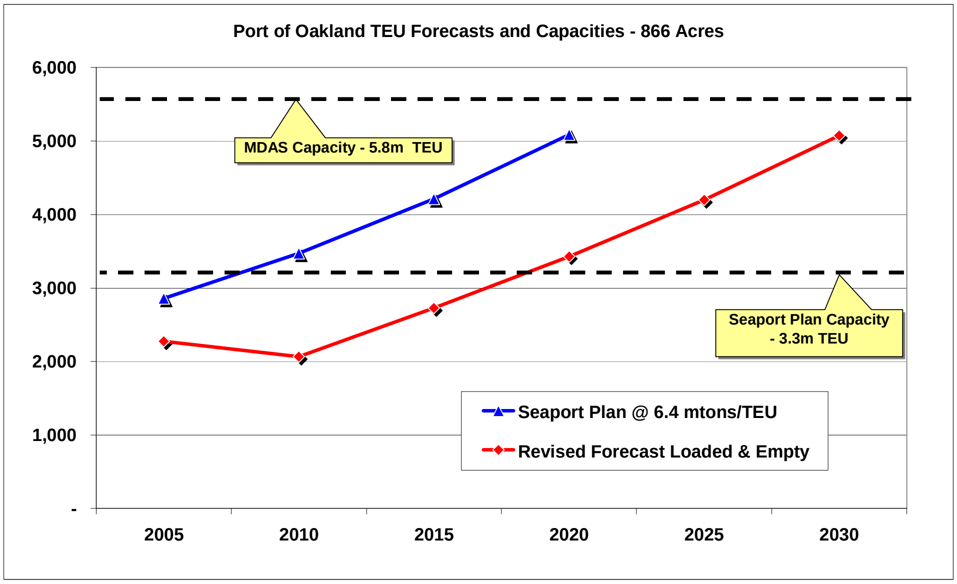
Exhibit 78: Forecast TEU versus Capacity

Measure	Containerized Cargo (000 TEU)					
	2005	2010	2015	2020	2025	2030
Forecast Demand						
Manalytics/WEFA Loaded TEU	1,837	2,236	2,724	3,303		
Seaport Plan @ 6.4 mtons/TEU	2,857	3,472	4,212	5,087	-	-
Revised Forecast Loaded & Empty	**2,274**	**2,061**	**2,723**	**3,427**	**4,194**	**5,067**
Capacity at 770 Acres						
Seaport Plan @ 6.4 mtons/TEU	2,951	2,951	2,951	2,951	2,951	2,951
MDAS Estimate	**5,134**	**5,134**	**5,134**	**5,134**	**5,134**	**5,134**
Capacity at 866 Acres						
Seaport Plan @ 6.4 mtons/TEU	3,319	3,319	3,319	3,319	3,319	3,319
MDAS Estimate	**5,774**	**5,774**	**5,774**	**5,774**	**5,774**	**5,774**
Capacity at 1000 Acres						
Seaport Plan @ 6.4 mtons/TEU	3,818	3,818	3,818	3,818	3,818	3,818
MDAS Estimate	**6,667**	**6,667**	**6,667**	**6,667**	**6,667**	**6,667**

Part of the Port's ability to handle forecast volumes is the reduction in the forecast over previous Seaport Plan estimates shown in Exhibit 78. The lower forecast essentially turns back the demand calendar by about six years. That effectively extends the capacity of the Port of Oakland, and thus of the SF Bay Area, by six years. The annual TEU/acre capacity estimates are also about 73% higher, further extending the Port's ability to absorb containerized trade growth.

Exhibit 79 provides a comparison based on planned terminal space of 866 acres. With that much space devoted to terminals, the productivity and capacity estimates in the MDAS report yield a total capacity of roughly 5.8 million TEU. This build-out capacity gives the port and the region a comfortable margin over the forecast volume of about 5.1 million TEU in 2030. The MAQIP indicates that the Port expects to meet environmental objectives at that same forecast volume.

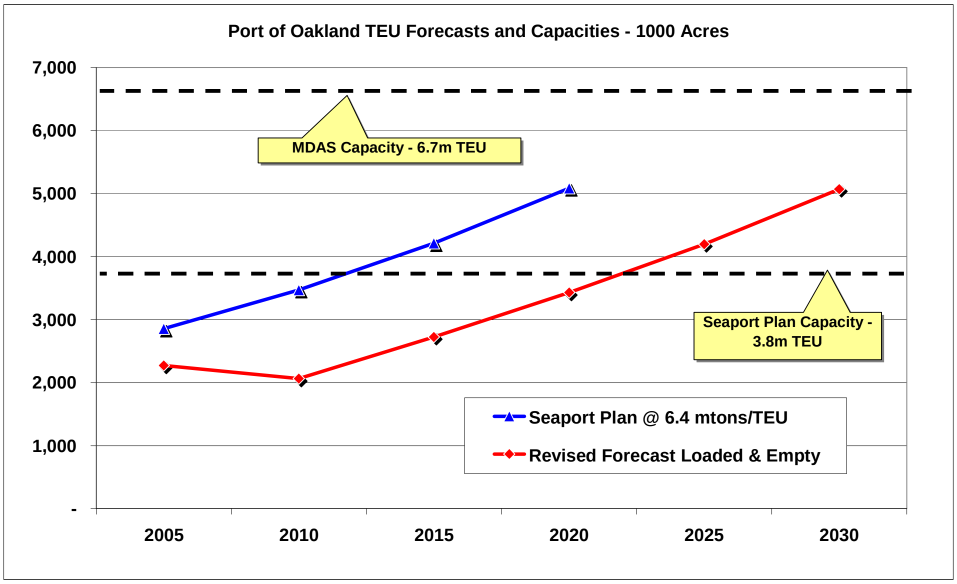
Exhibit 79: Port of Oakland TEU Forecast and Capacities at 866 Acres



The existence of excess potential capacity, as shown in Exhibit 79, also implies that the Port of Oakland can meet expected demand even if some improvement projects are delayed or must be built in stages. This observation adds a safety factor to the findings.

Exhibit 80 shows the same comparison, if the Port is able to reach the 1000 acres of terminal space anticipated in the Seaport Plan. In that case, there would be an even greater margin of potential capacity over forecast demand. In effect, the Port would be in the position of substituting additional land for some of the near-term technology investments.

Exhibit 80: Port of Oakland TEU Forecast and Capacities at 1000 Acres



Intermodal Share

Rail capacity is the binding constraint for the near term. As the MDAS points out, the larger the share of containers carried by rail the tighter the constraint. In effect, the Port of Oakland has greater capacity for Bay Area and Northern California cargo that would be trucked than for Midwest cargo that would move via rail.

When the MDAS was prepared about 28% of the maritime containers used the rail facilities. Those containers are generally bound to or from points in the Midwest and beyond, with the principal rail service being Oakland-Chicago. Such cargo is typically discretionary in that it can be handled at any major West Coast port with comparable service and at comparable cost. Indeed, one of Oakland's major strategic objectives is to obtain a larger share of such cargo, as the majority moves via San Pedro Bay, Puget Sound, or British Columbia ports. The remaining 72% of Oakland's cargo moves principally to and from the Port's regional hinterland in Northern and Central California and Northern Nevada, although some may come from more distant points.

The Port of Oakland could continue to grow beyond the capacity of the rail infrastructure if that growth consisted of local and regional cargo rather than intermodal containers. This observation raises the possibility that Oakland may still be able to handle the *regional* demand for containerized imports and exports by sacrificing its share of the discretionary intermodal cargo. This possibility also suggests that Oakland may be able to handle more regional demand than anticipated if the rail improvements are delayed, again by sacrificing the intermodal share.

Investment Needs

The Seaport Plan has implicitly assumed that ports, terminal operators, and other involved parties will make the required financial and organizational commitments to port and terminal capacity. That is still a critical assumption, particularly in the current recession.

The long-term container cargo capacity of the SF Bay Area, and specifically the Port of Oakland, depends on a continuing stream of major investments.

- Port investments in terminal expansion and infrastructure.
- State/Port and railroad capacity investments via the Transportation Corridor Infrastructure Fund (TCIF).
- Marine terminal operator investments in cargo handling equipment, technology, and systems.
- Railroad and partner investments in terminals, mainline, equipment, signaling, and other capacity factors.
- Port, Municipal, State, and Federal investment in roads and highways.
- Port and Federal investment in maintenance dredging.

There will doubtless be a near-term hiatus in many of these investment programs. The recession has resulted in excess capacity at port and rail facilities at the same time that both public and private revenue streams have diminished. The loss of six or more years of cargo growth may mean a comparable postponement in capacity investments.

The Port of Oakland itself is facing recession-induced financial challenges, in common with most US ports. As stated earlier some projects have been delayed and scaled back, and further adjustments will likely be needed. As trade recovers and the need for capacity increase eventually becomes manifest, Port finances will improve as well.

The two railroads concur on the eventual need for the designated rail infrastructure improvements, although they also agree that it is likely to be five years or more before the need becomes acute. Both railroads have the capability to accommodate near-term business surges, whether due to cargo routing decisions by customers or vessel routing decisions by ocean carriers.

The need for port-related arterial and highway improvements is also generally conceded. Funding and time will remain difficult to predict.

In the long run, therefore, the parties involved generally agree that the investments are a necessary part of their long-term capital and business plans. While the exact timing and nature of the investments will remain uncertain, the assumption that they will be made is consistent with a prudent approach to capacity planning.