Port of Long Beach
Rail Master Planning Study

EXECUTIVE SUMMARY

Prepared for:

THE PORT OF
LONG BEACH

Submitted by:

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EXECUTIVE SUMMARY

I. Introduction/Purpose of Study

The rail system serving the San Pedro Bay Ports of Long Beach and Los Angeles is essential to providing efficient transportation of cargo between the Ports and inland destinations. Rail service is both economically and environmentally beneficial. No other port is as well positioned as the Ports of Long Beach and Los Angeles to serve our country’s growing demand for international cargo. Bearing this responsibility, the Ports are carefully planning the infrastructure necessary to successfully accommodate that demand. The landside transportation links are especially important since these road and rail access issues have the highest potential to cause impacts to the Port’s capabilities and to the communities surrounding the Port.

The existing transportation system within and adjacent to the Ports of Long Beach and Los Angeles is becoming constrained. Expected increases in cargo throughput in the next five to twenty years will induce a considerable amount of rail and vehicular traffic onto the transportation system within and adjacent to the Ports of Long Beach/Los Angeles. The Alameda Corridor has introduced significant improvements to the rail system’s ability to efficiently carry trains from the Ports to the inland rail system beginning in downtown Los Angeles with greatly improved train speed and removal of at-grade crossings that had previously impacted traffic in the adjacent communities. Any cargo that is moved by train from the Port is a benefit to the transportation system by reducing the truck volumes.

This Rail Master Planning Study was prepared to: determine future rail traffic demand; identify the rail system deficiencies and necessary improvements; and develop an implementation plan (i.e., Port Rail Improvement Program). The need for the Port of Long Beach Rail Master Planning Study was identified as a complementary study for the recently completed Port of Long Beach Facilities Master Plan and the Ports of Long Beach/Los Angeles Transportation Study.

This report describes the methodology, findings and recommendations of the Port of Long Beach Rail Master Planning Study. The purposes for undertaking the Study include:

- Identify the growth in rail traffic that will occur as a result of growth in imports and export cargo moving through the Ports
- Develop transportation planning tools to address the technical challenges of defining adequate rail yard and mainline system capacity
- Identify existing and future rail system deficiencies in and around the Ports including on-dock mega terminals storage rail yards and mainline rail network
- Recommend physical and operational strategies to mitigate future system deficiencies

Consider that a single container ship may unload 5,000 twenty-foot equivalent units (TEU) to be delivered outside the Port boundaries by a fleet of trucks. Alternatively, the movement of cargo by trains loaded at on-dock rail yards is an effective method of reducing the truck traffic. Every train that is loaded on-dock can eliminate 450 truck trips from the highway, and a single ship call can generate 5 trains worth of intermodal cargo. Full implementation of the concepts and recommendations documented in this Rail Master Planning Study, could result in 115 million TEU successfully moving out of the San Pedro Bay Ports by trains instead of trucks between now and 2020.

With the opening of the Alameda Corridor on April 15, 2002 and plans for major on-dock rail yard construction, The Ports of Long Beach and Los Angeles are poised to handle the projected intermodal cargo growth through 2020. The final step is to ensure that all of the infrastructure and railway systems are in place to move trains efficiently from the Alameda Corridor, through the San Pedro Bay rail network, to the marine terminals of the Port, and back out again.

Photos: top right-Alameda Corridor trench under construction, downtown L.A. in background; bottom left-UP train in trench; bottom left-map of Alameda Corridor (orange), BNSF (green) and UP (red) tracks leading to San Pedro Bay Ports.
II. Project Goals/Scope of Work

The goal of this study is to develop a comprehensive rail master plan that identifies all rail related issues, including mainline track, storage capacities, operations and systems, and will substantiate the actions required to provide acceptable levels of service for trains in 2005, 2010, 2015 and 2020. The study will provide a Port Rail Improvement Program that will identify the rail system deficiencies and necessary improvements through a phased implementation plan with projects in each five-year increment to 2020.

The Scope of Work for the study is defined by the following tasks:

- **Rail Inventory**: Inventory existing rail infrastructure and conduct a condition survey. Evaluate current train control system/central train control (TCS/CTC) and plans for management and expansion.

- **Mega-Terminal Developments**: Develop on-dock rail yard concepts to handle as much of the forecast cargo as practical; evaluate the rail yard capacity; and estimate the number of trains generated by each port terminal in each of the forecast years. The rail yard concepts should consider storage track requirements and should also balance the competing need for space by both the rail yard and the container yard. Port-wide storage track requirements are also evaluated including the development of Pier B rail yard.

- **Develop Future Rail Volumes**: Estimate intermodal volumes from each of the port terminals in each of the forecast years. Rail volumes include intermodal, non-intermodal, switching and light engine train movements. Compare this volume to previous studies by Alameda Corridor Transportation Authority (ACTA).

- **Simulation Modeling**: Perform analyses of mainline system performance using dynamic simulation modeling. The model shall consider track network characteristics, train volumes, train performance, and train control system implications (including impacts of Badger Bridge openings).

- **Port Rail Improvement Program**: Identify deficiencies in the rail system that cause bottlenecks to train movement and recommend operating, infrastructure and equipment improvements that will be needed to maintain acceptable levels of service. Quantify specific improvements and dates needed.

- **Regional Rail Yard Capacity/Demand**: Estimate the capacity of on-dock and off-dock rail yards to handle intermodal cargo and compare this to the forecast demand. Address any shortfall.

- **Non-traditional Rail Concepts**: Determine how the Port can assist and encourage terminal operators to move more cargo by rail. Perform a review of regional rail issues, including an overview of regional international cargo operations and the feasibility of an inland port rail terminal and other non-traditional concepts.

The following section provides a brief 3-page synopsis of the Rail Master Plan Study findings. Key points are highlighted by bullets to the left of the text.

Subsequent sections of the Executive Summary provide more details, and the Technical Report (not included with all copies of the Executive Summary) provides a detailed description of the approach and findings of the Study.
III. Synopsis of Key Findings

This Rail Master Planning Study illustrates the significance of intermodal rail cargo and particularly the benefits of on-dock rail. On-dock rail provides the most efficient means of intermodal goods movement, with the benefits of minimizing the number of rehandles of each container, and reducing truck traffic with its associated highway congestion and diesel emissions. On-dock rail operations also give the terminal and shipping lines their desired level of control over the departure of their cargo, and facilitate tracking of shipments.

Mega-Terminal Developments

It is estimated that on-dock rail yards can be developed to handle approximately 35% of the total cargo moved through the San Pedro Bay Ports by 2020. This report provides the development plans, implementation schedule and construction cost estimates for the Port of Long Beach on-dock rail yards and Pier B Rail Yard.

The on-dock rail yard developments are recommended to include adequate storage tracks and full-train length departure tracks. Improvement projects are recommended to extend all existing and proposed rail yard leads to allow landing and building of trains to occur off of the mainline.

Rail Volume Forecasts

Rail volumes are forecast based on demand and capacity of the proposed on-dock rail yard terminals. The contributions of off-dock rail yards are also considered in this forecast. The on-dock rail volumes at each terminal for each forecast year are presented later in this Executive Summary, with intermodal volumes topping 100 trains per day in 2020. The peak day volumes projected for 2020 on the Alameda Corridor total 128 Port trains plus 15 ICTF trains. The capacity of the Alameda Corridor with 2 tracks is estimated at 120 trains, and for three tracks the Corridor capacity is estimated at 150 trains per day.

Simulation Modeling and Recommended Improvements

Train simulations have indicated the need for a series of track and rail system improvements. A summary table with these Port Rail Improvement Program projects is provided in Table 4 of this Executive Summary. The Rail Master Planning Study provides the development plans, implementation schedule and construction cost estimates for the each of the improvement projects. The following bullets highlight the most critical improvements:

- Provide extended staging tracks within Pier B Rail Yard to allow entire 8000-foot container trains to be chambered as they arrive from, or prepare to depart onto the Alameda Corridor. This improvement is needed by 2010.
- Double track mainline to Pier J where it is currently single track from Pier G by 2010.
- Extend CTC to the last turnout off of the mainline onto yard leads by 2015.
- Provide an additional track from Terminal Island to the Alameda Corridor (CP Mole to CP West Thenard), which will require 1) expansions of Henry Ford Avenue and New Dock Street grade separation projects to carry the additional track, 2) a new bridge to augment Badger Bridge over the Cerritos Channel, and 3) a solution to fitting another track through (or around) the highly constrained Texaco Slot. This improvement is needed by 2020.
Regional Rail Yard Capacity/Demand

The total projected volume of intermodal cargo (50 percent of San Pedro Bay Ports cargo as described in Section IV) wants to be loaded onto a train either at on-dock or off-dock rail yards. The demand and capacity for these intermodal loading facilities is summarized in Table 1.

Table 1: Intermodal Demand and Rail Yard Capacities

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual IY Throughput (millions TEU)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cargo Forecast    *</td>
<td>12.9</td>
<td>16.7</td>
<td>24.4</td>
<td>36.1</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Total Intermodal Demand</td>
<td>6.5</td>
<td>8.4</td>
<td>12.2</td>
<td>18.1</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>On-dock Rail Yard Capacity</td>
<td>3.6</td>
<td>4.7</td>
<td>8.5</td>
<td>12.5</td>
<td>28%</td>
<td>28%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>Off-dock Rail Yard Capacity</td>
<td>2.9</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>22%</td>
<td>21%</td>
<td>14%</td>
<td>9%</td>
</tr>
<tr>
<td>Rail Yard Capacity Shortfall</td>
<td>0</td>
<td>0.2</td>
<td>0.2</td>
<td>2.1</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
<td>6%</td>
</tr>
</tbody>
</table>

* Source: 1998 Mercer San Pedro Bay Ports Long-Term Cargo Forecast

The on-dock rail yard capacity is expected to be fully utilized since there is ample demand and this will be the most efficient operation with the least environmental impacts. The existing off-dock rail yard capacity is estimated to be 2.9 million TEU per year (devoted to international cargo). Off-dock rail yards include the near-dock ICTF rail yard and the rail yards in downtown Los Angeles. The existing off-dock capacities are comprised such that the near-dock ICTF rail yard can handle nearly 1.5 million TEU per year and the rail yards in downtown Los Angeles can handle 1.4 million TEU per year.

The conclusion from Table 1 is that additional rail yard capacity would be required by 2010 and a significant addition by 2020 to meet the projected demand for intermodal cargo. Since on-dock rail yards are built out to their maximum size for the planned marine terminal space, it is recommended that additional rail yard capacity be provided at new near-dock intermodal facilities.

- 2.1 million TEU of near-dock rail yard capacity should be developed in the Port vicinity south of I-405 freeway. This development could be in the form of a new rail yard or through expansion of the existing ICTF rail yard. Near-dock facilities are preferred since they have the least impact on regional highway traffic. Near-dock development should begin early to address community concerns and land use changes necessary to have a project opened by 2010.

The preceding analysis is based on the 1998 Mercer Forecast, which assumes the intermodal market to be beyond approximately 1,000 miles. The Rail Master Planning Study shows that the intermodal volumes could be even higher with the inclusion of markets in the 300 – 1,000 mile range. Considering traffic congestion in the Los Angeles region, these and even closer markets may be viable for intermodal rail transport. The effect of these increasing intermodal volumes will be to increase the demand for Port rail yards, which would suggest further near-dock developments.
Non-traditional Rail Concepts

Non-traditional rail concepts, such as alternative on-dock operating modes or distributed logistics initiatives were evaluated in this study. These concepts include:

- reducing the handling of containers during the transfer of cargo from ship to train,
- improving on-dock rail yard capacity by abbreviating train building operations, and
- utilizing inland port concepts to classify or resort landbridge cargo, or distribute local cargo.

The ultimate goal of these concepts is to increase the volume of cargo moved by rail, which will mitigate some of the cargo-generated truck traffic. In the current circumstances, the non-traditional rail concepts investigated seemingly do not provide the necessary impetus or benefits to significantly increase the volume of landbridge cargo that is moved by rail. However, inland port distribution of local cargo, which does not traditionally prove to be more economical than trucking, may prove beneficial due to the level of highway congestion and the potential value of truck traffic reductions as a mitigation measure; thereby making this concept suitable for further consideration. Such an increase in rail cargo would increase the demand for rail yard capacity beyond the levels indicated in Table 1 and require additional near-dock rail development.

In addition to the goal of encouraging cargo movement by rail, the inland port concepts can provide other rail operating improvements that coincide with the recommendations of this Study. These include providing dedicated regional shuttle engines and providing the ability to build Port-terminal specific westbound trains to reduce the volume of light engine and switcher movements on the capacity constrained Port rail network.
IV. Background

The San Pedro Bay Ports were at the forefront of intermodal goods movement beginning in the 1960s. With Asia as a major production center, goods flowed naturally through our ports with their deep water, modern terminals and excellent landside transportation system. In addition, developments such as landbridge service across the U.S., the Staggers Act of 1980 and the Shipping Reform Act of 1984 have encouraged the rapid growth of U.S. intermodal volumes as depicted in Figure 1.

The container forecast contained in the San Pedro Bay Ports Long-Term Cargo Forecast (Mercer Management Consulting, 1998) was used in both this Rail Master Planning Study and the 2001 POLB/POLA Transportation Study. To be conservative, the “High-Growth” scenarios for 2010 and 2020 were taken from the Mercer Forecast. The containerized forecasts were increased to account for recent changes in empty container logistics that have occurred since the container forecasts were developed. Specifically, the empty return factors for local and intermodal containers were increased. The historic growth in container volumes is shown in Figure 2 and the Mercer Forecast volumes are shown in Figure 3. The Mercer Forecast indicates that 50% of the cargo will move by intermodal rail.

In anticipation of the forecasted container volumes, the Port of Long Beach has prepared a $1.9 billion Mega-Terminal Development Program to build six terminals of more than 300 acres each. The program implementation is planned over the next 15 to 20 years and calls for the reconfiguration of most of the existing terminal facilities as well as construction of new terminals. The terminals will be named Pier A Pier E, Pier G, Pier J, Pier T and Pier W. The 200-acre Pier S terminal is also proposed for construction in the same period. Each terminal will have an on-dock rail yard, as conceptualized by this Rail Master Planning Study. The Ports currently have 2,500 acres of container terminal, and by the year 2020, the San Pedro Bay Ports plan to have created terminal space totaling nearly 4,800 acres. See Figure 4, San Pedro Bay Rail Map – 2020.
V. Rail Inventory and Condition Survey

The inventory and assessment of the Port rail infrastructure has been prepared through review and verification of: existing hard copy plans, electronic plans, exhibits showing locations of existing Port of Long Beach tracks and other appurtenances, and field verification of specific conditions. The effort also included confirmation of track condition by interviewing Pacific Harbor Line (PHL), making field visits, reviewing terminal layouts, interviewing Port staff, updating existing electronic maps and integrating ongoing designs into the database. The San Pedro Bay Railroad Network - 2001 Map was prepared for this Study and includes: streets, boundaries, road improvement projects, container terminals, other port terminals, rail yards, rail access tracks, Class I rail yards, Alameda Corridor tracks, industry tracks and the location of the mainline signalization control points.

The overall condition of the existing tracks (including mainline, special trackwork and Port maintained facilities) is good with no imminent mainline rehabilitation necessary. This can be attributed to the fact that most of the rail network has been renovated or newly constructed within the past 10 years, as well as proper attention to maintenance by the Port of Long Beach and PHL. Some specific recommended maintenance projects are described in the Technical Report to be used as budget items. It should be noted that the Ports are regulated by the Federal Railroad Administration (FRA) and the California Public Utilities Commission (CPUC). These agencies regulate the conditions of the rail network and can levee fines for unacceptable conditions.

VI. Future Terminal Development

This Study provides the essential investigations and forethought necessary to understand the implications of the anticipated increased cargo throughput, specifically the appropriate size of on-dock rail yards and the implications of the rail yards on container terminals. It also establishes the basic configuration requirements for on-dock rail yards and defines the amount of storage track required within the Ports. The resulting terminal development projects are presented in Section 4 of the Technical Report, and include the following Port of Long Beach on-dock rail yards: Pier A, Pier E, Pier G, Pier J, Pier T/W and Pier S. In addition, the Pier B rail yard expansion project will provide storage and staging tracks to support the overall Port rail operations.

The following table shows the timing of Port rail yard development projects.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Pier S On-Dock Rail Yard</td>
<td>Pier A Mega-Terminal Rail Yard</td>
<td>Pier J Mega-Terminal Rail Yard</td>
</tr>
<tr>
<td>Pier G-ITS Storage Tracks</td>
<td>Pier B Rail Yard Expansion</td>
<td>Pier G Mega-Terminal Rail Yard</td>
</tr>
<tr>
<td></td>
<td>Toyota Rail Yard Relocation</td>
<td>Pier E Mega-Terminal Rail Yard-2</td>
</tr>
<tr>
<td></td>
<td>Pier E Mega-Terminal Rail Yard-1</td>
<td>Pier W Mega-Terminal Rail Yard</td>
</tr>
<tr>
<td></td>
<td>Pier J Storage Yard</td>
<td></td>
</tr>
</tbody>
</table>
VII. Forecast Rail Volumes

Forecasts of future rail volumes have been arrived at through consideration of a range of demand and capacity factors, as well as operational issues. Train traffic volumes in the Port are calculated considering the projected train size and carrying capacity at each of the forecast years. The resulting rail volume forecasts are presented in Table 2 and only include Port traffic (15 trains/day from ICTF not included).

<table>
<thead>
<tr>
<th>Table 2: San Pedro Bay Ports Peak Day Train Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intermodal</strong></td>
</tr>
<tr>
<td>Intermodal</td>
</tr>
<tr>
<td>Non-intermodal</td>
</tr>
<tr>
<td>Light Engine/Yard Switcher</td>
</tr>
<tr>
<td><strong>Total Port Network Trains</strong></td>
</tr>
<tr>
<td><strong>Alameda Corridor Trains</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermodal by Area</th>
<th><strong>Existing</strong></th>
<th><strong>2005</strong></th>
<th><strong>2010</strong></th>
<th><strong>2015</strong></th>
<th><strong>2020</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>POLB South</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>POLB North (Pier A)</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>POLB Terminal Island</td>
<td>-</td>
<td>6</td>
<td>7</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>POLA Terminal Island</td>
<td>6</td>
<td>17</td>
<td>19</td>
<td>30</td>
<td>41</td>
</tr>
<tr>
<td>POLA West</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total Intermodal Trains</strong></td>
<td>12</td>
<td>31</td>
<td>40</td>
<td>69</td>
<td>102</td>
</tr>
</tbody>
</table>

Intermodal train traffic is forecast based on demand for on-dock intermodal service (determined from analysis of PIERS (Port Import Export Reporting Service) data and cargo origin/destination forecasts to identify unit-destination train blocks of cargo), as well as capacity of the proposed on-dock rail yards. The contribution of off-dock rail yards towards meeting the intermodal demand is also considered.

Non-intermodal train traffic is forecast to have low growth through the study period and potential growth may be constrained by rail capacity limitations beyond 2010.

Light engine moves occur due to engine fueling/maintenance and crew change requirements. These moves will be constrained after 2010 due to rail capacity limitations. Light engine moves will need to be minimized to avoid causing unnecessary track congestion and train delays; this is expected to be accomplished through the following practices:

- Engines delivering trains to on-dock rail yards will immediately pull a prepared departing train.
- Engine fueling facilities and crew change facilities need to be provided so that engines do not need to return to an inland yard to have these services performed. This could be accomplished with facilities at on-dock terminals, or at an inland port using shuttle engines as described later under “Non-traditional Concepts”.

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• Alternatively to the previous bullet, road engines could be changed out at an inland facility and dedicated shuttle engines could be used between the inland facility and the Ports. This would preclude fueling and crew change requirements. The inland facility could be located between downtown Los Angeles and Cajon Pass.

Yard switcher moves occur due to inter-terminal distribution of rail deliveries. The deliveries may be empty railcars or loads that were delivered to one terminal with a mix of cars ultimately destined to other terminals. Other yard switcher moves can include PHL making rounds that are not included in the direct delivery accounted for in the intermodal and non-intermodal train traffic numbers. Yard switcher moves will need to be minimized to avoid causing unnecessary track congestion and train delays; this is expected to be accomplished through the following practices:

• Westbound trains need to be sorted before arriving to the Ports so that they are dedicated to a specific terminal and do not contain cars that need to be switched into another terminal. This sorting should be done at an inland facility east of downtown Los Angeles.

• Westbound trains need to be sorted to arrive as 25-car unit trains that deliver containers and empty railcars in the same train. This will minimize the number of train movements to a specific terminal. This could be done at the same time as the previous bullet.
VIII. Rail Simulation Results

Dynamic simulation modeling was used to analyze mainline system performance. The model considered track network characteristics (grades, curvature and configuration), train volumes, train performance, and train control system implications (including impacts of Badger Bridge closures). Rail network system performance is presented as a level of service (LOS), which is a report card type grading based on delay ratio (total accumulated train delay time/running time). An LOS of C or better is considered acceptable based on experience at similar rail terminal environments and on the length of delays that were experienced by individual trains during simulation runs with those delay ratios. An LOS worse than C and delay ratio greater than 27% is considered unacceptable.

Table 3 presents the system performance indicated by results of the simulation modeling. The Badger Bridge is currently raised for vessels transiting the Cerritos Channel, which delays trains trying to cross the bridge. The scenarios presented in Table 3 focus on the affects of the Badger Bridge and mainline tracks onto Terminal Island, but all other Port Rail Improvement Projects are included in these runs as well. Five scenarios are presented, as follows:

Scenario 1. **Typical Current Badger Bridge Lifts:** This scenario considers 460 minutes of bridge up time per day, which corresponds to a typical day (average and peak day have 344 and 600 minutes of bridge up time, respectively).

Scenario 2. **Badger Bridge Lifts after 47-foot Heim Bridge Replacement:** Caltrans plans to replace the Heim Bridge in the next five years. The new bridge may be a fixed structure with less than 50 feet of vertical clearance. The restriction is estimated to reduce vessel traffic since taller vessels could not pass beneath. The amount of bridge up time for the remaining vessels ranges, for average and peak days, between 280 minutes and 472 minutes, respectively). This scenario considers 280 minutes of bridge up time per day, which represents an average day if the Heim Bridge is replaced with a fixed structure with less than 50 feet of vertical clearance.

Scenario 3. **Badger Bridge Lifts for Emergency Only:** This scenario represents a condition where vessels are not permitted to transit Cerritos Channel, except for emergencies. The condition simulated in the model did not include any emergency events and the no bridge up time was included.

Scenario 4. **Scenario 3 plus Extend CTC to Last Turnout Onto Yard Leads:** This scenario has the same Badger Bridge condition as the previous scenario, but in order to achieve acceptable level of rail service the Centralized Train Control (CTC) system is extended to the last turnout off the mainline onto each yard lead and power turnouts are added to appropriate leads.

Scenario 5. **Scenario 4 plus Third Mainline from CP Mole to West Thenard:** This scenario has the same Badger Bridge condition as the previous scenario, but in order to achieve acceptable level of rail service the mainline capacity needed to be increased by adding a third mainline to access Terminal Island. In addition to the third mainline, numerous crossovers are added.

The results of these five scenarios are presented in Table 3. A bold line delineates the acceptable level of rail service for each year (scenarios below the bold line and shaded have acceptable rail service). The table focuses on Badger Bridge requirements; however, other improvements are incorporated as presented in Section IX.
Table 3: Network Performance Results for San Pedro Bay Rail System

<table>
<thead>
<tr>
<th>Scenario (Badger Bridge Up Time)</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Typical Current Bridge Lifts</td>
<td>C (24%)</td>
<td>F (41%)</td>
<td>F (45%)</td>
<td>F (&gt;55%)</td>
<td>F (&gt;70%)</td>
</tr>
<tr>
<td>(460 minutes/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Bridge Lifts after 47' Heim Bridge Replacement (280 minutes/day)</td>
<td>D (30%)</td>
<td>D (32%)</td>
<td>F (&gt;45%)</td>
<td>F (&gt;60%)</td>
<td></td>
</tr>
<tr>
<td>3. Bridge Lifts for Emergency Only (0 minutes/day)</td>
<td>A (9%)</td>
<td>B (15%)</td>
<td>C (27%)</td>
<td>E (32%)</td>
<td>F (47%)</td>
</tr>
<tr>
<td>4. Scenario 3 plus Extend CTC and Add Crossovers (0 minutes/day)</td>
<td></td>
<td></td>
<td></td>
<td>C (27%)</td>
<td>F (40%)</td>
</tr>
<tr>
<td>5. Scenario 4 plus Third Mainline from CP Mole to W. Thenard (0 min/day)</td>
<td>A (12%)</td>
<td>A (13%)</td>
<td>B (20%)</td>
<td>C (27%)</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion – Badger Bridge requirement
ok w/current bridge lifts | no bridge lifts | no bridge lifts | extend CTC | add third track

The network performance results presented in Table 3 are based on the operations of the overall San Pedro Bay Ports rail system. This overall network result is the clearest indicator of system performance; however, the results of individual corridors within the Port of Long Beach have been analyzed as well.

**POLB Proper:** The results show that, except for Terminal Island, the Port of Long Beach mainlines (Long Beach Subdivision) function very well all the way through the planning horizon year 2020. Various improvement projects are recommended to achieve this performance, as listed in Table 4.

**POLA Proper:** The Port of Los Angeles mainline tracks did not perform as well, and improvements will need to be considered under a separate study. It is important for POLA to provide these improvements, as they affect the performance of POLB traffic coming off and getting on the Alameda Corridor. Some important POLA projects are listed in Table 4.

Terminal Island: The greatest concern identified by the rail simulation is the function of the mainline onto Terminal Island. Both POLB and POLA have major terminal developments on Terminal Island and it is critical to provide access for the high level of traffic generated by these terminals. The issues facing Terminal Island rail traffic include: addressing the impacts of lifting Badger Bridge for vessel traffic, and adding an additional mainline track. These two points are discussed further as follows:

- **Badger Bridge through 2005:** The Badger Bridge is currently raised for vessels transiting the Cerritos Channel. These intermittent closures to train traffic will cause significant impacts to rail operations by 2005.
- **Badger Bridge Fixed Down 2005-2015:** The Badger Bridge will need to be closed to all vessel traffic except for emergencies in order to provide acceptable rail service as defined by delay ratio. The simulation results show an unacceptable LOS of F or D with either the current number of Badger Bridge lifts, or the reduced number after Heim Bridge is replaced with a fixed span, respectively.
- **CTC Extension with Badger Bridge Fixed Down 2015-2020:** Extend CTC and crossovers to the last turnout onto yard leads beyond CP Mole to Pier T, Pier 400, Pier 300 and TICTF.
- **Third Track to Terminal Island by 2020:** The volume of train traffic accessing Terminal Island will require an additional mainline track from CP West Thenard to CP Mole. Adding a track will be challenging since this stretch of rail runs through the highly constrained “Texaco Slot”, through the Henry Ford Grade Separation (which currently only has width for two existing tracks), across Badger Bridge (which currently only has width for two existing tracks), and through the crowded CP Mole area with two built out grade separations and numerous yard lead restrictions.
IX. Port Rail Improvement Program

The Port Rail Improvement Program includes rail yard development projects, capacity improvement projects, regional rail capacity analysis, operating improvements and non-traditional rail concepts. These are described in this and subsequent sections of the Executive Summary, and in the Technical Report.

Recommended Capacity Improvement Projects

The simulation model was used to identify constraints and bottlenecks in the rail network system. When these bottlenecks caused unacceptable levels of service, then improvements were developed to alleviate the deficiency. Table 4 summarizes the rail capacity improvement projects that were found necessary in order to provide adequate train service. The drawing number shown in Table 4 represents the concept drawing of the rail improvement project as presented in Section 6 of the Technical Report.

<table>
<thead>
<tr>
<th>Drawing Number</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.Y05.1</td>
<td>Long Beach Lead/TILT Connection (POLB/ACTA)</td>
</tr>
<tr>
<td>6.Y05.2</td>
<td>Renovate POLA Transfer Rail Yard (POLA)</td>
</tr>
<tr>
<td>6.Y05.3</td>
<td>Pier T-East Rail Access Improvements (POLB)</td>
</tr>
<tr>
<td>6.Y05.4</td>
<td>Crossovers Connecting West Leg of TI Wye (POLB)</td>
</tr>
<tr>
<td>6.Y05.5</td>
<td>Extend Pier F and Metro Leads (POLB)</td>
</tr>
<tr>
<td>6.Y05.6</td>
<td>Remove Pier G-ITS Gate (POLB) *</td>
</tr>
<tr>
<td>6.Y10.1</td>
<td>Badger Bridge- Lift for Emergency Vessels Only (LA/LB)</td>
</tr>
<tr>
<td>6.Y10.2</td>
<td>Second Mainline to Pier J (POLB)</td>
</tr>
<tr>
<td>6.Y10.3</td>
<td>Pier E Lead Improvements (POLB)</td>
</tr>
<tr>
<td>6.Y10.4</td>
<td>Pier G-ITS Lead Track (POLB)</td>
</tr>
<tr>
<td>6.Y10.5</td>
<td>Construct Second Lead to Pier 400 (POLA)</td>
</tr>
<tr>
<td>6.Y15.1</td>
<td>Extend CTC to last mainline turnout into yard leads on TI (LA/LB)</td>
</tr>
<tr>
<td>6.Y15.2</td>
<td>Extend CTC to last mainline turnout into yard leads in POLB</td>
</tr>
<tr>
<td>6.Y15.3</td>
<td>Extend CTC to last mainline turnout into WBICTF in POLA</td>
</tr>
<tr>
<td>6.Y20.1</td>
<td>Third Mainline from CP Thenard to Anaheim w/Crossovers (LA/LB)</td>
</tr>
<tr>
<td>6.Y20.2</td>
<td>Third Mainline onto Terminal Island (LA/LB Project)</td>
</tr>
<tr>
<td></td>
<td>- Badger Bridge for Third Mainline (LA/LB Project)</td>
</tr>
<tr>
<td>6.Y20.3</td>
<td>- Third Mainline through CP Mole w/Crossovers (LA/LB ) *</td>
</tr>
<tr>
<td></td>
<td>Grade Separations at New Dock St. &amp; Henry Ford Ave</td>
</tr>
<tr>
<td>6.Y20.4</td>
<td>Pier B Rail Yard Expansion Phase 2- Extend Staging Tracks Along Pico Ave. (POLB) *</td>
</tr>
<tr>
<td></td>
<td>* - indicates projects that may require grade separations</td>
</tr>
</tbody>
</table>
A complete list of all rail capacity improvement projects and rail yard development projects are presented in Figure 5, which also indicates the development schedule and cost estimate for each project. The locations of these improvement projects are presented on Figures 6 through 9 for each of the forecast years. The drawing numbers identified on these figures refer to project specific drawings presented in the Technical Report. Baseline Rail Yard Projects are presented in Section 4 of the Technical Report (e.g. Drawing 4.Year.Project #) and Rail Capacity Improvement Projects are presented in Section 6 of the Technical Report (e.g. Drawing 6.Year.Project #).
LIST OF BASELINE RAIL YARD PROJECTS

- Drawing 4.Y05.1 Pier T 2000-2005
- Drawing 4.Y05.2 Pier S 2000-2005
- Drawing 4.Y05.3 G-TTS Storage 2000-2005
- Drawing 4.Y05.4 Manuel Yard 2000-2005

LIST OF RAIL CAPACITY IMPROVEMENT PROJECTS

- Drawing 6.Y05.1 LB Lead/TILT 2000-2005
- Drawing 6.Y05.2 POLA Transfer Yard 2000-2005
- Drawing 6.Y05.3 Pier T-East 2000-2005
- Drawing 6.Y05.4 X-over for TI Wye 2000-2005
- Drawing 6.Y05.5 Pier F & Metro Leads 2000-2005
- Drawing 6.Y05.6 Pier G-TTS Gate 2000-2005

Figure 6 Project Keymap 2000-2005

August 19, 2002
Figure 7 Project Keymap 2005-2010
LIST OF BASELINE RAIL YARD PROJECTS

Drawing 4.Y15.2 Pier G 2010-2015
Drawing 4.Y15.3 Pier E 2010-2015
Drawing 4.Y15.4 Pier T/W 2010-2015

LIST OF RAIL CAPACITY IMPROVEMENT PROJECTS

Drawing 6.Y15.2 Extend CTC in POLB 2010-2015
Drawing 6.Y15.3 Extend CTC in POLA 2010-2015

Figure 8 Project Keymap 2010-2015

August 19, 2002
LIST OF RAIL CAPACITY IMPROVEMENT PROJECTS

Drawing 6.Y20.1 3rd Mainline from CP Thenard to Anaheim 2015-2020
Drawing 6.Y20.4 Pier B Rail Yard Phase 2 2015-2020

Figure 9 Project Keymap 2015-2020

September 2002
X. Regional Rail Capacity/Demand

Existing Conditions

Currently, off-dock facilities are handling nearly 3 million TEU per year and on-dock facilities are estimated to be handling less than 1 million TEU, even though the on-dock capacity is estimated to be 1.6 million TEU. Currently, off-dock rail yards are handling nearly 40% of the total cargo volume, while on-dock rail yards are handling about 10%. The reasons that discretionary cargo is currently being handled off-dock may be ascribed to the following critical issues:

1. Unavailability of sufficient cargo to build dedicated destination trains on-dock.
2. Insufficient terminal space
3. Inadequate storage tracks
4. Labor costs and constraints
5. Loading efficiency and number of shifts

The Rail Master Planning Study shows that these five issues will be largely resolved in future years due to increased cargo volumes, new terminal developments and improved work rules and practices, as described in the Technical Report. In addition, lack of off-dock capacity will force the necessity of using on-dock rail yards.

Forecast Conditions

The total projected volume of intermodal cargo in 2020 (18.1 million TEU) will be loaded onto trains either at on-dock or off-dock rail yards. The demand and capacity for these intermodal loading facilities is summarized in Table 5 for each of the forecast years.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>(millions TEU)</td>
<td></td>
<td></td>
<td></td>
<td>Percentage of Total Port Throughput</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Cargo Forecast</strong></td>
<td>12.9</td>
<td>16.7</td>
<td>24.4</td>
<td>36.1</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total Intermodal Demand</strong></td>
<td>6.5</td>
<td>8.4</td>
<td>12.2</td>
<td>18.1</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td><strong>On-dock Rail Yard Capacity</strong></td>
<td>3.6</td>
<td>4.7</td>
<td>8.5</td>
<td>12.5</td>
<td>28%</td>
<td>28%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Off-dock Rail Yard Capacity</strong></td>
<td>2.9</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>22%</td>
<td>21%</td>
<td>14%</td>
<td>9%</td>
</tr>
<tr>
<td><strong>Rail Yard Capacity Shortfall</strong></td>
<td>0</td>
<td>0.2</td>
<td>0.2</td>
<td>2.1</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
<td>6%</td>
</tr>
</tbody>
</table>

* Source: 1998 Mercer San Pedro Bay Ports Long-Term Cargo Forecast

The on-dock rail yard capacity is assumed to be fully utilized since there is ample demand and this will be the most efficient operation with the least environmental impacts.

The existing off-dock rail yards are estimated to have an annual capacity of 2.9 million TEU that the railroads can dedicate to international traffic. These inland facilities include ICTF, East L.A., LATC and Hobart. This existing capacity is split such that the near-dock ICTF rail yard can handle nearly 1.5 million TEU per year and the rail yards in downtown Los Angeles can handle 1.4 million TEU per year.
The off-dock rail yards are currently constrained by parking space and it is assumed that this constraint could be alleviated by 2010, at which time the annual off-dock capacity would be increased to 3.5 million TEU, the resulting capacity gain is provided only at the downtown rail yards, therefore the near-dock ICTF rail yard can handle 1.5 million TEU per year while the downtown yards could increase to 2.0 million TEU per year.

The conclusion from Table 5 is that additional rail yard capacity would be required by 2010 with significant additional capacity required by 2020 to meet the projected demand for intermodal cargo. It is recommended that this capacity be provided through development of near-dock rail facilities south of the I-405 freeway.

The projected intermodal demand used for this Study, as presented in Table 5, is based on the 1998 Mercer forecast assumption that 50% of the total cargo volume will be handled by train. The basis of this 50% estimate is that all cargo with origin/destination beyond about 1000 miles be intermodal.

The Rail Master Planning Study shows that the percentage of intermodal could go even higher if markets in the 500 to 1,000-mile range were to transport cargo by rail. Doublestack rail traditionally competes well with trucks at distances greater than 500 miles.

As highway traffic congestion increases, there may be potential to handle cargo destined to markets even closer than 500 miles.

- If additional volumes from these markets were to be loaded on trains, then the shortfall in rail yard capacity presented in Table 5 would be even higher resulting in greater impetus to develop more rail yard capacity.

Since on-dock rail yards are conceptualized to be built out to their maximum size for the planned marine terminal space, it is recommended that

- near-dock rail yard capacity should be developed in the Port vicinity south of I-405 freeway. This development could be in the form of a new rail yard or through expansion of the existing ICTF rail yard.

While the railroads have indicated some ability to expand the downtown rail yards, these tentative plans would provide only one million TEU of annual capacity and still not meet the 2020 demand. Most importantly, this expansion will not improve the critical traffic conditions on roadways between the Ports and downtown Los Angeles. Therefore, it is recommended that the projected rail capacity shortfall be addressed through development of near-dock rail yards.
XI. Non-traditional Rail Concepts

It is important to think beyond the Port boundaries in order to understand how to assist and encourage shippers to move more cargo by rail, and terminal operators to fully utilize on-dock or near-dock rail yards. A review of non-traditional rail concepts included the feasibility of on-dock operations to enhance capacity, inland port rail terminal operations and other non-traditional concepts.

Non-traditional rail concepts, that were evaluated in this study include:

- **Alternative on-dock operating modes** aimed at improving efficiency to increase rail yard capacity and reduce the handling of containers during the transfer of cargo from ship to train, and

- **Distributed logistics initiatives** such as inland port concepts to classify or resort landbridge cargo, distribute local cargo or otherwise provide benefits to rail operations.

The ultimate goal of these concepts is to increase the volume of cargo moved by rail, which will mitigate some of the cargo-generated truck traffic. In addition, inland port concepts can provide rail operating improvements that are complimentary to the recommendations by this study for Port operating improvements. Mainline rail capacity in the Ports, Alameda Corridor and east of Los Angeles could constrain the ability to handle more trains. The ability to handle greater volumes of trains on the regional rail network should be evaluated simultaneously with the feasibility of the following non-traditional concepts in the future.

Alternative on-dock operating modes and distributed logistics concepts have been evaluated and the advantages and disadvantages of each are described in the Technical Report. **Alternative on-dock operating concepts** address how containers or railcars are handled on the marine terminal. **Distributed logistics concepts** deal with alternatives to loading full-length trains that are dispatched directly from the marine terminal to a landbridge destination. The concepts that have been evaluated include:

**Concept 1 - Direct Vessel to Rail Transfer**: This concept adopts the practice of moving containers directly from the quay crane to the rail yard to be immediately loaded onto trains. The concept could potentially reduce handling costs, but will not improve rail yard capacity and might cause impacts to rail yard operations.

**Concept 2 - Direct Access Rail Transfer**: This concept adopts the practice of moving containers immediately from the quay crane to be loaded onto railcars adjacent to the quay. The concept could potentially reduce handling costs associated with intermodal containers (since the number of rehandles are minimized), however, the placement of rail operations adjacent to the quay could adversely impact overall terminal operations. The area adjacent to the quay is traditionally reserved for export cargo, then local import cargo. If a high productivity system, such as rail mounted gantry or overhead bridge crane, were employed, then this system would be more beneficial for container stacking since this is more space efficient and can be applied to more of the terminal cargo. Also, any rail movement near the wharf area will be seen as a safety concern.

**Concept 3 - Sprint Trains**: This concept allows cuts of cars the length of the working track to be immediately hauled to an off-dock location once that cut is loaded. The advantage of this system is to maximize the rail yard turnover since an entire train worth of cargo does not need to be completed before dispatching the Sprint Train. In addition, the switching and train building time would be minimized. While the Sprint Train concept has very good potential to increase rail yard capacity, the impacts of moving less than full-length trains would be a significant detriment to mainline capacity, which is projected to be constrained by 2015.

**Concept 4 - Shuttle Train – “Block-Swap”**: This concept allows full-length trains to be built on-dock with cuts of railcars going to various destinations. At an inland rail yard, these cuts can then be blocked together with cuts from other trains to create solid destination specific trains. The additional time required to manage and handle
trains at the inland yard is not warranted since the volumes of cargo at each mega-terminal are expected to generate destination specific trains in a timely manner.

Concept 5 – Shuttle Train – “Container Shuffle”: Similar to the previous concept, but this concept allows the on-dock rail yard to immediately load containers without any sorting by destination. The containers can then be unloaded at an inland rail yard and reloaded with containers from other trains as solid destination trains. The ability to load trains without sorting by destination could potentially reduce the dwell time of containers on the marine terminal by a few hours. However, the time and cost required to reshuffle containers at the inland rail yard are expected to be more significant.

Concept 6 - Shuttle Trains for Westbound Cargo: While Concepts 4 and 5 focused on eastbound cargo movement, there is a more pressing need for sorting of westbound cargo. The cargo arriving from the east may not be sorted for a specific marine terminal, but this is one of the operational improvements necessary to minimize the amount of switcher moves between terminals on the busy Port Rail Network. An inland rail yard could be used to build Port-terminal specific westbound trains and reduce the volume of switcher moves on the Port rail network. This would best be accomplished using Block-swapping as described in Concepts 4 and 8.

Concept 7 - Inland Port for Local Distribution: While the previous distributed logistics concepts dealt entirely with intermodal landbridge cargo, another concept for an inland rail yard is to distribute local cargo. This concept is commonly called Inland Port or Port Inland Distribution Network (PIDN). While the costs of transporting local cargo by rail are not traditionally more economical than truck, the level of congestion and the potential value of truck traffic reductions as a mitigation measure make this concept suitable for further consideration.

Concept 8 - Hump Yard Block-Swapping Concept: Concept 4 (Shuttle Train – “Block-Swap”) and Concept 6 (Shuttle Trains for Westbound Cargo) described how inland rail yards could classify mixed trains with blocks of cars having containers for various destinations or port terminals. A variation is the Block-Swapping Yard where trains from various sources on one side of a node (the yard) are combined in blocks for destinations on the other side of the node. The trains are blocked in common order on each train at the point of initial loading and are scheduled to arrive at the yard in a common time frame. The blocks are then classified at the yard with the new trains built for the desired destination or terminal. Cars are classified but handling is more economical because containers are not unloaded/reloaded. In order to prevent unloading/reloading, the containers must have single destination loads on each multi-unit rail car and the greatest efficiency in sorting will be attained by destination blocking cars on each incoming train. Although this method has traditionally been applicable to domestic loads there may be benefits for the international loads if either complete destination trains cannot be made up in each terminal or if it becomes beneficial to save time on-dock by sorting inland. As mentioned in Concept 6, block-swapping may be most applicable to westbound cargo due to the need to organize trains by Port terminal, which is not typically done at the hinterland point of origin.

The classification or sorting of intermodal cars, referred to as “block-swapping” can be improved by the hump yard method (currently, in Europe, container cars are being both block-swapped in yards and sorted in hump yards). These new hump yards can be built in “green field” locations or as replacements for existing outdated strictly carloading hump yards. They would probably have higher hump exit grades than existing hump yards and use multiple computer-controlled retarders to control the running speed of cars coupling into already sorted sets. This method would greatly decrease switching time by limiting the number of switch moves and dedicated time of locomotive engines. Trains that are destination blocked at the terminals will make the hump yard more efficient since it will minimize the required number of hump moves.
Concept 9 - Regional Shuttle Engines: One of the operating improvements recommended by this Study is to turn engines at the on-dock rail yard (i.e. engines that are delivering a westbound train, immediately disconnect and pull out a prepared eastbound train). One complication with this requirement is that long-haul road power may require fuel, maintenance or a crew change. In addition, the road power may not have fully instrumented “lead engines” at both ends of the locomotive set. Therefore, instead of being able to disconnect from the east end of the locomotive and then connect to the west end, the set would need to weave around requiring a light engine transit through the Port rail network.

This concept provides the ability to exchange road power for dedicated regional shuttle engines at an inland rail facility. The shuttle engines will address the problems with turning at the on-dock rail yards since they would be set up with instrumented locomotives at both ends, would be fueled at the inland rail yard and have local crews that can be changed at the inland rail yard. Meanwhile, the road power can be serviced at or near the inland facility and pick up eastbound trains that are delivered from the Ports by the shuttle engine.

Based on the foregoing, and in light of some of the constraints noted by terminal operators, terminal operators and shipping lines at the Port, it is recommended that the concept of a remote, or satellite, intermodal rail yard merits further consideration. Shippers and shipping lines are both very interested in control over their cargo. One of the reasons that on-dock rail yards are preferred by these parties is that containers are loaded onto trains in the marine terminal and are directly dispatched to their ultimate destination. Any plan that requires cargo to stop and be handled at another location, such as Concepts 3-5, will eliminate this sought after feature of intermodal rail. Classification of westbound cargo to create Port-terminal specific trains (Concept 6) and setting up regional shuttle engines to the Port (Concept 8) are both highly valuable to Port operations.

XII. Conclusions/Recommendations

This study prepared a comprehensive rail master plan that identified all rail related issues, including mainline track, storage capacities, operations and systems, and will substantiate the actions required to provide acceptable levels of service for trains in 2005, 2010, 2015 and 2020. The study provides a Port Rail Improvement Program that identifies the rail system deficiencies and necessary improvements through a phased implementation plan with projects in each five-year increment to 2020. It is recommended that the findings of this Study be updated every 5 years to incorporate revised cargo forecast, updated terminal plans and current operating conditions.

The cargo that is forecast to arrive at the San Pedro Bay Ports over the next 20 years will require significant improvements in terminal throughput capabilities. The increased cargo volumes will also require careful evaluation of the landside transportation system. The 2001 Port of Long Beach/Los Angeles Transportation Study defined highway congestion that would result from the increased cargo volumes and recommended that at least 30% of the cargo should be moved by on-dock rail. This Rail Master Planning Study defines the rail yard, mainline, systems and operations improvements necessary to achieve and exceed this goal.

- Rail yards are conceptualized for each of the proposed mega-terminals at the Port of Long Beach. These rail yards have the combined throughput capacity to handle 35% of the Port cargo by 2020.
- The train volumes generated by these on-dock rail yards will exceed 100 trains per day.
- Various mainline, system and operation improvements will be required within the Port to accommodate the projected train volumes. These required projects are compiled into a phased Port Rail Improvement Program, and include: mainline track, yard leads, CTC expansion, and train storage/staging areas.
Even after maximizing the potential on-dock rail yards, the demand for intermodal rail service creates a shortfall in rail yard capacity by at least 2010. If some additional hinterland markets within 1000 miles of the Port can be served by rail, then the shortfall in rail yard capacity will become even greater.

- It is recommended that additional rail yard capacity be developed at near-dock facilities in the vicinity of the Alameda Corridor and south of the I-405 freeway.

Non-traditional rail concepts do not seem to provide the necessary impetus or benefits to significantly increase the volume of landbridge cargo that is moved by rail. However, inland port distribution of local cargo, may prove beneficial due to the level of highway congestion and the potential value of truck traffic reductions as a mitigation measure.

- This inland port concept will need to be evaluated for its market viability.
- Additional near-dock rail yard capacity will need to be developed to support the inland port concept.
- The mainline rail capacity required to support the increased train volumes between the Ports and the inland facility will need to be carefully evaluated.

In addition to the goal of encouraging cargo movement by rail, the inland port concepts can provide other rail operating improvements that coincide with the recommendations of this Study. These improvements would reduce the volume of light engine and switcher movements on the Port rail network, and include:

- Providing dedicated regional shuttle engines and
- Providing the ability to build Port-terminal specific westbound trains.

The Ports should work closely with the Railroads to define and pursue the inland port concept and near-dock rail yard capacity enhancement, this relationship should be expanded to include area government agencies for a critical evaluation of regional mainline capacity.