Strategies for Enhancing the Puget Sound Container Trade Gateway

Final Report – May 2014
Outline of Report

1. Executive Summary

2. Framework of Threat to Puget Sound Gateway

3. Puget Sound Gateway Infrastructure Drawbacks (versus Other Gateways)

4. Dynamics of Intermodal Volume Losses

5. Strategies to Defend / Strengthen Puget Sound Gateway

6. Financial Dimensions of Strategic Alternatives

7. Conclusions
Executive Summary

Puget Sound Ports Under Threat
- Intermodal container volume from and to Asia is vitally important to the Puget Sound container gateway, accounting for over one-third of total port volume, and is currently at-risk given industry trends towards larger vessels, combined with a lack of adequate container terminal infrastructure in the ports of Seattle and Tacoma to handle them.
- Puget Sound gateway intermodal volume is highly concentrated geographically, with 83% destined for Chicago, Cleveland, and Minneapolis, markets which are well served through other gateway port complexes.

Puget Sound Port and Intermodal Infrastructure Competitive Disadvantages
- Collectively, the ports of Seattle and Tacoma currently have three terminals with sufficient berth lengths and cranes to stevedore one ULCS vessel at a time, but lack sufficient intermodal infrastructure necessary to efficiently evacuate containers from the port on to inland rail-served markets.
- Other competing gateway ports currently have terminals capable of efficiently handling multiple ULCS vessels concurrently, are actively enhancing their terminal infrastructure, and will be well positioned to capture intermodal share from the Puget Sound ports should they not invest in developing comparable capabilities for handling ULCS ships.

Economic Dynamics of Continuing Deficiencies in Port/Intermodal Infrastructure
- If nothing is done to mitigate its infrastructure deficiencies, the Puget Sound gateway could stand to lose a significant portion of the almost 600k TEUs/year of intermodal imports that currently pass thru its ports.
- This will further exacerbate the highly under-utilized marine terminal capacity of the two ports and will likely cause certain Marine Terminal Operators (MTOs) to pursue ways to prematurely exit lease agreements/obligations.
- This will result in material reductions in fixed revenue for the port – Mercator estimates this to be just over $185m in cumulative nominal revenue by 2018.
- This could equate to an annual unrealized direct, indirect, and induced revenue impact for the State of Washington of nearly $600m, along with unrealized jobs gains of up to 2,100 positions by 2018.
Executive Summary (continued)

Mitigation Options for Infrastructure Investment and Enhancement

- The ports of Seattle and Tacoma both have options for enhancing their capabilities for handling ULCS ships
- There are options for enhancing intermodal capacity and mainline connections for each of these scenarios, which would provide adequate rail capacity to arrive and depart trains more expeditiously
- These enhancements would elevate utilization levels to more reasonable levels, as well as enable the Puget Sound to effectively compete with other gateways to maintain, if not increase, its share of intermodal volumes
- However, given the current unsustainably low level of marine terminal capacity utilization in the gateway, it will be difficult to financially justify more than one or two terminal enhancement projects simultaneously
- Moreover, to reduce excess terminal capacity in the gateway while concurrently enhancing a few terminals’ respective capabilities for ULCS ships, it should be feasible to re-purpose selected, obsolete facilities to non-container maritime uses

Financial Implications

- Mercator evaluated the gross profit contribution from each of the existing terminals of Seattle and Tacoma
- Revenue, cost, and capital expenditures (capex) for the ports were forecasted under alternatives ranging from a “perfect world” scenario (in which volume grows at market rates and terminal operators continue to honor their lease obligations), to a “status quo infrastructure” scenario (in which volume is lost and selected MTOs cease operations)
- Mercator believes that the status quo infrastructure scenario essentially represents the base case, as it incorporates expected market reactions to vessel upsizing in the Transpacific trade with current Puget Sound port infrastructure – therefore, the investment cases should be benchmarked against it
- Our preliminary financial analysis suggests in both cases that investing in ULCS capacity would enhance the overall value of the Puget Sound’s container terminal infrastructure from a cash flow perspective
Mercator concludes that:

- The Puget Sound container ports should refine and implement a program for enhancing the ULCS-handling capabilities of one or two terminals

  - The best alternative would be a sequential investment scenario to yield the highest net present value via generation of strong cash flows and effective risk mitigation

- Concurrently, the two ports should refine and implement a program for re-purposing selected container terminals, that cannot viably be enhanced to handle ULCS ships, to non-container maritime applications

- Both of these programs can be implemented more effectively through some form of collaboration between the two port authorities
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Puget Sound Gateway Container Volume Profile

**SEA/TAC 2013 Volume 3.47 million TEUs**

- **International 77%**
- **Domestic (AK/HI) 23%**

- **From/To Asia 95.3%**
- **From/To Other 4.7%**

- **Inbound Loads 36%**
  - To WA/OR/ID by Truck
  - To Midwest & E. Coast by Rail

- **Inbound Empties 6%**
  - To WA/OR/ID by Truck
  - To Midwest & E. Coast by Rail

- **Outbound Loads 29%**
  - From WA/OR/ID by Truck
  - From Midwest & E. Coast by Rail

- **Outbound Empties 6%**
  - From WA/OR/ID by Truck
  - From Midwest & E. Coast by Rail

**SEA/TAC volumes at risk because railed shipments can be easily shifted to other ports**

37%
Framework of Threat:
Relative Importance of Asian Intermodal Volume

- About 18% of the Puget Sound ports’ collective throughput (and about 47% of inbound international containers) is intermodal rail traffic from Asia to US Midwest points
- **Given equipment repositioning requirements of ship lines, a loss of inbound intermodal volume for the ports of Seattle and Tacoma will also lead to a loss of westbound volume (of loads and/or empties)**

### 2013 Seattle/Tacoma Port Volume Composition,
TEUs - 000s, % of Total

<table>
<thead>
<tr>
<th>Category</th>
<th>TEUs</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Domestic (excl Duwamish)</td>
<td>542</td>
<td>17%</td>
</tr>
<tr>
<td>International OB (Loads)</td>
<td>1,000</td>
<td>31%</td>
</tr>
<tr>
<td>International IB &amp; OB MTYs</td>
<td>427</td>
<td>13%</td>
</tr>
<tr>
<td>International IB Loads (Local)</td>
<td>660</td>
<td>21%</td>
</tr>
<tr>
<td>International IB Loads (Intermodal)</td>
<td>579</td>
<td>18%</td>
</tr>
<tr>
<td>CHICAGO, IL</td>
<td>272</td>
<td>47%</td>
</tr>
<tr>
<td>CLEVELAND, OH</td>
<td>138</td>
<td>24%</td>
</tr>
<tr>
<td>MINNEAPOLIS, MN</td>
<td>88</td>
<td>15%</td>
</tr>
<tr>
<td>DETROIT, MI</td>
<td>26</td>
<td>4%</td>
</tr>
<tr>
<td>ST. LOUIS, MO</td>
<td>20</td>
<td>3%</td>
</tr>
<tr>
<td>NEW ORLEANS, LA</td>
<td>10</td>
<td>2%</td>
</tr>
<tr>
<td>OTHERS</td>
<td>26</td>
<td>4%</td>
</tr>
</tbody>
</table>

**CHICAGO, IL**

**CLEVELAND, OH**

**MINNEAPOLIS, MN**

**DETROIT, MI**

**ST. LOUIS, MO**

**NEW ORLEANS, LA**

**OTHERS**
The graphic below provides a high-level overview of the routing patterns for cargo originating in Asia and destined for inland intermodal markets in North America.

The size of the circle for each gateway port represents its relative size from an overall port throughput perspective.
Framework of Threat:
Key Trend in Container Shipping – Increased Ship Sizes

- Ship lines have consistently ordered larger ships since the 1970s
- However, various forces (shown schematically below) have accelerated this pattern in the past ten years
- Moreover, these same forces are likely to intensify over the next ten years

**Factors Driving Carriers to Order and Deploy Very Large Container Ships**

- **Forces**
  - High Fuel Prices
  - Expectations of Strong Trade Growth
  - Competitive Pressures

- **Need**
  - Economies of Scale to Lower Slot Costs

- **Action**
  - Order & Deploy Larger Ships
    - Industry Consolidation
    - Subsidized Shipyards
    - Panama Canal Expansion

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*Port of Seattle*
Since 2007, the number of weekly services provided by global carriers in the Far East – PNW inbound market segment has dropped by 14%.

The average nominal capacity for Transpacific liner services to the Puget Sound has increased by 27%.

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Service</th>
<th>2013</th>
<th>2010</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSK/ CMA TP-3/ TP-9/ Columbus</td>
<td>TP1</td>
<td>8,616</td>
<td>6,156</td>
<td>2,824</td>
</tr>
<tr>
<td>MSK TP1</td>
<td>GA NWX</td>
<td>8,750</td>
<td>8,635</td>
<td>5,604</td>
</tr>
<tr>
<td>GA PAX</td>
<td>GA NWX</td>
<td>4,731</td>
<td>4,714</td>
<td>4,753</td>
</tr>
<tr>
<td>GA PNX</td>
<td>GA NWX</td>
<td>8,456</td>
<td>8,217</td>
<td>5,697</td>
</tr>
<tr>
<td>GA PNX</td>
<td>NWA PS-1</td>
<td>5,754</td>
<td>5,527</td>
<td>5,261</td>
</tr>
<tr>
<td>NWA NW</td>
<td>NWA PS-1</td>
<td>6,650</td>
<td>6,479</td>
<td>6,479</td>
</tr>
<tr>
<td>HJS PNH/ HPN</td>
<td>COSCO PNC/ CPN</td>
<td>5,175</td>
<td>5,361</td>
<td>5,453</td>
</tr>
<tr>
<td>COSCO PNC/ CPN</td>
<td>YML PN3</td>
<td>5,498</td>
<td>5,648</td>
<td>5,561</td>
</tr>
<tr>
<td>YML PNY/ YPN/ YH-PNW</td>
<td>K-L Nowco-A</td>
<td>4,331</td>
<td>5,643</td>
<td>5,612</td>
</tr>
<tr>
<td>K-L Nowco-A</td>
<td>EMC UAM</td>
<td>5,612</td>
<td>5,570</td>
<td>5,364</td>
</tr>
<tr>
<td>EMC CPN</td>
<td>EMU CPN</td>
<td>5,612</td>
<td>5,570</td>
<td>2,868</td>
</tr>
<tr>
<td>CSCL/UASC ANW 1/ AWN 1</td>
<td>AMP</td>
<td>4,201</td>
<td>4,250</td>
<td>4,453</td>
</tr>
<tr>
<td>ZIM AMP</td>
<td>CSCL/UASC ANW 1/ AWN 1</td>
<td>4,201</td>
<td>4,250</td>
<td>3,367</td>
</tr>
</tbody>
</table>

All Lines

<table>
<thead>
<tr>
<th>Total Weekly TEUs</th>
<th>73,380</th>
<th>66,250</th>
<th>67,360</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of Services</td>
<td>12</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Avg TEUs per Service</td>
<td>6,120</td>
<td>6,020</td>
<td>4,810</td>
</tr>
</tbody>
</table>
The number of weekly services provided by global carriers in the eastbound Far East – California market segment has also declined, by 25% since 2007.

Average ship size for vessel services to San Pedro Bay has increased by an even greater amount (34%) during this same period.

<table>
<thead>
<tr>
<th>Carrier Alliance</th>
<th>Size Range</th>
<th>2013</th>
<th>2010</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSK-MSC-CMA</td>
<td>&lt;6000 TEU</td>
<td>1</td>
<td>2</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>6000-8999 TEU</td>
<td>1</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>&gt;9000 TEU</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>5</td>
<td>5</td>
<td>7.5</td>
</tr>
<tr>
<td>GA</td>
<td>&lt;6000 TEU</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6000-8999 TEU</td>
<td>3</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>&gt;9000 TEU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>4</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>NWA</td>
<td>&lt;6000 TEU</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6000-8999 TEU</td>
<td>4</td>
<td>3</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>&gt;9000 TEU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>5</td>
<td>7</td>
<td>7.0</td>
</tr>
<tr>
<td>CHKY</td>
<td>&lt;6000 TEU</td>
<td>6</td>
<td>8</td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td>6000-8999 TEU</td>
<td>3</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>&gt;9000 TEU</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>10</td>
<td>10</td>
<td>11.0</td>
</tr>
<tr>
<td>EMC/CSCL</td>
<td>&lt;6000 TEU</td>
<td>2</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>6000-8999 TEU</td>
<td>3</td>
<td>3</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>&gt;9000 TEU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>5</td>
<td>4</td>
<td>5.5</td>
</tr>
<tr>
<td>Others</td>
<td>&lt;6000 TEU</td>
<td>2</td>
<td>3</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>6000-8999 TEU</td>
<td>2</td>
<td>3</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>&gt;9000 TEU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>2</td>
<td>3</td>
<td>3.0</td>
</tr>
<tr>
<td>FE-PSW Trade</td>
<td>&lt;6000 TEU</td>
<td>13</td>
<td>18</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>6000-8999 TEU</td>
<td>14</td>
<td>13</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>&gt;9000 TEU</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total Capacity (’000 TEU) | 203.4 | 185.5 | 195.6 |
| Average Ship Size (TEU)   | 6,560 | 5,800 | 4,890 |

Source: Alphaliner Database
Framework of Threat: 
Projected Transpacific Liner Ship Sizes in 2020 – PSW

- Based on analysis completed 18 months ago for a different client, Mercator projected that by 2020, the average size of ships in the Asia – California lane would increase to over 9,100 TEUs, as shown in the table below (in which each entry in the matrix cells represents a single vessel service)

- Mercator projected further that by 2020 about 11 of the 27 weekly services in this lane would be operated with 10,000+ TEU ships

- Since the completion of that report, the P3 and G6 consolidations have taken shape; and consequently, Mercator now believes that by 2020, a majority of the 27 services will have ships of that size

<table>
<thead>
<tr>
<th>Carrier Group Last Outbound Port Zone:</th>
<th>2020 Class</th>
<th>MSK / MSC / CMA Class</th>
<th>G6 Class</th>
<th>CKHY Class</th>
<th>EMC / CSCL Class</th>
<th>Niche Class</th>
<th>Total T/P Fleet Per Week</th>
<th>TEUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>JPN</td>
<td>9,000</td>
<td>9,000</td>
<td>6,000</td>
<td></td>
<td></td>
<td>4</td>
<td>33,000</td>
</tr>
<tr>
<td>Korea</td>
<td>KOR</td>
<td>10,000</td>
<td>7,000</td>
<td>10,000</td>
<td></td>
<td></td>
<td>3</td>
<td>27,000</td>
</tr>
<tr>
<td>North-Central PRC (Qingdao / Lianyungang)</td>
<td>QGD</td>
<td></td>
<td>9,000</td>
<td>2,000</td>
<td>4,000</td>
<td></td>
<td>9</td>
<td>69,000</td>
</tr>
<tr>
<td>Yangtze Delta (Shanghai / Ningbo)</td>
<td>YRD</td>
<td>11,000</td>
<td>8,000</td>
<td>8,000</td>
<td>13,000</td>
<td>7,000</td>
<td>9</td>
<td>69,000</td>
</tr>
<tr>
<td>South-Central PRC (Xiamen / Fuzhou)</td>
<td>XIA</td>
<td></td>
<td>10,000</td>
<td>8,000</td>
<td>10,000</td>
<td></td>
<td>2</td>
<td>17,000</td>
</tr>
<tr>
<td>Taiwan</td>
<td></td>
<td></td>
<td>8,000</td>
<td>8,000</td>
<td>8,000</td>
<td></td>
<td>3</td>
<td>24,000</td>
</tr>
<tr>
<td>Pearl River Delta</td>
<td>PRD</td>
<td>10,000</td>
<td>13,000</td>
<td>10,000</td>
<td>9,000</td>
<td></td>
<td>6</td>
<td>68,000</td>
</tr>
</tbody>
</table>

| # of Separate Deployments | 5 | 8 | 7 | 4 | 3 | 27 |

| Nominal TEUs | 60,190 | 76,450 | 65,050 | 34,030 | 10,400 | 246,120 |
| Average Service (Nominal TEUs)    | 12,040 | 9,560  | 9,290  | 8,510  | 3,470  | 9,120   |
| Effective TEUs | 53,190 | 65,450 | 56,160 | 29,000 | 7,920  | 211,720 |
| Average Service (Effective TEUs)   | 10,640 | 8,180  | 8,020  | 7,250  | 2,640  | 7,840   |
Framework of Threat: Puget Sound Ports’ Limited Capabilities for Handling ULCS

➢ The nine marine container terminals of the Ports of Seattle and Tacoma for international traffic have limited degrees of capability for effectively and efficiently handling one Ultra Large Container Ship (ULCS) at a time, due to:
  ○ Lack of sufficient deep-water berth length, cranes with required outreach, and/or lack of sufficient yard space
  ○ Rail transfer facilities that are off-dock and/or lack sufficient track capacity
  ○ Congested and/or inefficient links with the Class I railroads’ main lines

➢ Moreover, there will be increasing numbers of Transpacific services using ULCS over time, so carriers will prefer to call at terminals that can handle more than one large ship simultaneously
  ○ The Puget Sound lacks a marine terminal that could efficiently handle first-inbound calls of two ULCS at the same time

➢ These infrastructure disadvantages will be described in more detail in the next section of this report, but if not mitigated, the differentials in the sizes of the ships used in Asia – California liner services, versus Asia – PNW liner services, will widen over time
  ○ The much larger local market in Southern California, and the superior rail connections that the ports of Los Angeles and Long Beach have with Texas and the Southeast states will compound the infrastructure disadvantages of the Puget Sound gateway in leading to greater ship size differentials

➢ Greater differentials in ship sizes (between Asia-California and Asia- PNW vessel services) will make the San Pedro Bay gateway more cost-competitive with the Puget Sound gateway
  ○ *Over time, this enhanced cost-competitiveness, coupled with the greater pressures on carriers to fill their largest ships, will induce ship lines to re-route some of their discretionary intermodal traffic through San Pedro Bay, rather than through Puget Sound*
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Puget Sound Gateway Drawbacks:
Port-Related Infrastructure Issues - Introduction

This section will provide a high-level overview of port-related infrastructure challenges that the Ports of Seattle and Tacoma have which are associated with ULCS vessels, in comparison to competing intermodal gateways.

Fundamentally, there are four key infrastructure components required to efficiently handle first-inbound calls of ULCS vessels:

- Long and deep berths – a terminal should ideally be able to accommodate 2 ULCS vessels simultaneously (including required space between vessels) and must have the requisite water depth to allow vessels to arrive/depart fully loaded
  - A 13,000 TEU vessel is approximately 1,200 feet long and has a design draft of about 47.5 feet – to handle 2 vessels, a berth should be at least 2,600 feet long and a depth of water of 50 feet alongside

- Crane capacity – a marine terminal should ideally have a sufficient number of cranes of suitable size in order to service 2 ULCS vessels simultaneously
  - A 13,000 TEU vessel requires 5 to 6 cranes that can reach 19 containers across on deck – to handle 2 vessels, a competitive berth would have about 10-12 ULCS cranes (see the next slide)

- Intermodal yard – a gateway marine terminal needs to have an on-dock or near-dock intermodal yard of sufficient size and track configuration to efficiently transfer containers to/from multiple stack trains
  - A 13,000 TEU vessel might discharge half of its containers in a first inbound call (about 6,500 TEUs), of which about 50-60% might be intermodal (about 3,250 TEUs), which equates to about 5 to 6 trains

- Mainline connections – a gateway port should be able to move stack trains between its intermodal facilities and inter-city railroad mainlines as fluidly as competing ports

In the following pages, Mercator outlines key competitive infrastructure disadvantages of the Gateway’s marine terminals in the context of the liner industry’s migration to larger vessels.
Puget Sound Gateway Drawbacks:
Deficiencies of Container Terminal Infrastructure

The Ports of Seattle and Tacoma collectively have nine marine terminals that handle international container traffic – five in Tacoma and four in Seattle – with about 6.7 million TEUs of annual capacity in total.

The two ports also have terminals dedicated for domestic container & trailer traffic to/from Alaska, but these facilities are not included in Mercator’s strategic review and plan.
Puget Sound Gateway Drawbacks:
Identification of ULCS-Incapable Terminals

- The infrastructure deficiencies of the Puget Sound ports, if not addressed, will also make this gateway more vulnerable to losing intermodal volumes to BC ports and Northeast US ports

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Has Linear Berth of &gt; 2600’</th>
<th># of Cranes w/ &gt;18 wide Outreach</th>
<th>Has On-Dock Rail</th>
<th>Has On-Dock Rail Trackage of &gt; 24,000’</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-18</td>
<td>Y</td>
<td>10</td>
<td>Yes, but small and inefficient</td>
<td></td>
<td>Can receive and stevedore 2 ULCS at same time, but lacks efficient intermodal transfer</td>
</tr>
<tr>
<td>T-5</td>
<td>Y</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>Not presently ULCS capable</td>
</tr>
<tr>
<td>T-46</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>Not presently ULCS capable</td>
</tr>
<tr>
<td>T-25/30</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>Not presently ULCS capable</td>
</tr>
<tr>
<td>West Sitcum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not presently ULCS capable</td>
</tr>
<tr>
<td>Olympic</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>Not presently ULCS capable</td>
</tr>
<tr>
<td>Husky</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>Not presently ULCS capable</td>
</tr>
<tr>
<td>Washington United</td>
<td></td>
<td>2</td>
<td>Y</td>
<td></td>
<td>Can receive and stevedore 1 smaller ULCS but lacks sufficient ITF capacity</td>
</tr>
<tr>
<td>Pierce</td>
<td></td>
<td>7</td>
<td>Y</td>
<td>Y</td>
<td>Can receive and stevedore 1 ULCS</td>
</tr>
</tbody>
</table>
Puget Sound Gateway Drawbacks:
Main Line Rail Connectivity

- In the next few pages, Mercator outlines key competitive disadvantages of the Gateway’s rail infrastructure in the context of the liner shipping industry’s migration to larger vessels.
Puget Sound Gateway Drawbacks
Comparative Disadvantages of Puget Sound Intermodal Gateway

- Several competing ports have certain inherent advantages versus Seattle and Tacoma as intermodal gateways for Asian imports to key inland markets.

<table>
<thead>
<tr>
<th>Comparative Attribute</th>
<th>Competing Gateway:</th>
<th>LA / LB</th>
<th>Vancouver BC</th>
<th>Prince Rupert</th>
<th>NY / NJ</th>
<th>Virginia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larger local import market vs. Puget Sound</td>
<td>YYY</td>
<td>YYYY</td>
<td>Y</td>
<td>YYY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Larger domestic intermodal market vs. Puget Sound</td>
<td>YYYY</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superior rail lines (vs. Puget Sound) between port and:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- South Central / Southeastern states</td>
<td>YY</td>
<td>YY</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>- East Canada</td>
<td>YY</td>
<td>YY</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>- Ohio Valley</td>
<td>YY</td>
<td>YY</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Absence of Harbor Maintenance Tax</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quicker train access thru port's adjacent metropolitan area vs. Puget Sound</td>
<td>YY</td>
<td>YYYY</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

- Although the Puget Sound port authorities cannot mitigate these geographic and/or demographic advantages, they can potentially impact the relative velocity of train departures from/arrivals to their marine terminals.
Puget Sound Gateway Drawbacks – Rail Connectivity
Improving Train Arrival/Departure Fluidity in Tacoma

- All trains departing from or arriving to any of the Port’s marine terminals have to pass through Bullfrog Junction.

- Moreover, eastbound BNSF trains routed via Everett & Stevens Pass require locomotives to run-around their trains in BN’s Tacoma Yard.

- BNSF’s line into Bullfrog Junction is also only single-track, and its bridge across the Puyallup River has structural issues requiring a replacement in the near future.

- These limitations result in trains requiring an additional 45 to 60 minutes to enter / exit the port complex.

Source: Google Earth
Puget Sound Gateway Drawbacks – Rail Connectivity
Improving Train Arrival/Departure Fluidity in Seattle

- Train connectivity in Seattle between the marine terminal and the main line, unlike Tacoma, varies by facility and Class I carrier
- Most stack trains from/to T-5 have moved on the lead track across the south end of Harbor Island, then southeast into the UP’s Argo Yard, and onto the UP main line heading south – because APL and MOL use that railroad
- Given the absence of on-dock rail at T-46 and T-25/30, and the limitations of the rail facility at T-18, the majority of BNSF’s intermodal traffic to/from the Port is handled through its SIG Yard terminal
- Since the majority of BNSF intermodal trains use that railroad’s Stevens Pass route across the state to/from Spokane, most trains departing from SIG Yard run south through the Coach Wye to get on the main line north to Everett
- However, because of track layouts and curvatures in this area, BNSF trains are not able to come off of Harbor Island and access the Coach Wye

Source: Google Earth
1. Executive Summary

2. Framework of Threat to Puget Sound Gateway

3. Puget Sound Infrastructure Drawbacks versus Other Gateways

4. Dynamics of Intermodal Volume Losses

5. Strategies to Defend / Strengthen Puget Sound Gateway

6. Financial Dimensions of Strategic Alternatives

7. Conclusions
Dynamics of Intermodal Volume Losses:
Introduction

- As the previous section illustrated, the container terminals of the Puget Sound Gateway are inferior to the leading terminals of competing intermodal traffic gateways, in terms of being able to handle first-inbound calls of ULCS ships.

- Presently, only two of the terminals in the Puget Sound that have an on-dock rail transfer facility can handle ULCS ships, but become effectively one-ship-at-a-time terminals (due to berth length limits) when handling a ULCS ship call.

- Only one terminal in Puget Sound can berth more than one ULCS ship at a time, but it lacks an effective on-dock rail transfer facility and sufficient supporting container yard area to efficiently stevedore two SPPX ships concurrently.

- If this competitive disadvantage is not addressed,
  - Sizes of ships in Asia – California services and in Asia – US East Coast services will get much bigger than vessels in Asia – PNW strings.
  - Ocean carriers and shippers will exploit the superior unit cost economics of the vessel services with larger ships, diverting intermodal containers away from the Puget Sound Gateway.
  - Fewer Asia – PNW vessel services will make first-inbound port calls at Puget Sound ports, and instead will make more first-inbound port calls at BC ports.
  - **The Puget Sound ports will lose significant intermodal volumes.**
Mercator has developed a high-level logistics chain model to evaluate head-haul container transportation cost differentials of various routing permutations on a per container basis, based on its own analysis informed by inputs provided via periodic conversations with industry executives.

For this project, the model considers estimated average port costs at defined container origins, ocean transportation cost from those origins, North American marine terminal costs, and rail costs:

- **Origin Cost** – This cost is inclusive of estimated port fees per loaded and empty container.
- **Ocean Transportation** – This is inclusive of estimated slot costs broken down by vessel ownership, port, fuel, canal, and other costs for various vessel sizes operating in defined routing patterns utilizing current industry standards for speed and effective capacity.
- **North American Terminal** – This category is inclusive of throughput costs for terminal operators, tonnage assessments, wharfage costs, drayage and rail lift fees, as well as other corridor fees and taxes.
- **Rail** – This category contemplates rail carriage costs from the port of import through to defined destinations.

Segments of the analysis and conclusions are presented in the following pages.
The table to the right provides a high-level snapshot of the assumed service itinerary and estimated port costs driving Mercator’s cost estimates for an 8,000 TEU PNW service.

The table below provides a summary of cost outputs for the various types of vessel deployment scenarios contemplated for Mercator’s route costing analysis.
Dynamics of Intermodal Volume Losses:
Head-Haul Route Cost Analysis Summary Comparisons

- The table below provides a summary of route cost estimates through key gateway ports
- In all three comparison, competing gateways enjoy cost advantages vis-à-vis the Puget Sound gateway, ranging from $50 per TEU up to $225 per TEU
- Due to these cost advantages, those competing gateways are likely to experience continued intermodal volume growth at the expense of the Puget Sound, unless ULCS vessels are able to be effectively handled in the ports of Seattle and Tacoma

<table>
<thead>
<tr>
<th>SHIP CLASS (TEU)</th>
<th>TRADE</th>
<th>ROUTE</th>
<th>COSTS</th>
<th>Total</th>
<th>Var to PNW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Origin-</td>
<td>Gateway</td>
<td>Asia</td>
<td>Ocean</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Destination</td>
<td>Ports</td>
<td>Terminal</td>
<td>Transport</td>
</tr>
<tr>
<td>8000</td>
<td>PNW</td>
<td>Shanghai-Chicago</td>
<td>Puget Sound</td>
<td>$225</td>
<td>$550</td>
</tr>
<tr>
<td>16000</td>
<td>PSW</td>
<td>Shanghai-Chicago</td>
<td>San Pedro Bay</td>
<td>$225</td>
<td>$390</td>
</tr>
<tr>
<td>8000</td>
<td>PNW</td>
<td>Shanghai-Chicago</td>
<td>Vancouver, BC</td>
<td>$225</td>
<td>$550</td>
</tr>
<tr>
<td>8000</td>
<td>PNW</td>
<td>Shanghai-Columbus</td>
<td>Puget Sound</td>
<td>$225</td>
<td>$550</td>
</tr>
<tr>
<td>13000</td>
<td>All-Water</td>
<td>Shanghai-Columbus</td>
<td>NY/NJ</td>
<td>$225</td>
<td>$865</td>
</tr>
</tbody>
</table>

Note: figures are estimates
In order to understand the current and future view of potential share loss implications for the Puget Sound ports of route cost differentials, it is useful to understand recent historical trends.

Between 2005 and 2013 Puget Sound port volumes fell by approximately 687k TEUs at a compound annual rate of -2.2%.

Source: AAPA
The PNW’s loss of volume was correlated with volume growth in Vancouver and Prince Rupert

- Approximately 60% of Prince Rupert’s loaded import volumes in 2012 were destined for markets in the U.S. Midwest

- The share gain experienced prior to 2008 was due exclusively to Vancouver volumes

- Since 2008, Prince Rupert’s volumes have grown from zero to 536 kTEUs, and over this same period, Vancouver’s through-put is up by 321 kTEUs

W. Coast Canadian volumes up by 1.21 million TEUs at a compound annual rate of 5.8%

Source: AAPA
In the chart below, Puget Sound’s volumes have been broken down into four categories that together comprise the ports’ combined total volumes.

The decline in international empty TEUs (dashed red line) is largely explained by the rise in international loaded exports (dotted red line).

From 2006 - 2012, the volume of international imports, which are comprised of intermodal ‘at risk’ volumes and ‘local’ volumes, have declined by approximately 205 kTEUs.

Given the relatively strong performance of the local economy, and the strong historical correlation between real GDP and container throughput, Mercator surmises that the large majority of this decline is attributable to a reduction in intermodal, rather than local, volumes.

Volume decline of 205 kTEUs between 2006 and 2012

Source: PIERS Horizons
To support our perspective from the preceding page, Mercator compared Washington State GDP growth with National GDP growth.

As can be seen below, Washington State GDP has consistently outperformed National GDP since 2005.

Assuming that the strong correlation between GDP and container volume at the national level holds at the state level, one would expect local demand for international imports to have grown somewhat faster than the national container volume.

Therefore, as discussed in previously, the majority of the 205k TEU loss of international inbound volume since 2005 must be comprised largely of intermodal freight.

Moreover, the high destination concentration of intermodal volume currently moving through the Puget Sound gateway poses increased risk of more loss of intermodal share in the future.
Dynamics of Intermodal Volume Losses:
Inland Intermodal Volumes by Destination Market

- Puget Sound intermodal volumes are highly concentrated, in terms of destinations.
- In 2012, 83% of Puget Sound intermodal volumes cleared US Customs in three inland Customs Districts: Chicago, Cleveland, and Minneapolis.
- The “donut” charts below show that Puget Sound faces strong competition from other West Coast ports for both Chicago and Cleveland import traffic, but that the competition for the Minneapolis market is not as great.

**SEA/TAC Intermodal Volumes by Destination**

<table>
<thead>
<tr>
<th>Destination</th>
<th>TEUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOSTON, MA</td>
<td>1,906</td>
</tr>
<tr>
<td>BALTIMORE, MD</td>
<td>2,039</td>
</tr>
<tr>
<td>MILWAUKEE, WI</td>
<td>2,330</td>
</tr>
<tr>
<td>NORFOLK, VA</td>
<td>2,382</td>
</tr>
<tr>
<td>BUFFALO, NY</td>
<td>2,603</td>
</tr>
<tr>
<td>PHILADELPHIA, PA</td>
<td>3,625</td>
</tr>
<tr>
<td>SAVANNAH, GA</td>
<td>4,147</td>
</tr>
<tr>
<td>GREAT FALLS, MT</td>
<td>4,946</td>
</tr>
<tr>
<td>NEW YORK CITY, NY</td>
<td>7,643</td>
</tr>
<tr>
<td>NEW ORLEANS, MEMPHIS</td>
<td>14,152</td>
</tr>
<tr>
<td>ST. LOUIS, MO</td>
<td>25,254</td>
</tr>
<tr>
<td>DETROIT, MI</td>
<td>33,671</td>
</tr>
<tr>
<td>MINNEAPOLIS, MN</td>
<td>97,614</td>
</tr>
<tr>
<td>CLEVELAND, OH</td>
<td>143,530</td>
</tr>
<tr>
<td>CHICAGO, IL</td>
<td>289,135</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau

45% of Puget Sound Intermodal Inland intermodal to: CHICAGO

23% of Puget Sound Intermodal Inland intermodal to: CLEVELAND

15% of Puget Sound Intermodal Inland intermodal to: MINNEAPOLIS
The chart to the right compares the combined annual throughput of the Ports of Seattle and Tacoma to 2033 if they maintain their combined share of international traffic (the red bars) versus a potential, but realistic, scenario in which they lose only 10% of their current intermodal volume (the blue bars).

- With the loss of intermodal traffic projected here, the Puget Sound ports would not achieve 70% utilization of their combined current capacity until 2034.

Moreover, as shown in the chart to the left, over the next 20 years, in this scenario, the Gateway’s terminals could forego handling a cumulative 14 million TEUs, further eroding the viability of the MTOs’ businesses in the Puget Sound.
The Ports of Seattle and Tacoma collectively have far more container terminal capacity than their volumes can profitably support, given current market conditions.

In 2013, the nine marine terminals in Puget Sound for international container traffic handled about 3.0 million TEUs— for a capacity utilization level of approximately 45%.

As shown in the chart below (derived from AAPA statistics), the Puget Sound ports have proportionally more excess capacity than all of the other large port complexes in the US and Canada:

### 2013 Capacity Utilization

US / CAN Ports with Volume Greater Than 1.8m TEUs
The relatively high level of excess container terminal capacity in the Puget Sound results in an array of inter-related challenges for the Gateway’s two ports:

**Dynamics of Intermodal Volume Losses:**

**Impacts of Near-Term Problem for Puget Sound Container Ports**

- Low Capacity Utilization Rates
  - POS/POT incentivized to steal volumes from one another, thus enabling carriers to drive down terminal and port rates
- MTOs incentivized to terminate leases
  - If the MTO is carrier affiliated, carrier volumes put at risk
- Underinvestment in terminals and port infrastructure
  - Carriers shift volumes to other W. Coast gateways
- Low MTO profitability & suppressed port revenues
  - Inefficient & inadequate terminals and ports

*$185 million*
Cumulative unrealized port revenue through 2018
Mercator developed two forecasts to illustrate the potential negative impacts of **declining intermodal volumes** and **ongoing capacity underutilization**.

The “Perfect World” scenario is shown to illustrate combined port revenue assuming volume grows at market rates, the Gateway holds share, and all Puget Sound MTOs continue to operate facilities here in the future.

The “Status Quo” infrastructure scenario illustrates reasonable reactions of certain MTOs to the loss of intermodal volume – in this scenario, specific MTOs are assumed to cease operations and all revenue for each facility ceases to be paid to the port authority.

- Note: recoveries of lease guarantees via litigation are not included in this financial model.

As the charts to the right demonstrate, the impact on revenue for the ports is severe – by 2033, cumulative nominal revenue loss for the port authorities is about $1.15b.

- In the Status Quo scenario, capacity investment would also likely contract, which would only further perpetuate the downward underinvestment cycle.
Dynamics of Intermodal Volume Losses: Potential Impacts on Washington State Economy

- Mercator utilized ratios of jobs per ton of cargo handled and revenues per ton that were developed in earlier economic studies produced for the two port authorities, to estimate the magnitude of impact that unrealized (i.e., lost) intermodal volumes would have on the Washington State economy.

- As a consequence of the Puget Sound gateway losing 10% of its intermodal volume from uncompetitive infrastructure, the annual **unrealized** direct, indirect, and induced revenues generated in the state of Washington are projected to climb rapidly from zero to nearly $600 million by 2018.

- On a cumulative basis, by 2033 unrealized revenues from this same scenario are projected to amount to nearly $13 billion.

- Unrealized job gains rise from zero today to approximately 2,100 by 2018, and on a cumulative basis, nearly 50,000 potential jobs are projected to not be created through 2033 should major terminal infrastructure development not occur for the Gateway ports.
Dynamics of Intermodal Volume Losses:
Summary Points

- **Headhaul Route Cost Differentials**
  - Based on Mercator’s analysis of various vessel deployment scenarios, competing gateways enjoy cost advantage vis-à-vis the Puget Sound gateway, ranging from $50 per TEU up to $225 per TEU.
  - Due to these cost advantages, those competing gateways have managed to capture volume from the Puget Sound gateway and are likely to continue doing so, if the capabilities of the ports of Seattle and Tacoma for efficiently handling ULCS ships remain unchanged.

- **Volume Losses**
  - The ports of Seattle and Tacoma have already experienced material declines in intermodal import volume of about 200k TEUs/year since 2006.
  - Should the port not invest in ULCS capacity, this trend will continue and the gateway could stand to lose a significant portion of the nearly 600k TEUs/year of intermodal import volume that is routed via the Puget Sound.

- **Financial and Economic Impacts**
  - Facilities are already operating at an unsustainable 45% utilization of capacity – further intermodal volume loss will only exacerbate the problem and will likely drive MTOs to pursue options for exiting terminal leases (via litigation if necessary), reducing port authority revenue accordingly.
  - The combined port authorities could stand to lose up to $185m of accumulated nominal revenue by 2018, growing to $1.15b by 2033.
  - The impact of lost revenue and jobs for the state of Washington would be severe as well.
1. Executive Summary

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Strategies to Defend/Strengthen the Puget Sound Gateway:
Outline of Recommended Approach

- Mitigate excess capacity through facility re-purposing
  - Identify which of the nine terminals are incapable of (or ill-suited for) handling ULCS
  - Assess which of these ULCS-incapable terminals could not feasibly be enhanced to become attractive facilities for carriers operating ULCS
  - Formulate plan and schedule for re-purposing the latter group of terminals into facilities for non-container maritime uses

- Enhance ULCS-handling capabilities of selected terminals
  - Identify enhancement requirements/options to improve ULCS-handling capabilities of remaining terminals (those not re-purposed)
  - Compare the estimated capital costs, incremental capacity gains, and estimated implementation timelines among these terminals
  - Assess which terminal enhancement project(s) should be pursued first – then formulate plan and schedule for implementation of top-priority project(s)

- Adopt collaborative program for terminal asset management
  - Obtain superior results – financial, operational, commercial – through collaboration versus current approach of detrimental intra-gateway competition
Strategies to Defend/Strengthen the Puget Sound Gateway: Rationale for Collaborative Terminal Asset Management

- Collaboration facilitates successful implementation of Excess Capacity Mitigation Strategy
  - The two ports can proceed with facility re-purposing having fewer concerns about impairing their competitive position within the Gateway
  - Timing of when specific facilities are re-purposed can be better coordinated
  - Marketing efforts of both ports can be leveraged to identify, optimize, and expedite new maritime uses for re-purposed facilities

- Collaboration facilitates successful implementation of Asset Enhancement Strategy
  - Selection and timing of capital spending on terminals can be managed more effectively, with positive impacts on both ports’ financial performance
  - Timing of introduction of incremental capacity gains can be managed more effectively
  - Marketing efforts of both ports can be leveraged to capture new intermodal volumes from other gateway ports
  - Selection and timing of capital spending on off-dock rail infrastructure can be managed and negotiated (with BNSF/UP) more effectively
  - Consolidation of intermodal traffic flows moving through the two ports can be pursued more aggressively, to better support BNSF and UP transcontinental train operations

- Collaboration provides better leverage and policy-positioning with:
  - Washington Department of Transportation and other State agencies
  - Army Corps of Engineers and other Federal agencies
  - BNSF and UP
Construction of a new bridge over Puyallup River, with a new northbound wye track, will speed up BNSF intermodal trains to and from the Port by at least 45-60 minutes.

Concurrent construction of an additional track thru Bullfrog Junction will also expedite train movements to/from the Port and allow for more train volumes.

The combined capital cost for these two projects is estimated to be in the range of $75-85M.
The proposed refurbishment and re-concession of T-5 will likely lead to the facility being called upon by ocean carriers that use BNSF for intermodal train service.

Consequently, it will lead to a sharp increase in the number of BNSF trains using the cross-Harbor Island lead tracks.

Because of the sharp curvature of the southbound wye between the Harbor Island lead track and the “Colorado” line, the construction of a 1,900-foot long, second lead track (shown in red to the right) between the top end of Argo Yard and the Harbor Island would expedite BNSF train movements to/from T-5 & T-18.

Along with the construction of a few additional short connector tracks, this would also enable BNSF trains from T-5 or T-18 to head north directly (without first being pulled to the SIG Yard or South Seattle Yard) and would allow UP trains to bypass Argo Yard.

Combined capital costs for these inter-related rail track projects need to be estimated, but are likely to be in the range of $15 million.

Although this cost is relatively low, its implementation will require the Port to facilitate a joint track use agreement between BNSF and UP.
The map to the right represents a compilation of various congestion relief and freight mobility improvement projects that in aggregate are referred to as the Puget Sound Gateway Project.

The project essentially encompasses the connection of SR 509 and SR 167 to I-5.

In the map, the SR 509 connection is indicated by the green arrows, while the SR 167 connection is indicated by the purple arrows.

The improved connections will provide much needed connectivity and capacity to one of the State’s busiest and most congested corridors.

The project would improve the overall competitiveness of the PSG ports because it will help drive reductions in the time required to evacuate containers from the port complex, thereby decreasing inland transport costs.

While the two connection projects were initially conceived separately, WSDOT has combined them into the single project to implement efficiencies and systems integration, while also leveraging resources and accelerating project delivery.

The estimated Phase I cost for the project is approximately $2.8b.

The scope of subsequent phases and ultimate total cost of the project will depend on, among other things, the number of total lanes required in each direction.
Outline of Report

1. Executive Summary

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7. Conclusions
Mercator constructed a financial model of the Gateway ports’ consolidated container business in order to gain insight on the comparative economic value of three alternatives:

- The Phase I improvements for T-5 implemented first, followed by the Phase I Commencement Bay improvements and then the Phase II improvements for T-5 (i.e., a “Ports Collaboration” strategy)
- No enhancements made to Gateway terminals (i.e. a “Status Quo Infrastructure” strategy)
- All terminals continue to operate and volume grows at market rate (i.e., “Perfect World” scenario)

The charts below provide Mercator’s forecast of volume and capacity utilization by scenario:

- As illustrated below, in the Perfect World scenario there are no changes and volume grows at the market rate with no share loss, utilization remains at unsustainable levels through most of the forecast period.
- In the Ports Collaboration scenario, there is a step up in volume through the forecast period and improvement in capacity utilization, relative to the Perfect World scenario.
- In the Status Quo Infrastructure scenario, an assumed loss of intermodal share and volume over the next few years results in MTOs exiting leases, driving an increase in capacity utilization (of operating facilities).
The financial model compares alternatives from the previous slide on a present value basis over a 20-year period.

For each scenario, volume handled in the Gateway was estimated and Port Authority fixed and variable revenue and expenses in those container terminals that are planned/expected to remain open were forecasted.

Rental income (lease rates) for the enhanced terminal(s) were estimated so as to give a 10% return on the sum of new investments by the Ports plus the PV of payments from unexpired leases.

- However, modeling of each enhancement option from the MTO’s perspective still needs to be undertaken to test the viability of the targeted lease rates.

The investments by the Ports were confined to fixed infrastructure components.

- Container-handling equipment required for each project was assumed to be the financial responsibility of the MTO.

No rental income was included in the model for non-container operations in re-purposed facilities.
Financial Analysis of Strategic Alternatives:
Average Lease Revenue Per TEU Unit of Capacity (Redeveloped vs. Other)

- The chart below provides a forecast of average lease revenue per TEU of capacity across both ports for re-developed container terminals vs. all others in Ports Collaboration scenario (i.e., T-5 Phase I first and Commencement Bay Phase I second)
- As the chart demonstrates, for terminals to be redeveloped and densified, the average revenue per TEU of capacity decreases during the construction phase and then increases materially as capacity is phased in
- Based on derived lease rates that allow the ports to achieve a 10% target return, redeveloped capacity is almost double the average rate for other terminals
Financial Analysis of Strategic Alternatives:
Average Lease Revenue Per Acre by Scenario

- The chart below provides a comparison of total combined port lease revenue per acre for each scenario.
- As the chart demonstrates, as facilities are redeveloped, the total lease revenue per acre increases materially.
- It should be noted that this is primarily a function of assumptions that Mercator has made about lease rates, taking into account project capex as well as the present value of current lease obligations for terminals being redeveloped.
Financial Analysis of Strategic Alternatives:
Total Contribution to Free Cash Flow by Scenario

- The table below provides Mercator’s preliminary and approximate forecast of total contribution to free cash flows for each scenario.
- Contribution to free cash flow is defined as the gross profit derived from operating terminals (excluding depreciation) less major development capex.
- These cash flows are discounted (as of 2014) to derive present value for each scenario.

Puget Sound Total Contribution to Free Cash Flow by Strategic Alternative (MMs)

- Perfect World
- Status Quo
- Ports Collaboration
Financial Analysis of Strategic Alternatives:
Comparison of Scenarios

- The initial outputs from our preliminary modeling work indicate that if the target lease rates are achieved, the Ports Collaboration scenario yields a far better outcome than the Status Quo Infrastructure scenario, by providing:
  - Combined port authority income that is roughly twice the “Status Quo” scenario
  - NPV that is a few hundred million dollars higher

- The chart to the upper right summarizes the present value of forecasted contribution to free cash flow (from the prior page), by scenario
- As the chart demonstrates, the hypothetical, yet improbable, Perfect World scenario potentially generates a present value of approximately $1.2b
- Assuming the two ports do not materially enhance their marine terminal infrastructure and capture additional market share, the Status Quo scenario potentially generates a present value of approximately $760m
- The Ports Collaboration scenario potentially generates a present value around $970m
Financial Analysis of Strategic Alternatives:
Additional Commentary

- At this point in time, the model structure and inputs discussed in preceding pages need extensive refinements in order to properly project and rank the net present values analysis of each enhancement project and correlated phase-in plan.

- To underscore this need, the following items need to be addressed within the model’s structure:
  - Capital cost estimates for each development option need to be revisited and revised.
  - The assumptions regarding the treatment of unexpired leases need to be reviewed.
  - Decisions regarding how the model treats residual values of facilities after 2033 need to be re-examined.
  - Assumptions regarding lease revenue and costs from terminals that would be re-purposed need to be analyzed and developed.

- Nonetheless, it is apparent that at least one terminal enhancement project should be started promptly, given the negative impacts to the PV of the Gateway ports’ container business from the expected loss of volume and loss of rental income associated with the Status Quo approach.

- Notwithstanding the need for more detailed financial analyses of alternative investments, the optimal scheduling of asset enhancements will hinge upon on the pace of future demand for ULCS capacity, as well as on the ability and willingness of concessionaires to make investments in advanced terminal equipment and commit to lease payments required by the Ports.
Outline of Report

1. Executive Summary

2. Framework of Threat to Puget Sound Gateway

3. Puget Sound Infrastructure Drawbacks (versus Other Gateways)

4. Dynamics of Intermodal Volume Losses

5. Strategies to Defend / Strengthen Puget Sound Gateway

6. Financial Dimensions of Strategic Alternatives

7. Conclusions
Conclusions

- The Puget Sound container ports have two key strategic problems:
  - Significant excess terminal capacity
  - Inadequate terminal infrastructure for efficiently handling multiple ultra-large containerships

- Non-mitigation of these two strategic problems will likely have major negative consequences for the Gateway’s ports:
  - Loss of rental income, as unprofitable MTOs terminate or not renew their leases and as no other container terminal operators replace them
  - Loss of discretionary intermodal volumes, and eventually reduced trans-load volumes

- To resolve these problems, the two ports need to pursue the following strategies:
  - Reduce excess capacity by re-purposing terminals that are not presently capable of handling ULCS nor can practically/economically be enhanced to do so
  - Reduce excess capacity by re-purposing to non-container cargoes, for an extended period
  - Create efficient, ULCS-capable terminals over next 5-7 years
  - Major improvements to the other remaining terminals could occur after the first projects, as driven by market conditions and commercial requirements

- The strategies outlined above can be pursued most effectively through some form of collaboration between the two port authorities
Appendix
Crane Capability Requirements by TEU Vessel Class

- The table below provides crane capability requirements in terms of outreach in feet and container units, as well as approximate lifting height required above the water in feet and container units
  - Stacking height figures are assumed to be the commercially required level of crane capability for different containership size classes
- As the table shows, for 18,000 TEU vessels, cranes would need to be able to reach 23 units across, or 8 containers more than when handling 6,000 TEU vessels
- At the same time, cranes would need to be able to stack containers 9 high on deck rather than 6
- As stated in the previous slide, in order to effectively handle vessels in the Super-Post-Panamax (SPPX) range, a minimum of 5 to 6 cranes are required – and each should be of a size suitable to effectively handle the vessel
  - In other words, having, for example, 2 SPPX cranes and 3 PPX cranes, likely will not satisfy commercial berth productivity requirements for handling SPPX vessels

| Crane Capability Requirements by Vessel TEU Class |
|-----------------|-------|-------|-------|-------|-------|
| Vessel (TEU Class) | 6,000 | 8,000 | 10,000 | 13,000 | 18,000 |
| Beam (m)          | 40.0  | 42.8  | 45.6  | 48.2  | 59.0  |
| Beam (ft)         | 131   | 140   | 150   | 158   | 194   |
| Containers Across (above deck) | **16** | **17** | **18** | **19** | **23** |
| Container Tops Above MHW (m) | 33.0  | 36.1  | 40.7  | 42.5  | 46.1  |
| Container Tops Above MHW (ft) | 108   | 118   | 134   | 139   | 151   |
| Container Tiers (above deck)     | **6**  | **7**  | **8**  | **8**  | **9**  |