Evaluating Export Container Pooling Options in MN, WI, and MI's Upper Peninsula

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Preface

Project Objectives: The objective of this proposed research was to investigate the issues that limit containerized exports from Minnesota, Wisconsin, and the Upper Peninsula (UP) of Michigan. This effort will catalog best practices in other regions and explore adopting those practices for the Upper Plaines States. Exporters in portions of the study area such as the Twin Cities, the Fox River Valley, Warsaw metropolitan area and the Twin Ports are put at a competitive disadvantage when they are unable to obtain containers at a reasonable cost for their exports.

Project Abstract: Research was undertaken to investigate the issues impacting the expansion of containerized cargo in Wisconsin, Minnesota and the Upper Peninsula of Michigan. Best practices in container pooling, load matching, inland ports and electronic tracking were assessed. Interviews were conducted with key stakeholders to determine regional anomalies. Regional intermodal terminals and depots were cataloged and selective ones toured. Proposals were made for adopting best practices. Outreach to the stakeholders in the region on the results of the study was undertaken.

Task Descriptions:

Task 1 – Research best practices, such as container pooling, and load matching systems in other regions and catalog the successful systems for applicability to the study region.

Task 2 – Interview shippers, intermediaries, and carriers in the study region about the issues in export container availability, estimate demand.

Task 3 – This task will develop recommendations for adopting best practices to increase the availability of export containers in the study region.

Task 4 – Outreach events will be scheduled to promote industry dialogue. The study results (both positive and negative) will be presented to the Intermodal Association of North America, Intermodal Association of Chicago, the Twin Cities Transportation Club, TRB and other industry association meetings, and other interested industry gatherings.

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1. Executive Summary:

Containerization has revolutionized the shipping industry and coupled with advance communications technology the global supply chain industry has helped connect suppliers, manufacturers and consumers in an effort to reduce costs. However there is still room for improvement, as approximately 20% of all International Standards Organization (ISO) container moves at sea are empty and network users of these empty ISO containers spend approximately $7 billion annually to reposition ISO containers from delivery locations to the next user.

The U.S. National Export Initiative along with a weaker dollar has ignited an interest in exporting. Agriculture exporters have found that many consumers in other nations do not have storage for bulk shipments and containers have become a preferred solution. For manufactures, the National Export Initiative (NEI) has helped identify new markets and funding for trade missions and training programs but has fallen short in helping exporters physically move product overseas. There are many government programs to help exporters with trade missions and resources to find new markets, banking and contract assistance. The government has provided limited resources that are available or linked to the NEI to help identify export container availability to facilitate the physical movement of goods.

The research was undertaken to find out the reasons why container shortages were occurring in the study region of Wisconsin, Minnesota and the Upper Peninsula of Michigan and to provide options for improving ISO container availability. Through literature reviews, interviews, and terminal visits the researchers found that in the study region implementation of the NEI is hampered by a shortage of ISO containers available for export due to the following reasons:

1. Consolidation of intermodal terminals with closures of several small intermodal terminals in Wisconsin and Minnesota.
2. The limited container depots in the study region, reduces the number of "free" containers.
3. Increased reliance on large intermodal terminals (Inland Ports) in Chicago by ocean carriers in an effort to reduce the time an ISO container is not in use. This resulted in long and expensive drays for exporters in the study region.
4. Ocean Carriers have made an effort to exit the chassis business and have simplified their inland networks to improve asset utilization and equipment turn times. Many of the

inland market customers were rationalized or lost international container service, forcing a shift to transload operations where import loads are unloaded at the coasts, in many cases mixed and reloaded in domestic 53' containers or trailers. The increased transshipment of ocean containers closer to the ocean ports of entry has reduced the inland flow of ISO equipment for export use.

5. The loading of ISO containers with grain has expanded in the study region creating a demand for available ISO containers to move low unit value exports. Another challenge with export grain is the potential problems caused by heavy or overweight containers moving on highways. Rail and marine carriers face difficulties in maximizing their asset utilization when provided with too many heavy grain containers. The carriers would like to receive a balance of both heavy and less dense container loads.
6. The final challenge that reduces the movement of export containers in the region is the potential for ISO containers being "lost" or spending an inordinate amount of time during the loading. The time delays are often caused by long one way drayage or a lack of lane balance. Depots, drayage firms, terminals, transload centers and warehouses in the region all endeavor to optimize the existing system but there is room for improvement. There are both public and private tracking systems to help in locating empty containers. These systems are not universally adopted or consistently used by all stakeholders creating a container location black hole.

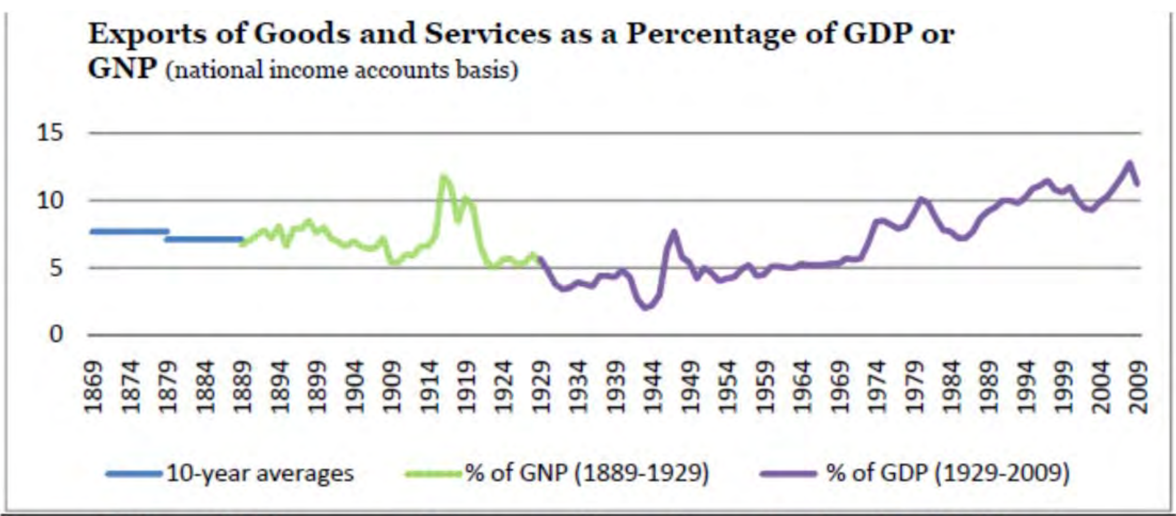
The study recommends that while there are barriers to change, tools and resources are available to identify equipment availability and these should be adopted. In a dynamic market, training and education could help to improve equipment visibility in the region.

To improve the supply of containers for export in the study region the study also recommends the establishment or expansion of a few select new intermodal freight terminals that could help export markets gain access to equipment. Establishing new terminals has historically been the decision of the rail carrier based on network transportation needs, train schedules, equipment balance, market demand and other competitive factors. There appears to be some opportunities in the Green Bay and Twin Cities regions for either new terminals or the expansion of existing terminals. Development of these terminals will require close coordination between all parties and a clear business plan that enables a reasonable return on investment for all parties involved.

2. Background:

In the Mid 1950's Malcom McLean revolutionized the transportation industry with the working concept of containerized transportation. This concept improved terminal productivity, reduced the time it took to load and unload ships and reduced loss and damage in the supply chain. The U.S. Navy perfected the concept with standardization of container sizes during the Viet Nam War and containerization began to be adopted worldwide. The U.S. National Export Initiative was launched by President Obama as a means to try to balance trade and reduce international debt payments. The program made great effort to provide training to new exporters, along which provided trade missions and financial assistance. The actual export shipping process was not addressed. As a new generation of export opportunities are being developed there will need to be a transportation system that provides sufficient ISO containers for an increase in containerized export cargo.

In a global market place exporting is essential for American business, expanding jobs and economic growth. In 2008, U.S. exports represented record levels of GDP (12.7%) and the greatest share of employment on record (6.9% of fully employed workers). Not since the beginning of the 1930s has America focused as intensely upon increasing levels of exports. Exports will play a vital role in economic recovery by increasing employment and creating strong, sustainable economic growth. **Figure 1** illustrates the trends in exports with a sharp downturn brought about by the recent recession.



Source: Tschetter, U.S. Department of Commerce, "Exports Support American Jobs," 2010, p. 3.

Figure 1: Export Goods and Services as a Percentage of GDP

Containerization has played a dual role in global trade and has often been credited with shrinking the world while at the same time increasing global trade volumes. The U.S. has historically imported more cargo by containers than it exported so, in theory, there should be a surplus of containers available to be loaded with export cargo. Recent changes in currency exchange rates have proved favorable for the U.S. exporters and products. These changes have increased the demand for export cargo and for containers to move exports. In the coastal port cities, container freight stations, distribution and load centers exist to unload and reload ISO containers. These facilities help keep the international containers close to deep water ports and improve container asset utilization by keeping containers closer to vessels.

Since the U.S. Midwest is located over one thousand miles from the major U.S. container ports on the east coast and two thousand miles from west coast ports, an extensive rail-truck intermodal system evolved to efficiently move containers by rail from the gateway ports to inland load centers (**see Figure 2**). From the intermodal terminals in the heartland the import containers are typically drayed by trucks to their final destinations. Chicago is a prime example of an inland terminal where the east and west railroads of the U.S. meet along with Canadian railroads. In 2010, the intermodal terminals in the Chicago region handled over six million containers as measured by lifts (PFLLC, 2012). A lift is the movement of containers from one mode to another within a terminal. Once the containers are empty, they are available to be loaded for export cargo. Unfortunately, import and export markets are not necessarily located in the same region. Exporters in the upper Midwest have reported that they are unable to obtain a sufficient number of containers to load with export products.

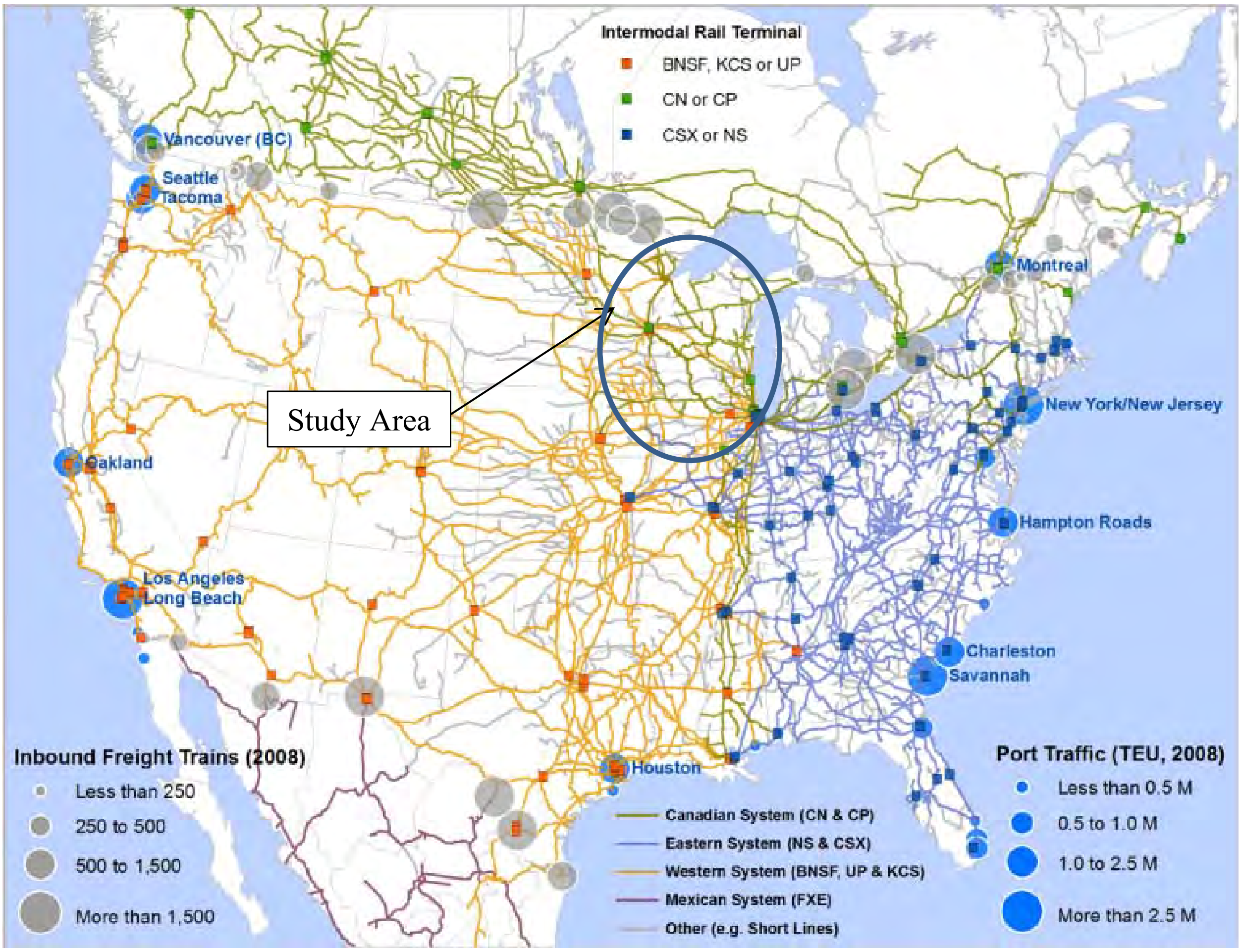


Figure 2: The Intermodal Network of Ports, Trains and Terminals

Source: Dr. Jean-Paul Rodrigue, Dept. of Global Studies & Geography, Hofstra University, New York, USA. Used with permission:

Within or close to the study region, major intermodal terminals are located in the Twin Cities, Detroit, and Chicago, (Stewart, et al, 2003). At the start of this study, Milwaukee had a small intermodal terminal served by CP railroad, but the facility was closed in September 2012. CN established a small intermodal terminal in Chippewa Falls, Wisconsin in February 2012. Intermodal terminals in the Fox River Valley metropolitan area and Stevens Point, Wisconsin were closed in 2004-5 not long after the regional carrier Wisconsin Central was acquired by a Class I railroad, (Stewart et.al. 2007).

Ocean carriers have made an effort to speed up container cycle times and as rail rates have increased, there has been an attempt to limit service to inland terminals in an effort to keep ISO containers closer to the ocean ports. Where service to inland intermodal terminals is justified, ocean carries who own ISO containers restrict how far the containers can move away from the terminal to keep turnaround time to a minimum.

Growing concern over the safety and maintenance of container chassis has resulted in the Federal Motor Carrier Safety Administration (FMCSA) enacting legislation to require motor carriers to prepare and transmit a driver-vehicle inspection report (DVIR) to the intermodal equipment provider at the time the equipment is returned to the terminal or depot, even when no damage, defects, or deficiencies are noted. Chassis management and increased regulatory action focusing on equipment and drivers, has further limited container availability in the U.S. Finally, highway truck size and weight regulations differing between states has created another barrier to moving dense export products by truck to distant terminals, (Rempel, et al., 2012).

Containerized intermodal exports can accomplish several important objectives for states struggling to manage their highway capacity in the face of ever-increasing demands on transportation systems. The strategic use of intermodal rail transport along corridors where freight shipment on highways have become congested, can take pressure off the highway system. Environmental benefits can accrue by diminishing the need to expand the highway system through better-utilization of the existing transportation infrastructure.

Operating a rail/highway intermodal system for export purposes requires that suitable ISO containers be available for exporters to load cargo. Without export containers the cargo must be trucked to a container freight station that may be located on the coast where the truck will be unloaded and the cargo will be transferred into an export container. Alternatively, if volume of the export product is sufficient, railcar shipments may also be made to the coast for transfer to ship or container. This cargo will incur the expense of double handling and possible damage and the additional costs create an economic disadvantage in marketing exports from the study region, (Midwest Shippers, 2010). Repositioning empty containers to the underserved markets and returning loaded containers to intermodal hubs at an economically viable price is a challenge that has been addressed in other regions and this report examines some of those processes.

3. Factors that Impact Container Availability:

There are many economic and contractual factors which impact container availability. Some examples include: market balance, commercial contracting terms, empty repositioning costs, transloading, intermediate equipment depots, and equipment visibility.

Container Economics:

Shipping containers were developed to improve the operation of the marine portion of supply chains by reducing port costs, liability for loss and damage. Containerization of cargo increases vessel asset utilization by reducing port time and streamlines cargo handling across all modes of transportation. Carriers have used the container as a tool to encourage shippers to move more cargo on vessels and wherever possible pass the cost of containers on to the shipper. The overriding function of a container system is to generate revenue for the ocean carrier. Historically the ocean carrier motivation was focused on the headhaul or the importer and in an ideal world the cost of empty equipment repositioning is built into the headhaul price. Many ocean carriers also focus on providing service for markets which have some prospect for a balanced flow of imports and exports. In the mid 2000's many ocean carriers rationalized the number of rail served inland market locations due to the increased rail costs of empty repositioning and to achieve economies of scale. The container used for international shipments has evolved to meet market requirements while conforming to ISO standards of construction. There can be many variations in container design and to a lesser degree, size. Intermodal Containers are divided into domestic and international categories. Domestic containers are typically 48' or 53' long. The majority of ISO containers currently in use are 20 feet or 40 feet long. Industry convention lists ISO container capacity as Twenty-foot Equivalent Unit (TEU) or Forty-foot Equivalent Unit (FEU).

Containers can be made available at depots that may or may not be part of a rail or marine intermodal yard. Marine carriers may have arrangements where they use, for a fee, each other's containers provided that each carrier retains market share and does not compete with themselves. Carriers and/or large shippers may lease containers to meet demand however the asset ownership decision is complex. An ideal container system would provide just the right amount of containers for import and export cargo in a reliable and timely manner. Nevertheless, many factors can adversely impact a "Goldilocks" scenario.

All parties want to minimize capital and operational expenses related to owning and using containers and maximize the utilization of their assets. For every container aboard ship, there needs to be containers ashore being loaded and in transit from the various destinations. The number of total containers needed is dependent upon the frequency the ship calls at a port and the average container turnaround time. Container turn-around time is a composite of port time, load and unload time, and the distance that the containers move inland away from an ocean port. The impact of these factors on the total number of containers needed was recognized very early in the intermodal trade. In the late 1970s a heuristic formula was developed by Atkins that used past experience to determine the total containers needed to service a vessel. In Atkins' formula the vessel's capacity measured in TEUs is multiplied by the average container turnaround time in days and further divided by a vessel's port call schedule measured in days. The outcome equals the total TEUs needed for service, (Atkins, 1982).

Using this formula, a steamship company with a vessel calling every 15 days with a 20 day average container turnaround time and loading allocation (capacity) of 10,000 twenty-foot containers (TEUs) per vessel would require 13,333 twenty foot containers on hand to service their customers.

10,000 TEUs capacity vessel x 20 days container turnaround /15 day port call = 13,333 TEUs

For every day that the average container turnaround time is increased for this vessel another 667 TEUs are needed. Interestingly lowering the number of days between port calls by speeding up vessel transit time increases the overall system capacity, but it also increases the need for containers unless container turnaround time is also reduced.

10,000 TEUs capacity vessel x 20 days container turnaround /10 day port call = 20,000 TEUs

In other studies investigating container movements, Branch listed the cost of providing containers, the imbalance of loads and repositioning as operating costs of ocean carriers, (Branch, 1998). Stopford's research also included the container turnaround time and empty repositioning as part of the equation in determining carrier costs, (Stopford, 2004). A recent study found that if a container moved inland from the port of Vancouver, that same container's ability to make transpacific roundtrips dropped from eight to six per year, (Rodrique, 2012). All parties involved with the cost of providing containers are interested in reducing the turnaround time.

The calculations to determine total container fleet sizes have become more sophisticated, but the core variables remain the same. If the container turnaround time is increased with other factors remaining constant, then the total number of containers needed and carrier costs increase. Coupled with the capital cost of containers themselves, considerations on additional expenses for more chassis, storage space, licenses, fees, maintenance, drayage, and tracking costs must be considered. The actual price for a shipping container is market driven with most containers manufactured in Asia. The cost of a new base model dry box, twenty-foot container was approximately $3,000 FOB in 2012, (Shipping Containers, 2012). At the cited price the purchase cost for the extra 3,333 containers above the vessel's 10,000 capacity, without including finance charges, would be $1 Million. Shipping lines are deploying an ever increasing amount of capacity (as measured in terms of TEUs) and a 2011 study reported that the U.S. container capacity has grown from 51,757,000 TEUs in 2002 to 76,792,000 TEUs in 2010, a 48% increase of 25 million TEUs, (Chambers, 2011).

Keeping unnecessary container costs down are critical for the carriers. Container vessel operators are facing difficult financial times with overcapacity, increasing fuel costs, new emission and chassis regulations, increased rail rates for the intermodal leg, and stagnant economic growth, (Bloomberg, 2012). Some ocean providers are now using vessels in the 15,000 TEU range. As the ocean carriers employ larger vessels in an attempt to improve productivity and reduce ocean line haul cost per container, they are also adopting measures to reduce the number of containers in use that are not generating revenue. Many carriers are restricting the movement of containers to within 100 miles of the port of discharge, in an effort to assure the container returns to the vessel in a timely manner. This restriction also helps reduce asset cycle time, inland equipment management, workforce requirements and rail transportation costs. Every container movement, loaded or empty, results in a transportation cost; regardless if the container moves by rail, truck or water. Depending on lane and distance, some repositioning costs can be expensive.

There is little literature on actual container shipping costs in the U.S., as most cost data is considered proprietary. However, in Australia, the Sea Freight Council developed an interesting graph that sheds light on the breakpoints between truck and intermodal transportation (**Figure 3**).

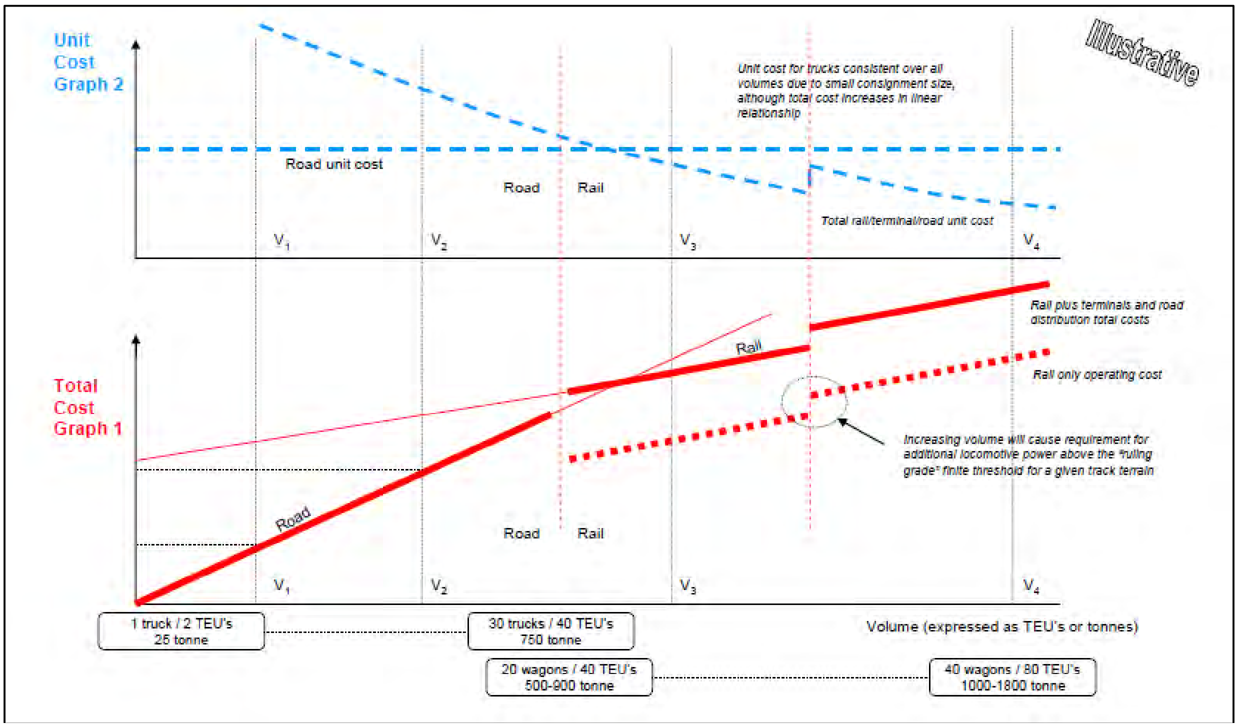


Figure 3: Generic Volume, Cost and Unit Relationships

Source: Generic volume, total cost and unit cost relationships for road and rail in Australia (**http://www.transport.nsw.gov.au/sites/default/files/b2b/publications/SFCNSW-Regional-Intermodal-Terminals-Sea-Freight-Council.pdf**)

Figure 3 illustrates that for each import and export there is an empty leg associated with the movement. Theoretically, if the empty legs could be filled with export cargo the round trip economics would be improved, yet the problem is to identify where in the shipment cycle the empty equipment is at a specific time. This simplistic flow model assumes that there are no delays in the system requiring the container to be removed from the drayage truck(s) between the marine terminal and the other two nodes. In fact if cargo is not available for the container it may be stored while the motor unit and/or chassis is used for other loads.

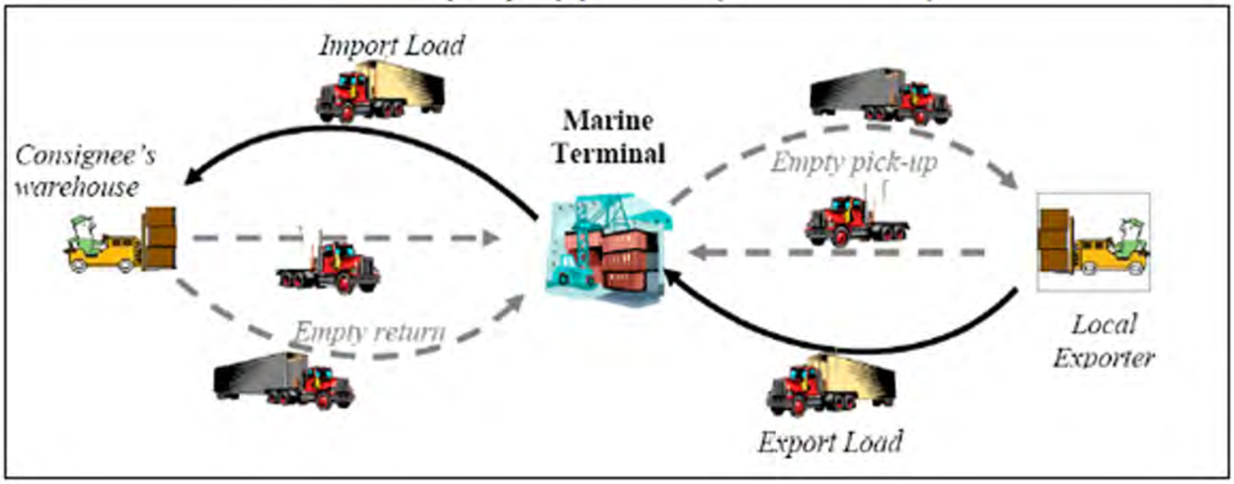


Figure 4: The Empty Equipment Cycle Source: Le dam Hanh 2003

Container Ownership:

Ocean carriers own and manage their own fleet of equipment. According to Drewry there are about three times as many ISO containers as ocean vessel slots. This would imply that at any given time there should be equipment on the ground loaded, about to be unloaded, or empty. Some carriers own their own equipment and lease additional containers based on market and lane balance while others use mostly leased equipment and reduce their overhead cost with flexible equipment leases. Leasing companies provide ocean carriers and shippers with the flexibility of off hiring container equipment in markets where a carrier has not developed a balanced trade. Leasing companies manage about 30% of the international containers in circulation today.

Contracting Terms:

Typically an ocean carrier will not allow booking for an international shipment unless equipment is available. Equipment availability is often determined at a single point in time and the place where empty equipment is located in the supply chain.

Equipment "Free Time":

Each ocean carrier has rules which are negotiable for the importer and exporter concerning the amount of "free time" they have to load and unload a container. Larger customers have more contract negotiating leverage than smaller customers. Some larger customers may be able to unload 15 or more containers per day, while smaller customers can only unload two containers per day given limited dock door space, parking areas and warehouse storage. Some ocean carriers charge $145-$165 demurrage per day over and above the contracted free time. This free time factor can become a significant issue, if a container shipment moves an extended distance. In December 2007 the North American Transportation Competitiveness Research Council noted that the average crosstown drayage in Chicago is less than 25 miles and that 70% of the freight traffic grounding within region travels to markets within 298 miles. For markets in the Chicago vicinity container "free time" is less of an issue when coordinating equipment reuse than when longer drayage is used to pick up export loads in market further from the Chicago Rail hubs, such as Northeast Wisconsin which is 200 miles away from Chicago intermodal rail complexes.

Gateway Port Transloading:

Transloading international equipment at, or near an ocean terminal is a recent trend to minimize equipment repositioning from inland locations and to reduce container cycle time. This allows importers to fine tune forecasts for import goods going to inland markets. Cargo allocations for inland customers can also be fine-tuned once the shipment arrives in the U.S. This allows importers to take advantage of larger 53'container equipment in the U.S. and in theory reduces transportation costs per ton. The development of the 53 foot stackable domestic intermodal container has allowed the increased use of rail intermodal service from coastal transload centers into the interior of North America.

Equipment Depots:

Figure 5 shows that once equipment is unloaded, it can be returned to the terminal or to an equipment depot where empty containers and chassis can be stored for future use in the region. Equipment depots are especially useful when drayage distance from the rail terminal to the import/export origin or destination is short. The ISO container owners want to maximize the time containers are moving loaded and minimize container dwell time in storage. Transloading also reduces the number of days associated with the inland delivery cycle. In some cases this can be up to two weeks if a container spends 4 days on the train to and from the Midwest and is given five days to unload at the customer's facility.

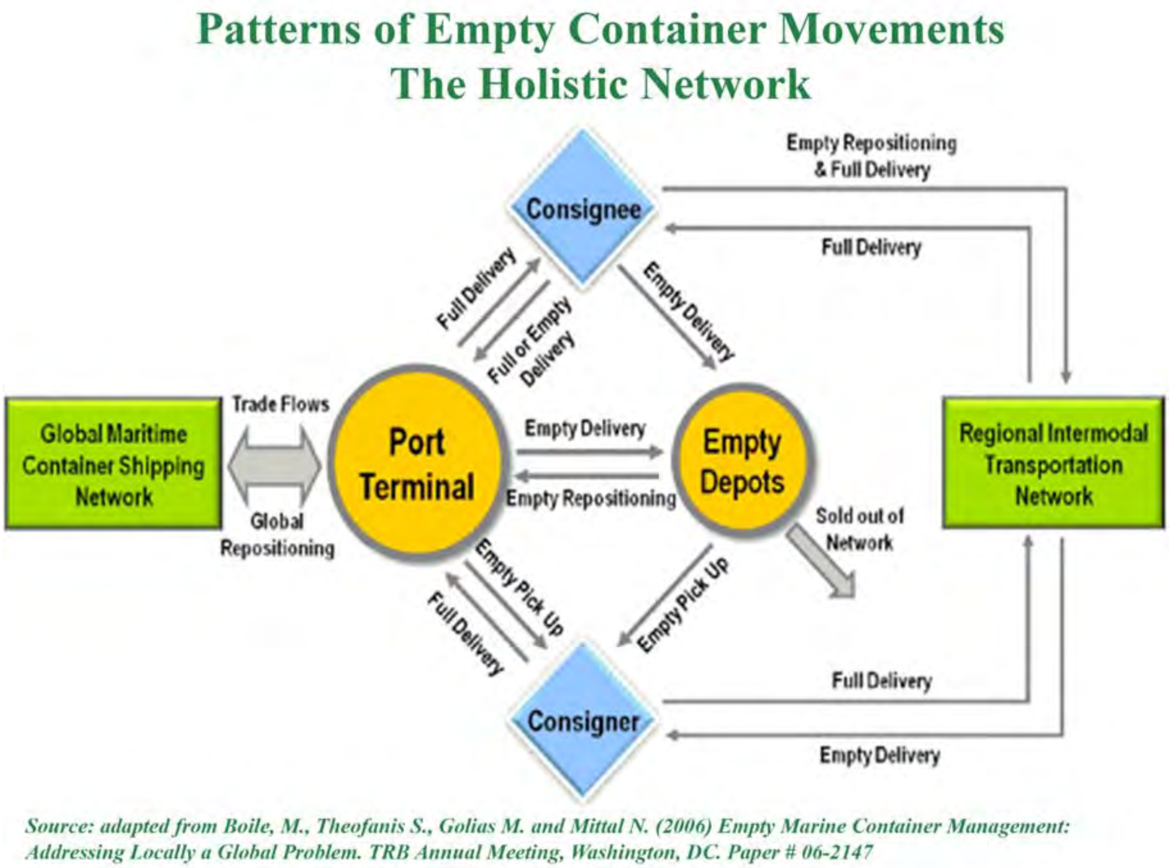


Figure 5: Patterns of Empty Container Movement

Equipment Flows:

Equipment matching is more complicated than simply identification of an empty container. In one interview, an equipment manufacture in Oshkosh stated that their imports come from Asia in a Maersk container and their exports go to markets served by Hapag Lloyd in Europe. In this case, the two ocean carriers do not accept the other's equipment so the empty Maersk container could not be reloaded with export cargo. The Maersk containers were returned empty in exchange for a Hapag container to be used for export. The result was two empty moves to and from the customer.

Equipment Visibility:

Container equipment moves through the transportation system with a series of equipment interchange agreements, which pass equipment liability and responsibility from one party to the next. The container might be on a vessel, on a train, in a rail yard, on a truck, at a facility, or at an equipment depot. At each of these locations the container should be reported by the interchange holder of the equipment. The location visibility of the container is only made available to the party paying the freight for that physical movement and any other party designated in the supply chain. Tracking of equipment is generally only as good and as timely as the carrier (ocean, rail, truck, depot, or terminal operator) who updates its location.

4. The North American Intermodal System:

The term “intermodal” has been defined by the Intermodal Association of North America as the transfer of containerized shipments involving multiple modes of transportation – truck, railroad, or ocean carrier. Intermodal freight is typically handled in a container or a trailer. More than one mode of transportation is required to move freight from shipper to the receiver of goods.

Starting in the 1990s, the rail industry moved from container on flat car operations to specially designed recessed platform rail cars that allowed double stacking of containers, (**see Figures 7 and 8**). The use of double stacking rail cars effectively doubled intermodal productivity for the railroads, (Mueller, 1999). Double stack efficiencies have encouraged the railroads to shift from trailers to containers in a number of markets, shifting the balance significantly towards the movement of containers (**Figure 6**).

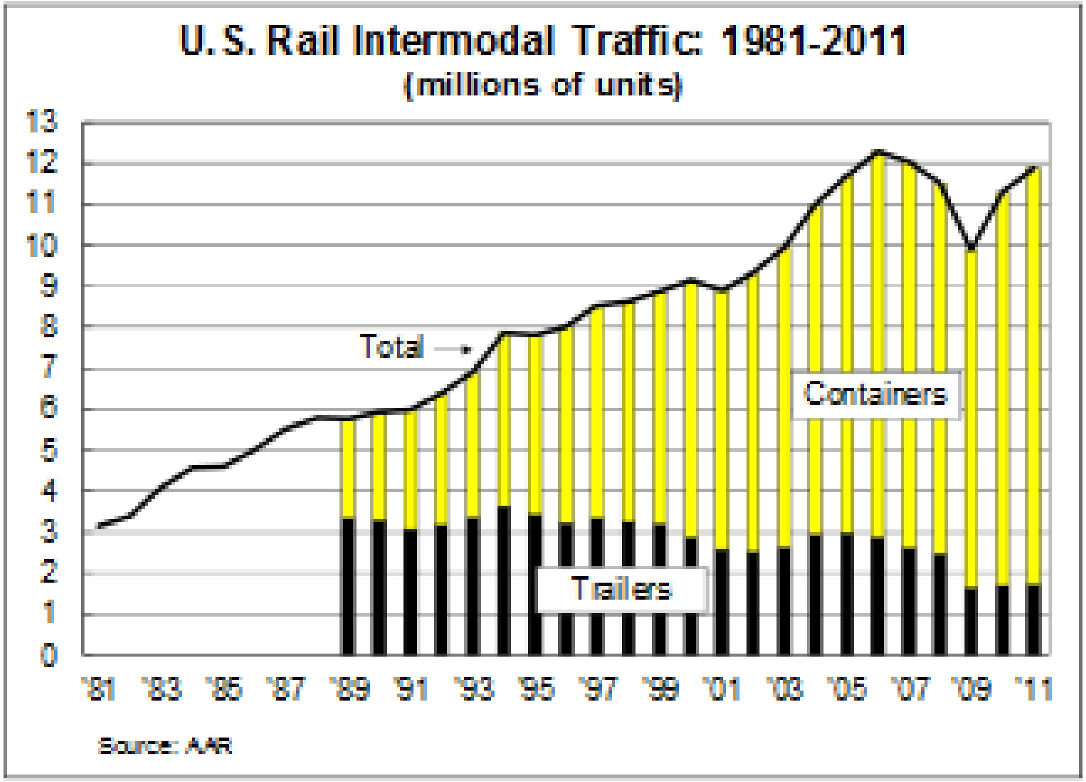


Figure 6: Intermodal Container and Trailer Volumes Source: Association of American Railroads

Figure 6 https://www.aar.org/keyissues/Documents/Background-Papers/Rail-Intermodal.pdf

Chassis are required for the highway movement of domestic and international containers but not for the rail linehaul move of containers. International ocean carriers are no longer supporting chassis for container delivery. Domestic chassis are typically provided by the domestic owner or lessor of the domestic container.

Domestic trailers also move via intermodal service, which include motor carrier owned equipment. Trailers move on rail flat cars where they are loaded and secured. The terms "trailer on flatcar" TOFC or "piggyback" are applied to this cargo. The flat cars will have fifth wheel attachment, (**see Figure 9**). Trailer use has been declining as the rail industry is reducing their trailer flatcar equipment. TOFC does not allow stacking in the rail yard, requiring more land for storage. However, as more motor carriers identify lanes where they can use rail service instead of drivers, these privately owned trailers still find their way to intermodal service and account for a small and recent up-turn in the use of trailers in intermodal service in 2010 and 2011, (**see**

Figure 10). UPS was historically the largest single shipper of TOFC in rail service. UPS recognizes the efficiency of containerization and is migrating to a containerized model. An example of this is the Willow Springs Intermodal Terminal in Chicago which is adjacent to their largest sort facility in North America and is converting to containerized operations.

Figure 7: Empty Double Stack Cars BNSF, May 2012 (Photo R.D. Stewart)

Figure 8: Loaded Double Stack Cars, May 2012 (Photo R.D. Stewart)

Figure 9: Trailer on Flat Car, May 2012 (Photo R.D. Stewart)

The Intermodal Association of North America (IANA) serves many functions for the intermodal industry, such as tracking intermodal growth and operations for decades. **Figure 10** illustrates intermodal volume in the United States from 2007 through 2011.

Annual Rail Intermodal Volume, 2007-2011

	2007	2008	2009	2010	2011
RAIL INTERMODAL ACTIVITY					
Containers	11,933,486	11,599,096	10,065,795	11,745,751	12,377,743
Trailers	2,145,466	2,060,399	1,604,555	1,664,064	1,693,782
Total Rail Intermodal Volume	14,078,952	13,659,495	11,670,350	13,410,538	14,071,525

Figure 10: IANA Intermodal Market Trends 2012 Statistics

5. Intermodal Rail Supply Chain and Types of Rail Terminals:

Intermodal terminals have high facility and equipment capital costs and relatively low variable operating costs. Access to existing rail networks and related rail infrastructure at the terminal site can have a significant positive impact on early returns on investment, (Sea Freight Council, 2004). Intermodal facilities traditionally have required large capital investments and significant fixed costs to operate, and therefore large volumes of traffic among which to disperse these costs. Consequently, these facilities are sensitive to economics of scale, (Fang Wu, K. M., 2008). Historically, many terminals are developed around pre-existing rail infrastructure. Today’s inland ports are designed around a rail service model where full trains can be built and run between two points (Gateway Port and Inland terminal) and enough demand can be generated for a fully loaded train per day inbound and outbound. When considering a new intermodal terminal, depending on market size, there are several key parameters to evaluate, such as: existing rail yards, zoning issues, access to docks, siding layout, track structure condition, length (2,500 feet minimum with 25 feet minimum spacing between tracks), current density of traffic on main tracks around terminal, access to Western Class I rail lines with a minimum separation between terminals of 500 miles., (Stewart, 2003).

The Sea Freight Council in Australia has developed interesting guidelines for terminal development. Generally, rail capital investment at a "brownfield" site can be expected to cost about $60 to $130 per TEU. The higher the volume, the lower the unit cost. Terminal investment and operating costs are in the range of $30 to $40 Australian per TEU for a terminal with a volume throughput of 20,000 to over 40,000 TEUs per year. In Australia, the volume throughput equivalent to the train size of 20 rail cars (40 TEUs) per day is considered a minimum requirement to attract a rail service to a terminal, with sizes up to 40 rail cars more likely to be sustainable. A smooth volume of cargo is preferable across the year, both to optimize train size, rail service schedules, and manage unit costs, (Sea Freight Council, 2004). One 2008 study stated that in the U.S., to create a new terminal for Class I railroads there would need to be nearly 100,000 lifts per year to support it, (Fang Wu, K. M., 2008). That assumption has not proven to be true as intermodal terminals along the Heartland Corridor and in Chippewa Falls, Wisconsin have been established with an annual lift volume far less than 100,000.

A 2001 study by Mark Berwick of North Dakota State University estimated that a traditional intermodal facility located in North Dakota would require about $2 million in investment in 2001. The cost per container lift was highly sensitive to volumes. At 2,000 lifts per year, the cost per lift would be $23, but it would decline to $15 per lift for 32,000 lifts per year, (Berwick, 2001). Terminal operating costs are one factor in establishing a terminal. Lane balance, location on the rail network and access to growing markets may enable or inhibit terminal development.

It is important to note that each rail carrier determines the cost of the container lifts at each terminal. This can vary based on labor, volume, lift equipment, wheeled vs. grounded operation, hostler support and other factors. Burlington Northern Santa Fe (BNSF) published an Intermodal Rules Circular and Policy Guide on July 1, 2008 which is still in effect in 2012.

Figure 11 shows the possible costs, in millions of dollars, that it takes to develop several different types of intermodal terminals in Australia. Unfortunately, similar graphics are not available in North America, (Sea Freight Council, 2004).

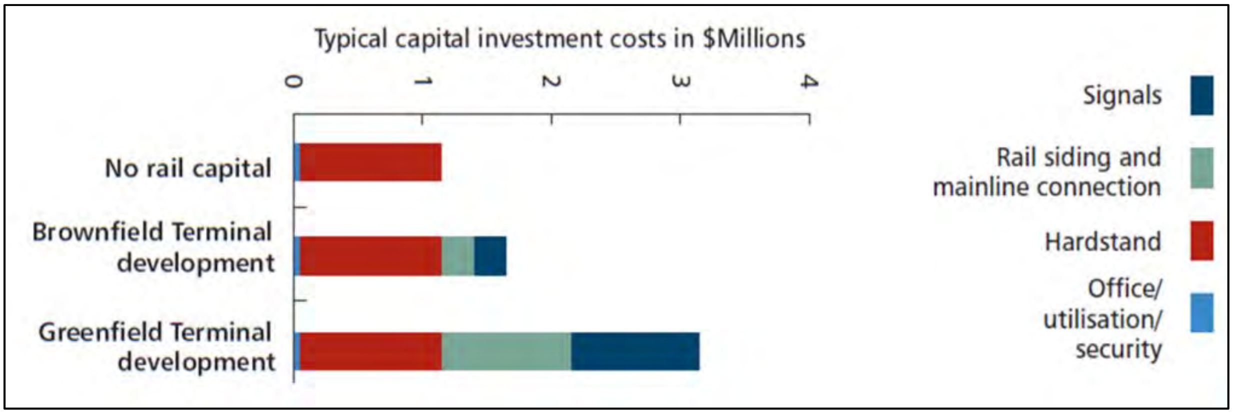


Figure 11: Costs for Intermodal Terminal Development in South Wales (Australian Dollars)

An intermodal rail container terminal is commonly composed of a gate structure, an intermodal yard with strip tracks and storage areas. Intermodal yards are the core of the terminal where unit trains are loaded and unloaded and at a major rail intermodal terminal. The intermodal unit trains serviced can be more than 1.2 mi (2 km) in length and will have as many as 140 double stack cars. Storage areas act as a buffer between the road and rail system. **Figure 12** demonstrates the different types of cargo hubs that serve the domestic and international markets, (www.envisionfreight.com).

Geographic Scope	Market Served	Examples	Cargo Hub Services	Carrier/Terminal Control/Users
Domestic	Regional	• Regional hubs operated by FedEx that connect to its national hub at Memphis. • Intermodal rail yards, such as CSX yard in Philadelphia or NS yard in Atlanta	• Truck service connections to regional and national air cargo services • Truck and rail interface for regional rail services	• Single carrier (FedEx) • Single carrier (CSX and Norfolk Southern (NS))
	National	• UPS hub in Chicago • Rail hubs in Chicago and Kansas City • FedEx air cargo hub in Memphis and UPS air cargo hub in Louisville	• Truck and rail package consolidation hub • Truck and rail transfers to destinations nationally • Air package and cargo transfers to destinations	• UPS with BNSF rail • Individual rail carriers • Single carriers (FedEx and UPS)
International	Rail/Truck border crossings	• Border crossings rail yard and truck terminals at Laredo, TX	• Border services to/from the US and Canada or Mexico	• Multiple or single carriers
	Air Cargo Gateway	• JFK, MIA, LAX cargo centers	• Domestic truck connections and air cargo connections between domestic and foreign markets	• Multiple carriers and connecting services
	Carrier Maritime Load Center	• Maersk/Sea Land Terminal in New Jersey	• Intermodal connections between domestics inland truck/rail services and international ocean vessels as well as transshipment to feeder vessels connecting to other regional ports	• Private single carrier (Maersk/Se Land)
	New York/ New Jersey Maritime Terminals	• Multiple Terminal Complex	• Intermodal connections between domestic inland truck/rail services and international ocean vessels as well as transshipment to feeder vessels connecting to other regional ports	• Public and private terminals with multiple carriers and connecting services
	LA/LB Port Hub	• Multiple Terminal Complex	• Intermodal connections between domestic inland truck/rail services and international ocean vessels as well as transshipment to feeder vessels connecting to other regional ports	• Public and private terminals with multiple carriers and connecting services

Figure 12: Types of Cargo Hubs Source: Envision Freight

In the development of freight hubs, the main factor is determining if customers will use an intermodal terminal. For this, the customer will look at the price, transit time and quality of the service they are receiving. More and more shippers value schedule reliability at a slightly longer transit time instead of a scheduled short transit time with low reliability (Nottebaum, 2008). **Figure 13** demonstrates different shipping arrangements and when the use of rail is determined more feasible, (Sea Freight Council, 2004). In 2006, the average BNSF intermodal train carried 163 units (trailers and containers), although the company prefers to operate larger double-stack trains of 250 containers. The willingness of railroads to pick up and drop off less than trainload quantities of intermodal units varies by carrier and is dependent on mitigating factors, such as equipment balance, (Wilbur Smith Associates, 2009).

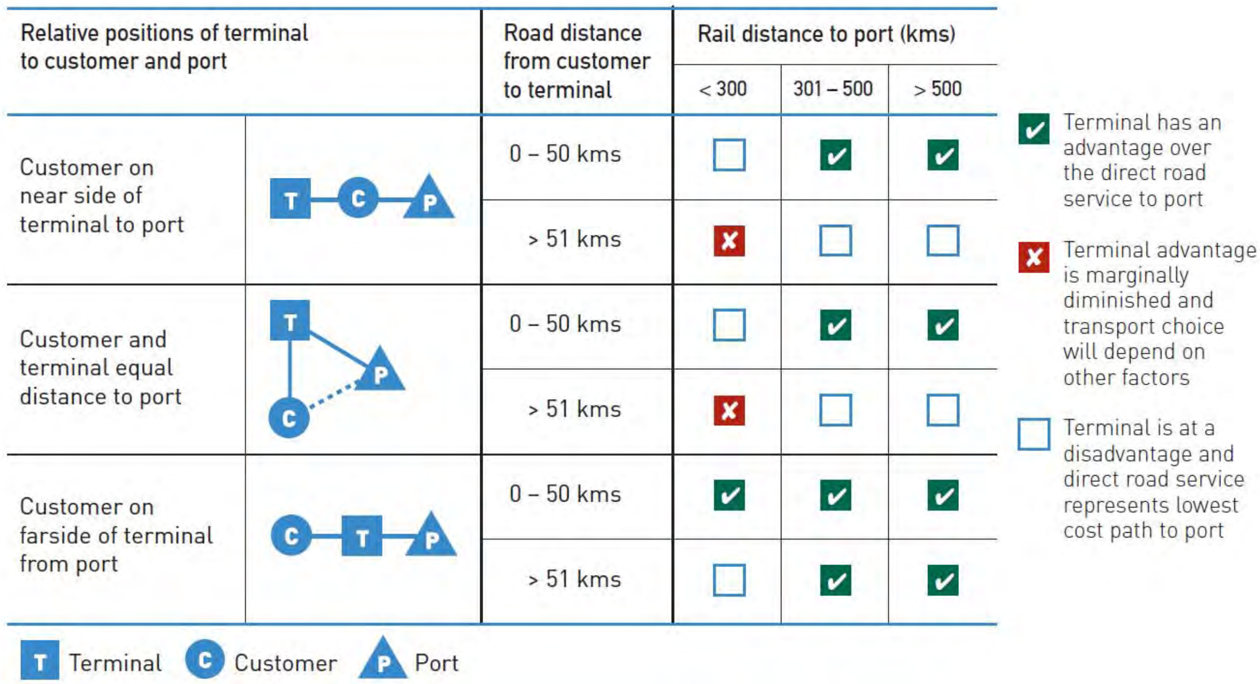


Figure 13: Shipping Relationships Source: Wilbur Smith 2009

Bimodal terminals could also be constructed to work with RailRunner Terminal Anywhere technology. RailRunner is one example of an innovative intermodal solution in which the intermodal highway reinforced trailer becomes part of a railcar. Trailers are lifted onto bogeys, which are essentially sets of rail wheels. The benefit of RailRunner or other types of bimodal equipment is that it reduces the investment requirements for establishing an intermodal terminal. No expensive lifting equipment needs to be bought, (Wilbur Smith Associates, 2009). Each rail carrier must agree to handle the equipment unique to the RailRunner system.

Roadrailer is another similar technology to Railrunner which has been used by the Norfolk Southern Railroad as part of their Triple Crown service and has been expanded in joint line rail service to reach the Minneapolis St. Paul market. This technology requires much less investment in terminal and lift equipment and operates trains which can run economically with 150 revenue units per train, (www.triplecrownsvc.com , 2013) vs. the 280 revenue units (TEU) container trains which are typically operated in Class 1 rail networks.

6. Rail Limitations in the Intermodal Supply Chain:

It is challenging for railroads to fit their operations with the changing demands of intermodal supply chains. This is especially true when a primary cargo is a dense product, such as grain or scrap. Many of the well cars used to transport the containers are weight restricted and cannot carry stacked overweight containers in the same well without overloading the railcars. The Umler System Reference Manual provides equipment specifications for this fleet of equipment. Single well and drawbar connected double stack cars have a load limit of 135,000 lbs. per well. "Light Capacity" well cars with five platforms per car have 100 ton trucks. "Heavy Capacity" well cars are equipment with 125 ton trucks at intermediate locations. Maximum gross weight is generally stenciled as a "load limit" on each well car.

Railroads measure productivity by the number of empty hitches per train. An empty hitch is an old term which was used in association with trailer on flat car (TOFC) shipments but has survived in the containerized world. An empty hitch refers to an open slot in a double stack train. Each car without a doublestacked container represents a lost revenue opportunity for the train, and reduces capacity as well as increasing the aerodynamic drag and fuel usage of the train. If railroads move too many outbound overweight containers, this can result in an unbalance of well cars in the rail network, as inbound containers are double stacked, while outbound containers are not.

For any container with an actual gross cargo weight of 29,001 pounds or more, the person tendering the container is required to provide a certification to the first carrier in the intermodal chain. The certification must contain five pieces of information: the actual gross cargo weight, a reasonable description of the contents of the container or trailer, the identity of the certifying party, the container or trailer number, and the date of certification or transfer of data. An intermediate carrier has a duty to accurately transfer the information on a certification, (APL Limited, 1996). In addition, rail owned, rail controlled or shipper furnished intermodal units must comply with all state, federal, Department of Transportation (DOT), and Federal Highway Administration (FHWA) regulations, (Union Pacific Railroad, 2008), (BNSF Railway Company, 2008).

The Association of American Railroads (AAR) and U.S. railroad companies place various rules and restrictions for moving containers on their trains. Due to safety issues for handling and transporting containers, railroads are especially aware of overweight or mis-declared containers, (20% of all containers). The maximum weight that U.S. railroads will accept is (including container weight) 52,900 lbs. (23,995kg) in the case of a 20 ft. container, and 67,200 lbs. (30,481kg) in the case of a 40 ft. container, (Overweight Container Guide, 2012) and all containers must follow AAR prescribed minimum standards for loading practices, such as weight distribution. **Figure 14** presents the maximum allowable weight and the penalty imposed for overweight containers for different railway companies serving the study area, followed by a short discussion of each railroad's policy. The table excludes the extra handling charges placed by some railroad companies for overweight containers up to a certain limit. These charges are discussed separately in the paragraphs following the table.

	Types	BNSF	CN	Canadian Pacific	Union Pacific
Maximum Gross Weight (lbs)	TOFC	65,000	n/a	n/a	65,000
	COFC (20')	52,900	47,900	47,500	52,900
	COFC (40'/45'/48'/53)	67,200 (53' n/a)	60,000	60,000	67,200
Penalty for Overweight Containers($)	TOFC	$5,000/car	n/a	n/a	**
	COFC (20')	$5,000/car	$3,000/car	$3,000/car	$600/car
	COFC (40'/45'/48'/53)	$5,000/car	$3,000/car	n/a	$600/car

Figure 14: Maximum Container Load Limits on Railroads

Maximum load limit and penalty by Class I Railway Companies operating in study region
Note: ** - Usually UP doesn't allow overweight containers. If found they will need to be retrieved.
Note: Lading weight per linear foot is not defined by CN and Canadian Pacific.

In accordance with BNSF's intermodal rules and policies, BNSF reserves the right to reject any vehicle or shipment not complying with BNSF intermodal rules and policy guide. BNSF may, but is not required to, weigh any shipment. The maximum gross weight that BNSF can accept or deliver is 65,000 pounds. If an overweight shipment is discovered upon arrival at a BNSF facility, the vehicle will be rejected at the gate but, if an overweight shipment is discovered or suspected after arrival at a facility, the shipper will be notified to retrieve the vehicle, (BNSF Railway Company, 2004). A shipper who tenders overweight equipment will be subject to a $5,000 charge per shipment and will arrange for and incur all costs. BNSF will also fine shippers U.S. $100 for each 1,000 lbs. of mis-declared weight, (BNSF Railway Company, 2008).

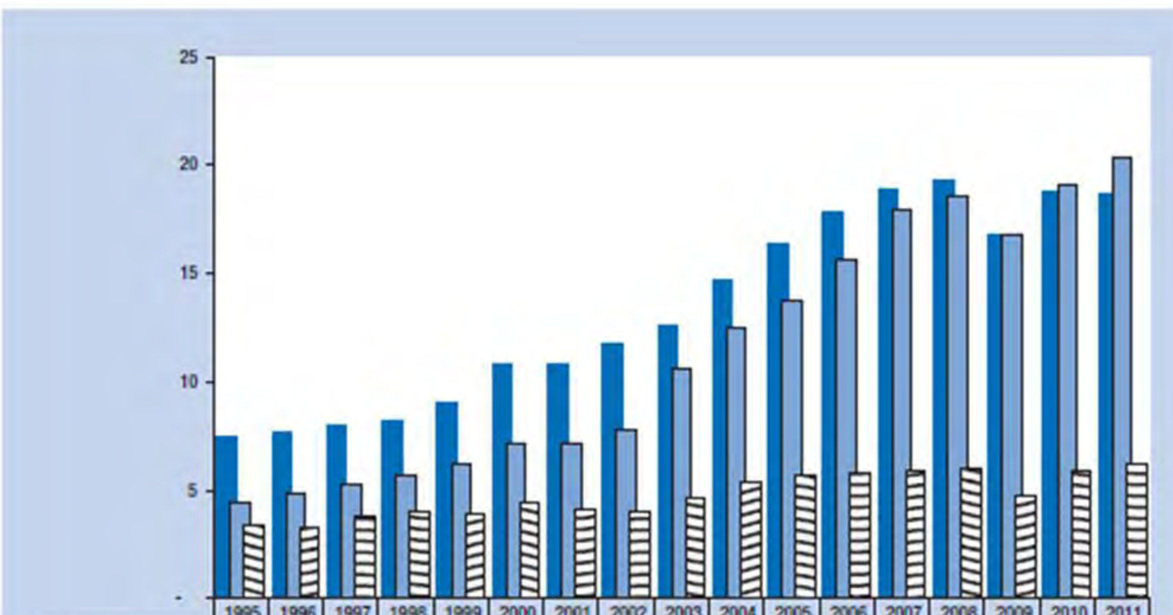
For Union Pacific Railroad (UPRR) the loaded trailer on flat car (TOFC) weight must not exceed the limit as stated on the manufacturer's plate. Combined weight of trailer and lading may not exceed 65,000 lbs. For container on flat car (COFC), combined weights for containers and lading may not exceed 67,200 lbs. except for 20 foot containers that must not exceed 52,900 lbs. A shipper who tenders overweight equipment will be subject to a $600 charge per car and other incurred costs, (Union Pacific Railroad, 2008). Shippers may also face "heavy load" surcharges, if weight restricts double stacking of containers. Additional potential surcharges and limitations may be assigned according to the Master Intermodal Transportation Agreement (MITA 2), (http://www.uprr.com/customers/intermodal/mita.shtml, 2013).

On CN Railway, the maximum payload for 40/45 ft. dry container can be 60,000 lbs. The maximum weight limit varies depending on the origin and destination, (U.S. and Canada). In any situation the maximum loading cannot exceed the weight limit engraved on the body of the container. Improperly or overloaded cars, when detected, will be pulled aside for load adjustment. The shipper will be responsible for arranging for the load to be reduced or rearranged and paying the costs for any such services. If any container is found misdeclared, a fine of $3,000 will be imposed. For the handling of overweight freight on CN Railway, a charge of $325 will apply against any 20-ft container with a net weight over 47,900 lbs. up to 55,000 lbs. and the same charge will be applied against any 40/45-ft container with a net weight over 60,000 lbs. and up to 65,000 lbs., (Canadian National Railway, 2012).

Canadian Pacific Railroad (CPR) has varied load limitations depending on the container's movement in the U.S. or Canada. They also vary depending on the type of container being used. For example, a 40/45 ft. refrigerated container will have a maximum gross weight of 48,000 lbs. if it is on a tandem chassis but 60,000 lbs. if it is on tridem chassis. If damaged products are found prior to loading they must be replaced with good ones. If a car is found overloaded, a penalty of $3,000 will be imposed on the consignee. Overweight containers up to 65,000 lbs. are allowed only for 40 ft. containers with an extra handling fee of $325 per container, (Canadian Pacific Railway, 2010). As discussed earlier, the railroads also want to maximize their assets and avoid building terminals too close together or with a small volume of traffic. The impact of some of these factors is a limited number of intermodal terminals in the study region.

7. International Equipment Flows:

The identification of containers available for export starts with the understanding of where ISO containers enter the country. The ocean shipping industry recognizes many trade groups however the three largest container trades include, 1) the Transpacific – linking Asia and North America, 2) the Trans Atlantic linking North America, and 3) the European Countries and Europe –Asia. Each of these trades shares the world's container fleet and based on regional economics and policy the container volumes ebb and flow. North America is a key trading partner in two of these three trade groups.



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Transpacific	8	8	8	8	9	11	11	12	13	15	16	18	19	19	17	19	19
Europe–Asia–Europe	4	5	5	6	6	7	7	8	11	12	14	16	18	19	17	19	20
Transatlantic	3	3	4	4	4	4	4	4	5	5	6	6	6	6	5	6	6

Figure 15: Estimated Cargo Container Flows 1995-2011 Source: IHS Global Insights

In the mid-1990s the U.S. container trade amounted to approximately 50 million TEUs. In 2012 the number of containers in the U.S. trade was nearly 150 million TEUs representing a nearly 300% increase over the 18 year period. While annual demand fluctuates as noted below

(see figure 16), the trend for international containerization out paces the U.S. GDP growth. According to a 2007 study by Drewry, the average amount of empty equipment in the global supply chain is 20%. There is also significant differences in the incidence of empty containers depending on the trade lane, (**See figure 17**).

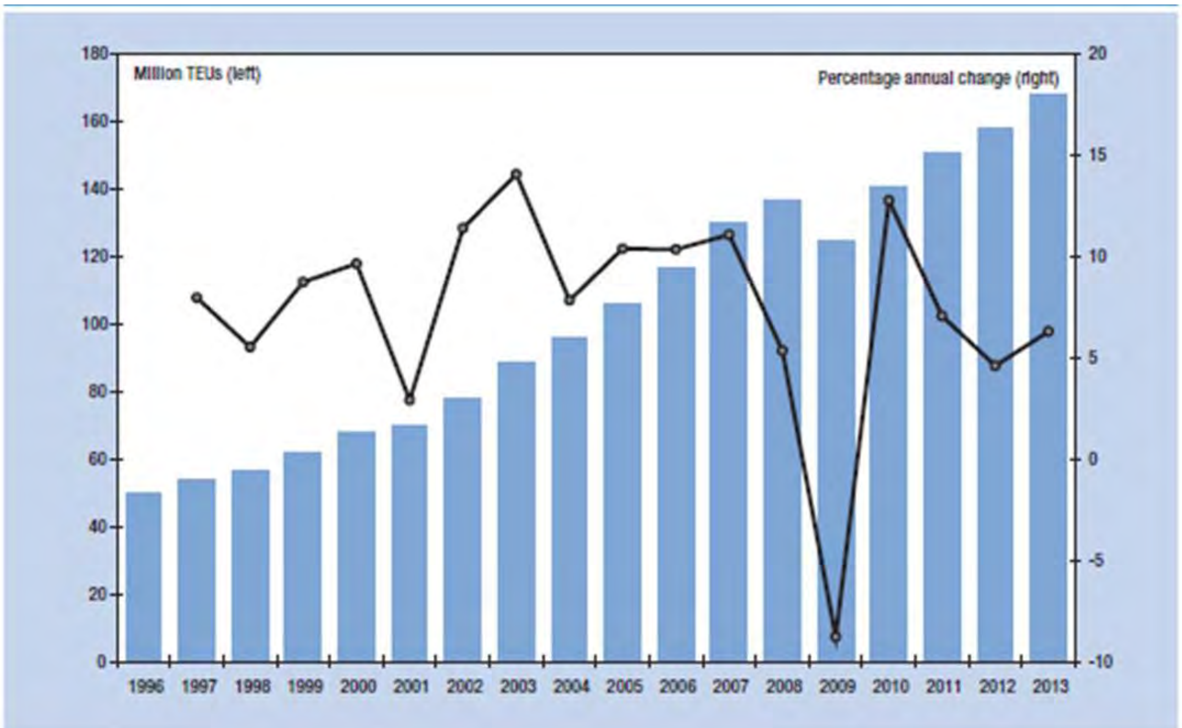


Figure 16: Annual U.S. Container Demand and Annual Percent Change Source: IHS Global Insight

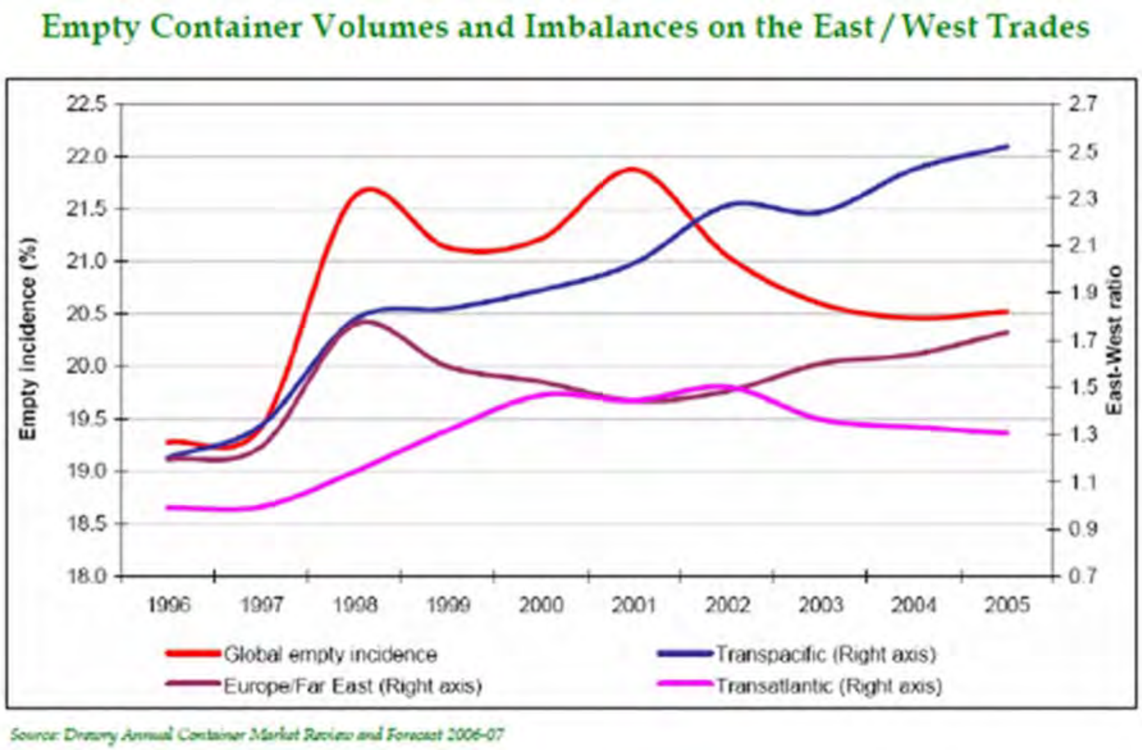


Figure 17: Empty Container Volumes and Balance Source: Drewry 2007

8. Many Exports Require Containers:

Wisconsin Exports:

The overall value of Wisconsin exports amounted to $22 billion in 2011. Wisconsin ranked 19th among all states for the value of total exports in 2011. Industrial and electrical machinery made up 42% of the total exports, medical and scientific equipment amounted to 11% of the 2011 export volume and agriculture exports accounted for 13% of the state's export revenue in 2011.

Wisconsin ranked 16th in 2011 in U.S. agriculture exports valued at $2.85 billion. Top export markets included: Canada $1.3 billion, Mexico $196 million, South Korea $125 million, China $118 million, and Japan $104 million as reported by the Wisconsin Department of Agriculture Trade and Consumer Protection. The top 10 agriculture exports for 2011 included unmilled cereals, beverages, processed food ingredients, dairy, bakery, raw hides, and meats.

According to the U.S. Department of Commerce jobs related to manufacturing of export products amounted to 6.5% of the Wisconsin total private-sector employment which is approximately one fifth of the state's workforce. A total of 6,847 Wisconsin companies exported product from Wisconsin in 2010, approximately 88% were small to medium size organizations with fewer than 500 employees.

Milwaukee-Waukesha-West Allis	$8.8 billion
Madison	$2 billion
Racine	$1.3 billion
Oshkosh-Neenah	$1.3 billion
Appleton	$1.1 billion
Green Bay	$1 billion
Janesville	$834 million
Sheboygan	$622 million
Eau Claire	$546 million
Fond du Lac	$468 million
Wausau	$281 million
La Crosse	$688 million (parts of MSA shared in MN)

Figure 18: 2011 Wisconsin Merchandise Exports by MSA Region

Minnesota Exports:

Export activities linked to manufacturing in Minnesota accounted for an estimated 5% of Minnesota's total private sector employment. Approximately 19.2 % of all manufacturing workers depend on exports for their employment. A total of 6,811 companies exported products from Minnesota in 2010. Approximately 66,063 (89%) of those exporting companies were small businesses.

Minnesota's export shipments of merchandise totaled $20.6 billion. Minnesota's largest export market is Canada, followed by China, Mexico, Japan, and Germany. The largest export category in Minnesota is computer and electronic products which amounted to approximately $4 billion in 2012. Other top exports from Minnesota include electrical, transportation equipment, miscellaneous manufactured commodities, food, and kindred products.

Rochester	$843 million
St Cloud	$295 million
Mankato	$290 million
Minneapolis / St Paul	$26.2 billion
Duluth	$595 million (parts of MSA shared in WI)

Figure 19: 2011 Minnesota Merchandise Exports by MSA Region

Michigan Exports:

Exports supported approximately 6.4% of private sector jobs in Michigan. Over 26.9% of all manufacturing jobs in Michigan depend on exports according to 2009 data. In 2010, 12,013 companies exported products from Michigan locations. Approximately 10,932 (91%) of the exporting firms were small to medium size companies.

Michigan's primary export partners include Canada, Mexico, China, Germany, and Saudi Arabia. Primary export products include transportation equipment, machinery, chemicals, primary metal products, and computer and electronic products.

None of the top exporting Metropolitan Statistical Areas are located in the Upper Peninsula. In 2012 Michigan State University Center for Economic Development analyzed the Export values for the Upper Peninsula (UP). Approximately $55.13 million of products were exported from the UP of Michigan in 2010. Leading export products included transportation equipment, agriculture, machinery, chemicals, and plastic products.

It is important to note that the U.S. Department of Commerce counts top exports by revenue, the U.S.'s largest export volumes are low value products which include bulk agriculture produces and scrap. Appendix 1 contains the list published annually by the Journal of Commerce and that lists the TEUs exported by company based on PIERS data. The top exporter is a scrap company.

One strategy to identify empty container supply is to identify the top importers. The Journal of Commerce identifies top importers by headquarter location, where decisions are generally made. In Appendix 1 the Journal of Commerce Top Import list shows that 17.9 % of the imported TEUs in 2011 were controlled by companies headquartered in the study region. Over 977,300 import containers are routed to the U.S. by 11 companies in Minnesota, Wisconsin, Illinois, and Michigan. While this is an impressive figure, many of these companies have distribution locations in states outside the study area. However, executives in these companies do have the ability to identify equipment flows, forecasts and could benefit from reduced transportation costs if empty equipment could be reloaded, or optimized for export.

9. Intermodal Inventory:

Rail intermodal has been the fastest-growing segment of the U.S. freight railroad industry for many years. In 2011, intermodal accounted for 21.5% of revenue for major U.S. railroads second only to coal among all rail traffic segments and preliminary data suggest that 2012 will surpass 2006 as the highest-volume intermodal year in history for U.S. freight railroads. The traffic tends to be comprised of higher value and lower weight items, such as consumer goods and the volumes are expected to grow at 5% per year (TTX, 2012) which is at a higher annual pace than current GDP. Exports and imports account for around 55% of U.S. rail intermodal traffic, with purely domestic movements accounting for the remainder. The domestic share of total U.S. rail intermodal traffic has been rising in recent years, with much of the increase consisting of freight that used to move solely by truck.

Intermodal transportation is driven by freight traffic volume, transportation distance, and population density. Metropolitan areas with a population base from 200,000 to 500,000 are on the edge of having sufficient volume for containerization generated by the population base, (Wilbur Smith Associates, 2009).

The Midwest has an important role as a freight transportation gateway and is thus the key location for intermodal rail terminals. Besides rail access to West and East coast ports, it also has some of the busiest border crossings with Canada, (**Figure 21**). Also note in **Figure 20** that the dominant corridors connecting importers and exporters in MN, WI, and the Upper Peninsula of MI are in a tangent connecting Pacific Northwest (PNW) and British Columbia Ports and gateways. PNW ports currently participate in significant exports of heavy agriculture and bulk commodities along with containers. The Pacific Southwest ports of Los Angeles and Long Beach currently are a port of choice for many Midwest exports due to the number of vessel calls and the scale of the export market activities. Cambridge Systematics noted that intermodal service to other regions outside of the northern Midwest is either unavailable or circuitous (major intermodal terminal to port), which has made intermodal a relevant and economical choice for only a small subset of shippers. For example, rail intermodal service linking Minneapolis to Los Angeles moves via Chicago due to the east-west orientation of the existing rail network. In some cases, Intermodal Marketing Companies and Trucking companies opt to dray containers to Kansas City rail terminals to avoid this circuitry.

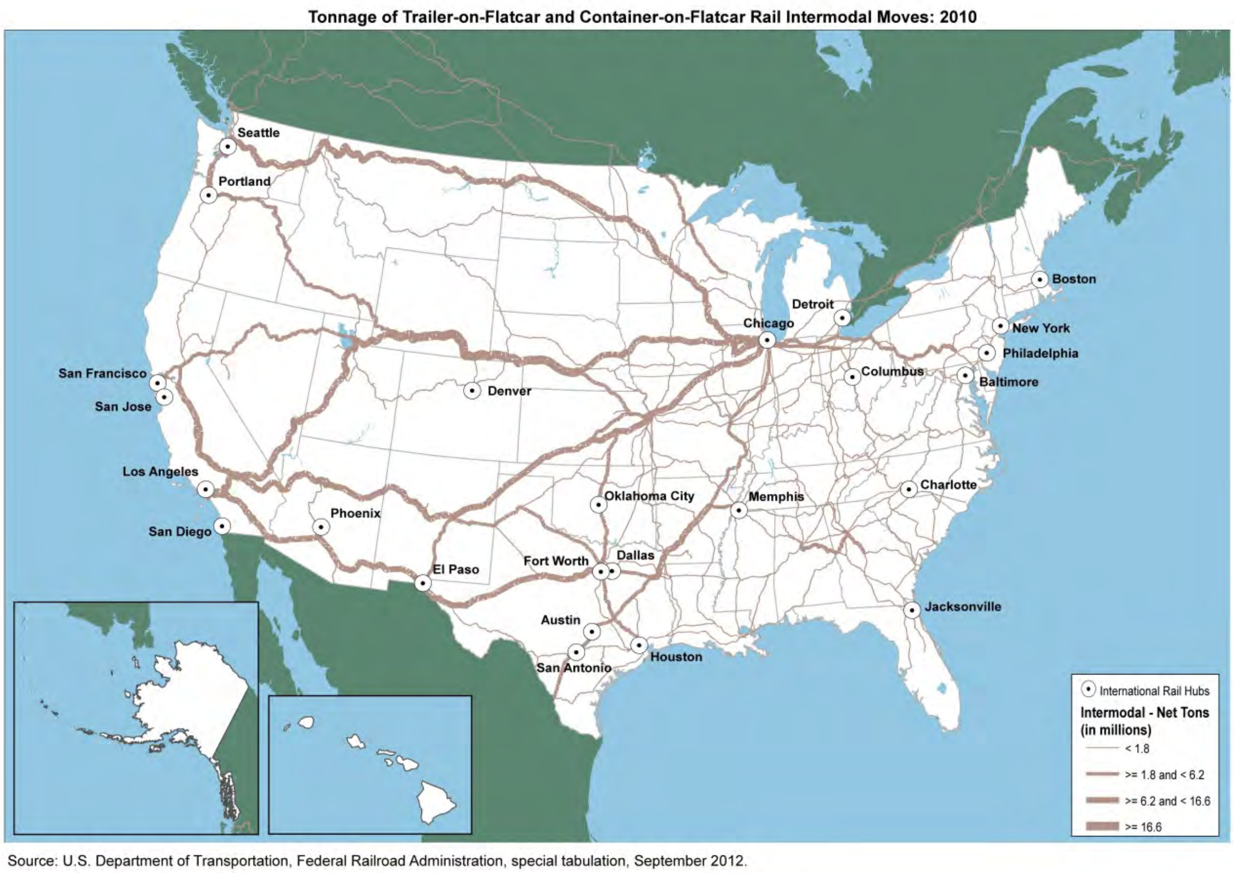
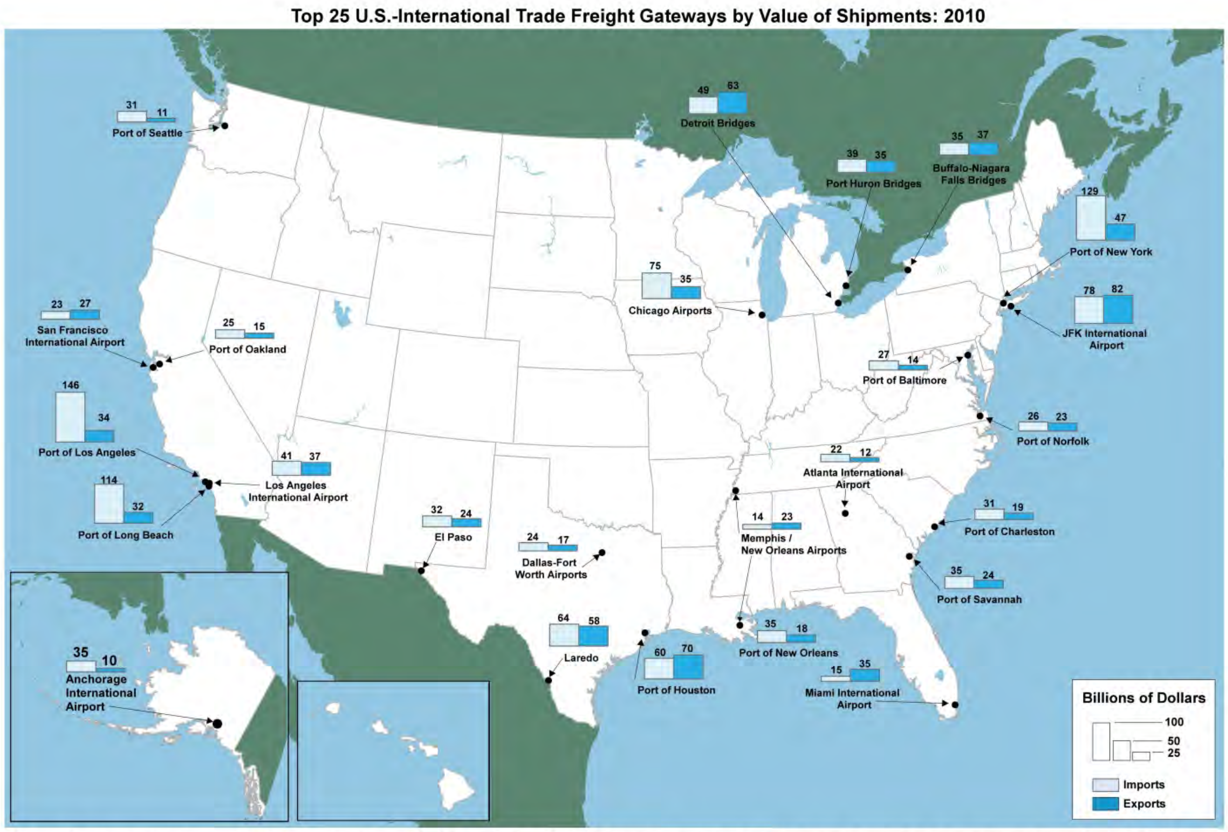


Figure 20: Rail Intermodal Freight Density Map



Notes: Air gateways include a low level (generally less than 3% of the total value of freight shipped through small user-fee airports located in the same area as the gateways listed. Air gateways not identified by airport name (e.g., Chicago, IL) include major airport(s) in that area and small regional airports. Due to Census Bureau confidentiality regulations, courier operations are included in airport totals for only New York (JFK), Los Angeles, Chicago, and Anchorage; and data for Memphis International Airport are included in the New Orleans Customs District.
Sources: Air: U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, USA Trade Online, **Land:** U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, TransBorder Freight Data, **Water:** U.S. Army Corps of Engineers, Navigation Data Center, personal communication, as cited in U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, National Transportation Statistics, table 1-51, available at http://www.bts.gov/publications/national_transportation_statistics/ as of October 2012.

Figure 21: U.S. Foreign Trade Gateways 2010

The growth of intermodal traffic has created a problem for rail terminals located in urban centers, many of which were reconfigured from carload classification yards without direct access to interstate roadways. An intermodal terminal's ability to expand is limited by land, existing rights-of-way and neighborhoods that are impacted by noise, congestion, and other perceived sources of pollution. Terminals located in a densely populated urban center can be restricted within their existing foot prints with little possibilities for external expansion, (www.envisionfreight.com). The BNSF Midway Intermodal terminal located in St. Paul, MN is an example of a terminal in the region that is constrained in its ability to expand due to limits on land and road access.

Studies have recognized that the primary transportation cost drivers in North America today, to a large degree, have shifted from ocean leg to the inland leg of the transportation chain.

Railroads incur incremental costs associated with stopping to load/unload containers at an intermodal terminal, potentially making the overall service less competitive. According to Cambridge Systematics, quality service to a broader set of markets beyond the state's borders is needed from a competitive and environmental standpoint, as is development of a major new Twin Cities terminal, and one or more other intermodal terminals in the study region but distant from the Twin Cities, (Cambridge Systematics, Inc., 2010).

Class I railways strongly favor dedicated trainload movement of container traffic and seldom promote locations that are not capable of loading an entire train for movement to a single destination. The majority of large commodity shipments, including those generated by rapidly growing international trade markets, utilize rail for the longest ground portion of a movement. Railroads may consider establishing terminals in such a marginal market when a low cost terminal coupled with adequate volume along a primary route results in a reasonable return on investment, (Wisconsin Department of Transportation, 2010). Some smaller intermodal facilities have been set up, such as in Chippewa Falls, WI, with limited service and for express purpose of reloading inbound international containers.

For higher-value intermodal traffic, which places a premium on reliable service, scheduled service, and a high on-time percentage are absolute requirements to attract and keep business. Having several terminals within an area can create a disadvantage for railroads that are trying to offer reliable, time sensitive, and cost competitive service. "New investment which creates excess capacity at a local or regionalized level will cause unit costs to rise, (owing to market fragmentation, and the "step function" of capacity and investment;) this may cause an existing terminal to become unviable and limit the opportunities of the new terminal." (Sea Freight Council, 2004)

Minnesota Intermodal Terminals:

For the state of Minnesota, intermodal freight has become a significant transportation mode, accounting for 35% of all units moved in the state, (Cambridge Systematics, Inc., 2010). Presently rail intermodal services available in Minnesota are limited both geographically and capacity-wise. The BNSF Midway Intermodal terminal located in St. Paul, MN is an example of a terminal in the region that is constrained in its ability to expand due to limits on land and road access.

In Minnesota, BNSF markets the Dilworth facility as an intermodal hub, but is actually no longer rail-served. Instead, all containers are trucked to the BNSF terminal in St. Paul for train loading. Among the concerns in Dillworth were a lack of a container pool at the facility and the cost of repositioning empty containers to Dilworth, (Wilbur Smith Associates, 2009). Private sector initiated intermodal service was recently developed for Central Minnesota agriculture producers wishing to export product. Hapag Lloyd had a surplus of containers in the Twin Cities and an intermodal rail service supported by a short line connected containers to producers in Montevideo, MN.

North Star Rail Intermodal, LLC (North Star Rail) established an intermodal reload facility in Montevideo and found that at 130 miles (the distance between Montevideo and St. Paul) intermodal service could be viable if the well cars could be interchanged intact to the CP in Shoreham yard, avoiding a grounding and reloading move within the terminal. While the program worked, the economic downturn impacted container supply and the fledgling service was closed down. In the Midwest, the North Star Rail company's cost of using rail to move containers, the 130 miles from Montevideo to the Shoreham Yard (in St. Paul, MN), was estimated to be somewhere between $10 and $13.69 per ton. This compares to $21 per ton plus fuel surcharges to dray containers by truck, assuming that containers would have been loaded in Montevideo in both circumstances. The cost of replicating the Montevideo facility was estimated to be about $4.7 million, although the cost to North Star Rail would have been less because much of the yard infrastructure was in place before North Star Rail moved into the property, (Wilbur Smith Associates, 2009). North Star operations clearly demonstrate that a short line intermodal terminal does not need to have the same level of investment as a Class I terminal.

For the Dilworth and the St. Paul shippers in Minnesota, the drayage costs to repositioning empty containers from Chicago are comparable to simply trucking the load to Chicago. However, if the St. Paul shipper has a container already available locally his costs are $436 less than those of the Dilworth shipper. (**Figure 22** shows comparison of rates for a 20 ft. container).

Nature of Rate	Dilworth	St. Paul
Tariff rate – Agricultural products (international, bagged) to Seattle, WA with fuel surcharge	**$1,068**	**$1,068**
Tariff rate – Agricultural products (international, bulk) to Seattle, WA with fuel surcharge	**$1,104**	**$1,104**
Tariff rate – General merchandise (international) to Seattle, WA with fuel surcharge	**$1,964**	**$1,493**
Tariff rate – Reposition empty container from Chicago, IL with fuel surcharge	**$436**	**$436**
Average revenue per unit for grain/oilseed shipments from St. Paul BEA to Seattle BEA from STB Waybill Sample, indexed to 4/2009	**NA**	**$1,029**

Figure 22: Comparisons of Rates for 20' Containers in Minnesota

A study by the Upper Great Plains Transportation Institute on the feasibility of an intermodal terminal in the Fargo/Moorhead area identified a challenge in lane balance. The study suggested that 73% of the terminal traffic would be outbound. Drayage is typically purchased on a round trip basis where the trucker retains the equipment interchange and liability while the container is off the rail terminal.

Wisconsin Intermodal Terminals:

Wisconsin has two active rail intermodal terminals. One is a private facility located in Acadia, WI and another was recently opened by CN in Chippewa Falls. Acadia facility loads approximately 15 containers per day inbound and outbound. The Ashley Furniture Company has a private trucking company which moves the containers to and from the furniture facility. The second CN intermodal terminal was recently opened in Chippewa Falls and has three day a week service with an original target to move 5,000 containers per year. Wisconsin's third intermodal terminal in Milwaukee was recently closed by the Canadian Pacific Railroad in 2012 along with two other terminals deemed to be "inefficient terminals" according to Canadian Sailings Transportation and Trade Logistics Magazine. The Milwaukee terminal provided an efficient link to international markets through Canadian ports in both Vancouver, British Columbia, and Montreal, Quebec. According to Canadian Pacific, this closure will help improve their service reliability, (Rail News Canadian Pacific, 2012.) CP is launching new train service to connect

Vancouver, BC to Chicago and Toronto with a shorter transit time of 4 days and increased train length from 7,000' to 12,000'.

The Milwaukee intermodal terminal also had several equipment depots which provided international containers for regional use. Closure of these depots has increased the cost of procuring empty equipment in Wisconsin due to longer truck distances to Illinois intermodal terminals. Some trucking companies in the region have their own storage facilities to reduce the time required to get an empty container for an ocean booking, but the amount of "free" time for equipment off of terminal property is limited.

In February 2012 CN opened a new intermodal rail terminal at Chippewa Falls, WI located only 100 miles east of Minneapolis/St. Paul, offering Wisconsin and Minnesota customers new supply chain options to ship and receive goods in containers (**Figure 23**). This new Chippewa Falls terminal is designed to offer new container shipping options for Wisconsin and Minnesota as it establishes the railroad's first intermodal facility between Chicago and Winnipeg, Manitoba; a distance of about 700 miles by rail. It is built on 8.5 acres of land and features a 2,500 foot long intermodal loading and unloading track and has an onsite grain transfer facility. Initially the new Chippewa Falls intermodal terminal was projected to carry 5,000 containers per year, (CN presentation at the Midwest Shippers Association Meeting, August 2012) but now the terminal handles up to four trains a week with 70 to 80 carloads per train which amounts to roughly 14,500 containers per year, (Graham, 2013). The twice-weekly import service provided by CN from this terminal provides 5th morning availability from the west coast. Grain exporters in particular can take advantage of this new terminal as CN provides a grain transfer facility located within the Chippewa Falls terminal. Export grain may be trucked to the terminal in bulk trailers and then be transferred into export containers.

Figure 23: CN Intermodal Terminal Map Source: CN

In addition to the Chippewa Falls terminal, CN also established a new intermodal container depot in Minneapolis, MN to support the Chippewa terminal, (CN Customer News, 2012). The facility is located about 100 miles from the Chippewa terminal and within the Minneapolis city limits.

According to Wisconsin Department of Transportation, the state railroad infrastructure faces several possible constraints, such as line capacity, yard capacity, inadequate fleet size, infrastructure limitations, labor limitations, shared tracks and freight rail, interchange consistencies, train-related crashes/incidents and severe weather conditions, (Wisconsin Department of Transportation, 2010). These factors may create additional costs and difficulties in locating additional intermodal terminals in Wisconsin.

Michigan Intermodal Terminals:

According to the Transportation Economic Development Impact System (TREDIS) analysis, the actual tonnage of commodities entering and leaving Michigan by rail accounts for only 9% of commodities on Michigan's overall transportation system, (Michigan State Rail Plan, 2011). Michigan has seven intermodal terminals in and around the Detroit area alone, and handles North American traffic that originates and terminates in Canada, the United States, and

Mexico. It also handles overseas traffic that utilizes east and west coast ports in the U.S. and Canada. Efforts are underway to combine these separate terminals into one to allow for more efficient movements of goods, (Michigan Department of Transportation, 2011). This terminal would be constructed by expanding the existing Livernois Junction yard which is centrally located in the Detroit, MI area in the proximity of several other rail facilities. This is the preferred option as most of the land required to carry out this project is already classified as industrial land, (Michigan Department of Transportation - MDOT Detroit Intermodal Freight Terminal Study).

Appendix1 lists the IANA approved intermodal rail terminals, equipment providers, and depots where marine carrier ISO containers are stored in the study region.

The current lifts for the intermodal terminals in the study region can be found in **Figure 24.** There is not a terminal in Green Bay, WI but a recent survey of companies in the Green Bay area forecast a potential annual lift of 89,426 containers.

Intermodal Lift Count		
Terminal	**Units**	**Source**
Milwaukee (CP)	12,382	Port of Milwaukee (Full Year 2011)
Chippeawa Falls (CN)	5,000	CN projected based upon (at full capacity)
Acadia, WI	7,560	Trains Magazine 1/20/2004
St Paul (BNSF)	212,000	BNSF Doug Gage (estimate 2012)
Shoreham Yard (CP)	53,000	CP Mike Knox (estimate MSA)
Prospective Green Bay	89,426	Fred Monique GB Advance

Figure 24: Intermodal Lift Counts within Study Region

Chicago Intermodal Terminals:

When measured by commodity value, Chicago is the top trading area reflecting the importance of intermodal traffic. Chicago's position places it as the primary gateway between the eastern and western U.S., and the largest inland origin and destination point for containers moving in the Pacific trade. Most of these trade routes pass through the upper Midwest on their way to their destination. Chicago receives over twice the rail freight from Minnesota by value as from any other destination.

Chicago lies at the southern edge of the study region but plays a significant role in container equipment availability in the region. The Chicago region is the hub of the North American freight rail network and by lift count, the world's seventh largest global port. Six Class I rail carriers meet in Chicago, including two western rail carriers, two Canadian railroads and two eastern railways. This hub handles more trains per day than any other gateway in North America where eastern and western rail networks meet. In 2005, 1,200 trains per day crossed the metropolitan area hauling more than 37,500 rail freight cars. Intermodal terminals performed 17,200 lifts per day. Approximately 7,500 cross-town trips per day are made between rail intermodal terminals as containers are exchanged between rail carriers. Approximately 15,000 daily truck trips are generated to or from customers dock doors. The profitable catchment area for containers is estimated at 250 miles by the BNSF. The average truck drayage in the Chicago region is estimated at 25.8 miles, (North American Transportation Competitiveness Research Council, 2005).

TTX, is a cooperative which is owned jointly by Class I railroads, and provides rail cars to move containers and trailers, and it estimates intermodal growth to continue at a 5% per year growth rate. If this forecast materializes by 2025 intermodal equipment volumes will double between 2013 and 2025. To accommodate this growth in volume, two new rail complexes similar to the Will County inland port complex, will need to be developed or equipment management practices will need to change.

The facilities which handle this volume are located throughout the Chicago metropolitan area and are connected by 24,902 miles of interstate highways, freeways, and principal and minor arterials in the seven county area, (IDOT 2004 Travel Statistics, 2004).

Figure 25 identifies each terminal and reported capacity by lift count. Each facility has unique operating characteristics depending on the train volumes, the type of freight (domestic or international) and the equipment handling protocols (chassis or grounded containers). While many similarities exist between the terminals and carriers, each carrier has unique rules about container storage and free time. Intermodal users are incented to minimize the dwell time for each container or trailer at the rail terminal.

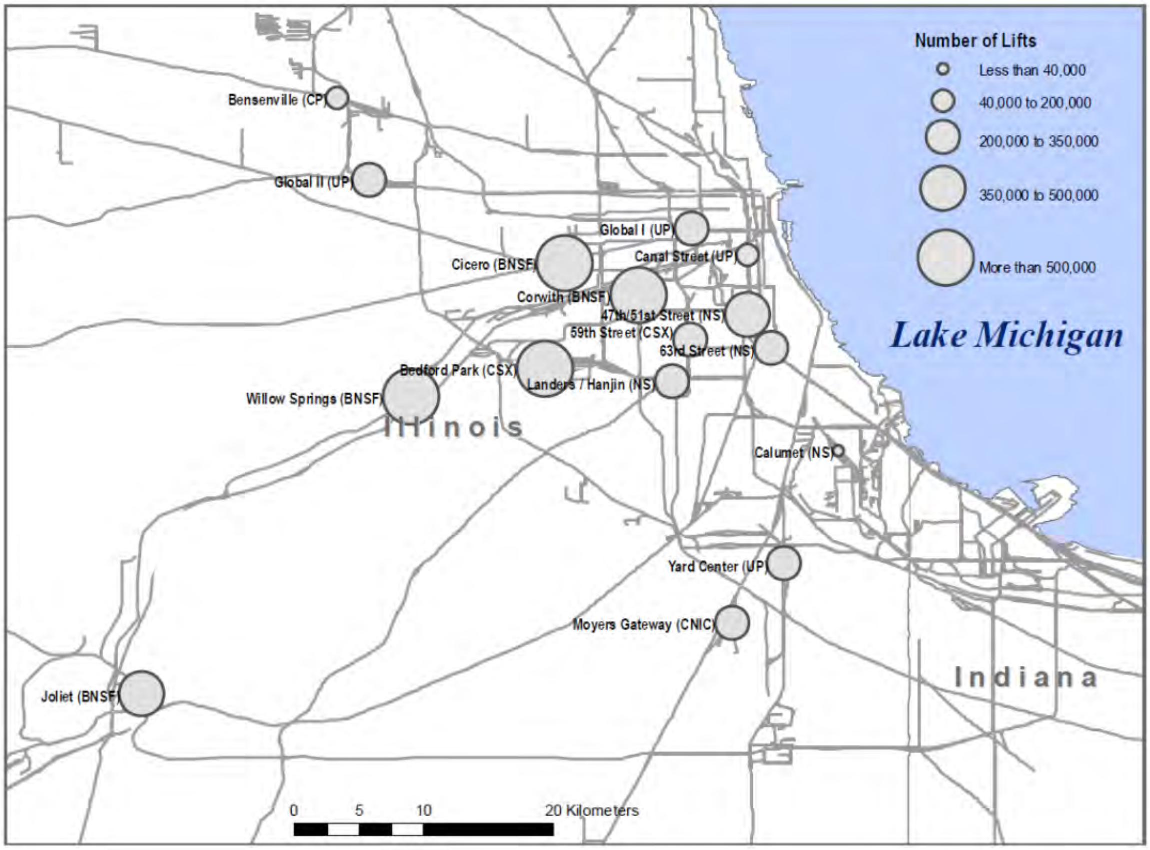


Figure 25: Chicago Area Terminals and Capacity Source: North America Competitiveness Council 2005

<u>Intermodal Growth in the Chicago Region</u>: Based on TTX forecasts and discussions with Intermodal Industry freight experts, the projection for intermodal growth in the Chicago area is significant. In **Figure 26** the historic intermodal lift counts from the Chicago Metropolitan Agency for Planning, (CMAP) are documented comparing 2000, 2005, 2006, 2009, and 2010 traffic volumes. Between 2000 and 2005 the number of Chicago area lifts increased 4.67%. Between 2005 and 2010 the lift count volumes increased 7.18% in an environment of higher fuel prices and an economy in recession. The 2010 lift count numbers do not take into account the new Global 4 or APL facility in the Centerpoint Complex in Will County, IL near Joliet, IL.

Year	**Chicago Lift Count**
2000	5,970,769
2005	6,249,605
2006	6,524,013
2009	6,144,848
2010	6,698,607
Estimated	***Chicago Lift Count***
2020	10,911,325
2025	13,925,922

Figure 26: Chicago Regional Intermodal Lift Counts Source: PFLLC 2012

Estimates for 2020 and beyond are based on TTX market studies and Container Port forecasts. It should be noted that increases in intermodal port volumes may lead to improved intermodal train efficiencies which may result in more point to point dedicated trains, which may reduce cross towns in Chicago. But the intermodal terminals in Chicago today will not have the capacity to handle these projected 2025 growth volumes given current facility sizes.

Drayage Considerations:

From drayage distance perspective, trucks historically have been considered the most economical mode for roundtrip movements of 500 miles or less. Since large Chicago intermodal facilities are mostly within that 500 mile radius from Wisconsin, container volume handled at Wisconsin facilities is quite modest and earlier studies have held that the need for additional in-state intermodal capacity may be limited, (Wisconsin Department of Transportation, 2010). **Figure 27** shows the distances between the major intermodal terminals based in Chicago and the

Twin Cities and city populations in the study area, (Wilbur Smith Associates, 2009).
The optimality of the 500 mile drayage distance number has been questioned, due to congestion, fuel prices and truck driver shortages. In the Eastern part of the U.S. rail intermodal terminals on the same railroad can be spaced as little as 200 miles apart. Western Class I railroads space their intermodal terminals from 500 to 700 miles apart; Eastern Class I railroads have intermodal terminals spaced closer together, in part, due to a higher population density. Continued growth in the study region may lead to spacing intermodal terminals closer together.

Cities	Distance to Chicago (in miles)	Distance to Twin Cities (in miles)
Green Bay, WI	202	278
Milwaukee, WI	89	337
Wausau, WI	276	186
Marinette, WI	257	300
Escanaba, MI	313	352
Marquette, MI	379	376
Superior, WI /Duluth, MN	468	154
Twin Cities	410	0

Figure 27: Distance Matrix to Regional Terminals in Study Region

10. Factors Which Impact Container Availability:

The ability to locate suitable containers for export cargo is essential to improving asset utilization, but finding ISO container for loading (or for booking) an international load can at times be a daunting task. Containers have been known to go missing from inventory lists either by mistake or design. Containers that do not have GPS tracking devices may be misplaced or be deliberately used for warehousing. This problem is so pervasive in the study region that intermodal trucking companies try to use only their own or their customers' chassis or ISO containers that are closely tracked, (Landberg, 2012). This loss of container visibility further compounds the reluctance of container owners to let their containers move into the hinterlands.

There have been numerous attempts to improve “off-terminal” equipment visibility in an effort to reduce empty miles. Southern California has been a testing ground for several virtual container yard operations and for several information based, software enabled solutions.

Some similar systems are in use in the Chicago market. In the Midwest grain and scrap paper are two of the primary export commodities which might provide equipment balance for highway, rail, and ocean carriers. Yet, truck size and weight laws, as well as vessel tonnage limitations, have resulted in a sub-optimized network. Earlier research found several solutions evolving to increase the utilization of empty containers and limit the “loss” of containers in the system, (Boile et al, 2004).

High value export cargoes are also competing for containers which have typically flowed to the hinterland regions in Wisconsin. The Illinois region is outpacing the nation in manufacturing jobs according to the Illinois Department of Employment Security. Coupled with a world class transportation network, more companies are bringing production and distribution activities back to North America. According to IHS Global Insights, the U.S. worker is three times as productive as the Asian worker and with intellectual property rights issues and growing labor uncertainties many companies are rethinking site location.

Container Management Systems Impact Container Availability:

To keep track of containers many systems have evolved and some common practices of container sharing are described below: (Boile et al, 2004)

Grey box pools: This is a system where container fleets are combined and each carrier contributes to the pool. The members who contribute to the pool each have access to equipment within the pool, yet on an operational basis there is no need to match the container and the carrier. Issues of competition, differences in corporate cultures, mergers and changing trade patterns have all been barriers to adoption. Many carriers view their equipment supply as a differentiating competitive feature. The internet has helped advance this process but once again the system relies on data entry and the partners are still resistant to the containers moving away from the port. Many carriers who participate in these pools have a management firm oversee the assets and provide reporting.

Box swapping: Box swapping is where marine carriers borrowing a box from a fellow carrier or lessor under a formal box match interchange scheme. According to Boile, the box match concept is easy to manage and produces significant savings for both the surplus and the demand parties, compared to other alternatives.

Horizontal Diversification: Companies create or team with companies to create backhaul opportunities when inland moves are necessary.

Yield Management: This is the art of maximizing profit in a business with substantial fixed assets by controlling and steering the asset's utilization. It has not proven to have widespread adaptability to container operations.

Policy Solutions: Companies and countries have introduced punitive measures for containers stored for more than a certain number of days. Though such policies if designed and implemented correctly can reduce the accumulation of empty containers in congested areas they may not result in the better asset utilization.

Logistical Solutions: Transloading two 40 foot boxes into a 53 foot domestic box can drastically reduce the turn-around time for the ISO containers. This process assumes that the transloading is occurring at the gateway port or at an inland port with crossdocking so the container’s turnaround time is minimized.

Container Technology Solutions: Another potential solution to the empty container accumulation problem is the promotion of alternative container designs, such as the collapsible or folding container. Conversely, this system does not address the issue of finding empty containers.

Chassis Pools:

Chassis are essential for the drayage of international intermodal containers. In the U.S., ocean carriers historically provided and managed chassis to move international containers to and from customers. There are over 700,000 chassis in the U.S. of which approximately 80% are dedicated to international traffic. According to the National Cooperative Freight Research Program (NCFRP) 43 Chassis Guidebook approximately 29% of the international chassis are owned and directly managed by ocean carriers, another 42% of these chassis are owned by ocean carriers but are managed by a co-op pool, 17% are managed in neutral pools, 6% are managed in terminal pools and the last 6% are managed by motor carriers.

Beginning in 2010, ocean carriers began to announce that they would be transitioning out of the direct ownership and management of the North American equipment. Approximately 40%

of the international chassis in operation today were built between 1985 and 1997 which means a significant share of this equipment is between 15-40 years of age. Several accidents which involved poorly maintained chassis raised industry concerns about liability. The Federal Motor Carrier Safety Administration stepped in and introduced a “roadability” rule in 2005 which became effective in 2009. This rule required the intermodal trucker to assume a shared safety responsibility for the condition of the intermodal equipment he pulled to and from the intermodal terminal.

In some instances large drayage firms have started to maintain and own chassis. In other cases, firms dedicated solely to maintaining and providing chassis to a pool of customers have been growing in number. Approximately 4,200 chassis can be stacked in the Elwood Terminal along with space for 5,000 wheeled containers and stacking for 6,000 more grounded containers.

Figure 28: Stacked Chassis (Photo R.D. Stewart)

The change in chassis management may have impacts on intermodal operations.

1. The availability of the chassis equipment may be reduced, thereby resulting in slower container cycle times and more storage requirements at critical terminals.

2. A change in ownership may result in more intermodal gate moves if chassis equipment is stored off terminal. More gate moves may increase congestion near terminals.

3. Increased parking for chassis may be needed outside the traditional equipment depots and terminals where current chassis equipment is stored today.

4. The aging fleet will need to be replaced and it is unclear who will pay for the replacement chassis.

5. Some international contracts are not specifying a daily charge for the use of a chassis. This may help the industry improve cycle time on an asset they have not managed before.

11. Container Inventory Tracking Tools:

Efficient freight transportation depends on the movement of three interrelated items. The first item is the freight, the second item is information related to the freight and the third item is the money related to the transaction. Containers add a fourth dimension because they are essential to the process but are not considered part of the freight by the shipper and even some of the carriers who do not own or lease the containers. The containers may be viewed, if at all, by the shipper as a form of packaging. The shipper is aware of the need for the container to use for their export but is not aware of the complexity involved in repositioning containers all over the world to meet demand while fitting a carrier's network.

Many individual companies have developed their own tracking tools. In both private and public systems, containers are tracked by their Bureau International des Containers et du Transport Intermodal (B.I.C.) serial number. Few containers are tracked using any global positioning systems. A number of approaches have been developed to try and keep track of empty containers and make them available in the intermodal system. For any of these systems to be successful, they must have information technology to keep track of the containers so the empty containers can be managed and matched with loads. All systems rely on timely active data entry from container users. The data entry is frequently the weak point in the systems and one of the reasons why containers owners and lessors want to keep the containers close to a port.

Once the container moves inland to a farm or rural location tracking becomes more difficult. A container whose location is not precisely known is "lost" in the intermodal system and empty containers may become lost when their location is not entered into data systems.

Equipment Location Reports and "Match Back" Services:

Carriers understand that balancing freight and equipment flow has a dramatic impact on carrier profitability. Brokers and Freight Forwarders have been the intermediaries who help match customer demand with carrier capacity. Historically load boards were managed via telephone contact, but as internet communication was more widely adopted in the late 90's many load matching services emerged.

There are many freight intermediaries interested in the identification of empty equipment and six alternative products are identified below. The services showcased are not endorsed by the research team.

Tracking Systems:

The tracking company eModal had been operating for years in the ports of LA and Long Beach. The company provided a way for our intermodal customers to manage truck registries, appointments, dispatching, chassis rental billing, and Maintenance and Repair (M&R) through a hosted solution at eModal.com. This system is located in or nearby ocean ports and it appears that it does provide regional tracking service to intermodal terminals in the study region. In March of 2012, eModal merged with Advent. Advent, Inc. is a leader in the development and delivery of mission-critical transportation systems, and eModal, a leading provider of online logistics solutions and products to create Advent Intermodal Solutions (AIS). This new company offers customers a suite of existing intermodal logistics software, as well as custom, purpose-built solutions. Both companies are focused on marine port intermodal operations and do not provide local tracking services to intermodal terminals in the study region.

SynchroNet:

SyncroNet was founded in 1996 and was developed to support a neutral global container database available to ocean carriers, container leasing companies, intermodal companies or NVO freight facilitators. The technology is available in 88 countries at 46,500 locations worldwide and gives users real-time access to a neutral database of more than 350,000 shipping containers. SyncroNet facilitates equipment interchanges in a real-time environment which enables a more efficient and timely interchange of empty equipment. The SynchroNet system aims to reduce the cost for a roundtrip container movement, reducing the importers cost, and linking the empty container with an export load in close proximity. In an example based in California a $350 roundtrip dray matchback could see a savings of $50-$80 per container shared between the importer and the exporters. Importers would save because they would not pay for a full roundtrip with an empty (unused leg). Exporters benefit by identifying a box for reuse and they are not paying for a full roundtrip drayage (within an inbound empty leg). The trucker benefits because he is paid for the extra work between the importer and exporter. Communities and local stakeholders benefit because there are fewer empty containers moving on local roads picking up or delivering international cargo.

SynchroNet has six distinct services:

- International Interchange – This is a container management service that enables international customers to access containers outside their own fleet when and where needed.
- North America Stack-Train Services – This is a web-based service providing visibility for containers moving by train between the U.S. and Canada.
- North America Street-Turn Services – This is a web-based service which facilitates efficient inland or port hinterland container street-turns.
- North American Domestic Interchange Service (NADIS) – A web-based system offering repositioning of empty containers to port destinations in North America.
- Exports-in-a-box – Provides U.S. and Canadian exporters with solutions to help identify marine containers available nearby key production and manufacturing facilities. This solution bundles SynchroNet intermodal systems with Schneider Logistics multi-modal capabilities including trucking, domestic intermodal, international stack-train service, and cross-dock operations.
- DoorLogistics – A 40' ISO container Door-to-Door service offered within the U.S. and between U.S. and Canada.

According to Synchronet's research, today about 20% of all container moves at sea are empty. An estimated $7 billion is spent each year repositioning empty containers. For exporters in rural areas or for intermodal users who are not in the immediate catchment area of an equipment terminal or depot, equipment visibility systems can help reduce drayage costs by up to 80% as demonstrated by several Synchronet customers.

International Asset Systems (IAS):

Another company International Asset Systems (IAS) coordinates with Maersk Lines and provides a variety of resources for tracking containers and chassis. IAS offers an Imbalance web based tool that enables ocean carriers, equipment lessors and NVOCCs to use expert brokers and find opportunities to buy and sell slot space along with imbalance management services. This allows IAS customers to exchange equipment and optimize container utilization. IAS claims that their system can save up to 65% in equipment repositioning costs. The IAS website claims: that the IAS InterAsset platform connects thousands of trading partners in 88 countries, including 18 of the top 20 ocean carriers, 7 of the top 10 equipment lessors, 2 of the top 3 logistics providers, approximately 3,000 repair depots and terminals, and approximately 1900 motor carriers with over 24,000 users making 60 thousand plus transactions annually, (http://www.interasset.com/global-connections.php accessed January 26, 2013). The firm lists a number of partners in the Milwaukee and Twin Cities region as well as in Winona, Neenah, and Green Bay.

The company's InterTurn system is an automatically updated website that creates an interface between trucking companies and ocean carriers so that the truckers can view the location of ocean carriers' empty equipment. InterTurn is integrated with ocean carriers' equipment systems allowing automatic updates on empty container availability and location. Only designated trucking companies can view an ocean carrier's containers and an automated system assists in obtaining carrier approval for equipment transactions. Using InterTurn the ocean carriers can flag and communicate "lease off-hire" and "for sale" units, (Integrated Asset Systems, 2006). IAS does have an office in Oak Brook, IL a suburb of Chicago.

Loadmatch.com:

Loadmatch and Drayage.com is a resource for the rail intermodal industry and any type of container which moves in rail service. The site provides visibility to those with loads that need power and/or equipment, (containers) for those that need a truck to move a load. A listing of empty intermodal equipment (both domestic and international) is available along with a resource guide including directions and facility information for intermodal terminals and equipment depots. This site is typically used by operations people who work for logistics service providers. When you pull up the map on the website each intermodal facility is an interactive icon. It allows you to search for third party transportation service providers in the area. The system lists drayage companies, equipment depots and site location maps by state and province and provides links to many other intermodal resources. Loadmatch has three main customer types which include third party logistics service providers, motor carriers which include over the road as well as drayage firms, and finally equipment suppliers. Equipment suppliers include asset owners such as leasing companies, railroads and ocean carriers. The Drayage Directory which is shown on this website has over 1933 unique drayage providers and is one of the largest intermodal exchanges. Members of the National Customs Brokers and Forwarders Association of America, Intermodal Association of North America and the Transportation Intermediaries Association are all regular users of this site. The way LoadMatch.com and Drayage.com makes money is through a flat monthly subscription. Members are required to adhere to Terms of Use and Rules of Conduct clauses. There is no contract for membership and there are no requirements to do business with any of the other member affiliates.

Government Container Inventory Systems (USDA OSCAR):

There is one government operated container tracking system run by the U.S. Department of Agriculture. The USDA Ocean Container Inventory can to a degree, highlight the number of international containers available for export. This tool is available on a weekly basis and is populated voluntarily by the ten member carriers in the Westbound Transpacific Stabilization Agreement, (WTSA) which include: APL, COSCO, Evergreen, Hanjin, Hapag Lloyd, Yang Ming, OOCL, NYK, Kline, and Hyundai Merchant Marine. Eighteen different locations in the U.S. have been selected to highlight container availability. The system does not guarantee containers for export but provides estimates for the current week and projections two weeks out.

The system does not track the availability of chassis to move the empty containers. A table with the average weekly container availability over a six month period was created for the Chicago and Minneapolis locations, (**see Figure 29**).

The containers that are available can be used in any applicable export market and not just agricultural products. Containers used to ship food grade agricultural products have requirements that may preclude their use in other markets and may mean that empty available containers cannot meet the agricultural product requirements. In addition an empty container may need to be returned to a particular market that is not the market that the export product needs to travel to. If the agricultural product needs to be loaded into a container at a remote location away from the intermodal terminal then the time involved may make employment of an available empty container unprofitable. The availability of empty containers is also seasonally driven. Import containers from Asian markets have a peak season of roughly July to October that may not coincide with export markets. In the study region Minneapolis is the only location providing data outside of the Chicago market, (U.S. Department of Agriculture, 2013).

Container Type	Minneapolis	Chicago	Total
20 foot	200	1,703	1,903
40 foot	281	1,450	1,731
40 foot High Cube	223	1,022	1,245
40 foot Refrigerated	4	106	110
20 foot Refrigerated	1	8	9

Figure 29: USDA Container Inventory Report 2012

Six-Month Snapshot (July 12- December 12) of Minneapolis and Chicago empty container weekly availability (Source U.S. Department of Agriculture, 2013)
http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5101927

Transload Operations:

Many agricultural shippers in the supply chain do not have shipping contracts and rely on transloaders or grain merchandisers to move their export product. Large transloaders have struck alliances with regional retailers to assure a steady stream of intermodal equipment.

There are 41 transload operations in Illinois, 16 in Michigan (none listed in the Upper Peninsula), 17 in Minnesota and 9 in Wisconsin where full carloads of rail freight are transferred to or from trucks or vessels at Ports. These facilities tend to specialize in bulk commodities. Some focus on bulk liquid transfers, some focus on paper, lumber or steel products. Transloading is not limited to bulk products. Some transloaders handle food products and garments.

Railroad websites are a good source of information for transload operations. Another source is the Transload Distribution Association (TDA), which is a trade group that posts their member locations and services, http://www.transload.org/ . Their website only lists TDA members which may not include all transloading facilities in the study region. Some of these facilities are located on short line railroads or near marine ports or river docks.

Short line railroads have begun establishing transload operations to expand their customer base and increase their trainload volumes. As fuel prices continue to remain unstable and as concerns over a shortage of truck capacity loom on the horizon, more companies are exploring transloading as an option. While this practice has been in existence for decades, few statistics have been captured to highlight growth trends or service packages.

Transload centers, grain consolidation facilities and some logistics parks enable the railroads to continue to provide carload service to compliment the intermodal activities. Transloading operations have become more popular in recent years to help rail carriers consolidate switching activities. To provide collection and distribution services to these centers, the Class I railroads continue to divest low-density branch lines to short line railroads, who can operate at lower cost than the Class I railroads, (Cambridge Systematics, Inc., 2010). Many short line railroads are now providing service to and promoting transload centers. A concern for these shipments is if a short line/regional railroad intermodal operation does not have direct access to a Class I railroad intermodal terminal, the service would not be as efficient or operationally cost effective. There is also the concern that ISO container availability for transload operations on a short line may be insufficient during high demand periods, (Fang Wu, K.M., 2008).

BNSF has developed a "Premier Transload Network" where it certifies transload operators located on the BNSF network to perform freight consolidation/deconsolidation activities which feature warehousing services, lay down areas for dimensional products like lumber, pipe or steel, and bulk transfers for agriculture products such as fertilizer or grains. Norfolk Southern railroad has a transload network devoted to multimodal transportation. UP railroad has a web based system whose acronym is UPDS network which aids customers with unique door to door solutions. UPDS provides door-to-door transportation products by combining the economics of long-haul rail service with the flexibility of over-the-road movements. CSX, CN, and CP all offer similar carload based distribution aided networks.

The U.S. is the world's largest producer and exporter of corn and soybeans, contributing 40% of the world's total production and almost 50% of the world's exports. Minnesota is the seventh largest agricultural exporting state in the U.S. For Class I railroads grain and grain related food products accounted for 7.9% of carloads, 11.3% of tons hauled and 12.2% of revenues. Much of the grain exported has to travel long distances (more than 1,000 miles) to reach U.S. ports. Rail is particularly important for the transportation of exported grain to ports for shipment to foreign destinations by water. Duluth, MN in the study region ships 32 million short tons of grain domestically by rail carload and as much as 14 million short tons of grain internationally by vessel, (USDA, 2004).

In some export operations identity preserved grain from the field is loaded directly into a container that has been sanitized and lined with a plastic bag. In other operations soybeans and Dried Distillers Grains (DDG) are trucked to a transload operation and containers are loaded on or near the rail terminal. In some cases high value food grade product is bagged and loaded into containers on pallets. Bulk product blown into containers can be loaded to 57,000 lbs. This is a higher load limit than if the container were moved by truck in accordance with the current Interstate highway limit of 80,000 pounds gross vehicle weight. The heavy weight container may be permitted on state roads or for movement within freight terminal ports or complexes. Drayage companies pick up containers for delivery to the nearest intermodal rail terminal. From there, it moves by train to a seaport. Utilizing containers, the specialized grain producer can control the individual shipment from the farm to its final overseas destination rather than merely from the farm to the first elevator (**see Figure 30**), (Wilbur Smith Associates, 2009).

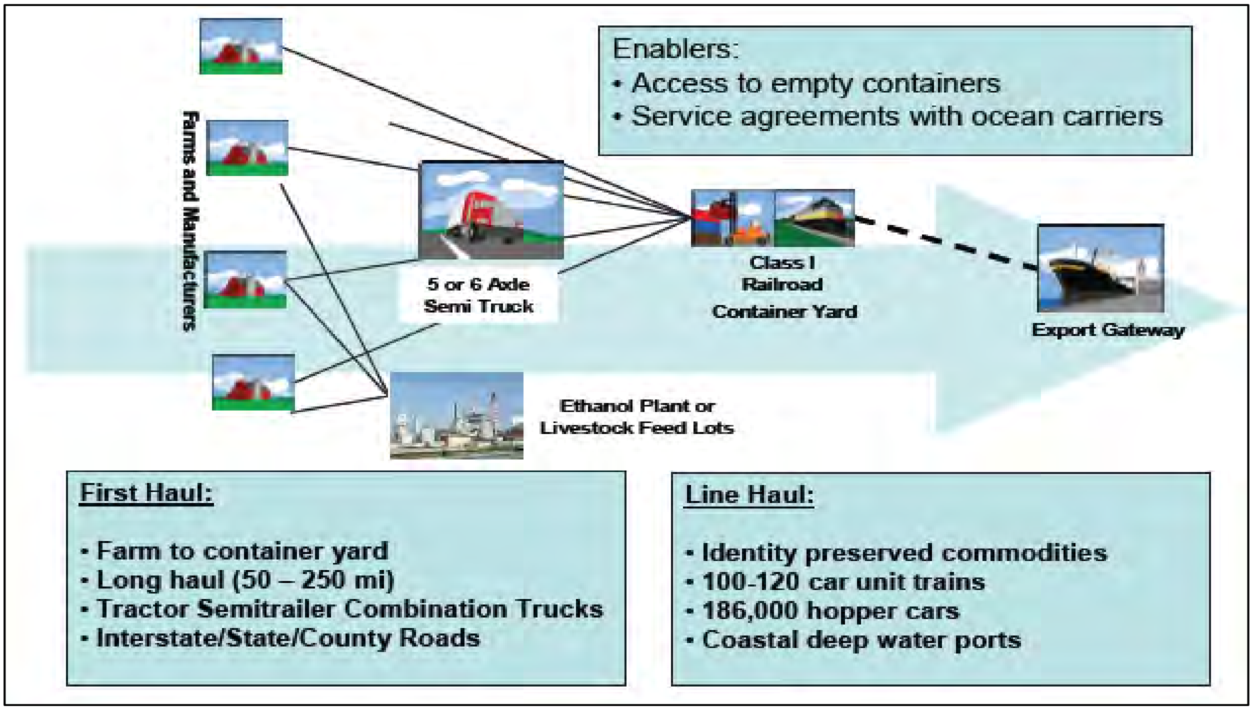


Figure 30: Supply Chain for Containerized Agriculture Source: Wilbur Smith 2009

Grain can also be loaded into intermodal containers at or near rail intermodal terminals. Examples of these terminals include Prairie Creek Grain Company located near the BNSF intermodal terminal near Joliet, IL and CN's terminal grain loading locations in Homewood, IL and Chippewa Falls, WI. Other agriculture reload operators are located within the Center Point Intermodal complex where no oversize or overweight laws apply within the property. Rail lines face difficulties in fitting their operations with the changing demands of intermodal supply chains. This is especially true when a primary cargo is a dense product, such as grain. Railroads load containers into well cars to transport the loads to destination. Many of the well cars are weight restricted and cannot carry two over weight containers in the same well without overloading the railcars. Railroads measure productivity by the number of empty hitches per train. An empty hitch is an old term which was used in association with TOFC shipments but has survived in the containerized world. An empty hitch refers to an open slot in a double stack train. An open slot represents a lost revenue opportunity for the train and creates aerodynamic drag, increasing fuel usage. If railroads move too many overweight containers, this can result in an in-balance of well cars in the rail network.

12. Stakeholder Interviews:

During May 17 and 18, 2012 the research team toured and observed intermodal and transload facilities in the Chicago region.

CN Homewood Terminal:

Figure 31: Grain Transfer Station CN Homewood, IL (Photo R.D. Stewart)

Located next to the CN intermodal terminal in Homewood, IL, the facility was opened in April of 2008 with a projected capacity of 24,000 containers per year. The transload operation can transfer product from railcar or truck to containers. At the time of the visit the majority of the inbound product was brought in via railcar to be transloaded to containers. The volume of one hopper car can load 3.3 containers. One to two trucks can load one container if the product comes in directly from the highway. The purpose of the facility is to promote balanced container movement for international equipment and to serve a growing agriculture export market. Value added services provided at the facility include sampling, fully automated weighing, and handling Identity Preserved (IP) grains. The facility is located on the CN property so containers can be loaded up to 57,000 lbs. which otherwise would not be legal to transport on local roads without a permit. CN does not charge extra to move overweight containers. Trucks or rail cars can dump agriculture products onto the endless belt where the product is then moved to storage or directly blown into the containers. The entire loading operation is protected from the weather, (**see Figure 33**). CN railroad provides rates and service to agriculture customers (among other customers) and also provides rates and service for the ocean carriers who provide the containers. CN also has a trucking division, but agricultural products moved directly from the farm or the farm cooperative can be farm owned equipment or for hire carriers. CN Worldwide is a non-vessel operating common carrier (NVOCC) who acts as an intermediary between the rail carrier, the customers, and the ocean carriers, additionally they provide customer service and other export documentation services. Other products can also be transloaded at this facility. The study team observed plastic and chemical bulk transfer operations during the visit.

Figure 32: Container Loading CN Terminal (Photo R.D. Stewart)

In order to load the full length of the container an auger that is self-braced extends into the container. The auger is positioned horizontally, near the roof of the container, entering from the rear. Then 4 or 5 2x6's which are pre-cut to fit across the inside of the rear door sill, are spaced about 3' high across the back door opening to form a gate. Cardboard is stapled to the 2x6's before the container is filled. At the time of the visit this facility was primarily occupied with loading dry distiller grains (DDG) for export. It takes approximately 30 minutes to load a container. Approximately 20 containers are loaded per day in Homewood.

BNSF - Terminal Chicago:

The BNSF Logistics Park in Elwood, IL not only handles ISO containers but domestic containers, piggyback, and auto trains. The 621-acre Center Point Rail Intermodal Terminal in Elwood, IL that opened in 2002 is on the site of the former Joilet Arsenal. BNSF intermodal terminal has a projected lift capacity of 70,000 lifts per month with a lift counting as a movement of a container on or off a train. They move approximately 2,500 trucks in and 2,500 trucks out of the gates per day. The facility uses a Windows based real time system called Oasis to track containers. All service vehicles have an Oasis system allowing employees to check inventory and locate containers while moving about the terminal. This logistics cluster is creating spin off operations in a wide variety of services that employ the containerized cargo and transportation network.

Oak Brook, IL based Center Point Properties has developed the 2,242-acre Deer Run Industrial Park that contains the BNSF Intermodal terminal. Examples of other logistics related companies located in the industrial park include, Container-Care International Inc. and Partners Warehouse Inc., Wal-Mart, Clearwater, Georgia Pacific, and Sanyo.

Container-Care provides BNSF container maintenance and storage services, and offer rail users off-site container storage. Partners Warehouse Inc. is a freight transportation provider that processes rail-to-truck and truck-to-rail bulk cargo shipments.

Other Grain Transload Operations:

The availability of empty containers in the Chicago region has created agricultural backhaul opportunities. Large and small companies have established sites located near the rail intermodal terminals. In discussions with the companies one of the issues brought up several times was the weight limits on roads that service these grain container transload operations. Local communities are often opposed to the increase truck traffic along rural highways and discourage operations through increased taxes or permitting requirements. Container availability can be a problem when containers arrive that have not been cleaned to food grade standards or have carried products prior to loading that are incompatible with food grade agricultural products. A few miles away from these facilities is the Illinois River that links to the Mississippi River System providing barge service to bring in grain and elevators for storage of grains.

Figure 33: Delong Container Transload Facility (Photo R.D. Stewart)

The Delong Company based out of Clinton, WI offers a wide variety of container related services in addition to container loading facilities. Delong is a grain merchandiser which means they buy agriculture products from growers and then sell the aggregated volume to buyers overseas. In Illinois producers cannot sell directly to off shore buyers without an FDA license which requires producers to certify and maintain quality standards. Many small producers who do not have on farm storage must sell their produce when harvested, often when demand for containers is highest. Farmers with small operations prefer to let merchandisers like Delong manage the contracts and certifications. Delong provides 24/7 import container drayage service to Chicago facilities with storage at secured lots. The website offers a container availability service for their customers. Twelve of DeLong's 19 grain terminals are in Illinois with access to export containers and intermodal terminals. Most of the product DeLong ships by container are Identity Preserved products with a higher unit value. DeLong recommends that farmers who want to ship their product by container, should first see if they can afford to ship their product to the Chicago/Joliet area where containers might be available, (Illinois Field and Bean, 2012). One of the locations where DeLong loads export containers is in Joliet, IL, (**see Figure 33**). In 2011 DeLong expanded some of its container loading operations into the CenterPoint Logistics Park.

In June 2012 Gavilon was sold to Marubeni Corporation, the former Gavilon grain and ingredient transload facility in Joliet IL, located three miles north of Union Pacific's intermodal terminal, (**see Figure 34)**, is capable of loading up to 100 containers per day and unloading from both truck and barge into storage for transloading into containers. Barges can be loaded on the Illinois River, which feeds into the Mississippi River system. From 2006 to 2011 the amount of grain shipped by containers doubled and in 2011 over 60 million bushels of grain moved by container out of Chicago's intermodal terminals, (Cain, 2011).

Figure 34: Gavilon Grain Transloading Operation (Photo: R.D. Stewart)

Midwest Bulk is another company that provides transloading services to the grain and feed export industry for Midwest area exporters. Midwest Bulk Transload is located in Joliet, Illinois near Chicago, and able to access containers and serve the nearby BNSF's Logistics Park and UP's Global 4 intermodal shipping yards. Midwest Bulk is served by a CN Rail line connection. They can also provide container loading service to the UP and BNSF. Midwest Bulk can provide transloading services, container drayage, grain inspections, export certificates and other services for handling exports of corn, soybeans, and other agricultural products.

CN Intermodal Terminal – Chippewa Falls, WI:

The Chippewa Falls terminal serves the gateway port of Prince Rupert, British Columbia, Canada. Prince Rupert was opened on September 12, 2007. The containers are offloaded from the vessels and placed on double stack rail cars in Prince Rupert and once loaded, CN dispatches 10,000 foot trains from Prince Rupert to Chicago, IL with an intermediary stop in Stevens Point, WI. In Stevens Point 1,500-2,000 feet of train are uncoupled and drayed back the ninety miles to Chippewa Falls, WI, (Louis, 2012). This new terminal services three trains a week with each train consisting of 30 - 40 containers. On arrival in Chippewa Falls the containers are either stacked or loaded onto chassis, **(See Figure 35)**. The expected annual volume was 5,000 containers per year. As of early 2013 the terminal handles up to four trains a week with 70 to 80 carloads per train which amounts to roughly 14,500 containers per year, (Graham, 2013). The facility has a 2,500 foot long loading/unloading track with ground storage for approximately 150 containers.

Figure 35: Container Loading Chippewa Falls, WI (Photo Alex Christian)

In November 2011 CN opened a paper ramp located in Minneapolis about 90 miles from the Chippewa Falls terminal. The bonded terminal offers accessibility to empty container supplies and CN will arrange transportation to the Chippewa Falls terminal. Loaded containers at the Minneapolis ramp require use of the TRAC chassis pool and CN provides full CN eBusiness system capabilities such as tracking, reservations, and billing.

Figure 36: Transload Operations Truck Unloading System Chippewa Falls, WI (Photo Alex Christian)

At the Chippewa Falls facility an exporter fills the containers with Dried Distiller Grain (DDG) from grain trucks, (**see Figure 36**). These containers are filled to 56,000 pounds in both TEUs and FEUs. In addition to the DDG corn, soybeans, and other dry bulk grains are loaded offering Minnesota and Wisconsin grain producers easy access to Asian markets and improving lane balance. This facility is open to the elements during the loading process. According to the Midwest Shippers Association Arcadia CO-OP based in Arcadia, Wisconsin, transloads grain delivered by truck into containers for shipment via the Canadian National (CN) Railroad to the ports of Vancouver and Prince Rupert, B.C. in Canada for export worldwide.

13. Potential Solutions to Container Availability in the Study Area:

Information Sharing:

An improvement in information sharing could be a win-win opportunity for carriers, exporters, and communities. Enabling visibility of equipment outside the terminal may help carriers reduce empty miles and would reduce drayage cost for exporters. One example is the Cross-Town Improvement Project that was adopted in Kansas City. It is an information sharing program designed to minimize unproductive and unnecessary moves of intermodal equipment on the highways. Coupled with and dependent on information sharing was Wireless Drayage updating, Real Time Traffic Monitoring and Dynamic Route Guidance.

The goals of the Cross Town Project were to:

- Reduce highway congestion by reducing empty truck moves.
- Create an Intermodal Move Exchange (IMEX) that would coordinate the activities of the railroads, terminals, and drayage companies.
- Chassis utilization tracking system to track and effectively manage chassis.

Tracking goods movement is very sensitive to the railroad industry and the IMEX operators had to sign nondisclosures that they would not be tracking any goods movement. It is considered very competitive information and is scrubbed out of the data that was used to determine success of the program. The results of the Kansas City Cross-town project were significant. According to a report by Butler in 2012:

- There was a 13% reduction in Empty Bob Tail Moves
- There was an 8% reduction in fuel consumption
- The improved moves and reduced fuel consumption reduced emissions by 10%
- Travel time was improved by 19%

The advantages of information sharing for loaded and empty containers can be translated into a monetary amount, making the information a valuable commodity. Using this information companies can control market access, cut costs, and improve customer service all of which provide a competitive advantage to the company with the information. An information company can make a profit selling the information to companies too small to gather it themselves. The likelihood of this information becoming publicly available at no cost is unlikely in a competitive economy.

The existing information sharing systems in the study region can be refined, expanded and may provide adequate tracking provided data entry becomes more automated so that empty boxes become more visible while in transit. ISO container availability would ideally be tracked on a real time basis with electronic access to location and status. This critical information would be available to a wide range of users insuring minimum empty container movement and coordination of cargo movement. There is the possibility of a private neutral third party controlling a large enough portion of the data to harmonize and maximize the efficiency of the information system.

At locations with a high concentration of intermodal movements it may also be feasible to adopt a system like the pilot program in Kansas City, as long as the data can be scrubbed so the business data remains confidential. Questions remain whether such a system should be in private or public hands and if in public control how would it be funded, and which agency should manage it.

VICS –Shippers Associations/Cooperatives:

The Voluntary Interindustry Commerce Solutions (VICS) Association was launched in 1986 primarily to help vendors and retailers manage inventory and replenishment forecasting. VICS pioneered the implementation of a cross-industry standard, Quick Response (QR) that simplified the flow of product and information in the retail industry for retailers and suppliers alike. VICS member companies have proven that a timely and accurate flow of product and information between trading partners significantly improves their competitive position. Since the economic downturn in 2009 and to combat high fuel prices for their members, VICS has worked to reduce empty miles by helping members match loads and empties. They have established a website, www.emptymiles.org which provides users with visibility of containers. More than 30 carriers and shippers are using this service in the U.S. One retailer noted that they are able to match 30 backhaul loads per week with one carrier, saved an average of 30% on the backhaul rates, and expect to save approximately $25,000 per year in transportation costs. The motor carriers participating in this effort have been able to eliminate, on average, 11% of their empty miles and have increased their backhaul freight volume by 22%. There are also other examples of shipper associations and shipper freight cooperatives which have achieved transportation cost reductions through collaboration and pooling of loads. Railroads often discount freight rates on carload equipment based on predictable volumes and freight density. Establishing a freight cooperative or shipper association requires a neutral or separate entity to administer a safe harbor to avoid anti-trust claims. A VICS type model maybe viable for the export community in the study region.

14. Potential New or Expanded Intermodal Terminal Locations within the Study Region:

To improve the supply of containers for export in the study region the establishment of new intermodal freight terminals could help export markets gain access to equipment. The decision to establish new terminals has historically been the decision of the rail carrier based on network transportation needs, end to end train schedules, equipment balance, market demand and other competitive factors. In the past decade one of the biggest trends in economic development has been to promote freight villages or logistics parks, based on the theory that market access to the global community is essential for growth, and that transportation, logistics and distribution jobs support a family sustaining wage structure. A new intermodal terminal would certainly provide additional options for shippers as has the new CN terminal in Chippewa Falls, WI.

This fact raises the question if there is sufficient market and opportunity for one or more additional intermodal terminals and/or an expansion of existing terminals in the study region. Historically western Class I railroads have preferred to space their intermodal terminals over 500 miles apart. In the study region there appears to be two possible locations for the development of inland ports.

1. The Twin Cities Region
2. The North Eastern Wisconsin Region

For each of these regions there exists demand for import and export products. The development of one site does not preclude the others but ultimately development will be based on demand.

Twin Cities Region:

The Twin Cities catchment area is over 300 miles from Chicago's inland port. Two potential locations in the proximity of the Twin Cities have the potential attributes for the development of an inland port. The Twin Cities currently has two intermodal terminals served by BNSF and CP with a ramp that serves the CN intermodal terminal in Chippewa Falls. There is a marine port on the Mississippi River, a population base in the millions with an already existing robust logistics knowledge base. Locating the inland port facility in the metropolitan area may be difficult as the two existing intermodal terminals have very limited space for development and highway congestion is an issue. The fact being inland ports do not need to be located in metropolitan areas but appear to work best in rural or medium size cities within a 150 mile or less drayage distance of the population centers.

The areas around Duluth or Eau Claire may provide additional options for an inland port to serve the Twin Cities region. Both regions have about the same population base. Eau Claire has connections to I-90 & 94 as well as U.S. Highways 29 and 53. The CN Terminal in Chippewa Falls is close by and the Twin Cities is only 95 miles from Eau Claire. Duluth is 150 miles from the Twin Cities and Eau Claire. Duluth is served by four Class I railroads, is the largest port on the Great Lakes, has an international airport, is a port of entry, has access to I-35, and U.S. Highways 53 and 2 and has a developed modest logistics base.

The lockout and resultant congestion occurring from 2003-2008 in the ports of LA and Long Beach coupled with the Canadian government's comprehensive gateway initiative supported the development of the deep draft container port of Prince Rupert and options for a container port in Melford, Nova Scotia. The system of containerization allows cargo that was historically tributary to a particular port to include other ports in other contiguous nations. There is nothing illegal in the diversion of cargo including the added benefit of not paying Harbor Maintenance tax, (Federal Maritime Commission, 2012). Efficient container rail service from the study region to gateway ports will be a key to economically moving the containers long distances. Rail routes to major gateways already exist and recently railroads have been investing in improving infrastructure where there is clear evidence of demand. The existing gateway port rail routes for one of the suggested geographical areas for an inland port are in **Figure 38**.

CN also has rail lines that run from this location via the Sault St. Marie to the ports of Montreal and the proposed port of Melford and the line runs close to the Green Bay area. The Central Wisconsin portion of the line would have to be significantly upgraded. There would need to be substantial and sustained demand to justify the capital investment so the route was not included in the map. There may also be options for short line railroads to feed into the logistics cluster as proposed in "Short Line Rail: Its Role in Intermodalism and Distribution" where the short lines pool cargo to and from areas they serve, (Betak, 2009).

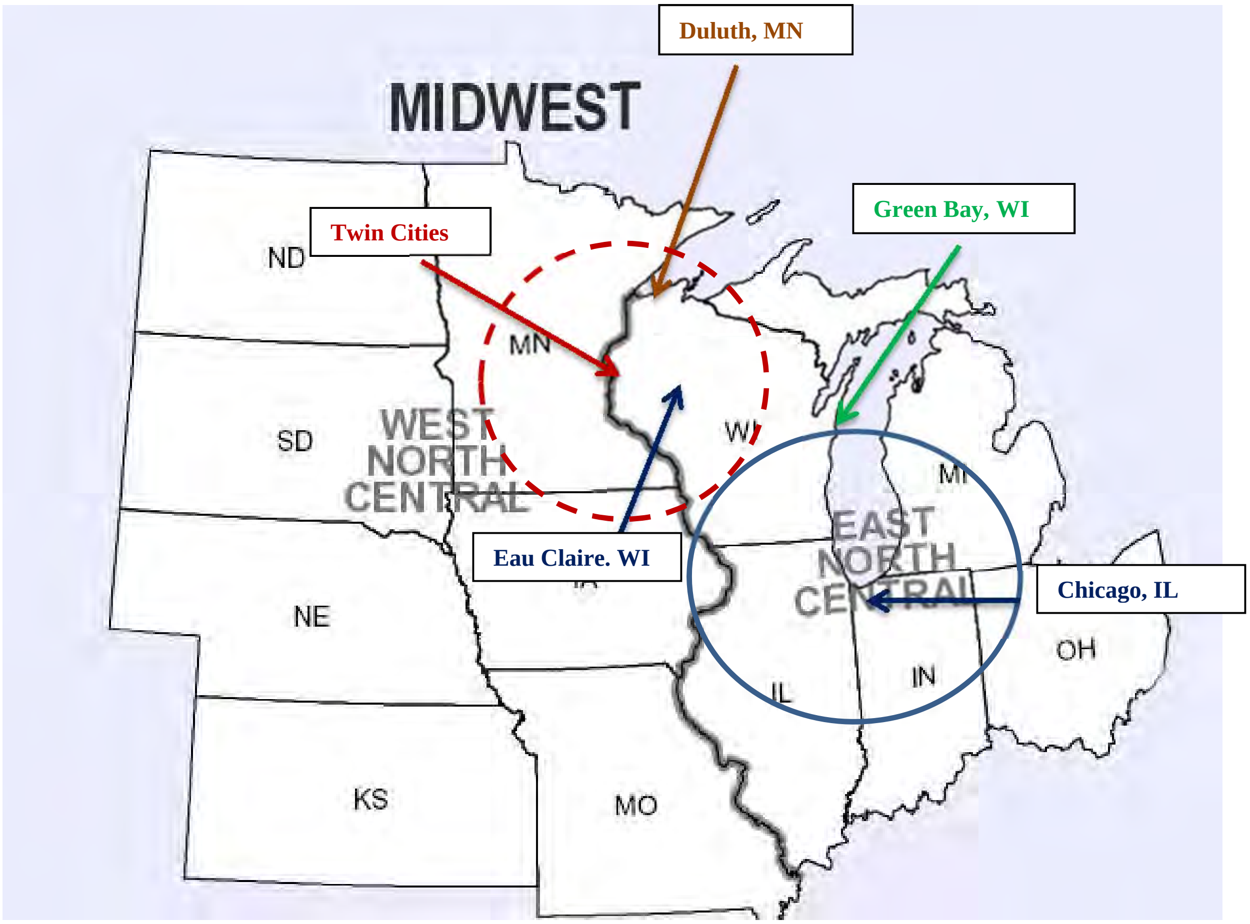


Figure 37: Potential Inland Port Locations Circle - 200 miles

Northeast Wisconsin:

Northeast Wisconsin is one of the paper making centers in the U.S. with box and corrugated fiber manufactures, multiple tissue producers and fine quality magazine paper facilities. The region is also a food producing and processing center with meat, cheese, and vegetable packaging operations. Northeast Wisconsin is the third largest population center in the state and is a regional distribution center for the Upper Peninsula of Michigan and Northeast Wisconsin. This area is approximately 200 miles north of the Northeast Illinois rail complex and 240 miles north of the mega rail international terminals in Joliet/Elwood. According to several drayage companies interviewed, it costs $700 - $800 plus a fuel surcharge which as of March 2013 adds 39% to the total price. Drayage costs are typically calculated based on the time it takes to accomplish a round trip movement; placing and emptying from a rail terminal or depot and pulling a load back to the rail terminal. To access Northeast Wisconsin truckers must pass through the heavy congestion of Milwaukee and Chicago to reach intermodal terminals in Illinois. Northeast Wisconsin has access to U.S. - 41 and 29 which can permit overweight containers as non-divisible loads and also I-43. There are marine ports in Green Bay, Marinette, Manitowoc, along with a strong logistics knowledge base compliment the region. Wisconsin Central had three intermodal terminals in the region prior to the sale to Canadian National. Facilities in Green Bay, Neenah and Stevens Point were closed in 2002. In 2013 the CP closed their intermodal terminal in Milwaukee. Both Milwaukee and Green Bay have undertaken studies to identify intermodal volume potential to reestablish service in each location.

Advance Green Bay Area Economic Development released a report approved on February 22, 2013 which convened a group of carriers and shippers in the region. A demand survey was undertaken to identify potential volume generated by a group of 404 manufactures in 17 Wisconsin counties and 9 counties in the Upper Peninsula of Michigan. Estimates of mode conversion based on 2011 shipment data, estimated that 38,100 inbound lifts and 51,326 outbound lifts could be realized if intermodal service was reestablished in Northeast Wisconsin. Recommendations from this report include reopening the intermodal terminal in Green Bay with potential terminal services and connections facilitated by the Escanaba and Lake Superior Railroad, (E&LS), who received pricing and interchange rights when the Wisconsin Central was sold to CN, (Advance, 2013). Availability of an intermodal terminal in the Green Bay area might also open opportunities to the Upper Peninsula. E&LS had TOFC service for Smurfit from Ontonagon for approximately half a year in 2008. Recently, another customer has expressed their interest for potential intermodal movements.

The creation of an inland port in the study region is a long term (5-10 year) project. Critical to establishing an inland port, and perhaps a logistics cluster, would be cooperation from government planning and environmental agencies, commitment by shippers as well as rail and motor carriers and equipment providers.

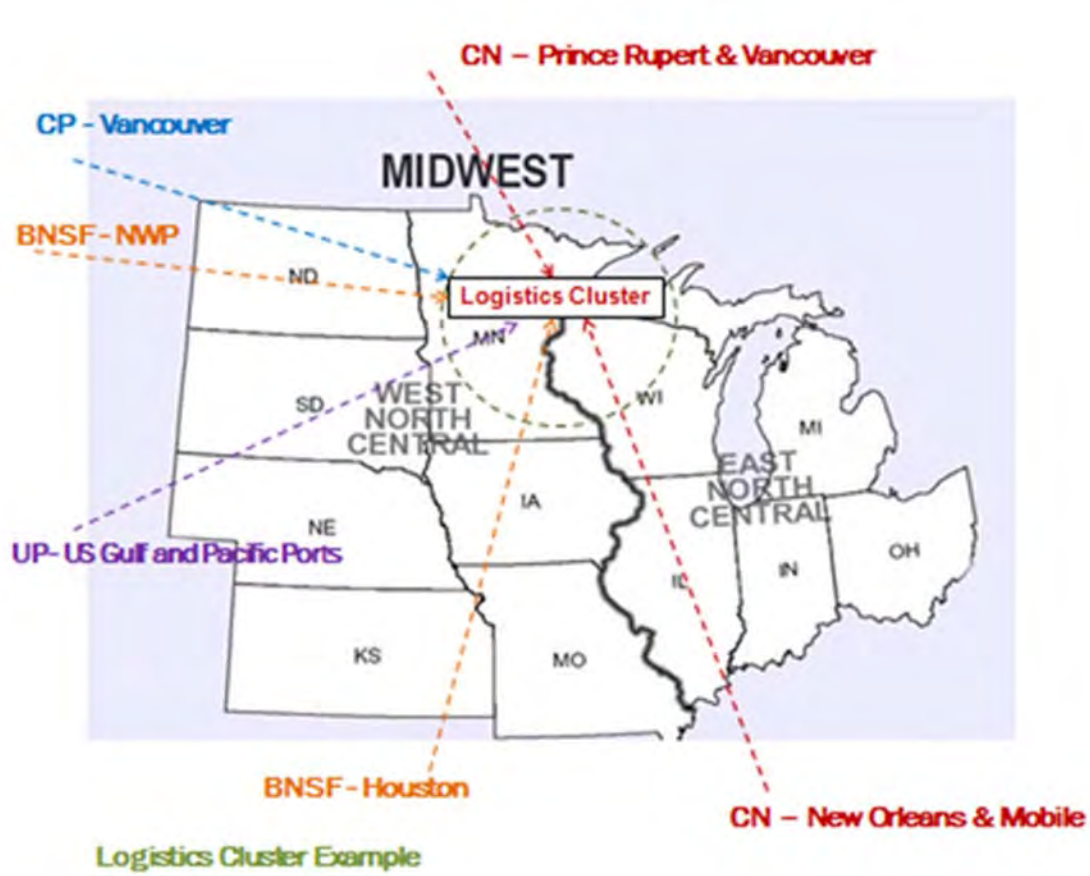


Figure 38: Existing/ Potential Rail Routes from Proposed Logistics Clusters to Gateway Ports

15. Outreach Efforts:

The Council of Supply Chain Management Professionals held a Spring Seminar on April 3, 2013, entitled "The State of Intermodal Transportation in Wisconsin". Over 87 attended the program which featured speakers from Canadian National Railroad, Dr. Richard Stewart, U.W. Superior and shippers, carriers, and local planning organizations. Mayor Jim Schmit was the opening speaker. This program provided an opportunity to validate findings from the research effort. Exporters, drayage providers, container providers, a railroad and an economic development agency discussed equipment depots and how the location of intermodal freight terminals impact container logistics for export.

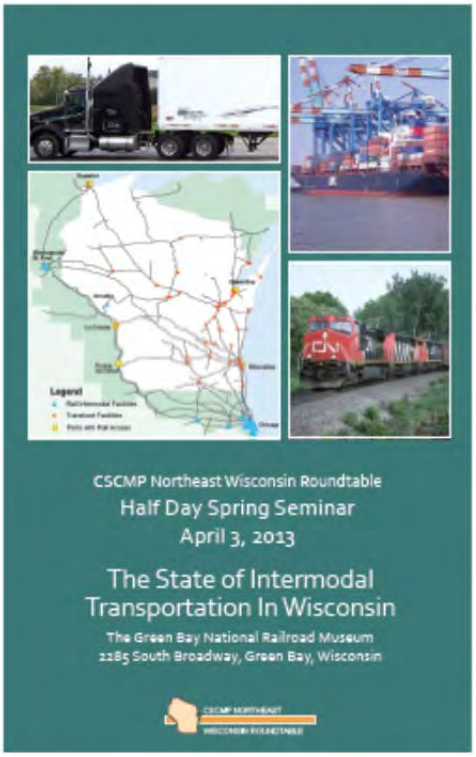


Figure 39: CSCMP Spring Seminar Brochure

AGENDA

7:30 am	HOT BREAKFAST BAR/NETWORKING & REGISTRATION
8:00 am	WELCOME • James J. Schmitt, *Mayor Green Bay, WI*
8:15 - 8:45 am	INTERMODAL TRADE AND INDUSTRY TRENDS • John Woodcock - *TTX*
9:45 - 10:15 am	INTERMODAL OPTIONS IN WISCONSIN This session will examine intermodal services in Wisconsin from multiple perspectives. A shipper will discuss the intermodal system needs and requirements. Carriers will describe intermodal services in various parts of the state. • Jodi L. Schneider, *Johnsonville Sausage* • Dwight Weber, *APL Logistics* • Jeff LeClaire, *Bay Motor Transport Inc.* • Gordon Graham, *CN*
10:15 am	*BREAK*
10:30 - 11:45am	INTERMODAL DEVELOPMENTS AND EQUIPMENT ACCESS Presentations in this session will discuss how intermodal networks and services have evolved in Wisconsin in an ever changing intermodal environment. • Steve Rose, *Hub Group:* "Intermodal Network Evolution" • Dan Drella, *Schneider National* "Intermodal Equipment Evolution" • Dr. Richard Stewart, *UW Superior.* "Container Pooling Analysis" • Fred Monique, *Advance* "Intermodal Demand in Northeast Wisconsin"
11:45 am	CLOSING REMARKS & SCHOLARSHIP PRESENTATION
Noon - 1:00 pm	GUIDED TOUR OF THE GREEN BAY NATIONAL RAILROAD MUSEUM – REGISTERED GUESTS ONLY

Figure 40: CSCMP Spring Seminar CN Gordon Graham Speaker

Figure 41: CSCMP Spring Seminar R.D. Stewart Speaker

Other outreach efforts included:

- The Midwest Shippers Association, Minneapolis, MN, August 27-29, 2012 – This conference featured presentations by Maersk, BNSF Logistics, CN and included a tour of Chippewa Falls, WI intermodal terminal. The concept of Match Back was discussed in detail.

- The Heartland Shippers Conference, Des Moines, IA, April 17-18, 2012 – This conference provided the opportunity to examine the government programs which support the national export initiative. Exporters, drayage providers and grain transloaders were available to discuss their interest in export container availability.

- Intermodal Association of Chicago, Chicago, IL, October 1, 2012 – A survey was completed prior to the meeting to identify the chassis availability. Equipment visibility and drayage service were discussed.

- Council of Supply Chain Management Professionals Green Bay Roundtable Spring Seminar, April 3, 2013.

- Minnesota District Export Council, Access the Western Hemisphere Conference, April 24, 2013.

16. Future Study Areas:

Potential options for improving ISO container availability in the study regions may require more in depth study to follow this research effort. Potential topics for further studies include:

1. Where feasible have heavy weight corridor(s) connect the inland intermodal terminal to large customers. Corridors could enable larger loads (gross vehicle weight) either in ISO containers or other vehicles to be moved.
2. Encourage Ocean Carriers to increase the amount of "free time" to improve opportunities for "match backs".

3. Create shipper cooperatives or trade associations which can coordinate shipping information concerning equipment flows to improve container utilization.
4. Establish drop lots in several regions which would support multiple customers. Equipment in these facilities must be visible to all who use or support these pools.
5. Examine the opportunity for "sprint train service" connecting to hubs within a 500 mile catchment area, possibly utilizing short line railroads.
6. Examine limited Class I rail service for secondary terminals such as the one in Chippewa Falls, WI with a limited service model.
7. Encourage Logistics companies such as BNSF Logistics to coordinate the inland transportation for ocean containers in an effort to aggregate shipping volume and density.

17. Conclusion:

An ideal system would carry freight in both directions during drayage with limited bobtail activity and there would be equipment and cargo lane balance during the line haul between the gateway ports and inland terminal. ISO containers would have constant in-transit and on the ground visibility with the ability to access available containers on a real-time basis and asset utilization would be maximized.

Today's system isn't ideal. The existing ISO container system in the study region north of Chicago is composed of three rail intermodal terminals with two in the Twin Cities and one in Chippewa Falls, WI serving an extensive geographical market. The Twin Cities terminals provide no transload services at the terminals requiring that containers be drayed from the facility for unloading. At the Chippewa Falls terminal containers can be loaded on-site with grain and other bulk agricultural products. Subscription based container tracking systems exist for all three terminals and chassis pools are available for membership.

Reports of ISO containers being "lost" or spending an inordinate amount of time in the region do occur. The time delays are often caused by long one way drayage or a lack of lane balance. Depots, drayage firms, terminals, transload centers, and warehouses in the region all endeavor to optimize the existing system. There is still reluctance by stakeholders to move containers inland to locations away from Chicago Inland Port and the cost of draying containers to the study region from Chicago can inhibit exporting from the region. Because some ocean carriers are anxious to get the ISO containers boxes back to ports they may offer substantial discounting of the freight rates on domestic moves to the ports as an incentive to get the boxes back to the vessels, (Landberg, 2012).

In an effort to increase the supply of equipment for exporters in the study region new or expanded intermodal terminals, drop lots and equipment exchange services should be examined. New or expanded intermodal terminals should be geographically distinct (over 200 miles away) from Chicago and preferably have the following attributes:

1. Rail service by one or more Class I railroads
2. A developed logistics base with trucking companies, third party logistics providers, forwarders, warehousing and other related logistics companies.
3. A suitable location for development of the inland port depots that includes rail, interstate highway and, if possible, marine access with limited congestion issues. Individual intermodal rail terminals can exist in proximity to each other and offsite provided there is access to the inland port location.
4. Space for expansion where value added operations, warehouses and distribution centers can be built. There needs to be adequate space for container and chassis storage. If transloading is to occur then cross dock facilities for ISO and domestic containers may be needed.
5. Customs clearance and bonded storage should be available for facilities and containers.
6. Inbound and outbound volume generated by the inland ports catchment area should be sufficient enough that full intermodal unit trains of can arrive and depart.
7. An efficient real time information system for tracking containers to identify opportunities for ocean and trucking carriers to reduce empty movement. This system needs to be used continuously by all parties in the supply chain.
8. Heavy weight highway corridors should exist linking the inland port to principal transload operations and between rail and marine intermodal terminals. Our marine freight system moves bulk commodities in large cost effective quantities. Moving bulk products to or from the region's port or rail hub connections, often requires shippers to handle the product multiple times to conform to 80,000 pound gross vehicle weight restrictions for interstate highway travel. The effort by some shippers and the trucking industry to increase the size and weight of trucks above 80,000 pounds across the country

is viewed by the railroad industry as subsidizing a competitor with public funds. The truck fees proposed by those who want to allow heavier trucks on public roads may be insufficient to cover current and future damages. The railroads note that the freight rail industry pays for its own infrastructure expansion and maintenance with little to no public funds. The increase of truck size and weight above 80,000 pounds without the appropriate fees to cover increased highway damage may impact the rail industry, particularly short line partners.

9. The cooperation and support of federal, state, and local government agencies is essential. Highway trucking regulations differ by state and often hamper seamless trucking connections for interstate commerce, zoning, and land use issues are often in conflict with transportation oriented developments. Assuring funding for highway interchanges and intermodal connectors is important to keep freight moving. For local agencies, planning and access to utilities along with transit for the workforce is important. At the community level, grade separations should be considered to reduce highway and rail crossing conflicts. Workforce education coordination should be undertaken to help develop the 21st century work force capable of using the latest technology the transportation sector is implementing. This cooperation will need to cross jurisdictional boundaries. For example the state DOTs would need to jointly examine the establishment of multimodal corridors to preserve the economies of scale that marine and rail transportation can provide growers and manufacturers when an inland port serves more than one state.

The successful development of a new logistics cluster with an inland port will take a long lead time and will require a cooperative public and private partnership to link all corridors. Key to the development would be substantial demand for the services that would ensure an acceptable return on investment. The continued growth of U.S. exports of manufactured goods fueled in part by lower energy costs may provide the demand side of the equation. Development will also require that the business and government ensure the efficient, reliable, and economical delivery of imports along with exports to maximize lane balance. The old adage that freight, like water, follows the path of least resistance will apply and if undue costs are incurred, operational or regulatory barriers result and freight will seek other corridors to market.

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Appendix 1: Intermodal Terminals and Equipment in the Study Region

Load Match http://www.loadmatch.com/ Accessed 1/31/2013

Wisconsin Intermodal Terminals: January 2013

Location	**Rail Service**	**Description and notes**	**Ocean Ports**
One Ashley Way Arcadia, WI 54612	**CN**	Private rail terminal for Ashley Furniture, all trucking done by Ashley Distribution Services, no other trucking companies are allowed into the terminal. Containers from CN-Arcadia destined for California are interchanged to BNSF-Chicago. Containers from CN-Arcadia destined for Portland / Seatte / Vancouver / Prince Rupert are interchanged to BNSF-Winona, MN	Vancouver, BC Prince Rupert, BC
1160 West River Street Chippewa Falls, WI 54729	**CN**	Opened Feb 3, 2012 Twice-week container service. 8.5-acre site at CN's Chippewa Falls Yard, 2,500-foot-long intermodal loading and unloading track, and a grain transfer facility. Hours of Operation: 07:00 - 18:00 Monday to Saturday	Prince Rupert, BC

Wisconsin Intermodal Equipment Depots: January 2013

Location	**Marine Carriers Equipment CY Depot**	**Description and notes**	**States Served**
Aim Transfer & Storage, Inc. 7774 S. 10th Street Oak Creek, WI 53154	OOCL, Hapig Lloyd	Drayage with full warehousing capability PRIVATE CHASSIS= yes (Tri-axles,) Approx 120 drivers TWIC drivers: no Day Cabs: yes Parking Space= yes, **Transload Service - Yes**	All 48
Harry H. Long Moving, Storage & Express 8707 Clayton Avenue Neenah, WI 54956	CMA, Maersk, NYK	Established 1917 - serving rails in Rochelle, Elwood and Chicago to points in Wisconsin, Illinois and Upper Michigan. Assets: PRIVATE CHASSIS= yes (Tri-axles, 20' Sliders, 40's) Approx 30 drivers TWIC drivers: no Day Cabs: yes Parking Space= yes **Transload Service - No**	WI,IL,MI No Indiana
Jet Intermodal, Inc. 445 W. Oklahoma Ave. Milwaukee, WI 53207	NYK, K-line, Hanjin, APL, Maersk	A fully secured yard, no yard storage charges for the first fourteen days, no pre pull fees and no chassis charges for standard chassis out of Milwaukee. Assets: PRIVATE CHASSIS= yes (Tri-axles, 20's, 40's) Approx 40 drivers TWIC drivers: no Day Cabs: yes Parking Space= yes **Transload Services: No**	IL,WI,IA,MI,IN

Minnesota Intermodal Terminals: January 2013

Location	Rail Service	Description and notes	Ocean Port Served
311 2nd Avenue SE Dilworth, MN 56529	**BNSF**	Hours of Operation: 7:30am-5pm Mon-Fri, closed Sat/Sun operated by Trailer Transfer Inc,	None – A paper ramp
(Midway) 1701 Pierce Butler Route St. Paul, MN 55104	**BNSF**	Hours of Operation: 24/7	**Tacoma, WA Seattle, WA Portland, OR**
615 - 30th Avenue NE Minneapolis, MN 55418	**CP**	Terminal Operations Management, Inc. Hours of Operation: 6am-10pm Mon-Fri, 9am-5pm Sat/Sun	**Vancouver, BC**
132 31st St NE Minneapolis, MN	**CN**	Paper Ramp Supported By Chippewa Falls Operation	**Vancouver, BC Price Rupert, BC**
International Falls	**CN**	Intermodal Terminal to Support Cross Border Inspections	**Vancouver, BC Price Rupert, BC**

Minnesota Intermodal Equipment Depots: January 2013

Location	Marine Carriers Equipment CY Depot	Description and notes	States Served
CBASE (Container Base) 132 31st Ave NE Minneapolis, MN 55418 USA	Mitsui, OOCL, Evergreen, ACL, Westwood, United Arab	Container yard and transportation company specializing in container drayage. Servicing CP Rail in Minneapolis and the BNSF in St. Paul to the 5 state area. CN Depot for Minneapolis. PRIVATE CHASSIS= yes (20's, 40's) Approx 15 drivers TWIC drivers: no Day Cabs: yes Parking Space= yes CY Depot= yes **Transload Service - No**	IA,ND,SD,WI,MN,MI,IN no Canada
Mason Dixon Intermodal Inc. 630 30th Ave NE Minneapolis, MN 55418	A CY depot is listed but marine carriers are not listed	Local, Regional and OTR for International and Domestic Freight. PRIVATE CHASSIS= yes (20' sliders & tri-axles, 40'goose, 48'expandable) Approx 23 drivers TWIC drivers: no Parking Space= yes CY Depot= yes **Transload Service - No**	IA,MN,ND,SD,WI
Multi-Modal Transport, Inc. 2185 Capp Rd. St. Paul, MN 55114	(Hanjin, Hyundai, NYK, CMA, Cosco, MSC, Hapag Lloyd	Intermodal Drayage specializing in street turn 40's for domestic. Container depots - Secure storage facility. We serve all U.S. points from St. Paul. Assets: PRIVATE CHASSIS= yes (tri-axles and tri-tank chassis) Approx 60 drivers TWIC drivers: no Day Cabs: yes Parking space = yes CY Depot= yes **Transload Service - No**	MN,IA,WI,SD,ND,IL,MI, Canada - maybe

Michigan Intermodal Terminals: January 2013

There are no terminals in the Upper Peninsula (UP) of Michigan. CN provides rail service to the UP but it is not intermodal rail service. The closest terminal listed below is a mile dray one way from the Mackinaw Bridge

Location	Rail Service	Description and notes	Ocean Port Served
12594 Westwood Detroit, MI 48223	**CP**	Hours of Operation: 24hrs Sun-Fri, 8am-4pm Sat	Vancouver, BC
6750 Dix Avenue Detroit, MI 48209-1289	**CSX**	Hours of Operation: 7am-8pm Mon-Fri, closed Sat/Sun	Jacksonville, FL Portsmouth, VA Baltimore, MD Tacoma, WA Houston, TX Port Elizabeth, NJ Los Angeles, CA NY Container Term., NY Newark Term., NJ Miami, FL
600 Fern Street Ferndale, MI 48220	**CN**	Hours of Operation: Monday - Friday : 06:00 - 22:00 hrs. Saturday: 06:00 - 14:00 hrs. Sunday: Closed	Vancouver, BC Prince Rupert, BC Halifax, NS New Orleans, LA
8501 West Fort Street Detroit, MI 48209	**NS**	Hours of Operation: 8am-5pm Mon-Fri, closed Sat, Sun	None
2725 Livernois Avenue Detroit, MI 48209	**NS**	2725 Livernois Avenue Detroit, MI 48209	Norfolk Int., VA Port Elizabeth, NJ NY Container Term., NY Baltimore, MD Portsmouth APMT, VA

Michigan Intermodal Equipment Depots: January 2013

There are no terminals in the Upper Peninsula (UP) of Michigan. CN provides rail service to the UP but it is not intermodal rail service. The closest terminal listed below is a mile dray one way from the Mackinaw Bridge

Location	Marine Carriers Equipment CY Depot	Description and notes	States Served
Bridge Terminal Transport (BTT) 27849 Wick Road Romulus, MI 48174	**Marine:** Maersk	Intermodal Drayage and Depot Assets: PRIVATE CHASSIS= yes Approx 40 drivers TWIC drivers: yes Day Cabs: yes Parking Space= yes CY Depot= yes (Maersk)	48 states - could not find specifics or exclusions
Classic Transportation 4729 Division Wayland, MI 49348	**Marine:** Hyundai, “K”Line, Hanjin, CMA	Full service customs bonded warehouse, distribution, and third party logistics firm located in the Grand Rapids, Michigan area. We have the tradition of being one of the most efficient third party warehouse providers in the industry. Intermodal Drayage, Container Depot, and	IN, MI, WI, IL

		Warehouse Services. Assets: PRIVATE CHASSIS= no Other Equipment= 53' Vans Approx 35 drivers TWIC drivers: no Day Cabs: yes Parking Space= yes CY Depot= yes	
Container Port Group Inc. (CPG) 312 S. Westend Detroit, MI 48209	**Marine:** Hanjin, OOCL, CSAV	Drayage for MI, IN, OH and Ontario, Canada Assets: PRIVATE CHASSIS= yes (All Kinds) Approx 33 drivers TWIC drivers: yes Day Cabs: yes Parking Space= yes CY Depot= yes	IN, MI, OH, ON, NJ and Ontario, Canada
Mason Dixon Intermodal, Inc. 4440 Wyoming Ave. Dearborn, MI 49126	**Marine:** APL, Cosco, K-Line, NYK, Med Shipping, China Shipping **Trucking:** Evergreen	Local, Regional and OTR for International and DoMmestic Freight. Assets: PRIVATE CHASSIS= yes (Tri-axles) Approx 1980 drivers TWIC drivers: no Day Cabs: yes Parking Space= yes (50 Acres) CY Depot= yes	MI, ON, IL, IN, OH
Masselink Brothers, Inc. 901 Freeman Ave. S.W. Grand Rapids, MI 49503	**Marine:** APL, Cosco, Hapag, Maersk, Mitsui, OOCL, NYK **Trucking:** Evergreen	Container trucking and depot. Door or ramp service partners with West Michigan Consolidators (IMC) & Van's Interstate (drayage trucking) Assets: PRIVATE CHASSIS= no Other Equipment= Vans, Flatbeds,Reefers Approx 70 drivers TWIC drivers: no Day Cabs: no Parking Space= yes CY Depot= yes	IL, IN, MI
Reliable Transportation Specialists, Inc. 7100 Dix Ave. Detroit, MI 48209	**Marine:** Mitsui	Specializing in intermodal drayage. Reliable can handle all your intermodal, and door-to-door truckload needs throughout Indiana, Illinois, Ohio, Michigan, Wisconsin, and northern Kentucky. We are also an official SmartWay carrier for the EPA. Assets: PRIVATE CHASSIS= yes (Standard & Tri-axles) Approximately 100 drivers TWIC drivers: no Day Cabs: yes Parking Space= yes (9 acres with stacking ability) CY Depot= yes	MI, IN, OH

Intermodal Terminals and Depots				
Source: Loadmatch.com (includes only facilities with public rates)				
State	Rail	Depot	Container Ports	Total
IL	***23***	***41***	***0***	***64***
TX	17	36	5	58
CA	14	24	9	47
FL	10	19	9	38
OH	11	12	0	23
NJ	7	10	5	22
TN	6	16	0	22
GA	7	13	1	21
WA	7	7	3	17
PA	9	5	1	15
NC	3	10	1	14
VA	3	8	3	14
AL	5	6	2	13
LA	5	7	1	13
MA	5	7	0	13
MO	6	6	0	12
MI	***5***	***6***	***0***	***11***
SC	2	6	3	11
IN	2	8	0	10
KY	4	5	0	9
MD	2	5	2	9
NY	4	3	1	8
KS	2	5	0	7
MN	3	4	0	7
OR	4	3	0	7
WI	***3***	***3***	***1***	***7***
AZ	3	3	0	6
CO	2	4	0	6
AR	1	3	0	4
MS	2	1	1	4
NV	3	1	0	4
UT	1	3	0	4
IA	2	1	0	3
NM	2	1	0	3
NE	1	1	0	2
ID	0	1	0	1
ME	1	0	0	1
MT	1	0	0	1
ND	1	0	0	1
NH	0	1	0	1
WY	1	0	0	1
DE	0	0	1	1
AK	0	0	0	0
CT	0	0	0	0
HI	0	0	0	0
OK	0	0	0	0
RI	0	0	0	0
SD	0	0	0	0
VT	0	0	0	0
WV	0	0	0	0

Chicago Intermodal Lift Count Estimate

Railroad	Facility	Annual Lifts (2000)	Annual Lifts (2005)	Annual Lifts (2006)	Annual Lifts (2009)	Annual Lifts (2010)
BNSF	Corwith	751,154	729,664	757,000	654,927	708,125
	Willow Springs	697,303	769,939	698,000	462,507	457,458
	Cicero	446,036	521,931	533,000	391,801	370,216
	Western Ave.	50,853	N/A	N/A	closed	closed
	Logistics Park	N/A	454,178	727,322	707,277	848,808
UP	Global I	335,286	322,978	321,000	306,366	317,492
	Global II	304,174	299,806	297,000	284,794	343,186
	IMX	113,182	N/A	N/A	closed	closed
	Canal Street	134,646	153,209	155,000	142,969	120,937
	Yard Center	263,914	231,049	248,000	200,132	240,668
	Global III	N/A	103,768	55,088	144,843	150,181
	Joliet Intermodal Terminal	N/A	N/A	N/A	N/A	118,461
CSX	Bedford Park	612,986	875,225	918,680	792,478	846,185
	63rd Street (was CSX)	262,502	N/A	to NS	to NS	N/A
	59th Street	355,226	233,480	217,000	499,397	249,932
NS	47th	440,491	385,843	409,971	429,091	488,685
	63rd Street	15,701	260,299	251,160	256,570	318,952
	Hanjin	64,140	N/A	N/A	closed	closed
	Calumet	29,369	26,526	26,223	23,074	33,257
	Landers	320,820	337,795	341,772	265,469	286,548
CN	Gateway	480,000	313,559	327,327	370,000	500,000
CP	Bensenville	86,198	N/A	N/A	103,375	128,040
	Schiller Park	91,671	N/A	N/A	73,241	139,476
	Total	N.A.	195,356	203,934	N.A.	N/A
IAIS	Blue Island	115,117	35,000	36,537	36,537	32,000
	Total	5,970,769	6,249,605	6,524,013	6,144,848	6,698,607

CMAP estimates are shaded red.

Source: CMAP, Railroad Companies

Calculation of Greater Chicago Region Lift-TEU Equivalents, 2010				
	US Railroads	Canadian Railroads	Total	
Lifts	5,931,091	767,516	6,698,607	
TEUs per Container (US)	2.23	1.75		Source: US: CMAP Container Count by Container Size, average of CSXT 59th Street Yard, BNSF Cicero Yard and UP Global I, Bing Maps, Bird's Eye View. Http://www.bing.com/maps. Accessed June and November, 2010, December 2011. Canada: Used estimate of distribution of containers by container size, CN representatives, August 2011.
Gross TEUs	13,226,646	1,343,153	14,569,799	
Laden Container Factor			87.95%	Source: CMAP analysis of STB Public Waybill Sample, 2010. Selecting containers and trailers on flat cars originating or terminating in Bureau of Economic Analysis Area 64 (Chicago), the laden container factor is the proportion of containers in the selected records that are not empty containers or trailers (in 42xx Standard Transportation Commodity Codes [STCC]).
Net TEUs			**12,813,615**	Chicago Region Intermodal TEU equivalents, 2010

Chicago Area Lifts, (Source: CMAP*)*

Top 100 Importers in 2011

Rank	JoC Top 100 Importers	Headquarters		TEUs in 2011	Sector
1	Wal-Mart Stores	Bentonville, Ark.	AR	710,000	Retail
2	Target	Minneapolis	MN	472,400	Retail
3	Home Depot	Atlanta	GA	296,800	Retail
4	Lowe's	Mooresville, N.C.	NC	228,000	Retail
5	Dole Food	Westlake Village, Calif.	CA	223,000	Diversified
6	Sears Holding	Hoffman Estates, Ill.	IL	207,700	Retail
7	Heineken USA	White Plains, N.Y.	NY	129,000	Beverages
8	Philips Electronics North America	Andover, Mass.	MA	127,200	Electronics
9	LG Group	Englewood Cliffs, N.J.	NJ	120,000	Conglomerate
10	Chiquita Brands International	Cincinnati	OH	117,500	Food
11	IKEA International	Conshohocken, Pa.	PA	101,200	Retail
12	Samsung America	Ridgefield Park, N.J.	NJ	96,100	Conglomerate
13	J.C. Penney	Plano, Texas	TX	89,900	Retail
14	Jarden	Rye, N.Y.	NY	85,600	Outdoor & Home Goods
15	Costco Wholesale	Issaquah, Wash.	WA	83,000	Retail
16	Nike	Beaverton, Ore.	OR	79,300	Footwear & Apparel
17	Ashley Furniture Industries	Arcadia, Wis.	WI	77,300	Furniture
18	General Electric	Fairfield, Conn.	CN	76,700	Conglomerate
19	Red Bull North America	Santa Monica, Calif.	CA	74,000	Beverages
20	Family Dollar Stores	Matthews, N.C.	NC	65,200	Retail
21	Whirlpool	Benton Harbor, Mich.	MI	65,100	Appliances
22	Dollar Tree Stores	Chesapeake, Va.	VA	63,200	Retail
23	Williams-Sonoma	San Francisco	CA	55,900	Retail
24	Gap Stores	San Francisco	CA	54,600	Retail
25	Big Lots	Columbus, Ohio	OH	51,800	Closeout Retail
26	Kohl's	Menomonee, Wis.	WI	48,600	Retail
27	Dorel Industries	Montreal	PQ	48,300	Furniture/Bicycles
28	Michelin North America	Greenville, S.C.	SC	43,100	Tires
29	Staples	Framingham, Mass.	MA	42,300	Retail
30	Dollar General	Goodlettsville, Tenn.	TN	40,500	Retail
31	Rooms to Go	Seffner, Fla.	FL	37,100	Retail
32	Michaels Stores	Irving, Texas	TX	36,600	Retail
33 tie	Sony Corp. of America	New York	NY	36,100	Electronics
33 tie	Toys "R" Us	Wayne, N.J.	NJ	36,100	Toys-Retail
35	Mattel	El Segundo, Calif.	CA	35,300	Toys
36	Bridgestone Americas	Nashville, Tenn.	TN	34,300	Tires, Auto Products
37	Nestle USA/Nestle Waters	Los Angeles/Greenwich, Conn.	CA	33,400	Food/Beverages/Pet Food
38	Canon USA	Lake Success, N.Y.	NY	32,900	Photo Imaging
39	Electrolux	Charlotte, N.C.; Stockholm, Sweden	NC	32,000	Appliances
40	Mercedes Benz/Daimler Trucks	Montvale, N.J.; Portland, Ore.	NJ	31,600	Motor Vehicles
41	Best Buy	Richfield, Minn.	MN	31,400	Retail
42	Toyota Tsusho America	Florence, Ky.	KY	31,100	Conglomerate
43	Panasonic Corp. of North America	Secaucus, N.J.	NJ	31,000	Electronics
44	Macy's	Cincinnati	ON	27,000	Retail
45	Anheuser-Busch InBev	St. Louis	MO	26,800	Beverages
46	Russell Hobbs	Miramar, Fla.	FL	26,800	Appliances
47	Hasbro	Pawtucket, R.I.	RI	26,600	Toys
48	Itochu International	New York	NY	26,500	Conglomerate
49 tie	Adidas Group	Portland, Ore.	OR	26,000	Sports/Lifestyle
49 tie	Hankook Tire America	Wayne, N.J.	NJ	26,000	Tires
49 tie	Ross Stores	Pleasanton, Calif.	CA	26,000	Retail
52	Arauco Wood Products	Atlanta, GA	GA	25,800	Forest Products
53	Southern Wines & Spirits of America	Miami, FL	FL	24,800	Beverages
54	Conair	East Windsor, N.J.	NJ	24,200	Appliances & Personal Care
55	Coaster of America	Santa Fe Springs, Calif.	CA	24,000	Furniture
56 tie	Falken Tire	Fontana, Calif.	CA	23,000	Tires
56 tie	Pier 1 Imports	Fort Worth	TX	23,000	Retail
57 tie	BMW of North America	Woodcliff Lake, N.J.	NJ	22,700	Auto & Transport
57 tie	VF	Greensboro, N.C.	NC	22,700	Apparel
60	Furniture Brands International	Clayton, Mo.	MO	21,600	Furniture
61	Keystone Automotive Industries	Exeter, Pa.	PA	21,100	Wholesaler & Retailer-Auto Parts
62	Hanes Brands	Winston-Salem, N.C.	NC	20,900	Apparel
63 tie	Hewlett-Packard	Palo Alto, Calif	CA	20,500	Mfg.-Computer Technology
63 tie	Nissan North America	Franklin, Tenn.	TN	20,500	Automobiles
65	TJX	Framingham, Mass.	MA	20,000	Retail
66	Phillips Van Heusen	New York	NY	19,600	Apparel
67	JoAnn Stores	Hudson, Ohio	OH	19,000	Retail
68	Hon Hai Precision Industries	Houston	TX	18,100	Electronics
69	American Honda Motor, Honda North America	Torrance, Calif.	CA	18,000	Automotive Goods
70	Sol Group Marketing	Pompano Beach, Fla.	FL	17,900	Fruit
71 tie	Marubeni America	New York	NY	17,700	Conglomerate
71 tie	Walgreen	Deerfield, Ill.	IL	17,700	Retail
73	Limited Brands	Columbus, Ohio	OH	17,400	Retail
74	Fonterra USA	Rosemont, Ill.	IL	17,300	Dairy Products
75	Yokohama Tire	Fullerton, Calif.	CA	16,700	Tires
76	Ricoh Americas	West Caldwell, N.J.	NJ	16,600	Imaging Technolgy
77	DSW	Columbus, Ohio	OH	16,300	Retail
78	Haier America Trading	New York	NY	16,100	Appliances
79	Cardinal Health	Dublin, Ohio	OH	16,000	Wholesale Medical Supplies
80	DuPont	Wilmington, Del.	DE	14,900	Diversified
81	Euromarket Designs	Northbrook, Ill.	IL	14,400	Retail
82	Fred Meyer Stores	Portland, Ore.	OR	14,400	Retail
83 tie	Giti Tire	Rancho Cucamonga, Calif.	CA	14,100	Tires
83 tie	Toyo Tire & Rubber	Cypress, Calif.	CA	14,100	Tires
85	Goya Foods	Secaucus, N.J.	NJ	13,800	Foods
86	Pirelli	Rome, Ga.	GA	13,700	Tires
87	Cost Plus	Oakland, Calif.	CA	13,400	Retail
88	CVS/Caremark	Woonsocket, R.I.	RI	13,300	Retail
89	Office Max	Naperville, Ill.	IL	13,000	Retail
90	Kia Motors America	West Point, Ga.	GA	12,900	Automobiles
91	Ralph Lauren	New York	NY	12,700	Fashion Conglomerate
92	Sharp Electronics	Mahwah, N.J.	NJ	12,600	Electronics & Appliances
93	Brother International	Bridgewater, N.J.	NJ	12,500	Imaging Technolgy
94	Skechers USA	Manhattan Beach, Calif.	CA	12,500	Retail
95	Bissell Homecare	Grand Rapids, Mich.	MI	12,400	Consumer Products
96	Toshiba America	New York, NY	NY	12,300	Electronics
97	Cooper Tire & Rubber	Findlay, Ohio	OH	12,200	Tires
98	Natuzzi Americas	High Point, N.C.	NC	12,000	Furniture
99	Nexen Tire America	Diamond Bar, Calif.	CA	11,700	Tires
100	Mando America	Opelika, Ala.	AL	11,600	Auto Parts

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Appendix 2:

Glossary of Terms and Acronyms

Accessorial Charges: Charges that are applied to the base tariff rate or base contract rate, e.g., bunkers, container, currency, destination/delivery.

Belt Line: A switching railroad operating within a commercial area.

Bill of Lading (B/L): This is a document that establishes the terms of a contract between a shipper and a transportation company. It serves as a document of title, a contract of carriage, and a receipt for goods.

Blocked Trains: Railcars grouped in a train by destination so that segments (blocks) can be uncoupled and routed to different destinations as the train moves through various junctions. This eliminates the need to break up a train and sort individual railcars at each junction.

Bobtail: Movement of a tractor, without trailer or chassis, over the highway**.**

Bogie: A set of wheels built specifically as rear wheels under the container.

Bolster: A device fitted on a chassis or railcar to hold and secure the container**.**

Bonded Freight: Freight moving under a bond to U.S. Customs or to the Internal Revenue Service, and to be delivered only under stated conditions.

Bonded Warehouse: A warehouse authorized by Customs authorities for storage of goods on which payment of duties is deferred until the goods are removed.

Boxcar: A closed rail freight car

Break Bulk: To unload and distribute a portion or all of the contents of a rail car, container, or trailer; loose, non-containerized cargo.

Bulk Cargo: Not in packages or containers; shipped loose in the hold of a ship without mark and count." Grain, coal and sulfur are usually bulk freight.

Bulk-Freight Container: A container with a discharge hatch in the front wall; allows bulk commodities to be carried.

Bridge Port: A port where cargo is received by the ocean carrier and stuffed into containers but then moved to another coastal port to be loaded on a vessel.

Car Pooling: Use of individual carrier/rail equipment through a central agency for the benefit of carriers and shippers.

Carload Rate: A rate applicable to a rail carload of goods.

Carrier: Any person or entity who, in a contract of carriage, undertakes to perform or to procure the performance of carriage by rail, road, sea, air, inland waterway or by a combination of such modes.

CFS: Abbreviation for "Container Freight Station." A shipping dock where cargo is loaded ("stuffed") into or unloaded ("stripped") from containers. Generally, this involves less than containerload shipments, although small shipments destined to same consignee are often consolidated. Container reloading from/to rail or motor carrier equipment is a typical activity.

Chassis: A frame with wheels and container locking devices in order to secure the container for movement.

Clearance: The size beyond which cars or loads cannot use Limits bridges, tunnels, etc.

Common Carrier: A transportation company which provides service to the general public at published rates.

Connecting Carrier: A carrier which has a direct physical connection with, or forms a link between two or more carriers.

Container: A truck trailer body that can be detached from the chassis for loading into a vessel, a rail car or stacked in a container depot. Containers may be ventilated, insulated, refrigerated, flat rack, vehicle rack, open top, bulk liquid or equipped with interior devices. A container may be 20 feet, 40 feet, 45 feet, 48 feet, or 53 feet in length, 8'0" or 8'6" in width, and 8'6" or 9'6" in height.

Container Pool: An agreement between parties that allows the efficient use and supply of containers. A common supply of containers available to the shipper as required.

Container Terminal or Container Yard (CY): An area designated for the stowage of cargoes in container; usually accessible by truck, railroad, and marine transportation. Here containers are picked up, dropped off, maintained and housed.

Containerizable Cargo (Intermodally Compatible): Cargo that will fit into a container and result in an economical shipment.

Containerization: Stowage of general or special cargoes in a container for transport in the various modes.

Container Load: A load sufficient in size to fill a container either by cubic measurement or by weight.

Cross Docking: Cargo is moved from one truck directly across the dock to another truck without warehousing. Occasionally it refers to moving containers across from one mode to another going to stacks.

Cu.: An abbreviation for "Cubic." A unit of volume measurement.

Cube Out: When a container or vessel has reached its volumetric capacity before its permitted weight limit.

Cubic Foot: 1,728 cubic inches. A volume contained in a space measuring one foot high, one foot wide and one foot long.

Cut-Off Time: The latest time cargo may be delivered to a terminal for loading to a scheduled train or ship.

Deadhead: One leg of a move without a paying cargo load. Usually refers to repositioning an empty piece of equipment.

Demurrage: A penalty charge against shippers or consignees for delaying the carrier's equipment beyond the allowed free time. The free time and demurrage charges are set forth in the charter party or freight tariff.

Destination: The place to which a shipment is consigned. The place where carrier actually turns over cargo to consignee or his agent.

Dock: For ships, a cargo handling area parallel to the shoreline where a vessel normally ties up. For land transportation, a loading or unloading platform at an industrial location or carrier terminal.

Drayage: The movement of containers to and from shippers and terminals. Usually a short distance of 50 miles or less. May also be the movement of containers between terminals where there is no track connection between terminals.

Dry-Bulk Container: A container constructed to carry grain, powder, and other free-flowing solids in bulk; used in conjunction with a tilt chassis or platform.

Equipment Interchange Receipt (EIR): A document transferring a container from one carrier to another, or to/from a terminal.

FEU: Abbreviation for "Forty-Foot Equivalent Units." Refers to container size standard of forty feet. Two twenty-foot containers or TEUs equal one FEU.

Fixed Costs: Costs that do not vary with the level of activity. Some fixed costs continue even if no cargo is carried. Terminal leases, rent, and property taxes are fixed costs.

Flat Car: A rail car without a roof and walls.

Flat Rack/Flat Bed Container: A container with no sides and frame members at the front and rear. Container can be loaded from the sides and top.

Foreign Trade Zone: A free port in a country divorced from Customs authority but under government control. Merchandise, except that which is prohibited, may be stored in the zone without being subject to import duty regulations.

Fork Lift: A machine used to pick up and move goods loaded on pallets or skids

Freight: Refers to either the cargo carried or the charges assessed for carriage of the cargo.

Gateway: Industry-related: A point at which freight moving from one territory to another is interchanged between transportation lines. Usually a gateway port.

Gross Weight: Entire weight of goods, packaging and freight car or container, ready for shipment. Generally in the U.S., 80,000 pounds maximum container, cargo and tractor for highway transport.

GVW: Abbreviation for "Gross Vehicle Weight." The combined total weight of a vehicle and its container, inclusive of prime mover.

HAZ MAT: An industry abbreviation for "Hazardous Material."

Inland Ports: Generally attached to a new Class I rail multimodal center capable of handling 1 million lifts or more per year.

Interchange Point: A location where one carrier delivers freight to another carrier.

Interline Freight: Freight moving from origin to destination over the freight lines of two or more transportation carriers.

Intermodal (Mulitmodal): Used to denote movements of cargo containers interchangeably between transport modes, i.e., motor, water, and air carriers, and where the equipment is compatible within the multiple systems.

Intermodal Marketing Companies (IMCs)/Logistics Companies: Freight transportation arrangers or brokers who sell a broad array of freight transportation services to the shipper or consignee.

JIT: Abbreviation for "Just In Time." In this method of inventory control, warehousing is minimal or non-existent; the container is the movable warehouse and must arrive "just in time;" not too early nor too late.

Joint Rate: A rate applicable from a point on one transportation line to a point on another line made by agreement and published in a single tariff by all transportation lines over which the rate applies.

Landed Cost: The total cost of a good to a buyer, including the cost of transportation.

LCL: Abbreviation for "Less than Container Load." The quantity of freight which is less than that required for the application of a container load rate. Loose Freight.

Less Than Truckload: Also known as LTL or LCL

Line-Haul: Transportation from one city to another as differentiated from local switching service.

Logistics Clusters: A logistics cluster is a geographically concentrated set of logistics-related business activities.

Net Tare Weight: The weight of an empty cargo-carrying piece of equipment plus any fixtures permanently attached.

Net Weight: Weight of the goods alone without any immediate wrappings, e.g., the weight of the contents of a tin can without the weight of the can.

Non-Vessel Operating Common Carrier (NVOCC): A cargo consolidator in ocean trades who will buy space from a carrier and sub-sell it to smaller shippers. The NVOCC issues bills of lading, publishes tariffs and otherwise conducts itself as an ocean common carrier, except that it will not provide the actual ocean or intermodal service.

Open Top Container: A container fitted with a solid removable roof, or with a tarpaulin roof so the container can be loaded or unloaded from the top.

Out Gate: Transaction or interchange that occurs at the time a container leaves a rail or water terminal**.**

Paper Ramp: A technical rail ramp, used for equalization of points not actually served. The term derives from that fact that it is an intermodal ramp only on paper and is not located in a rail served intermodal terminal.

Pickup: The act of calling for freight by truck at the consignor's shipping platform.

Piggy Packer (Sideloader, Toppicker, Laterno): A mobile container-handling crane used to load/unload containers to/from railcars.

Piggyback: A transportation arrangement in which truck trailers with their loads are moved by train to a destination. Also known as Rail Pigs or **TOFC:** Abbreviation for "Trailer on Flat Car.

Place of Delivery: Place where cargo leaves the care and custody of carrier**.**

Place of Receipt: Location where cargo enters the care and custody of carrier.

Point of Origin: The place at which a shipment is received by a carrier from the shipper.

Ramp: Railroad terminal where containers are received or delivered and trains loaded or discharged. Originally, trailers moved onto the rearmost flatcar via a raised ramp and driven into position in a technique known as "circus loading." Most modern rail facilities use lifting equipment to position containers onto the flatcars. Ramps offer unscheduled service.

"Ro/Ro": A shortening of the term, "Roll On/Roll Off." A method of ocean cargo service using a vessel with ramps which allows wheeled vehicles to be loaded and discharged without cranes.

Shipment: The tender of one lot of cargo at one time from one shipper to one consignee on one bill of lading.

Shipper: The person or company who is usually the supplier or owner of commodities shipped; also called Consignor.

Shipper's Instructions: Shipper's communication(s) to its agent and/or directly to the international water-carrier. Instructions may be varied, e.g., specific details/clauses to be printed on the B/L, directions for cargo pickup and delivery.

Side Loader: A lift truck fitted with lifting attachments operating to one side for handling containers.

Spine Car: An articulated five-platform railcar. Used where height and weight restrictions limit the use of stack cars. It holds five 40-foot containers or combinations of 40- and 20-foot containers.

Stack Car: An articulated five-platform rail car that allows containers to be double stacked. A typical stack car holds ten 40-foot equivalent units (FEUs).

Stacktrain: A rail service whereby rail cars carry containers stacked two high on specially operated unit trains. Each train includes up to 35 articulated multi-platform cars. Each car is comprised of 5 well-type platforms upon which containers can be stacked. No chassis accompany containers.

Standard Industrial Classification (SIC): A standard numerical code used by the U.S. Government to classify products and services.

Standard International Trade Classification (SITC): A standard numeric code developed by the United Nations to classify commodities used in international trade, based on a hierarchy.

Supply Chain: A logistical management system which integrates the sequence of activities from delivery of raw materials to the manufacturer through to delivery of the finished product to the customer into measurable components. "Just in Time" is a typical value-added example of supply chain management.

Tare Weight: In railcar or container shipments, the weight of the empty railcar or empty container.

TEU: Abbreviation for "Twenty foot Equivalent Unit."

TL: Abbreviation for "Trailer Load."

Trailer: The truck unit into which freight is loaded as in tractor trailer combination. *See Container*.

Transloading: Moving cargo from one mode to another. Usually applies to bulk or break bulk cargoes rather than containers.

Turnaround: In water transportation, the time it takes between the arrival of a vessel and its departure.

Unit Train: A train of a specified number of railcars, perhaps 100, which remain as a unit for a designated destination or until a change in routing is made.

Variable Cost: Costs that vary directly with the level of activity within a short time. Examples include costs of moving cargo inland on trains or trucks, stevedoring in some ports, and short-term equipment leases. For business analysis, all costs are either defined as variable or fixed. For a business to break even, all fixed costs must be covered. To make a profit, all variable and fixed costs must be recovered plus some extra amount.

Warehouse: A place for the reception, delivery, consolidation, distribution, and storage of goods/cargo.

Well Car: Also known as stack car. A drop-frame rail flat car.

Yard: A classification, storage or switching area.

Weights and Measures

Measurement ton	40 cubic ft. or one cubic meter
Net ton, or short ton	2,000 lbs.
Gross ton/long ton	2,240 lbs.
Metric ton/kilo ton	2,204.6 lbs.
Cubic meter	35.314 cubic ft.
Mile	5,280 ft.
Knot (Nautical Mile)	6,076.115 ft.
Meter	39.37 in.

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