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EXECUTIVE SUMMARY

This project was undertaken to assess the potential for development of an Inland Container Terminal in the province of British Columbia as a means of increasing the efficiency and effectiveness of the system for handling containerized cargo through the port terminals in the Lower Mainland and Prince Rupert.

Key Success Factors

An analysis of key success factors and Best Practices with reference to existing and planned Inland Container Terminals in Europe and the United States was undertaken. Five key success factors were identified:

1. An adequate catchment area
2. Availability of suitable land
3. Reliable and competitive rail service
4. Good access to a highway network
5. Phased development to limit initial capital investment

A survey of existing and planned Inland Container Terminals in North America and the UK was undertaken to examine the influence of these factors on the facility’s performance. A cross-sectional analysis identified key similarities among successful terminals:

1. They tend to be oriented primarily to import traffic, which has been the fastest growing traffic segment in Europe and the U.S.. Dependence on a single shipping line or commodity was a significant risk factor to successful terminal performance.

2. Public sector involvement in the assembly of suitable land was critical in almost all of the successful examples, though the nature of that involvement varied from direct provision of the land to the use of financial incentives to promote development.

3. Reliable rail service is a key element in the success of an Inland Container Terminal. Dependence on a single rail service and/or infrastructure provider can be a significant risk factor.

4. Good road access is required. The public sector has typically played a key role in ensuring adequate road infrastructure.

5. Phased development requires the availability of land surplus to initial facility requirements to support growth of the logistics cluster. In many cases this was assured by the development of Inland Container Terminals on large brownfield sites with plenty of room to grow.
Four business models of relevance to the current container transportation system in British Columbia were identified. They included Import transload-oriented, Export transload-oriented, Empty container terminal, and Integrated Logistics Park.

**Stakeholder Consultations**

Interviews were conducted with a broad range of stakeholders to identify needs and challenges for improving the containerized freight system. Many firms with existing operations in the Lower Mainland perceive opportunities from traffic growth and are positioning themselves to take advantage.

Stakeholders on the Northern Corridor face different challenges from those in the Lower Mainland. Development of the new container terminal at Prince Rupert is seen as a tremendous opportunity for enhanced economic growth, and the key concern is a flexible and economical means to access the container terminal.

**Container Movements in BC**

The basic features of the current system for handling containerized freight in British Columbia were analyzed to provide the understanding necessary for assessing the potential opportunities from the use of Inland Container Terminals. The most significant feature is an imbalance in the supply of empty containers in the Lower Mainland. The gap between the empty containers generated by the unloading of import containers and the containers loaded for export in the Lower Mainland is around 140,000 Twenty Foot Equivalent Units (TEU’s). This gap is filled by containers returned empty from Eastern Canada by rail. These are handled at the on-dock port terminals and trucked to export transload warehouses for stuffing.

The Lower Mainland container terminals have experienced periodic operational problems related to terminal congestion since 2004. Congestion at the on-dock terminals is seen by the majority of stakeholders as the major challenge to system efficiency at this time.

An Inland Container Terminal could eliminate the need to unload inbound empty containers from railcars at the dock in order to transfer them by truck to export warehouses. This would increase the capacity of the on-dock terminals for handling loaded containers. For this reason, the development of a facility to rationalize the handling of empty containers was identified as the best opportunity for the use of an Inland Container Terminal to improve efficiency in the BC transportation system.

**Inland Container Terminal Opportunities in BC**

Four basic categories of Inland Container Terminals were selected to guide the research for this study.

1. An Import Distribution centre-oriented Inland Container Terminal, designed primarily for handling of loaded import containers.

2. An Export Transload-oriented Inland Container Terminal, designed primarily to facilitate the loading of containers with commodities for export.
3. An Empty Container Inland Container Terminal, on the model of existing off-dock operations offering container storage, cleaning, repair and reefer testing, but enhanced by functional rail access or shortsea shipping services. A facility of this type could alleviate congestion at the deep sea terminals by providing a location to unload and store empty containers arriving by rail as well as drayed containers.

4. A Logistics park with integrated operations encompassing both import and export functions along with container storage. These are major industrial logistics parks which integrate direct rail, truck, intermodal and transload with distribution and warehousing in one location.

The need for an alternative method of handling empty containers as a means of reducing on-dock terminal congestion was identified as a short term priority during our consultations. The primary challenges identified to implementing an empty container terminal which were identified in our consultations were rail service and the availability of suitable land.

The primary obstacle to obtaining rail service is the concerns of CN and CPR over the potential impact on the efficiency of their operations. Two key elements of the railways' productivity, fluidity and equipment balance, could be adversely affected by use of an Inland Container Terminal. The scale of operations is a major determinant of the efficiency impacts, and project proponents have understood that a large scale operation would be required for the provision of rail service.

The impact of an Inland Container Terminal on system efficiency was examined with respect to the effects on trucking, rail and terminal operations. Expanded use of off-dock storage of empty containers – essentially the use of Inland Container Terminals for drayed containers in the Lower Mainland – coincided with a reduction in productivity in the drayage sector of as much as 17%.

Detailed cost analysis was undertaken for the two options for rationalizing the handling of empty containers – an empty container terminal in the Lower Mainland, and an export transload-oriented terminal for the Southern and Northern corridors. The need for an Inland Container Terminal of sufficient scale to maintain rail efficiency dictated the parameters for estimating capital costs. Three options were considered, ranging in size from 50 acres to 225 acres, with capital costs ranging from $38 million to $148 million exclusive of land costs. The smallest terminal size analyzed in the generic cost analysis has sufficient capacity to handle 150,000 TEU's.

The minimum scale needed for rail efficiency dictated the choice of a site on the CN Mainline east of Matsqui Junction where both CN and CP intermodal trains could be intercepted en route to the on-dock terminals, as the basis for an analysis of comparative costs. The use of a facility at this site would require changes from the current routing for intermodal trains in the Lower Mainland.

The costs of handling containers at this benchmark terminal – including land, capital and terminal and rail operating costs, and required trucking costs – were analyzed relative to the costs paid using the current system. The results of this analysis indicate that the location of the terminal – distant from the existing export transload warehouses – rendered it uncompetitive with the existing system, largely due to
increased trucking costs. Lower land costs were not sufficient to make the Inland Container Terminal competitive.

To analyze the potential for an Inland Container Terminal in the Interior on the Southern Corridor, an analysis was undertaken of the cost of shipping lumber from an Interior mill. At current trucking and rail rates, the use of an Inland Container Terminal would result in considerably increased costs.

The Northern Corridor is a special case due to CN's primary role as the rail service provider, and their possible intention to enter the export transload business in Prince George. This will assist Northern Corridor industries by providing additional shipping options. Truck access to the Prince Rupert should provide flexibility for development of new markets for local industry, and most efficiently in handling containerized exports, originating on the Highway 16 corridor between Prince Rupert and Prince George.

Conclusions

We have examined potential business models for an Inland Container Terminal in BC based on the composition of the existing traffic base. Our conclusions and recommendations based on the four business models are as follows.

Import Distribution

The most likely potential catchment area for an import distribution Inland Container Terminal is the Lower Mainland. The critical factor for import demand is the size of the local market, and the Lower Mainland is the only major population centre in BC. The availability of land for initial construction and expansion could be a major challenge in the Lower Mainland as the availability of industrial land is limited and land prices are high.

Developing a competitive short haul option to trucking is a major challenge in implementing an import distribution Inland Container Terminal. Our cost analysis highlights the impact of drayage costs on the competitiveness of rail shuttle and shortsea shipping alternatives. The requirement for a competitive import distribution Inland Container Terminal is achieving a compact cluster of facilities which can supply a sufficient scale of operations for a rail shuttle or shortsea shipping option, and substantially reduce the need for drayage. The rapid growth in import traffic improves the potential for development of an import transload-oriented Inland Container terminal, but will not be sufficient by itself to make it viable.

Export Transload

The major potential catchment areas in B.C. for containerized exports are areas with major forest products facilities. The other major containerized export category, specialty grains, would not provide a local traffic base for an Inland Container Terminal because the production of these commodities in BC is very limited. The most promising catchment areas for lumber are the major producing areas centred around Prince George in the North and Kamloops in the South. For pulp, the major catchment area is in the North centred around Prince George-Quesnel, though there is significant capacity at Kamloops and in the Northeast.
Our cost analysis highlights the challenges of developing a competitive export transload-oriented Inland Container Terminal under the current rail and trucking rate structures. The cost of trucking direct to the Lower Mainland is much lower than the combined trucking and rail costs for an intermodal movement under current rates. In the Northern Corridor, CN’s potential development of an export transload facility could provide additional options for shippers. Truck access to the new Prince Rupert container terminal will be a key requirement for competitiveness for shippers along the Highway 16 corridor between Prince Rupert and Prince George, and may provide opportunities for transloading of forest products from coastal mills in Prince Rupert.

**Empty Container Terminal**

This application of an Inland Container Terminal has the highest potential to increase the efficiency of on-dock container terminal efficiency. The potential catchment area with highest potential for an Inland Container Terminal to handle empty containers is the Lower Mainland. The major function of an empty container terminal is to reduce handling requirements at the on-dock terminals while ensuring the availability of empty containers for loading of export shipments. Since the existing export transload facilities are located in the Lower Mainland, in the short term this is the logical location for construction of an Inland Container Terminal for handling empty containers. This location also allows exporters to respond quickly to schedule changes due to vessel delays, etc. which may shift or reduce the time available for delivering containers to the docks.

Under the current business models, the minimum efficient scale for efficient rail operations is around 150,000 TEU’s. The current “container gap”, the total volume of empty containers returning from Eastern Canada needed for reloading is around 140,000 TEU’s. This implies that one terminal is sufficient to handle the empty container requirements for the Lower Mainland, and that it would have to be located where it could intercept all of the empty containers destined for both Deltaport and the Inner Harbour terminals.

The costs of implementing this model in the Lower Mainland are extensively analyzed in this report. The analysis indicates that distance from the on-dock terminals is a key determinant of drayage and rail operating costs, and that the costs of using an Inland Container Terminal of sufficient size to maintain rail efficiency are not competitive with the current system of trucking from on-dock terminals.

The implication of the forecast growth imbalance between imports and exports is that the demand for this service – the need for unloading of empty containers from rail cars to make them available for export loading may actually decrease. The reason for this is that under the assumption that the share of loaded imports picked up by truck from the on-dock terminals will remain the same, the growth in import traffic will increase the availability of empty containers within the Lower Mainland.

**Integrated Logistics Park**

In the Lower Mainland context, an Integrated Logistics Park could be thought of as an Inland Container Terminal with onsite facilities for import and export transloading
and empty container storage and servicing. A facility of this type could have numerous advantages, including a scale of operations which could make short haul rail shuttles to the on-dock terminals feasible, co-location of import and export transload facilities and empty container storage to minimize drayage costs, and reduced traffic congestion and air emissions.

The major barriers to development of an integrated logistics park in the Lower Mainland include the lack of suitable parcels of industrial land, local community opposition to container transportation activity, and the difficulty in relocating activities from current facilities, many of which have only recently been constructed. The opportunities may be limited to capturing the growth in import and export transloading as the capacity of existing facilities is fully utilized. This would imply a phased site development with land available for expansion as traffic grows.

**Recommendations**

1. **Container Activity Clusters**

   The analysis in this study has pointed out that efficiency for port-related rail and truck operations is maximized when activity takes place as close as possible to the port terminals. More rapid expansion of on-dock terminal capacity, or development of container handling facilities adjacent to the on-dock container terminals, may offer better efficiency and increased levels of service if it can be accomplished.

2. **Long Range Planning**

   Our analysis has pointed out that the Lower Mainland is likely to remain the focal point for container-related economic activity because the concentration of population and existing infrastructure base (including the on-dock and off-dock terminals and transload facilities) provide a catchment area which can support additional development. This means that if the Lower Mainland is to continue to grow as an Asia-Pacific Gateway all supply chain participants will have to come to grips with the challenges of expanding the infrastructure base for these activities. Competing demands for scarce land and growing concerns over the environmental impact of industrial activity are the major challenges which must be confronted.

3. **Land Use Policies**

   The availability of suitable land for initial construction and expansion has emerged as the dominant contribution that the public sector can make to the successful expansion of port-related economic activity. Our surveys of successful Inland Container Terminals have identified numerous examples where governments have enabled the development of facilities through the assembly of suitable parcels of industrial land, usually through conversion from other uses.

   If an Inland Container Terminal is required to enable the ports to expand their capacity, development of Integrated Logistics Park facilities can be characterized as a Best Practice. They can provide the critical mass for optimizing transportation and distribution activities while minimizing the external impacts such as road congestion, noise and emission on surrounding communities. This type of development requires
a large land base, and public policy changes may be required to facilitate the assembly of suitably zoned and serviced land parcels.

Given the difficulty in assembling large parcels of industrial land, it would be wise to protect the integrity of concentrations of industrial land through appropriate land use policies. It may be worthwhile to undertake a project on the model of the Brownfields Redevelopment Project at the Port of New York and New Jersey to identify existing sites which are well located for port-related activity and facilitate their redevelopment for this purpose. Where large clusters currently exist, they should be protected from encroachment by non-industrial developments and provided with the necessary road access and rail service.

Potential options for British Columbia include:

Creation of strategic Industrial Land Reserves on the model of the Agricultural Land Reserve to preserve high priority industrial land for industrial purposes, including container – handling industries.

Encouraging municipal land use and zoning decisions which enable the maintenance and expansion of container handling facilities.

A review of selective exemptions from Agricultural Land Reserve restrictions to facilitate the transfer of low productivity agricultural land to industrial use for high priority developments.

Development of an Integrated Logistics Park facility. This type of development requires a large land base, and public policy changes may be required to facilitate the assembly of suitably zoned and serviced land parcels.

An inventory of industrial land resources should be undertaken, and appropriate land use policies should be implemented to maintain the integrity of existing industrial areas. Where large clusters currently exist, they should be protected from encroachment by non-industrial developments. The efficiency of existing clusters of container handling facilities might be enhanced through upgrading of road access and rail service.

Fraserport ’s Richmond Property already has the nucleus of an Integrated Logistics Park but is hampered by inadequate access to the provincial highway system, and an inadequate scale of operations to attract sufficient rail service by CN. If these issues could be resolved, the benefits to the container system could be very significant, as the concentration of activities on site could reduce truck traffic and potentially render a shortsea shipping approach feasible.

4. Good mainline rail connections and competitive rail service.

The development of a rail service model which can support the transfer of activity from the congested on-dock terminals to external locations without compromising railway efficiency is a major challenge. The solution will have to be negotiated between the railways and their customers. Governments can play a role by attempting to foster a dialogue among the major railways, terminal operators and
shipping lines to identify possible solutions and policy changes which could facilitate a more flexible service model.

5. Direct connection to a major highway network

Governments can play a major role in this by ensuring adequate road access for existing port-related industrial areas, and continuing to plan for goods movement as an integral element in their road planning activities.

6. A phased development approach which can limit initial capital requirements

This factor is related to the land issues noted above. It is unrealistic to believe that, if an Integrated Logistics Park could be created, all current activity could be relocated there in the short term. Companies have made major investments in existing facilities and will not abandon them. However, over time the advantages of the Logistics Park cluster will provide the incentives for growth at the new site. The success of the endeavor will depend on assembly of a sufficient land base, and policies which can ensure the land remains available for the long term even though it may not be full utilized at the outset. These policies could include property tax changes and special zoning regulations.

This study has been undertaken at a time of tremendous change in the port community in the Lower Mainland. The firm operating two of the four on-dock container terminals, Terminal Systems Inc., has recently been purchased from Overseas Orient (International) Ltd. by the Ontario Teachers Pension Fund as part of a $2.4 billion transaction which includes Deltaport, Vanterm and two terminals in the U.S. Fraser Surrey Docks is currently for sale. The three Lower Mainland port authorities have agreed to merge into a single organization. These developments may lead to delays in investment decisions in the short term. However virtually all of the firms interviewed in the course of our research expressed confidence in the opportunities for growing their businesses, and many are currently working on plans for expansion. If the challenges identified in this report can be dealt with, the industry is poised to take advantage of these opportunities.
1. INTRODUCTION

IBI Group in association with Hatch Mott MacDonald was engaged by the British Columbia Ministry of Transportation to undertake an analysis of opportunities to increase effectiveness and efficiency in handling trade goods into and out of British Columbia through the development of Inland Container Terminals. This project includes a baseline analysis of inland container terminals, review of best practices and key success factors for inland container terminals, identification of current container flows and a financial analysis including identification of major cost factors in the establishment and operation of an inland container terminal. The results of this research were used to assess the need and viability of inland container terminals on both Southern and Northern corridors connecting the Lower Mainland and Prince Rupert BC ports to inland markets.

This research was funded by the British Columbia Ministry of Transportation and British Columbia Ministry of Economic Development. It was conducted under the guidance of a Steering Committee which included representatives of:

- BC Ministry of Transportation
- CN Rail
- CP Rail
- Western Economic Diversification Canada
- Fraser River Port Authority
- Prince Rupert Port Authority
- BC Ministry of Economic Development
- Transport Canada
- Vancouver Port Authority

The consulting team would like to acknowledge the contribution of the Steering Committee to this project. They provided valuable advice and guidance.

The baseline analysis in Section 2 of this report includes a literature review and synthesis of findings on the definition and categorization of inland ports; identification of four business models to guide the research; and a survey of selected Inland Container Terminals to identify success factors and best practices in their development and operations. The impact of these success factors (or their lack) is illustrated through an examination of Inland Container Terminal successes and failures.
Section 3 outlines the dynamics of current container flows through the Lower Mainland ports including identification of major containerized import and export cargos and the logistics of empty container flows.

Section 4 examines the applicability of the four business models identified in the baseline analysis to the current structure of container operations in BC. This section identifies potential demand for the major components of container flows – imports, exports and empty containers – and highlights particular success factors which may be of particular significance for an Inland Container Terminal to accommodate each of them.

Section 5 examines the potential impact of an Inland Container Terminal on the efficiency of other components of the system – trucking, rail and on-dock terminals.

Section 6 analyzes the viability of an Inland Container Terminal on the Southern and Northern Corridors.

Section 7 summarizes the conclusions and recommendations from the research.
2. BASELINE ANALYSIS OF INLAND CONTAINER TERMINALS

2.1 Inland Container Terminals

2.1.1 INLAND CONTAINER TERMINALS

The universe of Inland Container Terminals encompasses an array of facilities of varying sizes, functions and locations. The objective of this project – the identification and assessment of potential Inland Container Terminal business models applicable to the economy, geography and infrastructure of British Columbia – has been undertaken through a process of discarding models which for one reason or other are not applicable in the BC situation. The process has been guided by a high level analysis of key success factors which apply across the range of examples surveyed in the course of the study.

In the course of this research we found three major applications for Inland Container Terminals among existing and planned examples:

1. To accommodate traffic growth on a limited port land footprint. The scarcity of port lands or the high cost of developing new port lands encourages more intensive use of existing facilities through the transfer of non-essential functions to inland facilities. The additional logistics costs of shifting activities such as container stuffing/destuffing, storage, and repair offsite may be compensated by the reduction in capital required to expand on-dock terminal capacity.

   This application was explicitly identified in the study terms of reference as the focus of this research. The BC Ports Strategy identified “the shifting of cargo and transport assembly functions inland away from congested and costly port lands” as a strategy for increasing system efficiency. This recommendation sparked interest in a number of communities in the potential for establishment of an Inland Container Terminal in their area. The results of this study are intended to assist communities and governments in assessing the potential feasibility and effectiveness of these projects.

2. To influence mode choice for port-related traffic. Inland Container Terminals may be established to provide modal options to trucking in order to reduce air emissions and traffic congestion.

   This application is being implemented or planned in areas facing severe environmental and/or community pressures over emissions or traffic congestion due to port-related activity. The impact on efficiency for these projects is often a secondary concern and increased costs may be absorbed to mitigate the negative effects of port-related activity. Development of an Inland Container Terminal in British Columbia might result in secondary benefits from reduced truck traffic.
3. To enable ports to access market areas which are outside their existing catchment areas. In some cases ports will subsidize transportation costs associated with Inland Container Terminals in order to attract more business.

The best known North American example of this application is the Virginia Inland Port operated by the Virginia Port Authority. This terminal was developed in 1989 on a site 220 miles northwest of the Port of Virginia to capture additional traffic from shippers previously using other ports. This application was not analyzed in this study because the BC ports already handle essentially all of the containerized cargo movements within the provincial catchment area so there is little potential for capture of new business to offset the costs of an Inland Container Terminal.

2.1.2 LITERATURE REVIEW

A number of existing papers and studies on Inland Container Ports were reviewed for this study. The large number of recent studies testifies to the keen interest in the topic across North America, Europe and Australia. Information from the following studies was judged most pertinent for this analysis:

(a) The Identification and Classification of Inland Ports, Sara Jean Leitner and Robert Harrison, Center for Transportation Research, The University of Texas at Austin, 2001.

This study was sponsored by the Texas Department of Transportation and included a literature review, a detailed trade analysis, descriptions of existing inland ports in both the United States and Europe, the development of a message to characterize and identify inland ports in Texas, and measurement of the trade and transportation impacts.

The authors developed a definition of an Inland port as “a site located away from traditional land, air, and coastal borders containing a set of transportation assets (normally multimodal) and with the ability to allow international trade to be processed and altered by value-added services at the site as goods move through the supply chain.”

Four categories of inland ports were defined:

1. Inland Waterway Port: These ports are not a new concept in international and domestic freight movement. This class is listed by virtue of its inland location and volume of goods transported.

2. Air Cargo Port: Air cargo ports exist in conjunction with passenger facilities but are becoming more common as dedicated cargo ports.

3. Maritime Feeder Inland Port: The concept behind this class of inland port is to provide a deconsolidation point for cargo shipped to a congested maritime port.
4. Trade and Transportation Center Inland Port: This general class can be looked at as a location where border processing of trade is shifted inland and multiple modes of transportation are available in combination with value-added services.

Four key success factors were suggested:

1. Sufficient demand for intermodal freight transportation
2. Local supply of competitive motor carrier service
3. Practical basis for successful community relationships
4. Adequate public/private-sector capital to fund development

(b) Organisation of Swedish Dry Port Terminals, Violeta Roso, Johan Woxenius, Göran Olandersson Division of Logistics and Transportation, Chalmers University of Technology, Göteborg 2006.

This study included a review of literature, a survey of existing intermodal (“dry port”) facilities in Sweden, and analysis of the organisational forms of the dry ports and the roles of the actors involved in the implementation process.

The study used the definition of a “dry port” (or inland container terminal) as follows:

“A Dry Port is an inland intermodal terminal directly connected to a seaport, with high capacity traffic modes, where customers can leave/collect their goods in intermodal loading units, as if directly to the seaport.”

In addition to transhipment the authors suggest that additional services such as “storage, consolidation, depot-storage of empty containers, maintenance and repair for containers, customs clearance, etc. should be available at full-service dry ports. The quality of access to a dry port and the quality of the road/rail/waterway interface determines the quality of terminal performance therefore it is necessary to have scheduled, reliable, transport by high capacity means to and from the seaport. Thus, dry ports are used much more consciously than conventional inland terminals with the aim to improve the situation caused by increased container flows, focus on security and control by use of information and communication systems.”

In this study dry ports are classified by their distance from the seaport as follows:

1. Distant dry ports: The main reason for implementing it is simply that the distance and the size of the flow make rail or barge viable from a strict cost perspective. Compared to conventional rail shuttles to and from ports, the difference is mainly referred to the functions offered at the distant dry port and the moved interface towards shippers. The more structured approach increases the competitiveness of rail against road. Benefits from distant dry ports come also due to the modal shift from road to rail, resulting in reduced congestion at the seaport gates and its surroundings.
2. Mid-range dry ports: A mid-range dry port is situated within a distance from the port generally covered by road transport. The midrange dry port here serves as a consolidation point for different rail services, implying that administration and technical equipment specific for sea transport, for example x-ray scanners needed for security and customs inspections, are just needed in one terminal. The high frequency achieved by consolidating flows together with the relatively short distance facilitates loading of containers for one container vessel in dedicated trains. Hence the dry port can serve as a buffer relieving the seaport’s stacking areas. If this is a severe constraint, shippers with comparable distance to the seaport and the dry port can then be directed to the dry port if it is made cost neutral to them.

3. Close dry ports: With ever growing containerised maritime transport, the main problems seaports are facing today are lack of space or inappropriate inland access. To meet the demand, seaports can increase their terminal capacity by establishing a close dry port in their immediate hinterland or at the rim of the seaport city. With increased terminal capacity comes the ability for increased productivity, since bigger container ships may call the port. The close dry port consolidates road transport to and from shippers outside the city area offering a rail shuttle service to the port relieving the city streets and the port gates.

The study adopts the following as key factors in developing a Business case for a dry port:

1. The initial volumes of goods
2. Estimated volumes for a ten year horizon
3. The type of facilities that customers will require
4. Traffic flows between centres of production and consumption and the ports
5. Modes of transport available and network capacities
6. Transport infrastructure in the vicinity of the site
7. Existing auxiliary transport related services in the vicinity of the site
8. Possible reduction in tonne-km by road transport with the introduction of the dry port
9. The actual functions of the dry port, such as road haulage, stuffed and empty container storage, shunting, customs clearance, etc.
10. Scope for future site expansion

The paper profiles the existing intermodal transportation network in Sweden and analyzes a number of case studies to identify successful organizational models.
This study provides a high level assessment of the role which Inland Container Terminals could play within the context of Greater Vancouver's container transportation network, identifies the nature of Inland Container Terminal opportunities and the benefits which may be achieved.

For purposes of this study Inland Container Terminals are defined as “all of those facilities which, now or in the future, are involved with import and export containers originating from or destined to the deep-sea "transit" terminals.”

Four major categories (“business models”) are identified:

1. Existing container industry expansion
2. Inland export consolidation centre
3. Import distribution centre
4. Intermodal management and transfer centre

The “existing container industry” pattern has off-dock container terminals providing storage and servicing of empty containers, and (in general) separate facilities specializing in transloading of inbound import or outbound export containers located within the Lower Mainland.

The key success factors which are identified for each type include target market, land area, access, location and participation.

2.1.3 SYNTHESIS OF LITERATURE ON CLASSIFICATION AND SUCCESS FACTORS FOR INLAND CONTAINER TERMINALS

The studies referenced above suggest three methods for classifying Inland Container Ports:

1. By modal orientation (marine, air, rail)
2. By distance from port (distant, midrange and short)
3. By principal traffic (expansion of existing system, exports, imports)

Potential rail-truck intermodal options have been chosen as the primary focus of this study. In British Columbia, the feasibility of other modal options is limited by geography and by existing traffic levels. Inland marine options are limited by the scarcity of navigable waterways. Options are essentially limited to the navigable portion of the Fraser River within the Lower Mainland. Shortsea shipping options within this region are dealt with in the detailed analysis of the Southern Corridor.
The potential for development of an Inland Container Port incorporating air cargo is limited by the small volume of traffic, the limited capacity of existing air services, and the lack of integration with marine container services. The largest airport in British Columbia, Vancouver International Airport, handled 222,600 tonnes of cargo in 2005. The cargo is not containerized and almost all is carried as belly cargo on passenger flights. Prince George Airport Authority is pursuing opportunities for potential diversion of TransPacific air cargo from Anchorage but their project was judged to be insufficiently far advanced to be included as a high potential application for an Inland Container Terminal in this study.

Of the distance-based categories, only the mid-range or short “dry port” models are applicable. The distant dry port model applies to locations where the distance from port is such that rail transportation has an inherent advantage over trucking. In the B.C. context, there may be no location within which intraprovincial rail transportation for containers has a cost advantage over trucking even if intermodal facilities were available.

The principal traffic categories appear useful in terms of analyzing the specific challenges facing the intermodal transportation system in BC. By virtue of the commodity mix of traffic and the geographical distribution of economic activity in the province, we can establish the probable linkages between the commodity and distance categories:

1. Expansion of the existing container system corresponds to the short distance category proposed in the Swedish study; and potentially to the inland port (if shortsea shipping becomes viable within the Lower Mainland) or maritime feeder categories proposed in the Texas study.

2. Inland export consolidation may correspond either to the short distance or medium-range categories. Since a significant volume of major containerized export commodities originate in the interior it is not unreasonable to believe that export consolidation may be feasible farther from the port terminals.

3. Import distribution centres are typically located close to major population centres. The Lower Mainland is the only major population centre in BC and is therefore the most probable location for this activity.

The Texas and Novacorp studies each propose an additional category which incorporates a broader range of integrated functions at a single site.

### 2.2 Business Models for Analysis

The following four basic categories of Inland Container Terminals have been selected to guide the research for this study.

1. Import Distribution centre-oriented – As discussed, the Lower Mainland is the most probable location for this activity due to the size of the local market, but the prospects for growth in transloading of consumer goods to domestic containers destined for markets in Eastern Canada or the U.S. will also be a factor.
2. Export Transload-oriented – Current export transload operations in BC are carried out in the Lower Mainland. Products are shipped from the originating facility by truck or rail to the Lower Mainland, warehoused and/or transloaded directly into marine containers and drayed to the deep sea terminals.

An Inland Container Terminal of this type could be located closer to the source of the major containerized export commodities (in B.C., forest products). Westbound empty containers could be unloaded at an inland point and trucked to originating facilities for loading and return to the Inland Container Terminal, where they would be shipped by rail to the deep sea terminals. Alternatively an export transload facility could be located onsite at the Inland Container Terminal.

3. Empty container terminal – This would be an extension of existing off-dock operations (including container storage, cleaning, repair and reefer testing) with functional rail access. Access to shortsea services may also be an asset. A facility of this type could alleviate congestion at the deep sea terminals by providing a location to unload and store empty containers arriving by rail as well as drayed containers.

4. Logistics park with integrated operations encompassing both import and export functions along with container storage. This is a relatively new concept in North America, though it has a longer history in Europe. The prime examples of this concept are the logistics parks associated with major Burlington Northern Santa Fe (BNSF) intermodal facilities at Alliance, Texas and Chicago. These are major industrial logistics parks which integrate direct rail, truck, intermodal and transload with distribution and warehousing in one location.

2.3 Success Factors and Best Practices for Inland Container Terminals

2.3.1 BEST PRACTICES AND KEY SUCCESS FACTORS

From a review of the literature and analysis of the case studies highlighted below, the key success factors for inland container terminals can be summarized as follows:

1. Near the centre of production/population for a catchment area which can generate sufficient demand to ensure terminal viability. Dependence on a single customer or shipping line can be a major risk factor.

2. Availability of suitable land for initial construction and expansion. This requires the adoption of appropriate land use policies by the responsible authorities.

3. Good mainline rail connections and competitive rail service. Dependence on a single rail line and/or rail service provider can be a significant risk to terminal viability.

4. Direct connection to a major highway network

5. A phased development approach which can limit initial capital requirements.
2.3.2 SURVEY OF INLAND CONTAINER TERMINALS

(1) Coatbridge Freightliner Terminal, Coatbridge, Scotland (10 miles east of Glasgow)

This facility was one of the second generation of Freightliner terminals opened by British Rail (the Crown corporation responsible for the British rail system prior to privatization) in the 1970s as part of the expansion of the Freightliner intermodal network. The Freightliner container rail operation was sold to its management in 1996 and is now owned by investment banks 3i and Electra.

Coatbridge was established in 1976 on the site of an old coal yard which already had rail access. It was subsequently expanded, with an adjacent Containerbase facility, and during the early 1990s became the sole Freightliner terminal in Scotland. It is dedicated to the deep sea market and handles predominantly spirits, paper, electronics, foodstuffs, and retail goods.

The nearest deep sea port is Seaforth (Liverpool) which is around 200 miles away. The terminal also connects with the Southampton, Thamesport, Tilbury and Felixstowe container ports. It is located close to the economic centre of gravity of Scotland (population and production). It is close to major highways but road access is poor, along a two lane urban street through an adjacent residential area.

Throughput in 2005 was 88,648 TEUs / 61,629 containers representing around 3 million tones of cargo. Throughput peaked at 113,000 containers in 2000 but traffic was severely affected by rail route disruption caused by a major passenger train crash at Hatfield. Throughput dropped to 43,000 containers in 2002. Most of this business has been lost to competing shortsea ports with ship feeder services to Antwerp and Rotterdam. Throughput in 2005 consisted of 24% loaded import containers, 50% loaded export containers, 24% empty import containers and 1% empty export containers.

Terminal lift equipment includes 6 rail mounted gantry cranes and one reachstacker. Import and export transloading, empty container storage and container repair services are offered onsite. Freightliner also operates a fleet of 14 tractors and 22 trailers for road transport. Bonded warehousing is offered at the adjacent 16 acre Containerbase facility which is linked to the terminal by a private road.

The Containerbase’s major customer (and owner) was P&O Nedlloyd, which has been bought by Maersk. Maersk prefers to use shortsea feeder service from Scotland and the Containerbase may be closed. The land may be developed for housing.

Freightliner identifies the following key success factors for an inland container terminal:

(i) Good mainline rail connections

(ii) Proximity to motorway
(iii) Land for expansion

(iv) Distant from residential areas

(v) Near the centre of production/population for catchment area

(vi) Ideally next to port, as long as this does not compromise (v).

(2) ABP Connect, Hams Hall (Birmingham)

This terminal was developed by Powergen in 1997 on a brownfield site previously used for power generation. Powergen is one of the companies which took over responsibility for electricity generation in the UK following privatization of the Central Electricity Generation Board by the British government. The terminal was part of a larger development of the full 430 acre site which also included distribution companies and an automobile engine plant. ABP Connect holds a 10 year lease on the property. ABP Connect is a subsidiary of Associated British Ports which was created in 2001 to provide value-added logistics services. Associated British Ports owns and operates 21 ports all around the UK and handles approximately a quarter of the country’s seaborne trade. ABP Connect took over the Hams Hall terminal from the previous operator Parsec Europe in 2002.

Annual throughput at this facility is currently 130,000 TEU’s or 81,500 lifts. Throughput has grown rapidly:

Hams Hall Terminal Annual Throughput (Lifts)

2002 – 17.5k
2003 – 42.5k
2004 – 69.5k
2005 – 81.5k

The terminal handles bulk steels, scrap, white goods and fast moving consumer goods.

Traffic mix is 52% loaded import, 20% loaded export, and 28% empty containers.

The nearest deep sea port is 130 miles away. Hams Hall is an 'open access' terminal and all four of the main national rail service providers run trains there. Freightliner have their own terminal in the centre of Birmingham for their deep sea business, but it has capacity and road access problems so Freightliner runs trains into Hams Hall 3 times a day. In total the terminal has 6 daily train services including linkages to the ports of Felixstowe, Southampton and Tilbury, and the Channel tunnel.

The terminal has a total of 28 acres of operational area, with 4 X 500 meter working sidings and 2 X 750 meter reception sidings. Lifting equipment consists of 6 Kalmar
reachstackers. ABP has invested 3.5 million pounds in Hams Hall over the last 4 years; 1.2 million of that was covered by a Freight Facilities Grant from the Strategic Rail Authority.

For success factors, ABP indicated that controlling initial capital costs is important. They recommend that terminal operators be directly involved in the terminal design process from the start, to avoid “gold-plating” of the terminal design. ABP also believe strongly in the phased development approach, provided the initial design doesn't preclude phased expansion. They started with just two rail sidings and two reachstackers, and as new business has been identifies they have added new sidings, pavement and cranes.

(3) Port of Oakland Joint Intermodal Terminal and California Inter-Regional Rail Intermodal System (CIRIS) Project

The Port of Oakland is the third largest container port on the West Coast of North America, after Los Angeles and Long Beach, handling 2.3 million TEU’s in 2005. In the past Oakland was primarily an export port for containerized products; rapid growth in imports over the last ten years has brought loaded export and import container shipments into balance.

Exhibit 1

One of the strategies to accommodate this growth was construction of a near-dock rail facility 1.3 miles from the port, the Joint Intermodal Terminal. This facility was completed in 2002, to provide off-dock intermodal facilities for Port, railway and third party customers. Previously, a 14 mile dray to Burlington Northern Santa Fe Railway's (BNSF's) Richmond intermodal yard was required. Pressure to reduce local truck impacts for drayage and air quality were also factors in generating the project. Site assembly was facilitated by partial reuse of a former Naval supply base.
on the site. The realignment of the I-880 freeway following a 1989 earthquake provided an opportunity to construct grade separations and direct access ramps to the yard. The initial capital cost was $38 million of which $22 million was provided by the U.S. government through ISTEA and TEA-21 programs. The case for federal funds was bolstered by the expected reduction of 20,000 port-related truck trips from local roads. Although the JIT is BNSF/Port operated, trackage rights were secured with Union Pacific (UP) to access the facility. UP's own yard is adjacent to the JIT.

The facility has a total area of 85 acres. Throughput in 2005 was approximately 275,000 lifts or 350,000 TEU's. There are 60 employees. The traffic mix is 56% loaded import containers, 18% loaded exports, 4% domestic intermodal and 19% empty containers. Users warrant with the Port and Railway that no more than 5% of total movements into and out of the terminal in any year will be for domestic cargo movements.

The terminal has 13,300 feet of loading track (410-40 foot box capacity). Maximum train length is 8000 feet. Lifting equipment includes 2 rail mounted gantry cranes and 5 mobile straddle carriers. Import and export transloading is performed adjacent to the terminal. The Port has plans to further expand the JIT as part of an Outer Harbour Terminals Project.

Oakland is also seeking to expand the use of short haul rail services through its CIRIS (California Inter-Regional Rail Intermodal System) project. The location is to be finalized, but is likely to be Stockton or Lathrop, California. This project is a response to the growth in import shipments, highway congestion on key corridors from the Bay Area, and an increasing concentration of regional distribution centres in the Central Valley. Distribution centres are being constructed farther inland because site development costs are less than in the bay area, and they can be strategically located on the distribution network for retail markets. The Stockton area has good rail connections to both BNSF and UP.

CIRIS is not currently a functioning inland container terminal, but a concept being developed to provide off dock intermodal capacity for the Port of Oakland. Currently 24% of Oakland’s maritime containers move by rail through the off-dock facilities. With a port throughput of up to 6 million TEUs expected in 20 years, and Bay shore land at a premium, scope for expanding intermodal rail terminal capacity locally is limited. Intermodal rail capacity is limited in current facilities to 640,000 lifts annually. Without more rail capacity, Port throughput could be constrained at 3 million TEUs1. The CIRIS project involves the development of an inland container facility in the Stockton area, fed by a shuttle train along the Altamont Pass corridor, a distance of approximately 75 miles by rail. Currently this corridor is not heavily utilized by transcontinental corridor standards, with only 12 trains daily typically, mostly from the Port.

The CIRIS concept has been modelled in a variety of capacity, container storage and handling configuration, but in broad terms would accommodate 560,000 TEUs and 1.6 million TEUs at off-dock rail facilities close to the Port.

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1 Osantowski, with JWD Consultants: MDAS Study, Port of Oakland, 2004
Currently the project is still at the pilot stage with shuttles proposed to an existing terminal at Sharp Army Depot south of Stockton on the UP main line on three days a week basis.

The corridor however does suffer from signalling and track capacity limitations, and is currently shared with the expanding Altamont Commuter Express rail operation (with 6 trains daily, to increase to eight in late 2006). Options to dedicate the line to freight-only traffic and relocate passenger service on a parallel rail right of way are being explored at present.

(4) Port of New York and New Jersey Brownfields Redevelopment

In 2004 the PANY&NJ and the New Jersey Economic Development Authority (EDA) launched the Portfields Redevelopment Project. Essentially a marketing and public awareness campaign, the project was undertaken because:

(i) The Port Authority was receiving calls from companies indicating that they needed to build facilities with 750,000 sq ft and more of space, but there was nothing available in the port

(ii) New warehouse and distribution projects were being built further down the NJ Turnpike and using former farmland (this did not match with the EDAs Smart Growth policies)

(iii) Warehousing, distribution and 3PLs (Third Party Logistics Providers) were locating in Pennsylvania where land and labour were cheaper

The Port Authority wanted to keep and attract companies to the port area, while the EDA wanted to keep and attract companies in the state.

The partners identified 17 brownfield sites for development based on the following criteria:

(i) Located in the port district
(ii) Easy access to major roadways
(iii) Remediation issues resolvable in the immediate future, not cost prohibitive
(iv) Target of 25+ continuous acres per site
(v) Adjacent to essential utilities
(vi) Appropriate industrial zoning
(vii) Close to key transportation hubs
(viii) Limited ownership interest
(ix) Local government support
(x) Targeting ocean, rail or air freight related distribution and warehousing: ability to bring in significant jobs, investment and economic activity
The EDA is able to provide a number of financial incentives including low cost loans, training grants and support for applications for other government programs. The Port Authority cannot offer any financial incentives.

This is a three-year program (2004 – 2006) and the initial goal was to have 6 of the 17 sites shovel ready by the end of 2006. Almost all the sites are at this point. Some are fully developed, while others are in various stages of negotiations.

The partners are now working to identify an additional 15 sites that could be released on a public list. The initial 17 were the easy sites and the next round could present more challenges (higher levels of contamination or infrastructure restrictions such as limited turning radius for large trucks). The proposed sites will be given a cursory review (but not a formal assessment) by a real estate consultant and the NJ Department of Environmental Protection to ensure there are no glaring problems.

Given the success of the first phase, it is anticipated that the program will be extended by 1 to 2 years. At the end of that time, the partners may undertake a review to assess the success in terms of job creation and tax revenues (among other factors.)

(5) MCS Agriterminal, Moose Jaw, Saskatchewan

MCS Agriterminals Inc. opened an inland container terminal in Moose Jaw Saskatchewan in 2003. MCS Agriterminals is a subsidiary of MCS Containers, a container sales and servicing company in Montreal. The operation was designed to load specialty grains and cleaned seed into containers for shipment to overseas markets. The threshold for viability was estimated at 40,000 containers per year. Moose Jaw was chosen as the site for the terminal because of its strategic location in the heart of the province’s pulse crop operations, where half a million tons are produced annually. CN identified a track that could be used in the city. The City of Moose Jaw approved the land adjacent to the tracks for the new terminal, and financing was secured through the Royal Bank Financial Group\(^2\). The initial capital investment was $1 million. Few details are available about the terminal itself.

The operating plan was based on a schedule of deliveries three days a week for export to European markets through the Port of Montreal. The terminal had an agreement with the shipping line Hamburg Sud. The terminal suspended operations in 2005. In discussions with the operator, it appears that operations were hampered by an inability to obtain sufficient railcars from CN, and a reluctance to reposition empty containers for loading (though whether this was on the part of CN or the shipping line was not specified). The terminal was also unable to assemble sufficient volumes to meet CN’s minimum requirements for the service frequency they required. The operator is attempting to restart operations with a different (non-container) business model. There is concern that with the opening of its new grain reload centre in Edmonton, CN may not favour resumption of container service by MCS.

(6) Virginia Inland Port, Front Royal, Virginia

The port is one of four facilities owned by the Virginia Port Authority and operated by Virginia International Terminals (VIT). The VPA is funded through the revenues of the VIT and a state fuel surcharge. The state applies a $0.01/gallon charge on all gas sold. This is used for a variety of transportation projects and each year the VPA receives 4.2% of the fund.

The state began constructing the port in July 1987 and it was finished in March of 1989. The original estimate was $7.3 million but because of rocky soil conditions this increased by $6 million to a total of $13.3 million. There was no private financing in this project. There was no support from the municipality in term of infrastructure or provision of services.

VIT was constructed to enable the Port of Virginia to compete for traffic from the Ohio Valley which was previously shipped through other ports. The original goal was to capture 8% to 10% of the target market, which was estimated at a total of 190,000 containers per year.

The port handles only international cargo. In 2005 they handled 36,000 containers 40% loaded import, 14% loaded export and 47% empty containers. The port imports general merchandise, plastic pellets, paint and a small amount of exotic wood. Two of their big customers are Family Dollar (a warehouse general merchandise store) and Home Depot. Exports include logs & lumber, frozen poultry, and paint.

Shippers are charged $271/load regardless of size and $188 for empty repositioning. At this time there is also a 16% fuel surcharge.

The facility occupies a 40 acre site and has 17,820 feet of rail track. Norfolk Southern provides shuttle service to the Port of Virginia five days per week. Lifting equipment consists of 4 straddle carriers with 45 long ton capacities.

Warehousing is available on site. VIT has onsite U.S. Customs service and Foreign Trade Zone status.

The Virginia Port Authority credits the Virginia Inland Port with attracting 24 warehousing and distribution centers providing a total income of $599 million with over 6 million square feet of space, together with employee levels of over 7,000 workers.

2.3.3 SUCCESSFUL AND UNSUCCESSFUL CONTAINER TERMINALS

The contribution of each of the key success factors to the performance of the inland terminals surveyed for this study is analyzed below. Of the examples above, the Hams Hall, Oakland Joint Intermodal Terminal, NY/NJ Brownfields redevelopment and Virginia Inland Port appear to be performing well relative to the Coatbridge and MCS Agriterminals examples. The Oakland CIRIS project has not yet been implemented but the difficulties which are being experienced may be instructive as well.
1. Near the centre of production/population for a catchment area which can generate sufficient demand to ensure terminal viability. Dependence on a single customer or shipping line can be a major risk factor.

A cross-sectional analysis of the terminals noted above points out some interesting relationships. The successful terminals’ traffic is primarily import-related. Loaded import containers account for 52% of traffic at Hams Hall, and 56% of the Oakland JIT traffic. Traffic at the less successful terminals is primarily export-oriented, with loaded export containers accounting for 50% of traffic at Coatbridge and 100% at MCS Agriterminals. The explanation for this may be simply that for the markets in question (the UK, US and Canada), imports have been growing faster than exports and this is reflected in the traffic growth rates among the terminals.

The difficulties at Coatbridge and MCS Agriterminals also illustrate the risks of dependence on a single customer or shipping line. Coatbridge may lose the adjacent Containerbase facility as a result of Maersk’s change in strategy for the region. MCS Agriterminals apparently had an agreement with a single shipping line, and this may have been a factor in their difficulties in achieving viability.

2. Availability of suitable land for initial construction and expansion.

The availability of suitable land is critical for development of a successful Inland Container Terminal. Satisfying this requirement often requires substantial public sector involvement in both funding of projects and the adoption of appropriate policies to make development possible. This involvement is often motivated by the perception of substantial public benefits to be derived either from enhanced economic opportunity from improved transportation links, or from reductions in traffic congestion and environmental impacts from port operations.

With the exception of the MCS Agriterminals and Virginia Inland Port examples, all of the terminals surveyed were constructed on brownfield sites. Coatbridge was constructed on an old coal mining site with existing rail access. Hams Hall was constructed on a former coal-fired power generation site. The Oakland JIT was constructed on a former naval supply facility. The New York/New Jersey Brownfields redevelopment was designed specifically to reclaim brownfield sites adjacent to the Port for port-related uses. The redevelopment of brownfield sites can reduce initial capital costs for the terminal, particularly for rail access requirements.

In all of the successful examples, public authorities have played a key role. At the time it was constructed Freightliner was a subsidiary of state-owned British Rail. The Hams Hall terminal was constructed on a site acquired by Powergen through the privatization of the state-owned power generation facilities, and one third of expansion costs was financed through a grant program designed to shift traffic from trucks. The Oakland JIT was developed on an ex-naval supply base adjacent to the port; the land was essentially given to the port and U.S. federal contributions financed almost 60% of the capital cost of US$40 million. For the New York/New Jersey project, the port authority teamed up with the New Jersey Economic Development Authority which provided economic incentives and assistance in accessing additional resources from other government agencies.
2. Good mainline rail connections and competitive rail service. Dependence on a single rail line and/or rail service provider can be a significant risk to terminal viability.

Reliable and competitive rail service has been a factor favouring the successful terminals profiled. Hams Hall is an open access terminal with 6 daily rail services. All four of the major rail freight companies serve the terminal including Freightliner with 3 trains daily. The Oakland JIT is operated by BNSF, but the UP intermodal yard is located adjacent to the JIT and provides a competitive alternative.

Coatbridge is operated by Freightliner, one of a number of UK rail freight firms providing service over rail infrastructure operated by Railtrack (now Network Rail). As a rail service provider Freightliner had control over their own rail operations, but were vulnerable to their reliance on Railtrack for infrastructure. Disruption in rail service due to track problems (highlighted by the Hatfield accident) cut throughput by 60% between 2000 and 2002, and throughput has not recovered to the 2000 peak. According to the operator of MCS Agriterminals, problems in obtaining reliable rail service were a major factor limiting commercial success of that enterprise.

3. Direct connection to a major highway network

The successful examples have all benefited from direct connection to major highways. Hams Hall’s superior road access has resulted in Freightliner using the ABP terminal in preference to their own. The Oakland JIT has benefited from the construction of grade separations and direct off-ramps on the I-880 freeway, another example of public investment in port-related infrastructure.

Coatbridge’s effectiveness has been hampered by poor access to the highway network.

4. Phased development.

The operator of Hams Hall credited their ability to expand their facility in response to traffic growth as a key element in their success, as it allowed them to limit their initial capital costs and risk. This was unnecessary in the case of the JIT as the growth in imports and transfer of traffic from the BNSF intermodal yard previously used for this traffic provided a strong initial demand base. The ability to develop in a phased manner is related to land availability, in that an inventory of industrial land must be available adjacent to the terminal. In the case of Hams Hall, the terminal was part of a larger development project encompassing 430 acres. For a stand-alone project, the maintenance of appropriate zoning or the maintenance of an industrial land inventory by a public authority may be required.
3. DYNAMICS OF CARGO AND CONTAINER MOVEMENTS IN BRITISH COLUMBIA

3.1 Imports

Containerized import traffic has been the fastest growing business segment at the Port of Vancouver over the last 10 years. This experience is similar to that of the Port of Oakland, which is the only other major West Coast container port which has historically been a significant generator of export cargoes. The Port of Vancouver’s growth is illustrated below:

Exhibit 2 Port of Vancouver Terminal Traffic Laden Exports vs Imports (TEU's)
The composition of this cargo is very heterogeneous, but consumer goods predominate. A breakdown by category of containerized import cargo at the Port of Vancouver in 2005 is shown below:

![Port of Vancouver Containerized Imports by Category](image)

**Exhibit 3**

The proportion of import cargo consumed or transloaded locally has been declining, as illustrated in Exhibit 4, by the share of laden import containers picked up from the deep sea terminals by truck. As there are no rail destination points for intermodal traffic within the province outside the Lower Mainland, all of the rail shipments loaded at the terminals are destined outside BC, primarily to Toronto and Montreal. Therefore the competitiveness of the Lower Mainland ports for intermodal traffic has become more dependent on the capacity, efficiency and service levels provided by the Class 1 railways (CN and CP) serving the container terminals.
3.2 Exports

Containerized export cargo through the Port of Vancouver is dominated by forest products and specialty grains.
Lumber and woodpulp account for around 70% of total containerized forest product exports shipped via container through the Port of Vancouver. These commodities are the likeliest candidates to form a traffic base for inland loading of containers in BC. The second largest category, specialty grains, is not considered as a base for development of an Export-transload oriented Inland Container Terminal in British Columbia because virtually all of this traffic originates outside the province. The BC Ministry of Agriculture, Forestry and Fisheries reports total production of specialty crops (dry peas and mixed grains) of only 7400 tonnes in 2002.³

3 BC Ministry of Agriculture, Forests and Fisheries Fast Stats Agriculture and Food 2004 p5

### Exhibit 6

**Port of Vancouver Containerized Forest Product Exports 2005 (TEU's)**

<table>
<thead>
<tr>
<th>Category</th>
<th>TEU's</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumber</td>
<td>31%</td>
</tr>
<tr>
<td>Woodpulp</td>
<td>39%</td>
</tr>
<tr>
<td>Misc. Forest Products</td>
<td>4%</td>
</tr>
<tr>
<td>Misc. Paper / Paperboard</td>
<td>4%</td>
</tr>
<tr>
<td>New sprint</td>
<td>6%</td>
</tr>
<tr>
<td>Waste Paper</td>
<td>14%</td>
</tr>
<tr>
<td>Wood Panels</td>
<td>2%</td>
</tr>
</tbody>
</table>

### 3.3 Dynamics of Container Movements Through the Lower Mainland

The container transportation system in the Lower Mainland is a complex network of port terminals, import and export warehouses, served by two Class 1 railways and a large number of trucking companies providing local drayage and long haul services. There are four on-dock container terminals in the Lower Mainland. The terminals are geographically dispersed. Centerm and Vanterm, located in the Port of Vancouver's Inner Harbour, commenced operations in 1970 and 1976 respectively. Deltaport, located on Roberts Bank around 20 miles from the Inner Harbour, began operations in 1997. Fraser Surrey Docks, located on the Fraser River, handled relatively small numbers of containers prior to 2002.

The locations of the on-dock, off-dock and domestic intermodal container terminals are shown in Exhibit 7.
Total container throughput in the Lower Mainland was approximately 2 million TEU’s in 2004 distributed as shown below:

The growth in loaded import containers through the Lower Mainland has fundamentally changed the dynamics of container flows. Prior to 2002, the volume of loaded export containers exceeded the volume of loaded import containers. Significant quantities of empty containers were brought in to the Lower Mainland by vessel to accommodate loading requirements for export cargoes. The growth in import traffic has resulted in a dramatic increase in the number of empty containers available for reloading and reduced the requirement for supplying empties by vessel.
An efficient logistics system for intermodal transportation requires efficiency in the handling of empty containers as well as in the handling of cargo. An imbalance in the supply of empty containers arises from the differing activity centres for imports and exports. The major demand centres for imports are Toronto and Montreal, and most of this traffic is shipped directly (i.e. in marine containers) on CN and CPR intermodal trains. Most export traffic is transloaded in the Lower Mainland, so the empty containers are required in the Lower Mainland for stuffing.
The current flows through the Port of Vancouver are illustrated in the schematic below:

Exhibit 10 Port of Vancouver Marine Container Flows by Truck and Rail 2005
The trend in the shares of rail (long haul) and truck (local) in hauling loaded import containers from container terminals at the Port of Vancouver from 1996 to 2005 is illustrated below:

Exhibit 11

Port of Vancouver Terminal Statistics - Laden Imports Rail vs Truck (TEU's) 1996-2005

Exhibit 11

In order to provide a sufficient quantity of empty containers for stuffing of export cargoes in the Lower Mainland, the empty containers must be returned from Eastern Canada by rail and transferred to transload facilities in the Lower Mainland. Currently the only facilities available for the unloading of empty containers are the on-dock container terminals and the rail intermodal yards. The rail intermodal yards are not used for this purpose, as they primarily handle domestic intermodal cargo. The consequence is that empties returned by rail are unloaded at the on-dock terminals and then must be trucked from the terminal to transload facilities. In the current situation, with congestion affecting at least two of the major on-dock terminals at the Port of Vancouver, the requirement for handling these empty containers on the dock is a critical waste of resources.
The increase in empty containers returned by rail to the Port of Vancouver terminals is illustrated below. In 1996, only 12% of the volume of inbound laden containers shipped via rail returned empty by rail to the terminals. In 2005, 49% of the volume of inbound laden containers shipped by rail returned empty.

Exhibit 12

In December 2003 the Vancouver Port Authority announced a target of moving 50% of empty containers to off-dock storage. A draft protocol for achieving this target was developed, but following consultations formal implementation was deferred due to concerns expressed by port stakeholders. The use of off-dock facilities for storage of empty containers in the Lower Mainland has increased. Off-dock container facilities report increases in daily gate transactions ranging from 20% to 400% over the last 2 years.
The terminal operators have taken aggressive action to limit the return of empty containers to the dock by truck. This has resulted in a decline of 45% in the number of empties returned by truck between 2003 and 2005. The volume of empties returned by rail increased by 10% over the same period. The long term trend is illustrated in the following graph:

![Graph of Port of Vancouver Export Empty Containers by Rail and Truck (TEU's) 1996-2005](image)

Exhibit 13

The Lower Mainland container terminals have been experiencing operational problems related to terminal congestion which began with rail capacity problems in early 2004. Terminal congestion increased through 2004 as rail capacity was inadequate to handle unanticipated growth in import traffic. In early 2005 Terminal Systems Inc. declared force majeure at Deltaport due to inadequate rail service and ocean carriers were required to cut import volumes by 25% for 4 weeks beginning February 28, 2005 to enable the terminal to clear the backlog. Port operations were also disrupted by a trucking strike in the summer of 2005, as drivers withdrew service over issues including low rates, rising fuel costs, and delays and inefficiencies due to terminal congestion and operating policies.

The Terminal Systems Inc. terminals (Deltaport and Vanterm) have been experiencing severe congestion again this year, in part due to the transfer of former CP Ships container traffic from Fraser Surrey Docks. CP Ships was purchased by
Hapag Lloyd who have elected to incorporate the CP traffic in existing services calling at Vanterm and Deltaport. Terminal Systems Inc. has adopted stringent policies under their “Fluidity Plan” to limit the dwell time of containers on the docks, and to limit the throughput of the shipping lines to ensure that traffic remains within the rail loading capacity of the terminals. In April Terminal Systems Inc. announced that effective July 1, a penalty of $200 per TEU per day would be levied for each container unloaded in excess of a shipping line’s weekly allocation, and Terminal Systems Inc. reserves the right to refuse to unload containers in excess of rail allocations. In addition, empty containers are being accepted only for evacuation on the next vessel or immediate drayage to a local off-dock terminal. A penalty of $100 per TEU per day will be assessed on empty containers remaining on the dock which are identified for evacuation but not loaded to vessel. Terminal Systems Inc. issued revised throughput targets and storage charges on August 1, and their Fluidity Policy continues to evolve.

If the current cap on container throughput is maintained for an extended period, it could seriously impact the ability of the Lower Mainland to capture growth in the TransPacific container trade. Shipping lines are being forced to limit their throughput at Deltaport and Vanterm due to terminal constraints just as larger vessels are being introduced. Under these circumstances the shipping lines and their customers may elect to direct their growing traffic volumes to competing West Coast ports.

The impact of Terminal Systems Inc.’s congestion problems may be mitigated by increased capacity at Centerm, which has just completed a doubling of their terminal capacity from 360,000 TEU's to 783,000 TEU's. This would require some shipping line (or consortium) to shift their business from Terminal Systems Inc. Fraser Surrey Docks is currently underutilized, and can provide capacity for vessels which can be accommodated within the Fraser River's draft constraints.

Exporters have come to rely on the availability of low westbound ocean container rates for distribution of their products. This trade requires the availability of empty containers for loading. Under the current terminal constraints imposed by Terminal Systems Inc., the shipping lines have little incentive to make empty containers available for loading. The costs of trucking empties off the dock, off-dock storage, plus gate charges at both on and off-dock terminals is around $200 per container. With the low margins available for westbound export cargo, the shipping lines may find it more economical to evacuate empty containers by vessel rather than to solicit low margin export cargo. All of the shipping lines interviewed in the course of this research indicated that under Terminal Systems Inc.’s Fluidity Plan they are likely to evacuate as many empties as they can by vessel. In the long term, the growing imbalance between import and export container traffic is likely to increase the overall availability of empty containers; this may mitigate the impact of increased evacuation of empties.
3.4 Container Traffic Forecasts

Current Vancouver Port Authority forecasts call for an annual average growth rate for loaded imports of 9.6% between 2005 and 2011, with a growth rate of 4.8% for loaded exports. The forecasts reflect a continuation of trends over the last ten years, with a levelling off of growth in loaded export containers. The imbalance in the growth of imports and exports will result in rapid growth in the number of containers returning empty to Asia.

Exhibit 14

Port of Vancouver Container Trade Actual and Forecast (000 TEU’s)

In March 2006, WESTAC published demand forecasts for major Western Canadian import and export cargo flows. The forecasts were prepared following extensive consultations with major retailers and freight forwarders importing goods from overseas manufacturers, and with major Western Canadian shippers selling raw and semi-processed commodities to foreign buyers. The expected annual growth rates for major commodities within the Lower Mainland are shown below:
### Exhibit 15 Westac Forecast Growth Rates

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Westbound</th>
<th>Southbound</th>
<th>Eastbound</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers</td>
<td></td>
<td></td>
<td></td>
<td>10.2%</td>
</tr>
<tr>
<td>(Retail imports)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest Products</td>
<td>0.4%</td>
<td>3.4%</td>
<td>2.7%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>-3.6%</td>
<td>1.6%</td>
<td>-0.4%</td>
<td>-0.2%</td>
</tr>
<tr>
<td>Grains</td>
<td>2.5%</td>
<td>2.9%</td>
<td>1.1%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

Under this scenario, imports will be slightly higher than forecast by Vancouver Port Authority but export growth will be considerably less. The result would be a greater imbalance between imports and exports, and a more rapid increase in the quantity of empty containers exported from the Lower Mainland, under the assumption that the split between containerized and non-containerized shipments remains constant.
4. BUSINESS MODELS AND THEIR POTENTIAL APPLICATION IN BC

4.1 Import Distribution

There are numerous examples of inland container terminals, both existing and planned, designed primarily to expedite the shipment of import containers. Of the existing terminals surveyed in this study, the Virginia Inland Port and Hams Hall Terminal are examples. In some cases these have been developed to extend the market reach of a port into the traditional market areas of competing ports; this was the case with the Virginia Inland Port which was developed to enable Virginia Ports Authority to access traffic in the Ohio Valley which was formerly handled through other ports.

Potential or planned import-oriented inland container terminals include the Inland Rail Shuttle proposed to transport containers from the Ports of Los Angeles and Long Beach to the Inland Empire (San Bernardino and Riverside Counties, approximately 50 miles east of the Ports), and the CIRIS project planned to transfer containers from the Port of Oakland to the Central Valley (Stockton or Lathrop, around 50 miles.) Both of these projects are designed to serve existing concentrations of distribution centres, as increasing land prices close to the ports have driven logistics firms to establish facilities farther inland. This has increased the distance required for drayage from the port and raised public concern over both traffic congestion and air quality impacts.

The use of a rail shuttle presupposes a sufficient scale of operations to make the project feasible, and to offer a frequency of service which allows a level of service comparable to trucking. As is noted in the study on the CIRIS concept, it is noted that “Railroads offer favourable economics when their higher terminal and train-start costs can be spread over long distances. Obtaining favourable rail economics on … a short haul is inherently difficult.”

A map of the flows of loaded and empty containers to import warehouses from on-dock terminals, for the current system and for an inland rail shuttle, is illustrated in Exhibit 16. One of the key challenges in this model is the addition of the costs of an additional handling and transportation stage to the existing supply chain (illustrated in red in the illustration). The additional transportation cost may be offset to a degree by the shorter dray distance, but the additional handling charges typically represent a deadweight increase in cost.

The applicability of any sort of rail shuttle is questionable under current conditions because terminal throughput at the Terminal Systems Inc. terminals is constrained by their rail capacity. Dwell times for loaded import containers to be loaded to rail were reported to be three times as long as containers loaded to truck this spring at some terminals.

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Exhibit 16

Import Distribution - Current System

[Diagram showing import distribution process with Deepsea Terminal, Truck, Rail, and Destinations]
The potential for development of an import-oriented inland container terminal in the Lower Mainland is also constrained by the geographic dispersal of the existing Lower Mainland container facilities. Centerm and Vanterm are located in the Port of Vancouver’s Inner Harbour; Deltaport is located on Roberts Bank around 20 miles from the Inner Harbour; and Fraser Surrey Docks is located on the Fraser River. Existing import warehouses handling large volumes of containers are also dispersed, with significant facilities in Delta, Port Coquitlam, Pitt Meadows, and Surrey.

It appears that the current constraint on port throughput is the capacity of the TERMINAL SYSTEMS INC. terminals to load railcars i.e. their on-dock rail capacity. U.S. ports are addressing this problem through the construction of near-dock rail facilities such as the Joint Intermodal Terminal in Oakland and the ICTF in Long Beach. There is some controversy over this strategy. Local communities would prefer to see expansion of on-dock rail capacity which would reduce local truck traffic.

**Conclusions:** The most likely potential catchment area for an import-oriented transload center is the Lower Mainland. The critical factor for import demand is the size of the local market, and the Lower Mainland is the only major population centre in BC. The availability of land for initial construction and expansion could be a major challenge in the Lower Mainland as the availability of industrial land is limited and land prices are high. Developing a competitive short haul rail option is a major challenge in development of an import-oriented transload center.

### 4.2 Export Transload

The viability of an export transload-oriented Inland Container Terminal is less problematic than an import-oriented facility because it does not necessarily impose an additional handling and transportation stage in the supply chain. Empty and loaded container flows under the current system and with an Inland Container Terminal are shown below.
Exhibit 18

Export Transload - Current System

[Map showing current system for export transload]
Exhibit 19

Export Transload - Inland Container Terminal
In this case, where empty containers can be diverted for stuffing in the course of their return journey by rail to the Lower Mainland, there is no additional handling stage – just the location of the transloading activity is changed. This does have the potential to reduce congestion at the on-dock terminals since the empty containers would not have to be unloaded at the terminal.

CN has announced construction of a transloading facility in Edmonton with the capacity to load up to 20,000 containers or around 15% of current containerized specialty grain shipments through the Lower Mainland. This represents a change from the current system which has centralized grain transload activities in the Lower Mainland. The facility will offer transloading service from railcars or trucks, inland grain stuffing for identity preservation, and container cleaning and liner insertion services. It will have twenty railcar spots; an on-site container lift to minimize carrier delays and two tilt tables with integrated scales to facilitate loading 20-foot and 40-foot containers; a dual loading platform capable of accommodating 20-foot and 40-foot containers; a computerized loading system to achieve desired weights; and a fully computerized inventory management system. It is noted that the facility will provide daily service to the port of Vancouver by fall of 2006 and to Prince Rupert in 2007.

CN has indicated to communities and shippers in the Prince George area that they are also contemplating possible development of a transload facility for forest products in Prince George. According to CN, the target market for the facility would be westbound containerized traffic destined via the port of Prince Rupert.

The distribution of production facilities for the major BC-originated containerized export commodities, lumber and pulp, is shown in Exhibits 20 – 23. Not surprisingly, in the interior these facilities are clustered along the major road and rail transportation corridors.
Lumber capacity is clustered in the area of the Northern Corridor centred in Prince George, and in the Thompson Okanagan Region on the Southern Corridor.

Exhibit 21
There are 12 pulp mills located in the interior of BC, including 3 in Prince George and 2 in Quesnel. Total capacity is estimated at 3.6 million tones. The interior pulp mill locations are shown in Exhibit 22:
Currently lumber and pulp are transloaded into containers in the Lower Mainland or shipped breakbulk. Breakbulk vessels call at the Lower Mainland ports and at a number of coastal ports and production facilities.

With mergers in the forest industry, the BC forestry industry has become much more concentrated. Two companies, Canfor and West Fraser, now account for 37% of provincial timber processing capacity, and around 46% of interior capacity.

Forestry companies have experimented with inland loading of products into marine containers but have found no economic advantage in doing so because the additional fees charged by the shipping lines offset the reduction in transload costs.

There are differing supply chain models among the forestry firms interviewed for this study. One model is essentially a “produce to order” system where production is scheduled to meet specific order and vessel deliveries; the other is based on scheduled production at mills with product “shipped to order” from inventory stored in the Lower Mainland. The first model is more vulnerable to disruption because a delay in any stage of the supply chain – transportation of product from the mill to the Lower Mainland, transloading, and delivery to the terminal – can result in missed deliveries. The second model is less vulnerable to disruption but requires greater investment in inventory and warehousing costs.

The economics of inland transloading depend on the relative costs of containerized vs. rail or truck shipping to the Lower Mainland. Marine containers have a maximum payload of around 26 tonnes. Rail cars can typically be loaded to 80 or 90 tonnes, and Super B-train trucks to around 40 tonnes. Containers would have to be moved on single trailer trucks, as the transportation of two fully loaded 40 foot containers would exceed both the allowable weight and vehicle length.

Many of the stakeholders interviewed expressed scepticism over the ability of an inland transload facility to coordinate shipments to cope with the terminal delivery windows (Earliest Receiving Dates or ERD’s). In many cases delivery windows can be as short as two days due to vessel delays and U.S. Customs Freight Remaining on Board reporting requirements which require submission of documentation 24 hours before vessel sailing. It was pointed out by several stakeholders that the transit time from an inland facility in Edmonton could exceed the terminal delivery window, and that this would make it very difficult to adjust to changes in terminal ERD’s schedules due to vessel delays or other unanticipated events.

**Export Transloading on the Northern Corridor**

As part of the research conducted for this study we interviewed stakeholders in Prince George, Terrace and Prince Rupert. All expressed enthusiasm over the economic development opportunities which may flow from the construction of the new container terminal at the Port of Prince Rupert. These opportunities are seen to include the development of new products which can build on the local resource base – aluminium, forest products, seafood – and take advantage of enhanced logistics opportunities to develop new markets. Stakeholders also indicated to take advantage of these opportunities, the ability to load export commodities into containers will be required in the North.
CN’s indication that they are planning an export transload facility for forest products in Prince George is seen as good news for the region. However, stakeholders in the Terrace area do not believe they will be well served if they have to truck local products to Prince George for loading into containers which will then be shipped back to Prince Rupert by rail. They believe that the ability to pick up and deliver containers by truck at the Prince Rupert container terminal will be critical. According to Prince Rupert Port Authority, the first phase of the container terminal will not have extensive infrastructure to support truck movements (truck gates, etc.) but it will be accessible by truck and available to support local industry logistics. The second phase of terminal construction may see installation of additional infrastructure to support truck operations.

Conclusions: The major potential catchment areas in B.C. for containerized exports are areas with major forest products facilities. The other major containerized export category, specialty grains, would not provide a local traffic base for an Inland Container Terminal because the production of these commodities in BC is very limited.

The most promising catchment areas for lumber are the major producing areas centred around Prince George in the North and Kamloops in the South. For pulp, the major catchment area is in the North centred around Prince George-Quesnel, though there is significant capacity at Kamloops and in the Northeast.

The availability of competitive and reliable rail service is a major issue affecting potential locations for an export-oriented Inland Container Terminal. The area served by both major railways are limited to the region along the Fraser Canyon from Kamloops west. The entry of CN into the transloading sector poses a major risk to any third party wishing to develop an inland container terminal on CN’s northern corridors.

The longer transit time to port from an Inland Container Terminal located in the Interior may make it more difficult to cope with changes to terminals’ Earliest Receiving dates due to vessel delays or other unanticipated events.

4.3 Empty Container Terminal

The need for a solution to congestion caused by handling of containers at the on-dock terminals is widely recognized among the port community. Numerous parties interviewed in the course of the research for this study indicated they are actively planning to develop a facility for handling empty containers in the Lower Mainland. At a minimum, it appears that additional off-dock storage capacity is required. A broader solution requires a facility capable of receiving empty containers by rail to avoid the necessity of unloading them at the on-dock terminals.

The demand for an empty container terminal arises from the imbalance between the loaded import containers picked up at the terminals by truck, and the empty containers required to accommodate the export loads from local export transload facilities. This is illustrated in Exhibit 24:
The current container “gap” is approximately 140,000 TEU’s. This is the volume of rail-delivered empty containers which could potentially be diverted from the on-dock terminals by a rail-served empty container terminal. On the assumption that 80% of this volume consists of 40 foot containers, this amounts to around 80,000 containers. The actual figure would be higher, due to the need to match loads with suitable containers (20 foot, 40 foot, high cube, etc.).

Empty and loaded container flows under the current system and with an Inland Container Terminal are shown in Exhibits 25 and 26.
Exhibit 25

Empty Container Terminal - Current System (Off-Dock Storage)
Exhibit 26
Stakeholders interviewed in the course of this research emphasized two major challenges in developing an enhanced (rail-served) empty container terminal in the Lower Mainland: rail service and the availability of land.

The railways require a service model which can maintain the efficiency of their operations. In our consultations with CN and CPR they indicated concern over the impact of Inland Container Terminals on two major factors affecting railway efficiency: fluidity and equipment balance.

Fluidity refers to the maintenance of the velocity of rail equipment, or the minimization of terminal dwell times. Both railways indicated that they are reluctant to “stop the trains” at an inland point because it reduces the efficiency of their overall operations. The ideal is operation of intermodal unit trains between the on-dock terminals and major destination/origin points in the U.S. or Eastern Canada.

Equipment balance refers to the avoidance of movement of empty equipment. The ideal is running of fully loaded containers both eastbound and westbound between the on-dock terminals and major destination/origin points in the U.S. and Eastern Canada. In practice this is unattainable on the basis of TransPacific container trade alone due to the imbalance between imports and exports in the U.S. and Eastern Canada. An Inland Container Terminal could potentially improve equipment balance by providing additional loaded containers for transfer to port terminals.

In order to minimize the impact of an inland container terminal on their operating efficiency, the railways’ preference would be for a large initial scale of operations as a condition of service for any such facility. The port community has heard an indication from CN that the magnitude of operations which would kindle their interest is “6000 feet in and 6000 feet out, 6 days a week”, preferably loaded containers. The level of capital investment required for development on this scale is a barrier to entry. Achieving this volume would also require coordination of transload activities to ensure that the volume requirements are met, preferably onsite or adjacent to the intermodal facility to minimize drayage costs.

The requirement for a large initial scale of operations exacerbates the challenge of finding sufficient suitable industrial land to accommodate the operation. The ideal location would have rail service from multiple providers, good highway connections, relatively close proximity to the on-dock terminals and existing import and export transload facilities and domestic intermodal yards, and supportive local government policies. This is a difficult combination to find in the Lower Mainland.

The introduction of an Inland Container Terminal could have other impacts on rail efficiency, which are discussed in more detail below.

**Conclusions:** The potential catchment area with highest potential for an Inland Container Terminal to handle empty containers is the Lower Mainland. The major function of an empty container terminal is to reduce handling requirements at the on-dock terminals while ensuring the availability of empty containers for loading of export shipments. Since the existing export transload facilities are located in the Lower Mainland, in the short term this is the logical location for construction of an Inland Container Terminal for handling empty containers. This location also allows...
exporters to respond quickly to schedule changes due to vessel delays, etc. which may shift or reduce the time available for delivering containers to the docks.

Under the current railway business models, maintaining the efficiency of intermodal operations with an Inland Container Terminal requires a large scale of operations. This would require a large traffic base, and would increase initial capital costs and land requirements.

The availability of land for initial construction and expansion of an empty container Inland Container Terminal is a major challenge in the Lower Mainland as the availability of industrial land is limited and land prices are high. The requirement for a minimum site area of 50 acres makes land availability a significant constraint.

4.4 Integrated Logistics Park

Integrated Logistics Parks are a relatively new phenomenon in North America. The most prominent example is the Alliance Texas business park. This is a 17,000 acre mixed-use master-planned business park near Fort Worth, Texas. It began in 1989 as a combined effort between the City of Fort Worth, the Federal Aviation Administration and Hillwood Properties for the construction of Fort Worth Airport. The Santa Fe Railway (now BNSF) opened a terminal for unloading automobiles. Alliance Texas expanded in 1994 to include an intermodal facility operated by the Burlington Northern Santa Fe Railway (BNSF). The BNSF facility has grown from handling 120,000 lifts in 1994 to 500,000 lifts this year. In November 2004 BNSF expanded its intermodal terminal by adding 327 acres of direct rail access.

The key features of an Integrated Logistics Park have been summarized in a recent study by HDR Engineering Inc.-HDR/HLB Decision Economics Inc. which estimated the economic benefits from a potential “Integrated Logistics Center” in Florida:

Typically, an ILC comprises, at a minimum, several warehouses and an intermodal terminal, where freight is conveyed from one mode of transportation to another (train-to-truck or truck-to-train, for instance). It often houses distribution, manufacturing and processing sites as well as repair buildings (to ensure efficient, uninterrupted operations spaced throughout the day). Depending on its location and the range of its activities, an ILC can also provide customs services.

This “all-in-one” concept aims at increasing reliability, efficiency/synergy and providing a way to speed up freight movement, handle more freight and reduce a wide array of costs. More precisely, an ILC will provide the following transport system effects to the firms: optimization of the logistics chain, optimization of truck utilization, optimization of warehouse utilization, optimization of labour force resources, as well as a decrease in logistics and transport costs, a decrease in personnel costs and an increase in the volume of freight transported. For instance, with direct rail access, shippers eliminate 100 percent of the costs on drayage, or the movement of freight from rail by truck to another location.
To be successful, an ILC should be administered by a single and neutral legal entity. The private public partnership is the most widespread and efficient organizational structure for an ILC, chiefly because the sheer size of the project requires both a great investment effort and the intervention of local authorities (ILCs often are part of local land use/transportation plans). The most successful ILC public private partnerships are characterized by detailed joint planning, a financial sharing of costs and assistance by the public agency in seeking permitting, rezoning, highway access and other necessary site-related needs and approvals.

Development of these facilities is complicated by the requirement for large amounts of land. The area of existing facilities (total and intermodal yards) in the U.S. is shown below:

### Existing Integrated Logistics Parks in the U.S.

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Date</th>
<th>Operator</th>
<th>Area (acres)</th>
<th>Area - IY (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AllianceTexas</td>
<td>Fort Worth, TX</td>
<td>1994</td>
<td>BNSF</td>
<td>11,600</td>
<td>750</td>
</tr>
<tr>
<td>Logistics Park Chicago</td>
<td>Elwood, IL</td>
<td>2002</td>
<td>BNSF</td>
<td>2,200</td>
<td>625</td>
</tr>
<tr>
<td>Global III</td>
<td>Rochelle, IL</td>
<td>2003</td>
<td>UPRR</td>
<td>388</td>
<td>700</td>
</tr>
<tr>
<td>Dallas Intermodal Terminal</td>
<td>Wilmer, TX</td>
<td>2005</td>
<td>UPRR</td>
<td>4,500 (planned)</td>
<td>360</td>
</tr>
<tr>
<td>Mesquite Intermodal Facility</td>
<td>Mesquite, TX</td>
<td>2005</td>
<td>UPRR</td>
<td>94</td>
<td>155</td>
</tr>
</tbody>
</table>

The lead role in these projects has generally been taken by real estate developers, and public-private partnerships have been critical in facilitating required approvals (zoning, environmental, etc.) and construction of public infrastructure.

**Conclusions:** In the Lower Mainland context, an Integrated Logistics Park could be thought of as an Inland Container Terminal with onsite facilities for import and export transloading and empty container storage and servicing. A facility of this type could have numerous advantages, including a scale of operations which could make short haul rail shuttles to the on-dock terminals feasible, co-location of import and export transload facilities and empty container storage to minimize drayage costs, and reduced traffic congestion and air emissions.

The major barriers to development of an integrated logistics park in the Lower Mainland include the lack of suitable parcels of industrial land, local community opposition to container transportation activity, and the difficulty in relocating activities from current facilities, many of which have only recently been constructed. As an example, Canfor developed a new international distribution centre on Fraserport’s Richmond property in 2005, with a commitment of shipments of 300 million board feet of lumber to the warehouse operator (Westran). The opportunities may be limited to capturing the growth in import and export transloading as the capacity of existing facilities is fully utilized. This would imply a phased site development with land available for expansion as traffic grows.

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5 HDR Engineering- HDR/HLB Decision Economics Development of an Integrated Logistics Center in Winter Haven, Florida CSX Real Property Inc.
5. SYSTEM IMPACTS OF INLAND CONTAINER TERMINALS

5.1 Key Cost Drivers for Inland Container Terminal Operations

The key cost drivers influencing the efficiency of container operations are trucking, rail and terminal costs. All of these are affected by the introduction of an Inland Container Terminal as an additional step in firms’ supply chains.

5.2 Impact on Trucking Efficiency

In our consultations with CN and CPR they indicated concern over the impact of Inland Container Terminals on two major factors affecting railway efficiency: fluidity and equipment balance.

Fluidity refers to the maintenance of the velocity of rail equipment, or the minimization of terminal dwell times. Both railways indicated that they are reluctant to “stop the trains” at an inland point because it reduces the efficiency of their overall operations. The ideal is operation of intermodal unit trains between the on-dock terminals and major destination/origin points in the U.S. or Eastern Canada.

Equipment balance refers to the avoidance of movement of empty equipment. The ideal is running of fully loaded containers both eastbound and westbound between the on-dock terminals and major destination/origin points in the U.S. and Eastern Canada. In practice this is unattainable on the basis of TransPacific container trade alone due to the imbalance between imports and exports in the U.S. and Eastern Canada.

These two factors are also critical to the efficiency of port drayage. Terminal congestion and the adoption of off-dock empty storage have already resulted in major impacts on both of these factors. In fact, the adoption of off-dock storage for empty containers can be considered as the introduction of an Inland Container Terminal to the drayage sector.

The traditional drayage trip pattern was based on a round trip anchored to one of the on-dock terminals. The introduction of off-dock storage introduces a “third leg” to truck trip patterns as trucks picking up empty containers from importers are required to proceed to an off-dock terminal to drop the empty, and then to the on-dock terminal to pick up another loaded container; the impact on export deliveries is similar. The change in trip patterns is illustrated on the following pages.
Exhibit 27

Drayage Trip Patterns - On-dock Storage of Empty Containers
Exhibit 28

Drayage Trip Patterns - Off-dock Storage of Empty Containers
This has negatively affected equipment balance in the drayage sector. Traditional drayage trip patterns provided equipment balance through repositioning of empty containers from the on-dock terminals; trucks would drop a loaded export and pick up an empty container on a single trip, or drop an empty container at the dock and pick up a loaded import container. With off-dock empty storage, drivers found themselves driving an empty “third leg” with no container to or from the off-dock container terminals.

Approximately 85% of drivers engaged in the Lower Mainland drayage sector are owner/operators. Owner/operators are compensated on a revenue sharing basis, nominally receiving 70% of total drayage rates set by the trucking companies. Rates are quoted on a round trip basis (i.e. importers and exporters are charged a single rate which includes transfer of containers on both loaded and empty trip legs between their location and the container terminals). Owner/operators are paid one half of the round trip rate for each single trip leg carrying a container. They are not compensated when transporting an empty chassis.

The impact of off-dock storage of empty containers was a factor in the strike by drayage drivers in 2005. The organization representing the owner/operators, the Vancouver Container Truck Association (VCTA), cited four major factors precipitating the withdrawal of services: continued competitive erosion of container rates; cost increases (particularly for fuel); introduction of 8 off-dock container terminals (“satellite terminals”); and lengthy waits at both on-dock and off-dock facilities (VCTA, August 2005).

The VCTA described the impact of the use of off-dock facilities as follows:

To increase the container storage capacity the container terminals established eight satellite terminals to store empty containers. The container shipper pays a round trip rate that pays the cost of the container being taken from the terminal to a destination, emptied and returned to the dock or vice versa. Owner operators are paid the container rate for the two parts of the container’s normal trip. This would mean the owner operator always travels with a container and with revenue (except when some make the first trip to a terminal at the start of the day). With the advent of satellite terminals, owner operators travel to or from such a terminal without a container and therefore receive no revenue to compensate for their time and the vehicle expenses. Satellite terminals have line-ups that are longer and slower than at regular terminals. This further erodes the owner operator’s ability to earn an adequate income.  

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The uncompensated empty trip has come to be known as the “third leg”. Due to the geographical separation of the container terminals, and the fact that each shipping line contracts with only one or two of the off-dock facilities for empty storage, the “third leg” may be longer than the revenue legs. An extreme example of this is shown in Exhibit 29. The loaded trip to the terminals is indicated by the blue line; the “third leg” to pick up an empty container by the purple. This represents the transfer of loaded export containers from a facility in North Vancouver to one of the Inner Harbour terminals, and picking up an empty at a facility in Delta (Delta Containers) to complete the round trip. The loaded trip to the terminals is indicated by the blue line; the “third leg” to pick up an empty container by the purple. The owner-operator’s compensation is based on the rate between North Vancouver and the Inner Harbour terminals. In this case the round trip mileage between the export warehouse and the Inner Harbour terminals is around 16 miles; the round trip distance between the Inner Harbour and the off-dock facility is around 36 miles.
Exhibit 29 Round Trip to Inner Harbour from North Vancouver via Delta
The fluidity of drayage operations is affected by a number of factors, including terminal delays, dispatch efficiency, and regional traffic congestion. While it is difficult to evaluate the impact of these factors in isolation, there is evidence that the fluidity of drayage operations has declined in the Lower Mainland. A comparison of the daily average number of one-way revenue trips per day for three drivers, from two different companies, for January 2003, 2004 and 2005 is shown below. The decline in the daily average number of one-way revenue trips ranges between 8% and 17%.

![Exhibit 30](image)

Exhibit 30

The expansion of off-dock storage of empty containers has had serious impacts on both the fluidity and equipment balance of the drayage sector. The impacts included a disruption in port operations for almost five weeks, and a substantial increase in drayage costs as a result of the settlement negotiated to end the dispute. The lesson to be drawn is that it is critical to evaluate the impact on all links in the supply chain in assessing the benefits of changes in the network, and to plan to accommodate needed changes throughout the network.

Conclusions: On-dock terminal congestion and changes in operating practices in the Lower Mainland container logistics system have resulted in reduced efficiency in container trucking. Fluidity has been affected by terminal delays and traffic congestion. Equipment balance has been negatively affected by the introduction of off-dock storage of empty containers, which is analogous to the introduction of an empty container terminal on the rail system. It may be possible for the railways to accommodate the additional requirements within their operating plan but it will require cooperation among all system participants.
5.3 Impact on Railway efficiency

In addition to the direct costs of handling containers at the Inland Terminal and moving the containers and railcars to the port, there will be collateral costs on the railway network. Railway operations are scheduled to achieve maximum efficiency. Railways plan their operations to achieve maximum utilization of the rail network by running long, heavily loaded trains. They strive for maximum efficiency of their locomotives by ensuring they are working at the maximum level, pulling the heaviest loads in revenue service for the highest percentage of time possible. They strive for maximum productivity of their railcars by ensuring cars are loaded all the time, with the highest revenue freight available, and moving as quickly as possible. They strive for maximum productivity of their labour force by ensuring employees maximize their output every shift.

Meeting these operating expectations and also meeting customer expectations requires a well designed, balanced, integrated operating plan. Repositioning locomotives or empty equipment, or running locomotives with trains that are at less than optimum length or weight, or repositioning train operating employees (deadheading), are all non productive activities that railways try to schedule out of their system. With these key performance targets, the railway system is planned to achieve balance of movements, maximum corridor density and asset utilization, and fluidity of operations. Delays mean not only unproductive use of assets and infrastructure, but also negatively impact the critical balance and schedule of a large integrated system. The brunt of a delay in a strategic location like the approach to a port, can be far reaching, and cost implications can be significant.

The introduction of an Inland Container Terminal at some point along the route, with a variable amount of railway activity, will create issues with the railways that need to be studied in detail to determine their ultimate effects.

As an example, in current operations railways frequently load empty containers in double stack configuration on top of heavily loaded containers. This is necessary in cases where two loaded containers would exceed the maximum weight capacity for the car. The requirement to set off empty containers to the Inland Terminal may create additional cost issues for the railways in moving the time sensitive loads to dock. If empties are required to be loaded together and blocked in a train, this may reduce slot utilization on container cars and require additional handling at other terminals.

As noted above, most of these operating variables can be included in the railway planning process, and it may be possible for railways to develop operating plans to accommodate them. There will be cost implications however, and it will require cooperation among all stakeholders to achieve a successful operation.

Conclusions: The introduction of an Inland Container Terminal in the rail system could have wide-ranging impacts on rail efficiency. Potential delays and additional operating requirements due to Inland Container Terminal Operations could negatively impact railway schedules, equipment balance, and slot utilization for intermodal cars. It may be possible to mitigate these impacts through careful planning and cooperation among supply chain participants.
5.4 Impact on Port Terminal Efficiency

Under current conditions, the introduction of an Inland Container Terminal may have little impact on operating costs of the on-dock terminals. The TERMINAL SYSTEMS INC. terminals are operating at or beyond their design capacity. An Inland Container Terminal could free up capacity to enable the on-dock terminals to handle growing volumes of loaded import containers. This capacity will be critical in maintaining the competitiveness of the Lower Mainland as a Pacific Gateway as the shipping lines continue to bring larger vessels into service.

The capacity of on-dock terminals depends on their berth capacity, container yard capacity, and intermodal yard capacity. Currently Vanterm and Deltaport appear to be constrained by intermodal yard capacity. If a substantial portion of empty container operations can be removed from the on-dock terminals this should free up additional capacity at the terminals’ container yard and intermodal yard. It will not resolve berth capacity constraints if these turn out to be the limiting factor in terminal throughput.

Conclusions: The capacity of on-dock terminals depends on their berth capacity, container yard capacity, and intermodal yard capacity. Currently Vanterm and Deltaport appear to be constrained by intermodal yard capacity. If a substantial portion of empty container operations can be removed from the on-dock terminals this should free up additional capacity at the terminals’ container yard and intermodal yard. It will not resolve berth capacity constraints if these turn out to be the limiting factor in terminal throughput.

6. INLAND CONTAINER OPPORTUNITY ANALYSIS

The analysis of existing conditions has identified an opportunity to improve the capacity of the on-dock terminals by eliminating the need to handle empties destined for stuffing of export commodities. In the short term, this can be accomplished through two methods:

1. Through development of an Inland Container Terminal to receive empties by rail and distribute them as required to export transload warehouses for stuffing. The loaded containers could then either be trucked directly to the on-dock terminals or returned to the empty depot, reloaded to rail and shuttled to the on-dock terminals.

2. Through development of an Inland Container Terminal close to the source of containerized export commodities – in this case, locations in the interior of BC with significant forest products production.

To assess the viability of these options, the impact of the Inland Container Terminal on system costs will be analyzed for representative sites to explore the cost trade-offs for different terminal locations.
6.1 Southern Corridor Empty Container Terminal

6.1.1 LOWER MAINLAND EMPTY CONTAINER TERMINAL

1. Existing Container Handling Facilities and Flows

Analysis of potential Inland Container Terminal operations within the Lower Mainland requires an understanding of current logistics practices. The existing infrastructure – on and off-dock container terminals, transload warehouses, and road and rail networks – is a key determinant of these practices.

Container handling facilities are clustered in industrial areas in the Lower Mainland in relative proximity to the on-dock terminals or to major road links between them. Distribution of container-handling activity has evolved with the development of the on-dock terminals. The Inner Harbour terminals, Centerm and Vanterm, were developed in the 1970’s. Marco Marine Containers was established on the South Shore to service these terminals in 1986. Another major off-dock terminal, Canadian Intermodal Services, was established in North Vancouver in 1984 but moved to its present location on Mitchell Island in 1994. Delta Container was established to service Roberts Bank traffic with the opening of Deltaport in 1997. The share of containers handled by the Inner Harbour terminals declined to less than 40% since the opening of Deltaport.

The availability of suitable land in close proximity to the on-dock container terminals is very limited. Most export transload activity and a significant share of import transload activity is clustered along the Fraser River.

The distribution of marine container handling activities is shown in Exhibit 31.
Major facilities in each region include:

- **North Vancouver**: Northgate Terminals, Lynnterm, CN North Van Transload (export)
- **Inner Harbor**: Centerm, Vanterm (on-dock terminals), Marco (empty containers), Columbia Containers, Coastal Containers (export)
- **North Arm Fraser**: CIS (empty containers), EuroAsia Transload, Fraser River Terminals (export)
- **South Richmond**: Coast 2000 (empty containers/export), HBC Logistics (import), Canfor (export)
- **Tilbury/Nordel**: Delco, Bridge Terminal Transport, Metropolitan (empty containers), HUDD Distribution (import)
- **Deltaport**: Deltaport (on-dock terminal)
- **Fraser Surrey**: Fraser Surrey Docks (on-dock terminal), Westran Intermodal, Westnav, Apex Terminals, Sylvan Distribution (export)
- **Annacis**: Container World (import), MTE Logistix (export)
- **Coquitlam-Pitt Meadows**: TransPacific Container Terminal, Canadian Tire, Westfair (import)
- **Surrey-North Langley**: Home Depot, Best Buy (import)

The locations of a sample of transload facilities are shown in Exhibit 32.
Exhibit 32 Transload Facilities in the Lower Mainland
There is a significant concentration of import transload operations (TransPacific Container Terminal, Canadian Tire, and Westfair) located in close proximity to CPR's Vancouver Intermodal Facility (VIF) at Pitt Meadows. Westfair's facility is joined to VIF by a private road. This location is efficient because of the firms' use of CPR's domestic intermodal services. The extra trucking costs due to the distance from the port terminals may be compensated by the proximity of VIF.

Current Routing of Intermodal Trains in the Lower Mainland

In 2000 CN and CPR signed an agreement for directional running through the Fraser Canyon. Under this agreement, all CN and CPR westbound traffic travels on the CN mainline, and all eastbound traffic travels on the CPR mainline. Consequently both CN and CPR intermodal trains enter the Lower Mainland on the CN Main Line. Traffic diverges between Roberts Bank and the Inner Harbour at the Mission Bridge. CN and CPR implemented a new Routing and Switching Agreement in March 2006. Under the new agreement, CPR handles all CN traffic to the South Shore container terminals (Vanterm and Centerm) as well as their own. All of these trains are routed to the CPR yard in Coquitlam which is used as a staging area for trains to the Inner Harbour. CPR then assembles mixed trains (grain, containers, etc.) for shuttling to the Inner Harbor terminals. CPR's intermodal trains destined for Deltaport are routed eastward from Coquitlam Yard to the Mission Bridge and then proceed on the rail connection to Roberts Bank. CN run their own intermodal trains direct to Deltaport on the same route.
Exhibit 33 Train Routing Under CN-CPR Co-production Agreement

Present
- CNterm 1 served by CN
- AU Elevator 2 Vanterm 3 PAC 1 & 3 Elevators 4 are jointly served by CN and CPR
- CPR traffic over CN to North Shore (Neptune 6 SWP, JRI 7)
- CN traffic over CPR to PCT 8 & Cascadia 5

Proposed
- CPR to serve South Shore Terminals on behalf of CN
- CN to continue to serve North Shore Terminals on behalf of CPR
- CPR to crew coal trains for both railways to Roberts Bank

Routing
- CPR North Shore traffic over CN from Boston Bar
- CN South Shore traffic over CPR from Boston Bar
- Empties returned same route to directional running zone, east to North Bend
Costs of an Empty Container Handling Inland Container Terminal in the Lower Mainland

The opportunity which was identified for introduction of an Inland Container Terminal in the Lower Mainland is based on the need for a facility which can increase the capacity of the on-dock terminals by moving the unloading of empty containers to the inland facility. The costs of developing a terminal are analyzed below.

The key cost drivers for an Inland Container Terminal are land, terminal, rail and trucking costs. This section analyzes each of these in turn. The current cost and availability of industrial land in the Lower Mainland is examined through a review of a recent study undertaken by the Greater Vancouver Regional District and current published price ranges. Generic terminal capital and operating cost estimates are developed for three sizes of facility. Rail costs are estimated based on the distance of the Inland Container Terminal from the port terminals. Trucking costs are estimated from the rates currently in effect in the Lower Mainland. These costs are then analyzed for a sample location to evaluate the viability of an Inland Container Terminal in the Lower Mainland.

Cost and Availability of Industrial Land in the Lower Mainland

In 2005 the Greater Vancouver Industrial Region (GVRD) Policy and Planning Department undertook a study to identify the inventory of industrial lands in the Greater Vancouver region. The purpose of the study was to identify lands allocated for industrial use, and estimate the quantity of land currently used for industrial purposes and the quantity of vacant industrial land.

The distribution of industrial lands in the Lower Mainland is shown in Exhibit 34.

Exhibit 34 Industrial Land in the Lower Mainland
The study estimated the total industrial land base in Greater Vancouver at 26,089 acres, of which 26% is classified as vacant. For purposes of the study, vacant means "not currently utilized for industrial purposes, but designated for future industrial development." Of the almost 7000 acres of vacant land, 2400 acres was estimated to be developable in the short term (1 year) and 2500 acres in the medium term (2 to 10 years).

Industrial land prices as of the spring of 2006 are shown below:

**Exhibit 35 Industrial Land Prices in the Lower Mainland**

<table>
<thead>
<tr>
<th>Greater Vancouver Industrial Land Prices Spring 2006 (Per Acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Source: Avison Young Greater Industrial Overview Spring 2006)</td>
</tr>
<tr>
<td>Richmond</td>
</tr>
<tr>
<td>Burnaby</td>
</tr>
<tr>
<td>Surrey</td>
</tr>
<tr>
<td>Vancouver</td>
</tr>
<tr>
<td>Delta</td>
</tr>
<tr>
<td>Langley</td>
</tr>
<tr>
<td>Coquitlam</td>
</tr>
<tr>
<td>Port Coquitlam</td>
</tr>
<tr>
<td>Abbotsford</td>
</tr>
<tr>
<td>North Vancouver</td>
</tr>
<tr>
<td>New Westminster</td>
</tr>
<tr>
<td>Pitt Meadows</td>
</tr>
</tbody>
</table>

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8 Industrial Lands Inventory Executive Summary.
Our analysis of the land requirements for an Inland Container Terminal suggests that a minimum parcel of 50 acres would be required to maintain efficiency in intermodal train operations. The land cost for a parcel of this size at the median land price for each region is shown below:

### Exhibit 36 Comparative Site Acquisition Costs

<table>
<thead>
<tr>
<th>City</th>
<th>Median Cost of 50 Acres of Industrial Land (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richmond</td>
<td>$42.5</td>
</tr>
<tr>
<td>Burnaby</td>
<td>$48.1</td>
</tr>
<tr>
<td>Surrey</td>
<td>$35.0</td>
</tr>
<tr>
<td>Vancouver</td>
<td>$96.3</td>
</tr>
<tr>
<td>Delta</td>
<td>$22.5</td>
</tr>
<tr>
<td>Langley</td>
<td>$31.3</td>
</tr>
<tr>
<td>Coquitlam</td>
<td>$32.5</td>
</tr>
<tr>
<td>Port Coquitlam</td>
<td>$27.5</td>
</tr>
<tr>
<td>Abbotsford</td>
<td>$15.0</td>
</tr>
<tr>
<td>North Vancouver</td>
<td>$73.8</td>
</tr>
<tr>
<td>New Westminster</td>
<td>$31.3</td>
</tr>
<tr>
<td>Pitt Meadows</td>
<td>$18.8</td>
</tr>
</tbody>
</table>

The costs range from a high of $96.3 million in Vancouver to a low of $15.0 million in Abbotsford.

The availability of land parcels of 50 acres or larger is a constraint on potential locations for an Inland Container Terminal. The distribution of undeveloped industrial land parcels 50 acres and larger is shown in Exhibit 37.
The availability of large vacant parcels of land adjacent to railway mainlines is very limited.

6.1.2 GENERIC TERMINAL COSTS

6.1.3 THE SIZE OF THE TERMINAL

A primary consideration in site sizing and geometry has been the recent increases to train lengths by the Class 1 railroads. Both CN and CPR have expended considerable funds in the last two years to improve train length and capacity. CN has indicated that they plan to operate 12,000 foot trains in Western Canada; similar to their practice in Eastern Canada. The sidings, yard leads, yard tracks and Intermodal working tracks have been designed to handle the longer trains anticipated. The sites have been designed to have their own yard and siding capacity to be able to operate as Industrial Railways performing switching. The generic yard designs assume that considerable siding and yard lead trackage can be built adjacent and parallel to the Class 1 main track.

The Inland Container Terminal can be designed in a variety of ways to suit expected demand and utilization, and site availability. For the purposes of this study, we have priced the development of three different sized generic terminals;

1. A small terminal will handle 150,000 containers annually, and occupy approximately 50 acres of property;

2. A medium terminal will handle 360,000 containers annually and will require 115 acres;

3. A large logistics park terminal will handle in excess of 700,000 containers annually on approximately 225 acres of a larger property which could be 1500 acres or more.

The larger “Logistics Park” development will include many other services, which will be strategically located adjacent to the Intermodal terminal. These may include empty container storage depots, container stuffing and de-stuffing facilities, distribution centers, freight forwarders, warehouses, repair facilities for containers, chassis, trucks, rail cars and locomotives, manufacturers, customs brokers, trucking terminals and a host of other businesses.

6.1.4 TERMINAL DESIGN AND CAPACITY

The Inland Terminal must be designed with the capacity to efficiently handle the expected volume of containers. Terminal capacity depends on a number of key factors:

- the number and length of loading tracks, and their ability to hold container cars,
- average times for loading and unloading containers,
- number and type of loading and unloading lift machines,
- storage area for containers that are stored on the ground, and
- gate through-put capacity for road based volumes.
Terminal capacity can be added in stages and with a range of capacity for each infrastructure improvement based on operating activity levels. For instance, loading tracks have a fixed capacity, based on the number of cars they can hold for loading and unloading. However, their operational capacity varies depending on several factors:

- how many and what types of container loading/unloading equipment are in operation,
- are the lifts from rail to truck, or rail to ground,
- what distance does the container handling equipment have to travel to complete the lifts,
- how much storage space is available,
- how high and how deep the containers are stacked.

The design of empty storage areas must also consider the prevailing wind conditions. Empty containers stacked high can present a significant safety hazard in high wind conditions. In order to counter this to some extent, containers can be stored so that the end of the container faces the prevailing wind direction.

Terminal capacity must also be designed in a way that is compatible with railway efficiency. The railway operates as a system, and the railway system capacity, is determined by factors including the number of tracks in the corridor, train speed, train meet capacity, train lengths and the number of stops along the route. In addition to container handling capacity, the impact on railway line capacity must be considered. This will necessitate additional support trackage, additional operating equipment as the rail cars and locomotives will be delayed enroute, and additional manpower as a result of the delays.

Additional key factors for consideration include:

- When trains are lifting and setting-off traffic, they should not block main line train movements.
- With several railways utilizing a busy common railway corridor, it may not be possible to optimize the scheduling of train arrivals and departures, to operate the terminal at its design capacity. There will likely be an uneven flow of rail and container traffic, which will require peak capacity requirements well above the average level.
- The terminals must anticipate that train operations are subject to uncertainties and delays. The design capacity of the terminal must be sufficient to accommodate deviations from scheduled operations.

These factors create the need to design the terminal with a capacity higher than required under optimal conditions for the planned volume of containers.

6.1.5 TERMINAL CAPITAL COSTS

The cost estimates developed for this study are intended as ‘order of magnitude’ projections. Capital costs have been estimated for generic locations, not specific sites.

Contractors capable of constructing these types of facilities in BC are currently in great demand. This is putting upward pressure on future construction costs, making them less predictable.
Site selection will have a large impact on site preparation costs and the design of the facility in terms of the layout. Site preparation may require preloading over all or part of the site, and the soil conditions can significantly affect the design of the pavement required. The layout will depend on the shape of the site, which may impact the length, configuration and location of tracks and storage areas, road access, layout of the supporting track structure. The availability of municipal and other services may affect the cost of the facility.

The generic yards are assumed adjacent to an operating rail mainline track. A relatively flat, semi-developed site adjacent to a highway suitable for heavy truck traffic has been assumed.

The pricing of the sites includes gatehouses, lighting, administration buildings and facilities for minor chassis repair and basic equipment maintenance, a yard air system, costs for main track crossings and access route development to a presumed adjacent roadway, all sized for the appropriate facility.

The small generic Intermodal yard is designed with capacity to work one 12,000’ train left in the passing siding. It has a 12,400’ siding, a 6,000’ yard lead and 15,200’ of working tracks in the Intermodal yard. When fully stacked at 2 deep and 5 high, it has storage capacity of 7,400 TEU’s of loaded containers, or when fully stacked at 2 deep, and 8 high, it has capacity for 11,840 TEU’s of empty containers.

It is understood that while it is possible to store containers in this fashion, it is not efficient to work at much more than 70% capacity. At the rail/Intermodal yard interface, it is more common to work the yard by storing loaded containers 3 high and empty containers only 5 high to permit quick and efficient handling.

Exhibit 38

<table>
<thead>
<tr>
<th>CAPITAL COST SMALL-SIZE INTERMODAL YARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Infrastructure</td>
</tr>
<tr>
<td>Top Loader Equipment</td>
</tr>
<tr>
<td>Site Preparation and Grading</td>
</tr>
<tr>
<td>Sub-base, Base &amp; Paving</td>
</tr>
<tr>
<td>Access, Facilities &amp; Services</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Exhibit 39 Small Inland Container Terminal
The mid-sized generic yard is designed to work three 12,000’ trains. It would have a 12,000’ siding, 2 – 6,000’ yard leads, 6 – 6,000’ yard storage tracks and more than 30,000’ of working tracks in the intermodal yard. When fully stacked at 2 deep and 5 high, it calculates to have a storage capacity of 15,300 TEU’s of loaded containers, or when fully stacked at 2 deep and 8 high, it has a container storage capacity of 24,480 TEU’s of empty containers.

Exhibit 40

<table>
<thead>
<tr>
<th>CAPITAL COST MID-SIZE INTERMODAL YARD</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Infrastructure</td>
<td>$ 23,000,000</td>
</tr>
<tr>
<td>Top Loader Equipment</td>
<td>$ 4,000,000</td>
</tr>
<tr>
<td>Site Preparation and Grading</td>
<td>$ 11,000,000</td>
</tr>
<tr>
<td>Sub-base, Base &amp; Paving</td>
<td>$ 34,000,000</td>
</tr>
<tr>
<td>Access, Facilities &amp; Services</td>
<td>$ 9,000,000</td>
</tr>
<tr>
<td></td>
<td>$ 81,000,000</td>
</tr>
</tbody>
</table>
Exhibit 41 Mid Size Inland Container Terminal
The terminal serving the Logistics Park is sized to handle six 12,000’ trains. It would have two 12,000’ sidings, 4 – 6,000’ yard leads, 6 – 12,000’ yard storage tracks and more than 60,000’ of working tracks in the Intermodal yard. When fully stacked at 2 deep and 5 high, it has capacity for 30,000 TEU's of loaded containers, or when fully stacked at 2 deep and 8 high, a capacity of approximately 50,000 TEU's of empty containers.

### Exhibit 42

<table>
<thead>
<tr>
<th>CAPITAL COST LOGISTIC PARK INTERMODAL YARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Infrastructure</td>
</tr>
<tr>
<td>Top Loader Equipment</td>
</tr>
<tr>
<td>Site Preparation and Grading</td>
</tr>
<tr>
<td>Sub-base, Base &amp; Paving</td>
</tr>
<tr>
<td>Access, Facilities &amp; Services</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

6.1.6 TERMINAL OPERATIONS – CONTAINER HANDLING

The three generic terminals are assumed to use toplifters and empty container handlers to strip and load trains, transfer containers to truck, and to store and reload containers.

Empty containers will primarily be unloaded from trains and stored in a stack configuration, 4 wide, accessible from either side as required. Empties will also be loaded onto truck for relocation to empty container depots, and to loading sites within trucking distance.

Loaded containers being held for later delivery to the port will be stored in a stack configuration.

The railcars will be placed on tracks adjacent to the container stacks for efficient lift operations. The small terminal is projected to utilize 2 toplifters, and 1 empty container handler, the mid-size terminal 4 toplifters and 3 empty handlers, and the large terminal 7 toplifters, and 5 empty handlers.

6.1.7 TERMINAL OPERATIONS – RAIL

The terminal operations will vary depending on size and volume. Trains will enter the 12,000 foot siding track clear of the main track, so as not to block main line operations. Then the train will set its inland terminal traffic in the yard tracks. For the small terminal, it is not expected that entire trains will be delivered for processing, but that certain trains will set-off a number of cars with empties and loads for handling at the Inland Terminal. These trains may also pick-up or lift cars to be delivered to the port.
The Inland Terminal yard assignment will switch the container cars into the loading tracks for unloading. The containers will be unloaded and set in the appropriate storage area for either empty containers or short term storage for loads waiting for ship departure.

In the small terminal scenario, the railway switching assignment will have the capacity to shuttle cars to the port from the Inland Terminal, depending on the distance from the port. A practical distance for this operation should not exceed 30 minutes running time if it is planned to use the same crew and locomotive consist to keep the Intermodal yard switched. This would provide an efficient operation, and is dependent on reaching a commercial agreement with the railways to use the main track. Although this type of agreement is possible in the railway industry, it is dependent on a number of key factors, like line capacity, service requirements, and scheduling conflicts with other carriers, and agreement among stakeholders. It will require train crews and operational standards to meet additional qualification requirements and training, and the agreements will be subject to commercial negotiations.

If the Inland terminal is greater than 30 minutes running time from the port, then it becomes less practical to shuttle cars to the port with the same switching assignment. In this case, it may require a switching assignment, separate from the one that is involved switching the Intermodal yard, with dedicated locomotives, to shuttle the cars to and from the port. Even in this case, for a dedicated assignment to prepare the train and deliver it to the port, then make the return trip, the distance should pragmatically not exceed 2 hours running time in one direction.

For the large terminal, multiple yard switching assignments and port shuttle assignments may be required.

Assuming that the railways are prepared to negotiate an access fee for shuttle trains to operate to the port, or that railways are prepared to negotiate an agreement whereby they would deliver cars to the port on behalf of the Inland Terminal, then the Inland Terminal would have to make the decision to either operate its own service or pay the railways depending on the overall cost of each operating model.

Clearly, there will be a cost to deliver the containers to the port from the inland terminal.

The railway’s position may depend on their ability to lift the cars, and at what price they agree to do it. Their ability to lift the cars may depend on train length restrictions, tonnage hauling capacity of locomotives, hours of service restrictions of train crews, and traffic and scheduling issues on the main track. Most of these variables can be included in the planning process, and operating plans may be developed to accommodate them. Existing main track capacity may require infrastructure upgrades to track infrastructure or signal systems, or additional trackage. These items do have cost implications however and will likely influence the negotiated fee structure.

6.1.8 TERMINAL OPERATING COSTS

The terminal operating cost estimates are intended as ‘order of magnitude’ projections, broadly based on the prospective generic terminal designs, which may be notionally reflective of typical terminal costs, but are not based on any specific existing terminals.
Terminal operations are designed to support toplifter operations and assume container handling labour supplied by contract operators. In the large terminal scenario, the actual flow of traffic may be impacted by the potential for additional truck moves, both within and outside of the logistics park, and it may require significant flexibility of loading equipment. Because they are less mobile and therefore less flexible, large gantry cranes were not discussed, although at high volumes, there is some potential for cost advantage if mobility is not an issue.

Excluded from the cost table are any costs related to property acquisition. Capital costs are listed separately and at this pre-conceptual stage, depreciation charges for fixed assets are excluded. As the distance from the port is unknown, the estimates do not include costs related to this movement.

Operating costs for the 3 generic terminals are summarized in the table below:

### Exhibit 43 Generic Terminal Operating Cost Table

<table>
<thead>
<tr>
<th></th>
<th>Small Intermodal Yard</th>
<th>Mid-size Intermodal Yard</th>
<th>Logistics Park Intermodal Yard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 Toplifters</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour + overhead</td>
<td>$900,000</td>
<td>$2,100,000</td>
<td>$3,600,000</td>
</tr>
<tr>
<td>Own, Mtce, Fuel</td>
<td>$600,000</td>
<td>$1,400,000</td>
<td>$2,400,000</td>
</tr>
<tr>
<td><strong>Terminal support staff</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Supervisors</td>
<td>$480,000</td>
<td>$480,000</td>
<td>$960,000</td>
</tr>
<tr>
<td>2 clerks x 4 shifts</td>
<td>$560,000</td>
<td>$1,120,000</td>
<td>$1,680,000</td>
</tr>
<tr>
<td>2 Attendants 4 shifts</td>
<td>$560,000</td>
<td>$840,000</td>
<td>$1,400,000</td>
</tr>
<tr>
<td><strong>Track and facility costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track Mtce</td>
<td>$250,000</td>
<td>$400,000</td>
<td>$500,000</td>
</tr>
<tr>
<td>Facility Mtce</td>
<td>$100,000</td>
<td>$150,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>Lighting and util</td>
<td>$150,000</td>
<td>$250,000</td>
<td>$350,000</td>
</tr>
<tr>
<td><strong>Train switching costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Train crews</td>
<td>$900,000</td>
<td>$900,000</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>2 loco,own,mtce,fuel</td>
<td>$900,000</td>
<td>$1,800,000</td>
<td>$1,800,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$5,400,000</td>
<td>$9,570,000</td>
<td>$14,690,000</td>
</tr>
<tr>
<td>Container handlings</td>
<td>150,000</td>
<td>360,000</td>
<td>700,000</td>
</tr>
<tr>
<td><strong>cost per handling</strong></td>
<td>$36</td>
<td>$27</td>
<td>$21</td>
</tr>
</tbody>
</table>
6.1.9 COSTS TO SHUTTLE RAIL CARS FROM THE INLAND CONTAINER TERMINAL TO PORT

The cost to shuttle rail cars to the on-dock terminals depends on the distance from the Inland Container Terminal to the port. It is assumed that empty containers will be delivered to the Inland Container Terminal by rail on westbound trains. Loaded containers could also be staged for subsequent delivery to the port. Loaded containers would either be stored at the Inland Container Terminal or trucked out to an alternate storage location, and empty containers would either be stored at the Inland Container Terminal, trucked to alternate storage locations, or trucked to customer's facilities or to a stuffing/destuffing operator for loading. Loaded export containers would be returned to the Inland Container Terminal for delivery by rail to the port, to be loaded on a ship.

The railway operations required to deliver containers to the port, and the associated costs, will vary depending on a multitude of factors, including the size of the terminal, the distance from the port in transit time, and the working and rail switching capacity of the Inland Container Terminal. We have assumed that the railways will not reduce long haul intermodal rates because the movement is terminated short of the port terminals.

The small terminal specified in our generic cost analysis is sufficient to meet the expected demand of 140,000 TEUS, and this is used as the basis for capital cost estimates.

In all cases, the Inland Container Terminal will require tracks to receive rail traffic, and tracks from which rail traffic will depart. These tracks are typically called the receiving yard and the departure yard. For maximum efficiency, it should have a 12,000 foot siding and the receiving and departure yard tracks should be at least 6,000 feet each. Shorter receiving and departure tracks would reduce the efficiency of rail operations.

It is assumed that the Inland Container Terminal will be able to negotiate a commercial access agreement, to access the main track to deliver railcars to the port. Access fees can vary, depending on a number of variables, including the type of track, the volume of traffic to be moved, distance to be traveled, the volume and type of traffic on the line, available track capacity and scheduling issues. The fee structure per car can range from $0.40 per car, per mile, for high volumes moving over long distances, to $5.00 or greater per car, per mile, for lower volumes over shorter distances, especially in congested areas. (for the purposes of this type of agreement each double stack slot on a container car is counted as one (1) car). In addition, the track owner may require capital up front to add capacity to the line, in order to accommodate the traffic. A capacity study may be required to determine if capital is required under each scenario. We will assume, for the purpose of this exercise, that capital is not required to accommodate the movement of this traffic. We have prepared two cases: one using a fee of $1.00 per car per mile and one using a fee of $3.00 per car mile. These are hypothetical and the actual rate would have to be negotiated between the railways and the shuttle operator.

The operation assumes that container cars that are set-off at the Inland Container Terminal will be available for loading on the port less than 24 hours later. This takes the cars out of cycle for 24 hours, and may require additional cars in the fleet. We can estimate that 100 double stack slots are required to handle the volume on a daily basis. It should be kept in mind that this will also remove empty lifts and empty container flows from the port terminal...
operations, resulting in efficiencies. Therefore, removing traffic from the port may reduce the car fleet requirements. A more detailed study is required to determine the precise impact that removing this volume of traffic from the port will have on the car fleet requirements. For the purposes of this study we assume that we need to add 100 double stack slots to the fleet to operate in this manner.

To look at the feasibility of site locations, we have estimated costs for three scenarios. The first is a one way movement of 30 minutes or less, based on using the switcher from the Intermodal Container Terminal to deliver cars and return. The second was based on the movement using a train that would pick up the cars from the Inland Container Terminal, deliver to the docks, and return in the same shift. This was based on a one way movement of 2 hours or less. The third pricing scenario is based on a location that is more than 2 hours rail transit time from the dock, and in this case the example is about 4 hours one way. This will require the train crew to make a movement only in one direction, then go off duty and another crew will be required to bring the train back to the Inland Container Terminal.

30 Minutes Transit or Less

The first operational analysis is based on a terminal location within a transit time of 30 minutes or less, where the yard switching crew could shuttle the cars to the port within their 8 hour shift, with no requirement for more crews or locomotives. This would limit additional costs to access fees and car lease charges.

Costs

Cars: Assuming a lease rate of $10,000 per year, per car, the cost is estimated at $1.0 Million annually for 100 cars.

Track access fees: Track access fees for 100 cars per day, over 15 miles, 360 days per year at $1.00 per car/mile, totals $0.5 Million annually. At $3.00 per car mile, totals $1.5 million annually.

Total cost: Total costs with a track access charge would be $1.5 Million or approximately $11 per TEU. Total costs with a track access charge of $3.00 per car mile would be $2.5 million or approximately $19 per TEU.

The challenge of this analysis is locating a site where access to the Burrard Inlet terminals and the Deltaport terminal can be achieved within 30 minutes, especially by more than one Class 1 Railway. The rail routes from Mission Junction to Deltaport and to the downtown terminals are different. Locating the Inland Container Terminal in a location within 30 minutes of the downtown terminals may make it impractical to serve Delta port, and locating within 30 minute rail travel to Deltaport would be inefficient to serve the terminals on the Burrard Inlet.

2 Hours Transit Time

In identifying a site with a two hour transit time to the docks, a location near CN Mission Junction, where both CPR and CN operate is suggested. From this location, track distance to Deltaport and to the Burrard Inlet Terminals is similar, between 40 and 45 miles. From this location both railways have access to all ports, and there is no requirement for inefficient backhauling.
East of Mission Junction the CPR-owned line is on the north side of the Fraser River and the CN line is on the south side. Although they currently share these lines and operate trains directionally, Eastbound on the CPR and Westbound on the CN, the agreement is a term agreement and is not perpetual. This estimate is based on the assumption that the current conditions do not change.

Leaving Mission Junction, for both railways, and on routes to both terminal areas, the track signalling and traffic control system is Centralized Traffic Control. In both cases, although the allowable track speed varies from 25 to 50 mph, with scheduling issues for passenger trains and priority freight trains, and operation over river crossings with moveable deck bridges, running time has been estimated at 2 hours. With the addition of time for switching to lift cars and set-off cars, with start-up time, and some allowance for contingencies, a round-trip between the Inland Container Terminal and the Port Terminals will take approximately 8 hours, or one complete shift. Under this scenario, dedicated locomotives and crews would be required to shuttle the traffic to the port from the Inland Container Terminal.

Costs

Crews and locomotives: The costs of running 7 day per week service, including 4 shifts of 2 man railway crews and 2 dedicated locomotives is estimated at $1.8 Million annually.

Cars: Assuming a lease rate of $10,000 per year, per car, the cost is estimated at $1.0 Million annually for 100 cars.

Track access fees: Track access fees for 100 cars per day, over 45 miles, 360 days per year at $1.00 per car/mile, total $1.6 Million annually. With a track access charge of $3.00 per car mile, the cost would be $4.8 million.

Total cost: With a track access charge of $1 per car mile, costs would total $4.4 Million or approximately $32 per TEU. With a track access charge of $3, costs would total $7.6 million, or approximately $55 per TEU.

CN and CPR may be agreeable to haul this traffic from the Inland Container Terminal to the port on their existing trains, and it may be possible to negotiate a fee for this service that will generate a lower total cost. The factors that determine the fee structure can vary depending on many variables. Looking at other models, if the regulated interswitching rates were used as a model, the costs would be very high, and it would increase the overall cost. However, if block transfer switching rates, which are used in other cases for the transfer of grain were utilized, then there may be an opportunity to reduce the costs.

This of course assumes that railways are prepared to negotiate an agreement whereby they would deliver cars to the port on behalf of the Inland Terminal.

Greater than 4 Hours

For locations that are further from the ports, we propose a terminal somewhere east of Mission along south side of Fraser River, on the CN Yale Subdivision, with access by both CN and CPR trains westbound. For the purposes of this estimate we have assumed a distance of 85 miles from the docks.
The cost to shuttle cars from this terminal to the port will be higher, due to increased mileage, and due to the fact that the trains will not make the round trip in one shift, they will only make a single leg of the trip per shift. This will require more crews and more locomotives to shuttle the cars each 8-hour shift.

**Costs**

**Crews and locomotives:** The costs of running 7 day per week service, including 8 shifts of 2 man railway crews and 4 dedicated locomotives is estimated at $3.6 Million annually.

**Cars:** Assuming a lease rate of $10,000 per year, per car, the cost is estimated at $1.0 Million annually for 100 cars.

**Track access fees:** Track access fees for 100 cars per day, over 85 miles, 360 days per year at $1.00 per car/mile, totals $3.1 Million annually. At $3.00 per car mile, totals $9.3 million with a track access charge of $1 per car mile.

**Total cost:** Total costs of $7.7 Million spread over 140,000 TEUS, works out to approximately $55 per TEU with a $1 track access fee. Total costs of $13.9 Million spread over 140,000 TEUS, works out to approximately $99 per TEU with a $3 track access fee.

Exhibit 44 summarizes the estimated costs outlined above:
### Exhibit 44

#### Costs to Shuttle Rail Cars from the Inland Container Terminal to Port

<table>
<thead>
<tr>
<th>Transit Time</th>
<th>Track Access @ $1 per Car-Mile</th>
<th>Track Access @ $3 per Car-Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miles</td>
<td>30 Minutes</td>
<td>30 Minutes</td>
</tr>
<tr>
<td>Lease Cars</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>100@$10,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track Access @ $1 per Car-Mile</td>
<td>$547,500</td>
<td>$1,642,500</td>
</tr>
<tr>
<td>365<em>100</em>$1* Miles</td>
<td></td>
<td>$3,102,500</td>
</tr>
<tr>
<td>Crews &amp; Locomotives</td>
<td>-</td>
<td>$1,800,000</td>
</tr>
<tr>
<td>7 Day Service</td>
<td></td>
<td>$3,600,000</td>
</tr>
<tr>
<td>Total</td>
<td>$1,547,500</td>
<td>$4,442,500</td>
</tr>
</tbody>
</table>

#### Per TEU

<table>
<thead>
<tr>
<th></th>
<th>$11</th>
<th>$32</th>
<th>$55</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Miles</th>
<th>30 Minutes</th>
<th>2 Hours</th>
<th>4 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lease Cars</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>100@$10,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track Access @ $3 per Car-Mile</td>
<td>$1,642,500</td>
<td>$4,927,500</td>
<td>$9,307,500</td>
</tr>
<tr>
<td>365<em>100</em>$3* Miles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crews &amp; Locomotives</td>
<td>-</td>
<td>$1,800,000</td>
<td>$3,600,000</td>
</tr>
<tr>
<td>7 Day Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$2,642,500</td>
<td>$7,727,500</td>
<td>$13,907,500</td>
</tr>
</tbody>
</table>

#### Per TEU

<table>
<thead>
<tr>
<th></th>
<th>$19</th>
<th>$55</th>
<th>$99</th>
</tr>
</thead>
</table>

### 6.1.10 TRUCKING COSTS

Current drayage rates in the Lower Mainland are based on the Memorandum of Agreement between the Vancouver Container Truck Association and trucking companies which was negotiated with the assistance of Vince Ready. Adherence to this schedule of rates for owner-operators is a requirement of the licensing system operated by the Vancouver Port Authority which controls access to the on-dock terminals.
The current rates under the Ready MOA are shown below:

**Exhibit 45 Drayage Rates (to Owner/Operators) under the Ready MOA 2006 – One Way Trips**

<table>
<thead>
<tr>
<th>Location</th>
<th>Vanterm/Centerm</th>
<th>Deltaport</th>
<th>FSD</th>
<th>CP</th>
<th>CN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver Docks</td>
<td>100</td>
<td>135</td>
<td>120</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td>North Vancouver</td>
<td>105</td>
<td>140</td>
<td>135</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td>West Vancouver</td>
<td>110</td>
<td>145</td>
<td>140</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Burnaby North</td>
<td>105</td>
<td>135</td>
<td>110</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Burnaby South (S of HWY 1)</td>
<td>110</td>
<td>135</td>
<td>105</td>
<td>120</td>
<td>130</td>
</tr>
<tr>
<td>Richmond North</td>
<td>105</td>
<td>120</td>
<td>105</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td>Richmond South (South of Westminster)</td>
<td>110</td>
<td>110</td>
<td>105</td>
<td>140</td>
<td>135</td>
</tr>
<tr>
<td>Annacis Island</td>
<td>120</td>
<td>120</td>
<td>100</td>
<td>130</td>
<td>130</td>
</tr>
<tr>
<td>New Westminster</td>
<td>115</td>
<td>135</td>
<td>105</td>
<td>120</td>
<td>130</td>
</tr>
<tr>
<td>Coquitlam</td>
<td>115</td>
<td>135</td>
<td>110</td>
<td>110</td>
<td>115</td>
</tr>
<tr>
<td>Port Moody/Port Coquitlam</td>
<td>120</td>
<td>145</td>
<td>115</td>
<td>105</td>
<td>120</td>
</tr>
<tr>
<td>Pitt Meadows</td>
<td>135</td>
<td>150</td>
<td>120</td>
<td>100</td>
<td>130</td>
</tr>
<tr>
<td>Haney/Maple Ridge</td>
<td>140</td>
<td>160</td>
<td>135</td>
<td>105</td>
<td>135</td>
</tr>
<tr>
<td>Surrey North (N of 72, W of 152, FSD)</td>
<td>120</td>
<td>120</td>
<td>100</td>
<td>120</td>
<td>110</td>
</tr>
<tr>
<td>Delta North (Tilbury)</td>
<td>135</td>
<td>100</td>
<td>100</td>
<td>135</td>
<td>130</td>
</tr>
<tr>
<td>Surrey South (incl White Rock)</td>
<td>135</td>
<td>120</td>
<td>120</td>
<td>130</td>
<td>120</td>
</tr>
<tr>
<td>Cloverdale</td>
<td>135</td>
<td>135</td>
<td>115</td>
<td>130</td>
<td>100</td>
</tr>
<tr>
<td>Port Kells (N of HWY !, W of 208)</td>
<td>135</td>
<td>145</td>
<td>110</td>
<td>130</td>
<td>100</td>
</tr>
<tr>
<td>Langley City</td>
<td>145</td>
<td>135</td>
<td>120</td>
<td>135</td>
<td>105</td>
</tr>
<tr>
<td>Langley South (S of 40)</td>
<td>165</td>
<td>120</td>
<td>120</td>
<td>145</td>
<td>110</td>
</tr>
<tr>
<td>Pacific Highway</td>
<td>165</td>
<td>120</td>
<td>120</td>
<td>145</td>
<td>110</td>
</tr>
<tr>
<td>Fort Langley/Aldergrove</td>
<td>155</td>
<td>165</td>
<td>135</td>
<td>135</td>
<td>120</td>
</tr>
<tr>
<td>Abbotsford/Clearbrook</td>
<td>175</td>
<td>175</td>
<td>160</td>
<td>165</td>
<td>135</td>
</tr>
<tr>
<td>Mission</td>
<td>175</td>
<td>185</td>
<td>165</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td>Chilliwack/Sardis</td>
<td>200</td>
<td>200</td>
<td>185</td>
<td>185</td>
<td>175</td>
</tr>
</tbody>
</table>

Traditionally owner/operator compensation has been calculated as 70% of the rate charged to the shipper. Rates to the shipper are usually quoted on a round trip basis, to cover the cost of delivering a loaded container and returning the empty container (or vice versa). The exception has been on movements of empty containers for shipping lines between the on-dock and off-dock terminals for servicing, which have been billed on a one-way basis.
Applying the margin above the owner/operator compensation would result in the following round trip rates to shippers under the Ready MOA:

**Exhibit 46 Drayage Rates Under the Ready MOA 2006 (Rates to Shippers)**

<table>
<thead>
<tr>
<th>Location</th>
<th>Vanterm-Centerm</th>
<th>Deltaport</th>
<th>FSD</th>
<th>CP</th>
<th>CN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver Docks</td>
<td>286</td>
<td>386</td>
<td>343</td>
<td>386</td>
<td>386</td>
</tr>
<tr>
<td>North Vancouver</td>
<td>300</td>
<td>400</td>
<td>386</td>
<td>414</td>
<td>414</td>
</tr>
<tr>
<td>West Vancouver</td>
<td>314</td>
<td>414</td>
<td>400</td>
<td>429</td>
<td>429</td>
</tr>
<tr>
<td>Burnaby North</td>
<td>300</td>
<td>386</td>
<td>314</td>
<td>343</td>
<td>343</td>
</tr>
<tr>
<td>Burnaby South (S of HWY 1)</td>
<td>314</td>
<td>386</td>
<td>300</td>
<td>343</td>
<td>371</td>
</tr>
<tr>
<td>Richmond North</td>
<td>300</td>
<td>343</td>
<td>300</td>
<td>386</td>
<td>386</td>
</tr>
<tr>
<td>Richmond South (South of Westminster)</td>
<td>314</td>
<td>314</td>
<td>300</td>
<td>400</td>
<td>386</td>
</tr>
<tr>
<td>Annacis Island</td>
<td>343</td>
<td>343</td>
<td>286</td>
<td>371</td>
<td>371</td>
</tr>
<tr>
<td>New Westminster</td>
<td>329</td>
<td>386</td>
<td>300</td>
<td>343</td>
<td>371</td>
</tr>
<tr>
<td>Coquitlam</td>
<td>329</td>
<td>386</td>
<td>314</td>
<td>314</td>
<td>329</td>
</tr>
<tr>
<td>Port Moody/Port Coquitlam</td>
<td>343</td>
<td>414</td>
<td>329</td>
<td>300</td>
<td>343</td>
</tr>
<tr>
<td>Pitt Meadows</td>
<td>386</td>
<td>429</td>
<td>343</td>
<td>286</td>
<td>371</td>
</tr>
<tr>
<td>Haney/Maple Ridge</td>
<td>400</td>
<td>457</td>
<td>386</td>
<td>300</td>
<td>386</td>
</tr>
<tr>
<td>Surrey North (N of 72, W of 152, FSD)</td>
<td>343</td>
<td>343</td>
<td>286</td>
<td>343</td>
<td>314</td>
</tr>
<tr>
<td>Delta North (Tilbury)</td>
<td>386</td>
<td>286</td>
<td>286</td>
<td>386</td>
<td>371</td>
</tr>
<tr>
<td>Surrey South (incl White Rock)</td>
<td>386</td>
<td>343</td>
<td>343</td>
<td>371</td>
<td>343</td>
</tr>
<tr>
<td>Cloverdale</td>
<td>386</td>
<td>386</td>
<td>329</td>
<td>371</td>
<td>286</td>
</tr>
<tr>
<td>Port Kells (N of HWY 1, W of 208)</td>
<td>386</td>
<td>414</td>
<td>314</td>
<td>371</td>
<td>286</td>
</tr>
<tr>
<td>Langley City</td>
<td>414</td>
<td>386</td>
<td>343</td>
<td>386</td>
<td>300</td>
</tr>
<tr>
<td>Langley South (S of 40)</td>
<td>471</td>
<td>343</td>
<td>343</td>
<td>414</td>
<td>314</td>
</tr>
<tr>
<td>Pacific Highway</td>
<td>471</td>
<td>343</td>
<td>343</td>
<td>414</td>
<td>314</td>
</tr>
<tr>
<td>Fort Langley/Aldergrove</td>
<td>443</td>
<td>471</td>
<td>386</td>
<td>386</td>
<td>343</td>
</tr>
<tr>
<td>Abbotsford/Clearbrook</td>
<td>500</td>
<td>500</td>
<td>457</td>
<td>471</td>
<td>386</td>
</tr>
<tr>
<td>Mission</td>
<td>500</td>
<td>529</td>
<td>471</td>
<td>414</td>
<td>414</td>
</tr>
<tr>
<td>Chilliwack/Sardis</td>
<td>571</td>
<td>571</td>
<td>529</td>
<td>529</td>
<td>500</td>
</tr>
</tbody>
</table>

**6.1.11 TOTAL COSTS**

According to our analysis there is a current market opportunity to divert 140,000 TEU’s of westbound empty containers on rail to an Inland Container Terminal to satisfy the demand for empty containers for export transloading. On the assumption that these are all 40 foot containers this would imply a traffic level of 80,000 containers per year of rail traffic for the Inland Container Terminal, or around two thirds of the volume of the largest existing (truck-based) empty container terminal.

The need for a large scale of operations suggests that a single facility to serve all of the on-dock terminals would be most appropriate. In order to serve both the Roberts Bank and Inner Harbour terminals, the terminal would have to be established in a location which can
intercept traffic destined to both locations. For this reason we have selected a “generic site” east of Matsqui Junction in Abbotsford. This location is on the CN mainline which accommodates all westbound traffic under the directional running agreement between CN and CPR for traffic through the Fraser Canyon.

There is so far as we know no industrial land currently available at this location so the analysis is a theoretical exercise in order to analyze the impact of location factors – land costs, terminal costs, rail operating costs, and trucking costs – on the viability of the concept. The smallest generic terminal analyzed above is adequate to handle this volume. It requires a site of 50 acres. Based on current market prices, the cost of 50 acres of land in Abbotsford is estimated at $15 million. Estimated capital cost for the small terminal is $38 million, and terminal operating costs are estimated at $5.4 million. Annual rail operating costs are estimated at $4.4 million based on the running distance to the port terminals of around 2 hours, and a track access fee of $1.00 per car mile. At $3.08 per car mile, rail operating costs would be $7.7 million.

Trucking costs are estimated based on the current rates under the ready memorandum of understanding. The MOA rates are not comprehensive i.e. rates between non-terminal locations are not definitively specified. For purposes of analysis, we will use as an example a lumber reload facility in the Fraser Surrey Docks area and assume the round trip rate of $457 from FSD to Abbotsford would apply. The majority of export transload warehouses are located close to Fraser Surrey Docks in the areas along the Fraser River west of the Patullo Bridge.

Exhibit 47 summarizes the estimated costs per container of handling containers via an Inland Container Terminal located in the vicinity of Matsqui Junction, compared to current costs. According to these estimates, the cost of using the Inland Container terminal would be approximately $160 per 40 foot container higher than the current system with a track access fee of $1 per car mile. Increased trucking costs account for over 70% of this difference, due to the increased length of haul to existing export transload warehouses along the Fraser River.

The relatively low cost of land – the Abbotsford area is estimated to have the lowest price for industrial land in Greater Vancouver – is not sufficient to offset the costs of increased distance from the port. From our analysis of the impact of greater distance from the port on rail operating cost, it is likely that locations farther from the port would prove to be even more expensive for this application of an Inland Container Terminal i.e. an empty container terminal to reduce congestion at the on-dock terminals.

Location of an Inland Container Terminal close to the on-dock terminals could provide a significant reduction in the cost of shuttling containers by rail or truck; however, land costs are significantly higher and the availability of suitable land is extremely limited. From the point of view of trucking and rail costs, the most efficient arrangement is to handle the containers as close as possible to the on-dock terminals.
### Exhibit 47 Lower Mainland Terminal Cost Comparison

#### Inland Terminal Cost Analysis – Matsqui JCT

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost at $1 Access</th>
<th>Cost at $3 Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Cost (excl. site preparations and land)</td>
<td>$38,000,000</td>
<td>$38,000,000</td>
</tr>
<tr>
<td>Amortization period (years)</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Discount rate</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Annual Capital Cost</td>
<td>$6,070,936</td>
<td>$6,070,936</td>
</tr>
<tr>
<td>Land (acres)</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Cost per acre</td>
<td>$300,000</td>
<td>$300,000</td>
</tr>
<tr>
<td>Total Land Cost</td>
<td>$15,000,000</td>
<td>$15,000,000</td>
</tr>
<tr>
<td>Annual Land Carrying Cost</td>
<td>$2,396,422</td>
<td>$2,396,422</td>
</tr>
<tr>
<td>Annual Terminal Operating Cost</td>
<td>$5,400,000</td>
<td>$5,400,000</td>
</tr>
<tr>
<td>Annual Rail Operating Cost</td>
<td>$4,400,000</td>
<td>$7,727,500.00</td>
</tr>
<tr>
<td>Total Annual Cost – Rail and Terminal</td>
<td>$18,267,358</td>
<td>$21,594,858</td>
</tr>
<tr>
<td>Annual Traffic (TEU’s)</td>
<td>140,000</td>
<td>140,000</td>
</tr>
<tr>
<td>Rail and Terminal Cost per TEU</td>
<td>$130.48</td>
<td>$154.25</td>
</tr>
<tr>
<td>Total Terminal and Rail Cost per 40 ft Container</td>
<td>$261</td>
<td>$308</td>
</tr>
<tr>
<td>Trucking Cost Round Trip (FSD area)</td>
<td>$457</td>
<td>$457</td>
</tr>
<tr>
<td>Total cost</td>
<td>$718</td>
<td>$765</td>
</tr>
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</table>

#### Current Cost – Deltaport to FSD

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost at $1 Access</th>
<th>Cost at $3 Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trucking (Deltaport to FSD)</td>
<td>$343</td>
<td>$343</td>
</tr>
<tr>
<td>Deltaport Gate Charges (Truck in and out)</td>
<td>$116</td>
<td>$116</td>
</tr>
<tr>
<td>Handling charges*</td>
<td>$99</td>
<td>$99</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$558</td>
<td>$558</td>
</tr>
</tbody>
</table>

#### Cost differential: Inland Container Terminal vs. current

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost at $1 Access</th>
<th>Cost at $3 Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost differential: Inland Container Terminal vs. current</td>
<td>$160</td>
<td>$208</td>
</tr>
</tbody>
</table>

* Based on yard rehandling charge $49.50 per move
Rail System Cost Impacts of the Lower Mainland Inland Container Terminal

The cost analysis in Exhibit 47 is focused on the direct costs for the rail shuttle operation between the benchmark Inland Container Terminal and the port terminals. However, as noted in the previous discussion of rail system effects, rail operations are optimized on a system basis and detailed analysis is required to evaluate the system-level cost impact on railway operations.

We are indebted to the railways for providing information on the impact of the benchmark terminal on their operations, in particularly to CPR who provided a detailed analysis. The discussion below is drawn from detailed written comments provided by CPR Rail.

Presently, CPR service design has intermodal trains (including CN trains destined for the Inner harbour) arriving at their Coquitlam and Vancouver Intermodal Facility (Pitt Meadows) rail yards, and being switched before cars and containers are delivered to on-dock terminals. Eight of the ten daily CPR transcontinental intermodal trains originating and terminating in the Lower Mainland are 7,000 feet in length (which equals 6,500 feet of traffic). The remaining trains carry 6,000 feet of traffic. The transfers between Coquitlam and Inner Harbour can be as long as 8-10,000 feet in length, and carry grain cars, tank containers, woodpulp and other commodities, in addition to marine containers. Transfer trains to/from Deltaport are 6-8,000 feet in length.

Rail service is designed to meet both the fluidity and train/equipment balance criteria that define operating efficiency goals, and the service requirements of the shipping lines that direct the disposition of international containers. The service parameters and composition of CPR intermodal trains arriving in the Lower Mainland reflect the service demands of shipping lines. Shipping lines require quickest transit time and the latest cut off at inland origins (the deadline given to customers delivering loaded containers to rail container terminals for loading on intermodal trains) that is possible.

Continual communication between the railway and shipping line is needed to ensure that required loaded export containers arrive at on-dock terminals when ships arrive.

Quick, on-time delivery of the loaded export containers is the highest shipping line priority reflected in container train assembly. The second shipping line priority is that railways provide a steady flow of empty containers to the dock-side terminals for loading onto ships. The third priority of shipping lines is the supply of empty containers available for loading in the Lower Mainland.

At origin points, intermodal trains are assembled in a fashion reflecting shipper priorities. That is, at each terminal, train slots are filled first with loaded export containers (the intermodal train may also carry loaded domestic containers). The train is then topped up with empty containers and empty slots are filled with empty containers. This process can take place at a number of terminals in the intermodal train’s transit across the country, with the mix of containers loaded at each terminal reflecting the demands of numerous shipping lines (as many as 18) and their respective requirements to meet specific ship arrival times. Upon arrival at Lower Mainland yards, railcars are shuttled to dock-side terminals as required (and specified at the time and point of loading). These cars have a combination of export loads, empty containers on cars, plus any additional empty rail cars required by the terminals. Empty containers are delivered for loading onto ships or for other disposition at the direction of the shipping line.
The loaded containers are designated for specific ships, docks and times at the time of loading at origin terminals. In contrast, the specific empty container requirements of shipping lines at the dock terminals is determined on a daily basis with minimal advance notice – the priority of empty container types by shipping line, terminal and date is unknown at the time intermodal trains are loaded.

Service to the Lower Mainland Inland Container Terminal under present CPR operations would have this container terminal treated like a fifth terminal in the area. That is, the desired empty containers would have to be switched at Coquitlam and shuttled back to the Inland Container Terminal at extra cost and time. For CPR to serve the facility as assumed in the analysis – i.e. mainline trains intercepted before they reach destination rail yards – would require additional work and cost at originating terminals. Containers destined for the Inland Container Terminal would have to be assembled in a block to facilitate switching. Extra cost and time would be incurred setting off the train. At the assumed location, this set-off could create additional congestion in the Mission area. An additional cost and complexity is the return of the railcars once they have been unloaded, as the empty rail car will still be needed at the docks for import traffic.

Currently, the shipping lines direct the railroads in the loading of loaded containers at intermodal terminals. These instructions are given well in advance of the delivery of those containers to the dockside terminals. The empty containers are co-loaded with export containers at origin and priority is not assigned by the shipping lines until the empties arrive at the dock. Efficient use of the Inland Container terminal in the handling of empty containers would require shipping lines to identify the particular empty containers to be delivered to the Inland Container Terminal so that they can be loaded as a block at origins. The success of the modeled facility would be dependent on the shipping lines’ ability to identify empty equipment requirements in the Lower Mainland well in advance.

Impact of an Inland Container Terminal on the Road Network

Based on the assumption that 70% of containers handled at the Inland Container Terminal are 40 foot containers, a throughput of 140,000 TEU’s would amount to 80,000 containers. This would generate up to 160,000 truck trips per year (in and out). Most of this traffic would take place during the week, as this is the pattern of current truck-related container activity. If all trips occurred on weekdays, this would amount to around 615 trips per day. For the terminal analyzed above, virtually all of this traffic would be routed on the TransCanada Highway and either via the Port Mann Bridge or Highway 10 to the export reload centres clustered along the Fraser River. The contribution of these truck trips to congestion on Highway 1 would be minimal. Traffic counts on Highway 1 at 200th Street under the 1999 Lower Mainland Truck Freight Study indicated a daily truck volume of 7700 two-way trips, of which 61% was heavy trucks. This accounted for around 4% of daily traffic at the time.9 The plan to expand Highway 1 and twin the Port Mann Bridge under the Province’s Gateway Program should substantially improve performance on this corridor.

On the assumption that loaded export containers would be received at the on-dock terminals by rail, this would result in a decrease in truck trips on roads accessing the terminals. The bulk of this traffic would have traveled to either Roberts Bank or the Inner Harbour.

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9 1999 Lower Mainland Truck Freight Study Vehicle Volume and Classification Study Translink Strategic Planning Department Feb 2001.
Access to Deltaport is via Highway 17 and Deltaport Way. According to documents filed by Vancouver Port Authority for the Deltaport Third Berth expansion project, truck traffic is expected to increase from 1800 trips per day to 2400 trips per day by 2012. If half of the 615 truck trips handled at the Inland Container Terminal were destined for Deltaport, this would cut the growth in truck traffic following the Third Berth expansion by half. VPA and the BC Ministry of Transportation have already committed to improvements to Highway 17 to handle increased truck traffic at Deltaport.

Access to the Inner Harbour is either via McGill Street off of Highway 1 or Clark-Knight Street. Knight Street is a major truck route. A City of Vancouver study identified the port as the largest generator of truck trips along the Clark-Knight Corridor. It noted that truck traffic accounts for 8 to 9% of traffic at peak truck traffic periods. However, the peak time for trucks (11 a.m.) differs from cars so the contribution to congestion is less than would be the case if the peaks coincided. Truck counts at Hastings and Clark (the entrance to the port) totalled 1400 per day in a 2001 truck count, of which 60% or 840 were heavy trucks. A reduction of 300 truck trips per day would be significant in terms of the port access roads, but less significant for the corridor as a whole. The truck count at Knight and 41st Street was 2700 vehicles, almost double the level at the port entrance. While a reduction of up to 300 trips would be significant, it would likely have little impact on overall traffic congestion.

The access to Fraser Surrey Docks is via South Fraser Way. The reduction in traffic is likely to be minimal here, in part due to FSD’s small share of container traffic and in part due to the fact that several export transload warehouses are accessed by the same route and traffic to these facilities would not decline.

The Shortsea Shipping Option

In 2004 a study was undertaken to examine the potential for reduction of port-related truck trips from the on-dock terminals – particularly Deltaport – through shortsea shipping, in particular the transfer of containers by barge to potential sites on the Fraser River. The study was funded by the Vancouver Port Authority, Fraser River Port Authority, Fraser River Estuary Management Program, and Transport Canada and conducted by Novacorp Consulting with assistance from JWD Group, Royal Lepage Advisors Inc., and Trow Associates. The study was essentially designed to determine the viability of an Inland Container Terminal using shortsea shipping on short haul routes within the Lower Mainland.

The scope of the study included an evaluation of technical requirements, identification of suitable potential industrial sites on the Fraser River, development of high level cost estimates for selected sites, and an analysis of the competitiveness of the shortsea shipping option with local drayage based on costs and trip times. The study also included an estimate of the environmental benefits which might be realized from the shift in traffic from truck to barge.

For land requirements, the study suggested that at least 10 acres are required for the shortsea transfer terminal for traffic volumes up to 50,000 TEU’s per year. However, it recommended that sufficient land and/or the capacity for expansion would be very important to accommodate traffic growth.

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10 Clark-Knight Corridor Whole Route Analysis Background and Issues. City of Vancouver Community Services and Engineering Services March 2003.
The study identified the need for a rail intermodal yard associated with the shortsea terminal capable of handling up to 50,000 TEU’s per year. It was estimated this could be accommodated on 8 to 10 acres of land, under the following assumptions:

1. Average daily traffic of 137 TEU’s per day (200 peak);
2. The use of 300+-foot, five-well double stack railcars, each holding 20 TEU;
3. A static capacity of about 10 cars or about 3200 feet of track if switching in and out of the terminal is relatively prompt;
4. Up to 9,000 feet of working track for the storage of cargo for several days to assemble a sufficiently large train (i.e. three parallel tracks of 3,000 feet in length and about 100 feet wide requiring 7 acres of land.

Total land requirements were suggested to be:

- Short-Sea Terminal Operations And Storage: 10 to 20 acres
- Rail Inter-Modal Yard: 8 to 10 acres
- Supporting Container Industry Business Operations: 10 to 40 acres +
- Total Approximate Land Area Requirements: 28 to 70 acres +

The second part of the study examined potential industrial sites which would be suitable for development of a shortsea container terminal. Five potential sites were suggested as priorities, including Tilbury, Coast 2000, Fraser Surrey Docks, Parsons Channel/Port Kells, and Pitt Meadows. Tilbury, Coast 2000 and Fraser Surrey Docks were selected as priorities because they have existing infrastructure which would reduce capital cost requirements. Pitt Meadows was selected because of the availability of industrial land, and Parsons Channel/Port Kells was selected to contrast with the others because of the limited availability of land, lack of existing infrastructure, and distance up the river.

The study went on to estimate capital costs and operating costs for a barge service operating between the on-dock container terminals and the shortsea shipping “nodes”. It was assumed that barges would be loaded and unloaded using the container quay cranes at Fraser Surrey Docks, thus no additional capital would be required. For other sites, the use of a reach stacker was assumed. Coast 2000 and Tilbury were estimated to require only 50% of the capital investment required for the Greenfield sites at Pitt Meadows and Port Kells. No capital costs were assessed at the on-dock terminals, though a usage cost for existing equipment (quay cranes) was included where operations called for it. In spite of the suggestion that a rail intermodal yard would be essential, no costs were estimated for either construction or operations.

The results of this analysis are shown in Exhibit 48 for the route from Roberts Bank (Deltaport) to the selected sites.

Two scenarios were estimated, Scenario A assuming 100 containers each way per day, and Scenario B assuming 50 containers.
Exhibit 48 Shipping Study Estimated Costs

<table>
<thead>
<tr>
<th>SCENARIO A - ROBERTS BANK</th>
<th>Coast 2000 / Tilbury</th>
<th>Fraser Surrey Docks</th>
<th>Pitt Meadows /Persons Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>$ 52</td>
<td>$ 37</td>
<td>$ 45</td>
</tr>
<tr>
<td>Stevedoring</td>
<td>$ 81</td>
<td>$ 88</td>
<td>$ 91</td>
</tr>
<tr>
<td>Barge Terminal Development</td>
<td>$ 49</td>
<td>$ 12</td>
<td>$ 92</td>
</tr>
<tr>
<td>Dray To Final Destination</td>
<td>$ 50</td>
<td>$ 50</td>
<td>$ 50</td>
</tr>
<tr>
<td>Total Costs Per Move (Incl Profit @ 15%)</td>
<td>$ 223</td>
<td>$ 169</td>
<td>$ 279</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SCENARIO B - ROBERTS BANK</th>
<th>Coast 2000 / Tilbury</th>
<th>Fraser Surrey Docks</th>
<th>Pitt Meadows /Persons Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>$ 59</td>
<td>$ 69</td>
<td>$ 85</td>
</tr>
<tr>
<td>Stevedoring</td>
<td>$ 108</td>
<td>$ 123</td>
<td>$ 108</td>
</tr>
<tr>
<td>Barge Terminal Development</td>
<td>$ 73</td>
<td>$ 18</td>
<td>$ 138</td>
</tr>
<tr>
<td>Dray To Final Destination</td>
<td>$ 50</td>
<td>$ 50</td>
<td>$ 50</td>
</tr>
<tr>
<td>Total Costs Per Move (Incl Profit @ 15%)</td>
<td>$ 291</td>
<td>$ 260</td>
<td>$ 381</td>
</tr>
</tbody>
</table>

The study concluded that at the higher traffic level – 100 containers per day each way – the shortsea shipping service could offer competitive rates with trucks. It went on to estimate the competitiveness of the shortsea option with respect to transport time (terminal dwell time plus transit time). Using an estimate of 85 hours average dwell time for loaded import containers by truck, and an assumption that a dwell time of 24 hours could be achieved using the shortsea option, the study concluded that the shortsea service could be competitive on transport time in spite of the longer transit time by barge and the additional dwell time at the shortsea terminal.

The competitiveness of the shortsea alternative in these examples depended crucially on the following assumptions:

- The drayage cost from the shortsea terminal would be only $50 per one way trip.
- The dwell time at the terminal for loaded import containers was 85 hours.

The current reality appears to differ significantly from these assumptions.

- Drayage rates have risen under the Ready MOA. For example, the drayage rates currently in effect indicate a drayage rate of $314 per round trip for Deltaport to South Richmond and a rate of $300 between Fraser Surrey Docks and South Richmond. The margin which is available to cover the shortsea shipping move is only $14 per container. The cost (net of drayage) was estimated at $149 in the best case scenario.
- It appears that the actual dwell time for loaded import containers at the on-dock terminals is in the neighbourhood of two days, not 85 hours. This would render the shortsea service significantly slower than truck service.

The purpose of the Novacorp study was to examine the potential for shifting traffic from truck for regional container movements. This is not currently the highest priority for improving competitiveness of the Lower Mainland as a gateway for international container traffic, because the capacity limitations of the existing system are not related to regional trucking. The current problems relate to limited capacity of the on-dock container terminals due to congestion. The capacity of the terminal truck gates is not a constraint. Regular operations for the container terminals still only use the truck gates for 8 hours per day, and the capacity...
of the terminals’ truck operations could be easily expanded simply by expanding truck gate hours. Under current conditions, the terminal operators do not find it economical to incur the additional labour cost of manning the truck gate and terminal for 24 hours.

However, the Novacorp study did point out an important lesson regarding Inland Container Terminals. The location of an Inland Container Terminal relative to existing container-handling facilities can be critical to its competitiveness due to the influence of drayage costs. The Novacorp study noted that for the shortsea option to be most competitive, the ideal situation was to develop a larger area with container-handling facilities on site (in the terminology of this study, an Integrated Logistics Park) which could minimize or eliminate drayage costs. This applies as much to a rail-oriented Inland Container Terminal as a shortsea terminal.

The Novacorp study asserted that a rail intermodal facility is required for the success of a shortsea shipping terminal. However, there was no analysis offered regarding the market this facility would serve. The construction of a small intermodal facility as an adjunct to a shortsea terminal appears unrealistic given current railway operating practices. CN and CPR do not currently provide intermodal service in small car blocks, and (as discussed elsewhere in this report) the requirement for a large scale operation to attract rail service is a significant challenge to the development of a rail-oriented Inland Container Terminal.

6.2 The Inland Option on the Southern Corridor – Export Transloading

The Southern Corridor for purposes of this analysis includes the transportation links within BC serving the Lower Mainland ports. In the broadest interpretation, this includes the CPR southern corridor, the CN rail route to Edmonton, and the old BC Rail route to Prince George which is now operated by CN, and their associated highways.

We have concluded that the most appropriate role for an Inland Container Terminal for the Southern Corridor is to enhance the capacity of the Lower Mainland terminals to handle loaded containers by eliminating the need to handle empty containers on-dock. The option of accomplishing this through construction of an Inland Container Terminal to handle empty containers in the Lower Mainland has been analyzed above. The other opportunity is to intercept westbound empty containers for loading in the Interior of BC.

6.2.1 RAIL INTERMODAL SYSTEM – BUSINESS MODELS AND REGULATORY ENVIRONMENT

CN and CPR do not currently provide direct rail intermodal service in British Columbia outside of the Lower Mainland. This is consistent with the service model developed by the railways for their intermodal operations. The Canadian railways’ intermodal service was initiated in the 1950’s to supplement rail carload service. CN has described the theory behind the development of intermodal service as follows:

“... intermodal services were initiated over 30 years ago to supplement railway carload services. Intermodal service combines the line-haul efficiency of railways with the local distribution efficiency and the flexibility of highway transport. By designing the local distribution system to be handled by highway transport, intermodal service permitted
standardization, a high level of service, and the efficiency of high volume and high utilization of assets to be achieved from the railway components of the movement.  

Initially the railways offered both Trailer on Flat Car (TOFC) and Container on Flat Car (COFC) service but in recent years both CN and CPR have abandoned TOFC service in Western Canada. Both railways have now standardized their rail equipment on single platform double stack railcars capable of handling both marine containers (20, 40 and 45 foot) and domestic intermodal containers (primarily 53 foot containers).

The railways used to offer intermodal ramp service at smaller centres, but have rationalized their operations by centralizing activity at a small number of intermodal terminals in major centres. CN's Western Canadian domestic intermodal terminals are located in Vancouver (Surrey), Calgary, Edmonton, Saskatoon and Winnipeg. CPR has terminals in Vancouver (Pitt Meadows), Calgary, Edmonton, Regina, Saskatoon and Winnipeg.

The inability to obtain direct intermodal rail service has been a source of frustration for many smaller communities who see it as a potential tool for economic development. Many have argued that the railways have an obligation to provide this service under their obligations as federally regulated railways.

Federally regulated Canadian railways have always had statutory common carrier obligations to provide service. These obligations were maintained with the passage of the National Transportation Act 1987, which first deregulated the Canadian railways, and with passage of the Canada Transportation Act 1996 which remains in effect. However, intermodal services have received special treatment. As an example, they were exempted from Competitive Line Rate provisions of the 1987 Act which provided an option for shippers to negotiate rates with connecting railways and have an access rate set by the regulatory body, the National Transportation Agency.

There have been two regulatory rulings on the provision of rail intermodal service as a common carrier obligation of the railways. In 1988 Prairie Malt of Biggar, Saskatchewan made a complaint to the National Transportation Agency that CN Rail was in breach of its statutory obligations under sections 144(1) and 145(1) of the National Transportation Act 1987 because they refused to spot flat cars bearing marine containers at Prairie Malt's facility for loading. CN's submission focused on the cost implications of providing intermodal service to small sites:

- CN opposes the creation of an intermodal depot at the Prairie Malt site in Biggar because of the negative impact it would have on the integrity and performance of CN's centralized hub/satellite intermodal terminal system. In particular, CN views the extension of container spotting at Biggar to be mitigated by the following factors:
  - performance of the intermodal 200-series trains requires a minimum number of terminal stops and quick handling of originating and terminating traffic within those terminals.
  - the mixing of containers of different origins, destinations or owners on a single multi-spot container rail car requires CN to be able to treat cars interchangeably. Cars cannot be allocated to destinations independently or the ability to mix containers on them – necessary for full car spot utilization – breaks down.

11 Decision No. 411-R-1989 IN THE MATTER OF a complaint respecting the provision of container on flat car services at Biggar, in the Province of Saskatchewan. File No. D3206-89/1Canadian Transportation Agency August 11, 1989.
- inspection, servicing, storage, gathering, etc. of containers cannot be done efficiently by CN except at intermodal terminals.  

The Agency determined that the provision of intermodal service directly to Prairie Malt was not required by the railway's statutory obligations:

*Intermodal services, however, are not a basic utility type of service provided by a railway. It is, rather, a specific service, which is designed to meet the exigencies of competitive challenges posed by the motor carrier industry. In order to effectively react to that competition, market forces have dictated centralization of intermodal services at certain locations with trucks operating over the short-haul to and from a customer's facility. While the carrier service obligations of the NTA, 1987 protect the public from arbitrary or discriminatory treatment by a rail carrier, in the provision of intermodal services, they do not, conversely, require the extension of intermodal rail services to locations not currently possessed of them. To impose such a requirement i.e. container on flat car services, to every location where demand for such specialized service may exist, would inevitably result in an inefficient intermodal transport system.*  

Another case was brought before the Canadian Transportation Agency in 1996 by the Lethbridge Chamber of Commerce. They argued that CPR was in breach of their common carrier obligations under sections 113 and 114 of the Canada Transportation Act 1996 by virtue of the closure of CPR's intermodal facility in Lethbridge. CPR argued that the intermodal facility was no longer commercially viable:

*CPR suggests that the Lethbridge facility has become progressively less viable since 1994 when 7,100 loaded containers were handled. In 1996, the anticipated volume will drop to an estimated 3,650 loads. This reduction has occurred despite CPR absorbing the positioning cost for empty containers and despite other efforts at building volumes. According to CP, it projects losses in 1996 of $800,000. Further, CPR mentions that an intermodal operation is only efficient when it runs on the basis of a large "hub" being fed by spokes. Relative to its other intermodal facilities in Canada, CPR submits that the Lethbridge location is no longer a viable "hub".*  

The Agency determined that CPR was not in breach of its statutory obligations, and that the provision of service from their intermodal hub in Calgary constituted an acceptable level of service.

In summary, regulatory decisions have supported the railways' position that they are not obligated to extend direct intermodal rail service to sites which are not currently served, nor to maintain operations at sites which are not commercially viable. Any community or developer wishing to develop an Inland Container Terminal with direct intermodal rail service will have to negotiate a commercial agreement with the railways in order to proceed.

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12 Decision No. 411-R-1989  
13 Decision No. 411-R-1989  
15 Decision No. 59-R-1997
6.2.2 MARKET OPPORTUNITIES FOR CONTAINER TRANSPORTATION ON THE SOUTHERN CORRIDOR

The analysis in section 4 established that the major containerized export commodities currently being shipped through the Lower Mainland ports are forest products and specialty grains. There is insufficient production of specialty grains in BC to form the traffic base for a viable inland Container Terminal. The analysis in section 4.3 identified major clusters of forest products production centred around Prince George and the Thompson Okanagan Region which provide significant quantities of commodities exported in containers, including pulp, paper, lumber and panel products.

Forest producers in the interior of British Columbia have made extensive use of intermodal transportation since the late 1980's through lumber reload centres. These facilities receive lumber by truck and load to railcar or containers for further transport. There have been two major drivers behind this development:

- Producers who have mills which are captive to a single railway used trucking to access competing railways offering lower rates. This provided more leverage in rate negotiations with the railway with direct access to the plant, and expanded the options for shipments via competing railways. The Burlington Northern Railway was a leader in supporting the development of reload centres in the Lower Mainland, and an extensive network of reload centres grew up offering reloading service directly to BNSF in New Westminster and Sumas, Washington, or indirectly via the Southern Railway.

- Reload centres were developed to accommodate traffic from mills on lines which were abandoned by CN and CP. Among these is a reload centre in Kamloops operated by Arrow Transportation, which was established in 1988 to service customers affected by abandonment of the Princeton Subdivision by CP.

The reload centres have expanded their services to include package cutting, custom trimming, bar-coding, package splitting and grading of lumber and associated products. These services were initially offeredprimarily for North American shipments but expanded to include loading of marine containers for export.

Existing lumber reload centres in the Interior include (in addition to the Arrow Transportation facility in Kamloops) a facility operated by Tolko for CN in Kamloops, and a facility operated by CN in Prince George. In the Interior these facilities tend to be operated either directly by the railways or by a company under contract to the railway on whose line they are located.

The largest containerized commodity originating in BC is pulp. From the information gathered for this study, all pulp from the Interior is loaded directly into railcars for shipment to domestic markets or to the Lower Mainland for transloading.

6.2.3 INLAND CONTAINER TERMINAL VIABILITY ON THE SOUTHERN CORRIDOR – INTERIOR LOCATION

It seems unlikely that a single location in the Interior could support an Inland Container Terminal of sufficient size to solve the congestion problems of the Lower Mainland on-dock terminals due to the limitations of the catchment area. The total volume of containers containing lumber exported from the Lower Mainland was only around 115,000 TEU's in 2005. This includes lumber from all sources, not just British Columbia. An Inland Container
Terminal could serve lumber mills within long haul trucking range, and pulp and paper mills located within economical drayage distance. This requires the assumption that an agreement could be reached with CN or CPR for the provision of rail intermodal service.

Lumber is commonly trucked using double trailer Super B-train trucks which can load up to 40 tonnes, or in centre beam lumber cars of various sizes; average railcar loading is 80 to 90 tonnes. Sample rates for various origin-destination pairs within BC are shown below:

Exhibit 49 Rail and Truck Rates for Southern Corridor

<table>
<thead>
<tr>
<th>Comparative Rail and Truck Rates: Lumber</th>
<th>CN Rate (53 ft bulkhead)</th>
<th>Loading (tonnes)</th>
<th>Rate per tonne</th>
<th>Truck rate</th>
<th>Loading (tonnes)</th>
<th>Rate per tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prince George - Vancouver</td>
<td>$2,612</td>
<td>80</td>
<td>$32.65</td>
<td>$1,600</td>
<td>40</td>
<td>$40.00</td>
</tr>
<tr>
<td>Quesnel – Vancouver</td>
<td>$2,519</td>
<td>80</td>
<td>$31.49</td>
<td>$1,350</td>
<td>40</td>
<td>$33.75</td>
</tr>
<tr>
<td>Williams Lake – Vancouver</td>
<td>$2,519</td>
<td>80</td>
<td>$31.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kamloops – Vancouver</td>
<td>$2,427</td>
<td>80</td>
<td>$30.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kelowna – Vancouver</td>
<td>$2,427</td>
<td>80</td>
<td>$30.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quesnel – Kamloops</td>
<td></td>
<td></td>
<td></td>
<td>$1,400</td>
<td>40</td>
<td>$35.00</td>
</tr>
<tr>
<td>Williams Lake – Kamloops</td>
<td></td>
<td></td>
<td></td>
<td>$1,200</td>
<td>40</td>
<td>$30.00</td>
</tr>
</tbody>
</table>

From the rates above, it appears that it is cheaper to truck lumber to the Lower Mainland from as far away as Williams Lake, approximately 500 kilometres. The trucking rate from Williams Lake to Kamloops is only $3.75 per tonne less than the rate to Vancouver. Ignoring for the moment any cost differential on the cost of transloading, this would only allow $97.50 per 40 foot container for the cost of transporting the container to the Lower Mainland, or $189 for each double stack single platform car, if you were contemplating a transload terminal in Kamloops. The carload rate from Kamloops to Vancouver is currently $2427, so to be competitive the railway would have to set an intermodal car rate which was significantly below the rate for a lumber car. It is unlikely that the costs of transloading in Kamloops could be low enough to make this move competitive under the current rate structure.

Long haul drayage of containers is also unlikely to be competitive with the current system. The difference between the 40 tonne payload of a Super B-Train and the 26 tonne payload of a fully loaded 40 foot container is over 50%; if the truckload rate was the same this would imply a long haul drayage rate of almost $52 per tonne compared to $33.75 per tonne for a Super B -train.

The key to enabling a viable Inland Container Terminal in the Interior of BC is in finding a rail service model which can accommodate the requirements for the railways and shipping lines for efficiency in the use of their equipment, and in railway operations. If this can be accomplished, small scale transloading at multiple locations might provide a sizable contribution to reducing congestion due to the handling of empty containers in the Lower Mainland. Within BC, this could be accomplished with minimal capital investment at existing lumber reload centres in the Interior, which already have the required road, rail and yard infrastructure.
6.3 Northern Corridor Export Transloading

Northern British Columbia is experiencing a dramatic economic resurgence following years of challenge. The recovery of the coal sector, proposals for pipelines and other major projects, and the development of a new container terminal at the Port of Prince Rupert herald a bright future for the North.

Container operations at Prince Rupert are unlikely to face the same challenges of urban and port congestion that terminals in the Lower Mainland are facing. The rationale for an Inland Container Terminal on the Northern Corridor will not be to ameliorate port or road congestion, but to enhance options for shippers. This may indirectly ease congestion in the Lower Mainland through providing an alternative port for TransPacific container shipments.

The North West region of British Columbia faces some unique challenges. Long haul trucking is a less attractive competitive option than in the southern or central areas of BC, due to the long distance from markets. Ocean shipping options have been severely limited since the cessation of breakbulk shipping services by vessel to Prince Rupert several years ago. The transfer of BC Rail operations to CN has resulted in dependence on a single rail carrier for service.

Considerable uncertainty remains around the services which will be available through the new Prince Rupert container terminal. CN has announced a major investment in a grain transload facility in Edmonton, and is considering developing a transload facility in Prince George to take advantage of the new opportunities. These are positive developments in that they offer the potential for increased service options for export shippers.

Should CN decide to expand its interest in forest products transloading in the North, this would likely limit interest in establishing a competing facility on the Northern Corridor.

In our consultations in the North, it was apparent that shippers’ major concern was that competitive options be available to enable them to take advantage of the new opportunities offered by access to ocean container shipping through Prince Rupert. In addition to options for shipping existing products, stakeholders expressed ambitions to use the new transportation options to build on the region’s existing resource base and develop new products and industries. For this purpose, they indicated that it is essential that they have the option of accessing the new Prince Rupert container facility by truck where distance from the port makes this an economical alternative.

Transloading of lumber in Prince Rupert may be more economical for the majority of mills on the Highway 16 corridor between Prince George and Prince Rupert. The total capacity of the lumber mills on this section is around 2.6 billion board feet, distributed as shown in Exhibit 50.
**Exhibit 50 Lumber Mills on the Highway 16 Corridor – Prince George to Prince Rupert**

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Annual Capacity (Million board ft.)</th>
<th>Approx. Distance (km) – Prince George</th>
<th>Approx. Distance (km) – Prince Rupert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Forest Products Ltd.</td>
<td>Isle Pierre</td>
<td>175</td>
<td>52</td>
<td>687</td>
</tr>
<tr>
<td>L &amp; M Lumber Ltd.</td>
<td>Vanderhoof</td>
<td>168</td>
<td>99</td>
<td>620</td>
</tr>
<tr>
<td>Canadian Forest Products Ltd.</td>
<td>Engen</td>
<td>347</td>
<td>119</td>
<td>603</td>
</tr>
<tr>
<td>West Fraser Mills Ltd.</td>
<td>LeJac</td>
<td>240</td>
<td>149</td>
<td>625</td>
</tr>
<tr>
<td>West Fraser Mills Ltd.</td>
<td>Burns Lake</td>
<td>260</td>
<td>227</td>
<td>492</td>
</tr>
<tr>
<td>Cheslatta Forest Products Ltd.</td>
<td>Ootsa Lake</td>
<td>96</td>
<td>227</td>
<td>492</td>
</tr>
<tr>
<td>West Fraser Mills Ltd.</td>
<td>Burns Lake</td>
<td>73</td>
<td>227</td>
<td>492</td>
</tr>
<tr>
<td>Canadian Forest Products Ltd.</td>
<td>Houston</td>
<td>442</td>
<td>307</td>
<td>412</td>
</tr>
<tr>
<td>Houston Forest Products Co.</td>
<td>Houston</td>
<td>319</td>
<td>307</td>
<td>412</td>
</tr>
<tr>
<td>Corwood Timber Products Ltd.</td>
<td>Houston</td>
<td>8</td>
<td>307</td>
<td>412</td>
</tr>
<tr>
<td>West Fraser Mills Ltd.</td>
<td>Smithers</td>
<td>240</td>
<td>371</td>
<td>348</td>
</tr>
<tr>
<td>Kispiox Forest Products Ltd.</td>
<td>South Hazelton</td>
<td>48</td>
<td>443</td>
<td>277</td>
</tr>
<tr>
<td>Kitwanga Mills Ltd.</td>
<td>Kitwanga</td>
<td>55</td>
<td>482</td>
<td>239</td>
</tr>
<tr>
<td>West Fraser Mills Ltd.</td>
<td>Terrace</td>
<td>168</td>
<td>575</td>
<td>144</td>
</tr>
<tr>
<td><strong>Total Capacity</strong></td>
<td></td>
<td><strong>2639</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The locations of the lumber mills in this area are illustrated in Exhibit 51 following.
Exhibit 51 Lumber Mills on the Northern Corridor – Prince George to Prince Rupert
Almost 80% of the capacity is located closer to Prince George than Prince Rupert. However, lumber trucked to Prince George for export transloading will still incur rail line haul costs from Prince George to Prince Rupert, while lumber transloaded in Prince Rupert would only require a short local dray move. CN does not currently publish carload rates for lumber between Prince Rupert and Prince George. However, the distance from Prince George to Vancouver (760 km) is approximately the same as the distance from Prince George to Prince Rupert (719 km). The carload rate from Prince George to Vancouver is $2612 or $32.45 per tonne assuming an 80 tonne load. These additional rail costs may make it economical to truck to Prince Rupert in spite of the greater distance. The final result will depend on the intermodal rates set by CN in the event they decide to provide service.

The capacity within a catchment area extending as far east as Ootsa Lake from Prince Rupert would total 1.7 billion board feet or around 65% of the total capacity along this section of the corridor. A transload facility in Prince Rupert could also potentially handle export pulp from the Eurocan mill in Kitimat, and lumber and pulp from coastal mills. This underlines the importance of ensuring truck access to the Prince Rupert container terminal.

7. CONCLUSIONS AND RECOMMENDATIONS

This study has been undertaken to determine the potential for development of an Inland Container Terminal to improve container flows in British Columbia. Through a review of literature on the subject, and examination of successful and unsuccessful Inland Container Terminals worldwide, we have identified five key success factors:

1. Near the centre of production/population.
2. Availability of suitable land.
3. Good mainline rail connections and competitive rail service.
4. Direct connection to a major highway network.
5. A phased development approach which can limit initial capital requirements.

We have examined potential business models for an Inland Container Terminal in BC based on the composition of the existing traffic base. We have identified opportunities to develop Inland Container Terminals to mitigate congestion problems at the on-dock terminals. Our conclusions and recommendations based on the four business models are as follows.

7.1 Import Distribution

The most likely potential catchment area for an import distribution Inland Container Terminal is the Lower Mainland. The critical factor for import demand is the size of the local market, and the Lower Mainland is the only major population centre in BC. The availability of land for initial construction and expansion could be a major challenge in the Lower Mainland as the availability of industrial land is limited and land prices are high.

Developing a competitive short haul option to trucking is a major challenge in implementing an import distribution Inland Container Terminal. The cost analysis done in section 5.

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16 CN Tariff CN 002421-AH effective September 2006 to December 31, 2006 Rate for 53 ft. bulkhead car.
highlighted the impact of drayage costs on the competitiveness of the rail shuttle and shortsea shipping alternatives. The requirement for a competitive import distribution Inland Container Terminal is achieving a compact cluster of facilities which can supply a sufficient scale of operations for a rail shuttle or shortsea shipping option, and substantially reduce the need for drayage.

The rapid growth in import traffic improves the potential for development of an import transload-oriented Inland Container terminal, but will not be sufficient by itself to make it viable.

### 7.2 Export Transload

The major potential catchment areas in B.C. for containerized exports are areas with major forest products facilities. The other major containerized export category, specialty grains, would not provide a local traffic base for an Inland Container Terminal because the production of these commodities in BC is very limited.

The most promising catchment areas for lumber are the major producing areas centred around Prince George in the North and Kamloops in the South. For pulp, the major catchment area is in the North centred around Prince George-Quesnel, though there is significant capacity at Kamloops and in the Northeast.

The availability of competitive and reliable rail service is a major issue affecting potential locations for an export-oriented Inland Container Development. The areas served by both major railways are limited to the region along the Fraser Canyon from Kamloops west. The entry of CN into the transloading sector poses a major risk to any third party wishing to develop an inland container terminal on CN’s northern corridors.

The longer transit time to port from an Inland Container Terminal located in the Interior may make it more difficult to cope with changes to terminals’ Earliest Receiving dates due to vessel delays or other unanticipated events.

The cost analysis in section 5 highlighted the challenges of developing a competitive export transload-oriented Inland Container Terminal under the current rail and trucking rate structures. The cost of trucking direct to the Lower Mainland is much lower than the combined trucking and rail costs for an intermodal movement under current rates.

In the Northern Corridor, CN’s announced intention to develop an export transload facility should provide additional options for shippers. Truck access to the new Prince Rupert container terminal will be a key requirement for competitiveness for shippers along the Highway 16 corridor between Prince Rupert and Prince George, and may provide opportunities for transloading of forest products from coastal mills in Prince Rupert.

Rapid growth in westbound containerized shipments of forest products is not anticipated in either Vancouver Port Authority or Westac forecasts. Export growth cannot be counted on to improve the potential viability of an export transload-oriented Inland Container Terminal.
7.3 Empty Container Terminal

This application of an Inland Container Terminal has the highest potential to increase the efficiency of on-dock container terminal efficiency. The potential catchment area with highest potential for an Inland Container Terminal to handle empty containers is the Lower Mainland. The major function of an empty container terminal is to reduce handling requirements at the on-dock terminals while ensuring the availability of empty containers for loading of export shipments. Since the existing export transload facilities are located in the Lower Mainland, in the short term this is the logical location for construction of an Inland Container Terminal for handling empty containers. This location also allows exporters to respond quickly to schedule changes due to vessel delays, etc. which may shift or reduce the time available for delivering containers to the docks.

Under the current business models, the minimum efficient scale for efficient rail operations is around 150,000 TEU’s. The current “container gap”, the total volume of empty containers returning from Eastern Canada needed for reloading is around 140,000 TEU’s. This implies that one terminal is sufficient to handle the empty container requirements for the Lower Mainland, and that it would have to be located where it could intercept all of the empty containers destined for both Deltaport and the Inner Harbour terminals.

The availability of land for initial construction and expansion of an empty container Inland Container Terminal is a major challenge in the Lower Mainland as the availability of industrial land is limited and land prices are high.

The costs of implementing this model in the Lower Mainland were extensively analyzed in Section 5. The analysis indicated that distance from the on-dock terminals is a key determinant of drayage and rail operating costs, and that the costs of using an Inland Container Terminal of sufficient size to maintain rail efficiency are not competitive with the current system of trucking from on-dock terminals.

The implication of the forecast growth imbalance between imports and exports is that the demand for this service – the need for unloading of empty containers from rail cars to make them available for export loading may actually decrease. The reason for this is that under the assumption that the share of loaded imports picked up by truck from the on-dock terminals will remain the same, the growth in import traffic will increase the availability of empty containers within the Lower Mainland. The effect of the forecast traffic growth on the container “gap” is shown in Exhibit 52:
If the forecasts are accurate, the demand will not be sufficient to support a large scale rail-served Inland Container Terminal devoted solely to empty containers in the Lower Mainland in the future. Almost all of the empty containers returning from Eastern Canada will flow directly to the on-dock terminals for immediate evacuation by vessel.

7.4 Integrated Logistics Park

In the Lower Mainland context, an Integrated Logistics Park could be thought of as an Inland Container Terminal with onsite facilities for import and export transloading and empty container storage and servicing. A facility of this type could have numerous advantages, including a scale of operations which could make short haul rail shuttles to the on-dock terminals feasible, co-location of import and export transload facilities and empty container storage to minimize drayage costs, and reduced traffic congestion and air emissions.

The major barriers to development of an integrated logistics park in the Lower Mainland include the lack of suitable parcels of industrial land, local community opposition to container transportation activity, and the difficulty in relocating activities from current facilities, many of which have only recently been constructed. The opportunities may be limited to capturing the growth in import and export transloading as the capacity of existing facilities is fully utilized. This would imply a phased site development with land available for expansion as traffic grows.
7.5 Recommendations

7.5.1 CONTAINER ACTIVITY CLUSTERS

The analysis in this study has pointed out that efficiency for port-related rail and truck operations is maximized when activity takes place as close as possible to the port terminals. More rapid expansion of on-dock terminal capacity, or development of container handling facilities adjacent to the on-dock container terminals, may offer better efficiency and increased levels of service if it can be accomplished.

7.5.2 LONG RANGE PLANNING

Our analysis has pointed out that the Lower Mainland is likely to remain the focal point for container-related economic activity because the concentration of population and existing infrastructure base (including the on-dock and off-dock terminals and transload facilities) provide a catchment area which can support additional development. This means that if the Lower Mainland is to continue to grow as an Asia-Pacific Gateway all levels of government will have to come to grips with the challenges of expanding the infrastructure base for these activities in a major urban region with competing demands for scarce land and growing concerns over the environmental impact of industrial activity.

7.5.3 LAND USE POLICIES

The availability of suitable land for initial construction and expansion has emerged as the dominant contribution that the public sector can make to the successful expansion of port-related economic activity. Our surveys of successful Inland Container Terminals have identified numerous examples where governments have enabled the development of facilities through the assembly of suitable parcels of industrial land, usually through conversion from other uses.

In an Inland Container Terminal is required to enable the ports to expand their capacity, development of Integrated Logistics Park facilities can be characterized as a Best Practice. They can provide the critical mass for optimizing transportation and distribution activities while minimizing the external impacts such as road congestion, noise and emission on surrounding communities. This type of development requires a large land base, and public policy changes may be required to facilitate the assembly of suitably zoned and serviced land parcels.

Given the difficulty in assembling large parcels of industrial land, it would be wise to protect the integrity of concentrations of industrial land through appropriate land use policies. It may be worthwhile to undertake a project on the model of the Brownfields Redevelopment Project at the Port of New York and New Jersey to identify existing sites which are well located for port-related activity and facilitate their redevelopment for this purpose. Where large clusters currently exist, they should be protected from encroachment by non-industrial developments and provided with the necessary road access and rail service.
Potential options for British Columbia include:

Creation of strategic Industrial Land Reserves on the model of the Agricultural Land Reserve to preserve high priority industrial land for industrial purposes, including container – handling industries.

Encouraging municipal land use and zoning decisions which enable the maintenance and expansion of container handling facilities.

A review of selective exemptions from Agricultural Land Reserve restrictions to facilitate the transfer of low productivity agricultural land to industrial use for high priority developments.

Development of an Integrated Logistics Park facility. This type of development requires a large land base, and public policy changes may be required to facilitate the assembly of suitably zoned and serviced land parcels.

An inventory of industrial land resources should be undertaken, and appropriate land use policies should be implemented to maintain the integrity of existing industrial areas. Where large clusters currently exist, they should be protected from encroachment by non-industrial developments. The efficiency of existing clusters of container handling facilities might be enhanced through upgrading of road access and rail service.

Fraserport’s Richmond Property already has the nucleus of an Integrated Logistics Park but is hampered by inadequate access to the provincial highway system, and an inadequate scale of operations to attract sufficient rail service by CN. If these issues could be resolved, the benefits to the container system could be very significant, as the concentration of activities on site could reduce truck traffic and potentially render a shortsea shipping approach feasible.

7.5.4 GOOD MAINLINE RAIL CONNECTIONS AND COMPETITIVE RAIL SERVICE

The development of a rail service model which can support the transfer of activity from the congested on-dock terminals to external locations without compromising railway efficiency is a major challenge. The solution will have to be negotiated between the railways and their customers. Governments can play a role by attempting to foster a dialogue among the major railways, terminal operators and shipping lines to identify possible solutions and policy changes which could facilitate a more flexible service model.

7.5.5 DIRECT CONNECTION TO A MAJOR HIGHWAY NETWORK

Governments can play a major role in this by ensuring adequate road access for existing port-related industrial areas, and through adopting planning for goods movement as an integral element in their road planning activities.

7.5.6 A PHASED DEVELOPMENT APPROACH WHICH CAN LIMIT INITIAL CAPITAL REQUIREMENTS.

This factor is related to the land issues noted above. It is unrealistic to believe that, if an Integrated Logistics Park could be created, all current activity could be relocated there in the
short term. Companies have made major investments in existing facilities and will not abandon them. However, over time the advantages of the Logistics Park cluster will provide the incentives for growth at the new site. The success of the endeavor will depend on assembly of a sufficient land base, and policies which can ensure the land remains available for the long term even though it may not be full utilized at the outset. These policies could include property tax changes and special zoning regulations.

This study has been undertaken at a time of tremendous change in the port community in the Lower Mainland. The firm operating two of the four on-dock container terminals, Terminal Systems Inc., has recently been purchased from Overseas Orient (International) Ltd. by the Ontario Teachers Pension Fund as part of a $2.4 billion transaction which includes Deltaport, Vanterm and two terminals in the U.S. Fraser Surrey Docks is currently for sale. The three Lower Mainland port authorities have agreed to merge into a single organization. These developments may lead to delays in investment decisions in the short term. However virtually all of the firms interviewed in the course of our research expressed confidence in the opportunities for growing their businesses, and many are currently working on plans for expansion. If the challenges identified in this report can be dealt with, the industry is poised to take advantage of these opportunities.
Appendix A  
Steering Committee Membership

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dave Bachynski</td>
<td>BC Ministry of Transportation</td>
</tr>
<tr>
<td>Brad Bodner</td>
<td>CN Rail</td>
</tr>
<tr>
<td>Richard Emmer</td>
<td>CP Rail</td>
</tr>
<tr>
<td>Steve Jones</td>
<td>Western Economic Diversification Canada</td>
</tr>
<tr>
<td>Ed Kargl</td>
<td>Fraser River Port Authority</td>
</tr>
<tr>
<td>Lorne Keller</td>
<td>Prince Rupert Port Authority</td>
</tr>
<tr>
<td>Gary Schick</td>
<td>BC Ministry of Economic Development</td>
</tr>
<tr>
<td>Randy Sunderman</td>
<td>BC Ministry of Economic Development</td>
</tr>
<tr>
<td>Jim Wang</td>
<td>Transport Canada</td>
</tr>
<tr>
<td>Peter Xotta</td>
<td>Vancouver Port Authority</td>
</tr>
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</table>

Appendix B  
Inland Container Terminal Study  
List of Organizations Contacted

<table>
<thead>
<tr>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow Transportation</td>
</tr>
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<td>Canadian National Railway</td>
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<td>Canadian Pacific Railway</td>
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<td>Canfor</td>
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<td>China Ocean Shipping (Canada) Ltd.</td>
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<tr>
<td>City of Terrace</td>
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<td>Coast 2000</td>
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<td>Community Futures Association of Fraser Fort George</td>
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<td>Delta Container Inc.</td>
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<td>Fraser River Port Authority</td>
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<td>Greater Vancouver Regional District</td>
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<td>Hyundai Merchant Marine Agency Inc.</td>
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<td>Initiatives Prince George</td>
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<td>KTL Transport Inc.</td>
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<td>Transpacific Container Terminal Ltd.</td>
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Appendix C
Inland Container Terminal Study
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Appendix D
Inland Container Terminal Study
Glossary of terms and Abbreviations

BNSF: Burlington Northern Santa Fe Railway

Catchment Area: Market area served by a transportation facility.

CIRIS Project: California Inter-Regional Rail Intermodal System Project of the Port of Oakland to develop off-dock terminal facilities served by short haul rail service.

Domestic intermodal container: Steel container used for shipping cargo in domestic (North American) rail intermodal market. Standard sizes are 48 foot or 53 foot containers.

Drayage: The transportation of marine containers by truck.

ICTF: Intermodal Container Transfer Facility, a rail intermodal yard operated by the Union Pacific Railway which serves the Ports of Los Angeles and Long Beach.

Inland Container Terminal: A facility for the transfer of loaded or empty marine containers inland from vessel-handling port terminals.

Intermodal: The transportation of freight in a container or vehicle, using multiple modes of transportation (rail, ocean carrier and truck), without any handling of the freight itself when changing modes.

JIT: Joint Intermodal Terminal, a rail intermodal yard serving container traffic at the Port of Oakland.

Lift: Movement of a marine or domestic intermodal container on or off a vessel, railcar or truck.

Locomotive Consist: The configuration of a single locomotive, or any number of locomotives, joined together and working under a single point of control, normally referred to when handling equipment as a train. Locomotives used at mid train location are often referred to as remote locomotives.

Marine container: Steel container used for shipping cargo in container ships; standard sizes include 20 foot, 40 foot and 45 foot containers (dry and refrigerated or "reefer" containers)

Off-dock terminal: For purposes of this study, a container terminal for the storage, repair and servicing of marine containers, served by truck.

On-dock terminal: A container terminal offering loading/unloading services for deepsea vessels.

Ready MOA: Memorandum of Agreement negotiated between trucking companies and drivers during the port trucking strike in the summer of 2005. The Ready MOA is the basis of current drayage rates in the Lower Mainland.

Shortsea shipping: In the North American context, refers to the marine transportation of passengers and goods that does not cross oceans and takes place within and among Canada, the United States and Mexico.

TEU: Twenty Foot Equivalent Unit; used to measure container traffic based on a standard 20 foot ISO marine container (i.e. one 40 foot container = two TEU's).

Transload: For purposes of this study, to transfer cargo to/from a marine container from/to an alternative mode - rail, truck or domestic intermodal container.

VCTA: Vancouver Container Truck Association, the organization representing drayage drivers during the port trucking strike in the summer of 2005.