Note to Reviewers and Executive Summary
Revised Draft Final Cargo Forecast
Version of 11.19.19

This revised draft final forecast has been prepared to meet the needs of BCDC and the Seaport Planning Advisory Committee, and to assist in timely evaluation of proposed Seaport Plan amendments.

This draft incorporates a second round of port and industry input. The consultant team anticipates a final round of refinements and revisions with the help of the Committee and interested stakeholders.

Accordingly, all analysis, findings, and conclusions should be considered draft, and subject to change or revision in the final version.

The significant changes since the previous draft include:

- **Container Cargo**. Minor corrections to the Port of Oakland acreages were made after input from the Port. The previous berth analysis has been replaced with a higher-level approach that does not rely on allocating specific services and vessel to specific terminals. The results are similar to those of the previous approach.
- **Ro-Ro Cargo.** The import forecast has been adjusted slightly upward after additional analysis found little evidence of a shift to shared-vehicle services, and identified off-setting factors. Long-term acreage at Benicia and the Port of San Francisco was also adjusted based on Port feedback.
- **Dry Bulk Cargo.** Moderate and Strong Growth productivities (annual metric tons per acre) were adjusted upward to match the current Eagle Rock facility at Richmond and the proposed Eagle Rock facility at Oakland. Available acreage was adjusted for the Port of San Francisco.

The net impact on most study findings was small, as comparing the draft and revised summaries below reveals. The largest impact was in the demand for Ro-Ro terminal space.

Available Acres vs. Required Acres: 6/13/19 Draft Summary

Site	Acres	Potential Use		
		Container	Ro-Ro	Dry Bulk
SF Pier 96	50		X	X
Oakland Berths 20-21	20	X		X
Oakland Berths 22-24	130	X		
Oakland Berths 33-34	20	X		
Oakland Roundhouse	20	X		
Oakland Howard	50	X	X	X
Richmond Terminal 3	20		X	X
Available Acres	**310**	**170-240**	**0-120**	**0-140**
Moderate Growth Needs	**271**	**164**	**73**	**34**
Slow Growth Needs	36	-22	35	23
Strong Growth Needs	646	425	148	73

Available Acres vs. Required Acres: 11/19/19 Revised Summary

Site	Acres	Potential Use		
		Container	Ro-Ro	Dry Bulk
SF Pier 96 & Other	67		X	X
Oakland Berths 20-21	20	X		X
Oakland Berths 22-24	130	X		
Oakland Berths 33-34	20	X		
Oakland Roundhouse	26	X		
Oakland Howard*	38	X	X	X
Benicia Short-Term Lease	35		X	
Richmond Terminal 3	20		X	X
Available Acres	**356**	**189-250**	**35-162**	**0-147**
Moderate Growth Needs	**358**	**166**	**158**	**34**
Slow Growth Needs	100	-20	97	23
Strong Growth Needs	777	427	278	73

* Post turning basin expansion: 38 acres container, 40 acres Ro-Ro or dry bulk

Executive Summary

Overview

The *San Francisco Bay Area Seaport Plan* (Seaport Plan), prepared by the San Francisco Bay Conservation and Development Commission (BCDC), guides the development and use of the Bay Area's seaport land. The Seaport Plan focuses on the lands designated for "port priority use" in the *San Francisco Bay Plan*. The general goal of the Seaport Plan is to ensure that the Bay Area retains sufficient seaport capacity to serve its foreseeable waterborne cargo needs. The Seaport Plan covers five generic cargo types:

- Containerized cargo
- Roll-on/Roll-off (Ro-Ro) cargo (formerly classified as "neo-bulk")
- Dry bulk cargo
- Break-bulk cargo (not currently handled)
- Non-petroleum liquid bulk cargo

The composition of SF Bay Area cargo flows has changed over time, and will continue to shift in response to demand, trade conditions, and competitive alternatives. Exhibit 1 shows the commodities moving through Bay Area ports as of early 2019.

Exhibit 1: Current 2019 Bay Area Cargo Flows

Commodity	Seaport Plan Public Ports					Private Terminals	
	Oakland	Richmond	Benicia	Redwood City	San Francisco	Levin Richmond	Others
Containerized Imports	X						
Containerized Exports	X						
Containerized Domestic IB	X						
Containerized Domestic OB	X						
Import Autos		X	X		X		
Export Autos		X	X		X		
Export Scrap Metal				X		X(2)	X(1)
Import Veg Oils		X					
Import Chemicals							X
Import Gypsum				X			X
Import Cement				X	X		
Export Pet Coke			X			X	
Export Coal						X	
Import Sand & Gravel				X	X	X	X
Harvested Bay Sand					X		
Import Slag				X			
Import Bauxite				X			

(1) Schnitzer Steel (2) From SIMS Richmond

This report provides 30-year forecasts for the relevant cargo types, and a high-level review of marine terminal capacity and expansion potential. Future cargo volumes through Bay Area seaports will be determined by economic activity in the Bay Area itself, and in the broader Central and Northern California market. Available near-term forecasts identified in this section share a common view that growth in California over the coming three to five years will be slower than in the pre-recession years, and that the West Coast economy in general will grow more slowly than in the rest of the nation. The limited number

of long-term forecasts available tend to focus on population and expect steady growth over the long term, but again at a slower rate than previously seen in California.

Containerized Cargo

The previous containerized cargo forecasts prepared for BCDC were developed by Tioga in 2009 to assist BCDC in evaluating the proposed use of Richmond's Port Potrero site for Ro-Ro cargo rather than for containers. That forecast was prepared toward the end of the 2008-2009 recession, and reflected widespread expectations for a relatively strong recovery. Post-recovery trade growth deviated from those expectations, and cargo has grown more slowly than expected.

Container Cargo Forecast. The international TEU forecasts for imports and exports are driven by projections of economic growth developed by Moody's and Caltrans, including sub-components of national-level Gross Domestic Product, industrial output, and Gross Metro Product. The Moderate Growth scenario assumes that:

- Trade disputes are resolved, and most trade flows return to their recent growth patterns;
- Exporters affected by trade disputes either regain those former markets or find new markets;
- Long term exports rebound as foreign markets recover economically;
- Refrigerated container trade grows due to the development of the recently completed Cool Port facility at the Port of Oakland; and
- Imports of automobile parts increase as Tesla increases production.

Exhibit 2 shows the elements of the Moderate Growth container cargo forecast. The Slow Growth and Strong Growth scenarios have alternative assumptions documented in the report. The empty TEU forecast is built upon the loaded TEU forecast and the relationship between empty containers and loaded container movements. Domestic container volumes between the Port of Oakland and Hawaii are more opaque, and likely are driven primarily by market share shifts rather than economic growth.

Exhibit 2: Bay Area Moderate Growth Containerized Cargo Forecast, 2010-2050

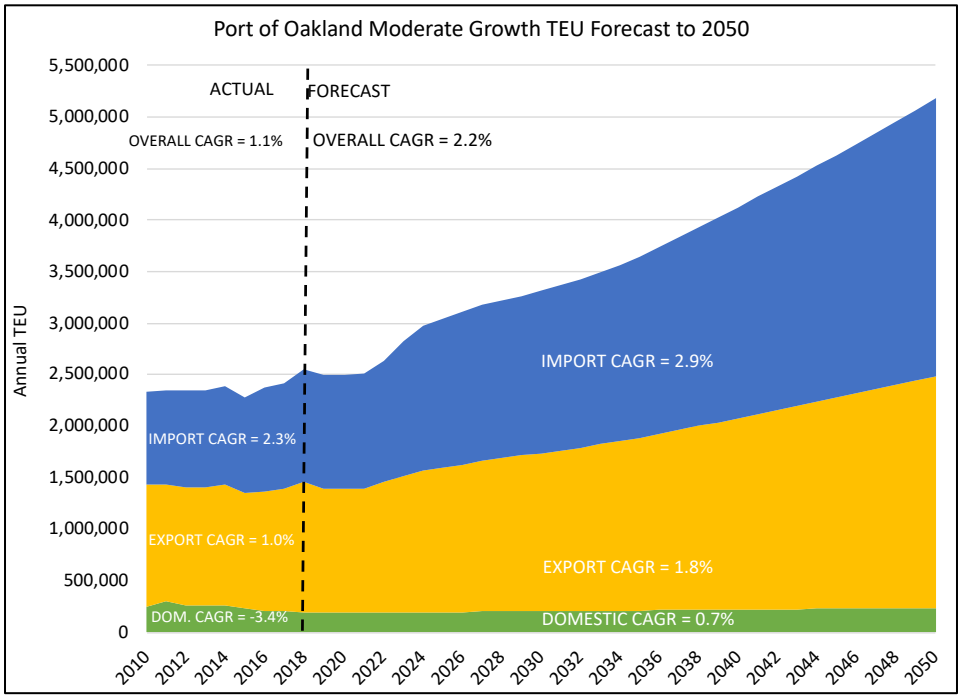
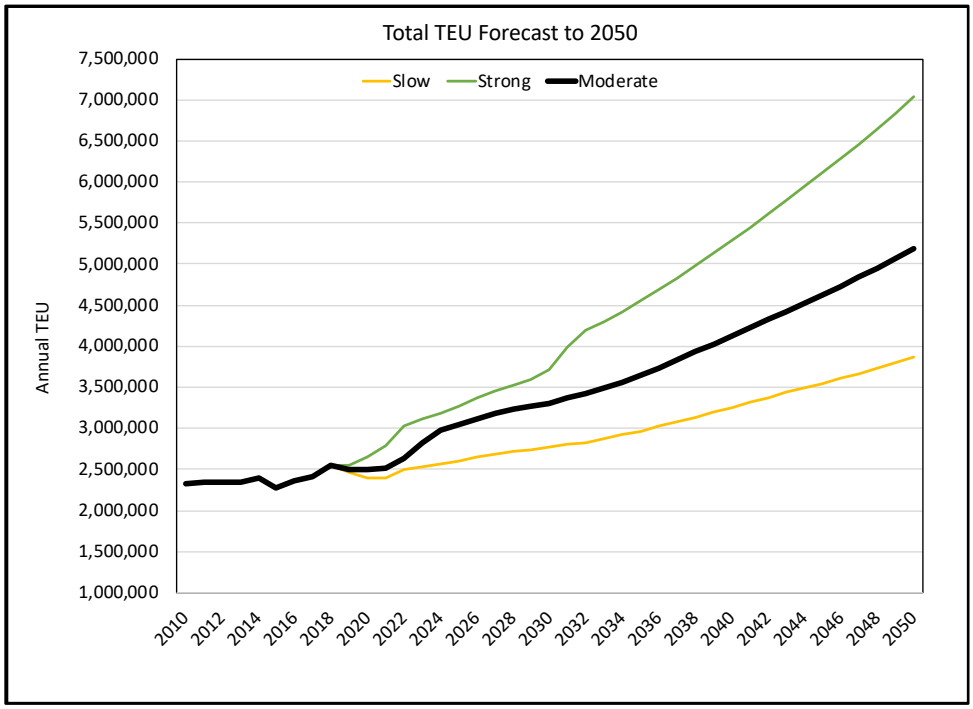


Exhibit 3 displays the three TEU forecast scenarios.

Exhibit 3: Total TEU Forecast to 2050



Container Terminal Capacity. Exhibit 4 shows the Port of Oakland's acreage in terminals and major off-dock parcels. The post-electrification acreages allow a two-acre battery exchange complex or equivalent to support electrically powered zero-emissions container handling equipment.

Exhibit 4: Port of Oakland Terminals and Acreages

Site	Acres	2019 Acres in Use	Potential Terminal Acres	Build-out Acres	Post-Electrification Acres
Ben Nutter	75	75	0	**95**	**93**
Berths 33-34	20		20		
OICT 55-56	120	120	0	**290**	**288**
OICT 57-59	170	170	0		
TraPac	123	123	0	**123**	**121**
Matson	75	75	0	**101**	**99**
Roundhouse	26		26		
Berths 20-21**	20		150	**150**	**148**
Berths 22-24	130				
Howard*	50		50	**40**	**38**
Subtotal	**809**	**563**	**246**	**799**	**787**
Off-Dock Staging***	30	30	0	0	0
Total	**839**	**593**	**246**	**799**	**787**

* Assumes 10 acres will be used for Inner Harbor Turning Basin

** 20 acres may become dry bulk terminal for 15 years (in negotiation)

**Not usable as long-term terminal space

The Port of Oakland container terminals currently average about 4,279 annual TEU per acre. The consultant team estimated maximum current capacity at 6,061 annual TEU per acre based on current OICT performance, and long-term sustainable capacity at 7,112 annual TEU per acre based on achieving high terminal productivity in line with industry benchmarks. The forecast thus allows for a 66% productivity increase over the present average throughput. Container terminals can be expected to expand horizontally where possible, and then invest in productivity improvements to accommodate further cargo growth.

Ancillary Service Needs. As of early 2019, there were approximately 314 acres of land in the immediate Port area either already in an ancillary use (e.g. Cool Port or the two cargo facilities on Union Pacific Land); under development for an ancillary use (e.g. Center Point Phase 1 or Prologis Buildings 2 and 3); or available for long-term ancillary use. Estimated acres required for all ancillary uses range from 167 in the Slow Growth scenario to 269 in the Strong Growth scenario. These comparisons suggest that there is adequate space within the Port of Oakland complex, including Port, City of Oakland, and Union Pacific land, for the identified ancillary services to support projected cargo growth in all three scenarios.

Container Cargo Growth vs. Terminal Capacity. Exhibit 5 shows that the Port of Oakland would be at or near capacity under the Moderate Growth forecast and at estimated maximum terminal capacity under high productivity assumptions. The Port currently plans to use about 20 acres at Berths 20-21 for dry bulk cargo for the next 15 years. If that land is not returned to container cargo use, the Port would be at about 95% of capacity by 2050 under Moderate Growth assumptions. If Howard Terminal were unavailable for container cargo handling but Berths 20-21 were available, the Port would be at about 98% of capacity in 2050. If both Howard and Berths 20-21 were unavailable for container cargo use, the port would be slightly over capacity by 2050. The Slow Growth forecast would leave Oakland at 69%-75% of capacity by 2050, while the Strong Growth forecast would exceed the port's estimated maximum capacity by 26% to 36%.

Exhibit 5: Container Cargo Growth vs. Annual Terminal Capacity

Estimated Annual Sustainable TEU Capacity for:	Phase VI: High Productivity at all Terminals	2050 Moderate Growth TEU and Maximum Capacity Utilization		2050 Slow Growth TEU and Maximum Capacity Utilization		2050 Strong Growth TEU and Maximum Capacity Utilization	
All Potential Terminal Acres	5,597,348	5,187,588	93%	3,862,435	69%	7,038,560	126%
Potential Terminal Acres w/o Howard	5,312,858	5,187,588	98%	3,862,435	73%	7,038,560	132%
Potential Terminal Acres w/o Berths 20-21	5,455,103	5,187,588	95%	3,862,435	71%	7,038,560	129%
Potential Terminal Acres w/o Howard or Berths 20-21	5,170,613	5,187,588	100%	3,862,435	75%	7,038,560	136%

A more stringent requirement, capacity to handle the 8.4% average August monthly peaking, would lead to somewhat more serious or earlier shortfalls, as explained in the report body.

To facilitate comparisons between cargo types, Exhibit 6 shows terminal acres available and required under the maximum productivity assumption.

Exhibit 6: Container Cargo Growth and Acreage Requirements

Container Terminal Acres	2050 Acres Available*	Moderate Growth		Slow Growth		Strong Growth	
		Required	Reserve	Required	Reserve	Required	Reserve
All Potential Terminal Acres	787	729	58	543	244	990	(203)
Potential Terminal Acres w/o Howard	747	729	18	543	204	990	(243)
Potential Terminal Acres w/o Berths 20-21	767	729	38	543	224	990	(223)
Potential Terminal Acres w/o Howard or Berths 20-21	727	729	(2)	543	184	990	(263)

* Post-electrification

Berth Requirements. Container vessel size and the associated need for greater berth length are both increasing. The consultant team developed multiple scenarios for future vessel sizes and vessel calls, and checked their implications for berth length as an annual average and for the peak weekday (Exhibit 7). Utilization in excess of 65% would likely result in congestion at the terminal. The Port would exceed 70% peak day utilization under the moderate growth scenario based on the existing, active container berths, regardless of whether vessel size was limited to 14,000 TEU, to 25,000 TEU, or not limited at all. Limiting vessel size to 14,000 TEU would likely exceed the standard of 65% utilization in each of the three future berth availability alternatives under the moderate growth scenario. Limiting vessel size to 25,000 TEU or not restricting vessel size would likely exceed the standard of 65% utilization only in the most restrictive of the berth availability alternatives (i.e. without Berths 20-21 or Howard Terminal) under the moderate growth scenario.

Exhibit 7: Port of Oakland Forecast Berth Utilization on Peak Weekday

Berth Capacity				2050 Berth Required Peak* Daily Foot-Hours					
				Moderate Growth Case					
Berth Dimensions	Nominal Berths	Total Berth Feet	Daily Berth Foot-Hours	No Vessel Cap	Peak Ute.	14,000 TEU Cap	Peak Ute.	25,000 TEU Cap	Peak Ute.

Existing Terminal Berth Dimensions (feet)	14	21,484	365,832	265,165	72%	341,974	93%	268,267	73%
Future Terminal Berth Dimensions (feet) with Expanded Turning Basin	18	19,094	458,256	265,165	58%	341,974	**75%**	268,267	59%
Future Terminal Berth Dimensions (feet) with Turning Basin & Howard Dolphin	18	19,594	470,256	265,165	56%	341,974	**73%**	268,267	57%
Future Terminal Berth Dimensions (feet) with Turning Basin w/o Howard	16	16,007	384,168	265,165	**69%**	341,974	**89%**	268,267	**70%**

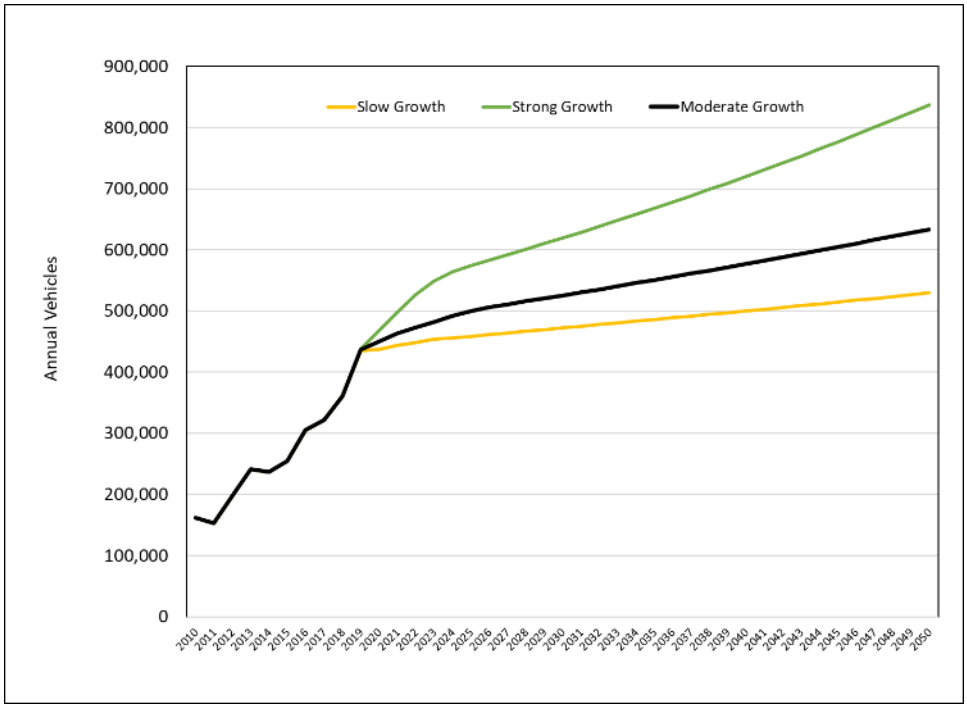
*Peak Utilization reflects 23% of weekly capacity at berth on Wednesday

Ro-Ro (Neo-Bulk) Cargo

The Seaport Plan has used the term "neo-bulk" to describe cargos that are neither containerized nor bulk, but do not require the traditional piece-by-piece handling of break-bulk cargo. Roll-on roll-off (Ro-Ro) shipment of autos and other vehicles has come to dominate this cargo segment, and is the only active "neo-bulk" category at SF Bay Area ports. The analysis therefore uses the "Ro-Ro" nomenclature for clarity and consistency with industry terminology.

The outlook for Ro-Ro cargo through San Francisco Bay depends on the growth in import and export auto volume, and on how many vehicles can be stored, processed, and moved through Bay Area facilities. The compound annual growth rate between 2019 and 2050 is projected to be 1.2% in the Moderate Growth scenario, 0.6% in the Slow Growth scenario, and 2.1% in the Strong Growth scenario (Exhibit 8).

Exhibit 8: Ro-Ro Cargo Forecast to 2050



The Ports of Richmond, Benicia, and San Francisco are currently handling import and export autos in Ro-Ro vessels. Exhibit 9 shows that existing Ro-Ro terminals total about 215 acres, which compares closely to the estimate of 212 acres currently required under the team's base productivity estimates. This comparison is also consistent with the observations by port officials that the Richmond and Benicia terminals are operating at or near capacity at present.

Exhibit 9: Bay Area Ro-Ro Terminals and Scenario Capacities

Terminal	Acres	Low Capacity	Base Case Capacity	High Capacity
Annual Units per Acre		**1,371**	**1,700**	**2,173**
Existing	**215**	**294,859**	**365,500**	**467,146**
Benicia	75	102,858	127,500	162,958
Richmond Port Potrero	80	109,715	136,000	173,822
SF Pier 80	60	82,286	102,000	130,366
Potential	**142**	**194,744**	**241,400**	**308,534**
SF Pier 96 & Other	67	91,886	113,900	145,576
Benicia Short-Term Lease	35	48,000	59,500	76,047
Oakland Howard Terminal*	40	54,857	68,000	86,911
Total	**357**	**489,603**	**606,900**	**775,679**

*Assumes turning basin widening

The table in Exhibit 10 displays the combined Ro-Ro forecast and capacity analysis. Nine scenario combinations are presented. The Moderate Growth forecast and base case productivity scenario together suggest that 288 acres of Ro-Ro terminal space would be required to handle 488,768 vehicles in 2050, and

about 73 additional acres of Ro-Ro terminal space would be needed. The Slow Growth scenario would require about 35 additional acres with base case productivity. The Strong Growth forecast would require 148 acres of additional space under the base case productivity, or 69 additional acres with higher productivity.

Exhibit 10: Ro-Ro Cargo Summary

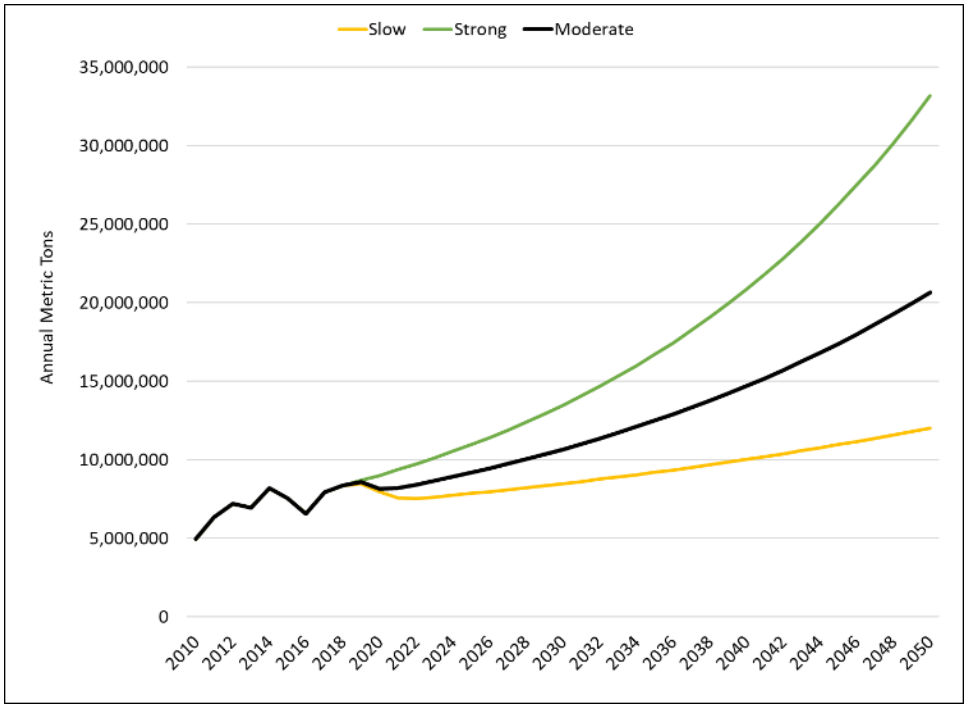
Scenario		2018	2020	2030	2040	2050	Existing Acres	New Acres	CAGR
Slow Growth		**360,671**	**437,142**	**472,160**	**500,067**	**529,633**			**1.2%**
Low Prod. Acres	L/L	212	267	344	365	386	215	171	1.9%
Base Prod. Acres	L/B	212	257	278	294	312	215	97	1.2%
High Prod. Acres	L/H	212	247	217	230	244	215	29	0.4%
Moderate Growth		**360,671**	**449,429**	**525,521**	**577,099**	**633,739**			**1.8%**
Low Prod. Acres	B/L	212	274	383	421	462	215	247	2.5%
Base Prod. Acres	**B/B**	**212**	**264**	**309**	**339**	**373**	**215**	**158**	**1.8%**
High Prod. Acres	B/H	212	254	242	266	292	215	77	1.0%
Strong Growth		**360,671**	**468,328**	**619,387**	**720,153**	**837,312**			**2.7%**
Low Prod. Acres	H/L	212	286	452	525	611	215	396	3.4%
Base Prod. Acres	H/B	212	275	364	424	493	215	278	2.7%
High Prod. Acres	H/H	212	264	285	331	385	215	170	1.9%

Dry Bulk Cargo

The dry bulk imports handled through Bay Area ports have long been dominated by construction industry needs. The major commodities have included, and continue to include, aggregates (sand and gravel), bauxite and slag (used as concrete additives), and gypsum (used in wallboard). Outbound dry bulk cargos include scrap metal, petroleum coke (pet coke, a refinery by-product), and coal.

Dry Bulk Forecast. Exhibit 11 displays the combined tonnage forecast for dry bulk commodities, including imports, exports, and harvested bay sand. The main drivers are growing demand for sand and gravel and a dwindling regional supply, leading to increased imports.

Exhibit 11: Bay Area Total Dry Bulk Cargo Forecast, 2010-2050



Dry Bulk Capacity. The current (2012) Bay Area Seaport Plan includes a benchmark of 13 acres, with one berth for a dry bulk terminal and an average throughput capability of 1,037,000 metric tons per berth. As Exhibit 12 shows, Bay Area dry bulk terminals in 2018 average about 50,256 annual metric tons per acre and 696,460 metric tons per berth. The productivity forecast considers a spectrum of efficiency improvements that increase the number of metric tons handled per acre at varying rates by scenario, either by gradually introducing denser storage or by moving the product through the terminal and out to the customer faster. combines these productivity scenarios to estimate terminal requirements under Moderate, Slow, and Strong Growth forecasts. The Moderate Growth scenario anticipates an average of 113,379 annual metric tons per acre, a bit more than double the current average and in line with new terminal proposals. Moderate Growth would likely require the equivalent of 163 additional acres and 1 additional berth to handle the expected volume.

Exhibit 12: Bay Area Estimated Dry Bulk Terminal Requirements for 2050

Factor	Existing	Moderate Growth	Slow Growth	Strong Growth
Annual Metric Tons	8,357,516	20,654,542	12,025,443	33,183,607
Tonnage increase	na	131%	39%	261%
Acres	**166**	**182**	**166**	**227**
Additional Acres		**16**		**61**
MT/Acre	50,256	113,379	79,769	146,295
Increase over 2018		126%	44%	191%
Acres per Terminal	13.9	13.8	13.4	14.9
Terminals	**12**	**13**	**12**	**15**
MT/Berth	696,460	1,558,957	866,730	2,402,750
Berths	**12**	**13**	**12**	**15**
Additional Berths		**1**		**3**

Other Cargo Types

Bay Area Seaport facilities at Richmond continue to handle some non-refinery liquid bulk cargo, including imported vegetable oils and chemicals. These are single-purpose terminals, however, and most are under private ownership. Cargo movements may rise or fall on a commodity-by-commodity basis without strong long-term trends. Accordingly, the consultant did not analyze these flows or terminals in detail.

Some Bay Area seaport terminals previously handled break-bulk or project cargo. None handle such cargoes at present, and there is no specific projection for future demand. As the need for break-bulk or project cargo shipments (e.g. windmill parts) could arise in the future, there may be a purpose in maintaining break-bulk capability for the Bay Area, perhaps within container or Ro-Ro terminals.

Summary Findings

The Bay Area's seaports can expect long-term cargo growth in three sectors that could stress capacity: containerized cargo, Ro-Ro vehicle cargo, and import dry bulk cargo. There are three basic strategies for accommodating the expected growth: increased throughput at existing facilities; horizontal expansion onto vacant land or land in other uses within seaport complexes; and use of dormant marine terminals.

Increased throughput at existing terminals is generally the least costly, most efficient, and least disruptive means of accommodating growth. Terminal operators can be expected to expand throughput to the point at which the terminal becomes congested or when substantial capital investment is needed to increase capacity. At that point, economic and financial tradeoffs will determine the preferred expansion path. Horizontal expansion onto available seaport land is often less costly and easier to implement than expansion via capital investment on existing footprints.

Exhibit 13 provides estimates of total seaport terminal acreage requirements under the three forecast scenarios. There are many possible variations. The three cargo types will not necessarily follow similar growth scenarios, although all will be affected by the same underlying regional economic growth trends. Also, different terminals may follow different productivity strategies. The general implication of

Exhibit 13, however, is clear:

- Under moderate cargo growth assumptions, the Bay Area will need more active terminal space, estimated at about 271 acres by 2050.
- Under slow cargo growth assumptions, the Bay Area will need about 36 acres more active terminal space by 2050.
- Under strong growth assumptions across the three cargo types, the Bay Area will need substantially more seaport terminal space, about 646 more acres than is now active (and will need to activate additional berth space for larger container vessels).

Exhibit 13: Estimated Seaport Acreage Requirements

Forecast Scenario	Container Cargo Terminal Acres			Ro-Ro Cargo Terminal Acres			Dry Bulk Cargo Terminal Acres			Combined Cargo Terminal Acres		
	Existing*	2050**	Additional	Existing	2050***	Additional	Existing	2050***	Additional	Existing	2050	Additional
Moderate Growth	**563**	**729**	**166**	**215**	**373**	**158**	**166**	**182**	**17**	**944**	**1,284**	**358**
Slow Growth	563	543	(20)	215	312	97	166	166	-	944	1,021	77
Strong Growth	563	990	427	215	493	278	166	227	62	944	1,709	766

* In-use acreage at Port of Oakland
** At high productivity Phase VI
***Under base productivity assumptions

Available Terminal Expansion Sites

Within the Bay Area seaports there are a few dormant or under-utilized terminal sites.

- San Francisco's Pier 96, formerly part of the Pier 94-96 container terminal, is currently partially vacant and partially in non-cargo uses. There is also usable land between Pier 92 and Pier 94.
- Oakland's Berth 20-21 area is used for ancillary services at present, although there is an active proposal to develop a dry bulk terminal there.
- Oakland's Berth 22-24 area, formerly part of the Ports America complex, is currently used for ancillary port functions.
- Oakland's Berth 33-34 area, between the Ben E. Nutter and TraPac terminals, is currently used for ancillary port functions.
- Oakland's Howard Terminal is also currently used for ancillary services.
- Oakland's Roundhouse parcel, although not on the water, is adjacent to active container terminals.
- Richmond's Terminal 3, formerly a small container terminal, is currently being used to load logs into containers for export through Oakland, but is not handling any cargo over the wharf.

Exhibit 14 lists these sites, their size, and their potential uses. The table also illustrates some inherent tradeoffs.

Exhibit 14: Bay Area Seaport Expansion Sites

Site	Acres	Potential Use		
		Container	Ro-Ro	Dry Bulk
SF Pier 96 & Other	67		X	X
Oakland Berths 20-21	20	X		X
Oakland Berths 22-24	130	X		
Oakland Berths 33-34	20	X		
Oakland Roundhouse	26	X		
Oakland Howard*	38	X	X	X
Benicia Short-Term Lease	35		X	
Richmond Terminal 3	20		X	X
Available Acres	**356**	**189-250**	**35-162**	**0-147**
Moderate Growth Needs	**358**	**166**	**158**	**17**
Slow Growth Needs	77	-20	97	-
Strong Growth Needs	766	427	278	62

* Post turning basin expansion: 38 acres container, 40 acres Ro-Ro or dry bulk

- San Francisco's Pier 96 was most recently used to handle containers. Its limited draft, however, would make it less suitable for container handling than the Oakland locations. Moreover, the container shipping industry previously consolidated at the Oakland terminals, and an isolated terminal across the Bay at San Francisco is unlikely to be attractive to container shipping lines in the future. Pier 96 also lacks access to active rail intermodal facilities. Trucks connecting Pier 96 with inland customers would add to congestion on the bay bridges. Pier 96 and adjacent land would therefore most likely be suitable for Ro-Ro or dry bulk cargos.
- Oakland's Berth 22-24 site is expected to be used for container cargo in the long run. The consultant team's analysis suggests that the Berth 22–24 capacity will be required under any container forecast scenario, and there have been no proposals to use this space for other cargos.
- Oakland's Berths 20-21 may be used for dry bulk cargo, either as an interim use or in the long term. If so, available container berth space would be reduced as well, increasing the need to either boost productivity or expand container operations to Howard Terminal.
- Oakland's Roundhouse site has no berth access, and can only function as added space for adjacent container terminals.
- Oakland's Howard Terminal capacity may be required for container handling under the forecast scenarios, depending on what degree of other productivity improvement is implemented at other terminals. In addition to its terminal acreage, Howard's berth capacity may be required to handle larger vessels or additional services under a Strong Growth scenario, particularly if Berths 20-21 are used for dry bulk cargo. Howard Terminal may also be a logical expansion site for Ro-Ro vehicle handling. Howard could also handle dry bulk cargo under some circumstances, and Schnitzer Steel has expressed interest in using a portion of Howard to expand its adjacent operations.
- Richmond's Terminal 3 has limited space, as the terminal totals about 20 acres. With such limited backland, 35' of draft, and isolation from the Oakland terminals, T3 is not a viable location for container handling. T3 would most likely serve as auxiliary parking for the Pt. Potrero Ro-Ro terminal. It could also handle dry bulk or break-bulk cargos.

As

- Exhibit 13 indicates, moderate container cargo growth through 2050 could probably be handled at Oakland without Howard Terminal, but as Exhibit 5 shows, Oakland would have little or no room for future growth. Strong container cargo growth would exhaust Oakland's total capacity unless terminals can boost productivity to higher levels than anticipated.
- Dry cargo growth may conflict with the availability of SF Pier 96, Oakland's Berth 20-21, or Howard Terminal for Ro-Ro or container cargo.

Overall, utilizing most or all of Pier 96 and Howard Terminal would probably be required for sufficient capacity under the Moderate Growth scenario. The Bay Area should have sufficient capacity in the Slow Growth Scenario through 2050. Available space would be insufficient under the Strong Growth scenario even if all available terminals were utilized.