

FINAL REPORT

**STRATEGIC ASSESSMENT
OF
MARITIME BUSINESS**

PREPARED FOR

**PORT
OF
REDWOOD CITY**

PREPARED
BY



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Strategic Maritime Assessment Table of Contents

I.	Introduction	1
	A. General.....	1
	B. Port of Redwood City – Profile.....	1
	C. TranSystems	1
	D. Methodology.....	2
II.	SWOT Analysis.....	4
	A. General.....	4
	B. Strengths	6
	C. Weaknesses.....	6
	D. Opportunities.....	7
	E. Threats	8
	F. Strategic Alternatives.....	9
	G. Recommendations.....	10
	H. Maritime Strategic Plan	11
III.	Existing Cargo.....	13
	A. Recyclables	13
	B. Building Materials	13
IV.	Other Cargo Opportunities.....	15
	A. Automobile.....	15
	B. Refrigerated.....	16
	C. Short Sea Shipping.....	17
	D. Forest Products	19
	E. Summary of Terminal and Vessel Requirements	20
V.	Competitive Landscape.....	21
VI.	Infrastructure.....	22
	A. Channel Dredging.....	22
	B. Rail and Road Connections.....	22
	C. Land Expansion.....	23
	D. Covered Bulk Storage	23
	E. Ferry Service	25
VII.	Appendices.....	26
	A. Previous Studies.....	26
	B. Port Commissioners’ Comments	27
	C. Interview Contacts.....	28

I. Introduction

A. General

This report is the first step towards a maritime strategic plan for the Port of Redwood City. The report is a top down assessment of the maritime business at the port, including a SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis, research on the future of the dry bulk commodities comprising the port's current business, and research on other maritime cargo opportunities identified in the SWOT Analysis. The current and future competitive landscape is also included in the analysis. Any subsequent steps to a full strategic plan, especially involving land expansion, should be coordinated with the City of Redwood City and their land use planning for the port area.

The overall objective of the strategic planning process is to describe what the port may look like in five to ten years, identify the main drivers of the port's business, offer strategic alternatives, and define strategic activities that could be undertaken by the port.

B. Port of Redwood City – Profile

The Port of Redwood City is located at the southwestern end of San Francisco Bay. A federally authorized 30-foot deep channel from the San Mateo Bridge to the port is used for the cargo vessel traffic. The port has five deepwater wharves that handle cargo operations. Maritime activities include the export of recycled metals and the import of dry bulk building materials such as cement, bauxite, gypsum and aggregates.

Approximately 75% of the Port's \$6 million revenue per year is related to maritime activity, while the remainder is rental revenue from commercial leasing activities. The Port is owned by the City of Redwood City, whose City Council appoints the five Port Commissioners to provide Port governance and liaison with the City. About 10% of revenues are provided to the City annually from the Port's net operating results and additional port profits are reinvested in infrastructure.

The four main maritime tenants at the port (in order of revenues) are:

- CEMEX (cement, aggregates)
- SIMS Metal (metal recyclables)
- Pabco Gypsum (gypsum)
- International Materials Inc. (IMI) (bauxite)

CEMEX produces over a third of the Port's maritime revenues, after their acquisitions of Harbor Sand and Gravel and RMC Pacific in 2005 established them as the primary tenant of the Port.

The annual throughput tonnage at the Port is 1.4 million metric tons with current capacity of more than double that number, or 3.3 million tons. The 1.4 million tons is down from last year due to a temporary decrease in cement imports.

C. TranSystems

TranSystems is a transportation engineering firm headquartered in Kansas City, with over 40 offices in the U.S. The San Francisco office, formerly Manalytics International, coordinated the strategic assessment. Similar studies have recently been conducted by this group at bulk terminals such as Mobile, Alabama; smaller ports including Humboldt Bay, California, and Corpus Christi, Texas; and large ports such as Seattle and Portland. TranSystems | Manalytics is also currently doing research work on a

West Coast short sea shipping service for the Center for Commercial Deployment of Transportation Technologies (CCDoTT) at Cal State Long Beach. The San Francisco office is also the lead for TranSystems supply chain consulting with major shippers, including bulk shippers such as Alcoa and recycling companies like Norcal in San Francisco. TranSystems' other offices do extensive engineering planning and design work for numerous large and small port facilities, in addition to major railroads.

D. Methodology

The project was initiated with a kick-off meeting with port executives to cover:

- project objectives
 - port orientation
 - available documents
 - interview list
 - project schedule
1. Interviews were held with the following executives and organizations:
- Port Commissioners – six interviews including all five current members and one past commissioner.
 - Interviews, some multiple for follow-up discussion, were held with the following executives at the Port:
 - Executive Director
 - Economic Development Manager
 - Manager of Operations
 - Director of Finance and Administration
 - Customer interviews included executives from:
 - SIMS Metal
 - Pabco Gypsum
 - CEMEX
 - Other California ports were visited and executive interviews included:
 - Port of San Francisco
 - Port of Stockton
 - Port of Richmond (Levin Terminal)
 - Other related contacted parties included:
 - General Steamship Corporation
 - Redwood City Industrial Saltworks
 - Metropolitan Stevedores
 - In addition, phone or in-person interviews were held with other potential interested parties.
 - Garden City Sanitation (recycling opportunities)
 - Norcal Waste (recycling market)
 - Allied Waste (recycling market)
 - Dole Fruit (refrigerated cargo in)
 - MTC (investment/partnerships)
 - Pasha (automobile imports)
 - Telephone interviews were also conducted with providers of covered bulk storage.

A list of all individuals interviewed is included in Appendix C.

2. A number of documents were provided by the Port for background research material and these are listed in Appendix A, along with other outside documents used by TranSystems for the project
3. Research was conducted on various commodities such as building materials, and recyclables from internal TranSystems files and external sources.
4. An initial SWOT Analysis for the Port was conducted with the Port's executive staff and later more rigorous analysis internally by TranSystems project staff
5. Reviews of preliminary findings were held with Port executive staff.
6. A presentation of the project's preliminary findings and progress was provided to the Port Commissioners on December 12, 2007 during the regular commissioners meeting.

II. SWOT Analysis

A. General

Tables 1A and 1B below are a summary of the SWOT Analysis or strengths, weaknesses, opportunities, and threats for the Port, performed for strategic assessment. This analysis is further discussed in subsections B, C, D, and E.

Table 1: Port of Redwood City - SWOT Analysis Summary

Table 1A.

Strengths	Weaknesses*
<ul style="list-style-type: none"> • Established Business <ul style="list-style-type: none"> - Management/BOD experience and tenure - Long-term customers, SIMS and CEMEX very established at Port - Continued profitability - City of Redwood City backing - Co-existence with a balance of adjacent recreational, industrial, and commercial activities - Established legal basis for Port in City of Redwood City charter (1937) and San Francisco Bay Conservation and Development Commission (BCDC) • Population Base – San Mateo and Santa Clara Counties <ul style="list-style-type: none"> - Excellent geographic position in South Bay - Vibrant local economy drives building activity - High volume consumer of domestic and international cargo - Extensive recyclables generation from nearby residential (and commercial) activity 	<ul style="list-style-type: none"> • Channel Depth <ul style="list-style-type: none"> - Silting, tides, shoaling - No dependable schedule for dredging - San Mateo Bridge height (135 feet) • Infrastructure <ul style="list-style-type: none"> - Key to increased maritime throughput, land expansion minimal due to non-maritime leases - Truck/highway access poor - Little cover for dry bulk products, dust created - Existing rail volumes low (little maritime rail activity), cannot handle large trains • Lack of diversification <ul style="list-style-type: none"> - No breakbulk cargo - No containerized cargo - Concentration with few bulk customers

* Applies to expansion potential and existing business.

Table 1: Port of Redwood City - SWOT Analysis Summary

Table 1B.

Opportunities	Threats
<ul style="list-style-type: none"> • Saltworks Land Availability <ul style="list-style-type: none"> - Buffer needed if residential plan approval for Saltworks - Requires separate road for commercial traffic • Expansion to Other Recyclables <ul style="list-style-type: none"> - Yard/food/wood waste (current opportunity) - Scrap tires • Automobile Imports <ul style="list-style-type: none"> - Local demand for product - Good buffer between Port and residential - Car carrier vessel depth requirement less than the 30-foot federal channel depth (although the 135-foot air draft of the San Mateo bridge is a constraint for the larger car carriers) - Easy to stage off port property • Cold Storage, Refrigerated Cargo <ul style="list-style-type: none"> - Currently break bulk, not container - Trucked from Southern California, PNW - Needs yard space for cross dock operation - May require deeper channel draft • Short Sea Shipping <ul style="list-style-type: none"> - Port well positioned to offload highway traffic to San Francisco Bay and beyond - International feeder and domestic cargo possibilities • Development of Shortline Railroad <ul style="list-style-type: none"> - Bay Area wide rail freight (domestic cargo) - More responsive and less expensive than UP - Requirement to support auto imports - Metal recyclables would be a guaranteed user • Other Opportunities <ul style="list-style-type: none"> - Bio-diesel industry - Project cargo destined for the region - Niche break bulk cargo 	<ul style="list-style-type: none"> • “Highest/Best Use” Land Development <ul style="list-style-type: none"> - Gentrification if residential development moves closer - Difficult to co-exist with uncovered dry bulk • Current Demand for Building Materials <ul style="list-style-type: none"> - Down in the local region - Demand shifting inland to Sacramento area - Major effect on Port revenues - However, population growth in the Port’s hinterland should support long term demand • Funding Approval for Dredging <ul style="list-style-type: none"> - Not always guaranteed as needed • Competitive Ports <ul style="list-style-type: none"> - Deeper channel depths - Better infrastructure for shipper supply chain (land, truck, rail) - Closer to recent demand (Central Valley, building materials)

B. Strengths

The Port of Redwood City is an established business operating since the 1930's. The current management and many of the Port Commissioners have been in place for years. The Port has strong and long term support from its owner, the City of Redwood City. The San Francisco Bay Conservation and Development Commission (BCDC) authority makes the Port of Redwood City an important part of their planning for cargo handling in the San Francisco Bay region.

The main maritime customers are long standing and well established in their location. CEMEX owns a portion of adjacent property, 17 acres, in addition to the land they lease from the Port. They import much of the cement, gravel, sand, and other aggregates used for building construction in the Santa Clara Valley. SIMS has the only metal shredder in Northern California located on-site at the port. A large volume of metal recyclables are trucked to the Port of Redwood City from outside the Port's hinterland. Pabco, the third major maritime tenant, imports gypsum for their wallboard facility nearby in Newark, CA.

The port has a long history of profitability and the last five years have seen tremendous growth in the tonnage throughput.

The port is situated in an area that includes commercial offices, recreational parks and marinas, and light industry both on Port property and adjacent land. This includes a high-end office complex, Pacific Shores Center, adjacent to the Port and on the waterfront.

The population base of San Mateo and Santa Clara country is 2.5 million. This base of people, fueled by the high tech industry, creates constant demand for housing, new offices, and support industries. It drives the demand for building materials and creates a major source of metal recyclables that make use of the Port. The increasing traffic congestion will eventually drive more cargo truckloads and passengers off the highways through short sea shipping, barge and ferry services on the San Francisco Bay and beyond.

C. Weaknesses

There are weaknesses facing the port that affect both existing business and expansion possibilities. Infrastructure support for the Port's current and future maritime customers is the primary weakness. This problem includes both land for cargo throughput expansion and general transportation for truck and rail. The railroad, which has very light activity, is owned and run by the Union Pacific and is not a high priority for freight movement around the San Francisco Bay Area. It is too expensive for shippers over current local trucking costs. Most of the current business, such as Granite Rock, is non-maritime. For truck traffic, the main road into the port is shared most of the way with commercial office traffic on both sides of the Port along Seaport Boulevard. SIMS Metal does the majority of their trucking at night. The Port access to the major freeway, Highway 101, is very congested as is the freeway itself. Any expansion of future truck traffic, especially during the day, would be problematic.

The Port covers 120 acres with 70 of those acres dedicated to maritime and the rest non-maritime tenants. At present there are only 9 acres of property, the former Liquid Bulk Terminal (LBT), which could be used for future maritime tenants or expansion for existing tenants.

The second major Port weakness is the channel depth designed for 30 feet but at times operating as shallow as 26 feet because of constant silting and tides. Dredging does not always occur on schedule (although the November, 2007 Federal Water Resources Development Act establishes an annual dredging schedule) and light loading has been a constant issue with maritime tenants. Even with the 30-foot channel depth, tides may force the vessels to leave early or late, disrupting their normal schedule. The 30-foot depth and the height restriction of the San Mateo Bridge (135 feet) place limits on the type of vessels that can even call on the Port.

The port is tied heavily to the bulk market, specifically building materials and recyclables. It does not have available land nor the necessary infrastructure (shore cranes and warehouses) to handle the typical requirements for breakbulk such as the cargo currently going to the Port of San Francisco (i.e. steel). Containers, liquid bulk, and automobile imports also go to other Bay Area ports. This lack of diversification puts the Port at risk if the Silicon Valley experiences any major downturn in building. However, the recycled metal business is booming with strong demand for these materials in India and China. With better infrastructure and channel depth, SIMS could easily increase its Port throughput tonnage.

Customer concentration at the port presents another potential problem when industries consolidate with fewer players, such as the cement business. The threat is increased leverage over the Port from less competition. However, CEMEX is aggressively expanding, including creating strategic partnerships, and is committed to using Redwood City with their own facility adjacent to the Port.

D. Opportunities

The major opportunity facing the Port is the future of the adjacent salt flats of 1,433 acres available south of the main access road. The owner, Cargill, has engaged a developer, DMB, and their plan announcement is scheduled for early April, 2008. The opportunities for the Port include a separate access road for commercial/industrial traffic which is a definite requirement in order to develop the salt flats beyond open space. The second opportunity would be the possibility to purchase or reserve a strip of land adjacent to the Port as a buffer to the future development, specifically if it's proposed as high or low density residential. This buffer between the Port's dry bulk business and the salt flats' future residential could be light industrial, such as warehouse, container, or auto staging. A separate access road for the salt flats residential development would be on the other side of the buffer strip and this road could also be used for Pacific Shores Center. They currently share Seaport Boulevard with the Port and its industrial traffic.

The expansion of recyclables beyond metals is an opportunity that is becoming more attractive. Rail, container, and short sea shipping may play a part in this as well as a barge service. Yard and food waste are current targets for municipal recycling programs, specifically in San Mateo County. Other recyclables include tires and scrap lumber.

Automobile imports is an attractive opportunity for a number of reasons

- A high volume of local demand exists in San Mateo County (and Santa Clara County)
- Smaller auto carrier vessel drafts fit well within the Port channel (the bigger carriers will not clear the San Mateo Bridge)
- Presents a clean buffer to Saltworks property (auto storage, staging and cross dock)

- The rail connection, additional land, and bulk storage covers to avoid sand and dust on the autos appear to be the main issues in order to develop this opportunity.

Cold storage is another opportunity for the port that could attract breakbulk reefer cargo such as bananas for Dole Fruit. However, some of the reefer vessels may require a deeper channel draft. The cold storage warehouse would be on-site, either from existing land that is available or on the buffer land from the salt flats. What needs to be gauged is the amount of yard storage for trailers and cross dock operations. The demand exists within the nearby population base and most perishables are currently trucked up from Southern California. The ports of Hueneme (CA) and Philadelphia, as well as Wilmington (DE), San Diego (CA), and Gulfport (MS) have successfully concentrated on this niche and would be candidates for benchmarking a cold storage operation. There is no on-dock cold storage facility in Northern California, but the Port of Stockton is currently developing one.

Another possible expansion opportunity that may indirectly have a positive effect on maritime cargo throughput is the development of a shortline railroad. There have been discussions between the Union Pacific (UP), major domestic shippers, and local ports such as San Francisco and Redwood City. A shortline separately owned and managed from the UP, could be more responsive and cost effective for shippers. It would definitely contribute to a reduction of highway truck traffic and SIMS Metal would likely become an eventual user as well. If an auto terminal was established in the region, this shortline could also handle imported autos so long as there is an efficient interchange with the UP and there is sufficient tunnel clearance for tri-level auto rail cars. The latter issue is not applicable to Redwood City, which has no tunnel constraints, but it is a challenge for the Port of San Francisco, a potential competitor for any auto import terminal on the peninsula. In addition to SIMS cargo coming in for shredding and export and potentially autos, there are other marine cargos needing a rail connection such as biofuels and other recyclables.

Short sea shipping as a reality on the West Coast is still a few years away. From a cost economic perspective, domestic and/or international cargo from LA or the Pacific Northwest destined for the Santa Clara Valley makes the most sense for Redwood City. Sacramento as a cargo source from the Central Valley is also a possibility with scrap autos on barges for SIMS Metal. Any barge or short sea moves from Oakland to Redwood City currently has too many inflated handling and crew charges to be economically viable for a short haul; however, this may change in the future if more flexible labor practices are created for handling domestic cargo movements.

Other opportunities for the Port include niche breakbulk and project cargo destined for the Santa Clara Valley. California's expanding bio-diesel industry also presents an opportunity for the Port. Many companies involved in bio-diesel are seeking port sites that allow for the import of raw materials and the shipment of products by water, rail and barge; these three modes are all available at Redwood City. In addition, bio-diesel producers are seeking sites in close proximity to major consumption centers.

E. Threats

The main threat to the Port of Redwood City is the "highest/best use" adjacent land values challenge, which has occurred in both San Francisco and Sacramento (and most ports around the world near large population centers). Encroaching residential, recreational, and commercial office waterfront space does not mix well with the open dry bulk movement and storage. Adjacent homeowners and commercial office tenants would complain about the Port's tenants' noise, lights, and dust.

The second potential threat to the Port is any downturn in the peninsula's economy that affects building and the import of needed materials. While the housing market is down, new office buildings and highway infrastructure upgrades may still support this activity in the short to medium term. On the positive side, long term regional population growth is expected to support the movements of bulk materials through the port.

The dredging issue still continues to be a threat when funding and dredge scheduling is not clearly defined. Extensive port management (and customer) attention has to be constantly focused on this issue.

Lastly, the competitive ports, both in the San Francisco Bay and the central valley (Stockton and Sacramento), will always pose a threat, especially to new opportunities such as auto imports and recycling, and also for existing cargo of cement and building materials. However, construction materials, due to their low value and highway trucking costs, are not likely to move to other ports if they are consumed in the immediate area.

F. Strategic Alternatives

From the SWOT Analysis, a number of strategic alternatives are open to the Port. The strategies presented below for consideration are not mutually exclusive and many can be pursued simultaneously. They are numbered but not ranked.

1. **Maintain Present Course**

- Keep low profile within City of Redwood City and hinterland
- Address opportunities as they arise for existing land leases
- Continue to support current tenants and encourage tonnage activity expansion

2. Pursue **Land Expansion** through proactive discussions with the adjacent landowner, Cargill, on Port involvement with their land development

- Purchase or lease substantial strip of buffer land adjacent to current Seaport Boulevard with agreements on usage (i.e. cold storage terminal, auto staging, container/trailer, ro-ro)
- Separate four lane road for truck traffic is critical (current Seaport Boulevard)

3. Develop plan to implement **Covered Storage of Bulk Cargo**

- Critical to get Cargill and Pacific Shores cooperation on expansion of Port
- Specifically for the dry bulk materials with domes, silos, etc.
- Work with existing tenants for their buy-in and support for this infrastructure improvement

4. Position the Port to become the **Recycling Port** for San Mateo and Santa Clara counties

- Redwood City already established with the recycling of metals/autos
- Yard and food waste is a major opportunity with possible barge service to a composting facility in the Sacramento delta
- Could include container, ro-ro, and rail connections for recyclables to avoid transloading costs

5. Discuss **Partnerships** with other **Ports** (i.e. Stockton) for a barge service linking the ports

- Similar to the current Oakland–Sacramento container shuttle concept

6. Proactive involvement in any **Shortline Railroad** discussions with other Bay Area ports on a freight railroad linking Ports and main junction to UP and BN railroads
 - Include major domestic users in discussion, such as Granite Rock, which could provide the base business
7. Investigation on use of Port as an **Auto Terminal**
 - Expansion with land buffer from adjacent Saltworks
 - May need shortline railroad or Union Pacific commitment for better service and investment
 - Possibly require a joint venture investment partner, such as an auto terminal operator or auto logistics company
8. Position Redwood City as the **Short Sea Shipping Port** for San Mateo and Santa Clara counties
 - Removal of substantial truckloads off the freeway is environmentally positive
 - Still needs government and union rules changes for economic viability
 - Domestic cargo from Pacific Northwest, international container feeder from LA are the most realistic candidates
9. **Cold Storage Facility Development**
 - Study the supply chain sources of local perishables (likely trucked in from LA)
 - Calls by refrigerated ships from Central and South America
 - Expanded land needs for local trucking, as a cross dock operation for the warehouse facility
 - Stockton is already positioning itself as a cold storage port for Northern California
10. **Partnerships for Port Expansion**
 - Discussions with terminal operators, major shippers and logistics companies as partners in port investment and expansion
 - Specifically new opportunities in auto, cold storage and niche markets (bio-diesel)
 - Accommodate long term growth of bulk cargo (public terminal operator and/or bulk shipper)
 - Investors for this type of infrastructure are currently active in the marketplace and aggressively looking for deals

G. Recommendations

This assessment identifies a number of strategic alternatives (10) open to the Port. The options were developed after the SWOT analysis and a screening of these options through the Port's strengths, weaknesses, opportunities, and threats. These alternatives are not mutually exclusive and many could be pursued in parallel. They are all options which should be reviewed and considered by Port management and Commissioners.

TranSystems can recommend a few of these options for priority focus as being more attractive or realistic given the current environment. Certainly Option 1, maintaining the present course, should have the highest priority, and working closely with tenants such as CEMEX and SIMS Metal to expand Port throughput has significant and immediate return. Option 2, land expansion from Cargill, is also highly recommended because of the near term opportunity and the potential upside to the Port, and the elimination of a threat if a port managed or owned land buffer is accepted. A development plan for the

land buffer would be necessary and should be started early in the process. Attracting shippers and investors should be easier if the needed land expansion looks more realistic. Of the remaining options, Option 4, expansion of recycling, seems to be the most attractive in today's environment. This opportunity also better serves the local population base and gives the Port a higher and positive profile within the community.

The Port should continue to position itself as a short sea shipping origin/destination, affecting strategic Option 8. Short sea shipping is defined as the use of coastal shipping as an alternative transport corridor for goods currently moving by increasingly congested highways. Many of the forces at play for short sea shipping are out of the Port's control with federal and state government actions necessary on harbor taxes, union work rules, requirements for US-built ships, trucking highway usage fees, etc. This can include both domestic and international cargoes.

The port can continue to position itself for short seas shipping by doing the following:

- The most likely short sea commodities in the near future will be low volume bulk cargo such as building supplies and recyclables. The Port is already well positioned for these cargoes as an established bulk port. The Port's recent brochure quantifies the cargo as over 160,000 highway truckload displacements per year.
- Land expansion is necessary especially for trailer or ro/ro equipment. Lift on/off containers will require heavy cranes while container on chassis as combination trailers would be more realistic. The containers thus become part of a wheeled operation.
- Quantify the long haul truck traffic into the Port's hinterland of San Mateo and Santa Clara counties as potential short sea shipping loads. As the valley grows and traffic congestion increases, the Port of Redwood City would gain a higher profile as a short sea shipping option.
- Participate as an observer or direct contributor to studies on short sea shipping (for example, studies conducted by CCDoTT and barge service concepts with other Bay Area ports), to insure small ports such as Redwood City are integrated into future short sea concepts.

TranSystems' final recommendation is that the Port proceed with the US Army Corp of Engineers feasibility study to evaluate deepening the channel to 35 feet. This proposed deepening will improve the cargo carrying capacity of vessels calling at Redwood City today, and will make the Port more competitive for other cargo opportunities mentioned in this report.

H. Maritime Strategic Plan

The steps to a Port strategic maritime plan can be immediately identified if the course is Option 1, maintain present course, or option 4, a focus on recycling. Any maritime strategic plan should include more research into the commodities, such as the sourcing, and the consumption and destinations of cement, aggregates, and recyclables. Meetings and coordination with CEMEX and SIMS is also a major part of the process. If it is decided to aggressively pursue land expansion with strategic Option 2, there needs to be feedback from both the City and Cargill before any buffer land use planning can

occur. This land development planning would need to include traffic studies for both the residential and the cargo trucking activity.

The selection of other options, such as the development of a shortline railroad, would also involve additional research, possible need for outside consultants, and extensive port management effort, if they are to be included in the maritime strategic plan.

A maritime strategic plan would outline the Port's direction, i.e. what strategic options are being pursued and what resources (i.e. capital, partnerships, staff, organization, etc.) are needed to affect these strategies.

III. Existing Cargo

The Port of Redwood City handles a variety of import bulk commodities (cement, gypsum, bauxite and aggregates) that are consumed by the local construction industry and exports of recycled metals (scrap automobiles, etc.) originating in the surrounding counties. The Port handled 1.44 million metric tons of cargo in fiscal year 2006/2007 ended June 30.

A. Recyclables

In fiscal year 2006/2007, SIMS Metal exported 362,290 metric tons of scrap metal, a 4.6% increase over the previous year. US exports of recycled metal have been growing strongly due to increased demand in Asia, a strong supply base of product, and a weakening US dollar. Regional population growth and economic growth in Asia are expected to continue to support the supply of and demand for recycled metals.

At Redwood City, Sims Metal operates one of the company's two shredders on the US West Coast; the other one located in Southern California. The company expects continued strong growth of demand from Asian markets, which will support export shipments of recycled metal. The principal concern for the Port relates to channel draft and the impact this has on the economics of export shipments – vessels can only be part loaded at Redwood City and then are topped-off at Richmond. Channel depth is also a concern for importers of building materials.

The recyclables sector may offer future opportunities for the Port, either for shipment to domestic or international markets, including:

- Compostable organic material is one of the largest components (25%) of the landfill waste stream. Examples include residential yard waste, residential food waste and commercial food waste. Collectively, all of these organic materials, including scrap lumber, could instead be returned to the soil as compost or mulch or used for other purposes such as energy production. There are strategic initiatives in many municipalities' waste plans to accomplish this.
- Expansion of Construction & Demolition (C&D) programs
- Electronics (used PC's, cell phones, plastics, etc.)
- Scrap tires

B. Building Materials

The Port handles a range of bulk imports (fiscal year 2006/2007 tonnage):

- 265,685 metric tons of cement from Asia, a 56 percent decrease over the previous year's record 602,000 tons.
- 277,100 metric tons of gypsum from Mexico, a 14% decrease from the previous year.
- 356,600 metric tons of sand, bauxite, and limestone imported from Australia and the Pacific Northwest, a 25% increase from the previous year

The lower import traffic, particularly for cement, was caused by a decline in demand from the local construction industry and also the availability of domestic sources of cement supply.

The long term market outlook for the imported bulk commodities is favorable due to regional population trends, which will continue to drive demand for construction materials. The Association of Bay Area Government (ABAG) projects that the population of the three counties (San Mateo, Santa Clara and Alameda) surrounding the Port will grow by 30% between 2005 and 2035 (see Table 2). The population growth will support construction activity, hence demand for building materials.

Table 2: Regional Population Forecast

Population	2005	2035f	Change
San Mateo	721,900	861,600	+19%
Santa Clara	1,763,000	2,380,400	+35%
Alameda	1,505,300	1,938,600	+29%
Total Above	3,990,200	5,180,600	+30%
Total ABAG ¹	7,096,100	9,031,500	+27%

(1) Sonoma, Marin, Napa, Solano, Contra Costa, Alameda, San Francisco, San Mateo and Santa Clara

Source: "Forecast 2007" prepared by the Association of Bay Area Government

Another long term driver of continued throughput of construction materials through the Port of Redwood City is the long term supply deficit of aggregates from sources within California. The California Geological Survey¹ has found that long term demand for aggregates throughout the major population centers of Northern California currently exceeds permitted aggregate resources. Specifically, in the South San Francisco Bay area permitted resources amount to only 37% of long term demand. This overall deficit picture is expected to support inbound shipments of aggregates into the region and thus the need for bulk terminal facilities at Redwood City.

¹ "Aggregate Availability in California, 2006", Department of Conservation, California Geological Survey

IV. Other Cargo Opportunities

The following discussion reviews market trends and terminal requirements for a selection of cargo opportunities that may be suitable for the Port of Redwood City. The opportunities were identified through the study interview process and a review of other projects being conducted by TranSystems. Most of the opportunities are dependent on the Port of Redwood City securing additional land for development.

A. Automobiles

Ports on the US West Coast handle a significant volume of vehicles each year, primarily imports from Asia and Europe. In 2006, total throughput was 1.96 million vehicles at the ports listed in Table 3. This total excludes the throughput at privately operated facilities at the ports of Benicia and Richmond in the San Francisco Bay Area. Benicia is one of three US West Coast import facilities for Toyota Logistics Services, which in late 2006 transferred the imports from Long Beach due to the expiration of its rail-yard lease at Long Beach. Toyota was expected to ship about 70,000 vehicles through Benicia in 2006 with future volume possibly increasing to 100,000 vehicles or more per year. The Port of Richmond currently handles an estimated 100,000 vehicles per year of imports for Hyundai and Kia and is seeking new customers. The vehicles are distributed to parts of California and by rail to inland states.

Table 3: Historical Vehicle Traffic at US West Coast Ports

# of Vehicles	2002	2003	2004	2005	2006
IMPORTS					
Portland	388,941	362,092	358,196	352,971	463,515
Long Beach	272,434	272,809	348,525	328,019	426,108
San Diego	231,623	242,834	247,058	231,401	311,488
Hueneme	240,934	210,144	275,480	295,377	287,249
Tacoma	179,858	158,129	156,869	135,698	166,087
Los Angeles	253,145	276,435	201,452	227,260	139,070
Vancouver, WA	60,937	45,644	52,644	46,865	43,016
Total Above	1,627,872	1,568,087	1,640,224	1,617,591	1,836,533
EXPORTS					
Portland	5,835	4,291	486	409	42
Long Beach	8,852	30,838	44,893	121,299	76,688
San Diego	380	0	111	850	33,993
Hueneme	1,306	1,097	1,359	1,253	1,218
Tacoma	315	218	300	202	0
Los Angeles	3,130	8,247	19,315	28,667	14,965
Vancouver, WA	0	0	0	5	62
Total Above	13,983	40,400	65,978	152,276	126,926

Note: The table excludes vehicle traffic that moves through privately operated terminals at the ports of Benicia and Richmond in the San Francisco Bay Area.

Source: American Association of Port Authorities

Looking to the future there are a number of important trends:

- The dominant import trade is projected to grow at a similar rate as in the past five years with some potential downside over the next few years due to the weaker US economy and the weaker US dollar.
- The export trade could experience some growth based on the weaker US dollar.

- Long term potential for imports from China as that country's auto industry seeks to expand into overseas markets.
- Pressure on automotive terminals from expanding container operations in some ports, the higher density container activity generating greater revenue for ports. This may allow secondary ports, both existing and new entrants, to capture automotive business.

Terminal operators and their customers have the following general requirements for their terminal facilities:

- Land for vehicle storage and processing. The storage area may be adjacent to the berth or inland from the berth; in the latter case, a dedicated road connects the berth and storage area.
- The terminal will typically have a processing facility to perform added-value activities. The size of the structure varies depending on customer requirements.
- Provision of on-dock or near-dock intermodal rail and a truck transfer facility.
- Efficient connections to intermodal rail corridors.
- The following are examples of terminal acreage and facilities at selected port US West Coast:

Port	Terminal Acres	Vehicle Processing Facility
Benicia, CA	34 acres for Toyota	25,000 sq. ft. for Toyota
Port Hueneme, CA	75 acres	70,000 sq. ft.
Portland, OR	82 acres	97,600 sq. ft.
Los Angeles, CA	85 acres	-
San Diego, CA	125 acres*	2 Warehouses
Long Beach, CA	168 acres	150,000 sq. ft.

*Total terminal area; only a portion allocated to auto handling.

Channel and berths must be able to accommodate the pure car and truck carriers (PCTC) and other roll-on/roll-off vessels types operated in the US import and export trades. Based on a sample of fleets operated by major shipping lines, vessels have a length-over-all (LOA) in the range 560 feet to 660 feet and a draft in the range 25 feet to 33 feet. A concern for Redwood City is the air draft of the San Mateo Bridge, which is 135 feet at mean lower low water (MLLW). The medium to large PCTC in operation and under construction today have air drafts that exceed 135 feet. In addition, some major vehicle carriers evaluate ports based on fleet wide access; that is, the port must be able to receive all vessels in the fleet so the carrier has an opportunity to mix and match vessels in a service on an as needed basis.

B. Refrigerated Cargo

The US is a significant importer of fruits, notably bananas, and vegetables from a range of origins including the West Coast South America, Australia and New Zealand. As Table 4 shows, US West Coast imports reached an estimated 3.75 million tons in 2006. Imports can be containerized or move by breakbulk conventional ships. Based on a review of major operators, conventional refrigerated vessels have a draft in the range 27 feet to 33 feet, while overall length ranges from 450 to 550 feet.

On the US West Coast, the major import terminals for refrigerated products are in Port Hueneme, CA and San Diego, CA. Port Hueneme has two refrigerated cargo facilities, operated by Del Monte and LauritzenCool. They mainly handle imports of bananas and tropical fruit, and citrus exports. The two terminals have the following characteristics:

- Del Monte - 30,720 square feet (552,960 cubic feet) of refrigerated space and 15 truck docks.

- LauritzenCool – Facility A has 70,735 square feet (1,061,025 cubic feet) with 10 truck docks and Facility B has 63,196 square feet (947,940 cubic feet) with 14 truck docks.
- The port offers vessel draft of 35-feet.

Dole's San Diego facility has the following capabilities:

- On-dock cold storage of 3.48 million cubic feet, which comprises a mixture of freezer/chill storage, chilled storage, ambient storage and dry storage.
- Off-dock cold storage of 2.40 million cubic feet offering freezer/chill storage and 480 tons blast-freezing capability.
- Adjacent rail car siding and truck loading
- Customs and Border Protection and federal (USDA) inspection services
- Located in a designated Foreign Trade Zone
- 30 to 35 feet of depth at the berth

Table 4: Estimated Refrigerated Cargo Imports to the US West Coast

Origin Region	2002	2003	2004	2005	2006
WCSA	1,149,400	1,155,900	1,150,040	1,178,952	1,526,064
Asia	664,732	827,714	900,010	977,897	986,485
C Amer / Caribbean	418,022	442,963	436,013	429,242	537,232
ANZ	438,214	431,386	446,354	393,886	418,111
Others	250,007	268,087	271,348	267,463	277,167
Grand Total	2,920,375	3,126,051	3,203,765	3,247,440	3,745,058

Source: TranSystems derived industry statistics.

C. Short Sea Shipping

Several studies are underway to determine the economic and market feasibility of short sea shipping service along the Pacific Coast. The intent is to transfer some traffic from the I-5 highway and rail corridors onto to coastal shipping service. Cargo lanes between major population centers currently are the primary focus of these studies: Los Angeles-San Francisco Bay Areas, Los Angeles-Seattle, and San Francisco Bay Area- Seattle. Market surveys of shippers and trucking companies see a role for short sea shipping service in certain situations if requirements of service and cost were met:

- Short sea shipping service is more appropriate for distances greater than 700 or 800 miles for non-time-sensitive cargoes. Shorter transit distances, such as from Los Angeles to the San Francisco Bay Area are considered to be “overnight” markets (defined as 8-12 hour truck transit), and may not be appropriate for a ship option.
- Ocean transit times can be longer than trucking as long as discounts are offered on the current trucking costs and the vessel service is reliable. For example, a transit time increase of one day for the longer routes would be reasonable if the rate was 20% to 30% lower than the trucking cost. Potential cost savings are one of the key drivers of interest in any proposed service.
- Daily shipping service would be preferable in order to minimize waiting time for the ship. A concern is that port waiting time and drayage to/from the port terminal could offset any cost benefits arising

from a ship option. This factor also limits the likely hinterland for short sea shipping service to within a 50 to 100 mile radius of the port.

- A coastal shipping service is likely to capture commodities that are non time-sensitive, low-value cargoes that are either being used for non-just-in-time warehouse replenishment or materials for manufacturing where longer transits have been built into the supply chain. Cargoes that may be divertible to short sea shipping include: existing railroad cargo that has similar service attributes as short sea shipping (transit time, cost, etc.); long shelf life cargo, such as forest products; bulk, low-value or low-margin cargoes that typically move at low freight rates; non-perishable commodities; and oversize or overweight cargoes.

Short sea shipping may have additional benefits that include reduced highway traffic congestion, reduced truck pollution, alleviation of some of the challenges facing the truck industry (driver availability, driver work conditions, etc.). However, moving truck freight through ports would have the downside of increasing truck traffic in and around port areas. Table 5 shows the major truckload commodities moving between the PNW and the counties of San Mateo, Santa Clara and Santa Cruz.

Table 5: Truckload Cargo Moving from the PNW to the Counties of San Mateo, Santa Clara and Santa Cruz

Commodity	Tons	Share
WAREHOUSE & DISTRIBUTION CENTER	17,660,259	30.3%
RAIL INTERMODAL DRAYAGE	8,615,833	14.8%
GRAVEL OR SAND	7,901,941	13.6%
LIQUEFIED GASES, COAL OR PETROLEUM	3,442,704	5.9%
PRIMARY FOREST MATERIALS*	2,778,769	4.8%
ASPHALT PAVING BLOCKS OR MIX	1,010,429	1.7%
PORTLAND CEMENT	866,613	1.5%
BROKEN STONE OR RIPRAP	843,265	1.4%
POTASSIUM OR SODIUM COMPOUND	713,408	1.2%
READY-MIX CONCRETE, WET	679,502	1.2%
NONMETAL MINERALS, PROCESSED	546,804	0.9%
AIR FREIGHT DRAYAGE	533,583	0.9%
GYPSUM PRODUCTS	532,366	0.9%
CONCRETE PRODUCTS	486,098	0.8%
ELECTROMETALLURGICAL PRODUCTS	446,119	0.8%
MISC INDUSTRIAL ORGANIC CHEMICALS	426,469	0.7%
INDUSTRIAL GASES	335,741	0.6%
FLOUR OR OTHER GRAIN MILL PRODUCTS	321,360	0.6%
MALT	309,048	0.5%
PLYWOOD OR VENEER	296,314	0.5%
MISC SAWMILL OR PLANING MILL	285,866	0.5%
PRIMARY LEAD SMELTER PRODUCTS	282,366	0.5%
PRIMARY ALUMINUM SMELTER PRODUCTS	279,959	0.5%
MISC AGRICULTURAL CHEMICALS	276,113	0.5%
MOTOR VEHICLE PARTS OR ACCESSORIES	244,240	0.4%
Total Above	50,115,169	86.0%
Total Tons	58,282,690	

* Includes logs, piling, posts, pulpwood, wood chips, etc.

Source: TranSystems derived from Global Insight's Transearch Database 2004

Vessel designs under consideration range in capacity from 150 to 700 trailers depending on divertible cargo in each trade lane under evaluation. The larger vessels are comparable in size and configuration to the vessels deployed by TOTE in the Pacific Northwest-Alaska trade. High ship construction costs at US shipbuilding yards may prohibit the use of roll-on/roll-off vessels in a short-sea coastal service. A potentially lower cost option may be roll-on/roll-off barge and tug combinations that would also have a shallower draft than a ship.

Table 6: Representative Dimensions of Short Sea Vessel Designs

	Baseline w/ Gas Turbine	Baseline MAX	SUPER MAX	SL-7 VARIANT Deep Hull
LOA (feet)	832.5	837.7	959.6	980.1
Draft (feet)	19.84	23.66	26.7	23.41
Trailer Capacity	450	550	718	500 to 600

Source: "Feasibility Assessment of Short Sea Shipping to Service the Pacific Coast, December 2006", TranSystems and Center for Commercial Deployment of Transportation Technologies (CCDoTT)

A short sea shipping terminal requires sufficient land to accommodate storage and staging of trailers, suitable berth to accommodate short sea ships or barges, and good access to the local road network. The terminal yard may not have to be located adjacent to the berth and it could be situated on backlands linked by a dedicated traffic lane to the berth. The terminal acreage requirements for a short sea shipping service will be driven by the frequency of vessels calls, the volume of trailers per call, terminal productivity, and other operational factors. Recent studies of short sea shipping concepts for the West Coast have identified terminal size ranges of 25 acres to 350 acres, the upper estimate driven by the more frequent service and larger volumes of major markets (for example, the Los Angeles market). The expectation is that the terminal acreage requirement would be towards the lower end of the range for smaller markets and ports.

D. Forest Products

While imports of forest products into Bay Area and Southern Californian ports have declined in recent years (see Table 7) there may be an opportunity for the Port of Redwood City to develop a niche role in this import trade. The ports in Southern California receive forest products imports for local consumption and also for distribution to other locations in California, including the hinterland of Redwood City. The two largest individual commodities handled by Southern Californian ports are newsprint and paper/paperboard, primarily imported from British Columbia in Canada by regular tug/barge and vessel service. Redwood City should explore positioning itself as a niche import gateway for the South Bay, with the port possibly included as an additional port call by barge service moving forest products between British Columbia, Canada and Southern California. The terminal requirements would be access to berth space and a warehouse for storage of the imported forest products.

Table 7: US West Coast Imports of Forest Products

Port (Metric Tons)	2002	2003	2004	2005	2006
Oakland	9,859	8,742	15,679	29,531	35,136
Richmond	215	0	856	0	0
Sacramento	81,751	70,951	46,414	40,907	31,658
San Francisco	25,614	31,155	27,355	12,219	7,095
Stockton	4,470	0	0	0	7,606
Total Bay Area Ports	121,909	110,847	90,303	82,657	81,495
Southern California Ports	453,374	406,389	385,345	370,864	319,323
Other US West Coast Ports	1,758,831	1,933,540	1,689,387	2,794,938	2,347,637
Total US West Coast	2,334,113	2,450,777	2,165,036	3,248,458	2,748,455

Forest products – boards, boxes & cartons, doors & parts, logs & lumber, newsprint, paper & paperboard, veneers & plywood, wood millwork, wood pulp, woodenware, and miscellaneous

Source: TranSystems derived from JOC Piers

E. Summary of Terminal and Vessel Requirements

The above review of market opportunities identified certain land, warehouse and vessel requirements that would have to be offered by the Port of Redwood City. These requirements are summarized in Table 8. It is important to understand that these requirements are merely indicative in nature, detailed acreage and vessel needs would have to be addressed through specific investigations of each market sector and discussions with individual companies that may want to use the Port of Redwood City. Channel depth is an important consideration for some of these market opportunities (for example, the refrigerated cargo) and the Redwood City channel would have to be dredged deeper, say 35 feet, in order for the Port to compete for selected opportunities.

Table 8: Summary of Terminal and Vessel Requirements

	Terminal Land	Terminal Warehousing	Vessel Draft	San Mateo Bridge Air Draft (135')
Auto Terminal	30+ Acres	Vehicle Processing Facility	25 to 33 feet	Medium to large vessels exceed 135' air draft
Refrigerated Terminal	Driven by Warehouse Size	Refrigerated Warehouse	30 to 35 feet	No restriction
Short Sea Shipping Terminal	25+ Acres	None	20 to 27 feet	No restriction
Forest Products Terminal	Driven by Warehouse Size	Dry Storage Warehouse	Barge	No restriction

Source: TranSystems

V. Competitive Landscape

The San Francisco Bay Area has seven main cargo ports that are actively engaged in handling one or more cargo types – breakbulk, bulk, container and roll-on/roll-off (Table 9). In addition, the Bay Area has several private terminals tied to specific companies and/or uses – for example, shipment of petroleum products. As the only bulk port serving the southern Bay area, Redwood City does not have a direct competitor for its cargo types – aggregates, bauxite, cement, gypsum, and recycled metals. These cargoes are consumed and generated by the immediate hinterland of the Port and therefore are not easily transferred to other port locations due to the higher transport costs that would be incurred by shippers.

Table 9: San Francisco Bay Area Ports by Cargo Type

Port	Channel Depth	Cargo Type				
		Breakbulk	Bulk	Container	Auto	Non-Auto Ro-Ro
Redwood City	30 feet		✓			
San Francisco	40 feet	✓	✓			
Oakland	50 feet ^a		✓*	✓		
Richmond	38 feet ^b		✓		✓	✓
Benicia	30 feet		✓		✓	
Sacramento	30 feet ^c	✓	✓			
Stockton	35 feet ^d	✓	✓			

a) Multi-year deepening program to 50 feet is expected to be complete in June 2009.

b) Draft of inner channel; the outer harbor channel is 45 feet.

c) USACE evaluating feasibility of deepening to 35 feet.

d) USACE evaluating feasibility of deepening to 40 feet.

*Bulk cargo in Oakland is handled at the privately owned Schnitzer Steel terminal.

Source: US Army Corp of Engineers, Ports, and San Francisco Bay Conservation and Development Commission (BCDC), and TranSystems

Redwood City would face competition from other ports for new cargo activities (for example, automobiles) that Redwood City may pursue if it secures a portion of the salt works land. Port selection factors that would be taken into consideration by terminal operators and shippers would include:

- Amount of land available for development
- Channel draft
- Air draft of bridges
- Inland rail and road connections
- Proximity to consumption markets
- Community support

VI. Infrastructure

A. Channel Dredging

Maintaining the channel depth is a major issue for existing customers and may indirectly affect new cargo opportunities. The channel is authorized at 30-feet but is currently at 29.5 feet. As stated in the 2005 report “The Port of Redwood City Dredging Issues and Impacts” (HPA and Tioga Group), vessels cannot arrive and depart the port fully loaded, which imposes additional costs on the Port’s customers. The report concluded that the current channel depth is a severe constraint on existing customers, which use vessels that would require a draft of at 35 feet or more (33 feet or more plus 2 feet of pilot required under keel clearance) to be able to load and discharge full cargos at Redwood City. Customers use a variety of strategies to overcome the draft restriction including riding the tides, lightering, light-loading and topping-off. For example, handysize bulk vessels light-load recycled metals at Redwood City and then sail to the Port of Richmond to top-off, taking advantage of Richmond’s deeper ship channel (38 feet MLLW).

The US Army Corp of Engineers (USACE) currently has two projects related to the Port of Redwood City:

- Maintenance dredging of the existing channel to the authorized 30 feet, and
- A feasibility study to investigate deepening the channel to greater than 30 feet.

Ongoing inadequate funding has delayed maintenance dredging.

The US Army Corp of Engineers (USACE) has a proposed study to address the deepening of Redwood City to an authorized depth greater than 30 feet in order to accommodate fully laden and larger vessels. The USACE is currently awaiting funds to proceed with the feasibility study and navigation simulation modeling. The cost and funding of the study is as follows (source: USACE):

Total Cost	\$ 4,148,000
Federal Cost	\$ 2,148,000
Non-Federal Cost	\$ 2,000,000
Total Federal Cost Through FY 2007	\$ 347,000
FY 2008 Budget	\$ 0
Federal Cost to Complete	\$ 1,801,000

Source: US Army Corp of Engineers, San Francisco District

B. Rail and Road Connections

The Port of Redwood City is served by the Union Pacific (UP) Railroad, whose track runs along the boundary of Port property. The Port owns and maintains tracks on Port property. The principal issues related to rail are:

- Management of rail traffic into and out of Redwood City, and the overall Peninsula region where freight and passenger traffic share rail lines on the Peninsula.
- UP interest in continuing to operate freight service on the Peninsula
- Feasibility of a shortline railroad to take over management and operations of rail service in the region.

A strong rail connection is viewed as important for the continued success of the Port of Redwood City and for potential expansion into other business areas.

Truck access to the Port is along Frontage Road and Seaport Boulevard with the latter shared with vehicle traffic traveling to and from the Pacific Shores Center office complex. The principal future concerns for Port growth are:

- Environmental mitigation related to truck traffic increases such as deteriorating surface track of Seaport Boulevard, the width of Seaport Boulevard, and general road congestion.
- The development of the salt works land, which is likely to increase traffic in the area. From the Port's perspective, the best long term solution would be the construction of a dedicated access road to the port, and a separate parallel road for the Pacific Shores Center and salt works land.
- Traffic congestion at the interchange with Highway 101, which can only be addressed through coordination and planning between the Redwood City and regional transportation bodies (Caltrans, etc.)

C. Land Expansion

The Port of Redwood City is currently land constrained with limited opportunities to develop new business areas apart from the 9-acre site formerly occupied by the liquid bulk terminal. The long term opportunity for expansion lies with the neighboring salt works land. A portion of this acreage would allow the Port to develop new opportunities – light industrial or cargo terminal – in addition to providing a buffer between the Port's operations and residential developments on the salt works land.

D. Covered Bulk Storage

The Port of Redwood City is reasonably isolated from commercial and residential communities, apart from the neighboring Pacific Shores Center, such that the current open storage of bulk commodities does not present a significant concern, with the exception of road dust. However, the future development of the salt works land with a likely heavy focus on residential is expected to create pressure for improved air quality at and surrounding the Port. In addition, California's Air Resources Board and the Bay Area Air Quality Management District are placing greater emphasis on the regulation of emissions and other pollution tied to port activities. Given these trends, the Port should work with its tenants to evaluate the different options for reducing the dust impacts from bulk cargo handling and storage.

The Port and its tenants have a number of options for providing covered storage of bulk commodities. The choice of storage option will be driven by specific tenant requirements, commodity characteristics and cost. TranSystems conducted a brief survey of companies that design and install storage facilities to determine the basic characteristics of common storage options; the results are presented below.

In order to compare pricing some general assumptions were made on annual throughput volume and frequency of delivery based on conversations with providers of bulk storage. The assumptions were a storage need of 25,000 tons, an annual throughput of 600,000 tons with a delivery every two weeks. Other factors that would be used to determine facility size include the density of the commodity, angle of repose in the storage pile, vessel discharge method, and reclaim method. In this example, it was assumed that

reclaim would be by front end loader and ship discharge via conveyor. The cost estimates are based on storage of a single commodity although some storage methods (flat warehouse and silos) could accommodate more than one commodity.

The following summarize the different types and cost of covered storage:

Covered Storage Type	Estimated Facility Price*
Flat Warehouse – material over metal frame	\$1.5 million (\$50 per square foot)
Flat Warehouse - Wood	\$2.4 million (\$80 per square foot)
Dome	\$2 million
Silo	\$2.5 - \$3 million

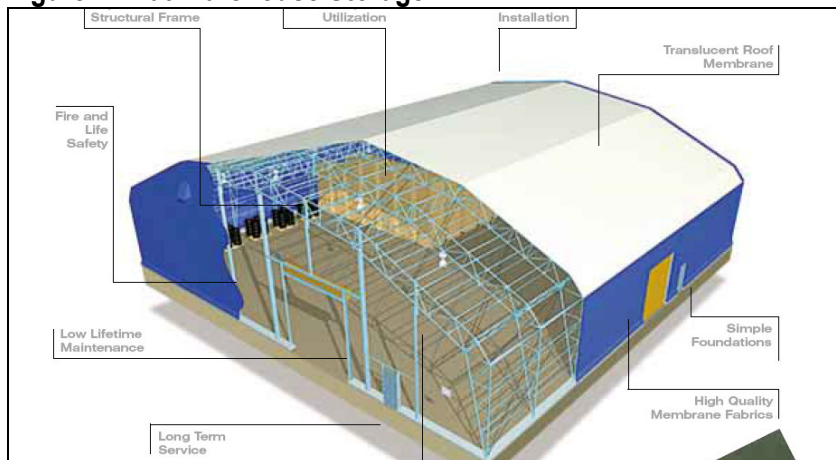
* Assumes a storage need of 25,000 tons, annual throughput of 600,000 tons with a delivery every two weeks.

Based on the interviews, if the primary driver is to cover material from weather and reduce dust emissions then the best option is likely to be flat warehousing. A dome could be overkill and a silo would likely be too expensive. A flat warehouse of roughly 150 feet by 200 feet would be suitable for the storage requirements in the example above.

Flat Warehouse Storage

Flat storage is the cheapest and simplest option especially if no alteration is required to discharge and loading operations. The facility is erected through prefabricated galvanized trusses that are bolted together and then covered in a translucent roofing material. The roofing/covering is polyester coated with PVC giving it a 20 year lifespan. Two concrete side retaining walls are then built to a height from 8 to 15 feet to allow reclaiming and storage; the higher the wall the more that can be stored. This retaining wall can be either poured concrete or ecology blocks which fit together via tongue and groove but are not as sturdy as poured concrete when hit by a front end loader. These facilities are portable and can also be broken down and reassembled in another location if need be. Multiple commodities could potentially be stored in the one facility with provision of dividing barriers.

Figure 1: Flat Warehouse Storage

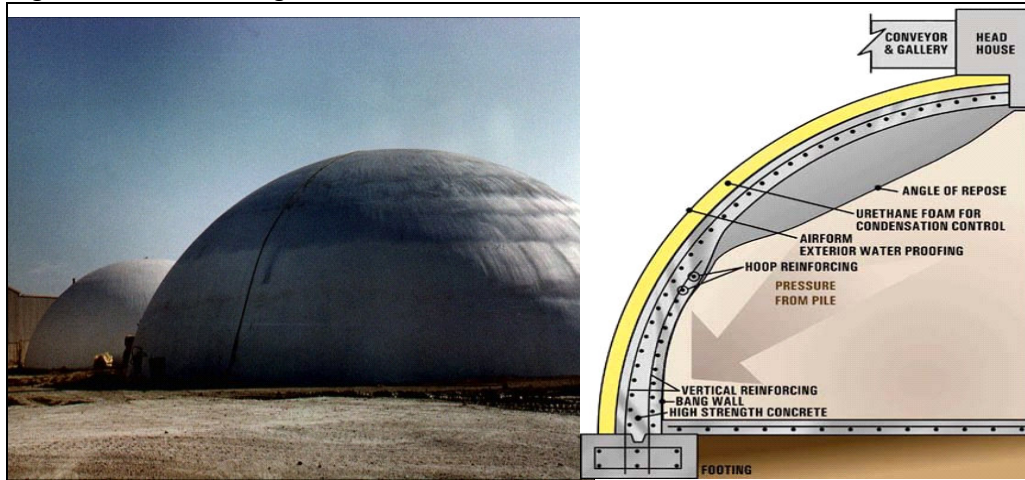


<http://www.rubb.com/products-ports-break-bulk.asp>

Dome Storage

The dome design requires a smaller footprint than that of flat warehousing to store similar quantities of material. In addition, with the weight spread over a wider area the dome foundation does not have to be as wide nor as deep as for a silo. A 25,000 ton storage facility would require a dome of approximately 180 feet in diameter. Separate domes would be required for each commodity.

Figure 2: Dome Storage



www.dometech.com and <http://www.monolithic.com>

Silo

Silo storage is the most expensive of option and the type of silo will vary by the commodity and capacity requirement.

E. Ferry Service

A new ferry terminal is proposed for Redwood City that would provide ferry service to other locations in the Bay Area. From the perspective of cargo operations, the following considerations are important:

- Control of dust from cargo handling and storage.
- Vehicle traffic related to the ferry terminal is segregated from truck traffic generated by the cargo operations.
- Ferry vessel operations do not interfere with commercial cargo vessel operations.

VII. Appendices

A. Previous Studies / Related Reports

The following research materials were used for this report.

Development Program for the Port of Redwood City
August 1974
Williams-Kuebelbeck and Associates

Dredging Issues and Impacts
June 2005
HPA, Tioga Group

Market Study – Re-Use of US Geological Survey Site and Wharf 5
(Pacific Network)
July 2005

Marine Terminal Plan
October 2005
TEC, Inc.

Aggregate Availability in California, December 2006, Department of Conservation, California Geological Survey

Feasibility Study for Ferry Service Between Oakland and Sacramento
(Seaworthy Systems, Inc.)
April 2007

Redwood City Ferry Terminal Draft Report
(CHS Consulting Group)
August 2007

Port of Redwood City Fiscal Year 2007 Budget
June 28, 2007

Organic Material Recycling Presentation
Garden City Sanitation
August 2007

Report to the Redwood City Community
November 2007 (?)
Redwood City Industrial Saltworks, LLC

Port of Redwood City Tonnage Report
FY 2007, 1st Quarter FY 2008

B. Interviews – Various Comments from Port Commissioners

Some of the comments and concerns stated during interviews with port commissioners are highlighted below.

- Port needs to diversify more, the significant drop in cement imports seriously affected the financial performance
- Port is an underutilized asset that has tremendous potential for South Bay traffic, both passenger and cargo
- Current tenants need to be locked in more on existing lease arrangements
- The bulk commodities should be under cover, whether silos or other types of cover (domes)
- The intersection of Seaport Boulevard and Highway 101 is a major traffic congestion issue: a solution needs to be forthcoming before any Port expansion can be considered
- The Port needs to work closer with the City of Redwood City for its future planning
- The Port is an established bulk commodity port. Other bulk materials that could use the Port should be identified and explored
- Auto imports is a possibility that was discussed in the past with an auto logistics terminal operator and should be looked at again
- What about lumber and forest products as import cargo? This was the main cargo (export) in the past
- What are other ports doing strategically that Redwood City should consider?
- The existing industrial buffer between the Port and both the City of Redwood City and Highway 101 is very advantageous to the Port

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