Quorum Corporation

Report of the Grain Monitor: Supplemental Program

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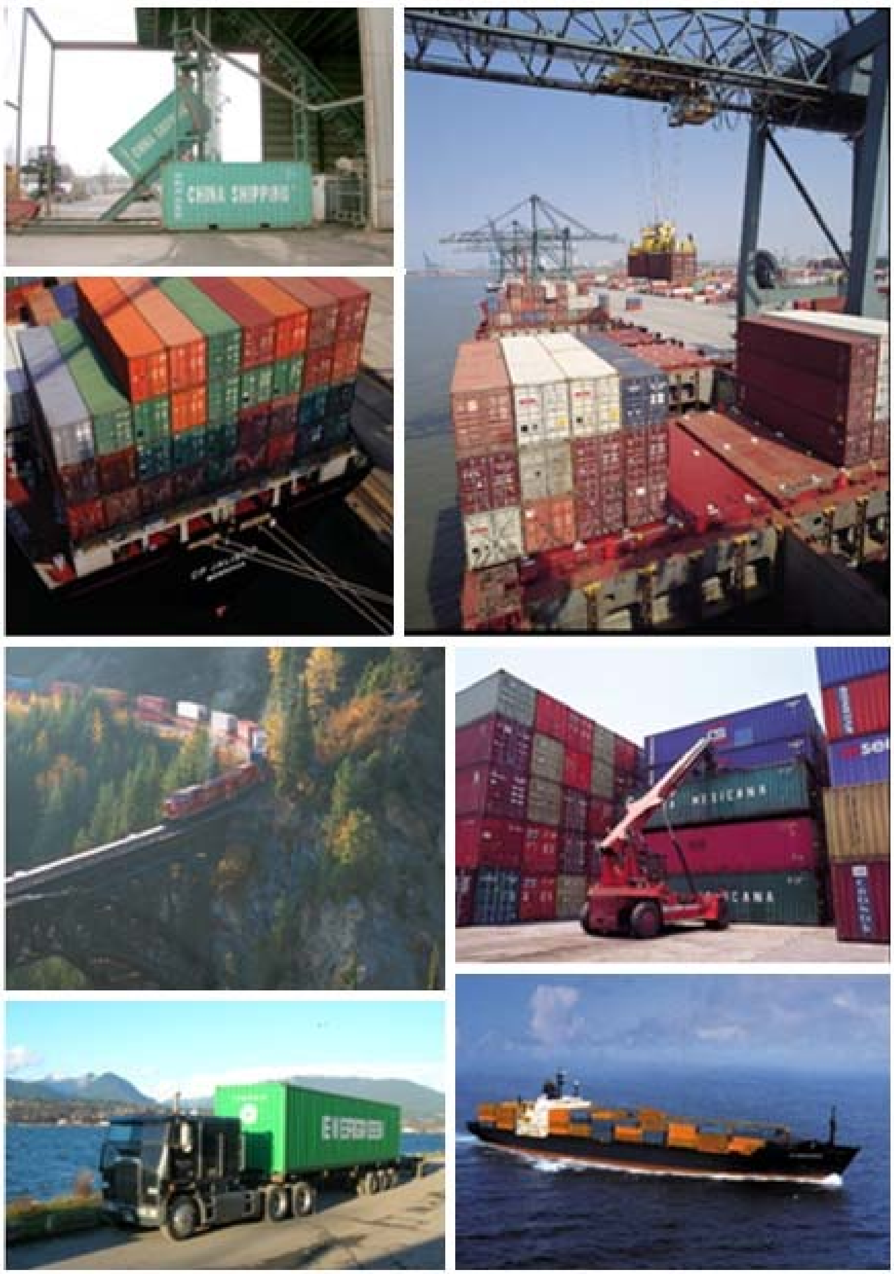

Container Use in Western Canada:

Inland Terminals, Container Utilization, Service and Regulatory Issues and the Optimization of Use in Western Canada

Government of Canada Gouvernement du Canada

Foreword

In developing the Grain Monitoring Program (GMP) the federal government included provisions for supplemental studies to be performed on topics related to the logistics of grain in Western Canada. This study has been undertaken under the supplemental portion of the GMP. While the study addresses issues related to the movement of grain in containers its focus is on the broader issues impacting the container industry in Canada.

As is the case with the core GMP, this study has as its foundation the analysis of comprehensive data related to the movement of containers to, from, and within Canada, much of which is summarized in data tables found in the report appendices. Key data sources include the Ports of Vancouver, Montreal, and Halifax; the railways; and Statistics Canada. We would like to thank the representatives of these organizations who worked with us in the provision, interpretation, and validation of the data to ensure the highest possible level of data integrity and quality.

During the course of conducting the research for this report extensive interviews were undertaken with a broad cross section of the stakeholder community. Over 50 companies and 90 people participated in the interview process. We would like to express our thanks and appreciation to those companies for their time and insights that contributed significantly to the completion of this study.

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Executive Summary

Driven by the growth of international trade, Canada's ports and inland transportation systems are dealing with rapidly increasing volumes of international shipping containers. Trade values increased 13% between 2002 and 2006 to $800 B – an average of 3% per year, but container volumes during this period grew more than 31%, or 7% per year. Total container handlings at Canadian ports exceeded 4.3 million TEUs in 2006, with the majority (94%) handled at Canada's three principal container ports – Vancouver[1], Montreal, and Halifax. Vancouver is Canada's largest container port with 2.2 million TEUs, followed by Montreal at 1.3 million TEUs and Halifax with 0.537 million TEUs.

Vancouver is one of North America's fastest growing container ports with total traffic having increased by more than 50%, as measured by TEU handlings, since 2002 and by more than 200% since 1997 when it was ranked as North America's 14th largest container port.

This growth has not come without its difficulties. Western Canadian industry in particular has been challenged to obtain access to adequate transportation capacity over the last number of years. The situation is particularly acute with regard to the international container sector, where export sales have been lost and late delivery penalties incurred.

In 2006 Transport Canada retained MariNova Consulting to examine issues surrounding the use of empty containers moving through Canada's west coast ports as part of the Asia Pacific Gateway initiative. Quorum Corporation has been asked by Transport Canada to complete a follow-up study to the work done by MariNova. The three areas of particular interest to Transport Canada are: inland terminals, shipper associations and cooperatives and issues relative to the Tariff on International Containers.

This report will focus on these areas and will provide:

- A comprehensive background and insight into how the container marketplace operates from a logistical and commercial perspective;
- An analysis of the costs and general business economics of inland container terminals including some of the key parameters for a breakeven analysis. It is intended this be used as a reference for municipalities and government policy groups in determining the viability of inland container terminal / port development;
- An examination of existing industry service and regulatory opportunities and challenges

This report uses a considerable amount of railway and container industry terminology. For the reference of the user we have provided a glossary of terms that are found in this report. It can be found in Appendix 1 at the back of the report.

[1] Excludes volumes and TEU handlings for Fraser Surrey Docks

Traffic Flows and Market Conditions

Containerized imports continue to increase in volume faster than exports. This gap between imports and exports has created a surplus supply of empty containers to support export movements. While shipping lines do have an interest in marketing this surplus capacity for the movement of Canadian export traffic, the lower value of Canadian export commodities (as compared to import commodities) and the surplus supply of containers results in export freight rates being significantly lower than the import rate levels. Consequently, the motivation for shipping lines to promote the movement of international containers to inland locations where export traffic volumes originate is low, as the financial returns for doing so are limited.

Discussions with some shipping lines revealed that, in their most recent drive to reduce costs, they have begun to adjust their pricing structures in order to discourage importers from moving imported goods directly to inland locations in international containers. Some lines have gone so far as to discontinue marketing services directly to the Prairie Provinces while others have increased the cost of these inland movements. These marketing actions serve to restrict the supply of containers to inland areas.

Notwithstanding the marketing actions by shipping lines, over 50% of international containers depart by rail empty from Alberta and Manitoba and over 20% of containers leave Saskatchewan empty, en route to export positions. Overall, the Prairie Provinces receive much of their inbound container supply through the domestic repositioning of international containers carrying domestic traffic, originating primarily in Central Canada. While port transloading and shipping lines' marketing actions may restrict supply of international containers to the Prairies, there is still an overall surplus of containers available on the Prairies.

There are differences in demand for types of containers. In terms of the total movement of containers into Canada, 38% are 20 foot and 60% are 40 foot containers with the remaining 2% consisting of a mix of other equipment types. While most commodities loaded in Western Canada will look for the maximum amount of cubic capacity, typically found in 40 foot containers, shippers of grain and other high density commodities show a preference for 20 foot equipment. This is because 20 foot equipment can accommodate up to 26-28 tonnes of grain where a 40 foot container is limited (because of structural issues) to slightly more than 30 tonnes. As such, the demand for 20 foot equipment in the province of Saskatchewan is high, and consequently, the one location and the one type of equipment where periodic shortages can occur.

The most important factors driving the shipping lines' equipment allocation decisions and the subsequent shortages of specific container equipment on the Prairies are the low revenues and consequent thin margins on the export traffic being offered for movement. For a shipping line, the current market prices on some of the traffic offered does not provide a sufficient incentive to support delaying containers at either inland or port locations. Pressured by resource demands and increasing costs of storage, they will often opt to return those containers empty to their main revenue generating head haul markets in Europe and Asia.

For shippers who can take advantage of bulk transportation and whose commodities are not susceptible to degradation through the transload process, transloading of export shipments to containers at port is the most popular option, and can be the most cost effective means of movement. It is estimated that 57% of all containerized exports from Canada are transloaded at port.

Railway transportation is critical to the logistics chain, especially at Vancouver where 70% of traffic is moved directly by rail from the docks. Stakeholders are concerned that the structure of the containerized transportation supply chain through Vancouver is not capable of handling seasonal surges of volume and that this is affecting the reputation of Canada's containerized logistics system.

Most stakeholders recognize the significant strides made by railways, port terminal operators and logistics providers to increase the efficiency of port operations. However, concerns remain about the fragility of the port's throughput capacity due to the lack of buffer capability available to handle shocks that occur from weather related disruptions to ocean and railway operations.

Inland Container Terminals

The quantitative analysis of inland container terminals (ICT) performed for this study shows that, much like other capital intensive operations, an ICT is highly sensitive to fluctuations in workload and revenue. Smaller, lower volume terminals have a greater susceptibility to changes in volumes and workload as they will naturally have a narrower margin within their capacity envelope. These facilities will therefore be very vulnerable to volume fluctuations and will need to be constructed only in locations where the prospects for predictable and stable volume from a broad range of commodities can be assured.

In addition, the implications for the network within which the terminal is situated must factor into the planning of an ICT in order to ensure that the traffic types and volumes are capable of generating positive returns and do not place a burden on other parts of the system. The network cost of implementing a new terminal into an intermodal system will typically exceed the terminal costs by a factor of three or more.

The impact of demographics on the draw of containers into geographic areas has an effect on the viability of any ICT development. The retail nature of most inbound commodities means that the natural traffic flow for containerized traffic imported to Canada is to areas of high population density. It is there that the greatest volume of available empty containers can be found. However, in Western Canada, the preponderance of export products requiring movement in containers originates on the Prairies in areas of low population density and outside of urban areas in British Columbia.

Finally, while initial cost reductions in infrastructure capital may reduce the level of investment they will result in higher operating costs. The immediate benefits in the case of an ICT must be weighed against the long-term operating costs that will be incurred, in addition to the long-term impact on the terminal's capacity.

It is important to note that the establishment of an ICT requires a relatively high volume of traffic to provide financial viability. At present there are currently no obvious locations where such a terminal could be built that would be financially self-sufficient without requiring the closure of existing railway intermodal facilities. The support and participation of railways and shipping lines in the development of such a facility is a precondition of its success and as such the prospect for the construction of such new facilities in Western Canada in the immediate term is very low.

Industry and Regulatory - Opportunities and Challenges

Two areas of study undertaken for this report were recommended in a previous undertaking for Transport Canada by MariNova Consulting of Halifax, NS. The first was to review and investigate where a possible cooperative effort could be undertaken to reduce logistics costs for Prairie container shippers. There was a consensus amongst stakeholders that the key potential benefit to such cooperative arrangements would be the pooling of demand to provide negotiating leverage and possible scale economies to smaller shippers.

However, a number of shippers with direct experience in dealing with such cooperative marketing and operating arrangements identified a number of critical success conditions for such arrangements. Their experience suggested that individual firms should have genuine joint interests that outweigh any competitive factors between firms, be of similar size and market power and must offer competitive advantage over existing logistics and marketing arrangements. In the case of exporters both the commercial and the operational relationships with transportation carriers should be managed through the cooperative in order to succeed.

Shippers of grains and special crops seemed more favorably disposed towards the creation of shipper cooperatives and marketing arrangements for the management of containerized shipments than were shippers of forest products. Most of the forest products firms are either large enough to manage their own carrier relationships effectively, or in the case of Interex Forest Products, have already established cooperative marketing and logistics arrangements in limited geographic markets.

The second area for study recommended in the MariNova report was a review of the current provisions in Canadian regulations that affect the use of international containers in domestic freight movements to determine whether or not changes in these regulations might be of benefit to Canadian importers and exporters. This was accomplished through stakeholder interviews with shippers, shipping lines and representatives of both the Canadian and US Federal Governments. While this topic has been reviewed previously by Transport Canada, the purpose of this assignment is to provide additional background as well as to elicit the opinions of stakeholders on the relevant issues.

The regulatory environment under which international containers are temporarily allowed into Canada places restrictions such that they are required to be exported within 30 days of entry, be used for no more than one point-to-point domestic movement provided that it is incidental to its use for international commercial transportation, and that any domestic movement must follow a route that is similar and consistent with the movement of the goods in international transportation[2.] Container operators can apply to the Carrier and Cargo Programs Section of the Canada Border Services Agency (CBSA) to be included in the Customs Post Audit System, under which international containers must be exported within six months of their importation[3].

[2] The regulations are contained in memorandums published and administered by the Canadian Border Services Agency (CBSA) and pertain to Customs Tariff item 9801.10.00, which is the responsibility of the Department of Finance.

[3] Provided the owner/operator is an approved bonded carrier and maintains records acceptable to the CBSA. Other provisions, such as entitlement to one incidental movement still apply. Twenty-one marine carriers operating in Canada participate in the Post Audit System. These carriers represent a large proportion of the container supply

There are twenty-one marine carriers operating in Canada that participate in the Post Audit System that represent a large proportion of the container supply.

The corresponding US regulations require that domestic moves are directed towards the port of ultimate exit. However in practical terms the containers can remain in the US without restriction for one year. This interpretation of US Cabotage regulations was confirmed to Quorum staff during discussions with United States Department of Homeland Security officials who confirmed that shipping lines have practically unfettered use during the 365 day time frame.

In discussion with stakeholders there was consensus that the current restrictions on the use of import containers for domestic freight movements do not place significant restraints on the use of such containers. It was argued that the Canadian freight market, with population centres spread along a narrow corridor of rail lines in an east-west orientation, allows little flexibility for triangulation opportunities to increase utilization of containers. This is in contrast with the situation in the United States with its more complex network of transportation corridors, ports and population centres which are distributed along three coasts and across the interior of the country.

In spite of the expectation that any relaxation of tariff restrictions would have little impact, the majority of stakeholders who offered an opinion on the topic suggested that it would be a good idea to relax the existing tariff restrictions to harmonize them with United States regulations in this area. The main reason given for this change was a desire to reduce administrative burdens that did not appear to have any current purpose.

Conclusions

The traffic flow and market analysis performed for this study determined that, with the exception of 20 foot containers in Saskatchewan where supply is very tight and periodic shortages do occur there is not a shortage of available empty container equipment in Western Canada. There is however, a host of other service and market related issues that pose equal if not greater challenges to the logistics network. Among these challenges are:

- *The low value, resource commodity based nature of a large proportion of Canadian export traffic that limits the capability of that traffic to absorb anything other than a "back haul" level freight rate. As a consequence shipping lines do not have a financial incentive to provide service or equipment allocation that adds cost or moves their equipment to a part of the world where they do not have a market capable of capturing a "head haul" type of movement. It is also important to note that shipping lines are not subject to any sort of common carrier type of accountability.*

- *Congestion and shortages of capacity with both railways and at port terminal locations continues to constrain the movement of export commodities across Canada, particularly through the Port of Vancouver. Intermodal and container operations have historically provided railways with marginal financial returns. The current financial success of this sector is predicated on its ability to balance the flows of traffic throughout its network. The downside of this for the other stakeholders in the supply chain is that there is little or no tolerance for variability in volumes or unplanned outages that come as a result of weather or network disruptions. Further, the onus for accommodating any* *variability or surge rests with the other stakeholders, as opposed to the railways. Where this capacity is constrained, as it is at the Port of Vancouver, the potential for severe disruption to transportation systems exists.*

In this context, we would suggest that, in order to assist exporters who utilize port transloading operations, the Government may wish to further examine the situation relative to the transloading services available in port locations, Vancouver in particular. This may identify opportunities to facilitate a better and more fluid process of moving traffic through these highly utilized and congested facilities.

Further, based on the analysis and feedback gained through the stakeholder interview process, we would offer the following considerations:

1. The Government should consider a review of the issues concerning congestion and service, particularly as it relates to the Port of Vancouver. It should include a broad cross section of stakeholders, with a view to determining both the real and perceived issues and establishing recommendations on what potential short and long term actions can be taken to address them.

2. Given the considerable risks and broad stakeholder cooperation, the Government should encourage any group considering the development of an ICT project to use the checklist in Appendix 8 as a guideline for the preparation of their plan.

3. Regarding the regulations covering tariffs on international container equipment, there was a consensus amongst stakeholders that the Government should develop plans to effect the necessary changes in the tariff exemption regulations such that they are in harmony with US and Mexican regulations. This despite the fact that it would not provide any immediate incremental benefit, but on the basis that it could in the future.

1.0 Purpose of the Project

1.1 Background and objectives

The "Use of Containers in Canada" study completed for Transport Canada by MariNova Consulting examined efficiencies and regulatory issues surrounding the use of empty containers moving through Canada's west coast ports as part of the Asia Pacific Gateway initiative. A number of recommendations were made and Transport Canada has prioritized areas of study that are to be further examined. Quorum Corporation has been retained by Transport Canada to complete a follow-up study to the work done by MariNova. The three areas of particular interest to Transport Canada are: inland terminals, shipper associations and cooperatives and issues relative to the Tariff on International Containers.

This report will deal with these three topics and at the request of the Client will have a particular focus on Western Canada and the Pacific Gateway. As per the project terms of reference this report will:

- Determine the business economics of inland container terminals including some of the key factors for financial viability
- Be appropriate for use as a reference for municipalities and government policy groups in determining the viability of inland container terminal / port construction
- Provide a comprehensive background and insight into how the container marketplace operates from a logistical and commercial perspective.

1.2 Methodology

This study has three major components and was divided into a number of interrelated steps. The project involved the gathering and assessing of data from railways, ports and Statistics Canada as well as a literature review of key topic areas. The data and literature provided the information necessary to support both quantitative analysis and a comprehensive analysis of key issues.

Traffic Flow and Market Review

One of the most fundamental aspects in the assessment of logistics issues is a review of the current and prospective traffic flows. A cornerstone of this study was the gathering of data on traffic flows and the subsequent analysis of that data. In order to ensure that a comprehensive view of container and commodity flows across all modes was available for analysis data was assembled and consolidated from a number of different sources. There were three primary sources – railways, ports and Statistics Canada. Canadian Pacific and Canadian National as well as the three major ports participated through the provision of data, and subsequently through an ongoing discussion that ensured the highest degree of data integrity possible. While the process was long and at times arduous, there was no shortage of cooperation, from the railways in particular. The outcome of this analysis has provided a number of findings that, in some cases, run counter to conventional wisdoms and thinking.

Industry and Regulatory – Challenges and Opportunities

Two areas recommended for study stemmed from a previous undertaking for Transport Canada completed by MariNova Consulting of Halifax, NS. The first was to review and investigate where possible cooperative efforts could be undertaken to reduce logistics costs for Prairie container shippers (shipper associations and cooperatives) and the second was to undertake further research on the regulatory and stakeholder issues surrounding tariffs on international containers, particularly as they relate to restrictions placed on the time they may remain in the country tariff free.

This was undertaken through a combination of research, stakeholder interviews with shippers and shipping lines and interviews with representatives of both the Canadian and US Federal government departments responsible for the oversight and enforcement of these regulations. (Canadian Border Services Agency in Canada and Homeland Security in the US)

Stakeholder Consultations

The primary purpose of the stakeholder consultations was to develop a clear understanding of the market forces that affect shipper, carrier and logistics provider decisions with respect to container utilization. In addition, the consultation process allowed the study team to obtain specific information about stakeholders' views on;

- container utilization and key service issues
- inland container terminals
- shipper associations and cooperatives
- tariffs on international containers

Most stakeholder interviews were conducted in person with a small number of interviews being completed by phone where scheduling of in-person interviews was not feasible. Stakeholder representatives were provided in advance with background documentation on the purpose of the study and the topic areas that would be covered.

The study team used a structured interview process that covered the key topic areas and all interview results were transcribed and entered into a database to allow for efficient analysis of the interviews within and across stakeholder groups. In order to encourage an open and free exchange of information, all interviews were confidential and neither the names of the individuals nor their individual responses to questions will be released, except in a consolidated summary of the consultation process.

Over 60 individuals representing 50 different companies and organizations were interviewed for this study. The organizations included a broad cross-section of organizations. Stakeholders were senior decision makers in logistics, marketing and operations within their organizations. A full list of participating organizations is listed in Appendix 2.

Organization Type	Organization Sub-type	Stakeholder organizations
Shippers/ Receivers	Grain	8
	Retail / Consumer	4
	Industrial Products	2
	Forest Products	5
Ocean Transportation	Port Authorities	3
	Port Terminal Operators	2
	Shipping Lines / Agents	8
Logistics Service Providers	Railways	2
	Truckers	3
	Container stuffing, de-stuffing warehousing, pickup and delivery	6
	Freight forwarders	4
Other	Shippers Associations/ Other	3

Table 1 - Stakeholder Consultations – by type of organization

Assessment of Inland Container Terminals

To review the concept of inland container terminals (ICT) it was first necessary to determine the most appropriate range and types of terminals to assess. This step was undertaken through research on existing and proposed undertakings and applying these concepts to a Canadian market environment. Once this was complete, the assessment of ICTs was undertaken in three areas:

1.) Operational and Terminal Design –Three fundamental types of terminals were examined, with two sizes in each type (small and medium) designed and modeled. This included both the operational concepts of the terminal as well as the physical layout and design.

2.) Capital and Equipment Cost Development – Based on the operational and terminal design, specifications were developed upon which the capital and operating costs could be developed.

3.) Operational and Financial Modeling – A model was developed that allowed for the assessment of workload capability and financial results at increasing levels of workload.

These results were combined with feedback obtained through the stakeholder interviews. The combination of the information gathered through both streams provided the basis for the assessments found in this report.

2.0 Container Markets and Flows

In this section we have provided a detailed summary of the analysis of traffic flows. To supplement this analysis we have also prepared the following which can be found in the appendices of the report:

- Appendix 3 contains a detailed profile of the traffic flows through the three major ports
- Appendix 4 contains detailed traffic flows to and from the ports, the Western provinces covering exports and imports by origin province, country and equipment type

2.1 Canadian Industry Overview

The use of containers for the import and export of goods to and from Canada continues to increase in importance. From 2002 to 2006 the value of Canadian imports and exports has increased 13% or an average of 3% per year. During this time period the volume of container handlings at Canadian ports has grown 31%[4] representing average annual growth of 7%.

Total container handlings at Canadian ports exceeded 4.3 million TEUs[5] in 2006[6] with an estimated 94% of containers handled at Canada's three principal container ports – Vancouver[7], Montreal, and Halifax. Ranked on the basis of total container handlings Vancouver is Canada's largest container port with 2.2 million TEUs, followed by Montreal at 1.3 million TEUs and Halifax with 0.537 million TEUs. On a tonnage basis, containerized goods account for an estimated 4.3% of total international freight traffic[8] to and from Canada or approximately 34.6 million tonnes in 2006 of which 33.5 million tonnes moved through Vancouver, Montreal, and Halifax.

The significance of containerized freight moving through Canada's container ports and its importance in import versus export flows varies by port. The Port of Montreal has the highest proportion of containerized freight at 45% followed by Halifax (33%) and Vancouver (22%). Using a measure of containerized freight as a percentage of total freight, containerized traffic is very heavily weighted to imports at Vancouver, heavily weighted to exports at Montreal and essentially balanced in both directions at the Port of Halifax.

[4] Total handlings of twenty foot equivalent units for import and export - loaded and empty
[5] Twenty foot equivalent unit
[6] U.S. / Canada Container Traffic in TEUs (1980 - 2006), American Association of Port Authorities
[7] Excludes volumes and TEU handlings for Fraser Surrey Docks
[8] Total import and export freight tonnes via all modes of transportation

	Vancouver	Montreal	Halifax	Total
Imports				
Total Freight Tonnes (MM)	12.4	16.5	6.1	35.0
Containerized Tonnes (MM)	7.9	5.9	2.0	15.8
Percent Containerized	64%	36%	33%	45%
Loaded TEUs (millions)	1.120	0.541	0.241	1.902
Exports				
Total Freight Tonnes (MM)	67.1	8.6	7.6	83.3
Containerized Tonnes (MM)	9.7	5.5	2.5	17.7
Percent Containerized	14%	64%	33%	22%
Loaded TEUs (millions)	0.762	0.618	0.217	1.597

Table 2 - 2006 Import and Export Statistics at Major Container Ports[9]

In gauging the level of activity and growth of containerization in Canada focusing on the number of containers or units handled provides a better indication than does containerized freight tonnage. As is shown in the table above, while the tonnage of containerized exports exceeded that of imports by 12%, the number of loaded import containers was 20% higher than the number of loaded export containers. This is due to the heavier average weight of export containers.[10] Exports consist largely of resource commodities whereas imports are made up predominantly of lighter manufactured consumer goods.

From 1987 to 2002 Canadian ports handled more loaded export containers than they did import containers. During the 1990s, exports exceeded imports by an average of 28% per year peaking in 1996 at 47%. This long standing pattern began to shift in 2000 when the dominance of exports was reduced to single digits (8.7%) and by 2002 imported containers exceeded exported containers for the first time since 1986.

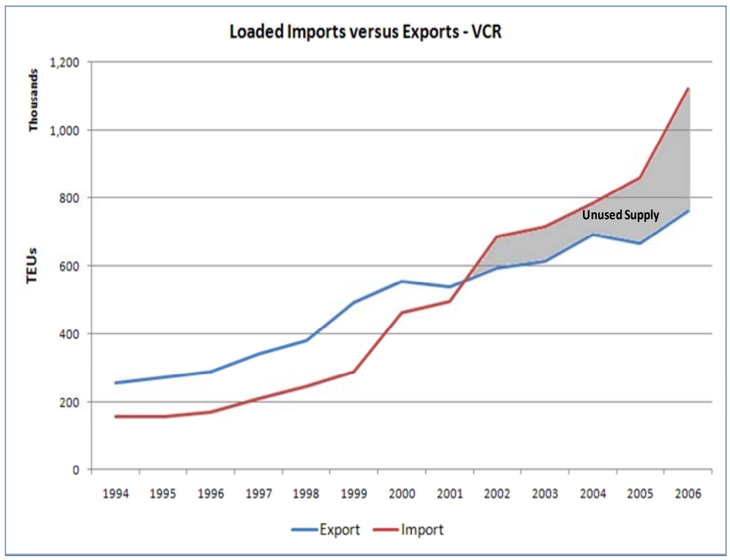


Figure 1 - Loaded Imports vs. Exports (TEU Handlings) at Vancouver - 1994 - 2006

The shift in balance between imports and exports is similar at Vancouver and Montreal whereas at the Port of Halifax loaded exports continue to exceed imports. As Figure 1 shows, the Port of Vancouver has seen much more rapid growth in imports than exports over the last 12 years. Since 1994 imports have grown by 600% whereas exports have grown at one-third the rate.

The dominance of imports has resulted in significantly higher volumes of available containers in all regions of Canada for use by Canadian exporters, as is demonstrated in Figure 1. Contrary to the

[9] Source: Internal port statistics as provided by Vancouver, Montreal, and Halifax
[10] Loaded TEU volumes for Montreal are estimated based on percentage of total handlings empty as identified by the Port of Montreal distributed against imports and exports based on history.

views expressed by some exporters, particularly on the Prairies, that demand for containers cannot be met by existing supply, this data suggests that there is ample supply. Actual shortages experienced by individual shippers are the result of specific market factors. These factors include; seasonal and operational disruptions to traffic flows, geographic positioning of shippers away from major population and logistics centres and the market demand prices for container transportation for certain commodity exports versus the prices required by suppliers of transportation services. These issues are discussed in detail in the following sections of this report.

A Global Context

Canada's major container ports are relatively small when compared to the major container ports in North America and throughout the world. The Port of Vancouver ranks as the fifth largest North American container handling port behind the three major United States west coast ports of Los Angeles, Long Beach and Oakland and the east coast port of New York/New Jersey. Montreal ranks 12th and the Port of Halifax ranks 19th among North American ports.[11]

Vancouver is one of North America's fastest growing ports having grown by more than 50%, as measured by TEU handlings, since 2002 and by more than 200% since 1997 when it was ranked as North America's 14th largest container port.

To place this in a global context the Port of Los Angeles, North America's largest container port, ranks as the tenth largest container port in the world.[12] Based on 2005 rankings, Singapore is the world's largest container port with annual volumes of more than 23 million TEUs. The top four ports in the world, Singapore plus three Chinese ports, all handle more than twice the annual volume of Long Beach and more than eight times the volume of Vancouver.

Rank	Container Port	2006	2002-2006 Growth	1997 - 2006 Growth
1.	Los Angeles	8,469,853	39%	186%
2.	Long Beach	7,289,365	61%	108%
3.	New York/New Jersey	5,092,806	36%	107%
4.	Oakland	2,390,262	40%	56%
5.	**Vancouver (BC)**	**2,207,730**	**51%**	**205%**
6.	Savannah	2,160,168	63%	194%
7.	Tacoma	2,067,186	41%	78%
8.	Hampton Roads	2,046,285	42%	66%
9.	Seattle	1,987,360	38%	35%
10.	Charleston	1,968,474	24%	62%
11.	San Juan (FY)	1,729,294	-1%	-6%
12.	Houston	1,606,360	40%	72%
13.	**Montreal**	**1,288,910**	**22%**	**48%**
14.	Honolulu (FY)	1,113,789	18%	133%
15.	Miami (FY)	976,514	0%	28%
16.	Port Everglades (FY)	864,030	56%	20%
17.	Jacksonville (a) (FY)	768,239	12%	14%
18.	Baltimore	627,947	24%	32%
19.	**Halifax**	**530,772**	**1%**	**16%**

Table 3 - North American Container Port Rankings – 2006

[11] U.S. / Canada Container Traffic in TEUs (1980 - 2006), American Association of Port Authorities
[12] World Port Rankings – 2005, American Association of Port Authorities

Forecast growth rates for containerized traffic through Canadian ports are much higher on the west coast than for Montreal and Halifax. Driven by expectations of continued strong growth of Asian imports, Pacific coast ports anticipate annual growth of 6-10% through 2020 as compared to 3-5% annual growth for Montreal and Halifax.

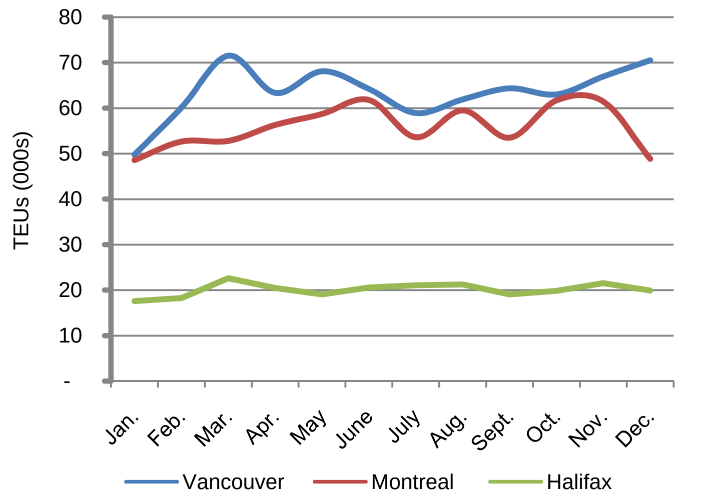


Figure 2 - Monthly Distribution of Containerized Imports and Exports - 2006

Imports

Between 2002 and 2006 the value of imports to Canada grew 13% to reach $396 billion in 2006[13]. Total imported freight tonnage to Canada in 2006 was 313.4 million tonnes[14] of which an estimated 16.6 million tonnes or 5.2% were containerized. Based on total imports to Canada via all transportation modes the United States is Canada's largest trading partner by a significant margin. Imports from the U.S.A represent 62% of total freight tonnes and 55% of imports as measured by dollar value. Other key trading partners include China, the United Kingdom, Japan, and a number of European countries. The relative importance of individual trade partners changes somewhat if we focus solely on containerized freight arriving at Canadian ports. China is the dominant exporting nation to Canada accounting for an estimated 5.7 million tonnes or 34% of all containerized import freight tonnage.

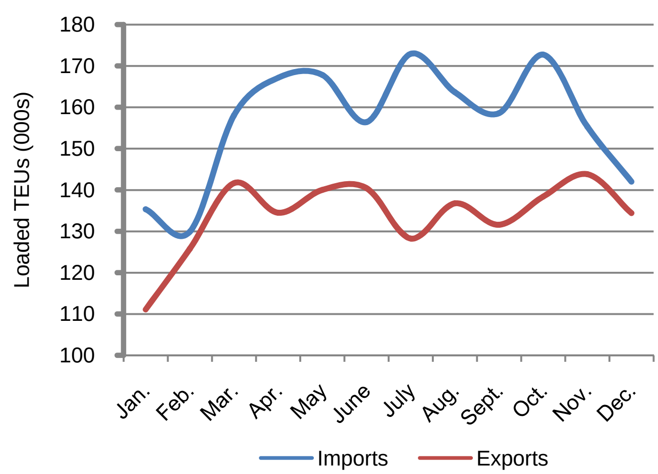


Figure 3 - Containerized Imports and Exports through Canada's Major Ports - 2006

Exports

Between 2002 and 2006 the value of exports from Canada has grown 12% to reach $411 billion in 2006[15]. Total exported freight tonnage from Canada in 2006 was 499 million tonnes of which an estimated 3.6% or 18 million tonnes were containerized. Canada's three principal container ports handled 17.7 million tonnes or 98% of all containerized traffic exported from

[13] Source: Statistics Canada, Trade Data Online
[14] Source: Statistics Canada, International Merchandise Trade Data, 2006
[15] Source: Statistics Canada, Trade Data Online

Canada.

As with imports the principal destination for Canadian exports is the United States which imports 75% of total freight tonnes shipped from Canada representing 81% of the total dollar value of exports. Other key trading partners include China, the United Kingdom, Japan, Mexico, and a number of European countries. Japan, China, and Germany are the dominant destinations for Canada's containerized exports accounting for an estimated 8.3 million tonnes in 2006 and approximately 43% of all containerized export freight tonnage.

Seasonality of Container Flows

Container traffic flows have seasonal patterns. Using 2006 as a reference year the data show three distinct peaks in traffic occurring from March – May, in July and again in October. This pattern, in varying degrees, is consistent for all three major ports[16] although the aggregate trend is driven in large part by Vancouver as it handles nearly 60% of all containerized imports.

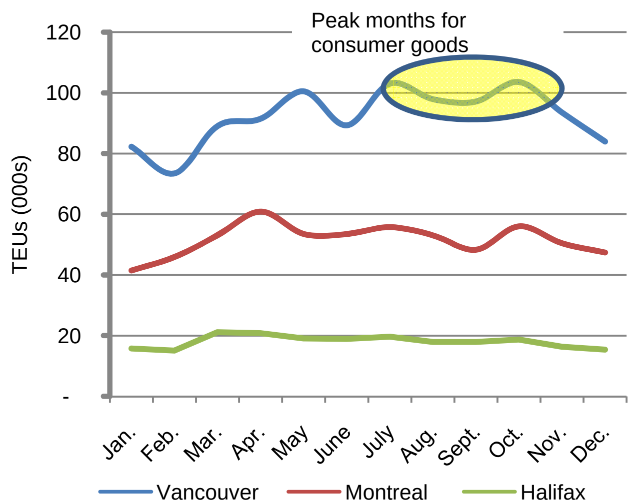


Figure 4 - Seasonal Patterns of Import Container Traffic at Major Ports - 2006

Export volumes peak during non-peak import periods. Unlike imports, Vancouver does not exert a significant influence on the overall trend or seasonal pattern of export movements as this traffic is considerably more balanced across the three ports.

The data suggest that the peak period for exports is somewhat "out of synch" with the peak import shipping periods. This was confirmed in stakeholder interviews with export shippers and logistics companies who indicated that empty container supply was most often an issue in the winter months. As import volumes decreased late in the calendar year the supply of containers into the country became more restricted.

However, as was noted earlier, the overall supply demand balance for containers remains in surplus within Canada. More loaded containers arrive in Canada than are exported loaded from the country by a wide margin.

[16] See Appendix 2 – Profile of Canada's major container ports.

2.2 Key Market Drivers

Containerization of Freight

Containerized freight movements have grown rapidly in recent years. In particular, some of Canada's bulk products have quickly converted from bulk or breakbulk shipping to containerized shipping. This rapid change has raised questions amongst policy makers as to how much more containerization of freight, particularly exports, is possible. A more detailed discussion of the opportunities for conversion of grain shipments to container is included in Appendix 5.

Import growth has made a large pool of empty containers available and shipping lines have priced these containers aggressively to provide revenue on their backhaul movements to Asia and Europe.

Export shippers' decisions on the containerization of freight are driven by cost and service considerations. As the volume of imports of containerized consumer and manufactured goods have risen, it has made available a large pool of empty containers. As a result, shipping lines have priced these containers aggressively to provide revenue on their backhaul movements to Asia and Europe. In many cases, these prices are now well below the competing breakbulk prices for ocean freight for forest products. Consequently the breakbulk carriers, whose movements were so dominant a decade ago, have removed capacity from the North American markets as the pulp, lumber and panel products shifted to largely containerized movements.

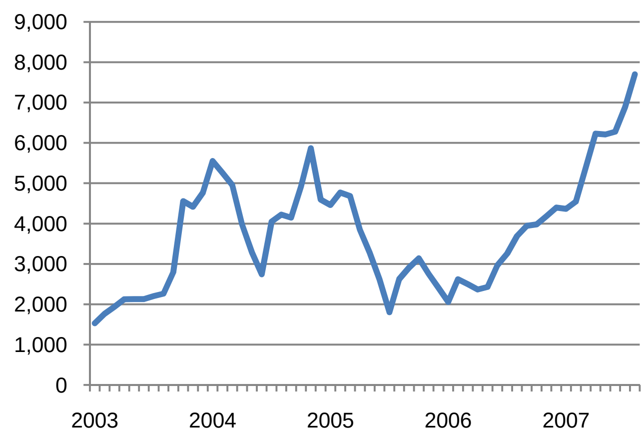


Figure 5 - Baltic Dry Index: December 2003 - August 2007[17]

Many shippers point to the most recent increases in bulk shipping rates as the primary reason for their shifting traffic to container. Under the Grain Monitoring Program, Quorum follows the Baltic Dry Index as the indicator of bulk shipping rates worldwide, shown in Figure 5. Over the past four years, bulk ocean shipping rates have climbed by over 400%. Driven by the combination of a shortage of bulk vessels and the demand of a vibrant Chinese economy, prices continue to surge higher. It is expected that new ships ordered two and three years ago will begin to make their way into the markets later this year, however real relief is not expected until after the completion of the Beijing Olympics in mid 2008.

The growth of containerized shipping for Canada's export products will continue to be affected by the key factors identified so far in this study. They are:

[17] Source: Grain Monitoring Program, Q3 2006-07 Crop Year Report

- The relative surplus capacity of export containers available for exports
- The diversion of breakbulk capacity away from Canadian export shipping lanes
- The availability of bulk shipping.
- The relative cost of bulk versus containerized shipping for grain products

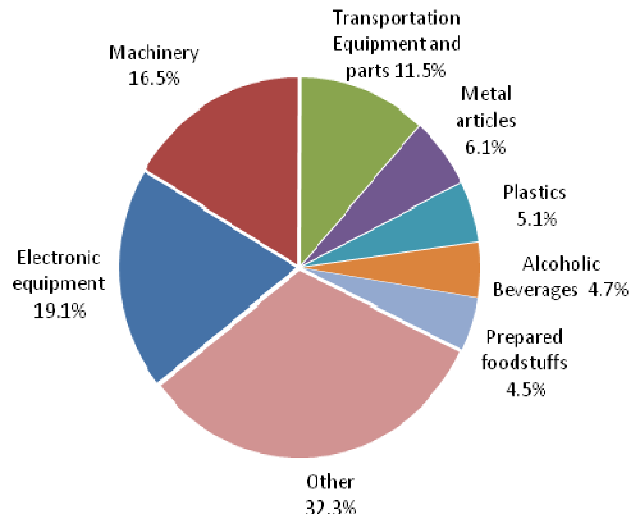


Figure 6 - Key containerized import commodities

Key commodities

The commodities imported to Canada in containers are dominated by manufactured products for industrial and consumer markets. While Canada does export some manufactured goods in containers, its *containerized exports are dominated by less valuable commodities such as forest products and specialty grain products*. [18]

The average value of 90% of the volume of imports and exports is $2,500 and $1,250 / tonne respectively.

This difference in product value is also reflected in the average revenue earned by shipping lines for the movement of containers between ports. In general, container lines derive most of their revenue from import movements to Canada. For example, on shipments from Asia to Vancouver, shipping lines will earn $3000 to $4000 per container but can expect to receive only $600 to $1,200 for the export movement from Canada back to Asia. Similar pricing differentials exist on movements between Europe and Canada as well. This imbalance in rates is in part a reflection of the imbalance in volumes but also of the much lower

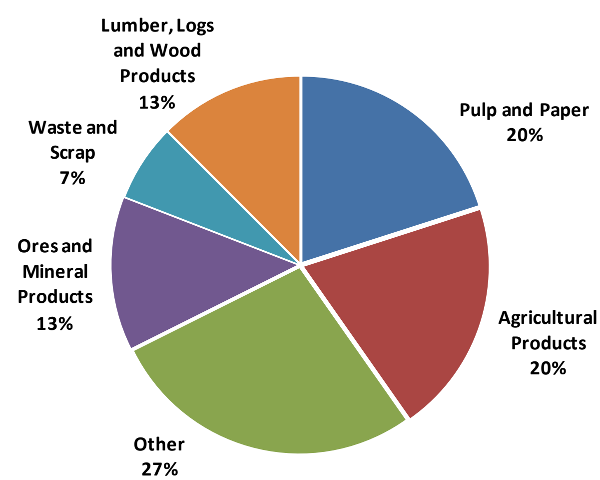


Figure.7 - Key containerized export commodities[19]

[18] Not all Canadian containerized exports are of low value. Canada exported $3.45 billion worth of high value processed metal product such as nickel and cobalt products and concentrates and $1.6 billion in meat and seafood products.

[19] Statistics Canada – International Trade Merchandise Data 2006 and Statistics Canada Shipping in Canada Data, 2004.

product values for exports, which cannot bear as great a transportation cost burden as the higher value imports.

This dramatic difference in the revenue earned by shipping lines on import versus export movements creates a strong incentive for shipping lines and their logistics partners to look for ways to minimize the time that containers remain at inland locations in Canada. This has led to the growth of port transloading of imported containerized products. The trend of port transloading and its impact on container logistics is discussed in the next section of this report.

2.3 Port Transloading

The transfer of goods between international containers and domestic transportation equipment for subsequent movement to their final destination is a growing logistics practice being employed by both Canadian importers and exporters.

Port Transloading – Imports

"In spite of the growth of import transloading, there remains a significant surplus of empty containers available for export movements."

For imports this activity is most prevalent among retailers importing consumer goods through either Vancouver or Halifax that are destined for distribution centers in Western Canada, Ontario, and Quebec. Typically this involves the ocean movement of goods in 40 ft international containers that are subsequently trucked from the container terminal to an off-dock transload facility. Here the goods are transferred from ocean containers to domestic containers for final rail movement to destination. Standard practice is to transfer the contents of three 40 ft containers into two 53 ft domestic containers. Even with additional handling costs associated with the transferring of contents, there are transportation cost savings available to shippers for doing so. This practice also has benefits for the shipping lines in that it provides faster turnaround times on ocean containers making them available in a very short time for evacuation from the Port to an international origin for re-loading. It is estimated that port transload practices improve container utilization by 3-4 weeks per trip providing shipping lines with improved asset utilization and improved earnings per unit. The downside of port transfer activities is that it reduces the available supply of containers for exporters at inland points.

In spite of the growth of import transloading, there remains a significant surplus of empty containers available for export movements with an estimated 0.4 million TEUs moved empty by rail to ports for export.

Vancouver, by virtue of its vastly larger import volumes and the significance of consumer goods imported from Asia, generates larger volumes of transload traffic than does Halifax. In 2006 at Vancouver, an estimated 155,000 TEU's of import freight were transloaded to domestic 53 ft containers, and moved via rail to the major retail distribution centers in Edmonton, Calgary, Saskatoon, Winnipeg, Toronto and Montreal. Approximately 77% percent of this rail traffic went to Toronto and Montreal.

While this practice is not new, it is growing rapidly. Transload shipments from Vancouver and Halifax have grown an estimated 52% and 108% respectively since 2004. Growth in transload traffic destined to the Prairies has exhibited the strongest growth during this period having essentially doubled in both the Vancouver and Halifax corridors. For Vancouver, the traditional head haul movement for this equipment has been east to west from Central to Western Canada. Import traffic has filled these domestic containers that would otherwise return empty. The increase in transload traffic in recent years has shifted the load-empty balance in this corridor to where eastbound loads now exceed westbound loads and empty equipment is being re-positioned to Vancouver in order to meet demand for traffic originating Vancouver. A similar pattern is also emerging in the Halifax corridor. How the railways handle the equipment balance issue in the future will in part determine the extent to which port transload traffic can continue to grow.

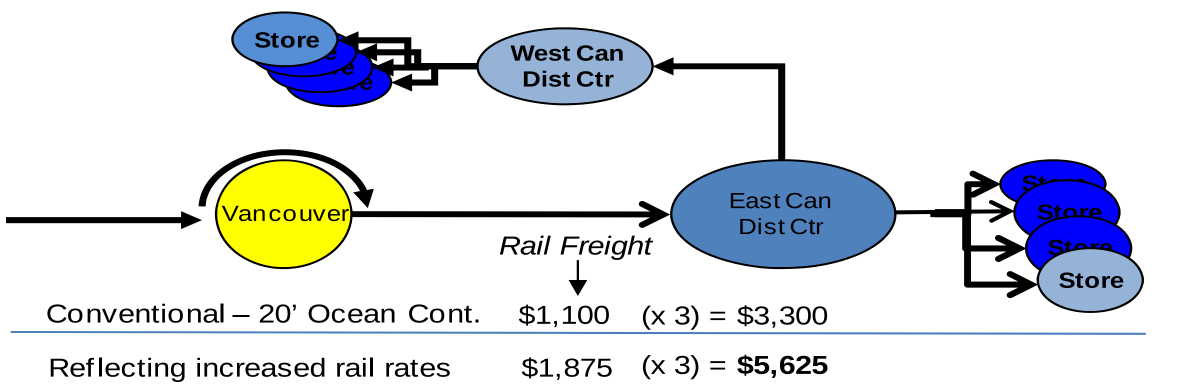
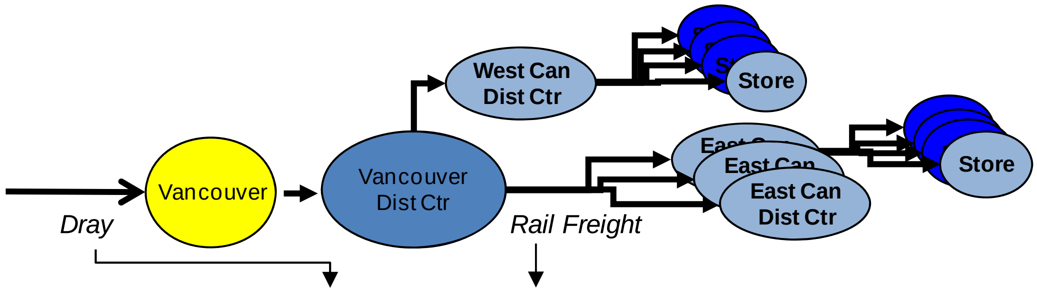


Figure 8 - Costs of ocean to domestic containers on imports via Vancouver to a distribution centre in Eastern Canada.

In recent years, shipping lines have increased their rates for moving containers via rail to inland destinations. This has supported the shift towards transloading of import freight into domestic containers at Vancouver. While in past years the rate for movement of a 20 foot ocean container via rail from Vancouver to Central Canada was approximately $1100, the rate charged by shipping lines to customers has been increasing to as much as $1875 – which reflects the underlying rates being charged to shipping lines by railways. In the past, market competition for the high volume movements to Central Canada resulted in shipping lines charging less for the inland leg of the movement than they were paying to railways. The shipping lines made up their profitability on the ocean leg of the movements. Pressure to increase profitability through improved asset utilization has put upward pressure on these inland rail movements and has increased the benefits to importers of transloading at the port. The example below uses sample rates to illustrate how the evolving increase in rail freight charges, assessed by the shipping lines, has a big impact on the logistics decisions faced by importers. Specifically, under the new rail rate levels, an importer would incur a cost of $5,625 to move the same amount of freight it used to cost $3,300 to move.



New … ($220 x <u>3</u> = $660) + ($3,520 x <u>1</u>= $3,520) = **$4,180**

Figure 9 - Costs of ocean to domestic containers on imports via Vancouver using a distribution centre in Vancouver.

By changing the logistics approach, an importer who previously moved his goods directly by rail from Vancouver to distribution centers in central Canada (as shown above), now transships his goods through a distribution centre in the Lower Mainland and moves his traffic in 53 foot domestic intermodal equipment to his inland distribution centres (as shown below).

In this new scenario, the cost to move that same volume of freight when consolidated into the domestic 53 foot containers is $4,180 or $1,445 less than the previous logistics approach. Stakeholders who were interviewed indicated that this approach also provides other logistics benefits including the ability to prioritize inland freight movements at a location closer to retail markets. In addition, transloading facilities can provide deconsolidation services to prepare goods with labeling and inventory control tags so that goods are store-ready when they leave the Vancouver deconsolidation facilities.

It is important to reinforce the fact that the increases in costs being passed on by shipping lines to their customers are not driven primarily by rate increases being charged by railways but are shipping line decisions to have the inland portion of customers' container movements more closely reflect the charges that shipping lines are paying to the railways for these movements. Through these pricing actions, shipping lines are removing what some customers have termed a subsidy on the inland portion of freight charges. Further, the importer avoids backhauling traffic from Central Canada to a Western distribution centre and obtains the benefit of the more efficient rates and lower cost per TEU on the movement to his central Canada DCs.

Port Transloading - Exports

In 2006 the Port of Vancouver exported 9.7 million tonnes of containerized commodities of which 85% or 8.3 million tonnes were resource commodities. Major resource commodities included specialty crops, lumber, woodpulp, and other forest products that accounted for 6.3 million tonnes and 0.481 million export TEUs in 2006. Based on an analysis of railway and Statistics Canada data, interviews with shippers and

> ***"The trend towards transloading of import containers into domestic containers at ports has increased the supply of international containers available at port locations."***

industry knowledge, the level of source loading versus port transload activity has been estimated, the significance of which can be seen in Table 4 below.

Major Containerized Exports	Containerized ex Vancouver Tonnes	TEUs	Source Loaded Tonnes	TEUs	Percent Trans-load Tonnes
Other Forest Products	1,110,498	101,917	277,624	25,479	75.0%
Lumber	1,502,946	127,700	60,118	5,108	96.0%
Woodchips and Woodpulp	2,380,503	178,476	303,304	22,740	87.3%
Specialty Crops	1,314,116	72,967	354,811	19,701	73.0%
S/T	**6,308,063**	**481,061**	**995,858**	**73,028**	**84.2%**
Total Containerized Exports	9,691,989	762,744	3,827,491	295,241	60.5%
Other Containerized Exports	3,383,926	281,683	2,831,633	222,213	16.3%

Table 4 – Estimated Port of Vancouver Export Transload Activity – 2006

For the four major export commodities it is estimated that 84% or approximately 6.3 million tonnes was transloaded to international containers at the Port of Vancouver. [20]. For containerized exports in total approximately 60% of traffic is transloaded at port and the remaining 40% source loaded into containers at origin for movement to the port.

Port transloading for resource commodities is also important for exports moving through the Port of Montreal. The two largest resource commodities exported in containers through Montreal are forest products and grain. In 2006 these commodities accounted for 1.5 million tonnes and an estimated 0.101 million TEUs. Approximately 63% of this traffic was transloaded into ocean containers at the port with the remainder containerized at origin and railed to the port for export.

Major Containerized Exports	Containerized from Montreal Tonnes	TEUs	Source Loaded Tonnes	TEUs	Percent Trans-load Tonnes
Forest Products	909,199	68,166	318,220	23,858	65.0%
Grain Products	602,498	33,454	253,049	14,051	58.0%
S/T	**1,511,697**	**101,620**	**571,269**	**37,909**	**62.7%**
Total Containerized Exports	5,473,863	541,764	2,742,613	320,046	49.9%
Other Containerized Exports	3,962,166	440,144	2,171,344	282,137	45.2%

Table 5 – Estimated Port of Montreal Export Transload Activity – 2006

[20] Source: CN and CP Railway Movement Data

Those shippers who load their containers at their production locations (source loading) generally do so because they have product security or quality control reasons for doing so. Shippers of very high value manufactured or processed products want to minimize re-handling of their products and avoid delays to shipments which can create opportunities for damage or theft. Exporters of some specialty grains, such as lentils, are marketing their products as "shelf ready" and they utilize source loading to ensure that all containers are of a high standard of integrity and cleanliness. Source loading also reduces opportunities for product damage or contamination that can arise through transloading operations.

Figure 10 – Transloading grain at WestNav, Vancouver

Of the exporters interviewed, 70% of the volume of their combined exports was shipped to coastal positions via bulk transport; with the vast majority of this 70% moving via rail. These exporters said that cost was the main factor in the utilization of bulk rail for shipments of their products to export positions.

The trend towards transloading from import containers into domestic containers at ports has increased the supply of international containers available at port locations. For bulk commodity shippers, this provides them with access to a more reliable container supply at port locations with access to a broader range of shipping lines and container types to choose from. Depending on the commodities and distances involved direct bulk rail shipment to ports via rail or truck may be more cost effective than shipping to ports via container. This is true even when the cost of transloading from rail into container at the port is taken into account. The following table shows the relative cost of shipping pulse crops from the Prairies to Vancouver both before and after costs and risks associated with potential delays to container traffic are taken into consideration.

While source loading of containers can appear more economical, if repositioning costs or storage costs must be absorbed, the financial balance shifts in favour of port loading.

In the first table, a comparison between the straight costs of loading at source and loading at port are presented. In each case, the analysis shows that source loading has cost advantages of 24% or up to $500 per container. However, this is provided that containers are available locally, at the maximum ocean rates indicated in the example, and shipments can be coordinated to move directly onto docks for export.

	Source Loaded at SK Points	Port Loaded, Origin SK	Source Loaded at AB Points	Port Loaded, Origin AB	Source Loaded at MB Points	Port Loaded, Origin MB
Origin Dray (100 Miles)	$407		$407		$407	
Rail (/ Car)		$3,667		$2,808		$4,681
Rail (/ Container)	$791	$917	$621	$702	$1,015	$1,170
Ocean	$800	$800	$800	$800	$800	$800
Destination Dray		$220		$220		$220
Stuffing		$545		$545		$545
Total Cost (Minimum)	$1,998	$2,482	$1,828	$2,267	$2,222	$2,735
Total for 4 containers	$7,992	$9,927	$7,312	$9,068	$8,888	$10,941
Option Differential		24%		24%		23%

Table 6 - Comparative Sample to China (ex Vancouver) from Western Canada Points

In the second example we assess the cost of the various types of risk that exist in each of the scenarios and add them to the straight cost. The result of this step significantly changes the differential between the loading options. The Saskatchewan and Alberta cases clearly suggest that the risk associated with container supply and service capability eliminates the source loading benefit and significantly reduces it in the case of Manitoba. The conclusion is that if repositioning costs or storage costs must be absorbed the financial balance shifts in favour of port loading.

	Source Loaded at SK Points	Port Loaded, Origin SK	Source Loaded at AB Points	Port Loaded, Origin AB	Source Loaded at MB Points	Port Loaded, Origin MB
Base Cost	$ 1,998	$ 2,482	$ 1,828	$ 2,267	$ 2,222	$ 2,735
Origin Delay						
Repositioning	$1,194		$1,424		$867	
Origin Storage	$225		$225		$225	
Port Terminal Delay						
Re file		$200		$200		$200
Storage (7 days)		$525		$525		$525
Demurrage		$180		$180		$180
Total Risk Cost	$1,419	$905	$1,649	$905	$1,092	$905
Total Cost with Risk (Max)	$3,417	$3,387	$3,477	$3,172	$3,314	$3,640
Risk % of cost variance	71%	36%	90%	40%	49%	33%
Option Differential with full risk		-1%		-9%		10%

Table 7 - Comparative Sample including risk

Railway Transportation in the Container Supply Chain

Railways are the critical transportation link for containerized imports moving inland from Canadian ports. The ports of Vancouver and Montreal are served by both Canadian National Railways (CN) and Canadian Pacific Railway (CP) while Halifax is served solely by CN.

"The importance of railways to port logistics creates a dependence of the ports upon highly reliable railway service."

Canada's railways handle a higher percentage of import traffic directly off the docks in containers (63%) than they do exports (57%) although railways' share of inland transportation activity for containers varies by individual port. *At Vancouver, 70% of import containers move directly off the docks via rail.* In 2006, CN and CP handled a combined 2.49 million TEUs or 60% of all containerized imports and exports.

The importance of railways to port logistics creates a dependence of the ports upon highly reliable railway service. This is particularly true at Vancouver where port terminals operate at in excess of 100% of capacity during their peak periods. As railways move whole trainload volumes to and from ports, a disruption to individual train operations can severely disrupt port operations by increasing port congestion and container dwell time. A single train will account for approximately 30% of the daily throughput from the largest container terminal at Vancouver. If the terminal is already operating at capacity, delays to a single train will have dramatic consequences for congestion.

The railways' role in transporting containers between inland regions and the major container ports differs substantially for imports as compared to exports. Import traffic handled by the railways is 99% loaded with very few empty containers railed inland. This ratio of loads to empties for imports has been consistent over the last three years and is consistent across all ports.

(millions of TEUs)	**Halifax**	**Montreal**	**Vancouver**	**Total**
Imports				
TEUs Handled at Port	0.266	0.619	1.185	2.070
TEUs Railed Directly Inland	0.146	0.335	0.829	1.310
Percent Handled Rail	55%	54%	70%	63%
Exports				
TEUs Handled at Port	0.271	0.669	1.117	2.058
TEUs Railed To Port	0.151	0.348	0.680	1.179
Percent Handled Rail	56%	52%	61%	57%
Total Imports and Exports				
TEUs Handled at Port	0.537	1.288	2.302	4.128
TEUs Handled by Rail	0.297	0.682	1.510	2.490
Percent Handled Rail	55%	53%	66%	60%

Table 8 - Railway Involvement in Container Handlings at Vancouver, Montreal and Halifax

For exports however, the traffic mix is significantly different. On the whole, approximately 35% of TEUs moved by rail from inland points to port locations are empty. The relative balance between loads and empties for export traffic has been shifting steadily since 2004 when empties represented only 29% of total export movements. As shown in Figure 11, empty TEUs now represent 53% of total rail handlings to the Port of Vancouver.

Movement of empty containers by the railways back to the ports of Montreal and Halifax have remained relatively constant since 2004, now making up 8% and 16% of railway handlings destined to these ports.

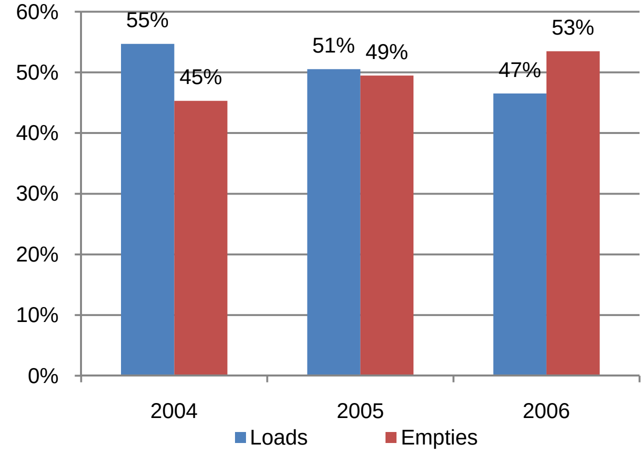


Figure 11 - Percentage of Loaded versus Empty Container Movements to Vancouver

Stakeholder views on service

The majority of exporters reported that they had suffered periodic shortages of containers in the last two years. Shortages were most acute for those shippers of grain products who utilize 20 foot containers. For grain shippers, the most commonly cited reasons for shortages, as revealed in interviews with both shipping lines and exporters, were the differences in seasonal demand peaks for exports versus the export container supply as made available by import shipments. Containerized grain products have peak shipping demand in the second quarter and then again at the end of the fourth quarter (calendar year). Import shipments peak at the end of the second quarter and in the third quarter. This creates an annual shortage in the later months of the year and into the early part of the first quarter. The import volume is driven by the seasonal nature of the retail industry and the demands of the "holiday shopping" season.

"Both importers and exporters are very concerned that the current rail operations models leave ports vulnerable to serious congestion problems"

For shippers of forest products, shortages of containers were more often reported to be the result of service disruptions to ocean, port and rail operations which unbalance container flows. These service disruptions have, at times, been severe – most especially in the early months of 2007 when port terminal operators in Vancouver placed a six week embargo on export shipments in order to deal with heavy congestion of import containers which were clogging their operations.

While most shippers reported periodic shortages of containers due to these market and operations related imbalances in supply, most exporters and all shipping lines emphasized that there was not an overall shortage of empty containers available to handle export products and indeed shipments of empty containers from the three Prairie Provinces to ports nearly equal the total number of loaded container shipments. Aside from the disruptions due to operational constraints referenced earlier, the major reason for the perceived shortage of containers by shippers of export products is the decision by shipping lines to evacuate empty containers from Canada back to key import supply regions (headhaul markets) due to the low financial returns available on the bulk product export shipments from Canada.

Stakeholders were asked, "aside from possible issues with the supply of international containers, have you experienced any other service problems with intermodal services related to import or export movements." Participants were asked to focus their concerns on issues that had arisen in the previous two years. The key service issues raised by both importers and exporters were as follows:

- Rail service issues 74% stakeholders
- Port terminal operations 42% stakeholders
- Labour issues 27% stakeholders

Railway service was characterized as both efficient but also inflexible and incapable of dealing with surges or shocks to commodity flows whether such shocks were caused by land based disruptions related to rail operations or weather; or due to ocean or port disruptions. While rail carriers were praised for creating highly efficient rail operations, both importers and exporters are very concerned that the current rail operations models used by CN and CP leave ports vulnerable to serious congestion problems when operations on either land or ocean sides suffer interruptions to service. This is particularly the case on the Pacific Gateway at Vancouver. Problems with port congestion specifically have not been as big a concern for stakeholders at either Halifax or Montreal.

This lack of flexibility is exacerbated by the fact that railways in Canada have pursued a strategy of aggressive asset utilization which attempts to balance loaded train movements across their systems both by day of the week and by direction between the major terminals on their networks. Railway asset utilization strategies have resulted in excellent financial performance for Canada's rail carriers and, as most shippers will attest, provide excellent service during times of undisrupted operations. However, these same strategies of balanced operations and careful management of capacity provide the railways with limited capability to recover from disruptions to the flow of traffic that are caused either on their systems, or through port or ocean operations.

Port of Vancouver stakeholders including the railways have worked to develop monitoring and forecasting processes that are designed to proactively identify the conditions that will lead to severe congestion and engage processes that will manage the congestion. In addition, stakeholders have made investments in terminal operations equipment, systems and processes and have extended the capacity and hours of service at port truck gates and at off-dock container yards in an attempt to increase throughput capability at the terminals and off-dock locations in the Greater Vancouver area. However, in spite of these improvements and investments, many stakeholders are still convinced that the current operational model of the Port of Vancouver will continue to suffer severe disruption when weather and operations related disruptions occur in the future. Both exporters and importers used words such as, "fragile", "unreliable" and "vulnerable" to describe the port and rail operations through the Pacific Gateway.

With respect to labour issues at the ports, multiple stakeholders suggested that the fragmentation of labour across multiple unions allowed for small disputes regarding limited issues to create the potential for major disruptions to port operations that were out of proportion to the relative importance of the issues in dispute. This labour fragmentation is seen as increasing the vulnerability of the port to disruption and further damaging the "brand image" of Canada's Pacific Gateway.

2.4 Supply and Use of International Containers in the Prairies

One of the key objectives of this study is to examine the supply and use of international containers for the movement of export commodities from the Prairie Provinces. Exporters located in these provinces have in the past expressed concerns regarding the availability of suitable container equipment for the movement of export goods, more specifically the movement of export agricultural commodities.

Key Export Commodities

The commodity mix of exports of containerized goods from the Western Provinces is dominated by resource commodities.

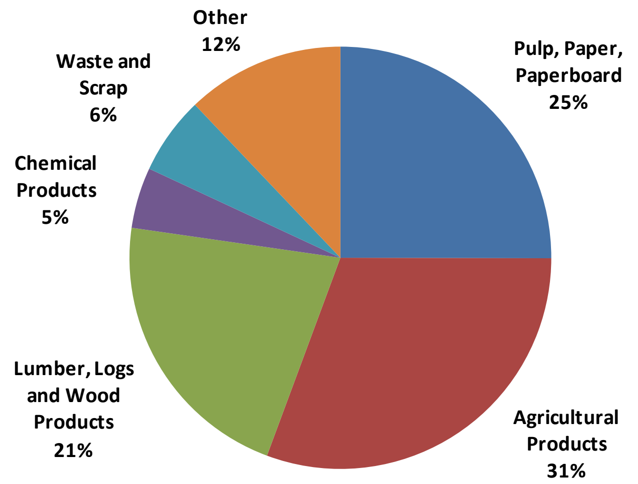


Figure 12 - Western Canada: Key containerized exports.

In addition, the overall volumes of exports vary considerably by province as noted in Figure 13.

It is important to note that this breakdown by province identifies the proportionate volume of containerized commodities that are produced in each of the provinces. This does not identify the volume of such containerized traffic that is loaded and shipped via container from each province. Included in these totals is traffic that is shipped via bulk rail and truck to ports for stuffing into containers at facilities located near the ports as was illustrated in an earlier section of the report.

On a provincial basis the total proportion of traffic that is source loaded and moved via rail to ports is:

- British Columbia 3%
- Alberta 55%
- Saskatchewan 32%
- Manitoba 66%

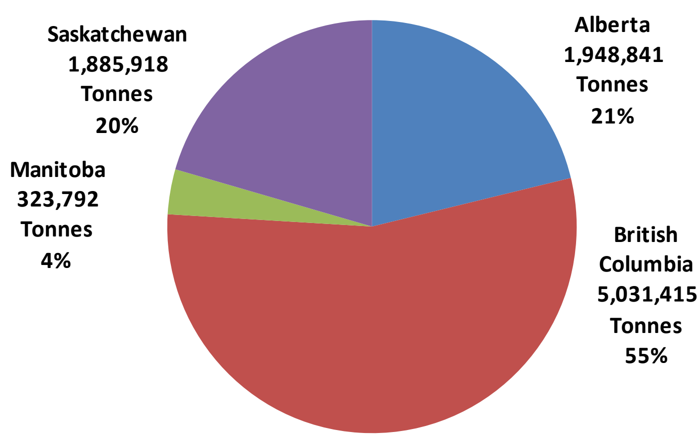


Figure 13 - Western Canada: Containerized exports by province where produced

As can be seen in the following table, there is significant difference between the commodity make-up of the containerized exports from each of the Western Provinces. Most containerized exports from the three Prairie Provinces are agricultural products while British Columbia's containerized exports are overwhelmingly made up of forest products.

British Columbia		Alberta		Saskatchewan		Manitoba	
Commodity	**% total containerized exports**	**Commodity**	**% total containerized exports**	**Commodity**	**% total containerized exports**	**Commodity**	**% total containerized exports**
Pulp & Paper	35.2%	Animal Feed	21.5%	Peas, Beans, Lentils, other special crops	76.0%	Peas, Beans, Lentils, other special crops	38.4%
Lumber and Panel Products	31.0	Pulp & Paper	21.8	Cereal grains	8.3	Primary or Semi-Finished Metals	13.0
Logs and Rough Wood	7.5	Plastics	16.1	Pulp & Paper	4.5	Cereal Grains	10.6
Basic Chemicals	6.2	Milled Grain Products	10.6	Animal Feed	4.5	Machinery	6.8
Waste and Scrap	9.6	Basic Chemicals	4.9			Pulp and Paper	6.7
Other	10.5%	Other	25.0%	Other	6.7%	Other	30.8%

Table 8 - Export Commodities by province

The decision by exporters to use port loading rather than source loading for the key commodities is partially explained by the geographical location of the production facilities for these products. As the following map demonstrates, the major pulp mills in Western Canada are well removed from the larger metropolitan centres where most import containers will be unloaded and made available.

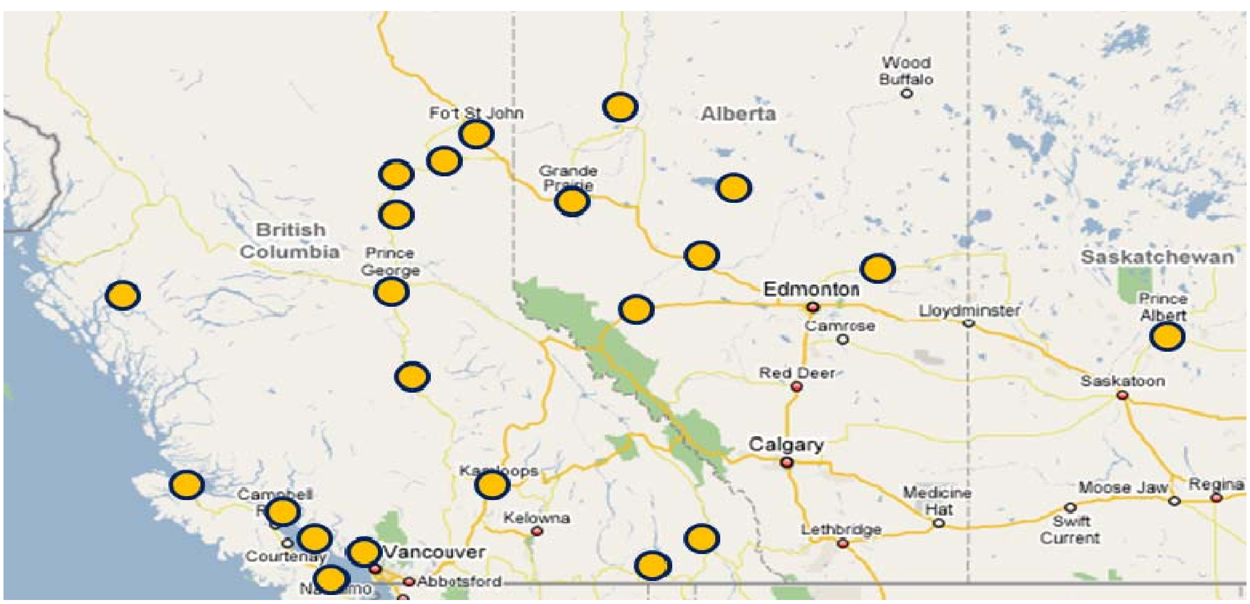


Figure 14 - Location of pulp mills in BC, Alberta and Saskatchewan

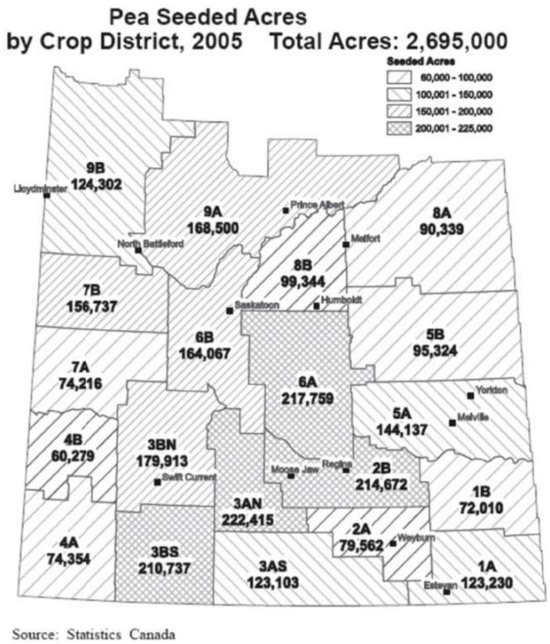


Figure 15 - Pea Seeded Acreage in Saskatchewan

The greatest volume of special crops moving in containers originates from Saskatchewan. As can be seen from the following two maps[21], the key special crops are produced in all areas of the province, with peas being more concentrated in the south central crop districts. For shipments originating at the major processing locations in Regina, Saskatoon and Moose Jaw some supply of containers will be available due to inbound movements of consumer and manufactured goods. For many of the more remote locations, port loading will be the most economical option for the shipment of special crops to avoid significant repositioning costs for empty containers from intermodal hubs in Saskatoon and Regina. However, as noted elsewhere in this report, for products where quality control issues require source loading, shippers are bearing the costs of empty container movements to processing locations in order to preserve a high level of product protection.

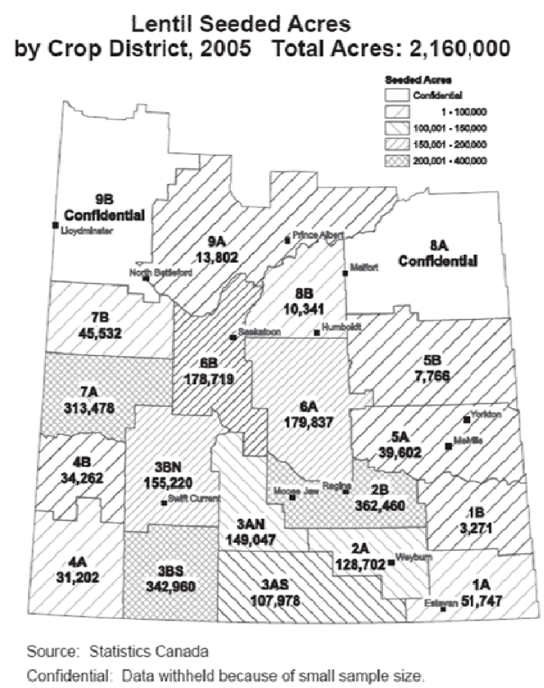


Figure 16 - Lentil Seeded Acreage in Saskatchewan

Forage products make up the majority of Alberta's containerized agricultural exports. Key production locations for these exports are in the northwest and west central regions of the province where low population density limits the inbound supply of empty containers. As is the case with Saskatchewan's special crops transportation demand, the higher costs associated with repositioning empty containers will generally encourage port transloading of these commodities. Unfortunately, some of these products are not well suited to bulk handling. This creates challenges for producers who wish to pursue export markets using containerized transportation.

Container Supply and Use

There are three principal sources of supply for international containers to inland regions: loaded import containers made empty and available for reloading, empty import containers positioned for loading, and international containers repositioned between inland locations in domestic service, whether loaded or empty, transported either by rail or truck. The principal source of

[21] Maps reproduced from _2006 Saskatchewan Specialty Crop Report_. Saskatchewan Agriculture and Food.

international container supply for the Prairies is the domestic repositioning of import containers that have been emptied in other Canadian regions and moved either loaded with domestic goods to the Prairies or empty for export loading en route back to the port of exit.

In 2006 loaded domestic repositioning movements (DRP) of international containers to the Prairies accounted for 0.162 million TEUs or 53% of total container supply. Total container supply to the Prairies for 2006 is estimated at 0.328 million TEUs. By comparison, the Prairie Provinces originated only 0.146 million loaded export containers or 44% of available supply. Table 9 below provides a high level summary of supply and use patterns for each province and for the Prairies as a whole.

SUPPLY					
Province	Loaded Import	Empty Import	Loaded Repositioning	Empty Repositioning	Total
Alberta	88.7	3.1	125.0	12.7	229.6
Saskatchewan	5.3	4.0	11.6	23.4	44.3
Manitoba	16.5	1.3	25.5	10.9	54.2
Total	**110.5**	**8.4**	**162.1**	**47.0**	**328.0**

USE					
Province	Loaded Export	Empty Export	Loaded Repositioning	Empty Repositioning	Total
Alberta	88.9	109.6	2.1	7.4	207.9
Saskatchewan	34.5	9.1	0.4	0.8	44.8
Manitoba	22.7	22.6	4.1	3.0	52.4
Total	**146.1**	**141.2**	**4.7**	**1.6**	**305.1**

Table 9 – Prairie Container Supply and Use by Province – 2006 TEUs (000s)

The analysis of supply and use of international containers on the Prairies uses container movement data provided by the railways. As the table above shows, there is an imbalance between supply and use within each of the provinces. While Manitoba and Saskatchewan are relatively balanced the data indicates that there are more containers arriving in Alberta than leaving. We believe that the imbalance is attributable to a number of factors including timing of railway movements, movement of empty containers by rail not reflected in the data, and a small amount of inter-provincial trucking of empty containers.

- At a high level, the data highlights a number of issues: Alberta receives 70% of container supply to the Prairies - 55% of which is the result of equipment repositioning through the transporting of domestic goods from Central Canada to Alberta
- Import traffic destined to the Prairies represents only one-third of total container supply and in 2006 would have fulfilled only 75% of container demand for Prairie exports
- Unlike Alberta, Saskatchewan and Manitoba are highly dependent on domestic repositioning movements to meet export container needs. In Saskatchewan's case, empty repositioning is required in order to provide sufficient capacity for export traffic.

2.41 Alberta

There are more containers, of all sizes, that leave Alberta empty than do loaded. In 2006, there were an estimated 0.230 million TEUs available to Alberta shippers, only 0.091 million or 40% of which were used for shipping of Alberta products. A total of 0.117 million TEUs were shipped empty from Alberta, some 56% of the total that departed the province by rail.

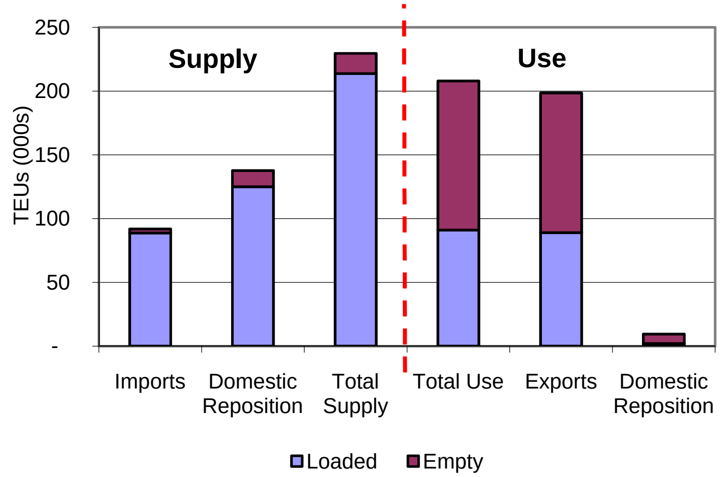
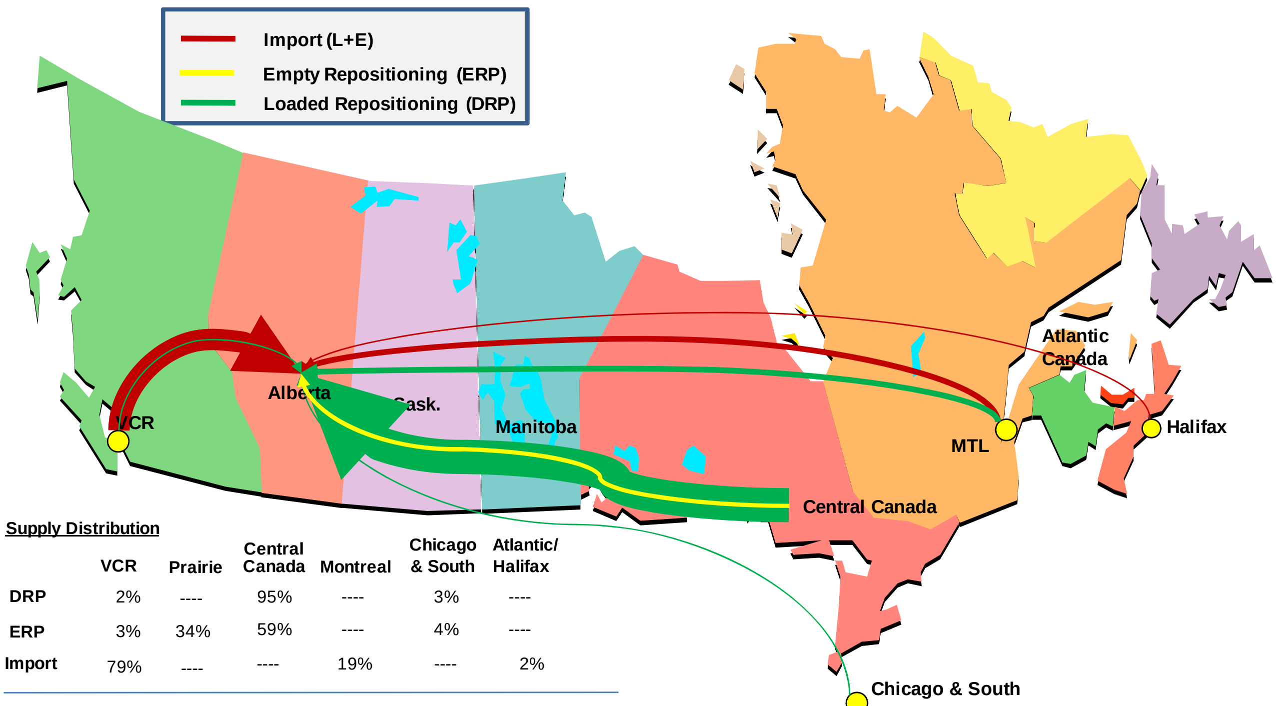


Figure 17 – International Container Supply and Use – Alberta 2006



Supply Distribution

	VCR	Prairie	Central Canada	Montreal	Chicago & South	Atlantic/ Halifax
DRP	2%	----	95%	----	3%	----
ERP	3%	34%	59%	----	4%	----
Import	79%	----	----	19%	----	2%

TEUs (000s)

	VCR	Prairie	Central Canada	Montreal	Chicago & South	Atlantic/ Halifax	Total
DRP	2.8	1.0	117.5	----	3.5	0.1	125.0
ERP	0.4	4.3	7.5	----	0.5	----	12.7
Import	72.3	----	----	17.8	-----	1.7	91.8

Figure 18 – International Container Supply to Alberta - 2006

Figure 18 highlights the key flows for the supply of containers to Alberta. Figure 19 shows the majority of containers supplied to Alberta come from domestic repositioning of international containers carrying domestic goods from other inland locations where the import containers have previously been made empty. More than 90% of these repositioning movements originate in the provinces of Ontario and Quebec. Import traffic destined to Alberta is also a key source of container supply accounting for 0.91 million TEUs, 80% of which was imported through the Port of Vancouver.

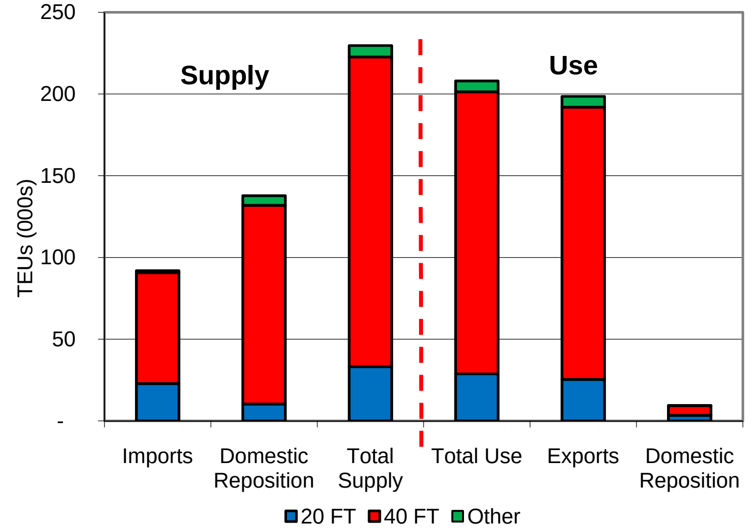


Figure 19 – Alberta Container Supply and Use by Equipment Size

More than 98% of containers shipped from Alberta are destined to the ports of Vancouver (93%) and Montreal (6%) with only nominal shipments to Halifax. While there is some domestic repositioning of containers from Alberta, these movements are limited and are principally for re-allocation of supply to Saskatchewan and Manitoba.

As noted earlier more containers are shipped from Alberta empty than loaded. Loaded export traffic accounts for only 43% of shipments whereas empty containers shipped back to port position for evacuation account for 53% of shipments. As shown in Figures 19 and 20, inbound containers to Alberta are predominantly loaded and leave predominantly empty – regardless of container size. Forty foot containers are the predominant equipment type accounting for 83% of supply. Based on railway movement data, we can conclude that Alberta is in a surplus position for all equipment types.

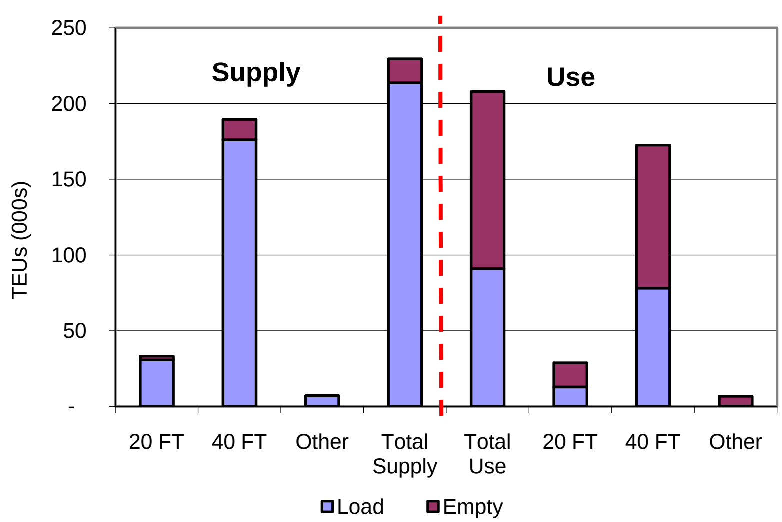


Figure 20 – Alberta Container Supply and Use by Equipment Size (Load vs. Empty)

2.42 Saskatchewan

Saskatchewan has the best container utilization of the three Prairie Provinces with nearly 80% of containers shipped loaded. Saskatchewan has the smallest market for container shipments of the three Prairie Provinces. With an estimated 0.044 million TEUs shipped in 2006 it is about one-fifth the size of the Alberta market.

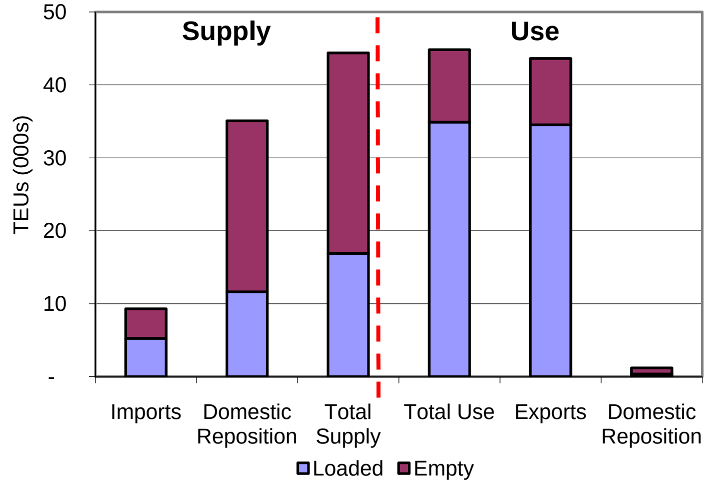
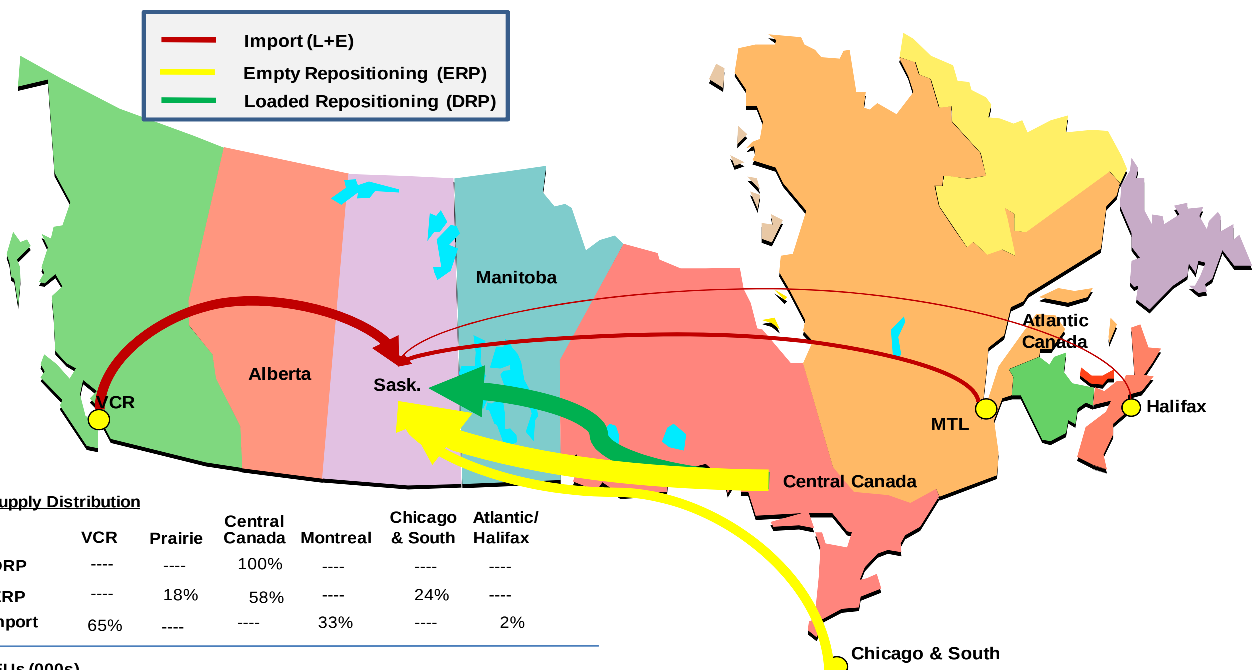


Figure 21 – International Container Supply and Use – Saskatchewan 2006

Much like Alberta the lion's share of container supply for Saskatchewan comes from the domestic repositioning of equipment that has been made empty elsewhere. Unlike Alberta however, the majority (68%) of the repositioning activity involves empty equipment. Direct imports to the province are relatively small at 0.009 million TEUs, nearly half of which are being imported empty. Key source markets for repositioning of equipment to Saskatchewan include Ontario/ Quebec, the Prairies, and the US Midwest.



Supply Distribution

	VCR	Prairie	Central Canada	Montreal	Chicago & South	Atlantic/ Halifax
DRP	----	----	100%	----	----	----
ERP	----	18%	58%	----	24%	----
Import	65%	----	----	33%	----	2%

TEUs (000s)

	VCR.	Prairie	Central Canada	Montreal	Chicago & South	Atlantic/ Halifax	Total
DRP	----	----	11.7	----	----	----	11.7
ERP	----	4.2	13.7	----	5.8	----	23.7
Import	6.5	----	----	2.5	-----	0.2	9.3

Figure 22 – Key Flows for International Container Supply to Saskatchewan – 2006.

Loaded containers exported from Saskatchewan are predominantly destined to the ports of Vancouver (41%) and Montreal (45%), with the remainder destined to Halifax. Vancouver's role is more prominent if we include empty container movements. More than 95% of the 0.009 million TEUs that move empty go through Vancouver.

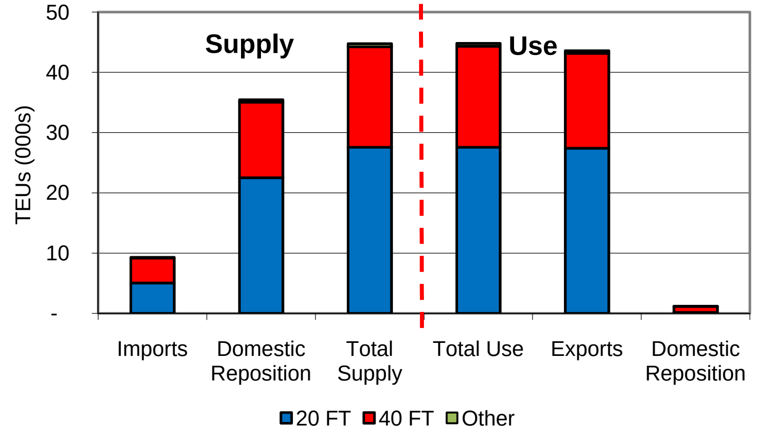


Figure 23 – Saskatchewan Container Supply and Use by Equipment Size

Whereas Alberta has more than half of its containers shipped empty in Saskatchewan empty movements represent only 23% of total export container shipments. Saskatchewan is heavily dependent on 20-foot containers and as shown Figures 23 and 24 this equipment type constitutes the majority of both supply and outbound shipments. Direct imports provide less than 20% of required supply for this equipment type and therefore an estimated 0.022 million 20-foot units are repositioned, mostly empty, from other regions. In 2006, more than 97% of the 20-foot containers shipped from Saskatchewan were loaded.

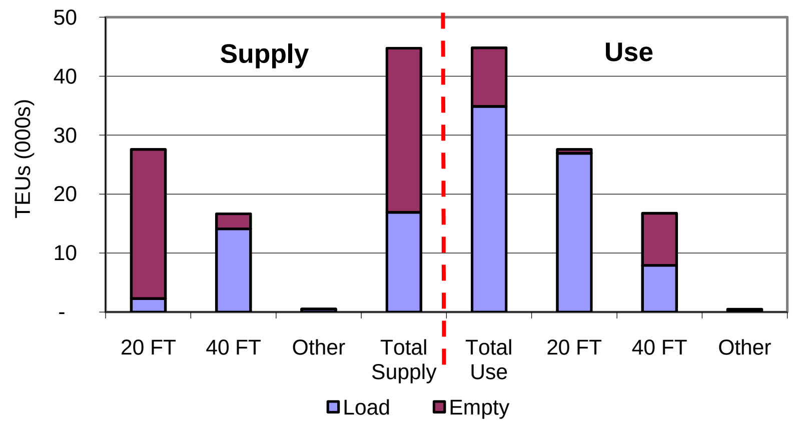


Figure 24 – Saskatchewan Container Supply and Use by Equipment Size (Load vs. Empty)

2.43 Manitoba

Much like Saskatchewan, Manitoba relies heavily on the repositioning of international containers from other inland regions to provide sufficient container supply for export traffic. More than two-thirds of container supply in 2006 was sourced through repositioning activities, largely from Ontario and Quebec.

In 2006, there were an estimated 0.054 million TEUs supplied to Manitoba and 0.52 million TEUs shipped from the Province. Its container utilization is slightly better than Alberta's with 51% of containers shipped loaded.

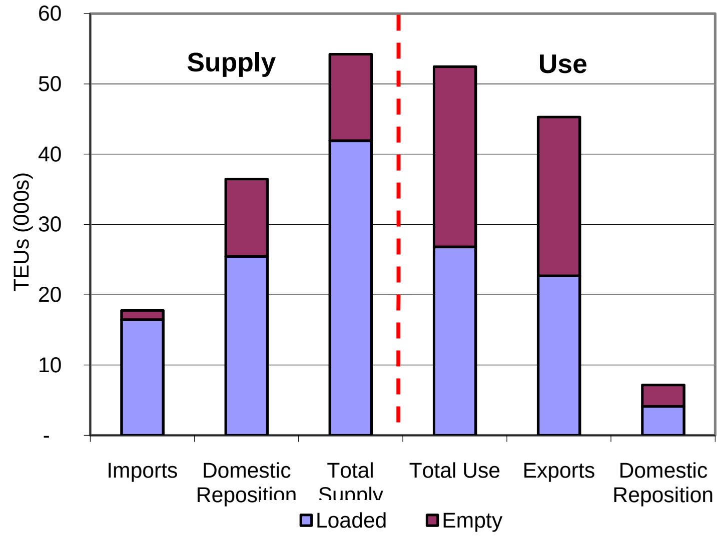
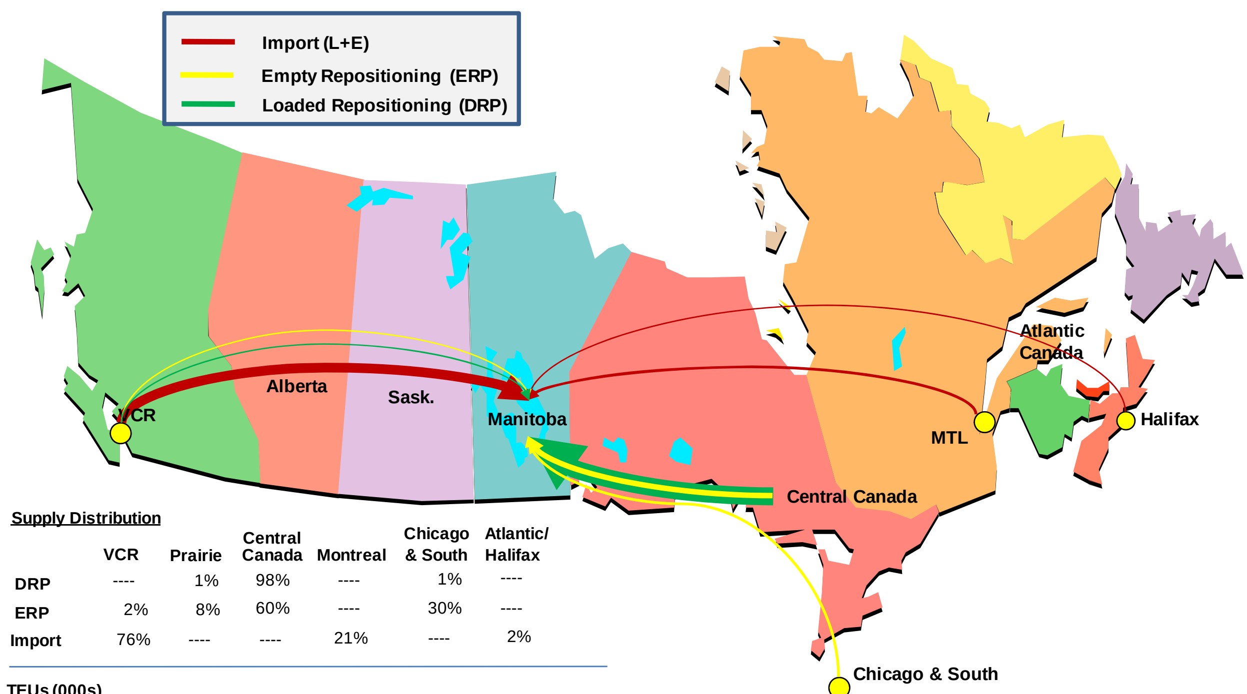


Figure 25 – International Container Supply and Use - Manitoba 2006



Supply Distribution

	VCR	Prairie	Central Canada	Montreal	Chicago & South	Atlantic/ Halifax
DRP	----	1%	98%	----	1%	----
ERP	2%	8%	60%	----	30%	----
Import	76%	----	----	21%	----	2%

TEUs (000s)

	VCR.	Prairie	Central Canada	Montreal	Chicago & South	Atlantic/ Halifax	Total
DRP	0.1	0.2	24.8	----	0.3	----	25.4
ERP	0.2	0.9	6.4	----	3.2	----	10.7
Import	13.5	----	----	3.8	-----	0.4	17.7

Figure 26 – International Container Supply to Manitoba - 2006

Similar to Saskatchewan the volume of containers destined to Manitoba from direct imports does not provide sufficient container supply to meet exporters' needs. In 2006, imports accounted for 78% of total TEUs exported from the province. Key source markets for repositioning of equipment to Manitoba to fill gaps in supply include Ontario, Quebec, and the US Midwest. Similar to Alberta and unlike Saskatchewan, repositioning activity consists principally of loaded containers sourced from the Ontario and Quebec regions.

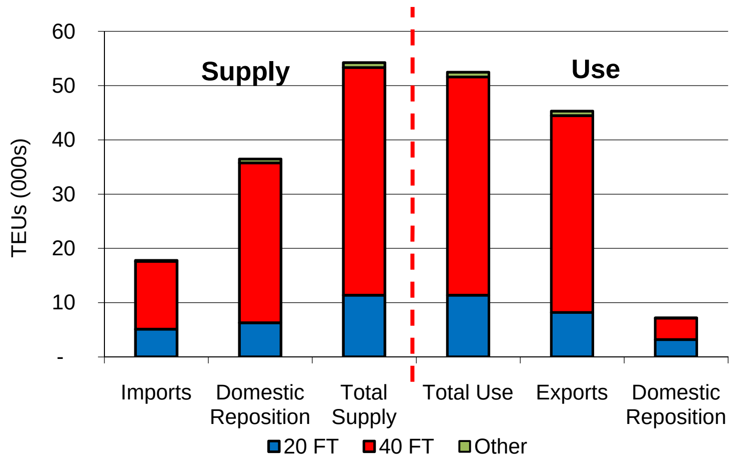


Figure 27 – Manitoba Container Supply and Use by Equipment Size

The Port of Vancouver is the primary destination for export traffic originating in Manitoba accounting for 80% of total TEUs shipped. While roughly twice as many loaded containers go to Vancouver as compared to Montreal, the dominance of Vancouver as a port of exit is driven by the high volume of empties, which exceed loads by 50%.

Equipment flows to and from the province are relatively balanced although far more containers arrive in the province loaded than leave loaded – 75% versus 51%. Forty-foot containers are the principal equipment type supplied to the province and represent 73% of loaded TEUs shipped. Twenty-foot containers are in a surplus position with nearly 40% of this equipment type leaving the province empty.

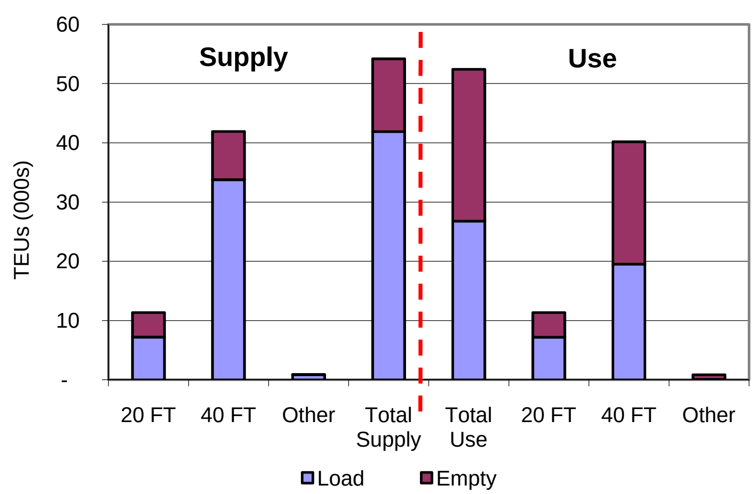


Figure 28 – Manitoba Container Supply and Use by Equipment Size (Load vs. Empty)

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2.5 Key issues – container markets and flows

Containerized imports continue to increase in volume faster than exports. This gap between imports and exports has created a surplus supply of empty containers to support export movements. However, due to both the excess supply of containers and the relatively lower value of Canadian export commodities as compared to import commodities the revenue available to shipping lines is much lower on export movements than imports. This creates a motivation for shipping lines to restrict the movement of international containers to inland locations where export traffic volumes and returns are limited.

"The most important factor driving apparent shortages of container supply on the Prairies is the low level of returns available to shipping lines for … low revenue export loads. "

Shipping lines have begun to adjust their pricing structures to discourage importers from moving imported goods directly to inland locations in international containers. Some lines have stopped marketing transportation services directly to the Prairie Provinces and others have increased the cost of these inland movements. These marketing actions serve to restrict the supply of containers to inland areas.

However, over 50% of international containers depart by rail empty from Alberta and Manitoba and over 20% of containers leave Saskatchewan empty, en route to export positions. Overall, the Prairie Provinces receive most of their inbound container supply through the domestic repositioning of international containers with loaded domestic traffic, primarily from Central Canada. While port transloading and shipping lines' marketing actions may restrict supply of international containers to the Prairies, there is still an overall surplus of containers available on the Prairies.

The most important factor driving apparent shortages of container supply on the Prairies is the low potential for profit available to shipping lines. Shipping lines do not have sufficient incentive at current market prices to delay containers awaiting low revenue export loads. Rather, they will opt to return the containers empty to their main revenue generating head haul markets in Europe and Asia, where a far better financial return can be found.

For shippers who can take advantage of bulk transportation to port locations, transloading export shipments to containers near the port is a cost effective way to participate in containerized export markets. However, shippers of commodities with sensitivities to handling due to their products having a higher value (semi-precious metals) or due to quality control considerations (some specialty and forage crops) face significant barriers to port loading of containers. This is particularly the case for exporters whose production facilities are remote from large population centres such as Prairie shippers of specialty grain products. These shippers will continue to be challenged in obtaining satisfactory container supply unless their products can bear high enough prices to absorb the transportation costs necessary to incent shipping lines to reposition empty containers to their shipping locations.

"Over 50% of international containers depart by rail empty from Alberta and Manitoba and over 20% of containers leave Saskatchewan empty."

Railway transportation is critical to the logistics chain, especially in Vancouver where 70% of import traffic is railed directly from the docks. Stakeholders are concerned that the structure of the containerized traffic supply chain through Vancouver is not capable of handling seasonal surges of volume and that this is affecting the reputation of Canada's containerized logistics system.

Many stakeholders recognize the significant strides made by railways, port terminal operators and logistics providers to increase the efficiency of port operations. There are however, concerns about the fragility of the port's throughput capacity due to the lack of buffer capability available to handle shocks that occur through weather related disruptions to ocean and railway operations.

3.0. The Inland Container Terminal

The creation of inland terminals in various locations in Canada has been suggested by several stakeholder groups and municipal representatives as a solution for a perceived shortage of containerized transportation capacity. In this section we examine the inland terminal concept from an economic and operational perspective in order to determine whether or not inland terminals may be useful for improving container transportation in Canada. We start by discussing the terminal's place in a network and what defines the different possible types of terminals before examining the design, structure and operation of the terminal.

In order to ascertain the economic drivers, threshold volumes and operational sensitivities of an inland terminal operation, Quorum employed a financial and operational modeling approach. A three step process was used; the first step was to set the physical and operating specifications of each of six different terminal scenarios. An operational model was then developed to provide an estimate of minimum and maximum workload in the second step, which in turn drives the third step, the financial model.

In approaching this task, the study team began by developing a "generic" inland terminal business model, which included a general operating model for three types of terminals. Each of these operations was assessed in both small and medium sized designs. In the development of these designs the requirements for the land footprint, storage and rail yard, equipment, maintenance, manpower and other ongoing operating expenses were taken into consideration and costs assigned. The development of the generic physical and operational design for inland container terminals and the identification of baseline economics for the operation of those terminals provide a basis that allows us to determine the breakeven threshold of the different types of terminals examined, and their capacity ranges. This analysis has also allowed us to evaluate the market and economic factors that impact the potential implementation of an inland container terminal as well as the relevant financial and economic drivers related to container terminal operations. ("inland" and otherwise).

An overriding factor in the establishment of any intermodal or container terminal (be it inland or at a port) is in its relationship within a greater network of terminals. We begin this section with a discussion of a terminal's place within a terminal network. This is followed by a discussion on the definitions of different types of terminals and how those definitions were viewed in the context of the scenarios used in the terminal modeling analysis performed for this report.

3.1 Implications of Terminals within an Intermodal Network

While most of the analysis on inland container terminals (ICT) deals with the economics and financial aspects of container terminals themselves, it is imperative that the terminal network implications be discussed. No matter where the ICT is located, it is entirely dependent on other terminals within a broader intermodal network to both receive and forward the traffic it handles. This network is most often part of a single railway system. The terminals and intermodal network can also be viewed in a context beyond that, namely, as a part of the entire North American intermodal terminal network. The key financial drivers for intermodal networks are traffic density and asset velocity. While some of these drivers apply to individual terminals, they are significantly more important from a network perspective.

"No matter where the ICT is located, it is entirely dependent on other terminals within a broader intermodal network to both receive and forward the traffic it handles"

3.11 Network Scale Economies

The most important aspect of intermodal network cost drivers are balanced traffic flows and the utilization of train / car slots:

- Balanced traffic flows into and out of a terminal not only aid in the terminal workload planning, they ensure optimal train capacity utilization and hence optimal unit costs (i.e. lower average costs per container). In Canada, both CP and CN have employed balanced train flow initiatives with the objective of reducing costs and optimizing the use of their key assets. As such, they have taken steps up to and including the prioritization of traffic to ensure that directional flows remain in balance and that trains are balanced between motive power and length (trailing weight). Therefore if a terminal has, for example, 200 TEUs arriving at a terminal, it must optimally have 200 going out. The goal is to have no empty slots on trains.

- Slot utilization is a measure of the container slots used on a train. Intermodal trains typically consist of multiple origin-destination specific "blocks" designed to serve individual terminals across the network. Empty slots are generated within individual origin-destination specific "blocks". Numerous small "blocks" tend to drive poor slot utilization. When slot utilization in a specific block is low, that portion of the network is viewed as driving costs up and is, therefore, a burden on the entire network.

Network service levels are driven by complexity – the greater the complexity, the lower the level of service, hence the greater the unit costs. The most prevalent example of this can be found in terminals with complex inbound and outbound schedules and multiple shippers, receivers and destinations. This is, more often than not, a consequence of low traffic volumes comprised of multiple destinations. This situation will require an increased amount of in-terminal workload on the network in order to "shuffle" containers on a train to accommodate the multiple destinations. Further, this traffic will necessitate train designs that demand significant setup time at the origin, en-route and destination terminals - all requiring extended service schedules. The result is that all key assets (cars, locomotives, terminals) will suffer lower utilization rates.

Networks with fewer and larger blocks of traffic will most often have more balanced traffic flow and consequently, better asset and slot utilization.

3.12 Railcar cycling

An approach taken in some networks involves the consolidating of traffic in larger terminals in order to "smooth" the variations in demand and reduce the requirement for a backup stock of railcars to handle surges in demand. Where restricted traffic types (i.e. destinations with small block volumes) generate a high degree of seasonality, the short-term variability in car requirements has the potential to generate significant empty car flows as they are reallocated along the network. A larger terminal that handles a mix of traffic can manage these variations more easily than smaller terminals that must either delay traffic or adversely impact both train and slot utilization.

3.13 Train schedules

When a network adds additional terminals it is necessary to add time onto train schedules so as to accommodate the pickup and setoffs of traffic. Minimum delays in these cases are in the range of 60-90 minutes per occurrence. One solution that has been attempted by some railways that can mitigate these delays is to employ dedicated transfers using short trains to another terminal. Another is to add intermodal trains to existing freight services[22]. However, this most often generates additional switching at the other terminal in addition to increased transit times for the individual containers involved.

3.14 Network complexity

Each time an additional terminal is added to a network other terminals are required to load an additional block for the additional terminal. This impacts loading track assignments at each of the other terminals in the network, and manifests itself in the form of increased switching as well as increased workload in each terminal for the segregation of yet another destination. Furthermore, individual block sizes tend to decrease resulting in an overall decrease in slot utilization on the network.

3.15 Network Capital Requirements

With every terminal that is added to a network it is expected that traffic will increase, as will the associated demand for railway rolling stock (railcars and locomotives). These expenses are not considered in this report's financial and operations model or in its economic analysis, but are considerable by comparison to the total capital cost of constructing and implementing a single terminal. To provide perspective on this issue, the study team used the breakeven volumes in each of the terminal type scenarios as a basis for determining the railcar and locomotive requirements of the associated traffic.

In every case the network capital costs are found to be 3 ½ to 5 ½ times that of the terminal costs. These costs are presented in Table 9.

$ (Millions)	Terminal Capital	Network Capital
Stand Alone - Small	2.06	11.16
Stand Alone -Medium	4.49	14.29
Satellite - Small	2.85	15.40
Satellite – Medium	11.14	31.76
General Purpose – Small	14.29	51.96
General Purpose - Medium	18.48	63.80

Table 9 – Comparison of Terminal and Network Capital Investment

To shed some additional perspective on this issue, replicating an intermodal network such as CN's would require approximately $420 million in terminal investment, $750 million in railcars and $250 million in locomotives. CP would be similar from a terminal perspective but would require in the order of $1.2

[22] This would particularly be the case from a satellite terminal where the traffic would be loaded in smaller blocks

billion in railcars and $400 million in locomotives as a result of specific challenges in their network, primarily grades. Additionally, network capacity investments in yards and sidings in order to support the requirements of incremental intermodal volumes are difficult to isolate but would almost certainly exceed the investment in an individual terminal.

There can be no doubt as to the importance of the network dynamics in container traffic management, terminal design and construction, and the overall profitability and market potential of any proposed ICT.

From an intermodal network system perspective, any ICT being planned must take into account its impact on the broader rail network. There can be no doubt that an ICT must be designed in every aspect with the full cooperation and partnership of the serving rail carrier, as they will have a far larger investment and carry a far greater level of risk than any single terminal stakeholder. Further, any new terminal contemplated for an intermodal network, whether it is owned by the serving railway or not, must add value to the network without taking resources or traffic from other terminals.

"There can be no doubt that an ICT must be designed in every aspect with the full cooperation and partnership of the serving rail carrier"

3.2 Terminals and Terminal Definitions

Containerized transportation came to Canada in the early 1960's. In its beginning stages the container mode was managed over conventional docks and generally handled through the trucking arms of the two major railways. Since its beginnings nearly fifty years ago, eleven dedicated container port terminals have been developed in four ports supported by twenty-one railway owned and managed intermodal terminals (ten with Canadian Pacific and eleven with Canadian National) across the country.

The individual operations of the various port terminals are very similar characterized by large waterfront footprints to accommodate container storage, dockside container handling cranes, and direct rail service. Inland intermodal terminals provide inbound and outbound service to both retail and wholesale domestic intermodal markets[23] in addition to the international container markets handled by the port terminals.

While the Canadian market has remained consistent with this basic business model so far, the US markets are evolving. Increasing volume and a changing demand for services is driving the industry to specialized terminal operations. In addition, there has also been a shift from the typical "railway owned and operated" ownership structure to a variety of ownership structures. These structures range from leases and contract operations to operations established and financed by local municipalities as part of either an economic development initiative or one aimed at reducing traffic congestion.

[23] Domestic retail markets are defined as trailers and containers owned by the railway and for which services are directly managed by the railway. Wholesale markets refer to companies who own their own equipment and contract terminal to terminal service from the serving railway. Examples of a wholesale client would be a domestic trucking company or a large company involved in retail sales such as Canadian Tire, Hudson Bay or Sears.

The changing approach to the design and use of inland and intermodal terminals has been the subject of several studies and papers, which were reviewed for this study. Two studies in particular were deemed to have the most relevance to the topic under discussion here and provided the background information and framework for selecting the six scenarios modeled for this report.

3.21 Geographic and Modal Definitions

In their August 2001 paper on "The Identification and Classification of Inland Ports", Sara Jean Leitner and Robert Harrison[24] identified four types of ICTs, generally based on the transportation mode and geographic location they served:

Inland Waterway Ports – The US has a great number of inland waterways (i.e. the Great Lakes, the Mississippi and Columbia River systems to mention just a few). The use of waterway ports aids in increased barge utilization (a highly efficient means of freight transport according to this study[25]). Quorum notes that these types of facilities are not commonly used to consolidate containers or container cargo.

Air Cargo Ports – The movement of freight by air increased at a rate twice that of passenger traffic in the 1990s, a trend that has continued into this decade, with cargo levels exceeding 20 MMT in the US and almost 700,000 MT in Canada by 2005[26]. Dedicated cargo carriers such as FedEx and UPS have aided largely in this growth and the creation of dedicated Air Cargo Ports has seen some interest in recent years. However, the demographics of the industry will continue to constrain this growth as almost half of all air cargo continues to be carried on passenger aircraft, requiring the continued association with passenger terminals and operations.

Maritime Feeder Inland Ports – Described in the Leitner-Harrison report as being most commonly related and associated to a traditional maritime port, these operations are intended to "provide relief for overcrowded" terminal facilities. They suggest such a facility should be located 50 to 250 miles from a port terminal – far enough away to allow for reduced congestion at the port facility but close enough to allow for economically and operationally efficient distribution and consolidation activities. Quorum would take this one step further and point to examples of the "nearby port" intermodal terminals in California and New Jersey (see section 3.61 below). In these locations the intermodal terminal operations were established well away from the port terminal in order to allow for the detraining and entraining of containers and the marshalling of inbound and outbound trains. This movement of rail operations away from the ports can reduce congestion at the waterfront operations.

Trade and Transportation Centre Inland Ports – Commonly referred to as "Logistics Parks", existing facilities in North America are most commonly centered on a railway's intermodal terminal operation

[24] The Identification and Classification of Inland Ports, August 2001, Sara Jean Leitner and Robert Harrison, Center for Transportation Research, The University of Texas at Austin

[25] Leitner and Harrison quote the Maritime Administration which states that in terms of energy efficiency, one ton of cargo travels 59 miles by truck, 202 miles by rail or 514 miles by barge per gallon of fuel.

[26] Source: US DOT Air Freight Summary Data, Bureau of Transportation Statistics, Transportation in Canada 2006, Transport Canada

with an associated large scale real estate development that is warehouse and logistics focused. These are described in the Leitner-Harrison report as “a general class of locations where border processing of trade is shifted inland and multiple modes of transportation are offered”. The successful examples (section 3.61 below) of these operations are essentially distribution and consolidation centres for inbound international freight.

In considering these options, it quickly becomes apparent that the Canadian marketplace, by virtue of its limited capability to generate volume or the demographic demand for the service negates the potential for success of some of these types of terminals if considered as separate stand alone ventures. In fact, almost all of the existing terminals would be classed as “*Maritime Feeder Inland Ports*” as delineated by Leitner and Harrison.

3.22 Business Models

In December 2006, the BC Ministry of Transportation released a report titled “Inland Container Terminal Analysis” which was prepared by the IBI Group[27]. This report included a section on the definitional issues of inland container terminals. The IBI report segmented the industry in terms of four business models:

Import/Distribution centre oriented – This business model focuses on the international import trade and the need to de-stuff and deconsolidate traffic out of the international equipment for furtherance to the final destination. The deconsolidation activity moves the traffic from the international equipment to domestic equipment, typically some form of consumer goods, usually to a retail environment and, in ever increasing volumes, destined to markets in Central Canada or beyond.

Export Transload oriented – This model uses the reverse movement of the import traffic and will source a large percentage of its required outbound equipment from the inbound import movement. In Canada, the export movement in a container is usually a lower value, resource or bulk commodity using a lower cost means of transport. When performed at or near a port terminal, the loading is performed at a separate warehouse or transload operation and trucked to the terminal operator.

Empty Container Terminal - While this is a growing requirement in port locations, empty container terminals serve a similar purpose at inland locations as well. At port locations they serve to provide cleaning and repair services, but also temporary storage so as to reduce the length of dray between the last consignee’s and next shipper’s facilities. With the recent changes in railways’ terms of storage on railway property, empty container terminals at inland locations have become more prevalent.

Logistics Park – Referenced in the Leitner-Harrison report as *Trade and Transportation Centre Inland Ports*, IBI points out that these are relatively new concepts in North America, but have a longer history in Europe.

[27] Inland Container Terminal Analysis, IBI Group for the British Columbia Ministry of Transport, September 18, 2006

The Canadian experience to date would indicate that inland container terminals of any sort must be capable of handling the first three business model types in order succeed.

Utilizing these concepts, Quorum designed operational options that would be most suitable for the Canadian marketplace. In doing so we determined the following attributes as being most appropriate:

- The capability to grow at staged levels using a combination of increased "surface footprint" and increased resources (i.e. manpower and equipment)
- All options must have the market and operational capability of handling both international and domestic equipment movements (as do the existing intermodal operations in Canada).
- Options at the low volume end of the scenarios that are "low cost" alternatives must be tested.
- Options at the high volume end that would allow for next step transitions to a "Logistics Park" like model must be provided as well.

The rationale for not providing a broader spectrum of options is summarized as follows:

1.) The demographic requirements (dense and high population areas) that drive so much of the intermodal and international container traffic economics will continue to play a part in the growth of Canadian container markets. As such, the larger options that have been mentioned above will not, in the short and medium terms play a part.

2.) For the same reasons relative to demographics and traffic volumes, the requirement for specialized operations will not be in demand

3.) The network aspects of basic intermodal operations in Canada will continue to drive much of the inland container and intermodal terminal development

4.) The necessity for "off port" and "off terminal" empty container yards will continue to grow with volume. However these facilities will most often be located such that they are very low cost and will be in support of existing or planned operations. While their existence will be significant and contribute to the efficiency of the overall network, they were determined to be superfluous to this analysis. Further, the benefits derived by such operations are very much on a case by case basis, and would not lend themselves easily to a standard modeling assessment such as is being undertaken in this study.

The above formed the basis for the terminal design and classifications that follow.

3.3 Terminal Design and Functional Classifications

For the purposes of this analysis three generic terminal classifications were used. Each type has a different level of functionality and operational complexity that is driven by the type of traffic the terminal is intended to handle. The three classifications are Stand Alone, Satellite and General Purpose.

3.31 Stand Alone Facility

This is a commodity, industry or customer specific terminal that is intended to handle either inbound or outbound loads. All of the loads would have similar service requirements or operating characteristics. They could be specific to a single industrial plant, a seasonal facility, or could focus on one commodity produced or consumed by a number of industrial or commercial establishments in a defined geographic area.

Examples of this type of terminal include the Mazda assembly operation in Flat Rock, Michigan and the Honda assembly plant in Marysville, Ohio. In both of these instances, the terminal handled imported parts for the assembly operation and there was no requirement for a gate other than the normal access for the assembly operation. An example of a larger stand-alone operation that served a number of facilities in a region was the APL facility in Woodhaven, Michigan that gathered parts from suppliers in Michigan, Ontario and Ohio for shipment to the Ford assembly operation in Hermosillo, Mexico.

3.32 Satellite Facility

This is a terminal facility that is essentially an extension of another larger intermodal facility. Inland ports and empty container yards are the primary examples. The value proposition for this type of facility is either customer service, product improvement, or it is a means to free up capacity in the larger facility. Examples of this type of terminal include the Virginia Inland Port that extends the operations of the Port of Norfolk inland to Front Royal, Virginia. This has provided Norfolk with an ability to compete more effectively against the Port of Baltimore for business in the Ohio Valley. From a customer perspective, the same services (customs, lift on/off etc.) are available inside the gate at Front Royal as are available at Norfolk. The satellite is connected to the port by a dedicated rail service.

Another example is the Inland Container Transfer Facility in Long Beach, California. This is the first “near dock” facility to be located in the Los Angeles-Long Beach area and is a satellite to the large number of marine terminals in the Port. The value proposition is product and service based as the facility significantly reduces the trucking required to connect to the existing intermodal facilities. The facility is owned by the port and is funded through a gate charge for each container handled. When development for this facility was underway it was made available to all the railroads serving the area (Southern Pacific, Union Pacific and the Santa Fe), ultimately only the Southern Pacific opted in.

There are a number of container yards that have been built to handle empty containers. The Mississauga Intermodal Service Centre for instance is an extension of the CN Brampton Intermodal Terminal and was built to release capacity in that facility. A truck shuttle connects the two.

3.33 General Purpose Facility

A General Purpose facility is intended to handle a mix of traffic types (inbound and outbound, domestic and international) that have a number of service and operating requirements. These facilities would serve a number of other points on the network each of which may have different scheduling requirements. The types of containers, service requirements and paperwork requirements will vary depending on the mix of origins and destinations, customers, and commodities. Train loading and blocking, gate and interchange processes, and container accessibility are key issues. The mix of traffic will normally be loads and/or empties each way.

Examples of General Purpose terminals that *have not* been developed by Class 1 railroads include:

- Huntsville, Alabama. This intermodal terminal was part of an airfreight and logistics park development associated with the airport. It has access to two Class 1 rail networks but only one (Norfolk Southern) has regular service into Huntsville. Norfolk Southern has closed some other small facilities in the area and concentrated some traffic at this facility.
- Stark County, Ohio. The Neomodal Facility is a technologically advanced facility built southeast of Cleveland with some ISTEA[28] support. It has access to the Class 1 railway intermodal networks only through a short line rail operation. It has never handled significant volumes of freight despite being in a very attractive market for outbound freight. None of the Class 1 operators offer regular service into Neomodal.
- Auburn, Maine. This facility was developed by a short line connector to CN and was funded with ISTEA support. It also had a contractual commitment from CN to provide a service connecting the facility to the CN network in Montreal. The facility operates as an extension of the CN network and CN has commercial control of the business.

There is a fourth type of facility that we have not addressed and this is the mixing facility. As the number of origins and destinations in an intermodal network increase, the number of potential traffic blocks (origin-destination combinations) increase and the network loses scale economies on these individual blocks. A mixing facility reworks cars or blocks with mixed destinations and combines them with traffic from other origins to forward on to the ultimate destination. Many of the railroad-owned General Purpose facilities do some of this mixing.

3.34 Terminal Design Specifications

The operational standards used in developing designs and specifications for the various terminal types and sizes are based on industry averages and recognized standards in the North American industry, adjusted to Canadian requirements (i.e. seasonal and climatic differences). The following table illustrates each terminal type's base infrastructure requirements in terms of land acquisition, rail, yard and site preparation, utilities' installation and building construction.

[28] ISTEA (Intermodal Surface Transportation Efficiency Act) was passed by the US Government in 1991 and provided planning and policy direction in the area highway/multi-modal and metropolitan transit transportation matters. In addition to providing the basis for funding of a number of infrastructure projects and issues related studies, it also identified over 80 key transportation corridors. It expired in 1997 and was replaced by the Transportation Equity Act for the 21st Century (TEA-21) and most recently in 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

			ICT Type	Stand Alone Small	Satellite Small	Stand Alone Medium	Satellite Medium	General Purpose Small	General Purpose Medium
Environmental Study				Y	Y	Y	Y	Y	Y
Land (hectares)	Incremental			0.85	0.33	0.66	0.85	0.99	1.98
	Total			0.85	1.18	1.84	2.69	3.68	5.66
Surface Preparation	Surface (60 kip)			Y	Y				
	Surface & Sub-surface (120 kip)					Y	Y	Y	Y
Rail Line (Track meters)	Container Train			205	310	520	725	1040	1660
	R & D and Support			310	470	780	1090	1560	2490
	Marshalling			30	30	30	80	80	160
Facilities	Services	Lighting	Minimum	Y	Y	Y	Y		
			Tower					Y	Y
		Water + Sewage	Tank+ Trailers	Y	Y	Y			
			Municipal Service				Y	Y	Y
		Power + Track Outlets		Y	Y	Y	Y	Y	Y
		Air							Y
	Drain-age	Surface		Y	Y				
		Sub-surface				Y	Y	Y	Y
	Terminal Operating Facilities	Loader Fueling		Y	Y	Y	Y	Y	Y
		Loader Mtce.							Y
		Washing							
		Truck Scale		Y	Y	Y	Y	Y	Y
		Buildings	Trailers	Y	Y	Y	Y	Y	
			Fixed Structure						Y
	Sec urity	Gate		Y	Y	Y	Y	Y	Y
		Fence				Y	Y	Y	Y
		Building		Y	Y	Y	Y	Y	Y

Table 10 - Terminal Design Specifications

3.35 Terminal Design Fundamentals

For the purpose of developing capital and operating costs we have developed a number of base terminal designs. The designs are modular and the terminal types differ primarily in terms of size. Terminals have three basic elements: the load-unload track and supporting storage; the staging and maneuvering space; and the gate, administrative support infrastructure, lighting, maintenance and other utilities.

The load-unload modules are the basic train building areas of the terminal. A segment of track the length of a 5-pack railcar, non-articulated with 53-foot wells each, 340 feet long (the longest railcar commonly in use today) forms the basis for these modules. The size and capacity of the loading and unloading area is predicated on the multiples of modules the track is designed to accommodate.

The staging and maneuvering area for "top pick" container handlers is 55 feet, with minimum requirements for a storage area being 27 feet (sufficient to stack containers 3 deep). The support areas are designed to, and must be capable of, supporting the current industry design standard of 120 KIP[29] axle loads.

[29] KIP is the standard reference to loading capability. (1 KIP = 1,000 pounds loading). In the context of this and most intermodal design references, the reference is to KIP's per square foot. In other words, the compression of the ground must be such that it is able to sustain and carry weights of up to 120,000 pounds per square foot.

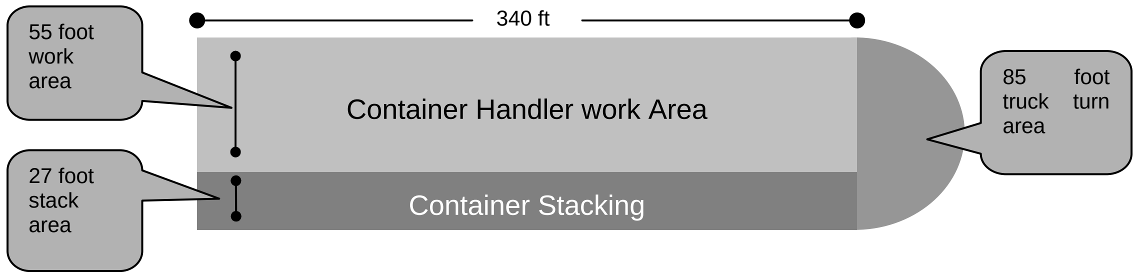

Figure 29 – A typical load – unload – storage module and its dimensions

Based on these two factors, the minimum module size for a terminal is an area 340 feet long by 92 feet wide. The smallest facility (Stand-Alone Small) consists of two of these modules. The largest (General-Purpose Medium) is based on 20 modules (two sets of 10 modules placed back-to-back). The working area in this case is 3,400 feet by 184 feet. The working tracks can be either run through (connected to the rail network at each end) or stub ended (connected only at one end). Practically speaking, a small Stand-Alone or Satellite facility would usually be stub ended and a larger General Purpose facility run through.

Additional land and trackage is required to connect the modules to the rail network. Switching and storage tracks, equal in length to the load/unload tracks, are required to support the rail operation. Typically these activities are performed outside of a container terminal's operational limit.

Also, additional land is required for the gate and administrative functions, for truck access to the load-unload areas, and for truck maneuvering (u-turns etc.) outside of the load-unload area.

Each of the terminal types is assumed to have a gate operation that facilitates inspection and interchange. Sufficient roadway length is allocated so as to enable queuing for both inbound and outbound trucks. The office size and amenity requirements (i.e. locker rooms) are based on staff levels in each scenario.

Figure 30 – Taylor 974 top lift machine (Taylor Machine Works)

Safety and security requirements dictate that night time operations are properly illuminated by proper fixed lighting. Lighting can range from pole lights intended to support only modest nighttime operations to towers that can support a 24-hour operation.

There are a number of alternatives for lifting containers onto, as well as off, railcars. These range from the use of top-lift machines to gantry operations. For this analysis we have chosen the top-lift alternative as it is the most flexible and portable. The equipment used in all cases is a front-end top-lift machine similar to that of a Taylor 974. These are designed to handle international containers but can handle heavy domestic containers if required. The terminal infrastructure can support the slightly larger top-pick or reach stacker machines that would be used for a heavier flow of these domestic containers. A concrete pad with the capability to capture small oil spills would be provided for each top lift machine required.

3.36 Terminal Operating Plans

The terminal operating plan provides the basis for the financial model and focuses on how inbound and outbound trains are handled with respect to the timing of unloading and reloading the cars. This approach determines the level of workload and is used as the basis for estimating the operating costs as well as the income stream for the operation. It is envisioned that each facility would cycle railcars within a 12-24 hour timeframe (i.e. no railcar would wait longer than 12-24 hours).

The design and operating plans of the model are iterative: first, in a progressive design size and capacity perspective (i.e. each type and scenario gradually increases in "land footprint" size, equipment requirements and capacity) and second, from the perspective of each scenario's analysis, the volumes are viewed in a step function.

A workload estimate attributable to each terminal has been developed through modeling of the terminal operations within each terminal type. The model contains 46 separate conditions that have been set based on the study team's expert knowledge of intermodal operations and was run in increments of 1,000 inbound units. It estimates the number of supplemental "in terminal lifts" required, manpower requirements, equipment utilization, fuel consumption, and total employment. In each of the design specifications by terminal type, an example of the associated workload and the key indicators has been provided. More detailed estimates of annual workload can be found in Appendix 7.

Stand Alone Facility

The planned operating scenario sees empty containers arriving inbound and offloaded into stacks. The only segregation would be for different container owners (shipping lines), or types of container (i.e. size, heated, reefer etc.). Outbound loaded containers would be lifted directly from the truck onto the railcar wherever possible and the truck would be loaded directly from the railcars with an empty container.

Assumptions:

- Empty containers inbound, loaded outbound.
- 50% of inbound containers are offloaded on arrival; the remaining 50% are offloaded as outbound loads are brought to the facility (thereby reducing the number of lifts required).
- Outbound loads are loaded on arrival at the facility.
- If the traffic mix requires 20-foot containers only, they will arrive on cars with 2-20's in each well and an empty 40-foot container on top. The empty 40's are reloaded on top of loaded 20's for furtherance. This maintains network double stack economics.

Workload and Key Operations Indicators: (Stand Alone – Small)

Containers Received (Annually):	1,000	5,000	10,000	14,500	19,000
Containers Handled (TEUs)	2,652	13,260	26,520	38,454	50,388
Total Container Lifts:	6,300	31,500	63,000	91,350	119,700
Total Top lift-Hours:	450	2,250	4,500	6,525	8,550
Total Fuel Consumption (Imp. Gals.)	6,930	34,650	69,300	100,485	131,670
Total Labour-Hours:	10,400	16,640	22,880	26,624	30,368
Employees:	5	8	11	13	15
Lifts per 1000 Labour-Hours:	606	1,893	2,753	3,431	3,942

Satellite Facility

The planned operating scenario also sees containers arrive inbound and offloaded into stacks. The segregation of loaded equipment would be by individual container. When containers are retrieved from stacks extra moves are required to "dig" out, again generating additional ancillary lifts. Outbound loaded containers would be lifted directly from the truck onto the railcar where schedules permit and where railcars are available. The truck would be also be loaded directly with a loaded or empty container.

Assumptions:

- Both loads and empties inbound and outbound.
- All inbound traffic unloaded on arrival.
- Loads are stacked no more than 2 deep.
- Outbound traffic loaded on railcar when scheduled; assume 50% upon arrival at the terminal.

Workload and Key Operations Indicators: (Satellite Medium)

Containers Received (Annually):	1,000	10,000	19,000	30,000	38,000
Containers Handled (TEUs)	2,652	26,520	50,388	79,560	100,776
Total Container Lifts:	6,300	63,000	119,700	189,000	239,400
Total Top lift-Hours:	450	4,500	8,550	13,500	17,100
Total Fuel Consumption (Imp. Gals.)	5,625	56,250	106,875	168,750	213,750
Total Labour-Hours:	49,504	49,504	49,504	66,976	75,712
Employees:	24	24	24	32	36
Lifts per 1000 Labour-Hours:	127	1,273	2,418	2,822	3,162

General Purpose Facility

The operating scenario for General Purpose facilities sees that containers arrive inbound and are then offloaded into stacks. The segregation of loads is by individual container. When containers are retrieved from the stacks, extra moves are required to "dig" them out generating additional ancillary lifts. Outbound loaded containers would be lifted directly from the truck onto the railcar where schedules permit and where railcars are available. The truck would be loaded directly from the railcars with a loaded or empty container. The facility would have a fleet of road chassis and, where dray service is required the containers would be pre-mounted on the chassis for highway delivery.

Assumptions:

- Both loads and empties inbound and outbound, except 25% of inbounds placed on chassis.
- All inbound traffic unloaded on arrival.
- Loads are stacked no more than 2 deep.
- Outbound traffic loaded on railcar when scheduled; assume 50% upon arrival at the terminal.

Workload and Key Operations Indicators: (General Purpose Medium)

Containers Received (Annually):	**1,000**	**15,000**	**30,000**	**51,000**	**58,000**
Containers Handled (TEUs)	2,652	39,780	79,560	135,252	153,816
Total Container Lifts:	6,300	94,500	189,000	321,300	365,400
Total Top lift-Hours:	450	6,750	13,500	22,950	26,100
Total Fuel Consumption (Imp. Gals.)	5,250	78,750	157,500	267,750	304,500
Total Labour-Hours:	114,816	114,816	114,816	114,816	114,816
Employees:	55	55	55	55	55
Lifts per 1000 Labour-Hours:	55	823	1,646	2,798	3,182

3.4 Infrastructure Design Criteria

Overview

For each of the six ICT types it has been assumed that side-lift loaders will be used for the lifting, carrying, and stacking of the containers. Each of the ICTs has a specific function which requires particular services and facilities and that facilitate these functions to become more complex with size. The following sections describe these services and facilities - the cost of which is estimated in the final section of this chapter. Schematics of each of the designs can be found in Appendix 6.

Design Standards

It has been assumed that industry design standards and construction techniques will be used to construct the civil works of the ICTs. However, the design guidelines of the *American Railway Engineering and Maintenance-of-Way Association* (AREMA) were consulted in the development of the cost estimate for each of the terminals as intermodal terminals are usually associated with a railway operation. These guidelines are contained in Chapter 14, Section 4.2 – Design of Intermodal Terminals.

Land

As previously mentioned, the land area occupied by each of the six ICT designs is successively larger than the last to allow for an increase to the complexity of the terminal functions and for railway track requirements. The ICTs were developed to be scalable in complexity simply by acquiring additional land. The ICT type and area required were developed based on specifications noted in Table 11.

An ICT will most likely be located in an industrial area of a town or city. For this reason a land price of $50 per square meter has been assumed.

ICT Type	Land Required (ha)	
	Incremental	Total
Stand Alone Small	0.85	0.85
Satellite Small	0.33	1.18
Stand Alone Medium	0.66	1.84
Satellite Medium	0.85	2.69
General Purpose Small	0.99	3.68
General Purpose Medium	1.98	5.66

Table 11 – Terminal types and Land Requirements

Surface Preparation

Following land stripping and excavation as required, the surface of the terminal should be constructed to suit the capacity and complexity of the work to be carried out at the site. Surface preparation for the parking and working area for the Stand Alone Small and Satellite Small ICTs will be suitable for light duty and therefore only require a gravel surface. Design loads for these two ICTs will be approximately 50 to 60 kips (250 kN). The problem with a gravel surface preparation is that when the aggregate particles begin to break down the accompanying dust becomes a nuisance. However, this surface is easily repaired with the passing of a grader.

Maximum design loads for the remaining terminal types will be 120 kips (530 kN) and the design should be similar to airport runway specifications. For this heavier service parking and working surface, the preparation should comprise approximately one meter of bituminous-cement or similar durable surface. This type of surface has a lower initial capital cost and maintenance repair cost than other types such as Portland cement or roller compacted concrete. Surface repair can be isolated to specific areas so the disruption to the terminal operations can be minimized.

Rail Trackage

We have followed design and construction standards for the railway trackage needed for each of the ICTs like those found in the AREMA[30] Manual for Railway Engineering. Tracks will be installed along the outer edge of the long side of the terminal property with the container stacking area at the opposite side. When a second track is required it will be located on the opposite side of the property so the container stacking area is in the middle of the terminal between the two tracks. Clear track distances for the positioning of container trains as shown in Table 12 can be achieved with a single track for the first three terminals and with the addition of a second track beginning with a Satellite Medium ICT.

[30] The American Railway Engineering and Maintenance-of-Way Association (AREMA) is the American Association of Railways engineering arm. AREMA was formed on October 1, 1997, as the result of a merger of three engineering support associations. It provides the standards for aspects of railway construction in North America.

Track structure is comprised of 115 pound jointed rail, treated wood ties with tie plates, regular cut spikes and rail anchors. Ballast should be approximately 300 mm below the ties with a minimum of 150 mm shoulders. Depending upon the characteristics of the terrain, sub-ballast will need to be approximately 300 mm or more.

Terminal Type	Track Length
Stand Alone Small	205 m
Satellite Small	415 m
Stand Alone Medium	520 m
Satellite Medium	725 m
General Purpose Small	1,040 m
General Purpose Medium	1,660 m

Table 12– Rail trackage requirements by terminal type

Facilities

Various facilities are required for the particular functions that will take place at each of the ICTs. These facilities vary from basic utilities to surface or sub-drainage and different amenities to assist with terminal operations and site security.

Lighting

Some sort of lighting system is required at each of the six terminal designs to provide light during the low-light periods of the workday in the winter as well as to provide safety and security. Minimum lighting is needed for the first four ICT types and should consist of simple high-pressure sodium lamps fastened to a standard treated wood pole. Because containers may be stacked three high at every terminal, the above-ground portion of these poles will need to be a minimum of 10.5 meters in order for the light to be above the top of the container stack. The distance between these light poles will be about 40 meters. Light poles will be placed along the edge of the terminal property.

A more sophisticated lighting system is required for the General Purpose Small and General Purpose Medium ICTs. Light masts 40 meters high separated by a distance of 125 meters will be required for these ICT types as dictated by the higher degree of activity and security needs at these terminals. Light masts will be installed in the gaps between the container stacks.

Water and Sewerage

Water and sewerage needs can be facilitated with refillable water tanks and portable toilets for the relative low volume Stand Alone Small, Satellite Small and Stand Alone Medium terminals. Local fire regulations must be satisfied with regard to the provision of fire hydrants. Once the activity and size of the terminal increases to that of a Satellite Medium and larger, buried water and sewerage and a connection to the municipal water and sewerage system is required. Fire hydrants may be placed between the container stacks near the light masts, as required.

Power

The design allows for electrical supply and facilities like power outlets for electrical tie-down equipment to be installed on the light poles or masts.

Air

Air supply is not required for the sizes of ICTs being studied. However, for the General Purpose Medium, there is an allowance for a roughed-in air line between the location of the maintenance tent to one end of the entrance track. If the ICT expands in size beyond that of General Purpose Medium then, because additional trackage will be constructed, air supply will be required to assist in preliminary charging of the train line for a more rapid train departure.

Drainage

As mentioned previously, for the Stand Alone Small and Satellite Small designs, the working and parking surface preparation will be gravel. As such, drainage for these two ICTs will be facilitated by means of grading the gravel surface to collect and to channel rain and melt water. Generally, the terminal area will be higher along both edges coincident with the alignment of the railway track on one side and the container stacks on the other. Water from the terminal surface will be channeled away from the area toward the municipal drainage ditches adjacent to the access roads.

Once the size of the ICT becomes larger and a paved working and parking surface is needed, the terminal will be designed with a sub-drainage system to collect the surface run-off. Typically, these sub-drains will comprise a trunk line parallel to the track down the centre of the terminal area with manholes of appropriate size every 60 to 100 meters. At these manholes, perforated pipes will be connected at 90 degrees to the trunk line. Because this drainage system is more sophisticated than simple surface drainage it is usually connected to the local municipal sub-surface drainage network.

Operating Facilities

Aside from the typical facility requirements like utility services and drainage discussed above, the ICTs will also need various operating facilities to conduct their daily tasks effectively and efficiently. These operating facilities are discussed in the following sections.

Loader Fueling - A side loading container crane has been chosen to handle the containers at each of the six different terminals. Loader fueling, although necessary, does not need to be an elaborate design. A simple concrete pad and accompanying elevated fuel tank with appropriate environmental protection (i.e. spill berm) will suffice.

Loader Maintenance - The concrete pad installed for the loader fueling will also serve as an appropriate working area for any maintenance that needs to be done on the side loaders. To function properly, the loader fueling/maintenance pad should be a minimum of 6 meters x 9 meters in size.

Once the volume of the ICT increases such that two container side loaders are required, the concrete maintenance pad can be fitted with a simple canvas or a heavy plastic tent. The tent will supply added protection from the elements as maintenance service to the loaders is conducted. Supports for the tent can be ‘Hilti’ anchored into the existing concrete pad.

Truck Wash - Washing facilities for the road trucks which transport the containers to and from the ICT will not be included for a terminal of any size. There are many existing independent washing facilities for semi-tractor road vehicles at truck stops and fueling stations.

Truck Scale - Load limits for major streets and highways are regulated by provincial authorities and are especially important during spring thaw. For this reason, a truck scale has been included as a requisite operating facility for every ICT studied.

The equipment for truck scales has greatly improved over the last few years with many types now based on electronic load cell or strain gauge technology. Because of this technology, truck scales are smaller, portable and less expensive to maintain. Several manufacturers offer an above-ground truck scale that can be easily installed on an existing pad or firm surface like in an ICT.

Operations Buildings

Office and storage buildings required for daily operations also do not need to be elaborate or permanent in nature. Containers or trailers that are converted into offices are all that is required for each of the six terminal types. Similarly, a container is all that is required for storage. A container placed adjacent to the concrete fueling/maintenance pad will suffice for storage of any hazardous material containment apparatus or blocking and bracing material for securing containers.

Security

Security at the ICTs will depend on the location and the commodities handled at the particular site. Gate and general security by means of closed circuit television (CCTV), fencing and buildings for entrance security forces are facilities that have been considered.

Gate - Entrance gate security is included for all six ICT designs. Basic security will consist of a CCTV camera to record the entrance and exit of individuals and of trucks. The quantity of CCTV cameras around the terminal and security features installed at the entrance gate will increase with the size of the terminal. A separate trailer placed off-site to house the remote CCTV monitors can also be included for added security if on-site tampering of monitors becomes an issue.

The entrance gate should be designed for sufficient truck queuing space. Approximately 30 meters or 2 truck lengths is the minimum length required prior to the entrance for the smallest terminal – Stand Alone Small. For larger terminals a two-way road at the entrance should be constructed to accommodate the more frequent truck traffic in and out of the terminal. A length of about 100 meters should be sufficient to accommodate a peak queue for a Satellite Small terminal. As the terminal grows, the queuing space should increase incrementally. Care should be taken during the design of the entrance queuing space so that the roadway alignment does not cause the trucks to potentially block the tracks or the public access road.

Fence - As the volume of business and value of commodities handled at the ICTs increases, perimeter fencing and gate barriers can be installed. It is assumed that a 3.6 meter high chain link fence will be installed on the full perimeter of the terminal for the Stand Alone Medium ICT and larger.

Buildings - Separate from the small office-type trailer to house the remote CCTV monitors, the security employee stationed at the entrance gate should also have a similar small trailer. This small security trailer should be approximately 2.5 meters X 5.0 meters or of sufficient size to accommodate exchange of information between the security attendant and the truck driver through a large window at one end of the trailer. If additional paper work is required to be completed by the truck driver there will be room for a counter inside the trailer to complete the necessary forms.

3.5 Financial Assessment and Breakeven Analysis

3.51 Approach and Methodology

Workload

As noted earlier, the workload for each terminal type was developed and estimated based on a modeling approach. In each scenario the terminal design factors determine the workload required for operating variables such as the number of additional lifts to accommodate storage, truck loading, train and rail car loading etc. The model estimates the key workload factors and applies them to the other areas of the financial model (revenue and operations costs) in increments. These workload indicators can be found in Appendix 7.

Capital

Consistent with the guidelines previously discussed an estimated capital cost for the construction of the infrastructure for each of the six ICT types was undertaken. A basic principle used during the determination of the physical design of the ICTs was that they should be kept simple and low-cost. In this regard reasonable estimates were developed for the services, drainage needs, operating facilities and security infrastructure. In the cases of the two smallest terminals studied, the Stand Alone Small and the Satellite Small, a “least cost” approach was undertaken in order to provide estimates that portray the lowest cost options. Aggregate costs for the major components of each ICT are included in Table 13 below.

In each scenario it is assumed it will be necessary that an environmental study be undertaken. The cost of that study is included as part of the terminal infrastructure cost.

	Stand Alone Small	Stand Alone Medium	Satellite Small	Satellite Medium	General Purpose Small	General Purpose Medium
Rail Infrastructure	243,070	593,180	479,450	845,170	1,195,280	1,922,260
Land	425,000	920,000	590,000	1,345,000	1,840,000	2,830,000
Terminal Infrastructure	739,595	2,276,932	987,326	4,995,955	6,696,060	10,244,220
Terminal Buildings	38,038	82,340	52,805	120,378	164,680	1,009,895
Total Facility Infrastructure	1,445,703	3,872,452	2,109,581	7,306,503	9,896,020	16,006,375
Terminal Equipment						
Yard	593,500	593,500	719,380	1,316,800	2,444,500	2,444,500
Office	22,500	22,500	25,000	32,500	32,500	32,500
Total Terminal Equipment	616,000	616,000	744,380	1,349,300	2,477,000	2,477,000
Total Capital	2,061,703	4,488,452	2,853,961	8,655,803	12,373,020	18,483,375
Annual Depreciation	262,424	403,846	331,639	855,041	1,347,794	1,745,248
Annual Cost of Capital[31] (information only)	$209,989	$457,159	$290,682	$1,135,102	$1,455,317	$1,882,573

Table 13 - Inland container terminal facility infrastructure capital costs by major component and terminal type

The depreciation cost of the capital, based on applicable Revenue Canada CCA rates, is included in the total financial estimate. It is important to note that a conscious decision was made by the study team *not to include the cost of capital* in these estimates, as different funding arrangements will significantly change the cost of funds to a project. In this analysis all options are compared on an equal footing, but subsequent use of these numbers must take into account the amortization of the investment specific to the project under consideration.

In Canada typically, ICTs are incorporated into a railway's operating network and as such are capitalized as part of their annual capital funding expenditures. In the United States, there have been a number of ICTs and ICT-type projects where funding has been shared between a private interest (such as a railway) and a public interest such as a port or municipality. In other cases such as the Alameda Corridor and its associated support yards in Los Angeles and Long Beach funding was secured through municipal bonds and then recovered through fees charged to the using railways (BNSF and UP) on the basis of workload. This option is not yet available to Canadian operators; however there have been a number of infrastructure related projects that utilized a "Public-Private Partnership (P3) financing vehicle[32].

[31] The annual cost of capital is calculated at 8% interest over 20 years, but is not included in any of the financial analysis as stated above

[32] Highway 407 in Toronto, the Coquihalla Highway in British Columbia and most recently the southeast leg of the Anthony Henday Freeway in Edmonton.

Revenue

Typically, intermodal terminals in North America are owned and operated by railways as part of a complete network operation intended to support the railways' container traffic service offerings. As such, market indicators for individual terminal revenue streams – whether they be on a total terminal or on a unit basis are somewhat difficult to find. However, with the advent of more and more contracting out of services (a practice becoming more popular with US terminals), the need for unit pricing has become more prevalent. Based on the experience of the staff assigned to this study, an average price of $70.00 per lift (charged on a per unit basis, into and out of the terminal) has been used. This is based on the rates charged by existing terminals in the US where the contracting of terminal operations services is in place.[33] The workload estimates developed earlier provide the basis for the revenue stream and are displayed in summary in the financial estimates below and in detail in Appendix 7.

Operating

The terminal operations were modeled based on inbound traffic and subsequently on 46 specific areas of the operation. The financial portion of the operations cost estimate was broken into four areas:

Terminal Operations - This includes the manpower associated with operating terminal equipment and the activities of loading and unloading railcars and trucks, as well as the associated movement of containers inside the yard. It includes the management and supervision, as well as the ground men and gate personnel. It also includes the cost of fuel for all terminal equipment.

Facility Maintenance – The proper maintenance of both the terminal grounds and the rail infrastructure is central to the efficiency of a container terminal operation. The cost of associated personnel involved in the direct maintenance of the property is included as well as associated contractors (i.e. snow removal, pavement contractors etc). A portion of these costs are estimated based on a percentage of the total capital costs (3%).

Equipment Maintenance – Another essential element of a container terminal operation is effective and efficient maintenance of the terminal equipment, top-lift equipment in particular, but also the yard tractors, container chassis and utility (pickup) trucks. Included in this area is the supervision and staff required in providing the maintenance service. Also included are the parts and materials required.

General Administration – In this area we have estimated the general management costs including terminal administration staff costs. Also included are the overall terminal staff employment costs (Employment Insurance, benefits etc.), utility costs (electric, water, heating, etc.), office support (computers, photocopiers, systems, telephones, communications etc.), as well as insurance, WCB,

[33] Examples in Houston, Dallas and Chicago were used and price structures were found to vary between $65 and $75 per lift. Typically, one container entering the terminal would be charged for two lifts, one in and one out. It should be noted that this does not directly correspond to a "TEU count" as a lift can be any size of container. It should be further noted that this also does not reflect the terminal workload as numerous additional lifts inside a terminal operation will be necessary to accommodate storage requirements within the terminal.

training, travel, and of course, taxes. Taxes cover property taxes only and do not consider any form of corporate or income tax that may be applicable on operating profits.

The results of the modeling of operating costs by each terminal type can be found in detail in Appendix 7.

Financial Projections

The financial projection brings together the revenue, operating and depreciation costs to provide an estimate of the break even volume levels for each terminal type scenario. As noted above, the workload portion of the model provides the variable workload drivers that allow for the operating estimates and the development of the revenue stream. A summary of this analysis is discussed below.

3.52 Analysis Results

The analysis that was undertaken sought to determine the workload threshold where breakeven profitability is achieved (where total revenues exceed the total of operating expenses plus depreciation). In each case the modeling base is 1,000 units.

The following portrays the results of the analysis and five volume levels with each level's attendant revenues, expenses, and associated operating income. In each case an estimate of the total TEUs handled in and out of the terminal is presented.

Stand Alone Small

The smallest of the alternatives explored requires an initial capital investment of $2.062 million, operates with 1 top-lift unit and 13 employees at its breakeven level of 14,500 inbound units, as noted in Table 14 below.

				Break Even	
Inbound Containers	**1,000**	**5,000**	**10,000**	**14,500**	**19,000**
Estimated TEUs Handled	2,652	13,260	26,520	38,454	50,388
Revenues	$140,000	$700,000	$1,400,000	$2,030,000	$2,660,000
Variable Operating Expenses	206,395	471,817	766,413	986,934	1,207,455
Fixed Operating Expenses	739,871	739,871	739,871	739,871	739,871
Total Operating Expenses	946,266	1,211,688	1,506,284	1,726,805	1,947,326
Total Expenses (incl. Depreciation)	$1,208,691	$1,474,112	$1,768,708	$1,989,229	$2,209,750
Operating Income Profit/ (Loss)	***(1,068,691)***	***(774,112)***	***(368,708)***	***40,771***	***450,250***

Table 14 - Stand Alone Small

As mentioned above, the Stand Alone Small scenario portrays a minimal operation – one with as small a capital outlay as possible and that operates with a minimum of staff and resources. With regard to capital investments, it is assumed that the operation will not require terminal equipment other than the top-lift and a utility vehicle; there will be no fence or extra security over and above minimal yard lighting. The terminal will retain staff to operate the top-lift machine; however, it would contract out the equipment maintenance, as it would all portions of facility maintenance. The management and supervision would be covered by one individual, supported by a second administrative person.

This scenario portrays the smallest possible type of operation that, in the opinion of the study team, could economically operate in a feasible and effective manner.

Stand Alone Medium

The Stand Alone Medium scenario requires an initial capital investment of $4.49 million, and also operates with 1 top-lift unit. It would require 17 employees at its breakeven level of 17,500 inbound units, as noted in Table 15 below.

			Break Even		
Inbound Containers	1,000	7,000	17,500	25,000	35,000
Estimated TEUs Handled	2,652	18,564	46,410	66,300	92,820
Revenues	140,000	980,000	2,450,000	3,500,000	4,900,000
Variable Operating Expenses	296,889	680,994	1,178,154	1,599,943	1,851,175
Fixed Operating Expenses	810,824	810,824	810,824	810,824	810,824
Total Operating Expenses	1,107,713	1,491,818	1,988,977	2,410,767	2,661,999
Total Expenses (incl. Depreciation)	1,511,559	1,895,664	2,392,823	2,814,613	3,065,845
Operating Income Profit/ (Loss)	(1,371,559)	(915,664)	57,177	685,387	1,834,155

Table 15 - Stand Alone Medium

Similar to the Stand Alone Small scenario, the Stand Alone Medium scenario also portrays a minimal operation with a more flexible terminal layout. It too, will operate with no terminal equipment other than the top-lift and a utility vehicle and there will be no fence or extra security over and above minimal yard lighting.

The primary difference between this and the Stand Alone Small scenario is this scenario's capability of expanded volumes and an increased amount of stored containers.

Satellite Small

The Satellite Small scenario requires an initial capital investment of $2.85 million, which includes 1 top-lift unit, 1 terminal tractor and three container chassis. The design is, in essence, an expansion of the Stand Alone Small scenario, but operates with more equipment so as allow for increased throughput. It would require 17 employees at its breakeven level of 17,500 inbound units, as noted in Table 16 below.

				Break Even	
Inbound Containers	1,000	5,000	10,000	17,500	19,000
Estimated TEUs Handled	2,652	13,260	26,520	46,410	50,388
Revenues	140,000	700,000	1,400,000	2,450,000	2,660,000
Variable Operating Expenses	437,040	558,288	709,848	1,204,884	1,250,352
Fixed Operating Expenses	859,237	859,237	859,237	859,237	859,237
Total Operating Expenses	1,296,277	1,417,525	1,569,085	2,064,121	2,109,589
Total Expenses (incl. Depreciation)	1,627,916	1,749,164	1,900,724	2,395,760	2,441,228
Operating Income Profit/ (Loss)	(1,487,916)	(1,049,164)	(500,724)	54,240	218,772

Table 16 - Satellite Small

The capital investment in this scenario reflects a shift from 60 KIP gravel compound to a paved 120 KIP compound and implements security measures in the form of fencing and improved lighting.

While this scenario's design is similar to the Stand Alone Small, the approach of using additional equipment to increase throughput has the effect of increasing the operating expenses. This trade off of $1.64 in reduced capital results in a $76,000 increase in annual operating costs. It effectively matches this scenario's breakeven point with that of the Stand Alone Medium, and provides a good example of the options available for reducing capital costs and its attendant consequences.

Satellite Medium

The Satellite Medium scenario requires an initial capital investment of $8.66 million. The expanded size and intended capacity would require operations needing 2 top-lift units, 1 tractor, 5 chassis and a utility vehicle. It would require 32 employees at its breakeven level of 30,000 inbound units, as noted in Table 17 below.

				Break Even	
Inbound Containers	1,000	10,000	19,000	30,000	38,000
Estimated TEUs Handled	2,652	26,520	50,388	79,560	100,776
Revenues	140,000	1,400,000	2,660,000	4,200,000	5,320,000
Variable Operating Expenses	929,541	1,142,673	1,355,804	2,028,128	2,423,493
Fixed Operating Expenses	1,204,095	1,204,095	1,204,095	1,204,095	1,204,095
Total Operating Expenses	2,133,636	2,346,768	2,559,899	3,232,223	3,627,588
Total Expenses (incl. Depreciation)	2,988,677	3,201,809	3,414,940	4,087,264	4,482,629
Operating Income Profit/ (Loss)	(2,848,677)	(1,801,809)	(754,940)	112,736	837,371

Table 17 - Satellite Medium

In addition to a higher breakeven point, this scenario also provides a higher level of capacity. Municipal services (water and sewer) are also included at this stage. Permanent full time staff dedicated to facility maintenance is incorporated into this scenario.

General Purpose Small

The General Purpose Small scenario requires an initial capital investment of $12.37 million. The expanded size and intended capacity would require operations needing 3 top-lift units, 4 tractors, 25 chassis and a utility vehicle. It would require 53 employees at its breakeven level of 45,000 inbound units, as noted in Table 18 below.

				Break Even	
Inbound Containers	1,000	20,000	40,000	45,000	58,000
Estimated TEUs Handled	2,652	53,040	106,080	119,340	153,816
Revenues	140,000	2,800,000	5,600,000	6,300,000	8,120,000
Variable Operating Expenses	1,611,860	2,031,807	3,226,586	3,337,099	3,624,431
Fixed Operating Expenses	1,568,931	1,568,931	1,568,931	1,568,931	1,568,931
Total Operating Expenses	3,180,791	3,600,738	4,795,517	4,906,029	5,193,362
Total Expenses (incl. Depreciation)	4,528,585	4,948,532	6,143,311	6,253,823	6,541,156
Operating Income Profit/ (Loss)	(4,388,585)	(2,148,532)	(543,311)	46,177	1,578,844

Table 18 - General Purpose Small

The General Purpose scenarios both incorporate capital requirements for enhanced tower lighting in the yard.

General Purpose Medium

The General Purpose Medium scenario requires an initial capital investment of $18.48 million. This scenario would also require 3 top-lift units, 4 tractors, 25 chassis and a utility vehicle. It would require 55 employees at its breakeven level of 51,000 inbound units, as noted in Table 19 below.

				Break Even	
Inbound Containers	1,000	15,000	30,000	**51,000**	58,000
Estimated TEUs Handled	2,652	39,780	79,560	**135,252**	153,816
Revenues	140,000	2,100,000	4,200,000	**7,140,000**	8,120,000
Variable Operating Expenses	2,391,889	2,701,324	3,032,861	**3,497,014**	3,651,731
Fixed Operating Expenses	1,858,541	1,858,541	1,858,541	**1,858,541**	1,858,541
Total Operating Expenses	4,250,430	4,559,865	4,891,402	**5,355,555**	5,510,272
Total Expenses (incl. Depreciation)	5,995,677	6,305,112	6,636,650	**7,100,802**	7,255,520
Operating Income Profit/ (Loss)	(5,855,677)	(4,205,112)	(2,436,650)	**39,198**	864,480

Table 19 - General Purpose Medium

The largest of the scenarios that is modeled, the General Purpose Medium terminal provides the largest footprint and the largest potential capacity of the six designs examined. In this scenario, permanent structures are included as well as a full complement of facility and equipment maintenance staff.

3.53 Capacity Analysis and Comparison

The financial model requires that a fixed capital investment for each scenario be used. In other words, the model does not consider dynamic capital investment amounts based on throughput capacity. This approach was chosen so as to enable the analysis to determine a startup capital amount and then assess the terminal's capacity based on the limitations of either the terminal storage space or equipment time limitations (i.e. a top lift unit, running 7 days a week - 24 hours/ day will have a maximum number of lifts and then require that an additional unit be introduced).

In this analysis each scenario's "breakeven point" is considered the minimum volume capacity. The maximum volume capability is calculated as a function of the equipment's total capability to operate within a 24-7 environment (i.e. before an additional top-lift and other equipment must be purchased and the attendant staff hired to operate that equipment). The maximum volume tested is set at a level estimated as the optimum level given the physical capability of the "footprint" to store the containers. On this basis a calculation of the equipment required to reach these limits was made in addition to the total employees required to operate the terminal at those traffic levels. The results are shown in Table 20 below.

	Stand Alone Small	Stand Alone Medium	Satellite Small	Satellite Medium	General Purpose Small	General Purpose Medium
Break even Model Volumes (TEUs)	38,454	46,410	46,410	79,560	119,340	135,252
Maximum Model Volumes (TEUs)	50,400	50,400	50,400	100,800	153,800	162,000
Maximum Capacity Tested	75,000	120,000	210,000	240,000	265,000	400,000
Next step Incremental Capital (millions)	$1.13	$1.13	$1.13	$2.49	$1.90	$3.80
Employees at Model Cap	13	17	17	32	53	55
Employees at Max Cap	23	39	49	75	91	135

Table 20 - Capacity Analysis

This analysis reveals a narrow band between the breakeven point and the maximum capacity (the capacity envelope) before additional capital investment and staff is required, particularly in the smaller design scenarios (Stand Alone and Satellite). In all cases the incremental increase in the terminal's capacity requires both capital and additional staff. In the case of capital, the expense is primarily for additional top-lift machines as the "in-terminal" workload grows. In short, an ICT will always have a narrow capacity envelope and additional capacity must be gained through capital injections. In the case of this model, the injections are directed at the addition of top-lift and other yard equipment. These same results have been depicted in the chart shown in Figure 30. This chart portrays the capacity limits (envelope) as calculated within the operating and financial model as well as the expanded capacity when incremental capital and staff are added.

For comparison purposes and to provide perspective relative to the model's results, the existing Western Canadian railway intermodal terminals have been placed in their traffic volume range and in the terminal type classification (as determined by the study team) [34].

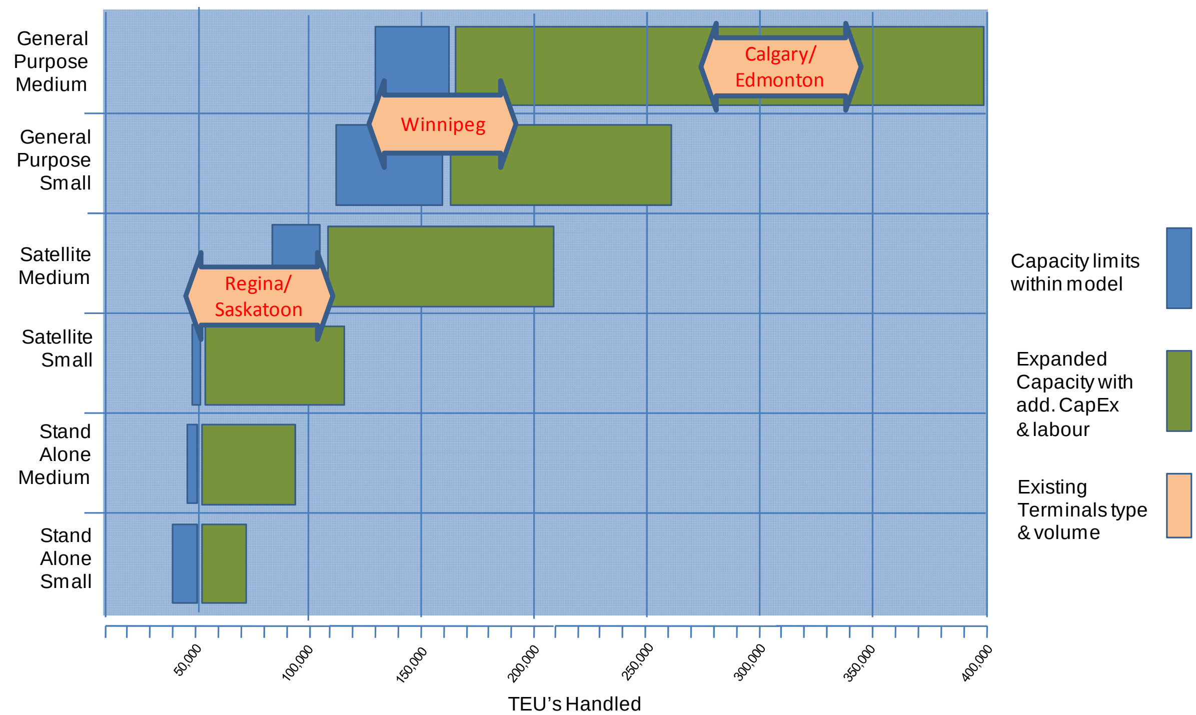

Figure 30 - Capacity Analysis – Comparison capacity ranges to existing facilities

The Regina and Saskatoon terminal designs and volume ranges correspond most closely with the study model's Satellite terminal, with volumes handled being in the 45,000 to 65,000 TEU range. In Saskatchewan, CN has one terminal located in Saskatoon while CP has its main terminal in Regina. It retains a small presence in Saskatoon as well. Both CN and CP operate intermodal terminals in Winnipeg that fall to the lower end of the General Purpose range and design. The Winnipeg terminals handle in the 140,000 to 170,000 TEU range each. The Calgary and Edmonton terminals are both at the higher end of the General Purpose terminal range of volumes ranging between 275,000 and 315,000 TEUs.

Terminal capacity is a combined function of available land, storage space, operating hours, and primarily the availability of equipment and the staff to operate the equipment. At lower volumes the

[34] In order to protect sensitive commercial information, Quorum has shown a blended "volume range" for each of the cities. The placement of classifications as shown are based on the study teams opinions in comparison to the design specifications used in the study model.

model shows the terminal's capacity to be highly sensitive to these variables, with an attendant impact on both capital and operating costs.

3.54 Sensitivity Analysis

As discussed above, capacity is highly sensitive to volumes particularly when a terminal's volumes are at the low end of the scale. In order to ascertain the impact of other variables on the analysis, three sensitivity tests were run against the higher volume scenario. It should be noted that these tests were undertaken with the assumption that no additional capital outlay or staff would be added to the scenario. These are depicted on the graph shown in Figure 31 below.

In the "normal" model scenario for the General Purpose Medium terminal type, the breakeven point is 135,000 TEUs handled, and the capacity remains topped at 153, 800 TEUs.

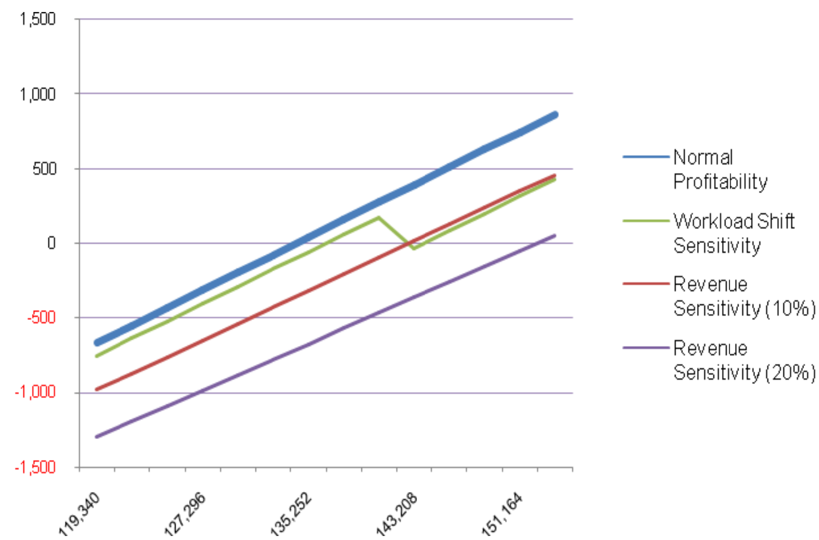

Figure 31 – Sensitivity Analysis

Workload Shift Sensitivity: The model assumes that all containers will arrive on a train, be lifted off to storage followed by a lift to a truck and return in a status (loaded or empty) such that it will be moved through the terminal in a reverse process. In actual operations, this of course is not the case and a certain number of containers will make more than one trip through the terminal before being loaded back onto a train. The sensitivity test assumes that 25% of all containers will be returned from their initial unloading back to storage in the terminal and then sent back out for a load, thereby increasing the "in-terminal" workload. The result of this test shows that the breakeven moves up over 10,000 TEUs to 145,000.

Revenue Sensitivity at 10%: The model assumes that all inbound and outbound lifts will generate equal amounts of revenue. In actual operations, it is often necessary to come to an arrangement with shippers and steamship lines that sees a portion of the revenue foregone or reduced in order to ensure that terminal fluidity is maintained. In the first revenue sensitivity test, it is assumed that the outbound revenue will be reduced by 10%. The result is the increase of the terminal breakeven by some 8,000 TEUs to 143, 200 TEUs.

Revenue Sensitivity at 20%: This is the same scenario as above, however it is assumed that outbound revenues will reduce by 20%. In this revenue sensitivity test, the result is the increase of the terminal breakeven a further 10,000 TEUs to 153, 820 TEUs, effectively negating the margin between the breakeven and the maximum capacity of the terminal.

The ability for a terminal to generate positive returns is entirely dependent on it maintaining as wide a margin of profitable (i.e. low cost) capacity as possible. The effective and efficient management of the operation is key to this and anomalies such as those discussed in this portion of the analysis are examples of how these challenges will impact that profitability. The table below provides a summary of the impact each sensitivity test has on the margin between the breakeven and maximum capacity, culminating in the revenue sensitivity test at 20% that eliminates the capacity margin.

This portion of the analysis reveals that even at higher volumes, an ICT's profitability is highly sensitive to changes in the workload distribution and the revenues derived from that workload. With these relatively modest changes in the operating scenario, the profitability of the operations shifts by more than 12%.

	Min. Capacity (Breakeven)	Max. Capacity	Capacity Margin
Normal Profitability	135,252	153,800	12.1%
Workload Shift Sensitivity	145,860	153,800	5.2%
Revenue Sensitivity (10%)	143,200	153,800	6.9%
Revenue Sensitivity (20%)	153,820	153,800	0.0%

Table 21 - Sensitivity Tests - Impact on terminal capacity

In fact, in the case of the "normal" scenario for the General Purpose Medium terminal type, an operating ratio of 0.85, normally seen as a nominal level of profitability, is not realized until volumes reach in excess of 260,000 TEUs (this would require further capital investment for an additional top-lift unit as well as almost 40 additional employees to operate the terminal). While some terminals can and will operate with volume that meet and exceed this level, most in Western Canada operate at levels far below that and are therefore highly susceptible to the impact of volume and workload fluctuations and operational anomalies.

3.6 Examples of Inland and Port Support Container Terminals

In this section examples of "successful", "not so successful" and "yet to be proven" ICTs and ICTs that directly support port operations are examined and discussed.

3.61 Successes

Port of Oakland Joint Intermodal Terminal: This "near dock" rail facility was developed to support the growth in Oakland and San Francisco dock traffic (over 2.3 million TEUs in 2005). This BNSF operation uses a former military base, and has eliminated a 14 mile dray to the nearest BNSF intermodal terminal. It has the capability of supporting full train operations.

Intermodal Container Transfer Facility (ICTF), Los Angeles: This was the first "near-dock" facility in California and supports a large number of both the Los Angeles and Long Beach marine terminals. It is a Port owned facility, and is fully financed by gate charges. Access is offered to both Class 1 railways (UP, BNSF). The facility currently handles over 500,000 lifts annually.

Alliance Logistics Park, Dallas – Ft. Worth: This was a real estate development centered on BNSF Alliance Terminal (located in the tri cities between Dallas and Ft Worth) where the development was focused on warehousing, distribution centres and transload facilities requiring logistics, intermodal and highway truck service. Recognized as one of the most successful ICTs and logistics parks in North America, it has become the primary distribution and logistics center for the DFW region as well as the South Texas and Oklahoma markets.

Port of New York & New Jersey Brownfield's Redevelopment: The demand for distribution, warehousing, 3PLs and transloading by the users of the Port Authority of New York and New Jersey (PANY and NJ) led an economic development thrust to find "brownfield" sites to accommodate these initiatives. As of the spring of 2007, 17 sites had been identified, six of which are at or near completion. A continuing economic development initiative is underway to identify another 15 sites.

Intermodal Terminal, Auburn, Maine: This terminal was built by the serving shortline in conjunction with CN. Serving a significant outbound paper market, the development had ISTEA support on the financing of its development and construction. A contractual commitment with CN sees CN controlling the commercial relationship with shippers and buying terminal and haulage service from the shortline.

Virginia Inland Port: This terminal serves the Port of Norfolk with a terminal in Front Royal. A rail shuttle runs service to the Port. It is used to target Ohio Valley freight moving via the Port of Baltimore. The volume through the facility is strong but original forecasts did not consider pricing response from Baltimore, which could threaten a portion of the traffic base.

Huntsville Intermodal Terminal, Huntsville, AL: Owned by the Port Authority, this Norfolk Southern (NS) anchored intermodal terminal is part of an airfreight and logistics park development with an emphasis on technology. The facility is operated using a rail mounted gantry crane. Started with a focus on industrial and economic development, traffic was very slow developing, however when NS closed some small regional facilities, volumes shifted to the Huntsville facility.

3.62 Terminals that have closed

MCS Agriterminal, Moose Jaw, SK: This operation was independently owned and operated as a subsidiary of MCS of Montreal (a container repair and supply company). The initiative was directed at the special crops market, primarily in southern Saskatchewan. Located on CN tracks, it was serviced by CN from their Saskatoon intermodal terminal. While there were multiple reasons for its closure the primary reasons was the infrequent rail service it received (account the extended distance from Saskatoon) compounded by an infrequent supply of containers from shipping lines who were reluctant to position equipment so far from a major terminal and incur delays in the cycle of their containers.

UP Intermodal Terminal, City of Industry, CA: Built in the early 80's with a capacity about 200,000 lifts, the UP owned (or had inherited through its merger with the Southern Pacific) three other terminals in the LA basin. The City of Industry facility was closed after 3-4 years because it made the system network design too complex and could not be served effectively. UP rationalized terminals in an effort to simplify its overall network and system. It should be noted that as a result of increased volumes UP has reopened this facility.

Mazda Assembly Plant, Flat Rock, Michigan: Integral to "just in time" plant operations, this terminal supported the inbound import containers carrying parts for the manufacturing line. The operation was closed as offshore sourcing was reduced because of the costly and inefficient operation.

APL Woodhaven, Michigan: Outbound auto parts that were sourced in Michigan, Ontario, and Ohio to support an assembly plant operation in Hermosillo, Mexico were directed through this facility (despite there being two large intermodal terminals close by). Served by a dedicated train on CN/UP (3 times per week) the operation was closed after a lower cost parts sourcing alternative was found.

3.63 Terminals awaiting "Proof of Concept"

California Inter-Regional Rail Intermodal System (CIRUS) Proposed ICT, Stockton or Lathrop, CA: The growth in the import traffic through the ports of San Francisco and Oakland requires additional logistics and staging support. This concept is to create a short haul rail system from dock to an ICT that will be located in either Stockton or Lathrop. The estimated capacity limitation in Oakland is 3 M TEU, while the current traffic level is at 2.5 M TEU.

South Dallas Logistics HUB: A real estate venture developed initially in competition to BNSF's Alliance Logistics Park. This logistics park drove the development of UP's South Dallas IM Terminal. Similar to Alliance, the focus will be on import traffic to distribution centers, warehouses and transload facilities. Also planned is an air cargo facility that will be anchored by an existing cargo airport (Lancaster AP). BNSF has recently announced that they will also build a second Dallas terminal at this site. The service marketed for this facility will be for the DFW area, South Texas as well as distribution and deconsolidation centres for traffic destined for Mexico.

Already under construction, this facility will likely move forward. The most significant challenge for this project will obviously be whether the market is large enough to support two large logistics parks.

Honda Assembly Plant, Marysville, Ohio: An operation that is integral to plant operation, this facility deals exclusively with inbound import containers carrying parts required for production. It was developed as there are no large intermodal terminals close by. As offshore sourcing is reduced the volume handled is dropping significantly leaving this facility's future in question, especially given the fate of similar operations in Flat Rock and Woodhaven as noted above.

Kansas City SmartPort, Kansas City: The Smart Port concept is an economic development initiative intended to promote the transportation and logistics capabilities of Kansas City and the surrounding areas. The concept is to create a "virtual" terminal through a linking of facilities and service offerings in the Kansas City region. The target market is "Asian freight" and US importers with an eventual goal of creating a distribution centre hub. The project also has a goal of establishing expanded ICT activities with serving railways (KCS, BNSF, UP). With the majority of funding being applied for through Government programs (such as ISTEA and the Federal Highway Administration), they will eventually be challenged by a lack of a consistent source of income.

3.64 Common Characteristics of Successful Terminals

The terminals noted above have a number of key common attributes that allow for their success:

1.) With the exception of one (Auburn) they all are located in areas of highly concentrated population – a draw for retail trade and hence the import containers.

2.) They all have the support of both the serving railways (in some cases owned and/ or operated by a railway), and the shipping lines.

3.) They are all operating with a high level of volume, with diverse commodity groups and customer types, thereby allowing the operations to minimize risk to specific and unique market swings.

4.) They were all built into a market where demand for the service existed, as opposed to "building on spec".

5.) The capital for infrastructure development was shared amongst the stakeholders or was sourced from bond supported capital pools (a common funding vehicle in the United States).

It is important to note that the cases where terminals were closed, they did not benefit from two or more of the more prominent attributes:

- The MCS terminal in Moose Jaw may have had the support of the railway, but the service was questionable as the operation was located two or more days travel time from the major serving intermodal terminal and the railway mainline. Further, the shipping lines would not provide a consistent supply of equipment. It was located in a lightly populated area so there was no "natural flow" of equipment to the area.
- The Union Pacific (UP) facility was one of several terminals within close proximity. Closing it reduced the network complexity and therefore made the UP system more efficient.
- The Mazda facility in Flat Rock and the APL facility in Woodhaven were both focused on single client movements and not integrated with the existing traffic base of the serving rail carriers.

Where terminals were closed it was a case of either the service from a railway not being guaranteed; the terminal being too close to another and/ or; it did not have a diverse client base

3.7 Stakeholder Input on the Inland Terminal Concept

Most stakeholders were well aware of the concept of inland container terminals. Over 80% of respondents said that they knew of proposals for the construction of inland terminals in various locations, particularly in Western Canada. The list of Canadian locations identified by respondents included: Kamloops, Prince George, Edmonton, Grande Prairie, Moose Jaw, Regina, Thunder Bay, Sault Ste. Marie and Quebec City. A number of participants were also aware of various inland terminals in the United States and Europe.

Stakeholders were divided on the question of whether or not new such facilities in Western Canada would provide meaningful benefits as compared to existing logistics systems. Stakeholders were in strong agreement that any new logistics system for handling containers would need to have clear cost benefits over existing systems and that such cost savings would only be achievable if inland container terminals were able to achieve significant economies of scale through high volumes of traffic. Many stakeholders were quick to point out that the value of an ICT must exceed the cost burden it would bring to the system.

Many respondents suggested that inland container terminals may increase the supply of empty containers for exporters if these terminals offered scale economies to importers. This would be accomplished by encouraging regional deconsolidation of import freight at the inland locations rather than at facilities in areas of high population concentration, such as in Central Canada and British Columbia. However, it was noted by a number of stakeholders, particularly those in the retail and logistics sectors that the location of an inland container terminal was by itself unlikely to influence the location of import deconsolidation. Location selection would be driven by the freight volumes, retail store locations and ultimately by population and market density. The only locations where such deconsolidation might be likely to increase in inland areas in Western Canada are the major urban areas such as Calgary, Edmonton and Winnipeg – which are already served by railroad intermodal services.

When asked, “How might the establishment of inland container terminals affect your business?” a variety of positive and negative comments were provided. These comments are summarized in the table below.

The most common response to this question on the impact of inland terminals was that such facilities would be expected to have no direct impact on the organizations interviewed as such facilities were not expected to be utilized by these firms as they did not expect the terminals to provide any economic advantages to their organizations.

“How might the establishment of Inland Container Terminals affect your business?”	
Positive	**Negative**
• *Might increase empty container availability in inland areas.* • *May be employment and economic development benefits in affected communities.* • *May eliminate bulk rail handling of some products to ports for transloading*	• *Facility would be a direct competitor to established transload operators at port locations, also for some trucking and container handling firms in inland areas who already provide container storage and servicing.* • *If facilities did not offer improved economics and railways are forced to serve facilities – would increase costs for all users.*

Railway representatives indicated that service to inland container terminals would only be seriously considered by railways if the terminals were located on their core networks and provided sufficient volume to support full train service. If the terminals required the stopping of existing train service to set off and pick up traffic, this would result in delays to all traffic on the trains and would decrease the utilization of all railway assets as well as decrease service levels on existing traffic.

3.8 The Impact of an ICT on Local and Regional Economies

The specific nature and magnitude of the impact that an ICT would have on the local and regional economies would be entirely dependent on where the facility was situated and the markets it served. The discussion below does not constitute a detailed analysis but rather a discussion on three general areas of impact and how an analysis could be carried that was specific to any proposed ICT.

Employment and Economic Benefits

In the ICT model presented above it is noted that a small start up terminal (Stand Alone – Small) would require 13 staff members to operate. Assuming it is intended to serve an existing market, the ICT would be displacing truckers presently performing the work. In this case there would be little or no workforce benefit as the labour requirements for either mode are similar in nature including essential qualifications and rates of pay. If the market were new, the incremental workforce would be the 13 in addition to the workforce associated industry that is being established. Again, the benefits in terms of both workforce employment and overall economic benefit are entirely dependent on the labour requirements of the proposed industry and the value and logistical requirements of the products it would ship.

Impact on Road and Highway Traffic

The establishment of an ICT would result in the shifting of highway traffic from long haul highway movements to shorter haul movements between local or regional production facilities and the terminal. To estimate the impact this might have, we offer the following methodology as one possible means to do so:

1.) Truck trailers are commonly between 40 and 53 feet in length, the more common being 48 feet. Truck trailers are also typically wider and higher than a standard twenty foot container, therefore we can assume that 2.87 TEU will replace one 48 foot trailer on the highway.
2.) Assuming this then, a “Stand Alone – Small” container terminal as discussed in the ICT model above, handling 35,000 TEUs annually would move approximately 12,195 highway movements to a rail mode.
3.) This would translate to 34 trucks per day, or 17 in either direction.

Impact on Greenhouse Gas Emissions

The benefit in terms of greenhouse gas emissions of rail movements over truck is well known. Based on Railway Association of Canada estimates, the following methodology for the calculation of GHG benefits is offered:

	Class 1 Railways	Trucks	Variance
Carbon emissions per 1,000 Revenue Tonne Miles	58.58 lbs	389.3 lbs	330.72 lbs

- If the distance of the proposed ICT from the nearest existing Terminal is 300 miles, and one TEU carries 16 tonnes of traffic, then the GHG saving can be calculated as:

  1.) 1 x 16 tonnes x 300 miles = 4,800 RTMs per TEU
  2.) 330.72 lbs. x 4,800 RTMs / 1000 = 1,587.46 lbs./ TEU
  3.) (35,000 TEUs x 1,587.46) / 2,200 lbs. per tonne = 25,254.98 tonnes

The total carbon emission savings in this scenario could be estimated to be in excess of 25,000 tonnes annually[35].

3.9 Conclusions & Criteria for Success

The quantitative analysis shows that, much like other capital intensive operations, an inland container terminal is highly sensitive to fluctuations in workload and revenue. Smaller, lower volume terminals have a greater susceptibility to changes in volumes and workload as they will naturally have a narrower margin within their capacity envelope. These facilities will therefore be very vulnerable to volume fluctuations and will need to be constructed only in locations where the prospects for predictable and stable volume from a broad range of commodities can be assured.

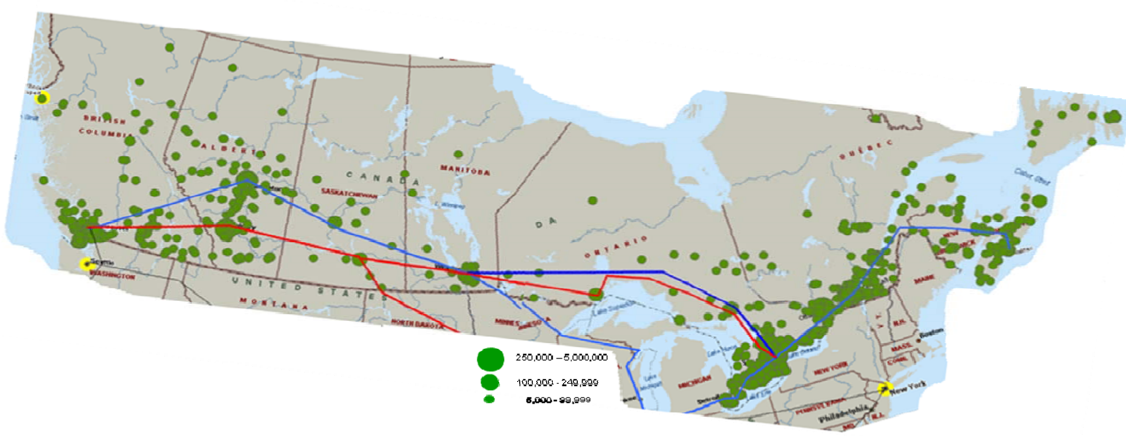

Figure 32 - Demographics of Canadian Regions (2004 Census)

The network implications of any potential terminal that is being considered must factor greatly into all aspects of the planning and building of an ICT. This is primarily to ensure that the traffic types and volumes are capable of generating positive returns and are not placing a burden on other parts of the

[35] This does not account for the truck emissions remaining from workload associated with the transit of containers from customer's origins/ destination to and from the terminal.

system. The network cost of implementing a new terminal into an intermodal system will typically exceed the terminal costs by a factor of 3 or more.

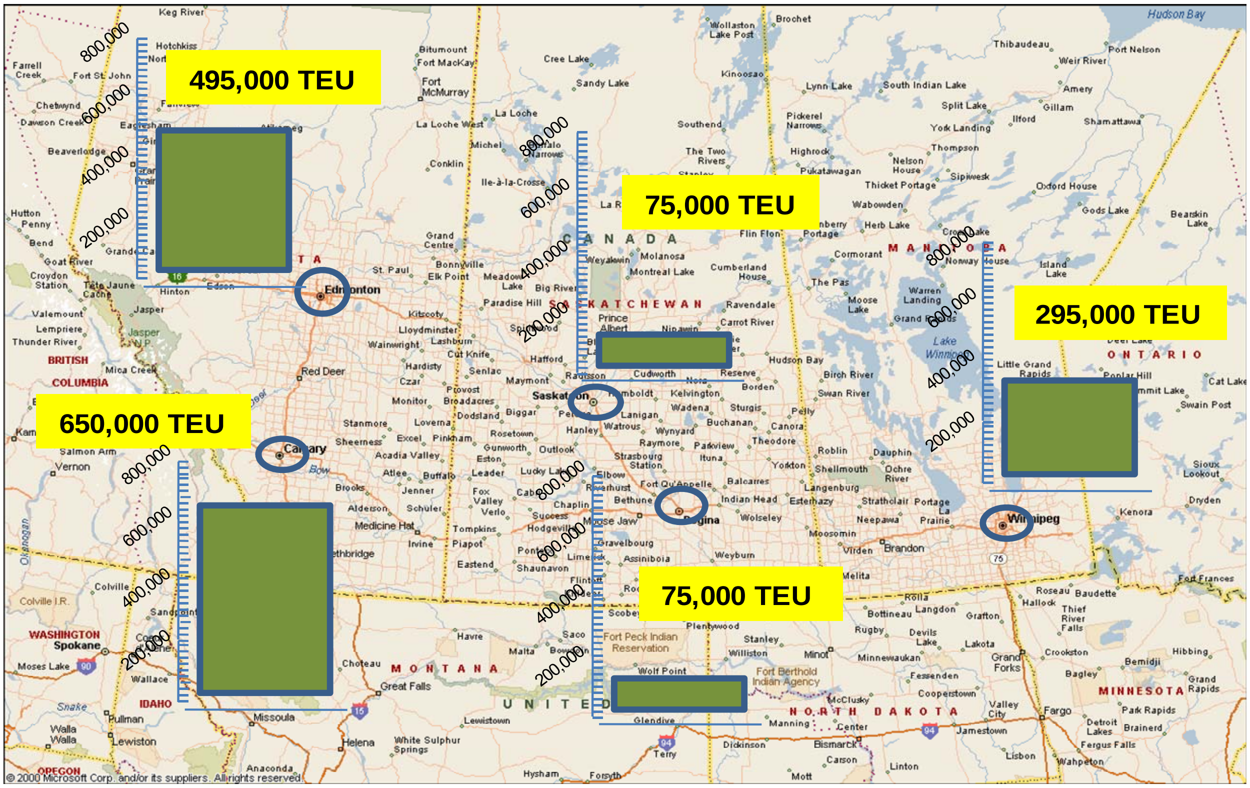

Figure 33 - Western Canada Intermodal Terminals locations - total traffic volumes by city (2004 – 2006 average)

Finally, while initial cost reductions in infrastructure capital may lower the need for investment they will result in higher operating costs. The immediate benefits in the case of an ICT must be weighed against the long term operating costs that will be incurred, in addition to its impact on the terminal's capacity.

The impact of demographics on the draw of containers into areas has been mentioned in this report in a number of areas. The importance of demographics in the development of an inland container terminal is paramount for no other reason than the need for empty containers (refer to Section 2 on traffic flows). The map in Figure 32 provides a perspective on the demographics of Canada, and highlights the concentrations of population in Eastern Canada, the Vancouver Lower Mainland area, and the Edmonton to Calgary corridor.

It is also important to appreciate the current total traffic flowing through the different terminals in the Western Canadian cities. Displayed in Figure 33 are the total average traffic flows of both international and domestic traffic[36] flowing through the terminal in each of the five cities where terminals are located. The Edmonton – Calgary corridor, where a high density of population exists is the largest with the smallest being in the Saskatchewan terminal.

Based on the above analysis, it is recommended that the following be used as a checklist of conditions which any proposed inland container terminal must meet before it should be seriously considered for development.

- Shipping lines must be committed to utilizing such facilities for storage, servicing and transloading of their containers to consolidate sufficient volume.
- Railways must be committed to providing train service to the terminals with such commitment driven by the underlying economics for the railways.
- The location of the terminal must be such that immediate access to railway mainlines is available as well as clear and unconstrained access to major road and highway thoroughfares.
- Local and Provincial governments must be involved and supportive of the concept through the initial planning stages and the implementation.
- Traffic must be incremental to and not a diversion from existing railway intermodal terminals.
- Margins on traffic for the terminal operator must be high enough to cover the capital costs of terminal construction and operation. It was clearly stated by numerous stakeholders that any new initiative within the logistics chain (ICT or transloader) must provide value equal to or greater than cost burden it brings.
- Specific products and markets must be identified cooperatively by exporters, importers, shipping lines and railroads to ensure individual concepts are viable for all affected stakeholders.

A detailed checklist is provided in Appendix 8.

36 The total averages of all rail intermodal traffic at both railways has been taken in order to protect the railways confidential commercial information.

4.0 Shipper Associations and Cooperatives

One of the recommendations made in the MariNova Report was that, "a cooperative effort could be undertaken to reduce logistics costs for Prairie container shippers." [37] Stakeholders were asked under what conditions pooling of activities or assets might assist container shippers. Interview participants were also asked to identify possible benefits of such arrangements and what barriers might exist to their success. A number of examples of such associations and cooperatives were referenced by stakeholders such as: CRSA Logistics Ltd.[38], Interex Forest Products[39], and the Alberta Forest Products Shippers Association.[40] In addition the MariNova report cited such examples as Nova Agri Limited and Canjam Trading.

In discussions with stakeholders and through a literature review for this study, the following were identified as the potential benefits of such arrangements:

- Stable volumes over time
- Sales coordination and forecasting improvements
- Better access to empty equipment for smaller exporters
- Marketing expertise and logistics coordination

There was a consensus amongst stakeholders that the key potential benefit to such cooperative arrangements would be the pooling of demand to provide negotiating leverage and possible scale economies to smaller shippers. Shippers who might not otherwise be able to interest shipping lines in their individual volumes may as a group, be able to provide stable shipment volumes over time to increase the interest of shipping lines in providing empty containers for their export products. In addition, if the cooperative organization included marketing activities for products and forecasting of demand, this may be expected to increase opportunities for shippers to coordinate sales and shipping demand with transportation carriers. This pooled demand might also provide scale economies through the use of professional logistics and marketing personnel who could coordinate shipments on behalf of multiple shippers thereby reducing marketing expense for individual shippers and perhaps increasing expertise in these specialized areas.

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[37] *The Use of Containers in Canada* - MariNova Consulting Ltd. and Partners, November 2006, Transport Canada - Page 88

[38] CRSA Logistics Ltd. provides distribution and logistics services on product sourcing outside North America to the member participants of the Canadian Retail Shippers' Association.

[39] Interex Forest Products is owned by six medium sized Canadian forest product manufacturers. The organization markets lumber and oriented strand board primarily (though not exclusively) in Asian export market exports on behalf of its owners.

[40] Alberta Forest Products Shippers Association is a non-profit agency that provides rate negotiation, shipment management, claims handling and transportation consulting to participating forest products shippers in the Province of Alberta. Membership in the association is voluntary and members are not obligated to use the services of the association for any particular markets or products.

However, a number of shippers with direct experience in dealing with such cooperative marketing and operating arrangements identified a number of critical success conditions for such arrangements. They are:

- Individual firms must have genuine joint interests that outweigh any competitive factors between firms
- Firms should be of similar size and market power
- Organization must offer competitive advantage over existing logistics and marketing arrangements
- For exporters both commercial and operational relationships with transportation carriers should be managed through the cooperative

These critical success conditions were raised by many of the stakeholders. The issue of the relative size and market power of the firms was frequently mentioned as being one of the most important factors that would lead to the success or failure of a proposed cooperative arrangement. If one of the firms was large enough – or over time grew large enough – to manage the marketing and transportation of its own products cost effectively, it would fail to share the interests of the smaller shippers and might be inclined to either opt out of the cooperative or would not participate fully, thereby weakening the overall negotiating strength of the cooperative. As a result, most stakeholders recognized that such cooperatives will be successful in industries where there are numerous small firms and where consolidation has not already taken place through mergers or other means. However, even in markets where there is a high degree of concentration of ownership, niche or regional markets may be managed by medium or larger firms through cooperative arrangements. The Interex Forest Products export marketing cooperative is a good example of this type of arrangement.

As regards the scale of services that shipper cooperatives might be able to offer, stakeholders were asked whether such cooperative arrangements might extend to investments such as container fleets which could be offered to shipping lines for their use in moving exporters' traffic. International shipping lines do not believe that such arrangements are economically feasible or desirable for the lower value commodity exports which make up the bulk of Canadian containerized export shipments. Margins available to shipping lines on Canadian commodity exports are typically very low, sometimes barely exceeding the variable cost of repositioning empty containers at shipping locations. As a result, shipping lines would have little incentive to manage a specific container pool to ensure that upon being unloaded in foreign markets it is positioned for a return to the Canadian market. In order to manage such containers as a separate fleet, the containers would need to be segregated in shipping blocks on docks and at container yards which would decrease asset velocity and increase the costs of handling the container pool without a commensurate return available on the Canadian export shipments for which the fleet was being managed. If such management of the containers was not undertaken, there would be little likelihood that they would return in a timely manner to be made available in Canada. Furthermore, even if the shipping lines had an economic incentive to do so, their current systems do not effectively track containers at inland locations in many foreign countries and the management effort to put such systems in place would be quite onerous.

As a group, shippers of grains and special crops seemed more favourably disposed towards the creation of shippers' cooperatives and marketing arrangements for the management of containerized shipments than shippers of forest products. Forest Product firms were either large enough to manage their own carrier relationships effectively, or in the case of Interex Forest Products, they had already established cooperative marketing and logistics arrangements. In the case of specialty grains, private companies do operate in the Canadian market that provide marketing and logistics services for shippers of specialty grains which while not cooperatives, do offer the same types of services as are customarily offered by such cooperatives. If shippers of specialty grain products wish to band together to form some type of larger cooperative organization to increase their market power and access, the critical success factors identified above will apply to firms in this market as it has to those in the retail and forest products industries.

5.0 Tariff Restrictions on the Use of International Containers

One of this study's mandates was to undertake a review of the current provisions in Canadian regulations that affect the use that can be made of international containers in domestic freight movements to determine whether or not changes in these regulations might be of benefit to Canadian importers and exporters. This topic has previously been reviewed in detail by Transport Canada and the purpose of this review was to provide a brief background on the topic and to solicit current stakeholder views with respect to the regulations and need for change.

5.1 Canadian Regulatory Environment

The regulatory environment under which international containers are temporarily allowed into Canada places restrictions on the duration, direction and type of use that can be made of the equipment prior to its departing the country. The regulations are contained in memorandums published and administered by the Canada Border Services Agency (CBSA) and pertain to Customs Tariff item 9801.10.00, which is the responsibility of the Department of Finance.

The general conditions applied to the temporary importation of international containers into Canada are that they be exported within 30 days of entry, may be used for one point-to-point domestic movement provided that it is incidental to its use for international commercial transportation, and that any domestic movement must follow a route that is similar and consistent with the movement of the goods in international transportation.[41]

Container operators can apply to the Carrier and Cargo Programs Section of the CBSA to be included in the Customs Post Audit System, under which international containers must be exported within six months of their importation, provided the owner/operator is an approved bonded carrier and maintains records acceptable to the CBSA.[42] Other provisions, such as entitlement to one incidental movement still apply. Twenty-one marine carriers operating in Canada participate in the Post Audit System. These carriers represent a large proportion of the container supply.

Many interested parties have in the past suggested that these regulations contribute to the limited number of empty containers that are made available for Canadian exporters, particularly in the Prairie Provinces. Further, the disparity in comparison to more lenient regulations governing the movement of international containers in the United States is cited as a factor in lessening the competitiveness of some Canadian industries which make use of these containers.

[41] CBSA Memorandum D3-1-5 states that an incidental movement is one that is immediately before or after the container is used in international commercial transportation.
[42] CBSA Memoranda D3-1-6 and D3-7-1 outline all provisions of the Customs Post Audit System.

5.2 United States Regulatory Environment

Various elements of United States Law govern the use of international containers including the 1920 Jones Act and Title 19 governing Customs Duties in the US Code of Federal Regulations (CFR). While in general the Jones Act restricts movement of people and goods between points in the United States unless that movement is done using US companies and equipment, Title 19 of the CFR designates “Lift vans, cargo vans, shipping tanks, skids, pallets” and other items for the carriage of freight as “instruments of international traffic” and thereby allows them duty free entry into the United States. Other sections of Title 19 effectively allow the container to remain in the United States duty free for up to 365 days and allow multiple loaded domestic moves. In principle, US regulations may require that domestic moves are directed towards the port of ultimate exit, however in practical terms the containers can remain in the US without restriction for 1 year.

This broad interpretation of US Cabotage regulations was confirmed during consultations with United States Department of Homeland Security officials who confirmed that shipping lines have practically unfettered use during the 365 day time frame.

U.S. Homeland Security officials indicate that their regulations were relaxed in 1997 to take a “common sense approach” to administering these provisions.[43] With the vast numbers of containers moving within the country at any given point of time, consistent monitoring and enforcement of tighter regulations would be impossible. Thus Title 19 Section 10.41a paragraph (g) of the U.S. Code of Federal Regulations requires only that international marine containers leave the country within 365 days of their importation. This exemption pertains exclusively to containers as defined in Article 1 of the Customs Convention on Containers. Other instruments of international traffic in the U.S. must comply with more rigid point-to-point and incidental movement provisions.

5.3 Canadian Practice and Stakeholder Views

International containers are heavily used in domestic movements within Canada. As indicated in Section 2 of this report, the railways use international containers to market domestic freight, primarily westbound between Central Canada and the western provinces. Foreign containers make up a significant proportion of the total supply of loaded containers moving via rail between these regions.

At present, for movements from the Prairie Provinces back towards both west coast and St. Lawrence and Atlantic ports, there is a surplus of container equipment. It therefore appears unlikely that removing restrictions on the use of international containers would have a significant effect on shipping lines’ ability to reuse these containers a second time for domestic movements from these key markets.

[43] Glen E. Vereb, Branch Chief, Cargo Security, Carriers & Immigration Branch, Office of International Trade, U.S. Customs & Border Protection, Department of Homeland Security, August 24, 2007; see Federal Register, Vol. 62, No. 151, Wednesday, August 6, 1997, Rules and Regulations.

There may be specific opportunities where additional secondary movements of international containers, beyond the single movement allowed under Canadian regulations, permit additional transportation efficiencies. Shipments of containers loaded with consumer goods in international containers capable of refrigerated service to Newfoundland, where they could then be reloaded with seafood requiring temperature controlled service for shipment to foreign markets, has been referenced by both carriers and shipping lines as a potential opportunity. However, most shipping lines indicate that in current markets, the strong demand for empty containers in headhaul markets in Asia and Europe combined with the low returns available on movements of Canadian exports will limit the opportunities for shipping lines and rail carriers to capitalize on any relaxation of tariff provisions.

Stakeholders were asked for their views on the impact of the existing import tariff restrictions. Participants were first asked a qualifying question to gauge their familiarity with the regulations. Detailed questions about this topic were only asked if the individuals had knowledge of the issues. Overall, individuals from 11 different organizations offered their views on this topic, including most of the shipping lines, the two railways, a small number of shippers and freight forwarders.

There was strong consensus amongst stakeholders that the current restriction on the use of import containers for domestic freight movements does not place significant restraints on the use of such containers. Shipping lines confirmed that the opportunity cost of the container in import movements from the headhaul markets in Asia and Europe exceeds the value that they could obtain from utilizing containers in domestic movements. In addition, it was argued that the Canadian freight market, with population centres spread along a narrow corridor of rail lines in an east-west orientation, allows little flexibility for triangulation opportunities to increase utilization of containers. This is in contrast with the situation in the United States with its more complex network of transportation corridors, ports and population centres which are distributed along three coasts and across the interior of the country.

However, Canadian railways, who are the primary marketing agents for international containers in domestic movements through their domestic repositioning programs, have indicated that they believe that the relaxation or removal of some of the restrictions may, over time, allow the identification of additional opportunities to increase the utilization of international containers. At present, as indicated above, it is not clear where these opportunities will be. Under current market conditions, given the continuing high demand for empty evacuation of containers from Canada to support lucrative demand in headhaul markets, any relaxation of regulatory restrictions would be expected to have limited impact on the use of international containers in domestic moves. It might, however, offer possibilities for triangulated movements in conjunction with the much larger U.S. domestic network.

In spite of the expectation that any relaxation of tariff restrictions would have little impact, the majority of stakeholders who offered an opinion on the topic suggested that it would be a good idea to relax the existing tariff restrictions to harmonize them with United States regulations in this area. The main reason given for this change was a desire to reduce administrative burdens that did not appear to have any current purpose. Stakeholders did not believe that either trucking companies, or possible domestic container manufacturers (of which there are currently none) faced any threat from increased flexibility being provided to the transportation industry to better utilize international shipping containers.

"The majority of stakeholders who offered an opinion on relaxing of tariff restrictions suggested that it would be a good idea to relax the existing tariff restrictions and to harmonize them with United States regulations in this area"

The domestic carriers, such as the trucking and railway industries have indicated a desire for a relaxation of these regulations. In fact, on 12 June 2007, Paul D. Waite, Vice-President, IMX, CN in testimony to the Standing Senate Committee on Transport and Communications, stated that harmonization with the U.S. regulations may provide an opportunity to better service regions of Canada such as Newfoundland and Labrador and "optimize the supply chain".

Furthermore, our research with industry stakeholders suggests that it is commonly believed that the general provisions are not being enforced consistently in Canada. The 30 day time limit established by the general conditions under Tariff 9801.10.00 is not only inconsistent with regulations administered by our NAFTA partner the U.S. it is also tighter than the provisions within the Customs Convention on Containers, 1972, a United Nations sponsored international agreement to which Canada is signatory. Article 4 states "Containers granted temporary admission shall be re-exported within three months from the date of importation. However, this period may be extended by the competent Customs authorities."

5.4 Recommendation

Industry stakeholders believe that the current tariff provisions governing the use of international containers in domestic service should be relaxed and aligned with US regulations. The cost of administration for the CBSA may be reduced and the potential for criticism of inconsistent application would be eliminated. Allowing unfettered use of international containers and a longer timeframe in Canada will provide added flexibility for domestic carriers to service their customers and as markets develop will ultimately result in some degree of improvements in utilization and lowering of transportation costs for Canadian industry.

6.0 Conclusions

It is important to frame the conclusions of this report in the proper context. Through the stakeholder interview process shippers, importers and shipping lines were all quick to point out that decisions for the allocation and positioning of empty container equipment are driven wholly by the economics and financial return of any particular movement. By extension and because of the necessity for economies of scale in this industry, demographics also play a critical role. Largely because of the retail nature of the import commodities, containers will naturally flow to and from high density population areas. This places regions with lower density population at an immediate disadvantage.

In the case of the Canadian Prairie Provinces, these regions are further disadvantaged by the nature of the commodities exported – lower value, resource or agricultural products with a high density weight – with thin financial margins and a low tolerance for risk. Many of these commodities have a very limited ability to absorb additional freight cost.

It is from this perspective that many stakeholders interviewed emphatically stated that any action, investment or process contemplated for the Canadian container industry be evaluated based on its ability to deliver real value that is greater than the cost of the burden it places on the traffic moving to and from this country.

Observations on Traffic and Markets

Contrary to what many believe, the availability of equipment at inland points in Alberta and Manitoba has consistently been in an excess position for both 20 and 40 foot equipment for the years examined in this study. In fact, shipping lines have consistently evacuated containers from both provinces to keep inventories at an acceptable level. While chronic shortages of equipment are confined to 20' containers in Saskatchewan, the indicators suggest all other corridors are in excess positions and in fact moving empty equipment out. In the case of Saskatchewan, 40' containers are being evacuated by shipping lines to support container demand in other countries.

The traffic analysis did suggest that there exists potential in some markets for seasonal shortages. In Saskatchewan, the predominance of export shipments (over 76%) is grain. Because of grain shippers' preference for 20 foot equipment (due primarily to a high density weight) there does exist a shortage of supply. This shortage is driven wholly by market demand and is the foundation of much consternation within the industry. Demand for the 20 foot capacity is continuing to grow while container lines review their strategic approach to this particular market – one that will likely see a further reduction in the supply of 20 foot containers to Saskatchewan. The consequence is an increase in the demand for transloading services at port locations, particularly in Vancouver where transloading capacity has become strained and congestion and delay a matter of course as opposed to an exception. It is expected this demand will continue to rise in the near and medium term.

In order to assist exporters who utilize port transloading operations, the Government may wish to further examine the situation relative to the transloading services in port locations, Vancouver in particular. This may facilitate a better and more fluid process of moving traffic through these highly utilized, albeit congested facilities.

The stakeholder interview process identified the Port of Vancouver as a critical area of congestion. Both importers and exporters are very concerned that the combination of high dependence on direct rail service to the port terminals and low levels of surplus rail and port capacity create the potential for severe congestion. Several stakeholders have suggested that this is adversely impacting the reputation of the Port as a reliable gateway for Canadian import and export movements.

There have been numerous studies in the recent past that refer to these problems with this study being no exception. The comments heard in the stakeholder consultations ranged from constructive to very emotional but can best be summed up in one stakeholder's words who said that "Although Canada is recognized as having the superior product, because of the Vancouver gateway's inability to consistently provide a reliable flow of traffic, we are no longer the preferred supplier." Other stakeholders, including both shippers and shipping lines, point to the fact that they are now in a position that forces them to review their medium to long term strategic plans to explore options outside the Port of Vancouver so as to ensure they have a greater level of reliability, consistency and efficiency.

Several stakeholders suggested that a thorough review of service and congestion issues impacting the Port of Vancouver be considered with a view to identifying what short and long term actions can be taken that will improve the reliability of the Port.

Inland Container Terminals

The concept of inland container terminals is driven largely by a desire to improve containerized transportation service to regions that have experienced or perceive container shortages. One option that is being considered by a number of groups across Western Canada is the establishment of independent terminals to support municipal and regional economic and logistics needs.

This report evaluated the concept from a traffic, network, operational and financial perspective in order to determine the threshold volumes for a "breakeven" operation as well as the capital, market and operational requirements for establishing such a facility.

The following seven specific areas of concern should be reviewed when evaluating the potential success of a proposed inland container terminal.

- Shipping lines must be committed to utilizing such facilities for storage, servicing and transloading of their containers to consolidate sufficient volume.
- Railways must be committed to providing train service to the terminals with such commitment driven by the underlying economics for the railways.
- The location of the terminal must such that immediate access to railway mainlines is available as well as clear and unconstrained access to major road and highway thoroughfares.

- Local and Provincial governments must be involved and supportive of the concept, through the initial planning stages and the implementation.
- Traffic must be incremental to and not a diversion from existing intermodal terminals.
- Margins on traffic for the terminal operator must be high enough to cover the capital costs of terminal construction and operation. It was clearly stated by numerous stakeholders that any new initiative within the logistics chain (ICT or transloader) must provide value equal to or greater than cost burden it brings.
- Specific products and markets must be identified cooperatively by exporters, importers, shipping lines and railroads to ensure individual concepts are viable for all affected stakeholders.

There is no doubt that the development of any ICT – whether it be a small satellite operation or a large multi modal terminal supporting numerous logistics activities –will have significant challenges in gaining a level of support and participation of the required stakeholders that ensures a critical and financial success. This will be particularly true if the proposed ICT is not fully sponsored and or supported by a serving railway.

While the establishment of an independent inland container terminal in Canada is not an impossibility it would require the right mix and volume of traffic, the right location and position within an existing intermodal network and a critical mass of stakeholder participation in order to be successful. It is also important to note that the traffic that would be considered for a facility cannot be a diversion of existing railway traffic away from another terminal.

Tariff Exemption Regulations

While it was broadly stated through the stakeholder interview process that changes to the tariff exemption regulations would provide no immediate solution or relief to the capacity constraint felt by the Canadian container industry, there was a consensus that the harmonization of these regulations with the US and other free trade partners would be in the best interest of Canada and the Canadian economy. The fact that Canada is signatory to other agreements that are in conflict with our own regulations was also raised as a concern that we must examine these issues with haste.

Most stakeholders were quick to suggest that the Government should undertake to develop plans to effect the necessary changes in the tariff exemption regulations such that they are in harmony with US and Mexican regulations. This is despite the fact that it would not provide any immediate incremental benefit, but on the basis that it could in the future.

Appendix 1 - Glossary of Industry Terms and References

Back haul	Traffic flows are normally viewed in terms of their origin - destination movements, and a flow viewed as "to the destination and back". One direction of the movement will have a lower degree of demand than the other (for various reasons) and will therefore command a lower freight rate than the other. It is referred to as the "back haul"
Balanced Traffic Flow	A balanced traffic flow refers to balance between the volumes flowing in versus those flowing out. An optimally balanced flow would have 100 loaded containers moving into a terminal and 100 loaded containers moving out.
Blocks	A "block" in railway terminology refers to a grouping of railcars whose intended destination is the same. For example, a train from Vancouver to Toronto will have cars (or containers) for cities it passes through along the way. The railway will "block" each cities' traffic when the train is built in Vancouver (place all the Edmonton destined cars together, the Winnipeg cars together, etc.), so as to reduce the amount of switching at each stop along the way.
BNSF	The Burlington Northern Santé Fe Railway is Ft. Worth, Texas based Class 1 railway whose territory extends throughout the western US states and into western Canada.
Cabotage	Cabotage refers to the regulations and tariff exemptions covering the use and importation of international containers into Canada. It commonly refers to the regulations surrounding a container's exit from the country within 30 days of its entry.
Chassis	When a container is to be delivered to its destination it is placed on a chassis, effectively turning it into a common "semi-trailer". The chassis is configured such that the container can be "locked" on. It will normally remain on the chassis until it is returned to the terminal or to a storage yard.
CN	The Canadian National Railway is a Montreal, Quebec based Class 1 railway whose territory extends throughout Canada and the central US states.
Consolidation	The act of consolidating traffic is to take the lading from multiple containers, each whose lading is destined to multiple locations and unload it, sort it to single destinations and then reload the resorted traffic destined to one location.
Container stack	Stored containers may be "stacked" on one another up to five high, as is commonly done in terminals and storage yards. Multiple groups of containers piled in this manner are referred to as "stacks".
CP	The Canadian Pacific Railway is a Calgary, Alberta based Class 1 railway whose territory extends throughout Canada and through the central US states.
Cube	A common reference for empty equipment space in the transportation and logistics industry. For example an empty 20 foot container would be referred to as "20 foot cube"; or the logistics of moving empty containers to a location for loading is commonly referred to as "putting cube in position".
Deconsolidation	The act of deconsolidating traffic is to take containers of consolidated loads, unload and

	deliver that traffic.
Demand smoothing	The "smoothing" of demand refers to various actions taken to reduce surges of traffic that may cause imbalances in the movement of traffic in any specific traffic flow.
De-stuffing	The unloading of lading from a container
Dray	The movement of container equipment from one location to another is referred to as "dray".
DRP	DRP refers to Domestic Repositioning Programs, which are predominantly managed by railways. They are intended to use international containers to move traffic from a domestic origin to a domestic destination in order to position the container at a location close to where either an internationally destined shipment can be loaded or the container can be evacuated from the country.
Evacuation	This refers to the act of a container being moved from the country empty on a container vessel. (i.e. "100 TEU were evacuated" means 100 empty twenty foot equivalent containers were loaded to a vessel)
Gate Operation	An integral part of any intermodal, port or container terminal requires a gate operation to allow the orderly entry and exit of containers. This part of a terminal operation is the most important control process for "in-terminal" container inventory
Head Haul	Traffic flows are normally viewed in terms of their origin - destination movements, and a flow viewed as "to the destination and back". One direction of the movement will have a higher degree of demand than the other (for various reasons) and will therefore command a higher freight rate than the other. It is referred to as the "head haul"
ICT	An Inland Container Terminal
Interchange	An interchange is the physical location where two railways exchange equipment. It is usually a siding or a small yard where two railways' rail lines intersect. The act of interchanging equipment refers to both a physical as well as procedural action that covers the exchange of billing information and the cars' lading records.
KIP	KIP is the standard reference to loading capability (1 KIP = 1,000 pounds loading). In the context of most intermodal design, the reference is to KIP's per square foot. In other words, the compression of the ground must be such that it is able to sustain and carry weights of up to 120,000 pounds per square foot.
Lading	The goods and traffic that are loaded in equipment to be moved from origin to destination.
Margin	A margin in this context refers to the difference between the revenue derived from a freight movement and the cost of performing the service.
Matchback	The shipping line industry commonly refers to "matchback" loads when dealing with movements in a back haul scenario. A matchback allows a container to move to a destination where a load (most likely a more remunerative one) is readily available for that equipment.
Motive power	The locomotive or group of locomotives required to pull a train.
Reefer	A container moving lading requiring controlled temperature service will most often require a refrigeration (reefer) unit.
Repositioning	In this context, refers to the movement of an empty container to a location where a load is waiting or can be secured.

Setoff	Railway operations reference for the act of stopping a train between its origin and final destination to "drop off" a car or block of cars at an intermediate location. E.g. train 101 must "setoff" a block of 10 cars at Edmonton.
Slot	A railway intermodal operations reference for the space in a container car where the container is loaded.
Slot utilization	A railway intermodal operation reference and measure for the number of slots on a car, train or origin destination flow that have been used. This measure will commonly refer to empty slots, as well as empty and loaded containers loaded into the slots.
Storage Tracks	In this context, a railway operations reference for the tracks in, or close to, a terminal designated to store loaded or empty rail cars
Stuffing	The loading of lading into a container
Support Tracks	In this context, a railway operations reference for the tracks in or close to a terminal designated to switch and marshal cars into blocks as well as to construct or break apart trains.
TEU	A twenty-foot equivalent unit is a common reference used in the container industry and is based on International Standards Organization (ISO) specifications. For example, a 40 foot container = 2 TEU.
Top-lift Unit	A large mobile crane that lifts containers on and off of rail cars, chassis and container stacks within a terminal. Raygo Wagner, Fantuzzi and Taylor are the three most prominent manufacturers of top-lift equipment in North America.
Tractor	A tractor refers to a truck tractor that hauls container chassis within a terminal and from a terminal to the consignee’s location.
Train Blocking	A railway reference to the act of assembling blocks of railcars in a manner pre-determined by the train’s design and intended to make the train’s intermediate stops and final delivery more efficient.
Train design	A railway reference for the specifications that state the blocks a train will carry and the order in which they are to be assembled in that train.
Transloading	An industry reference for the movement of a shipment’s lading from one mode of transport (domestic container or bulk railcar) to another (usually to or from an international container).
UP	Union Pacific Railroad is an Omaha, Nebraska based Class 1 railway whose territory extends throughout the western US states and south to Mexico. UP also connects to Canadian railways at Kingsgate, BC and through trackage rights with the BNSF to Vancouver, BC.
Working Tracks	In this context, a railway operations reference for the tracks that run through a terminal and from which containers are unloaded or loaded.

Appendix 2 – List of Stakeholders Interviewed

Interview company	Category	Location
Agricom	Shipper Grain	N. Vancouver
Agricore	Shipper Grain	Winnipeg
Canadian National	Railway	Toronto
Canadian Pacific	Railway	Toronto
Canadian Retail Shippers Association	Association	Toronto
Canadian Spec Crops Assoc	Association	Winnipeg
Cargill	Shipper Grain	Winnipeg
Canadian Forest Products Ltd	Shipper FP	Vancouver
Canfor Pulp and Paper	Shipper FP	Vancouver
China Shipping	Shipping Line	Vancouver
CITA	Association	Ottawa
Coastal Containers	Stuffer Reloader	Vancouver
CTL Westrans	Broker	Vancouver
DP World	Terminal Operator	Vancouver
Evergreen	Shipping Line	Vancouver / New Jersey
Greer Shipping	Shipping Line	Vancouver
Hanjin Shipping	Shipping Line	Vancouver
Hapag Lloyd	Shipping Line	Vancouver / Toronto
Hudson Bay/ Zellers	Shipper Retail	Vancouver
Interex Forest Products	Shipper	Vancouver
J & T Trucking	Trucker	Saskatoon
JK Commodities	Shipper Grain	Vancouver
JRI	Shipper Grain	Winnipeg
Kuene & Nagel	Freight Forwarder	Vancouver
Locher Evers International	Freight Forwarder	Vancouver
Maersk Canada	Shipping Line	Montreal
Millar Western	Shipper FP	Edmonton
MTE Distribution	Shipper Retail	Edmonton
MTE Distributors	Stuffer Reloader	Edmonton
OOCL (Canada) Inc	Shipping Line	Vancouver
OCTS	Container Dray	Edmonton
Port of Halifax	Port	Halifax
Port of Montreal	Port	Montreal
Port of Vancouver	Port	Vancouver
Ray-Mont Containers	Stuffer Reloader	Montreal
Saskatchewan Wheat Pool	Shipper Grain	Regina

	Category	Location
SaskCan Pulse	Shipper Grain	Regina
Schenker Logistics	Freight Forwarder	Vancouver
Sears Canada	Shipper Retail	Toronto
Sherrit International Corporation	Shipper Industrial	Edmonton
Simpson Seed	Shipper Grain	Moose Jaw
Sysco Foods	Shipper Industrial	Edmonton
Transpacific Container Terminal Ltd.	Logistics Provider	Vancouver
TSI Terminal Systems	Term Operator	Vancouver
Walmart	Shipper Retail	Toronto
West Fraser	Shipper FP	Vancouver
WestNav Container Services	Stuffer Reloader	Surrey
Yankee	Trucking Freight Forwarder	Saskatoon

Appendix 3 – Profile of Major Ports

Port of Vancouver

Imports

In 2006 the Port of Vancouver handled a total of 2.2 million TEUs with imports accounting for 1.14 million TEUs or 52% of all container movements through the Port. Containerized import freight tonnage in 2006 totaled 7.9 million tonnes. Import traffic arriving Vancouver is 99% loaded with only nominal import of empty containers. Loaded import containers represent 59% of all loaded container movements through Vancouver.

Key Trading Partners and Commodities

Nearly all of the import traffic moving in containers through Vancouver originates in the Asia Pacific region. The port's top ten trading partners account for 96% of container traffic. Imports from China dominate the import container trade with total freight tonnage of 4.9 million tonnes and an estimated 0.712 million TEUs. Chinese imports represent 62% and 64% of total freight tonnes and TEUs respectively. Total containerized imports from China are more than eight times larger than Hong Kong which ranks second.

Rank	Country	TEUs	Million Tonnes	2004-06 Growth
1	China	712,728	4.94	74%
2	Hong Kong	86,494	0.53	-6%
3	S Korea	72,520	0.61	63%
4	Taiwan	46,075	0.37	7%
5	Thailand	43,458	0.39	5%
6	Japan	37,032	0.32	2%
7	Indonesia	24,594	0.19	0%
8	Malaysia	23,791	0.15	24%
9	Vietnam	16,568	0.11	51%
10	India	10,362	0.09	66%
Top Ten Importing Countries		1,073,622	7.72	
Percent of Total Imports		96%	97%	

Table 22 – Port of Vancouver Key Import Partners 2006[44]

Inland Distribution

Rail is the key inland transportation mode for the movement of containers to and from the port. In 2006 Canadian railways transported 0.829 million TEUs or 70% of import containers[45] from Vancouver directly by rail to Canadian and US inland destinations. As shown in Figure 33 below 81% of loaded traffic or 0.662 million TEUs were railed to Central Canada, primarily to the greater metropolitan areas of Montreal and Toronto.

Containers railed to Canadian destinations are primarily 40 ft dry containers (78%) with the remainder consisting of 20 ft containers (19%) and 45 ft containers (3%). Distribution across inland regions by equipment type is not significantly different than the relative weighting of total containers distributed from the Port. Although 20-foot equipment is in greater demand on the Prairies, where it is highly valued for the export of agricultural commodities, only 15% of these containers are destined to the Prairies as direct imports. Direct imports of 20-foot containers destined to this region accounts for only one-third of total supply. As was noted earlier in the discussion much of the Prairie region supply for this equipment type, particularly for

[44] Source: Port of Vancouver Containerized Import Statistics
[45] Excludes import traffic arriving at Vancouver in ocean containers that is subsequently reloaded to domestic containers and railed inland.

Saskatchewan, is derived through the repositioning of containers, loaded or empty, from Central Canada and the US Midwest.

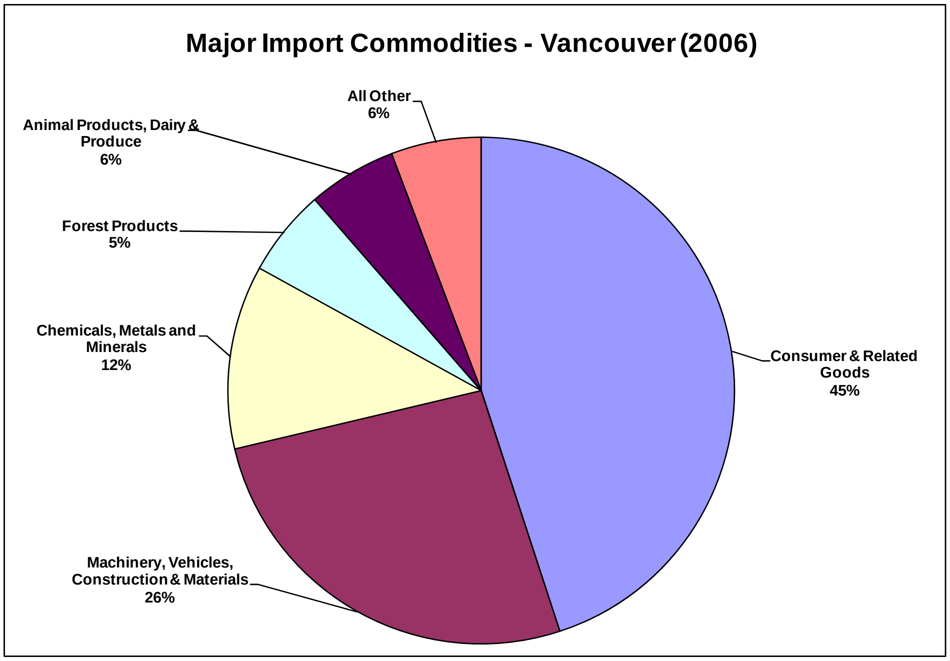
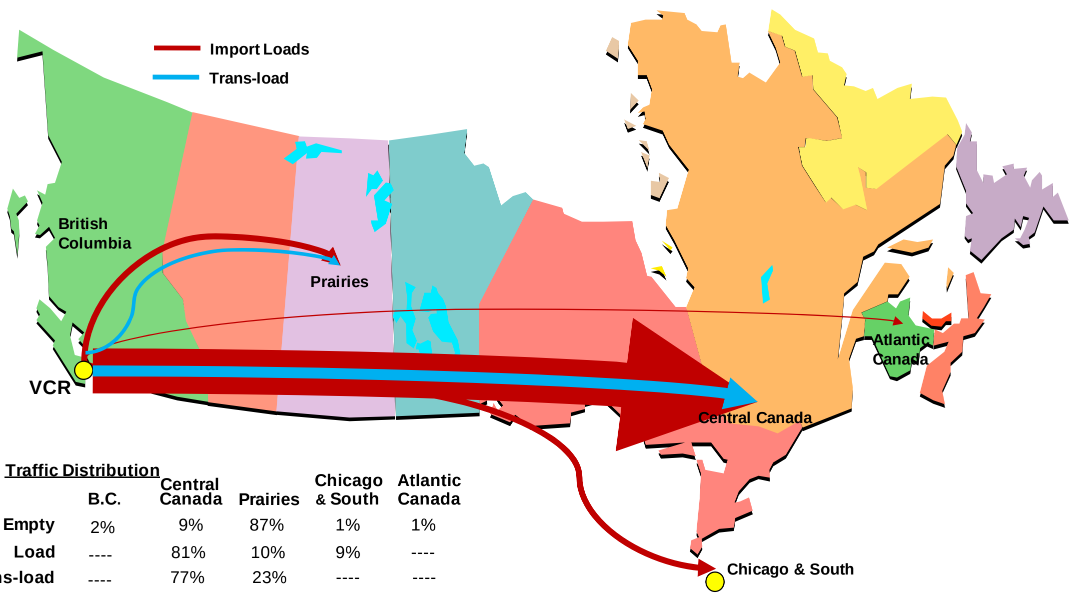


Figure 34 – Commodity Breakdown for Containerized Imports through the Port of Vancouver – 2006



Traffic Distribution	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada
Empty	2%	9%	87%	1%	1%
Load	----	81%	10%	9%	----
Trans-load	----	77%	23%	----	----

TEUs (000s)	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada	Total
Empty	0.2	0.8	7.4	0.1	0.1	8.6
Load	----	662.6	84.9	72.1	1.1	820.7
Trans-load	----	119.7	35.5	----	----	155.2

Figure 35 – Inland Rail Distribution of Import Containers from Vancouver - 2006

Exports

Containerized exports through the Port of Vancouver totaled 1.07 million TEUs in 2006 representing 48% of total container handlings. In contrast to imports however, where only 1% of units arrive empty, 29% of export units evacuated from the port are empty. Looking solely at loaded TEUs, export traffic at the port accounts for only 41% of all loaded TEUs handled. Containerized export freight tonnage in 2006 totaled 9.7 million tonnes.

Key Trading Partners and Commodities

Much like import traffic through the Port exports are almost exclusively destined to Asia Pacific countries. The Port's top ten trading partners account for 94% of containerized export traffic. Much like imports, China is the dominant player for exports with total export freight tonnage of some 3.49 million tonnes and 0.272 million TEUs. Japan is the second leading destination market for the Port of Vancouver with approximately 70% of Chinese volumes at 0.185 million TEUs and 2.37 million tonnes of freight. These two countries alone account for an estimated 60% of loaded export container volumes.

Rank	Country	TEUs	(Millions) Tonnes	2004 - 06 Growth
1	China	272,402	3.49	32%
2	Japan	185,501	2.37	-10%
3	Taiwan	66,507	0.84	-4%
4	S Korea	57,078	0.68	20%
5	Hong Kong	36,167	0.44	9%
6	India	29,818	0.40	17%
7	Indonesia	28,951	0.38	7%
8	Phillipines	16,940	0.19	-1%
9	Thailand	13,930	0.19	-19%
10	Malaysia	10,094	0.14	38%
Top Ten Export Destinations		717,386	9.11	
Percent Containerized Exports		94%	94%	

Table 23 – Top Ten Export Trade Partners – 2006

Unlike import traffic that consists largely of manufactured and finished goods export traffic consists primarily of resource commodities such as forest products and agricultural products that account for 65% of total exports. Forest products at 51% of total export volumes are a significant export to each of the ten major importing countries. Woodpulp and lumber are the leading export commodities accounting for 3.9 million tonnes or 40% of all export traffic.

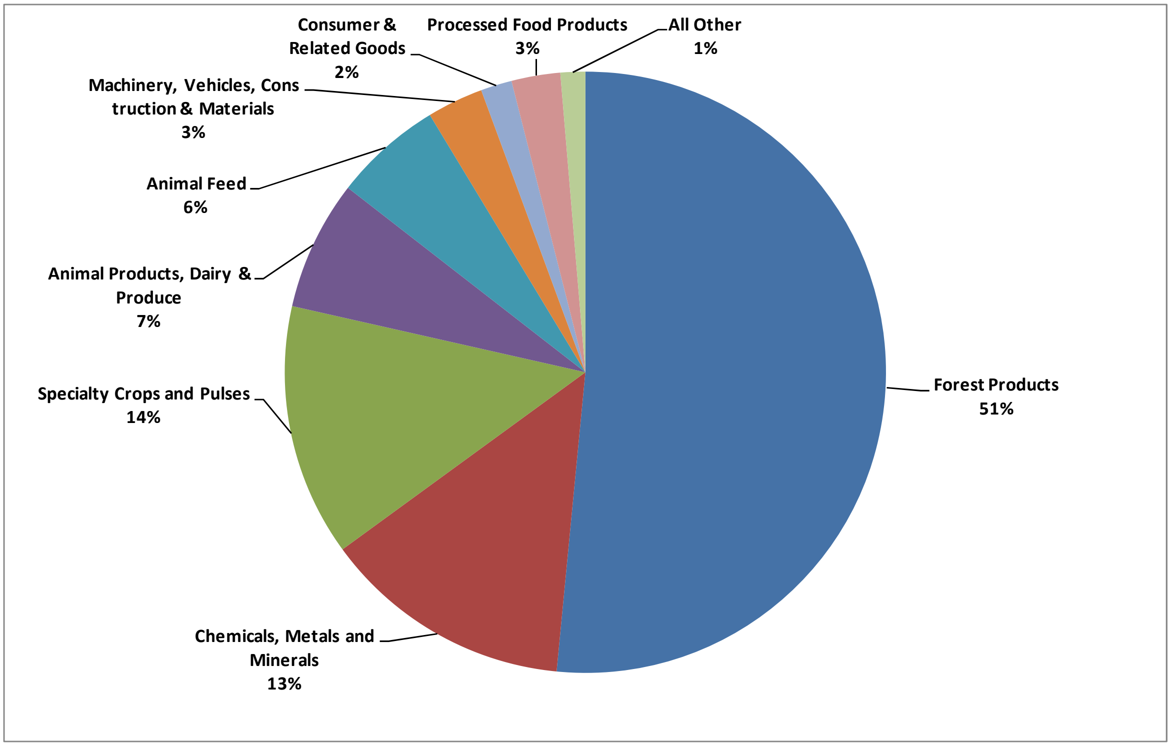


Figure 36 – Commodity Breakdown for Containerized Exports through the Port of Vancouver – 2006

Key highlights and characteristics of containerized import and export traffic moving through the Port of Vancouver include:

- Container utilization is significantly more efficient for import traffic – 99% loads on imports versus 71% for export movements
- Average loading weights for export containers are higher at 12.7 tonnes per TEU as compared to imports at 7.2 tonnes per TEU driven by the difference in commodities – for exports primarily resource commodities and for imports principally manufactured goods
- Containerized imports and exports are growing at significantly different rates with imports having grown by 46% since 2004 and exports by 11% resulting in a growing number of empty containers being evacuated from Vancouver.

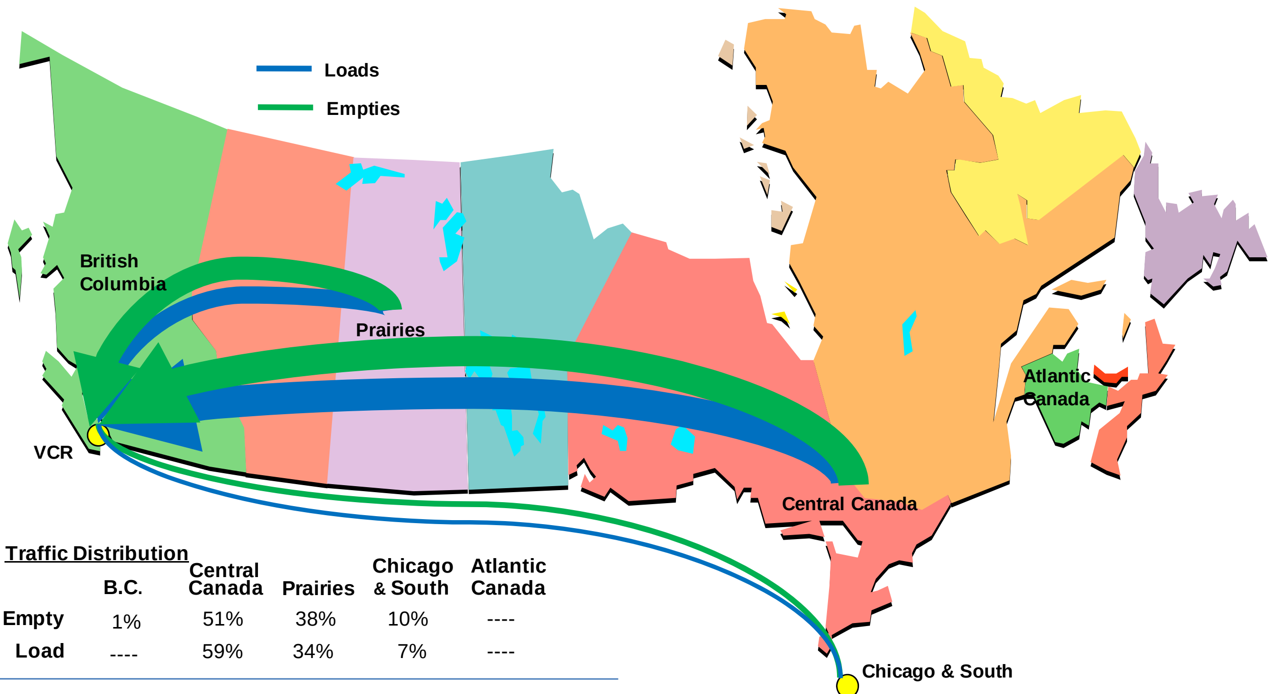
	2004	2005	2006	2004 - 06 Growth
Import Tonnes (MM)	5.40	5.99	7.96	47%
Export Tonnes (MM)	8.66	8.41	9.69	12%
Import TEUs (000s)	758.12	838.76	1105.33	46%
Export TEUs (000s)	689.49	665.92	762.74	11%

Table 24 – Growth Rates for Import and Export Container Traffic – Vancouver

Railway Movements

As with imports rail is a key inland transportation mode for the movement of containers from inland regions to the port. A key difference between the two however, is the significant percentage of empty container movements by railways back to the port from inland regions. In 2006 Canadian railways transported 0.680 million TEUs or 68% of export containers[46] to Vancouver directly by rail from inland origins.

The three key originating regions for export traffic to Vancouver are Central Canada, the Prairies, and the US Midwest. Of the 0.680 million TEUs railed to the Port 54% or 0.364 million TEUs moved empty. Both the Prairies and the US Midwest originated more empty containers than loaded containers.



Traffic Distribution

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada
Empty	1%	51%	38%	10%	----
Load	----	59%	34%	7%	----

TEUs (000s)

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada	Total
Empty	2.6	185.4	137.8	38.1	0.1	364.0
Load	0.2	187.1	107.9	21.6	----	316.8

Figure 37 – Direct Rail Movement of Export Containers to Vancouver - 2006

Seasonality of Container Movements

Containerized traffic, both imports and exports, exhibits some degree of seasonality. For imports the overall trend in container movements throughout the year is driven by the flow of consumer and related goods which account for 45% of imported containerized tonnes and an estimated 59% of import TEUs[47]. Using 2006 as a

[46] Excludes export traffic railed to port destination using domestic containers for trans-load to ocean containers and subsequent export.
[47] TEUs by commodity estimated using Port of Vancouver import and export tonnage statistics and estimated payload factors by commodity as provided by the Port.

reference year the data show three distinct peaks in traffic occurring from March – May, in July and again in October.

The trend for export movements shows volume peaks that generally occur during non-peak import periods. The peak periods for exports are March, May – June, and October – December. The "peaking" seen in export movements is much less severe than for imports. It should be noted however that the patterns exhibited in the import data also reflect the rapid growth of imports that may be influencing the pattern of movements.

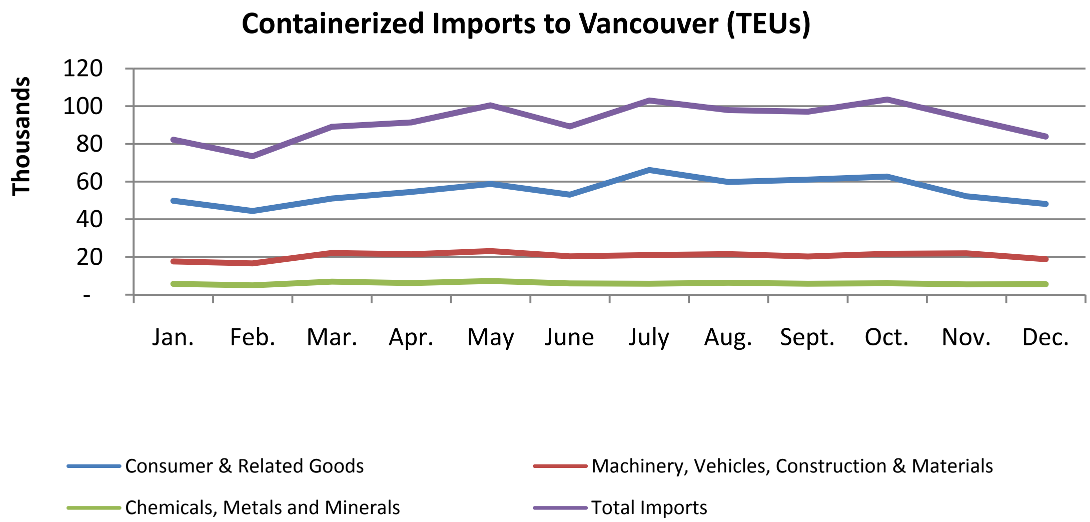


Figure 38 – Imports to Vancouver

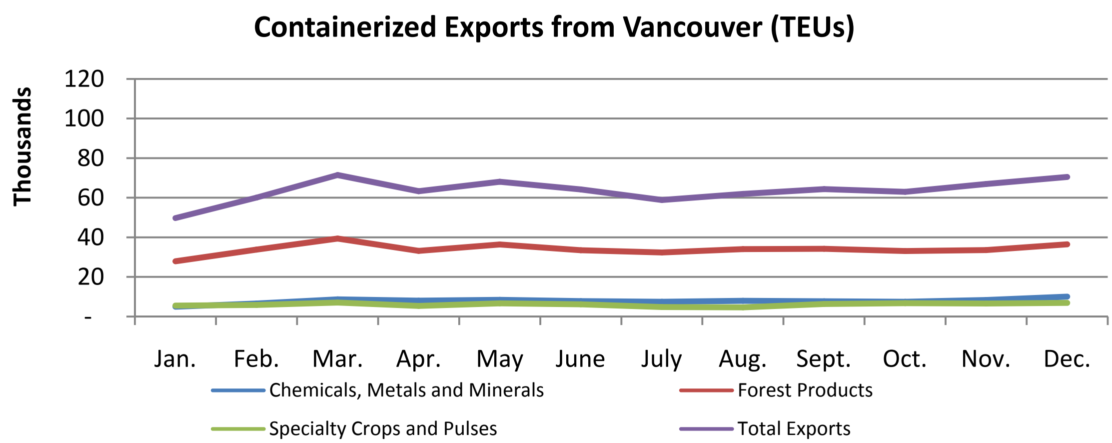


Figure 39 - Export from Vancouver

Port of Montreal

Imports

In 2006 the Port of Montreal handled a total of 1.3 million TEUs of which 0.619 million were import containers representing 48% of all container movements through the port. Although total TEUs handled and containerized freight tonnage is similar for both imports and exports through Montreal, imports represent a much smaller share of total freight tonnes imported (36%) as compared to exports (64%). Much like Vancouver there are few empty import containers arriving at the Port[48].

Key Trading Partners and Commodities

The United Kingdom and the European continent represent the largest trading partners for the Port of Montreal accounting for approximately 80% of total import and export tonnages. Key European countries include Belgium, Germany, Italy, and France.

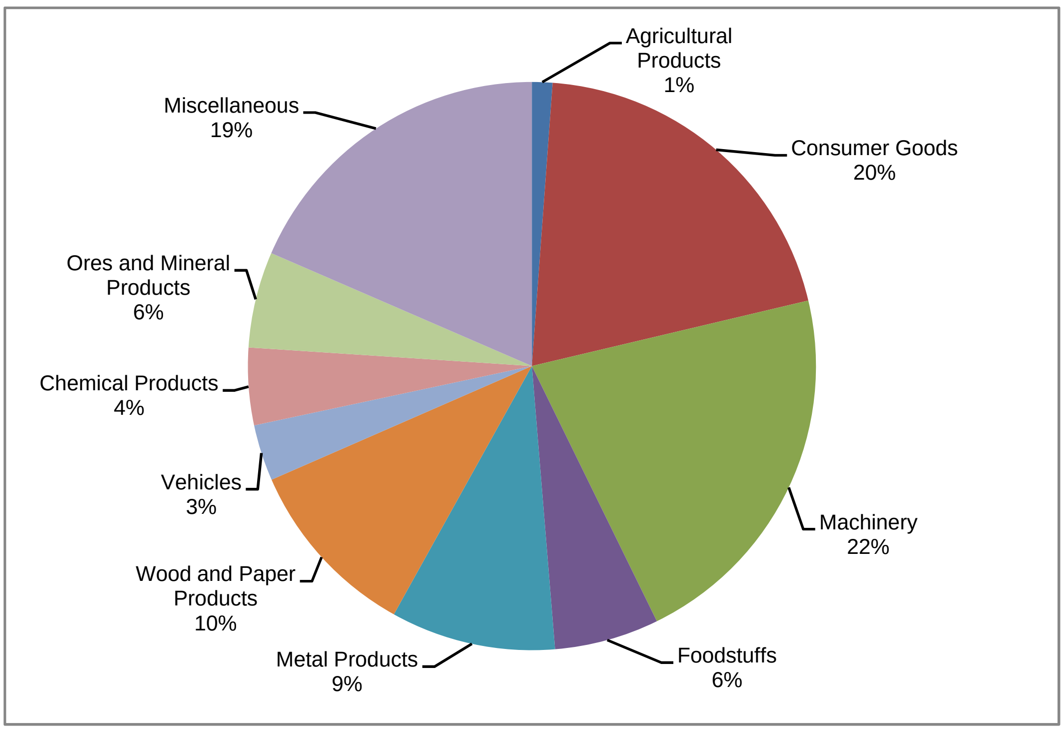


Figure 40 – Commodity Breakdown for Containerized Imports through the Port of Montreal – 2006[49]

Imports through the Port of Montreal, as compared to the Port of Vancouver, consist of a broader range of commodities with no single commodity group accounting for more than 22% of total import traffic. Unlike Vancouver, where consumer goods represent 45% of total containerized imports, at Montreal they represent only 20% of total import tonnage. Containerized imports arriving at Montreal are characterized by a higher

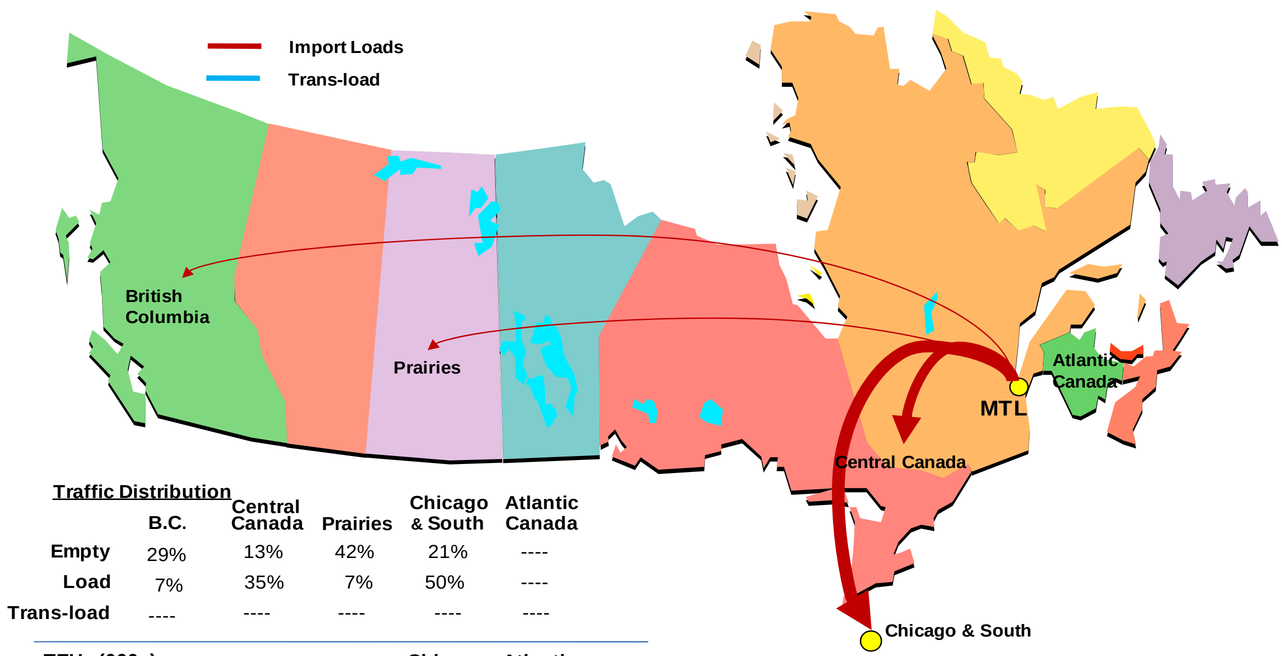
[48] Load / empty ratios for import and export container movements beyond 2004 have been calculated by allocation estimates total percentage of movements empty as identified by Port of Montreal against historical distribution of empty/load ratios from Statistics Canada data.
[49] Source: Port of Montreal

proportion of goods that can be described as industrial in nature with machinery, metal, chemical, and ore products accounting for 41% of total traffic.

Inland Distribution

Although important, railway transportation of import containers from the port to inland destinations plays a less significant role at Montreal than at Vancouver. In 2006 approximately 54% of import containers or 0.334 million TEUs were transported by rail to final destination. As shown in Figure 40 below 85% of imports or 0.286 million TEUs were transported to two principal inland markets, Central Canada and the US Midwest.

The lower volume of rail based container distribution from Montreal is likely a reflection of the geographic proximity of the major consuming markets in Quebec and Ontario that can be effectively accessed using truck transportation. The provinces of Ontario and Quebec are also the principal inland destination market for Vancouver imports with nearly 0.662 million TEUs transported there by rail, nearly six times as many as from Montreal. From Vancouver however rail is the most efficient means of transportation to these markets.



Traffic Distribution

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada
Empty	29%	13%	42%	21%	----
Load	7%	35%	7%	50%	----
Trans-load	----	----	----	----	----

TEUs (000s)

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada	Total
Empty	0.7	0.3	1.0	0.5	----	2.4
Load	23.6	117.9	23.2	167.8	----	332.5
Trans-load	----	----	----	----	----	----

Figure 41 – Inland Rail Distribution of Import Containers from Montreal - 2006

Containers railed from the Port of Montreal are primarily 40 ft dry containers (69%) with the remainder consisting of 20 ft containers (31%) and some nominal movements in other equipment types. Much like Vancouver the relative weighting of equipment types railed to inland regions is consistent with overall container distribution from the Port.

Exports

In 2006 the Port of Montreal handled a total of 0.669 million export TEUs representing 52% of total units handled. It is estimated that 80% of TEUs were evacuated from the Port loaded. Containerized exports represent 64% of total exported freight tonnes through Montreal.

Key Trading Partners and Commodities

Containerized exports at the Port of Montreal are distributed somewhat evenly across a number of trading partners in contrast to Vancouver where traffic is dominated by essentially two countries, China and Japan. The United Kingdom and the European continent as a group occupy seven of the top ten positions among export destinations from the Port of Montreal. These countries account for an estimated 2.78 million tonnes of containerized freight or approximately 50% of total containerized exports.

Rank	Destination Country	Total Freight Tonnage	Containerized Tonnage
1	United Kingdom	0.69	0.66
2	Netherlands	0.61	0.55
3	Italy	0.52	0.42
4	United Arab Emirates	0.35	0.35
5	Belgium	0.39	0.35
6	France	0.38	0.30
7	Germany	0.32	0.30
8	Spain	0.26	0.20
9	Russian Federation	0.18	0.18
10	Saudi Arabia	0.14	0.14
Top Ten Trading Partners		3.86	3.45
Balance of Exports		8.83	1.52

Table 25 – Top Ten Export Trade Partners – 2006[50]

Exports through the Port of Montreal are diverse in nature with no single commodity group accounting for more than 17% of total export tonnage. Forest products and grain are the largest commodities at 17% and 11% respectively.

[50] Containerized tonnage by country has been estimated based on historical percentage of containerized freight tonnage exported through Montreal based on Statistics Canada data.

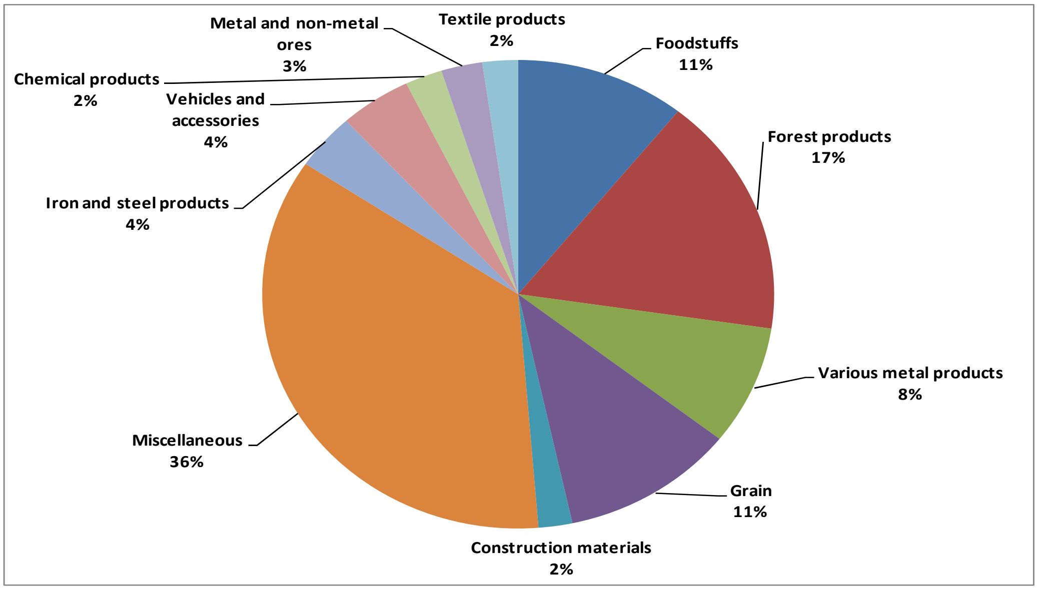
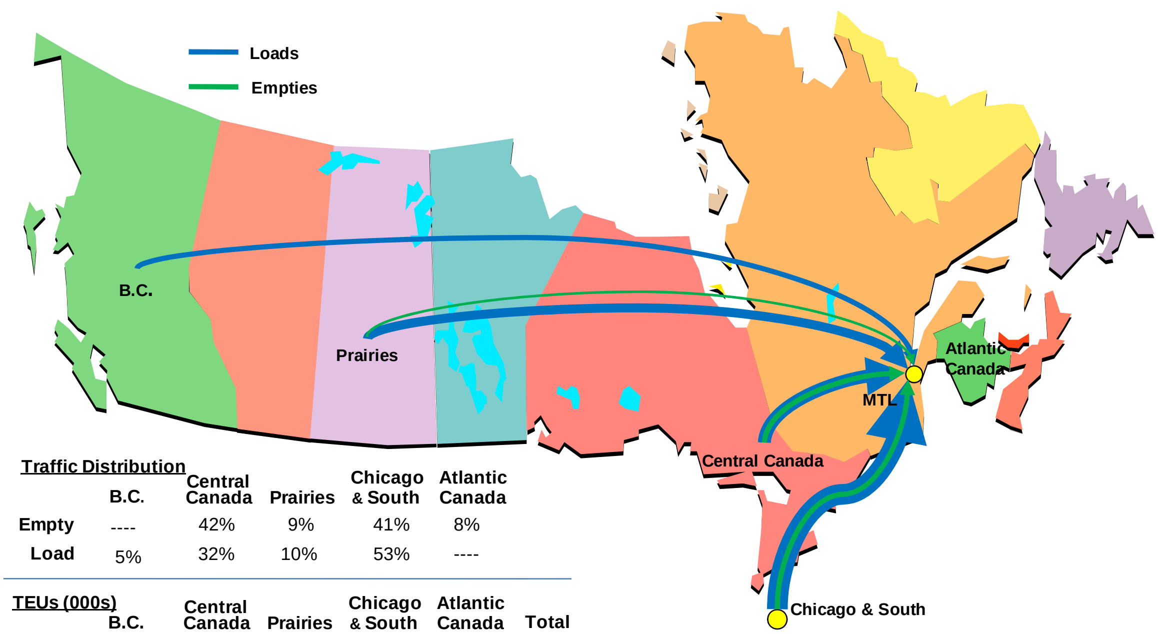


Figure 42 – Commodity Breakdown for Containerized Exports through the Port of Montreal – 2006

Inland Distribution

Railway transportation for export container traffic to Montreal is comparable to its role for the movement of imports from the Port. In 2006 there were 0.348 million TEUs railed to the port for export of which 92% were loaded. Key origin regions for rail movement of export containers include the U.S. Midwest (52%), Central Canada (32%), and to a much smaller extent the Prairies accounting for 10% of loaded exports.



Traffic Distribution

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada
Empty	----	42%	9%	41%	8%
Load	5%	32%	10%	53%	----

TEUs (000s)

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada	Total
Empty	----	12.8	2.5	12.5	----	27.8
Load	16.9	102.9	31.4	168.8	----	320.0

Figure 43 – Railway Movement of Export Containers to Montreal - 2006

Seasonality of Container Movements

Figures 43 and 44 below provide a high level view of the seasonality of import and export container movements through the Port of Montreal. Once again import traffic demonstrates some defined peaks in the spring, mid-summer, and fall periods with export peaks trailing these time periods slightly. Unlike for the Ports of Vancouver and Halifax our analysis does not have the benefit of detailed commodity data for containerized imports and exports for Montreal and as such we are unable to identify the principal commodity drivers for these seasonal patterns.

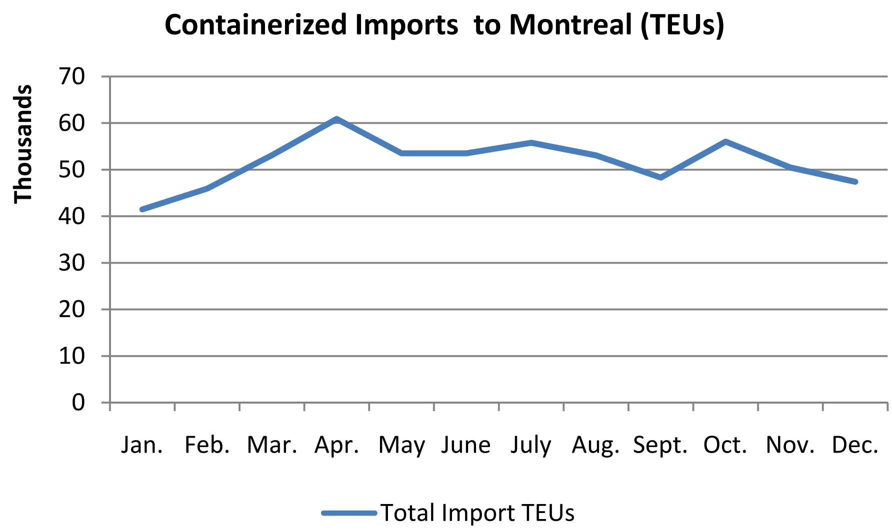


Figure 44 - Exports from Montreal

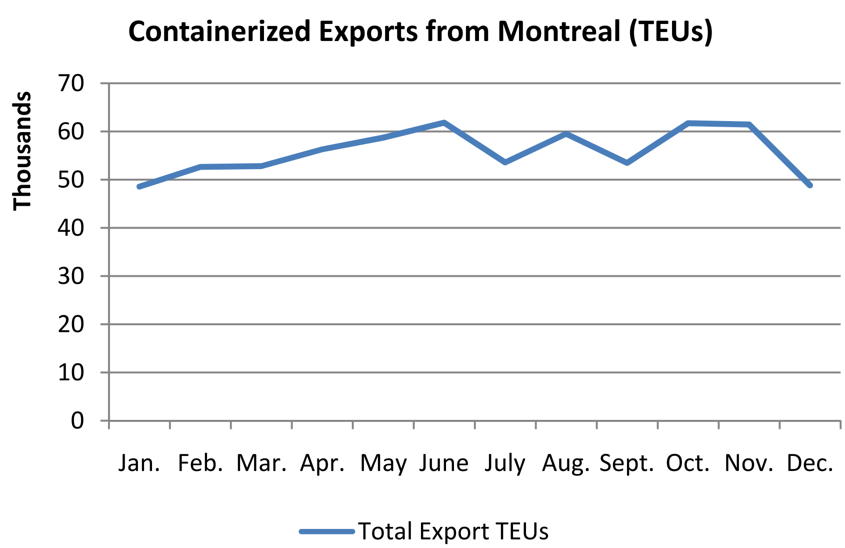


Figure 45- Imports to Montreal

Port of Halifax

Imports

In 2006 the Port of Halifax handled 0.537 million TEUs of which 50% or 0.266 million TEUs were import traffic. While 80% of import traffic arriving at the port is loaded containers more than 97% of import containers railed inland are loaded. The majority of empty containers are positioned for loading of local traffic.

Key Trading Partners and Commodities

The European continent is the principal region of origin for goods imported through the Port with six of the top ten trading partners. The top ten countries account for roughly two thirds of inbound goods.

Much like the Port of Montreal, imports through Halifax are less concentrated on consumer goods and have a higher proportion of industrial goods. Machinery, construction materials, chemicals, metals, and minerals products account for 45% of traffic whereas consumer goods represent only 28% of total imports.

Ranked by Freight Tonnage

Rank	Country	(Thousands) Tonnes
1	ITALY	239.0
2	SPAIN	201.4
3	INDIA	168.0
4	UNITED STATES	161.8
5	GERMANY	140.7
6	UNITED KINGDOM	134.6
7	BELGIUM	82.5
8	ISRAEL	75.8
9	CHINA	71.4
10	SWEDEN	68.6
	Top Ten Trading Partners	1,343.8
	Percent Total Import Tonnes	66%

Table 26 – Top Ten Import Trade Partners – Halifax 2006

Inland Distribution

The share of railway handlings for import containers at the Port of Halifax is much the same as at the Port of Montreal with 55% of all import containers arriving at the Port moving inland by rail. While comparable to Montreal on a percentage basis the actual volumes railed inland from Halifax is much smaller at 0.146 million TEUs, approximately 40% of Montreal volumes. There are two principal rail destination markets for Halifax imports, Central Canada and the U.S. Midwest. These two markets account for 97% of total rail handlings from the Port.

Containers railed from the Port of Halifax are once again primarily 40 ft dry containers (76%) with the remainder consisting of 20 ft containers (23%) and some nominal movements in other equipment types. The Port of Halifax is not a significant port of import for traffic destined to the Prairies and as such we do not see a significant volume of 20 ft containers moving to this region. The limited volume of import traffic destined to the Prairies is predominantly 40 ft equipment with 20 ft containers accounting for only 35% of traffic almost entirely loaded movements. It is estimated that imported goods transloaded to domestic equipment at the Port account for approximately 40% of total import traffic destined to the Prairies from the Port.

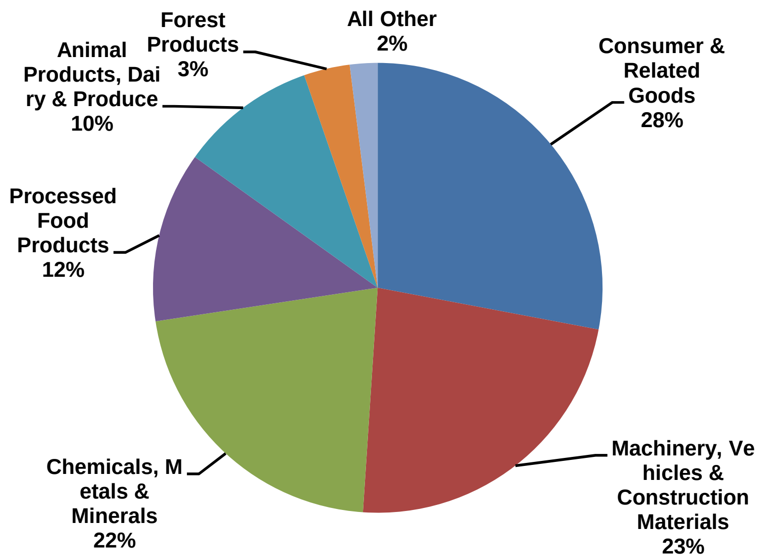
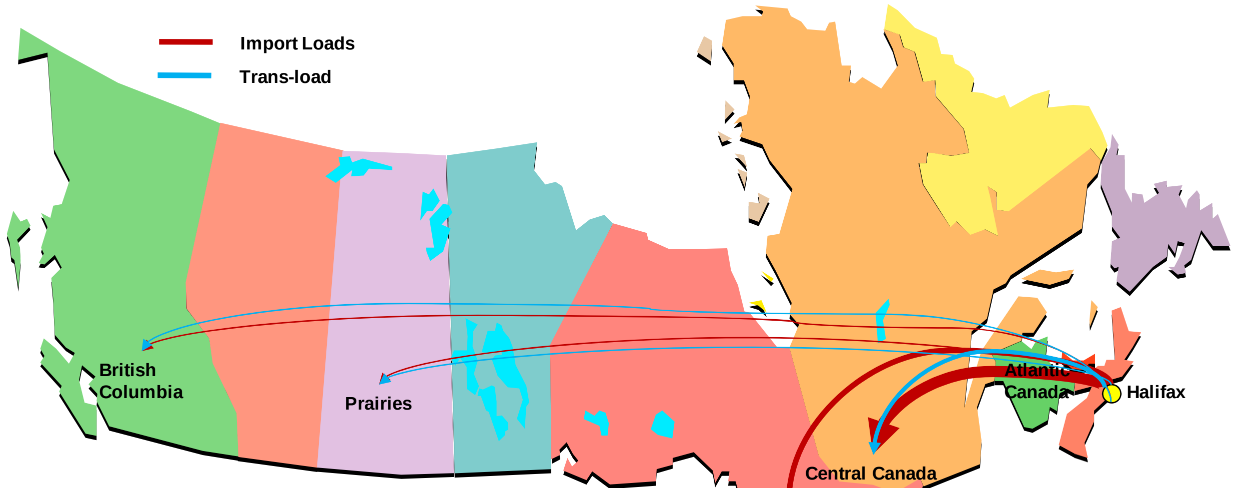


Figure 46 – Commodity Breakdown for Containerized Imports -Halifax 2006



Traffic Distribution

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada
Empty	5%	56%	2%	2%	35%
Load	1%	68%	2%	29%	----
Trans-load	4%	86%	10%	----	----

TEUs (000s)

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada	Total
Empty	0.2	2.2	0.1	0.1	1.3	3.9
Load	1.8	96.2	2.3	41.7	----	142.2
Trans-load	0.4	8.3	0.9	----	----	9.6

Figure 47 – Inland Rail Distribution of Import Containers from Halifax - 2006

Exports

Export container movements through the Port of Halifax in 2006 totaled 0.271 million TEUs of which 89% or 0.241 million TEUs were loaded. As compared to imports, containerized exports represent approximately 33% of total export freight tonnes although in absolute terms volumes are some 0.5 million tonnes higher.

Key Trading Partners and Commodities

Key trading partners for exports include many of the European countries that also play a prominent role in import traffic via the Halifax. Asian countries are beginning to achieve prominence with China, India, Japan, and Thailand all in the top ten export destinations. The top ten countries account for roughly 50% of export traffic.

Rank	Destination Country	Tonnes	(000s) TEUs
1	CHINA	0.3	22.9
2	UNITED KINGDOM	0.1	18.3
3	BELGIUM	0.1	15.6
4	INDIA	0.2	14.1
5	UNITED STATES	0.1	12.5
6	CUBA	0.1	11.4
7	JAPAN	0.1	10.2
8	ISRAEL	0.1	8.0
9	GERMANY	0.1	6.9
10	THAILAND	0.1	5.4
Top Ten Trading Partners		1.2	125.3
Balance of Exports		1.3	115.7

Table 27 – Top Ten Import Trade Partners – Halifax 2006[51]

Export commodities moving through the Port of Halifax are diverse with forest products comprising the single largest commodity group at 28% of total containerized tonnage.

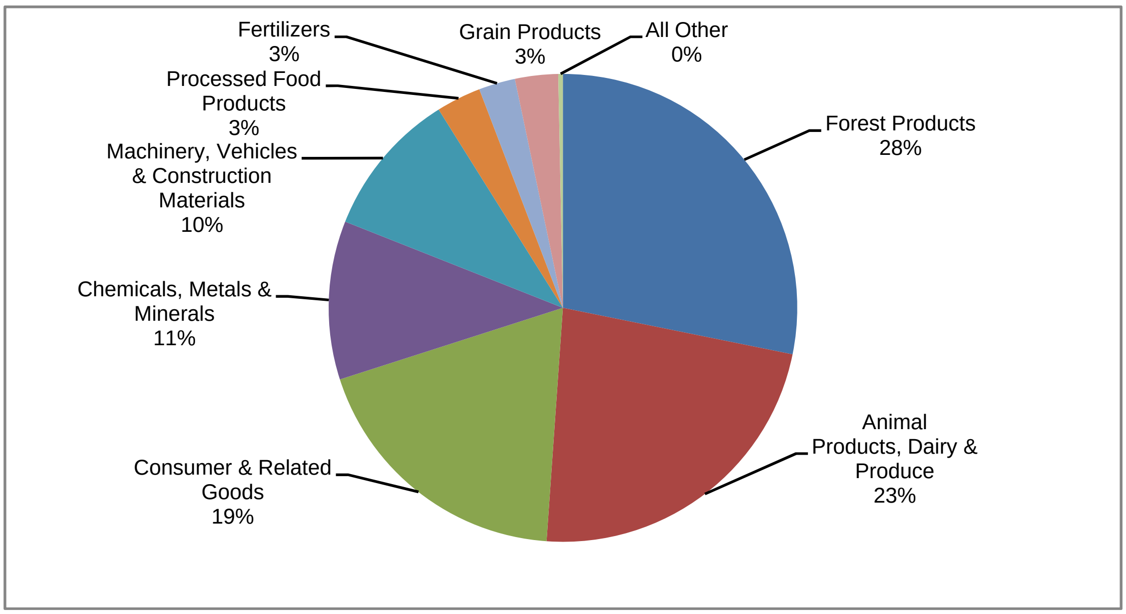


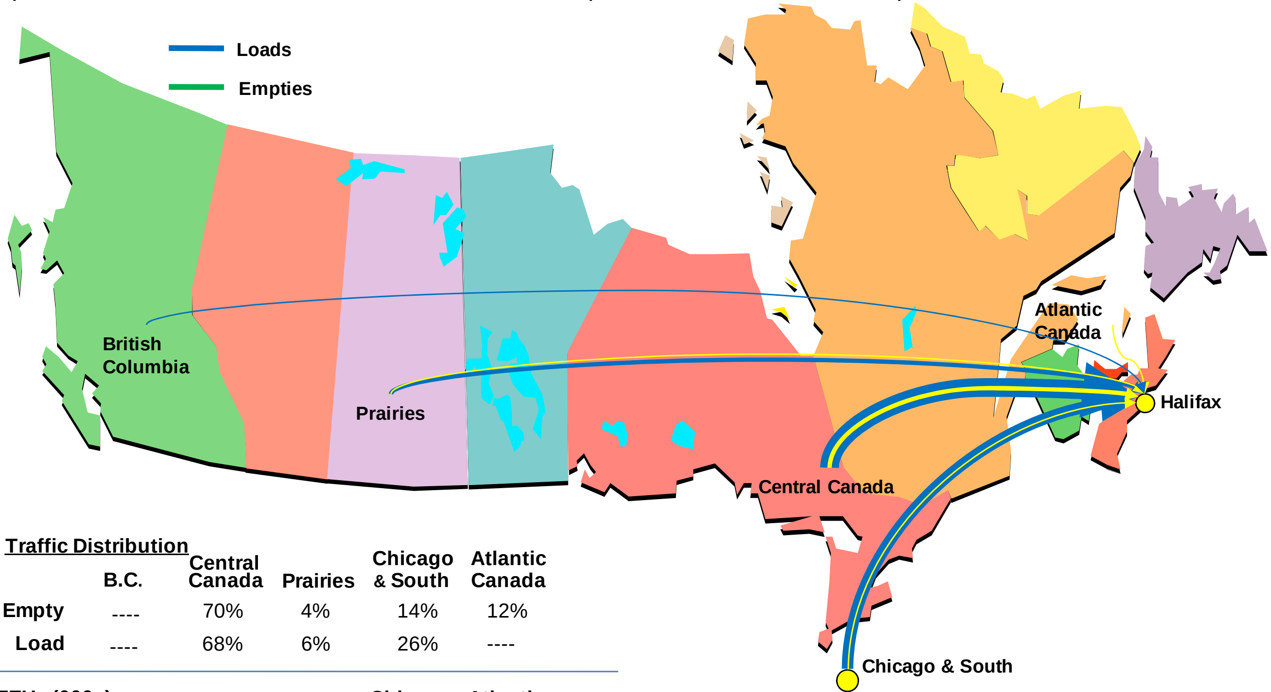
Figure 48 – Commodity Breakdown of Export Containers from Halifax – 2006

Inland Distribution

While total railway export container movements to Halifax are very comparable to imports at 56% of all exports the percentage of loaded export containers handled by rail is significantly less than it is for imports.

51 Source: Port of Halifax

Whereas the railway moves 66% of the Ports loaded import traffic it only handles 52% of the loaded exports. Approximately 94% of all loaded exports railed to Halifax originate in Central Canada and the U.S. Midwest. This traffic pattern is consistent with the rail movement of imports where 95% of rail imports are destined.



Traffic Distribution

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada
Empty	----	70%	4%	14%	12%
Load	----	68%	6%	26%	----

TEUs (000s)

	B.C.	Central Canada	Prairies	Chicago & South	Atlantic Canada	Total
Empty	----	17.3	0.9	3.5	2.9	24.6
Load	----	86.2	6.8	33.4	----	126.4

Figure 49 – Railway Movement of Export Containers to Halifax - 2006

Seasonality of Movements

Container flows at Halifax exhibit similar patterns as are seen at Vancouver and Montreal. We can see defined peaking for import traffic in the early spring, mid-summer, and in the fall. This overall pattern mirrors that of the movement of consumer type goods through the port which represents 25% of total import TEUs. Other principal commodities support this pattern with complimentary although less dramatic peaking. Export patterns are very similar in nature driven by the timing of export forest products and consumer goods.

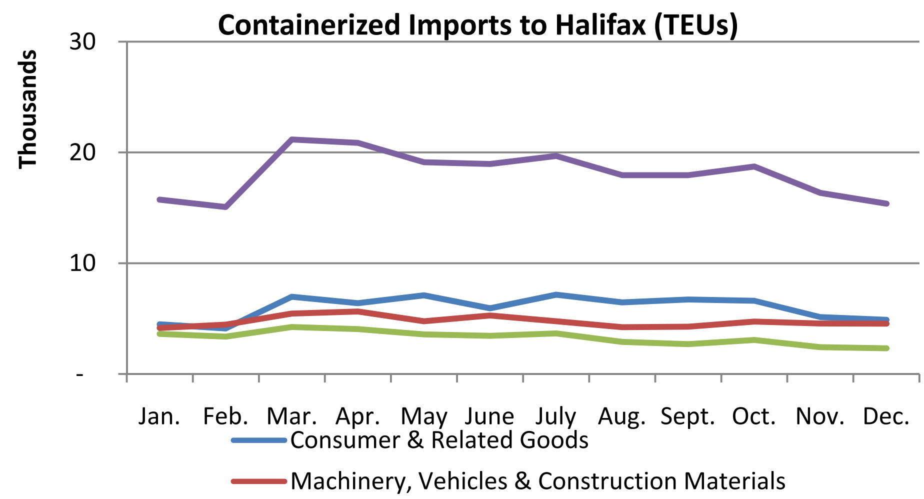


Figure 50 - Imports to Halifax

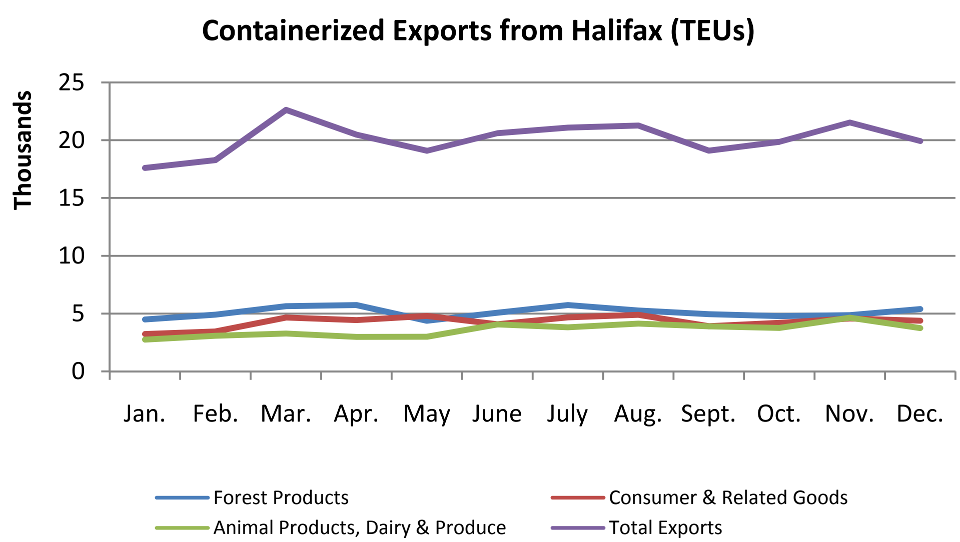


Figure 51 – Exports from Halifax

Appendix 4 – Traffic Flows

Inland Rail Distribution of Containerized Imports

Loaded TEUs

	Year			Growth		
Origin Port	**2004**	**2005**	**2006**	**'05 vs. '04**	**'06 vs. '05**	**'06 vs. '04**
Port of Halifax	146,130	149,573	142,240	2%	-5%	-3%
Port of Montreal	339,333	319,985	332,471	-6%	4%	-2%
Port of Vancouver	658,599	737,957	820,759	12%	11%	25%
Grand Total	**1,144,063**	**1,207,515**	**1,295,471**	**6%**	**7%**	**13%**

Empty TEUs

	Year			Growth		
Origin Port	**2004**	**2005**	**2006**	**'05 vs. '04**	**'06 vs. '05**	**'06 vs. '04**
Port of Halifax	2,008	4,315	3,981	115%	-8%	98%
Port of Montreal	701	2,169	2,431	209%	12%	247%
Port of Vancouver	7,888	9,600	8,635	22%	-10%	9%
Grand Total	**10,596**	**16,083**	**15,047**	**52%**	**-6%**	**42%**

Total TEUs

	Year			Growth		
Origin Port	**2004**	**2005**	**2006**	**'05 vs. '04**	**'06 vs. '05**	**'06 vs. '04**
Port of Halifax	148,137	153,888	146,221	4%	-5%	-1%
Port of Montreal	340,034	322,154	334,902	-5%	4%	-2%
Port of Vancouver	666,487	747,557	829,395	12%	11%	24%
Grand Total	**1,154,659**	**1,223,598**	**1,310,518**	**6%**	**7%**	**13%**

Rail Distribution of Containerized Imports - Halifax

Loaded TEUs

Destination Country	Destination Region	Year 2004	2005	2006	Growth '05 vs. '04	'06 vs. '05	'06 vs. '04
CANADA	BC	2,258	1,938	1,866	-14%	-4%	-17%
	Central Canada	93,631	94,941	96,244	1%	1%	3%
	Atlantic Canada	11	-	2	-100%	-	-82%
	Prairie	2,006	2,920	2,356	46%	-19%	17%
S/T Canada		**97,906**	**99,799**	**100,468**	**2%**	**1%**	**3%**
USA	Midwest	47,840	49,687	41,640	4%	-16%	-13%
	Northeast	168	-	-			
	South	215	72	132	-67%	84%	-38%
	West	2	15	-	650%	-100%	-100%
S/T USA		**48,225**	**49,774**	**41,772**	**3%**	**-16%**	**-13%**
Grand Total		**146,131**	**149,573**	**142,240**	**2%**	**-5%**	**-3%**

Empty TEUs

Destination Country	Destination Region	Year 2004	2005	2006	Growth '05 vs. '04	'06 vs. '05	'06 vs. '04
CANADA	Central Canada	1,585	2,685	2,261	69%	-16%	43%
	Atlantic Canada	212	1,062	1,340	401%	26%	532%
	BC	122	297	262	143%	-12%	115%
	Prairie	33	186	58	459%	-69%	74%
S/T Canada		**1,953**	**4,230**	**3,921**	**117%**	**-7%**	**101%**
USA	Midwest	55	82	59	49%	-28%	7%
	South	-	2	1	-	-50%	-
S/T USA		**55**	**84**	**60**	**53%**	**-29%**	**9%**
Grand Total		**2,008**	**4,314**	**3,981**	**115%**	**-8%**	**98%**

Rail Distribution of Containerized Imports - Montreal

Loaded TEUs

Destination Country	Destination Region	Year 2004	Year 2005	Year 2006	Growth '05 vs '04	Growth '06 vs '05	Growth '06 vs '04
CANADA	BC	23,002	21,454	23,560	-7%	10%	2%
	Central Canada	88,890	96,461	117,963	9%	22%	33%
	Atlantic Canada	34	46	17	35%	-63%	-50%
	Prairie	17,308	18,762	23,150	8%	23%	34%
S/T Canada		**129,234**	**136,724**	**164,690**	6%	20%	27%
USA	Midwest	202,164	178,581	163,230	-12%	-9%	-19%
	Northeast	305	10	4	-97%	-60%	-99%
	South	7,247	4,316	4,190	-40%	-3%	-42%
	West	384	353	357	-8%	1%	-7%
S/T USA		**210,100**	**183,261**	**167,780**	**-13%**	**-8%**	**-20%**
Grand Total		**339,333**	**319,985**	**332,471**	**-6%**	**4%**	**-2%**

Empty TEUs

Destination Country	Destination Region	Year 2004	Year 2005	Year 2006	Growth '05 vs. '04	Growth '06 vs. '05	Growth '06 vs. '04
CANADA	Central Canada	44	159	262	0%	0%	0%
	Atlantic Canada	84	-	-	263%	65%	499%
	BC	100	424	670	-100%	-	-100%
	Prairie	318	558	1,021	325%	58%	572%
S/T Canada		**546**	**1,141**	**1,953**	**75%**	**83%**	**221%**
USA	Midwest	152	1,028	471	576%	-54%	210%
	Northeast	3	-	7	-100%	-	133%
USA Total		**155**	**1,028**	**478**	**563%**	**-53%**	**209%**
Grand Total		**701**	**2,169**	**2,431**	**209%**	**12%**	**247%**

Rail Distribution of Containerized Imports - Vancouver

Loaded TEUs

Destination Country	Destination Region	Year 2004	Year 2005	Year 2006	Growth '05 vs. '04	Growth '06 vs. '05	Growth '06 vs. '04
CANADA	BC	5	7	3	40%	-57%	-40%
	Central Canada	517,361	589,710	662,638	14%	12%	28%
	Atlantic Canada	1,554	1,360	1,067	-12%	-22%	-31%
	Prairie	47,019	63,191	84,948	34%	34%	81%
S/T Canada		**565,938**	**654,268**	**748,656**	**16%**	**14%**	**32%**
USA	Midwest	80,471	76,742	61,407	-5%	-20%	-24%
	Northeast	683	913	1,660	34%	82%	143%
	South	11,503	6,035	9,038	-48%	50%	-21%
	West	4	-	-	-100%	-	-100%
S/T USA		**92,660**	**83,689**	**72,104**	**-10%**	**-14%**	**-22%**
Grand Total		**658,599**	**737,957**	**820,760**	**12%**	**11%**	**25%**

Empty TEUs

Destination Country	Destination Region	Year 2004	Year 2005	Year 2006	Growth '05 vs. '04	Growth '06 vs. '05	Growth '06 vs. '04
CANADA	Central Canada	1,193	1,281	814	7%	-36%	-32%
	Atlantic Canada	244	118	127	-52%	8%	-48%
	BC	125	1,590	180	1172%	-89%	44%
	Prairie	6,271	6,531	7,399	4%	13%	18%
S/T Canada		**7,833**	**9,520**	**8,520**	**22%**	**-11%**	**9%**
USA	Midwest	16	76	81	375%	7%	408%
	Northeast	2		6	-100%	n/a	200%
	South	37	4	28	-89%	606%	-23%
USA Total		**55**	**80**	**116**	**46%**	**44%**	**111%**
Grand Total		**7,887**	**9,600**	**8,636**	**22%**	**-10%**	**9%**

Railway Movements of Containerized Exports

Loaded TEUs

Destination Port	2004	2005	2006	'05 vs. '04	'06 vs. '05	'06 vs. '04
		Year			Growth	
Port of Halifax	125,641	129,213	126,437	3%	-2%	1%
Port of Montreal	281,314	290,807	320,046	3%	10%	14%
Port of Vancouver	293,036	314,689	316,803	7%	1%	8%
Grand Total	**699,990**	**734,709**	**763,286**	**5%**	**4%**	**9%**

Empty TEUs

Destination Port	2004	2005	2006	'05 vs. '04	'06 vs. '05	'06 vs. '04
		Year			Growth	
Port of Halifax	27,709	25,280	24,642	-9%	-3%	-11%
Port of Montreal	27,784	18,217	27,851	-34%	53%	0%
Port of Vancouver	242,765	308,177	364,151	27%	18%	50%
Grand Total	**298,258**	**351,674**	**416,643**	**18%**	**18%**	**40%**

Total TEUs

Destination Port	2004	2005	2006	'05 vs. '04	'06 vs. '05	'06 vs. '04
		Year			Growth	
Port of Halifax	153,350	154,493	151,079	1%	-2%	-1%
Port of Montreal	309,097	309,024	347,896	0%	13%	13%
Port of Vancouver	535,801	622,867	680,954	16%	9%	27%
Grand Total	**998,248**	**1,086,383**	**1,179,929**	**9%**	**9%**	**18%**

Railway Movement of Containerized Exports - Halifax

Loaded TEUs

Origin Country	Origin Region	Year 2004	2005	2006	Growth '05 vs. '04	'06 vs. '05	'06 vs. '04
CANADA	Central Canada	74,987	76,247	86,216	2%	13%	15%
	Atlantic Canada	17	-	-	-100%	-	-100%
	Prairie	4,809	6,569	6,799	37%	4%	41%
S/T Canada		**79,813**	**82,816**	**93,015**	**4%**	**12%**	**17%**
USA	Midwest	45,127	46,294	33,339	3%	-28%	-26%
	Northeast	391			-100%		-100%
	South	208	90	80	-57%	-11%	-62%
	West	102	13	2	-87%	-85%	-98%
S/T USA		**45,828**	**46,397**	**33,421**	**1%**	**-28%**	**-27%**
Grand Total		**125,641**	**129,213**	**126,437**	**3%**	**-2%**	**1%**

Empty TEUs

Origin Country	Origin Region	Year 2004	2005	2006	Growth '05 vs. '04	'06 vs. '05	'06 vs. '04
CANADA	Central Canada	23,665	20,534	17,315	-13%	-16%	-27%
	Atlantic Canada	756	1,839	2,903	143%	58%	284%
	Prairie	423	651	922	54%	42%	118%
S/T Canada		**24,844**	**23,024**	**21,140**	**-7%**	**-8%**	**-15%**
USA	Midwest	2,566	1,446	1,644	-44%	14%	-36%
	Northeast	80			-100%		
	South	219	810	1,858	270%	129%	748%
S/T USA		**2,865**	**2,256**	**3,502**	**-21%**	**55%**	**22%**
Grand Total		**27,709**	**25,280**	**24,642**	**-9%**	**-3%**	**-11%**

Railway Movement of Containerized Exports – Montreal

Loaded TEUs

		Year			Growth		
Origin Country	**Origin Region**	**2004**	**2005**	**2006**	**'05 vs. '04**	**'06 vs. '05**	**'06 vs. '04**
CANADA	Central Canada	84,042	86,517	102,884	3%	19%	22%
	BC	12,226	13,320	16,916	9%	27%	38%
	Prairie	24,908	26,571	31,460	7%	18%	26%
S/T Canada		**121,176**	**126,407**	**151,260**	**4%**	**20%**	**25%**
USA	Midwest	158,686	162,102	167,815	2%	4%	6%
	Northeast	46	3	61	-93%	1933%	33%
	South	1,392	796	859	-43%	8%	-38%
	West	14	1,500	50	10611%	-97%	257%
S/T USA		**160,138**	**164,400**	**168,786**	**3%**	**3%**	**5%**
Grand Total		**281,314**	**290,807**	**320,046**	**3%**	**10%**	**14%**

Empty TEUs

		Year			Growth		
Origin Country	**Origin Region**	**2004**	**2005**	**2006**	**'05 vs. '04**	**'06 vs. '05**	**'06 vs. '04**
CANADA	Central Canada	8,514	8,227	12,767	-3%	55%	50%
	Atlantic Canada	15	-	-	-100%	-	-100%
	BC	14	38	30	171%	-21%	114%
	Prairie	1,407	650	2,511	-54%	286%	78%
S/T Canada		**9,950**	**8,916**	**15,308**	**-10%**	**72%**	**54%**
USA	Midwest	16,642	8,567	12,371	-49%	44%	-26%
	Northeast	749	561		-25%	-100%	-100%
	South	443	173	171	-61%	-1%	-61%
S/T USA		**17,834**	**9,301**	**12,543**	**-48%**	**35%**	**-30%**
Grand Total		**27,784**	**18,217**	**27,851**	**-34%**	**53%**	**0%**

Railway Movement of Containerized Exports - Vancouver

Loaded TEUs

Origin Country	Origin Region	Year 2004	Year 2005	Year 2006	Growth '05 vs. '04	Growth '06 vs. '05	Growth '06 vs. '04
CANADA	BC	6	10	244	67%	2340%	3967%
	Central Canada	179,127	193,476	187,061	8%	-3%	4%
	Atlantic Canada	10	22	18	120%	-18%	80%
	Prairie	92,195	100,174	107,918	9%	8%	17%
S/T Canada		**271,337**	**293,682**	**295,241**	**8%**	**1%**	**9%**
USA	Midwest	20,135	19,936	20,383	-1%	2%	1%
	Northeast	713	768	1,148	8%	49%	61%
	South	851	304	31	-64%	-90%	-96%
	West	1	-	-	-100%	-	-100%
S/T USA		**21,699**	**21,008**	**21,562**	-3%	3%	-1%
Grand Total		**293,036**	**314,690**	**316,803**	**7%**	**1%**	**8%**

Empty TEUs

Origin Country	Origin Region	Year 2004	Year 2005	Year 2006	Growth '05 vs. '04	Growth '06 vs. '05	Growth '06 vs. '04
CANADA	BC	3,044	2,592	2,651	-15%	2%	-13%
	Central Canada	111,414	153,006	185,450	37%	21%	66%
	Atlantic Canada	50	129	147	157%	15%	195%
	Prairie	42,061	85,874	137,794	104%	60%	228%
S/T Canada		**156,570**	**241,600**	**326,042**	**54%**	**35%**	**108%**
USA	Midwest	76,232	60,924	33,941	-20%	-44%	-55%
	Northeast	5,051	1,752	40	-65%	-98%	-99%
	South	4,913	3,902	4,129	-21%	6%	-16%
S/T USA		**86,196**	**66,577**	**38,110**	**-23%**	**-43%**	**-56%**
Grand Total		**242,766**	**308,178**	**364,152**	**27%**	**18%**	**50%**

Container Supply to the Prairies – Equipment Type (TEUs)

Movement Type	Container Size	2004	2005	2006
Empty Imports	20 FT	2,887	3,474	4,951
	40 FT	3,726	3,792	3,522
	45 FT	9	9	5
	Other	-	-	3
		6,622	**7,275**	**8,481**
Loaded Imports	20 FT	16,545	21,981	28,031
	40 FT	49,022	61,594	80,988
	45 FT	743	1,276	1,366
	Other	23	23	68
		66,333	**84,873**	**110,453**
Total Import TEUs	**All Ports**	**72,955**	**92,148**	**118,934**
Empty Repositioning	20 FT	24,961	23,938	26,894
	40 FT	19,764	24,334	20,542
	45 FT	124	32	36
	Other	9	19	11
		38,354	**42,742**	**40,966**
DRP	20 FT	11,124	11,480	12,210
	40 FT	110,856	127,344	143,048
	45 FT	6,143	5,522	6,874
	Other	29	14	22
		128,152	**144,360**	**162,154**
Total Repositioning	**All Regions**	**166,506**	**187,102**	**203,119**
All Sources of Supply	20 FT	55,517	60,873	72,086
	40 FT	183,368	217,064	248,100
	45 FT	7,018	6,838	8,281
	Other	61	56	104
Total Container Supply to Prairies		**245,964**	**284,831**	**328,570**

Container Supply to Alberta – Equipment Type (TEUs)

Movement Type	Container Size	2004	2005	2006
Empty Imports	20 FT	875	479	622
	40 FT	1,786	1,820	2,510
	45 FT	5	9	-
	Other	-	-	-
		2,666	**2,308**	**3,132**
Loaded Imports	20 FT	12,535	17,156	22,204
	40 FT	37,862	48,430	65,390
	45 FT	635	1,121	1,078
	Other	21	20	64
		51,052	**66,726**	**88,735**
Total Import TEUs		**53,718**	**69,034**	**91,867**
Empty Repositioning	20 FT	3,206	1,951	1,796
	40 FT	9,954	14,274	10,864
	45 FT	106	16	25
	Other	6	2	2
		13,272	**16,243**	**12,687**
DRP	20 FT	7,481	7,793	8,516
	40 FT	85,788	100,414	110,722
	45 FT	4,937	4,489	5,778
	Other	25	14	20
		98,230	**112,710**	**125,036**
Total Repositioning		**111,502**	**128,953**	**137,723**
All Sources of Supply	20 FT	24,097	27,379	33,138
	40 FT	135,390	164,938	189,486
	45 FT	5,681	5,634	6,881
	Other	52	36	86
Total Container Supply to Alberta		**165,220**	**197,987**	**229,590**

Container Supply to Saskatchewan – Equipment Type (TEUs)

Movement Type	Container Size	2004	2005	2006
Empty Imports	20 FT	1,397	2,429	3,663
	40 FT	260	390	368
	45 FT	-	-	3
	Other	-	-	3
		1,657	**2,819**	**4,034**
Loaded Imports	20 FT	1,147	1,230	1,399
	40 FT	2,366	2,514	3,760
	45 FT	11	41	106
	Other	2	1	-
		3,526	**3,786**	**5,265**
Total Import TEUs	**All Ports**	**5,183**	**6,605**	**9,299**
Empty Repositioning	20 FT	15,247	18,428	21,621
	40 FT	3,146	3,032	2,178
	45 FT	7	-	2
	Other	3	7	3
		18,402	**21,467**	**23,804**
DRP	20 FT	1,069	729	899
	40 FT	8,178	8,748	10,358
	45 FT	394	266	396
	Other	2	-	-
		9,643	**9,743**	**11,653**
Total Repositioning	**All Regions**	**28,045**	**31,209**	**35,457**
All Sources of Supply	20 FT	18,860	22,816	27,582
	40 FT	13,950	14,684	16,664
	45 FT	412	306	507
	Other	7	8	6
Total Container Supply to Saskatchewan		**33,229**	**37,814**	**44,758**

Container Supply to Manitoba – Equipment Type (TEUs)

Movement Type	Container Size	2004	2005	2006
Empty Imports	20 FT	615	566	666
	40 FT	1,680	1,582	644
	45 FT	5	-	2
	Other	-	-	-
		2,300	**2,148**	**1,312**
Loaded Imports	20 FT	2,863	3,595	4,428
	40 FT	8,794	10,650	11,838
	45 FT	97	115	182
	Other	-	1	5
		11,754	**14,361**	**16,453**
Total Import TEUs	**All Ports**	**14,053**	**16,509**	**17,765**
Empty Repositioning	20 FT	6,508	3,559	3,477
	40 FT	6,664	7,028	7,500
	45 FT	11	16	9
	Other	-	10	6
		13,183	**10,613**	**10,992**
DRP	20 FT	2,574	2,958	2,795
	40 FT	6,890	18,182	21,968
	45 FT	812	767	700
	Other	2	-	2
		20,279	**21,907**	**25,465**
Total Repositioning	**All Regions**	**33,462**	**32,520**	**36,457**
All Sources of Supply	20 FT	12,560	10,678	11,366
	40 FT	34,028	37,442	41,950
	45 FT	925	898	893
	Other	2	11	13
Total Container Supply to Manitoba		**47,515**	**49,029**	**54,222**

Container Supply to the Prairies – Regional Sourcing

Movement Type	Origin Country	Origin Region	2004	2005	2006
Empty Imports		Port of Halifax	33	186	58
		Port of Montreal	318	558	1,021
		Port of Vancouver	6,271	6,531	7,399
			6,622	**7,275**	**8,478**
Loaded Imports		Port of Halifax	2,006	2,920	2,356
		Port of Montreal	17,308	18,762	23,150
		Port of Vancouver	47,019	63,191	84,948
			66,333	**84,873**	**110,453**
Total Imports		**All Ports**	**72,955**	**92,148**	**118,931**
Empty Repositioning	CANADA	BC	927	731	666
		Central Canada	21,456	26,482	27,673
		Atlantic Canada	11	20	11
		Prairie	8,659	10,860	8,875
			31,053	**38,093**	**37,225**
	USA	Midwest	13,237	10,189	10,257
		South	428	40	-
		West	1	-	-
		Northeast	138	-	-
			13,805	**10,229**	**10,257**
DRP	CANADA	BC	4,081	5,173	2,941
		Central Canada	119,620	134,578	154,027
		Atlantic Canada	78	45	142
		Prairie	1,151	1,412	1,241
			124,931	**141,208**	**158,350**
	USA	Midwest	2,541	2,341	2,568
		South	127	65	100
		Northeast	552	745	1,130
			3,220	**3,150**	**3,798**
Total Repositioning		**All Regions**	**173,009**	**192,681**	**209,631**
Total Container Supply to Prairies			**245,963**	**284,829**	**328,562**

Container Supply to Alberta – Regional Sourcing

Movement Type	Origin Country	Origin Region	2004	2005	2006
Empty Imports	Canada	Port of Halifax	33	114	37
		Port of Montreal	8	122	84
		Port of Vancouver	2,624	2,072	3,011
			2,666	**2,308**	**3,132**
Loaded Imports	Canada	Port of Halifax	1,228	2,098	1,673
		Port of Montreal	12,634	14,152	17,743
		Port of Vancouver	37,190	50,476	69,319
			51,052	**66,726**	**88,735**
Total Imports		**All Ports**	**53,718**	**69,034**	**91,867**
Empty Repositioning	CANADA	BC	563	318	410
		Central Canada	6,473	9,236	7,483
		Atlantic Canada	8	10	7
		Prairie	4,406	5,787	4,286
			11,450	**15,351**	**12,186**
	USA	Midwest	1,762	872	500
		West	1	-	-
		Northeast	58	-	-
		South	-	20	-
			1,822	**892**	**500**
DRP	CANADA	BC	3,982	5,026	2,820
		Central Canada	90,379	103,539	117,536
		Atlantic Canada	75	39	142
		Prairie	863	1,181	1,022
			95,300	**109,785**	**121,519**
	USA	Midwest	2,443	2,242	2,486
		Northeast	366	633	955
		South	122	51	76
			2,931	**2,925**	**3,517**
Total Repositioning		**All Regions**	**111,503**	**128,954**	**137,723**
Total Container Supply to Alberta			**165,220**	**197,988**	**229,590**

Container Supply to Saskatchewan – Regional Sourcing

Movement Type	Origin Country	Origin Region	2004	2005
Empty Imports		Port of Halifax	-	55
		Port of Montreal	68	286
		Port of Vancouver	1,589	2,478
			1,657	**2,819**
Loaded Imports		Port of Halifax	213	321
		Port of Montreal	1,898	1,546
		Port of Vancouver	1,415	1,919
			3,526	**3,786**
Total Imports		**All Ports**	**5,183**	**6,605**
Empty Repositioning	CANADA	Central Canada	9,114	11,404
		BC	57	113
		Prairie	3,610	4,568
		Atlantic Canada	3	6
			12,784	**16,091**
	USA	Midwest	5,619	5,376
DRP	CANADA	Central Canada	9,494	9,683
		Atlantic Canada	3	2
		BC	22	25
		Prairie	87	28
			9,606	**9,738**
	USA	Midwest / Northeast	36	4
Total Repositioning		**All Regions**	**28,045**	**31,209**
Total Container Supply to Saskatchewan			**33,228**	**37,814**

Container Supply to Manitoba – Regional Sourcing

Movement Type	Origin Country	Origin Region	2004	2005	2006
Empty Imports		Port of Halifax	-	17	-
		Port of Montreal	242	150	280
		Port of Vancouver	2,057	1,981	1,032
			2,300	**2,148**	**1,312**
Loaded Imports		Port of Halifax	565	501	441
		Port of Montreal	2,775	3,065	3,514
		Port of Vancouver	8,414	10,796	12,498
			11,754	**14,361**	**16,453**
Total Imports		**All Ports**	**14,053**	**16,509**	**17,765**
Empty Repositioning	CANADA	Central Canada	5,869	5,842	6,429
		BC	307	300	236
		Prairie	643	505	962
		Atlantic Canada	-	4	3
			6,819	**6,651**	**7,630**
	USA	Midwest	5,856	3,941	3,362
		South	428	20	-
		Northeast	80	-	-
			6,364	**3,961**	**3,362**
DRP	CANADA	BC	77	122	113
		Central Canada	19,747	21,356	24,860
		Prairie	201	203	211
		Atlantic Canada	-	4	-
			20,025	**21,685**	**25,184**
	USA	Midwest	62	95	79
		South	5	14	24
		Northeast	186	112	175
			253	**221**	**278**
Total Repositioning		**All Regions**	**33,461**	**32,518**	**36,454**
Total Container Supply to Manitoba			**47,514**	**49,027**	**54,219**

Container Shipments from the Prairies – Equipment Type (TEUs)

Movement Type	Container Size	2004	2005	2006
Empty Exports	20 FT	7,372	9,520	16,566
	40 FT	33,830	72,448	117,068
	45 FT	2,680	5,114	7,506
	Other	10	93	86
		43,891	**87,175**	**141,226**
Loaded Exports	20 FT	35,107	38,152	44,439
	40 FT	86,498	94,898	101,472
	45 FT	284	214	230
	Other	55	50	36
		121,943	**133,314**	**146,177**
Total Export TEUs	**All Ports**	**165,835**	**220,489**	**287,403**
Empty Repositioning	20 FT	5,592	5,559	4,233
	40 FT	6,028	8,476	6,934
	45 FT	189	41	70
	Other	15	5	3
		11,824	**14,080**	**11,240**
Loaded DRPs	20 FT	2,584	2,785	2,473
	40 FT	6,448	5,458	4,048
	45 FT	385	126	36
	Other	8	-	2
		9,424	**8,369**	**6,559**
Total Repositioning	**All Regions**	**21,248**	**22,449**	**17,799**
All Movements	20 FT	50,655	56,016	67,711
	40 FT	132,804	181,280	229,522
	45 FT	3,537	5,495	7,841
	Other	87	148	128
Total Container Movements from Prairies		**187,083**	**242,938**	**305,202**

Container Shipments from Alberta – Equipment Type (TEUs)

Movement Type	Container Size	2004	2005	2006
Empty Exports	20 FT	5,491	7,363	13,254
	40 FT	25,422	54,884	89,902
	45 FT	2,097	4,262	6,311
	Other	7	76	76
		33,017	**66,584**	**109,543**
Loaded Exports	20 FT	10,328	10,624	12,154
	40 FT	65,954	73,792	76,626
	45 FT	241	169	169
	Other	15	22	15
		76,538	**84,607**	**88,964**
Total Export TEUs	**All Ports**	**109,555**	**151,191**	**198,507**
Empty Repositioning	20 FT	2,886	3,800	2,727
	40 FT	3,218	5,452	4,590
	45 FT	146	32	38
	Other	15	5	3
		6,265	**9,288**	**7,358**
Loaded DRPs	20 FT	530	735	628
	40 FT	952	1,930	1,430
	45 FT	200	54	7
	Other	5	-	2
		1,687	**2,719**	**2,067**
Total Repositioning	**All Regions**	**7,952**	**12,007**	**9,425**
All Movements	20 FT	19,235	22,522	28,763
	40 FT	95,546	136,058	172,548
	45 FT	2,684	4,516	6,525
	Other	42	102	97
Total Container Movements from Alberta		**117,507**	**163,198**	**207,933**

Container Shipments from Saskatchewan – Equipment Type (TEUs)

Movement Type	Container Size	2004	2005	2006
Empty Exports	20 FT	505	586	546
	40 FT	3,078	5,532	8,128
	45 FT	207	218	416
	Other	-	3	5
		3,790	**6,339**	**9,096**
Loaded Exports	20 FT	17,630	21,623	26,864
	40 FT	6,280	6,322	7,630
	45 FT	7	5	9
	Other	37	15	17
		23,954	**27,965**	**34,520**
Total Export TEUs	**All Ports**	**27,744**	**34,304**	**43,615**
Empty Repositioning	20 FT	261	69	96
	40 FT	704	1,018	714
	45 FT	9	5	20
	Other	-	-	-
		974	**1,092**	**830**
Loaded DRPs	20 FT	464	538	76
	40 FT	1,370	440	292
	45 FT	113	41	9
	Other	-	-	-
		1,947	**1,019**	**377**
Total Repositioning	**All Regions**	**2,921**	**2,110**	**1,207**
All Movements	20 FT	18,860	22,816	27,582
	40 FT	11,432	13,312	16,764
	45 FT	335	268	455
	Other	37	18	22
Total Container Movements from Saskatchewan		**30,664**	**36,414**	**44,823**

Container Shipments from Manitoba – Equipment Type (TEUs)

Movement Type	Container Size	2004	2005	2006
Empty Exports	20 FT	1,376	1,571	2,766
	40 FT	5,330	12,032	19,038
	45 FT	376	635	779
	Other	3	15	5
		7,084	**14,252**	**22,588**
Loaded Exports	20 FT	7,149	5,905	5,421
	40 FT	14,264	14,784	17,216
	45 FT	36	41	52
	Other	2	13	4
		21,451	**20,742**	**22,693**
Total Export TEUs	**All Ports**	**28,536**	**34,994**	**45,281**
Empty Repositioning	20 FT	2,445	1,690	1,410
	40 FT	2,106	2,006	1,630
	45 FT	34	5	11
	Other	-	-	-
		4,585	**3,701**	**3,051**
Loaded DRPs	20 FT	1,590	1,512	1,769
	40 FT	4,126	3,088	2,326
	45 FT	72	32	20
	Other	3	-	-
		5,791	**4,632**	**4,115**
Total Repositioning	**All Regions**	**10,375**	**8,332**	**7,167**
All Movements	20 FT	12,560	10,678	11,366
	40 FT	25,826	31,910	40,210
	45 FT	518	711	862
	Other	8	27	10
Total Container Movements from Manitoba		**38,911**	**43,326**	**52,447**

Container Shipments from the Prairies – Destination Region

Movement Type	Destination Country	Destination Region		2004	2005	2006
Empty Exports		Port of Halifax		423	651	922
		Port of Montreal		1,407	650	2,511
		Port of Vancouver		42,061	85,874	137,794
				43,891	**87,175**	**141,226**
Loaded Exports		Port of Halifax		4,809	6,569	6,799
		Port of Montreal		24,908	26,571	31,460
		Port of Vancouver		92,195	100,174	107,918
				121,911	**133,314**	**146,177**
Total Exports		**All Ports**		**165,803**	**220,489**	**287,403**
Empty Repositioning	CANADA	BC		2,423	1,594	1,257
		Central Canada		310	513	338
		Atlantic Canada		4	6	3
		Prairie		8,658	10,860	8,874
				11,395	**12,973**	**10,472**
	USA	All Regions		428	1,104	759
Loaded DRPs	CANADA	Atlantic Canada		40	44	108
		Central Canada		3,811	3,349	2,051
		BC		3,598	2,449	1,664
		Prairie		1,154	1,412	1,242
				8,603	**7,253**	**5,065**
	USA	All Regions		825	1,120	1,494
Total Repositioning		**All Regions**		**21,251**	**22,450**	**17,790**
Total Container Movements from Prairie Provinces				**187,053**	**242,939**	**305,194**

Container Movements from Alberta – Destination Region

Movement Type	Destination Country	Destination Region	2004	2005	2006
Empty Exports		Port of Halifax	175	353	523
		Port of Montreal	1,011	350	1,069
		Port of Vancouver	31,831	65,881	107,951
			33,017	**66,584**	**109,543**
Loaded Exports		Port of Halifax	1,491	1,947	1,300
		Port of Montreal	7,645	7,929	9,046
		Port of Vancouver	67,402	74,731	78,618
			76,538	**84,607**	**88,964**
Total Export TEUs		**All Ports**	**109,555**	**151,191**	**198,507**
Empty Repositioning	CANADA	Central Canada	104	193	201
		Atlantic Canada	4	6	3
		BC	734	397	323
		Prairie	5,164	7,980	6,224
			6,006	**8,576**	**6,751**
	USA	All Regions	**257**	**710**	**599**
Loaded DRPs	CANADA	Atlantic Canada	17	27	102
		Central Canada	752	1,068	306
		BC	199	546	101
		Prairie	257	300	335
			1,225	**1,941**	**844**
	USA	**All Regions**	**464**	**782**	**1,223**
Total Repositioning		**All Regions**	**7,952**	**12,009**	**9,417**
Total Container Movements from Alberta			**117,507**	**163,199**	**207,924**

Container Movements from Saskatchewan – Destination Region

Movement Type	Destination Country	Destination Region	2004	2005	2006
Empty Exports		Port of Halifax	79	79	99
		Port of Montreal	129	103	261
		Port of Vancouver	3,582	6,157	8,736
			3,790	**6,339**	**9,096**
Loaded Exports		Port of Halifax	2,337	3,817	4,660
		Port of Montreal	10,625	12,626	15,535
		Port of Vancouver	10,960	11,522	14,325
			23,922	**27,965**	**34,520**
Total Exports		**All Ports**	**27,712**	**34,304**	**43,615**
Empty Repositioning	CANADA	Central Canada	14	30	37
		BC	125	112	169
		Prairie	835	936	618
			974	**1,078**	**824**
	USA	All Regions	-	13	6
Loaded DRPs	CANADA	Central Canada	357	503	153
		Atlantic Canada	17	9	4
		BC	1,261	400	199
		Prairie	155	7	6
			1,790	**919**	**362**
	USA	All Regions	158	101	15
Total Repositioning		**All Regions**	**2,922**	**2,111**	**1,207**
Total Container Movements from Saskatchewan			**30,634**	**36,414**	**44,822**

Container Movements from Manitoba – Destination Region

Movement Type	Destination Country	Destination Region	2004	2005	2006
Empty Exports		Port of Halifax	169	219	300
		Port of Montreal	267	197	1,181
		Port of Vancouver	6,648	13,836	21,107
			7,084	14,252	22,588
Loaded Exports		Port of Halifax	981	805	839
		Port of Montreal	6,637	6,016	6,879
		Port of Vancouver	13,833	13,922	14,975
			21,451	20,742	22,693
Total Export TEUs		**All Ports**	**28,536**	**34,994**	**45,281**
Empty Repositioning	CANADA	BC	1,563	1,085	765
		Central Canada	192	290	100
		Prairie	2,659	1,944	2,032
			4,414	3,319	2,897
	USA	All Regions	171	381	154
Loaded DRPs	CANADA	Central Canada	2,702	1,778	1,592
		Atlantic Canada	6	8	2
		BC	2,139	1,503	1,364
		Prairie	742	1,105	901
			5,589	4,394	3,859
	USA	All Regions	203	237	256
Total Repositioning		**All Regions**	**10,377**	**8,331**	**7,166**
Total Container Movements from Manitoba			**38,912**	**43,325**	**52,447**

2006 Major Containerized Commodity Flows from Western Canada [52] [53]

Origin Province	Commodity	Percent Total Containerized Exports	Estimated TEUs By Port of Exit		
			Montreal	Halifax	Vancouver
Alberta	Pulp and Paper	21.9%	25	-	34,023
	Animal Feed	21.6%	3,853	63	31,706
	Plastics	16.0%	916	666	25,055
	Milled Grain Products	10.6%	125	118	17,313
	Chemical Products	5.0%	7	-	8,275
	Other	24.9%	19,281	3,692	23,130
		100.0%	**24,182**	**4,540**	**105,480**
Manitoba	Peas, Beans, Lentils & other Special Crops	38.4%	4,334	53	3,000
	Primary or Semi Finished Metals	13.1%	293	40	2,535
	Cereal Grains	10.4%	846	1,493	506
	Machinery	6.8%	-	8	2,752
	Pulp and Paper	6.8%	1,197	-	544
	Other	24.5%	2,184	208	5,468
		100.0%	**8,855**	**1,802**	**14,805**
Saskatchewan	Peas, Beans, Lentils & other Special Crops	66.4%	31,664	88	53,059
	Cereal Grains	7.2%	7,278	3,193	2,627
	Animal Feed	4.0%	76	6	7,183
	Pulp and Paper	4.0%	15	-	6,747
	Milled Grain Products	2.4%	38	20	4,299
	Other	3.4%	544	1,679	5,035
		100.0%	**39,613**	**4,986**	**78,950**
British Columbia	Pulp and Paper	35.3%	452	412	140,656
	Lumber and Panel Products	30.9%	3,909	63	136,475
	Waste and Scrap	9.6%	480	29	47,341
	Logs and Other Rough Wood	7.5%	44	-	37,321
	Chemical Products	6.3%	-	-	26,957
	Other	10.6%	3,284	281	42,639
		100.0%	**8,169**	**785**	**431,389**

[52] TEUs estimated based on Port of Vancouver cargo load factors by commodity grouping
[53] Port of Clearance and Origin Province as defined in Statistics Canada International Merchandise Trade data

Appendix 5 –Containerization of Bulk Products – The example of Grain

Containerization of Freight

Containerized freight movements have grown rapidly in recent years. In particular, some of Canada's bulk products have quickly converted from bulk or breakbulk shipping to containerized shipping. This rapid change has raised questions amongst policy makers as to how much more containerization of freight, particularly exports, is possible. Shippers' decisions on the containerization of freight are driven by cost and service considerations. As the volume of imports of containerized consumer and manufactured goods have risen, it has made available a large pool of low cost empty containers and shipping lines have priced these containers aggressively to provide revenue on their backhaul movements to Asia and Europe. These prices are now well below the competing breakbulk prices for ocean freight for forest products and the breakbulk carriers have removed capacity from the North American markets as the pulp, lumber and panel products shifted to largely containerized movements rather than the breakbulk movements that were dominant a decade ago.

Many shippers point to the most recent increases in bulk shipping rates as the primary reason for their shifting traffic to container. Under the Grain Monitoring Program, Quorum follows the Baltic Dry Index as the indicator of bulk shipping rates worldwide, shown in Figure 51 below. Over the past four years, bulk ocean shipping rates have climbed by over 400%. Driven by the combination of a shortage of bulk vessels and the demand of a vibrant Chinese economy, prices continue to surge higher. It is expected that new ships that were ordered two and three years ago will begin to make their way into the markets later this year, but real relief is not expected until after the completion of the Beijing Olympics in mid 2008.

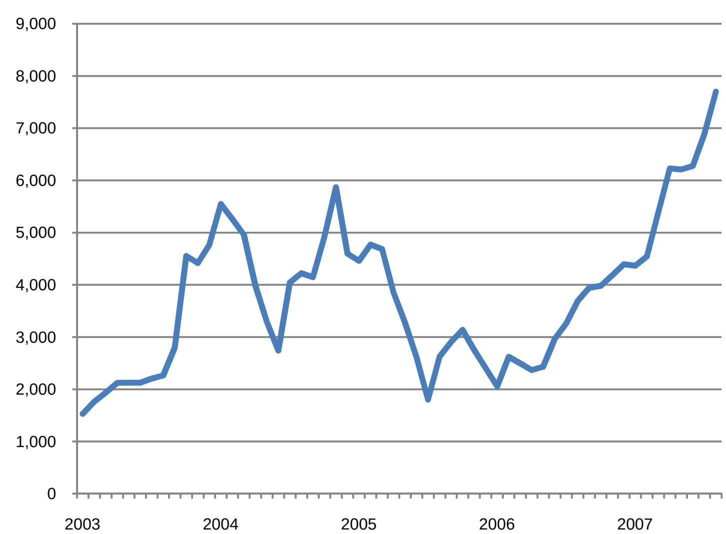


Figure 52- Baltic Dry Index: December 2003 - August 2007[54]

For grain products, the argument is similar however there are important differences as the comparison for bulk cereal and oilseed grains is not to breakbulk but to bulk shipping for the vast majority of the markets for these products.

[54] Source: Grain Monitoring Program, Q3 2006-07 Crop Year Report

There are niche markets for cereal grains that can move in container and specialty crops are more geared to containerized shipment as these products are sold in much smaller lot sizes and often move to receivers who are accustomed to receiving grain in containers.

A considerable amount of discussion has been dedicated to the concept and potential of converting the movement of Canada's resource and agricultural commodities from their traditional bulk mode to a containerized mode. It is argued that grain products could be converted to containerized freight because:

- Grain flows to export port in hopper cars that return to the Prairies empty. Containers move loaded to inland locations and flow back to ports (the opposing direction) most frequently empty. It is believed that the conversion of grain from bulk to container will balance the loaded movements of both these commodity groups.

- A foundation of "convertible" traffic is needed to establish a form of critical mass that will allow for origin traffic growth at inland origins in order to support new inland container terminals

The proponents of conversion suggest that if more grain is converted to move from Prairie origins by container, there will be improved railway capacity utilization as well as an increase in the overall efficiency of the Grain Handling and Transportation System (GHTS).

In reviewing this issue, the Consultant spoke with numerous industry stakeholders - logistics decision makers in particular. The subsequent assessment of the issues revealed a number of barriers to a large scale conversion of grain to containerize movements.

Railway efficiency – In comparing the merits of container versus bulk movement, the most predominant difference between the two approaches is the volume capability of the two kinds of train service. For comparison purposes we examined the characteristics of a typical container or bulk grain train with a length of 6,000 ft [55] and found a considerable difference in the amount of lading each is able to carry. A container train will carry approximately 450 TEUs with an average of lading weight of approx 15.9 tonnes each [56], or a total of 7,800 tonnes per train while a bulk grain train will carry in excess of 10,300 tonnes, a difference of over 32%. This difference will result driving up the average logistics cost/ tonne for the movement of grain and hence reduce margins for both grain companies and producers.

Container line efficiency - The average container ship is designed to a specification for an average lading weight in a container of between 11 and 13 tonnes[57]. The load and balance of a vessel becomes far more challenging when presented with containers that are heavily loaded such as ones containing in excess of 20

[55] Train lengths for trains will typically run between 6,000 and 12,000 feet depending on the route taken, time of year and traffic demand. A reference to 6,000 foot trains is used for the purpose of comparison only.

[56] The equipment preference of most shippers loading grains into containers is the twenty foot high capacity units as they allow for the heaviest loading at approximately 26 tonnes. These units are not always easily available and therefore, forty foot units are utilized. Forty foot units however are restricted to a maximum loading of about 31 tonnes due to their structural capability. The average per TEU on a train is therefore 15.98 tonnes.

[57] The Hanjin Berlin was built in 1997 and has a 5,302 TEU capacity with 67,272 DWT loading capacity or an average of 12.7 tonnes/ TEU.

tonnes per TEU, as is often the case with containers loaded with grain. Further, if a line were to attempt to completely load a ship with this type of traffic it would be necessary to leave up to 25% of its' holds empty in order to compensate for the additional weight, adversely impacting the shipping lines capacity utilization and creating an imbalance in traffic flows (inbound/ outbound)

In practice, container lines will balance the heavier loaded containers with empty or lighter loaded ones, leaving heavier traffic behind in order to ensure a proper balance of movement and a safely loaded vessel. The traffic left behind would place increased pressure on the storage capacity of port terminals that are already constrained, and adding additional costs in the form of storage and rebilling fees.

Port property utilization – The nature of Canada's major ports is such that land space on tidewater is at a premium and comes at a high price. It is crucial that the utilization of that space be managed in the most efficient and effective manner possible.

The design of bulk grain terminals sees product transferred and stored at port in bins that are approximately 40 feet in diameter and upwards of 80 feet tall. The typical grain train carrying 10,300 tonnes will require 4.2 bins, or result in the utilization of slightly less than 5,000 square feet of port tidewater space. Conversely, The 645 TEUs required to carry the same tonnage can be stacked no more than 5 high, and will therefore require more than 20,600 square feet of land, some 4 times more than a bulk train would.

The average storage time for bulk grain at port is likely longer than it would be in the case of a container movement. The average days in store for bulk grain during the 2005-06 crop year was 15 days[58], while it is likely that a turn time for containers at Vancouver would be approximately 10 days. The 30% lower time at port seen in containers would not mitigate the increased land requirement.

Country and port terminal asset investments – Grain companies, railways and the government have made significant capital investments in the country's bulk handling infrastructure (estimated to exceed $5 billion) including the country and port terminal network, the hopper car fleet and the processes that allow them to function. While it would be possible to convert or adapt these facilities to load containers, it would be costly. Further, the location of terminals in the present gathering network would necessitate an increased amount of truck movement in order to position containers at the appropriate inland terminal.

Volume Impact of conversion – Based on current traffic levels, the conversion of bulk grain to containers would likely have an impact of the balance of inbound and outbound flows.

Using the bulk grain traffic currently moving through the Port of Vancouver (2005-06 crop year) as an example, the conversion of all bulk traffic would result in over 583,000 additional containers (TEUs) through the port of Vancouver. The three year average of outbound container movements from the Port of Vancouver is 931,000 TEUs, 222,000 of which are empty. Consequently, the demand for grain would outstrip the availability of empty containers by more than 2 ½ times. If empty containers were brought into Vancouver to meet the additional demand, this would have the effect of increasing the outbound movements by 63%,

[58] GMP Measure 3D-4 – Terminal Elevator and Port Performance, Average Days in Store for the 2005-06 crop year, Vancouver, all grains.

changing the inbound – outbound balance in favour of the outbound as well as placing greater pressure on an already strained port capacity.

	2004-2006 Annual Avg.
Bulk Grain through Vancouver	
Tonnes (000)	12,244
Estimated TEUs (converted)	583,053
All Containers (TEUs)	
OB - Loaded	708,613
OB - Empty	222,594
Total Outbound movement	931,207
% of Empty Supply	262%
% of Total Movement	63%

Table 28 – Calculation of potential TEUs converted from grain bulk movement

While the factors described above will place a ceiling on the growth of containerization for grain, there will be two specific areas that should expect to experience continued growth.

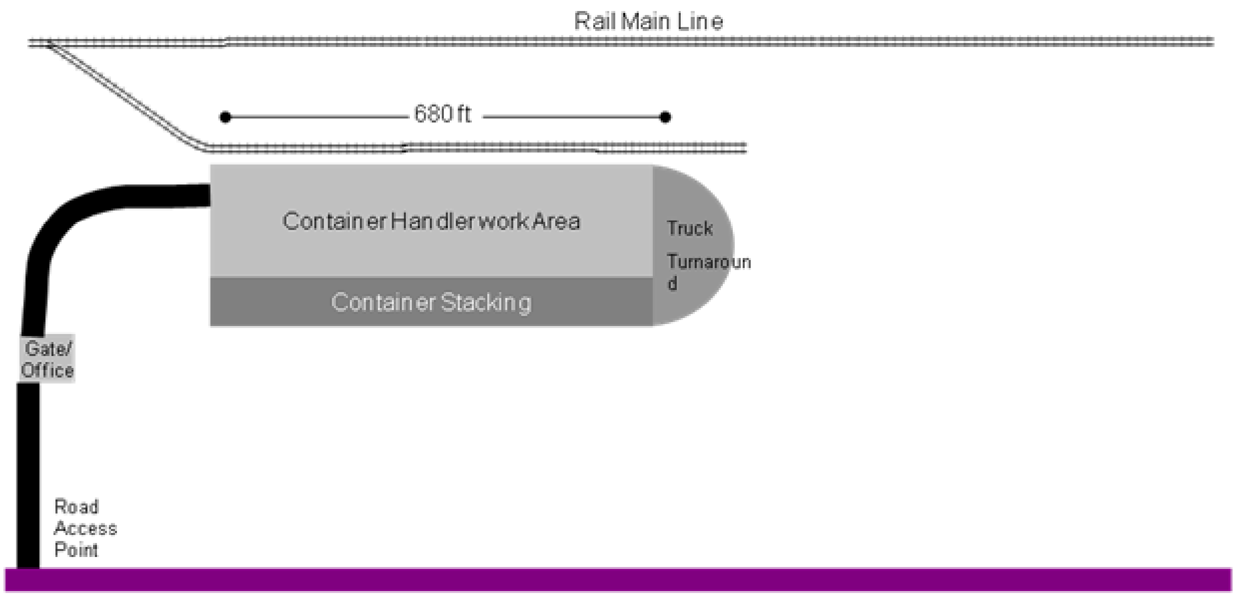
- As markets open in the grain industry for more identity preserved products there will be a demand for smaller, better controlled logistics solutions, and the most effective means of accommodating this is through containerization.
- The most prevalent area of growth continues to be the specialty crops markets, pulses in particular, where sales are typically made in lot sizes less than 10,000 tonnes and not as conducive to bulk movement.

In discussions with other bulk commodity shippers (coal, sulfur, fertilizers etc.), there was no one who could see a potential market of significance that would demand movement by container. Further, China and other major markets for Canada’s bulk commodities have recently invested heavily in port based bulk handling facilities, including grain elevation and oilseeds crushing plants. So long as both buyers and sellers of these products continue to invest in logistics infrastructure that focuses on bulk movement, and the economics of bulk movement continue to favor this mode, no large shift to container movement should be considered as a potential target for growth to container movement.

Appendix 6 – Terminal Schematics

Stand Alone Terminals

Small



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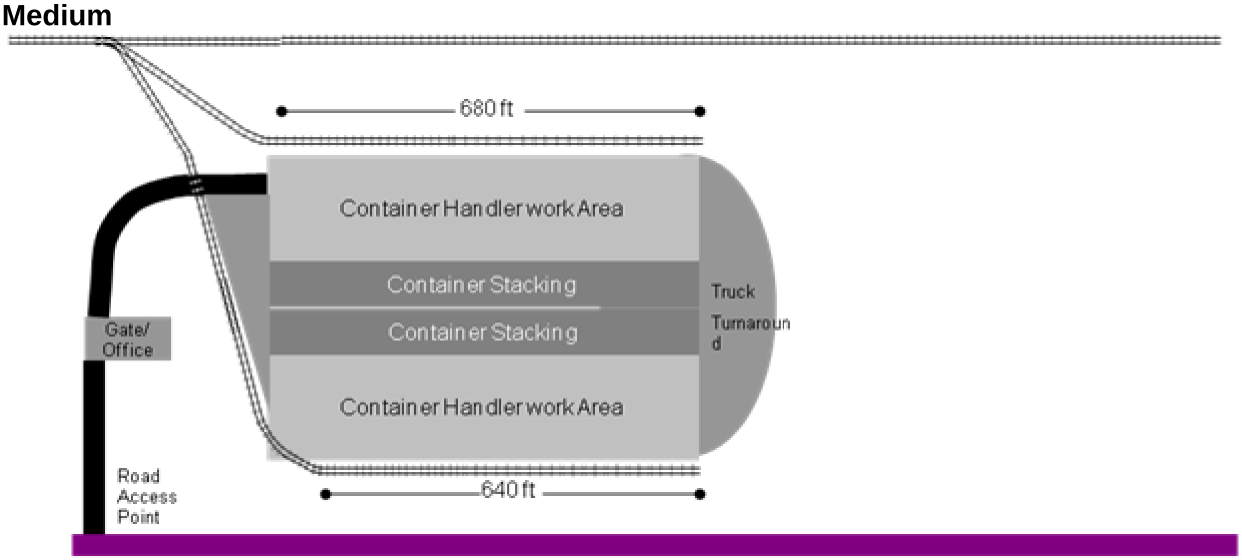
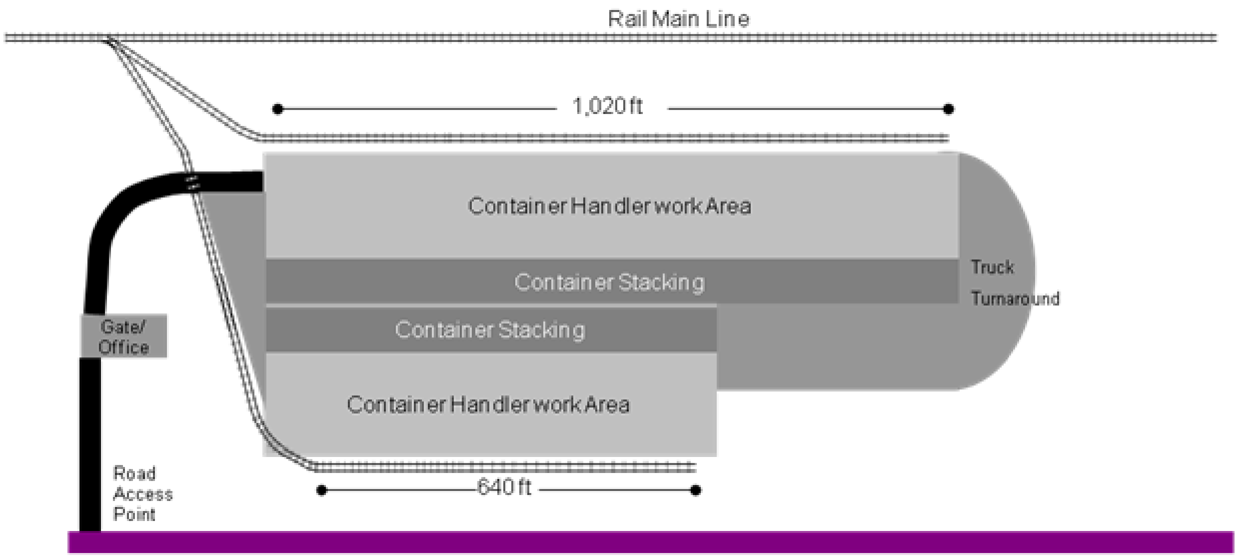


Satellite Terminals

Small



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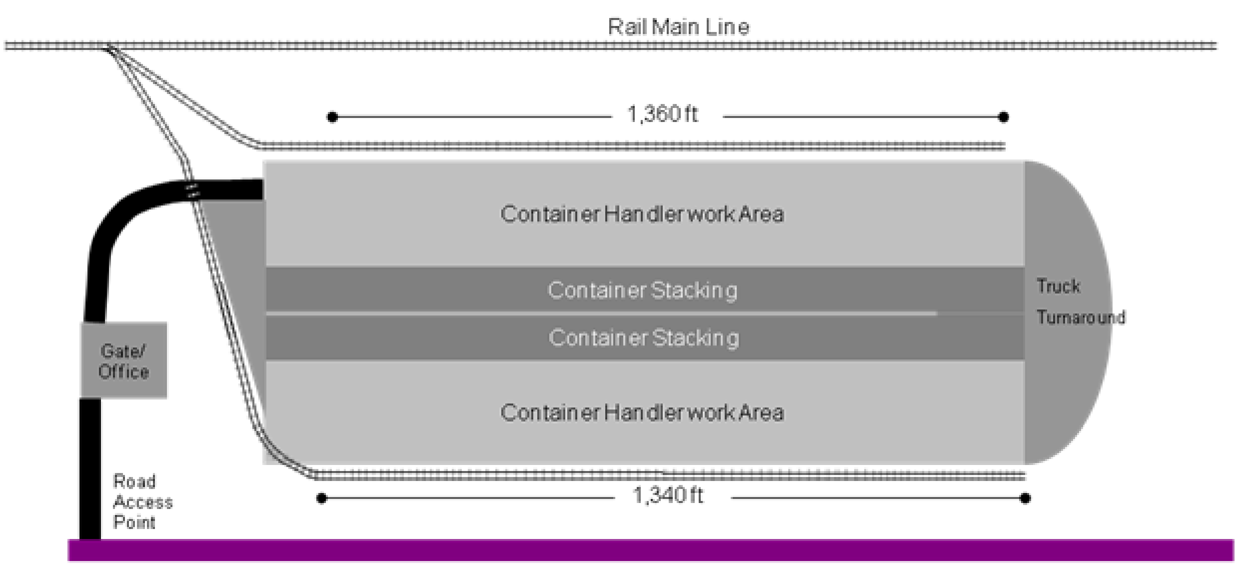
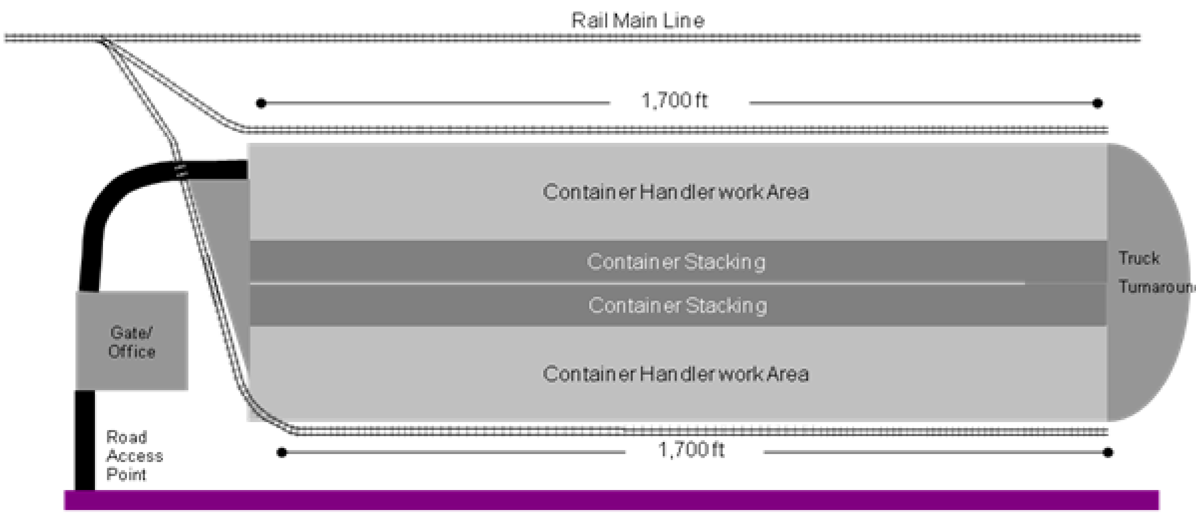


General Purpose Terminals

Small



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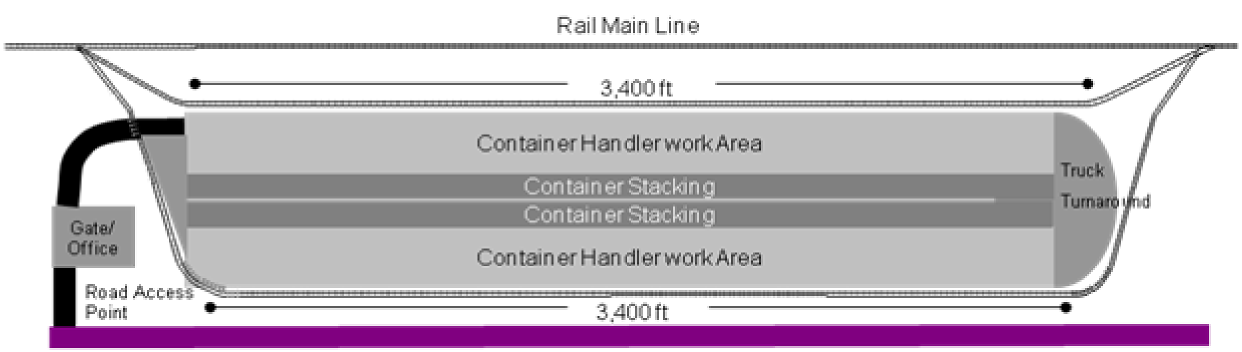
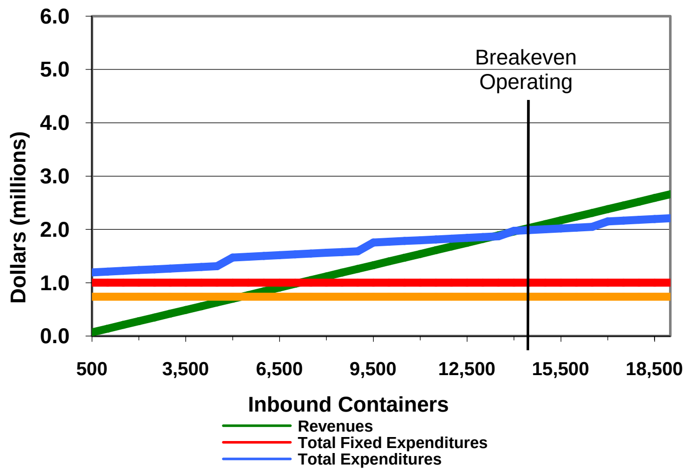


Appendix 7 - ICT Financial Model : Summary Results

Stand Alone Small

Capital Expenditures

	Total
Facility Infrastructure	
Rail Infrastructure	243,070
Land	425,000
Terminal Infrastructure	739,595
Terminal Buildings	38,038
Total Facility Infrastructure	1,445,703
Terminal Equipment	
Yard	593,500
Office	22,500
Total Terminal Equipment	616,000
Total Infrastructure and Equipment	2,061,703
Annual Depreciation	262,424



Volume Dependent Cost Projections

Inbound Containers	**1,000**	**5,000**	**10,000**	**14,500**	**19,000**
Revenues:	140,000	700,000	1,400,000	2,030,000	2,660,000
Variable Operating Expenditures:					
Terminal Operations	143,575	374,677	634,953	834,882	1,034,811
Facility Maintenance	-	-	-	-	-
Equipment Maintenance	-	-	-	-	-
General Administration:	62,820	97,140	131,460	152,052	172,644
	206,395	471,817	766,413	986,934	1,207,455
Fixed Operating Expenses:					
Terminal Operations	5,000	5,000	5,000	5,000	5,000
Facility Maintenance	35,621	35,621	35,621	35,621	35,621
Equipment Maintenance	95,450	95,450	95,450	95,450	95,450
General Administration:	603,800	603,800	603,800	603,800	603,800
	739,871	739,871	739,871	739,871	739,871
Total Operating Expenses:	**946,266**	**1,211,688**	**1,506,284**	**1,726,805**	**1,947,326**
EBITDA:	**-806,266**	**-511,688**	**-106,284**	**303,195**	**712,674**
Depreciation:	262,424	262,424	262,424	262,424	262,424
Operating Income:	-1,068,691	-774,112	-368,708	40,771	450,250

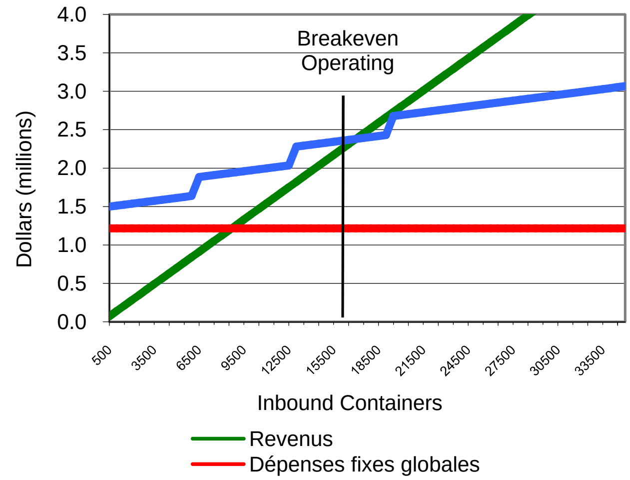
Workload

Containers Received:	1,000	5,000	10,000	14,500	19,000
Containers Handled (TEUs)	2,652	13,260	26,520	38,454	50,388
Container Lifts:	6,300	31,500	63,000	91,350	119,700
Top-lift-Hours:	450	2,250	4,500	6,525	8,550
Fuel Consumption (Imp. Gals.)	6,930	34,650	69,300	100,485	131,670
Labour-Hours:	10,400	16,640	22,880	26,624	30,368
Employees:	5	8	11	13	15
Lifts per 1000 Labour-Hours:	606	1,893	2,753	3,431	3,942

Stand Alone Medium

Capital Expenditures

	Total
Facility Infrastructure	
Rail Infrastructure	593,180
Land	920,000
Terminal Infrastructure	2,276,932
Terminal Buildings	82,340
Total Facility Infrastructure	3,872,452
Terminal Equipment	
Yard	593,500
Office	22,500
Total Terminal Equipment	616,000
Total Infrastructure and Equipment	4,488,452
Annual Depreciation	403,846



Volume Dependent Cost Projections

Inbound Containers	1,000	15,000	17,500	25,000	35,000
Revenues:	140,000	2,100,000	2,450,000	3,500,000	4,900,000
Variable Operating Expenditures:					
Terminal Operations	204,635	915,385	978,193	1,346,129	1,597,360
Facility Maintenance	-	-	-	-	-
Equipment Maintenance	-	-	-	-	-
General Administration:	92,254	199,961	199,961	253,815	253,815
	296,889	1,115,346	1,178,154	1,599,943	1,851,175
Fixed Operating Expenses:					
Terminal Operations	10,000	10,000	10,000	10,000	10,000
Facility Maintenance	98,574	98,574	98,574	98,574	98,574
Equipment Maintenance	60,450	60,450	60,450	60,450	60,450
General Administration:	641,800	641,800	641,800	641,800	641,800
	810,824	810,824	810,824	810,824	810,824
Total Operating Expenses:	**1,107,713**	**1,926,169**	**1,988,977**	**2,410,767**	**2,661,999**
EBITDA:	**-967,713**	**173,831**	**461,023**	**1,089,233**	**2,238,001**
Depreciation:	403,846	403,846	403,846	403,846	403,846
Operating Income:	-1,371,559	-230,015	57,177	685,387	1,834,155

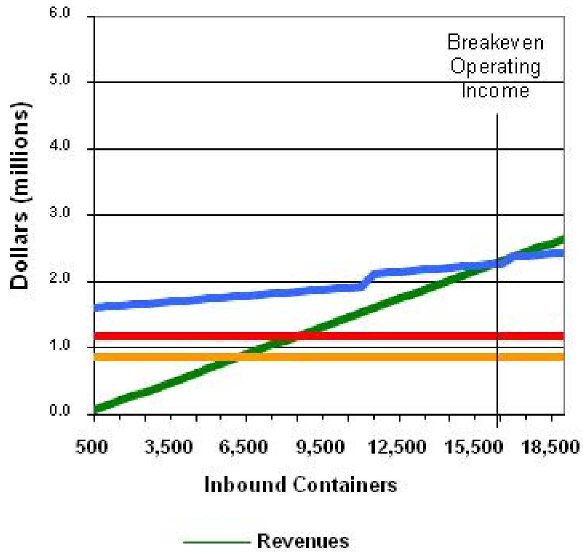
Workload

Containers Received:	1,000	15,000	17,500	25,000	35,000
Containers Handled (TEU):	2,652	39,780	46,410	66,300	92,820
Container Lifts:	6,300	94,500	110,250	157,500	220,500
Top-lift-Hours:	388	5,813	6,781	9,688	13,563
Fuel Consumption (Imp. Gals.)	5,968	89,513	104,431	149,188	208,863
Labour-Hours:	16,224	36,192	36,192	46,176	46,176
Employees:	8	17	17	22	22
Lifts per 1000 Labour-Hours:	388	2,611	3,046	3,411	4,775

Satellite Small

Capital Expenditures

	Total
Facility Infrastructure	
Rail Infrastructure	479,450
Land	590,000
Terminal Infrastructure	987,326
Terminal Buildings	52,805
Total Facility Infrastructure	2,109,581
Terminal Equipment	
Yard	719,380
Office	25,000
Total Terminal Equipment	744,380
Total Infrastructure and Equipment	2,853,961
Annual Depreciation	331,639



Volume Dependent Cost Projections

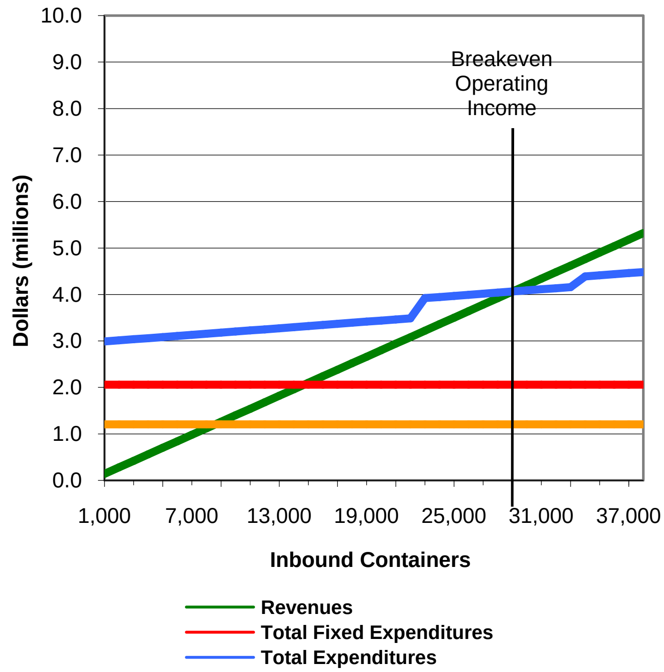
Inbound Containers	1,000	5,000	10,000	17,500	19,000
Revenues:	140,000	700,000	1,400,000	2,450,000	2,660,000
Variable Operating Expenditures:					
Terminal Operations	304,872	426,120	577,680	1,010,940	1,056,408
Facility Maintenance	-	-	-	-	-
Equipment Maintenance	-	-	-	-	-
General Administration:	132,168	132,168	132,168	193,944	193,944
	437,040	558,288	709,848	1,204,884	1,250,352
Fixed Operating Expenses:					
Terminal Operations	5,000	5,000	5,000	5,000	5,000
Facility Maintenance	50,587	50,587	50,587	50,587	50,587
Equipment Maintenance	128,850	128,850	128,850	128,850	128,850
General Administration:	674,800	674,800	674,800	674,800	674,800
	859,237	859,237	859,237	859,237	859,237
Total Operating Expenses:	**1,296,277**	**1,417,525**	**1,569,085**	**2,064,121**	**2,109,589**
EBITDA:	**-1,156,277**	**-717,525**	**-169,085**	**385,879**	**550,411**
Depreciation:	331,639	331,639	331,639	331,639	331,639
Operating Income:	-1,487,916	-1,049,164	-500,724	54,240	218,772

Workload					
Containers Received:	1,000	5,000	10,000	17,500	19,000
Containers Handled (TEUs)	2,652	13,260	26,520	46,410	50,388
Container Lifts:	6,300	31,500	63,000	110,250	119,700
Top-lift-Hours:	450	2,250	4,500	7,875	8,550
Fuel Consumption (Imp. Gals.)	7,200	36,000	72,000	126,000	136,800
Labour-Hours:	23,296	23,296	23,296	34,528	34,528
Employees:	11	11	11	17	17
Lifts per 1000 Labour-Hours:	270	1,352	2,704	3,193	3,467

Satellite Medium

Capital Expenditures

	Total
Facility Infrastructure	
Rail Infrastructure	845,170
Land	1,345,000
Terminal Infrastructure	4,995,955
Terminal Buildings	120,378
Total Facility Infrastructure	7,306,503
Terminal Equipment	
Yard	3,805,600
Office	32,500
Total Terminal Equipment	3,838,100
Total Infrastructure and Equipment	11,144,603
Annual Depreciation	1,601,681



Volume Dependent Cost Projections

Inbound Containers	**1,000**	**10,000**	**19,000**	**30,000**	**38,000**
Revenues:	140,000	1,400,000	2,660,000	4,200,000	5,320,000
Variable Operating Expenditures:					
Terminal Operations	657,266	870,397	1,083,528	1,660,814	2,008,661
Facility Maintenance	-	-	-	-	-
Equipment Maintenance	-	-	-	-	-
General Administration:	272,275	272,275	272,275	367,313	414,832
	929,541	1,142,673	1,355,804	2,028,128	2,423,493
Fixed Operating Expenses:					
Terminal Operations	5,000	5,000	5,000	5,000	5,000
Facility Maintenance	225,845	225,845	225,845	225,845	225,845
Equipment Maintenance	232,450	232,450	232,450	232,450	232,450
General Administration:	740,800	740,800	740,800	740,800	740,800
	1,204,095	1,204,095	1,204,095	1,204,095	1,204,095
Total Operating Expenses:	**2,133,636**	**2,346,768**	**2,559,899**	**3,232,223**	**3,627,588**
EBITDA:	**-1,993,636**	**-946,768**	**100,101**	**967,777**	**1,692,412**
Depreciation:	855,041	855,041	855,041	855,041	855,041
Operating Income:	-2,848,677	-1,801,809	-754,940	112,736	837,371

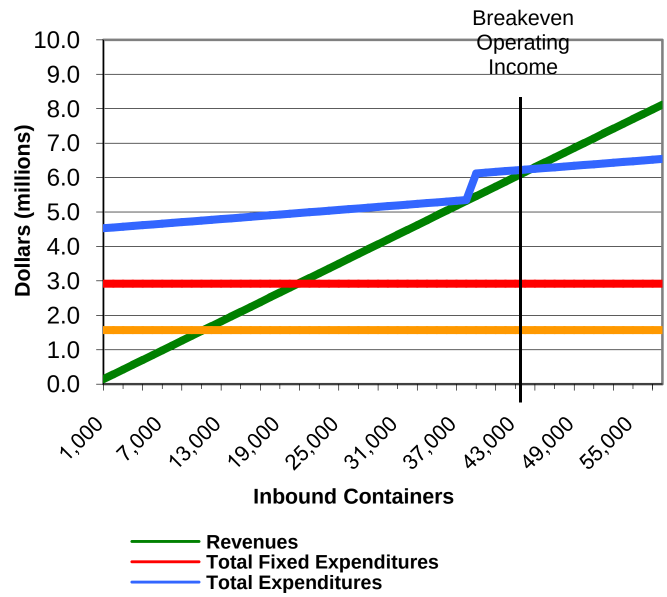
Workload

Containers Received:	1,000	10,000	19,000	30,000	38,000
Containers Handled (TEUs)	2,652	26,520	50,388	79,560	100,776
Container Lifts:	6,300	63,000	119,700	189,000	239,400
Top-lift-Hours:	450	4,500	8,550	13,500	17,100
Fuel Consumption (Imp. Gals.)	5,625	56,250	106,875	168,750	213,750
Labour-Hours:	49,504	49,504	49,504	66,976	75,712
Employees:	24	24	24	32	36
Lifts per 1000 Labour-Hours:	127	1,273	2,418	2,822	3,162

General Purpose Small

Capital Expenditures

	Total
Facility Infrastructure	
Rail Infrastructure	1,195,280
Land	1,840,000
Terminal Infrastructure	6,696,060
Terminal Buildings	164,680
Total Facility Infrastructure	9,896,020
Terminal Equipment	
Yard	2,444,500
Office	32,500
Total Terminal Equipment	4,392,500
Total Infrastructure and Equipment	14,288,520
Annual Depreciation	1,347,794



Volume Dependent Cost Projections

Inbound Containers	1,000	20,000	40,000	45,000	58,000
Revenues:	140,000	2,800,000	5,600,000	6,300,000	8,120,000
Variable Operating Expenditures:	-	-	-	-	-
Terminal Operations	1,180,147	1,600,094	2,621,166	2,731,679	3,019,011
Facility Maintenance	-	-	-	-	-
Equipment Maintenance	-	-	-	-	-
General Administration:	431,713	431,713	605,420	605,420	605,420
	1,611,860	2,031,807	3,226,586	3,337,099	3,624,431
Fixed Operating Expenses:	-	-	-	-	-
Terminal Operations	45,000	45,000	45,000	45,000	45,000
Facility Maintenance	288,681	288,681	288,681	288,681	288,681
Equipment Maintenance	527,450	527,450	527,450	527,450	527,450
General Administration:	707,800	707,800	707,800	707,800	707,800
	1,568,931	1,568,931	1,568,931	1,568,931	1,568,931
Total Operating Expenses:	**3,180,791**	**3,600,738**	**4,795,517**	**4,906,029**	**5,193,362**
EBITDA:	**-3,040,791**	**-800,738**	**804,483**	**1,393,971**	**2,926,638**
Depreciation:	1,347,794	1,347,794	1,347,794	1,347,794	1,347,794
Operating Income:	-4,388,585	-2,148,532	-543,311	46,177	1,578,844

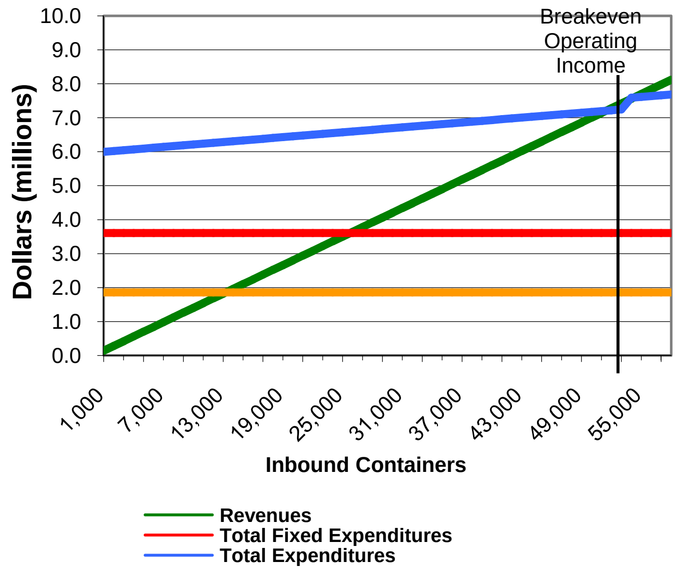
Workload

Containers Received:	1,000	20,000	40,000	45,000	58,000
Containers Handled (TEUs)	2,652	53,040	106,080	119,340	153,816
Container Lifts:	6,300	126,000	252,000	283,500	365,400
Top-lift-Hours:	450	9,000	18,000	20,250	26,100
Fuel Consumption (Imp. Gals.)	5,250	105,000	210,000	236,250	304,500
Labour-Hours:	78,624	78,624	110,656	110,656	110,656
Employees:	38	38	53	53	53
Lifts per 1000 Labour-Hours:	80	1,603	2,277	2,562	3,302

General Purpose Medium

Capital Expenditures

	Total
Facility Infrastructure	
Rail Infrastructure	1,922,260
Land	2,830,000
Terminal Infrstructure	10,244,220
Terminal Buildings	1,009,895
Total Facility Infrastructure	16,006,375
Terminal Equipment	
Yard	2,444,500
Office	32,500
Total Terminal Equipment	2,477,000
Total Infrastructure and Equipment	18,483,375
Annual Depreciation	1,745,248



Volume Dependent Cost Projections

Inbound Containers	1,000	15,000	30,000	45,000	51,000	58,000
Revenues:	140,000	2,100,000	4,200,000	6,300,000	7,140,000	8,120,000
Variable Operating Expenditures:						
Terminal Operations	1,759,169	2,068,604	2,400,141	2,731,679	2,864,294	3,019,011
Facility Maintenance	-	-	-	-	-	-
Equipment Maintenance	-	-	-	-	-	-
General Administration:	632,720	632,720	632,720	632,720	632,720	632,720
	2,391,889	2,701,324	3,032,861	3,364,399	3,497,014	3,651,731
Fixed Operating Expenses:						
Terminal Operations	45,000	45,000	45,000	45,000	45,000	45,000
Facility Maintenance	455,291	455,291	455,291	455,291	455,291	455,291
Equipment Maintenance	572,450	572,450	572,450	572,450	572,450	572,450
General Administration:	785,800	785,800	785,800	785,800	785,800	785,800
	1,858,541	1,858,541	1,858,541	1,858,541	1,858,541	1,858,541
Total Operating Expenses:	**4,250,430**	**4,559,865**	**4,891,402**	**5,222,940**	**5,355,555**	**5,510,272**
EBITDA:	**-4,110,430**	**-2,459,865**	**-691,402**	**1,077,060**	**1,784,445**	**2,609,728**
Depreciation:	1,745,248	1,745,248	1,745,248	1,745,248	1,745,248	1,745,248
Operating Income:	-5,855,677	-4,205,112	-2,436,650	-668,187	39,198	864,480

Workload

Containers Received:	1,000	15,000	30,000	45,000	51,000	58,000
Containers Handled (TEUs)	2,652	39,780	79,560	119,340	135,252	153,816
Container Lifts:	6,300	94,500	189,000	283,500	321,300	365,400
Top-lift-Hours:	450	6,750	13,500	20,250	22,950	26,100
Fuel Consumption (Imp. Gals.)	5,250	78,750	157,500	236,250	267,750	304,500
Labour-Hours:	114,816	114,816	114,816	114,816	114,816	114,816
Employees:	55	55	55	55	55	55
Lifts per 1000 Labour-Hours:	55	823	1,646	2,469	2,798	3,182

Appendix 8 - Terminal Development Checklist

Preliminary Checklist for a Successful Terminal Operation

Attribute	Comments
Service Providers	
Shipping lines • Have the shipping lines made an absolute commitment to the provision of empty containers through direct routing of empties or by supporting railways and forwarders in the use of their equipment in DRP movements? • Have they committed to utilizing the facility for storage, servicing and trans-loading of their containers to consolidate sufficient volume?	*The vast majority of international containers in the world are owned and managed by shipping lines. As they are not subject to regulatory conditions such as common carrier obligations, it is essential that the business and market conditions are such that they gain and retain an interest in serving the area*
Railways • Have the serving railway(s) agreed to partner with and fully support the ICT initiative • Have the serving railway committed to be fully involved in the design and development of the ICT and its associated processes? • Has the serving railways committed to a long term relationship that includes providing train service to the terminal and are they willing to commit the resources of their system network and its associated terminals in support of the traffic generated by the ICT?	*Railways are the most integral participant in any Inland Container related project. This is particularly true when significant distances to tidewater are at issue, as is the case with almost all Canadian traffic origins.* *It is also important to recognize the fact that the establishment of any inland operation served by rail will require an investment by the serving railway of at least 2 times the cost of terminal construction.*
Network	
• Has an assessment been undertaken by both the serving railway and the proponent of the terminal that considers the inbound and outbound traffic and its impact on its origin/ destination terminals operations?	*This is to ensure that the terminal network has the capability and capacity for continued servicing of the traffic and the terminal, and that the terminal and its proposed traffic base fit within the over traffic base of the network* *Inland Container Terminals are not and cannot be viewed as standalone enterprises. They are, in fact, part of systems networks and are vertically integrated both in their operational characteristics and in their place in the greater marketplace*

Traffic

Source

- Is the traffic that is expected to flow through the terminal incremental to and not a diversion from existing railway intermodal terminals in other locations?
- Is any traffic that is contemplated in the traffic analysis contemplated for conversion from an existing rail mode? If so, does that conversion generate true incremental market value (i.e. identity preservation) as opposed to short term, rate related margins? If the latter is the case, it should be excluded from the analysis and not be considered a benefit to the project.

Terminals are established to serve the traffic that will flow through them. A balance between the terminal providing the traffic with a "value added service" and the traffic providing a value to the terminal and the network it is a part of, must be established.

For example, if the traffic creates an imbalanced flow within the network, or originates from or is destined to locations where incremental costs of handling are incurred, the potential of creating a heavy burden on other traffic flows is significant.

Pricing and Economics

- Has an assessment of the freight rate pricing of the traffic been undertaken so as to ensure that sufficient margins exist to cover the capital costs of terminal construction and incremental operating costs on the railway network?
- In the development of the project economics, has the cost of repositioning empty containers (if deemed a requirement) been reflected as part of the terminal operating costs and incorporated into the cost analysis for specific traffic flows?
- Has an assessment of potential area of market risk been completed?
- Have major traffic flows been identified and a contingency plan for the potential loss of large block traffic been developed provided?

It is essential that the creation of a terminal add value to the system, and reduce the overall cost of moving goods to their destination. Any costs incurred, whether they be capital or incremental operating costs (such as the repositioning of empty containers) should be offset by at least the value of moving the freight in this manner. If it does not, other options must be explored.

All traffic flows are subject to a variety of risk. It is important that a diversity of traffic be secured in order to mitigate risk. It is equally important that contingency plans for both surges and periods of low volumes be addressed from both a financial and operational perspective.

Design

Location

- Is the terminal located such that nearby access to railway mainlines is available as well as clear and unconstrained access to major road and highway thoroughfares?
- Has the size, number of employees and operations and capital costs been prepared in detail?
- Does the location being considered have adequate access to equipment and maintenance

As is the case with the ICT's association within a network of terminals, it's location's proximity to the market it serves is imperative, as is the ease with which service providers can gain access to it.

services?

Government Participation and Support

Provincial governments

- Does the project require that the provincial government be involved and supportive of the concept, through the initial planning stages and the implementation?
- Where access to provincial highways and roadways are involved, have the proper provincial authorities been consulted have they become involved in the access and egress planning of the site?

In addition to easing the processing of the necessary regulatory approvals, the support of provincial government agencies will be required to implement road and highway access to those routes under the control of the provincial regulators.

Local/ Municipal

- Because of the cross commodity and multi disciplinary nature of an ICT, have local economic development groups become active participants and promoters of the project?
- Where access to municipal highways and roadways are involved, have the proper authorities become involved in the access and egress planning of the site?

As is the case with provincial regulators, the participation and support of Municipal governments will aid in the processing of the necessary regulatory approvals.