Terminal 6 Business Study Executive Summary

January 2018

1.1 The Assignment and Overview

The Port of Portland (Port) hired the Advisian WorleyParsons consultant team and its subcontractors (IHS-Markit, The Beckett Group, and Coraggio Group) to undertake a business study to define the Port's future role in container shipping at Terminal 6 and to identify a sustainable business model for developing and managing this business. The Port posed six questions to be answered by this study:

- What is the Port's future role in container shipping at Terminal 6?
- What is the value proposition of Terminal 6 to container carriers and prospective container terminal operators?
- How can Terminal 6 be used to provide efficient market access for cargo shippers?
- Is there a "niche" in the direct trans-ocean container service market that Terminal 6 can occupy?
- Is it feasible to use Terminal 6 as a feeder facility to other West Coast terminals, either as a complement or an alternative to direct trans-ocean carrier service?
- What is the business model that maximizes business opportunity at the terminal but is financially sustainable, both for the Port and/or potential private partners?

A 23-member Terminal 6 Industry Leader Committee – consisting of diverse, statewide representation - was convened by the Port to provide input and guidance to the consultant team and Port leadership. The Coraggio Group facilitated the consultant-committee process.

To address the above questions, seven tasks were undertaken by the consultant team:

Task 1: Industry Analysis. The team reviewed changes in the industry (both ports and liner shipping) to understand current trends and how these changes might impact future container business at the Port.

Task 2: Market Analysis. The team completed a comprehensive review of the market that is more economically served through Portland over any other gateway. This included southern Washington and all of Oregon and Idaho. The team identified the size of the potential market using data from both PIERS and Transearch to disaggregate the data to the county level.[1]

Task 3: Terminal 6 Strengths, Weaknesses, Opportunities and Threats Analysis. A review of the strengths, weaknesses opportunities and threats (SWOT) was completed by both Port staff and the Industry Leader Committee. These two analyses were then reconciled to produce one summary of the SWOT. There were only minor differences between the conclusions reached by the consultant team, Port staff and the Industry Leader Committee, reinforcing the validity of the SWOT analysis.

Task 4: Operating Models. The team evaluated various operating models and the many permutations available under each one. The team looked at a port operating model, a port semi-operating model, a landlord model, and a concession model. The team also studied the variations of each model with respect to who provides the equipment, who provides the maintenance, and what risks are assumed by whom. Further, the team reviewed the various methods of engagement for an operator under the semi-operating model both in terms of what services a terminal operator might provide and how the Port might compensate them for these services.

Task 5: Alternatives Analysis. In conjunction with the financial analysis, the consultant team looked at alternative types of operations at Terminal 6. A stand-alone container operation, a mixed-use operation, and water feeder services to U.S. ports and Canadian ports were reviewed. Other ancillary operations such as rail shuttle, equipment receiving and dispatch, trucking, and bulk container handling were also reviewed.

Task 6: Financial Analysis. The consultant team conducted an in-depth financial analysis of Terminal 6 container operations, utilizing existing information on past operations and updating that data for current operations. Costs and revenues were adjusted, capital

[1] PIERS is a provider of import and export data from bills of lading filed with U.S. Customs. Transearch is a planning tool that models U.S. freight flows. Both services are owned by IHS Markit, a member of the Terminal 6 study consultant team.

and administrative expenses were analyzed, and then administrative charges and depreciation were capped to insure Terminal 6 would be as competitive as possible.

Task 7: Stakeholder Engagement. During the study process, the team had five meetings with the Industry Leader Committee to review the business study tasks and invite input from the committee. The interest and engagement of the committee was integral to the process and provided the Port and the consultant team with valuable insights.

Task 8: Final Report. The remainder of this Executive Summary describes key takeaways from the study's tasks and ends with consultant findings and conclusions.

1.2 Task 1 - Situation Analysis

Consolidations / Mergers and Acquisitions

As evidenced by the following events in 2016-18, the trend of consolidation within the liner industry has resulted in fewer and much larger lines in all the major trade lanes:

- Hanjin Shipping went bankrupt.
- Hapag-Lloyd acquired United Arab Shipping Company.
- CMA CGM acquired American President Lines.
- China Ocean Shipping (Group) Company merged with China Shipping Group to form COSCO Shipping.
- Maersk Line acquired Hamburg Sud.
- NYK Line, "K" Line and Mitsui O.S.K Line (MOL) announced their intent to form the Ocean Express Network (ONE) in 2018, effectively becoming one line.
- COSCO Shipping announced its intent to acquire Orient Overseas Container Line (OOCL).
- COSCO Shipping is also rumored to be interested in acquiring CMA CGM.

- COSCO Shipping, Maersk Line, and CMA CGM have all made numerous other acquisitions in the past and continue to become the behemoths of the industry along with Mediterranean Shipping Company.

Rationalizations / Alliances

The formation of alliances by liner shipping companies is a form of asset rationalization. Multiple liner companies are putting freight on each ship in the alliance. Multiple companies are contributing ships to alliance vessel strings and the terminal assets of the member companies are also utilized by multiple liner companies. This is necessary to fill large vessels and to better control costs. Large vessels result in lower costs per container when they are well utilized and this allows the members of the alliance to be more competitive than they could be on an individual carrier basis when operating smaller vessels.

In 2017, the four major alliances reshuffled their members and became three alliances, as follows:

THE Alliance

NYK Line

MOL

"K" Line

Hapag Lloyd

Yang Ming Marine Transport (Yang Ming)

2M Alliance

Mediterranean Shipping Company (MSC)

Maersk Line

Ocean Alliance

COSCO Shipping

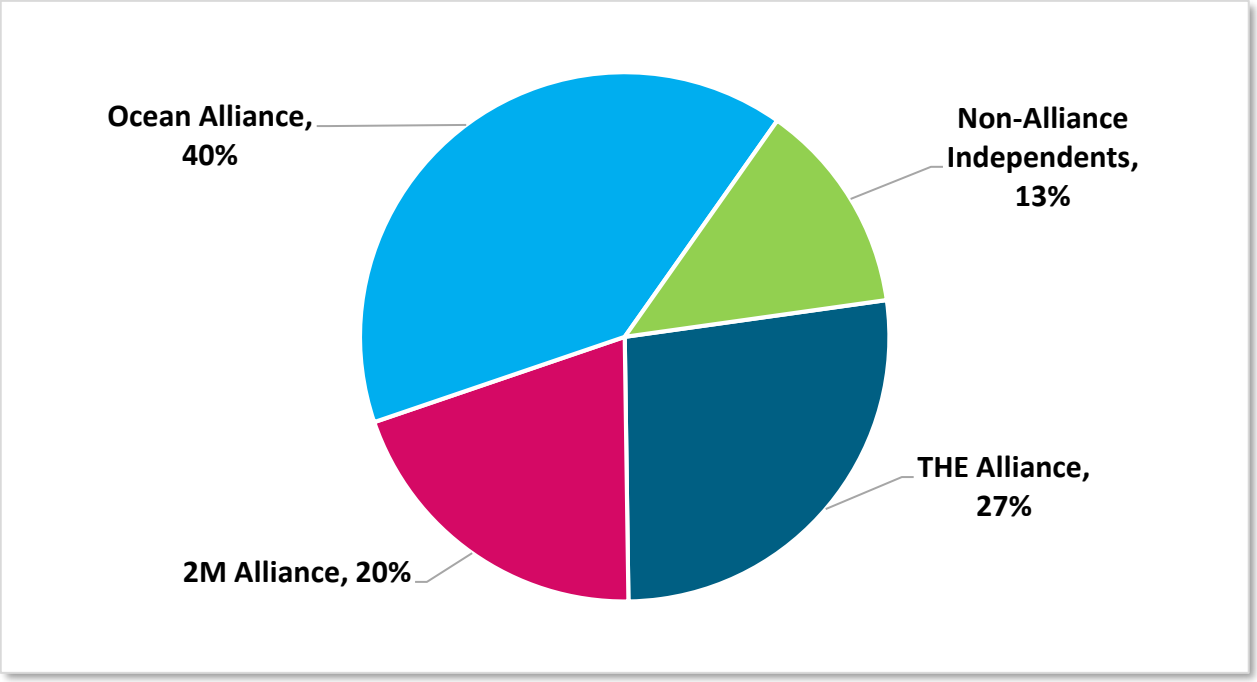
OOCL

Evergreen Marine Corporation

CMA CGM

The three alliances account for 87% of the transpacific container market (see Figure 1).

Figure 1: Alliance Share of Transpacific Container Market



In addition to the alliance groups, there are several independent carriers in the transpacific trade. They are: Wan Hai Line, Pacific International Lines (PIL), SM Line, ZIM Integrated Shipping (ZIM), Hyundai Merchant Marine (HMM), Westwood Shipping Lines (Westwood), and Matson (eastbound only). Of these carriers, only HMM and Westwood currently serve Pacific Northwest (PNW) ports.

In 2016, there were 46 transpacific services; in 2017, there were 39. More specifically, as it pertains to Portland, there were 18 PNW services in 2016 and only 12 in 2017. The 12 services to the PNW include:

2M Alliance – 2

Ocean Alliance – 4

THE Alliance – 3

ZIM – 1

HMM – 1

Westwood – 1

As of today, eight of these services employ vessels of a size that could physically call Portland. However, all members of an alliance would need to agree to such a call as the alliances' governing boards control the routings and terminal selections for the carriers. It is important to remember that alliances exist to maximize profit and control costs, not to improve service. The result is that the Beneficial Cargo Owners (BCOs) have fewer choices of carriers, fewer choices of routes, and less visibility of the physical movement of the cargo (i.e., which ship cargo goes on or which terminal cargo will come through). It is more likely that Portland would be attractive to one of the independent lines operating smaller vessels.

The longer-term issue is that transpacific carriers are in the process of upsizing their fleet – 10,000 twenty-foot equivalent units (TEUs) and larger. Due to the depth constraint of the Columbia River navigation channel, the largest container ships that can call Portland are 5,000 to 7,000 TEUs in size. As larger vessels are cascaded in the transpacific vessel strings, the number of ships of a size that could or would call Portland will diminish.

The quest for lower cost structures has resulted in the acquisition of newer, larger vessels that require carrier rationalization and cooperation to maximize vessel utilization. That trend is continuing at a rapid pace. The vessel order books of the carriers include 158 new builds from 2017 to 2019. Although some of these vessels are small (<2,500 TEU), nearly 85% of current orders are for vessels above 10,000 TEU. Almost no ships of the 5,000 -7,000 TEU size are being built. It is likely that none of the 2,500 TEU vessels will be deployed in the transpacific trade lanes and instead will be used for intra-Asia or intra-Europe trade lanes.

The trend toward larger ships in the transpacific will continue and there will be limited opportunities for Portland to attract a transpacific service due to vessel size limitations. Alliances control almost 90% of the transpacific freight. This is not a favorable condition for a smaller port like Portland.

1.3 Task 2 – Market Analysis

Through an analysis of PIERS data and utilizing Transearch to disaggregate the data to a county level, the consultant team estimated that the market more economically served over Portland than any other gateway was approximately 225,540 loaded containers or 406,000 TEUs, of which 58% was export cargo and 42% was import cargo. In addition to the loads, there are movements of empty containers to balance the difference between imports and exports, which the team estimated to be 20% of the number of loads thereby creating a total market of 270,648 containers or 487,166 TEUs. This is based on

2014 data, which was the last full year of container service in Portland. In that year, the Port of Portland handled 195,000 TEUs or 40% of the market potential. While a market of this size is not insignificant, it would be the smallest market on the U.S. West Coast to be served by a direct transpacific liner call.

The other key finding of the market analysis was that approximately 90% of the Portland container market is coming from or destined for Asia. This underscores the importance of attracting a weekly transpacific carrier. While the Port might attract other niche carriers, the only way to achieve the volume required to sustain operations at Terminal 6 is to attract a weekly transpacific carrier. This task is made more difficult when considering that 87% of the transpacific cargo is moving on alliance carriers and that alliance carriers account for 146 of the 158 new builds between 2017 and 2019.

As part of the market analysis, the consultant team also looked at other ports of a similar size to determine if there were any lessons to be learned for Portland. The team reviewed operations at San Diego, Port Hueneme and Philadelphia. In all three cases, proximity to larger population centers contribute to the success of the port. All three also have anchor tenants and focus on large volumes of refrigerated cargo or other niche cargo. In the case of Philadelphia, there has been large subsidies for dredging ($392 million) and infrastructure that have greatly benefited this port.

1.4 Task 3 – Terminal 6 SWOT Analysis

The SWOT analysis was done by conducting two separate seminars and then reconciling the results of both. The first was done with key members of the Port staff and the second was done with members of the Industry Leader Committee. While there were minor differences between the two, the results were largely the same. The combined SWOT indicated that Portland's strengths as a container port are its connectivity to inland transport (barge and rail), its turnkey infrastructure, the lack of competition being the sole large container terminal in Oregon, strong shipper support, and land availability in the region and at the port.

Weaknesses included location challenges that result in higher costs for vessel diversion and for steaming time up the river, the perception of labor as undependable and unavailable, the demonstrated history of operating losses resulting in an unsustainable business model, the market size, and political obstacles due to environmental concerns or community protections.

Opportunities that were identified were the strong public interest in a container facility at Terminal 6, the ability to attract niche services, inland barge connectivity, an on-dock

intermodal rail yard, truck connectivity, a strong regional economy, and continued demand for service. It was also thought that the lack of current business created an opportunity for innovation and to try new technologies.

Threats were identified as the unpredictability of labor; costs to attain profitable, sustainable operations; the alliances and consolidations of carrier services; re-attracting cargo interests that have developed new supply chains in the last three years; underutilized terminals in Seattle and Tacoma; and, lastly, increasing ship size.

1.5 Task 4 – Operating Models

The study examined four types of port operating models with numerous variations possible to each model.

In a **The Port Operating Model**, a public port authority directly owns and operates the terminal and is fully responsible for all management aspects and customer satisfaction. Most notably, the port directly hires longshore labor. The port has total control and 100% of the operational and financial risk under this model.

In a **Semi-Operating Port Model,** the port contracts part of the operation to a terminal operator. The range of what is contracted can be as simple as payroll services only to contracting the entire management of all aspects of day-to-day operations. The port still owns the terminal but has less control and still has the majority of the risk (mostly financial and customer satisfaction). The terminal operator is compensated within a range, from a fixed fee to a cost-plus contract. A key component of this model is who purchases the equipment and a contractual understanding of how the equipment is maintained.

A **Landlord Model** is when the terminal is leased out to a carrier or a terminal operator on a long-term basis and the carrier or terminal operator performs all or most of the operations within the leased area. Variations of this model include equipment ownership, equipment maintenance, and terminal maintenance. Depending on the final terms negotiated, the port has little control over the operation and a reduced amount of risk as compared to the port operating or semi-operating models. Typically, long-term container terminal leases run between 20 and 30 years with options to extend.

In a **Concession Model,** a port offers a long-term concession to a tenant, usually 25-50 years or even longer depending on the initial development investment required. This model usually requires the tenant to offer a concession fee up front as well as to provide the equipment and all capital improvements to the terminal area. Usually the

concessionaire is responsible for all maintenance activities and the Port has no exposure to maintain any assets. The Port effectively has no control over operations and little financial or operational exposure.

As Portland is unlikely to attract a long-term tenant or concessionaire due to the size of the market and the recent operating history of the terminal, the Port will have to be either an operating or semi-operating port. Since the Port is not a Pacific Maritime Association (PMA) member, and does not want to become one, it will have to hire a terminal operator at least for payroll purposes.[2] The Port no longer has extensive internal container terminal operating expertise and, therefore, the team concluded that the Port should hire a terminal operator to manage the operations on a day-to-day basis with the Port providing operational and financial oversight. The consultant team further concluded that the contract with the terminal operator be a fixed fee type of arrangement with key performance indicators that need to be met. In this way, the Port can maintain some control over costs and productivity and hence reduce the financial and customer satisfaction risks to the Port.

1.6 Task 5 – Alternatives Analysis

As part of the Alternatives Analysis, the consultant team reviewed other container and non-container uses for Terminal 6. The team did not, however, study the commercial viability of attracting other non-containerized commodities to the terminal as this was outside the scope of the study.

The team also looked at a water feeder service for Portland cargo to either Seattle/Tacoma or Vancouver, B.C. Seattle/Tacoma options are too expensive due to needing to use a U.S.-built, U.S.-crewed feeder vessel. While a foreign-built, foreign-crewed vessel could be used to Vancouver, B.C., it still requires handling the box three times to get it onto a ship in Canada and the resulting costs are prohibitive.

The rail intermodal shuttle to Seattle/Tacoma is a viable option and has been done by Northwest Container Services from Portland for many years. The consultant team believes the BNSF Railway (BN) service from the intermodal yard at Terminal 6 can be successful and can help defray some gate and yard costs for container vessel operations. The new laws regarding electronic logs will enforce the rules regarding driver hours and should contribute to the success of the BN operation. In conjunction with intermodal

[2] The PMA is an industry association with 78 member shipping lines and terminal operators. The PMA negotiates and administers maritime labor agreements with the International Longshore and Warehouse Union (ILWU).

shuttle service, Terminal 6 can also offer equipment pooling services that could be helpful during the start-up period of container vessel operations.

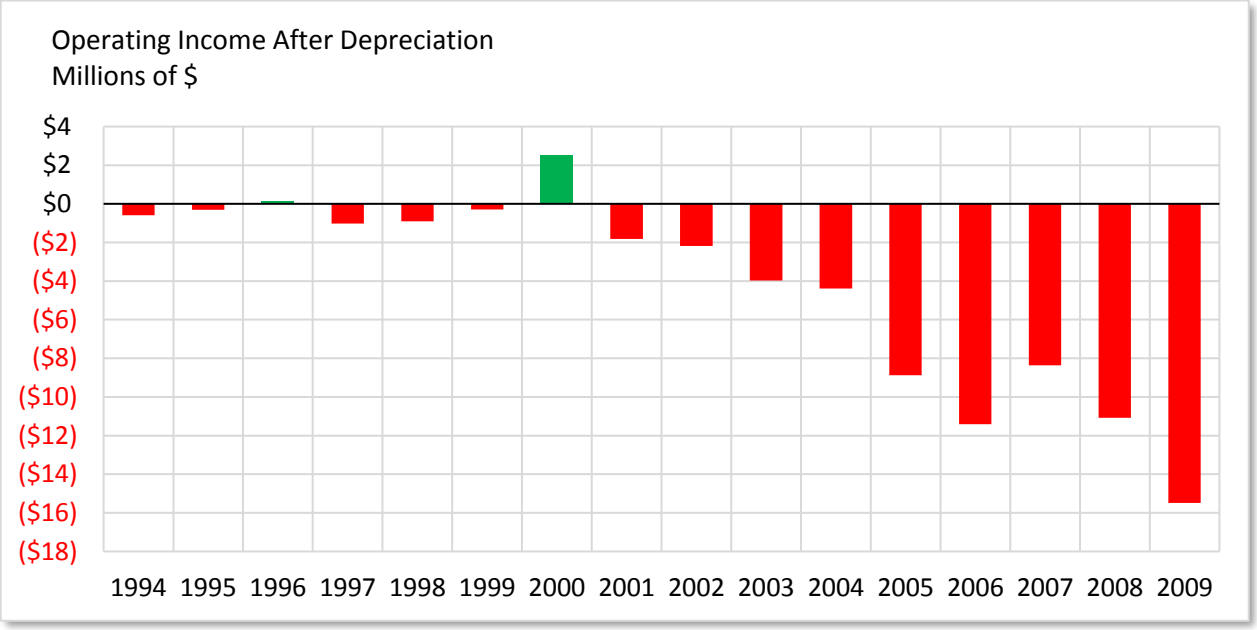
Container bulk handling might be another semi-container/mixed-use option and should be explored. In this type of operation, bulk cargo comes into the terminal by rail in specialty containers. A specialized spreader is attached to the container crane and the crane both lifts and turns the container over and dumps the cargo into the hold of a bulk carrier at the dock, thereby controlling dust, etc. This type of operation is used in mining and agriculture in Australia and South America.

1.7 Task 6 – Financial Analysis

This task utilized past cost and revenue information from the Port for Terminal 6 and included assumptions to update that information to current operating models recommended from Task 4. By doing this, the consultant team analyzed the circumstances required to operate the terminal in a financially sustainable manner.

It is clear from studying past performance that the three keys to financial sustainability are volumes, rates, and operational productivity. From 1994 through 2004, the terminal averaged 163,000 vessel moves per year and from 2005-2010 the average was only 121,000 vessel moves per year. The terminal only experienced positive net income in 1996 and 2000.

Figure 2: Financial Performance, Terminal 6 Container Line of Business

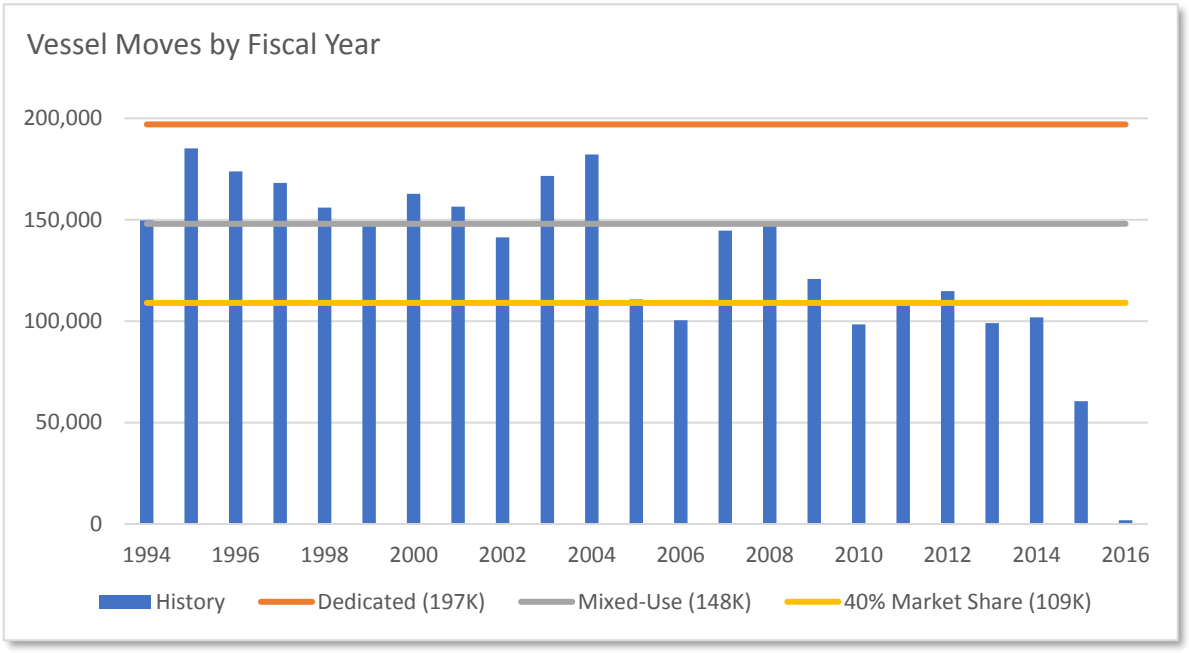


Assumptions regarding terminal productivity and pricing were incorporated into the analysis. Productivity is assumed at 2006-2009 levels in three major categories: vessel, gear-locker, and gate/yard operations. To establish current pricing levels for the mode, the consultant team analyzed past revenues per vessel move and then adjusted those rates to current dollars. The corporate support services expense was capped to bring that expense in line with expenses that a private terminal operator might allocate to terminal operations of this size and type. Depreciation was also capped, on the assumption that major capital expenditures to upgrade or expand the terminal will not be needed in the foreseeable future.

The consultant team modeled both a dedicated container terminal scenario (container vessel-related operations only) and a mixed-use terminal scenario (rail feeder and breakbulk operations in addition to container vessel operations). The mixed-use scenario assumes that part of the 52-acre intermodal yard and that 30 to 50 acres of Berths 603-604 would be used to handle rail feeder and breakbulk operations. Container vessel operations would use approximately 50-60% of the Terminal 6 footprint.

The results of the financial modeling indicate that 197,000 annual vessel moves are needed to reach a break-even point in a dedicated container terminal scenario while 148,000 annual vessel moves are needed to break even in a mixed-use terminal scenario. The mixed-use terminal scenario includes profits from the non-container cargoes. The 197,000 annual vessel moves are higher than ever experienced in Portland. A volume of 148,000 annual vessel moves has been reached in the past, though only one time in the past 10 years (see Figure 3).

Figure 3: Break-even Volume vs. Past Volume



These results are based on an inflation-adjusted price level that assumes rates charged to carriers have kept pace with longshore cost increases. This might be an optimistic assumption as per box revenues failed to keep pace with expenses during the latter years of the Port's operation of the terminal. The results also assume there are revenues from non-container cargo. The break-even volume of 148,000 vessel moves in a mixed-use terminal scenario also represents capturing about 54% of the available market. This level of market share has been experienced in the past, but may be difficult to achieve in the future due to changes in the industry and marketplace.

1.8 Task 7 – Stakeholder Engagement

The 23-member Industry Leader Committee provided industry knowledge and guidance to the consultant team and Port leadership on the Port's future role in container shipping at Terminal 6, and a sustainable business model for managing and developing the container business.

The committee included diverse, statewide representation from: shippers (exporters and importers), service providers (freight forwarders, railroads, barge and trucking industry), carriers, ports, labor, and legislators with strong shipper interests. The committee met five times between June 2017 and December 2017 with the consultant team and Port management. Meetings were facilitated by the Coraggio Group.

Committee members remained deeply engaged throughout the process and provided guidance and insight to the consultants and Port management. The committee expressed strong support for the return of Terminal 6 container and barge service and a recognition of Terminal 6's importance to the state from a market access and economic perspective. The committee supports the Port's business strategy of investing limited funds associated with prior lease termination to ready the terminal for long term container service, while pursuing near term business opportunities that serve regional shippers and build confidence in the productivity of the terminal. To recover transpacific container service at Terminal 6, the committee underscored the importance of engaging all parties (shippers, stevedores, labor, Port, service providers, state government, and other leaders) in this endeavor. Members of the committee expressed interest in participating in an ongoing shipper committee to provide support for Terminal 6 container service marketing and other business activities.

1.9 Findings and Conclusions

1.9.1 Findings

The following summarizes the consultant team findings for each of the six Terminal 6 business study questions.

What is the value proposition of Terminal 6 to container carriers and prospective terminal operators?

Terminal 6 offers a built-out facility, berth availability, strong local support, a pool of cargo, limited competition, and an expectation of labor cooperation.

What are the negatives regarding the value proposition of Terminal 6 to container carriers and prospective terminal operators?

The shrinking supply of container vessels in the transpacific trade small enough to handle the draft restrictions on the Columbia River, the cost and time associated with a Portland call, and a relatively small cargo market present challenges to container operators.

How can Terminal 6 be used to provide efficient market access to cargo shippers?

A direct vessel call at Terminal 6 is the best option for local shippers. Terminal 6 can also help provide efficient market access to shippers by offering rail feeder and equipment pooling services.

Is there a "niche" in the direct trans-ocean container service market that Terminal 6 can occupy?

Terminal 6 could attract an independent carrier with smaller vessels in the transpacific service and possibly attract a South American or Australian carrier. Other niche ports analyzed had anchor tenants, a larger population base close by, and government funding. Examples of viable niche trades for Terminal 6 could be a focus on the movement of refrigerated cargo and/or a focus on the fruit/produce trade between North and South America where vessel sizes are a good fit for the Columbia River.

Is it feasible to use Terminal 6 as a feeder facility to other West Coast terminals either as a complement or an alternative to direct trans-ocean service?

A Terminal 6 vessel feeder operation would likely not be feasible due to the high cost of a U.S. flag vessels and U.S. crew requirements pursuant to the Jones Act. Feeder services to Vancouver, BC would be more reasonable but the cost of handling the box three times would be prohibitive.

What is the business model that maximizes the business opportunity at the terminal but is financially sustainable, both for the port and/or potential private partners?

The most viable business model for Terminal 6 is a mixed-use facility with the profits from non-container operations used to help support the container business.

What is the Port's future role in container shipping at Terminal 6?

Terminal 6 has a potential future as a mixed-use facility including niche container services, general cargo and intermodal rail. Revenue from the mix of uses would be necessary to help support a return of weekly transpacific service where the Port is exposed to a much higher degree of operational and financial risk. The Port would need to be a semi-operating port and would need to generate sufficient volume necessary to cover the significant fixed costs of the operation.

1.9.2 Conclusions

In the last decade, there have been significant changes in the container industry marked by bankruptcies, consolidations and new shipping alliances as well as increasing vessel sizes and competition. The future looks much the same, underscoring the consultant team's conclusion that Terminal 6 will not be able to compete with so-called mega-ports on the West Coast. Terminal 6 is not likely to see a return of weekly transpacific

container services by multiple carriers. The Port is best advised to diversify operations at Terminal 6, using revenue from a multi-use business model to help support future container services.

Ships will continue to increase in size in the transpacific trade and this will limit the number of lines that are able to call on Portland. A weekly transpacific service is essential as the Asian market represents nearly 90% of Portland's volume. Even if a transpacific service is obtained, financial success is not assured as the volume requirements are significant. If all goes well, achieving financial sustainability will require that terminal rates are commensurate with operational and labor costs – something that was not achieved in the past. Volumes needed to break-even are high under the dedicated terminal scenario and may be challenging to achieve even in a mixed-use scenario. Financial sustainability will be challenging to achieve even in a mixed-use terminal scenario. Volumes from 2010-2014 averaged 104,000 vessel moves and almost 150,000 vessel moves are needed to break even in the mixed-use terminal scenario. Revenues and profits from non-container vessel operations are essential to the success of Terminal 6. Assumptions regarding labor productivity in the yard/gate, gear-locker and vessel crane operations must be met and maintained. Shippers have established new supply chains and they must be convinced to change back to Portland which they will only do if they believe Terminal 6 service is sustainable.

With all those obstacles, securing the return of weekly transpacific service is a high bar in the current industry paradigm. The reason for pursuing this is to achieve the Port's mission of providing market access to regional importers and exporters. The Port should target weekly niche transpacific service by independent or alliance container carriers with vessels in the transpacific rotation that can transit the Columbia River channel. To recruit and maintain this service, the Port will need the strong support of the regional shipping community, service providers, labor, and government.

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