INTERMODAL FREIGHT TRANSPORTATION IN MINNESOTA

White Paper

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MINNESOTA FREIGHT ADVISORY COMMITTEE

MFAC

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Executive Summary

This white paper provides an overview of intermodal freight transportation in Minnesota. It examines intermodal service, how intermodal service operations have transformed the global economy, and Minnesota's intermodal strengths, challenges, and opportunities. Development included literature reviews, site visits, and interviews with shippers, carriers, terminal operators, freight forwarders, and third-party logistics providers.

What is intermodal service?

Intermodal service is the movement of cargo in shipping containers (boxes) or trailers by more than one mode of transportation. Container vessels, ports, terminals, railroads, and trucks are essential for international intermodal service. The system has numerous moving parts that require tracking, timing, and balancing of resources to operate cost-effectively and efficiently. The system requires cargo volume, lane balance, and rail-network fit to justify its establishment and continued operation.

Intermodal in the United States comprises two growing services—domestic and international—that can be both competing and collaborative. International intermodal service uses containers meeting International Organization for Standardization (ISO) requirements and moving through gateway ports. Domestic intermodal service can use ISO boxes, trailers, or 53-foot boxes.

Minnesota's intermodal advantages

- Minnesota is served by four Class 1 railroads. Three of those have intermodal terminals in the state that provide shippers direct connections to gateway ports on the northwest coast of North America, two provide service to Atlantic gateways through Canada, and one has service to the Gulf—all allowing seamless access to international markets.
- The terminals are working to improve service through new technology and streamlining their operations.
- Minnesota shippers, carriers, and government agencies have a history of success in collaborative efforts to improve transportation systems.
- U.S. domestic intermodal service is provided by BNSF or CP to Chicago and BNSF to Seattle. CN's Duluth Terminal moves minimal domestic traffic by ISO-box repositioning.
- Current domestic and international intermodal service provides Minnesota shippers with a competitive advantage on several, but not all, transportation corridors.

Minnesota's current intermodal challenges

- The four Class 1 railroads operating in the state do not have through tracks to the U.S. southeast and east ports or domestic markets. Shippers use CP intermodal rail to Chicago, connecting by interline transfer to eastern railroads, or shippers will truck (dray) to Chicago or Kansas City terminals.
- Minnesota shippers must move cargo east to Chicago by rail, or they must truck to go west to ports in Southern California (SoCal), increasing costs and transit time.
- The state exports more products than it imports, especially agricultural products. With more exports than imports, rail and truck movements along traffic lanes are unbalanced.
- Lane imbalance limits access to empty containers for Minnesota agricultural exporters. Long truck trips (drayage) are needed to bring empty boxes from Chicago or other out-of-state terminals. Lane imbalance inhibits building intermodal terminals in rural Minnesota.
- Hours-of-service regulations for truckers, increasing highway congestion, and long-haul truck driver shortages are increasing drayage cost and time.
- Current depot operations are creating inefficiencies in the Twin Cities intermodal system.
- The CP intermodal terminal has delays resulting from the current track layout that has parked trains blocking truck access to intermodal boxes.
- Ocean carriers currently provide limited rates to Duluth's terminal, creating difficulties in pricing and access to empty boxes at the terminal.
- The lack of truck scales at the CP and BNSF terminals means that drayage companies may inadvertently take overweight containers on highways.

Minnesota's intermodal opportunities

- Closer collaboration and cooperation between all intermodal service parties can improve lane balance, as well as address container dwell time, pricing, and depot access issues.
- CN's Duluth terminal has the potential to directly serve New Orleans (Louisiana), Mobile (Alabama), Montreal (Quebec), and Halifax (Nova Scotia) international gateway ports. CN's rail network could also provide scheduled domestic intermodal service to and from Duluth to Chicago, Memphis, and other cities. Profitably establishing new trade corridors to and from Duluth would require cargo volume, collaboration, lane balance, and CN network fit.
- Government agencies working with carriers, shippers, and the public can establish highway corridors to and from intermodal terminals that incorporate a level of automation, increased highway weight limits, or expedited overweight permits. This would increase highway and intermodal service capacity. Public-private funding opportunities could address track layout issues at the CP terminal if the railroad was open to a partnership.

- Trucking's rising costs and the move to warehouses closer to consumers may tip the scales towards moving import distribution centers (DCs) closer to the Twin Cities. With new DCs located in the state, the increased flow of import boxes could improve lane balance and empty box availability for export cargo.
- Locating a terminal on UP's rail line south of the Twin Cities has the potential to increase intermodal service, reduce drayage, and open a direct rail link to SoCal markets and ports. The development of such a terminal would require that the operation be advantageous for all parties and would require committed anchor shippers. A successful new terminal would have traffic density and lane balance. This new terminal could provide both international and domestic single-railroad service to and from SoCal if the complexity of combined operations is cost effective. Several of the companies interviewed recommended building a UP terminal. One interviewee commented that if UP opened a ramp near the Twin Cities, it would likely be a balanced lane and would remove a significant number of long-haul trucks from Minnesota highways.

In summary, intermodal service can be an engine of economic development, creating or growing logistics clusters, reducing costs, and encouraging businesses to expand or relocate. Efficient intermodal service reduces the environmental impact of freight movement and reduces truck traffic on highways—creating multiple benefits for the state, especially in urban areas. However, intermodal service expansion can create conflict where terminals abut residential areas.

Improving Minnesota's intermodal service will require collaboration and communication with all stakeholders. Intermodal service is fundamentally a private enterprise driven to operate safely and profitably.

Introduction

This white paper provides an overview of intermodal freight transportation in Minnesota. It examines intermodal service, how intermodal service operations have transformed the global economy, and Minnesota's intermodal strengths, challenges, and opportunities. Development included literature reviews, site visits, and interviews with shippers, carriers, terminal operators, freight forwarders, and third-party logistics providers.

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An Overview of Intermodal Operations

Intermodal, multimodal, and transloading operations

The Intermodal Association of North America (IANA) defines intermodal service as "the movement of cargo in shipping containers or trailers by more than one mode of transportation" (IANA, 2017). Cargo is transferred between modes in packages or in bulk. Such operations are called multimodal or transloading operations. The key difference between intermodal and transloading or multimodal is intermodal's use of standardized shipping containers or trailers. These terms should not be used interchangeably. Over the course of the past 60 years, the industry has evolved to use a steel container that conforms to International Organization for Standardization (ISO) standards. Approximately 95 percent of the world's manufactured products now move by marine containers, also called ISO boxes. The boxes can be safely moved by vessels, trucks, railroads, and occasionally by jets between countries without modifying any equipment. An intermodal system provides door-to-door service.

Containers (boxes)

While there are a few exceptions, the majority of boxes in international trade are 20, 40, or 45 feet in length and designed for safe handling and transport worldwide using standardized equipment. The metric for container use is a twenty-foot equivalent unit (TEU). A 40-foot box equals two TEUs and is called a forty-foot equivalent unit (FEU).

The ISO box design has multiple variations that allow a variety of cargoes to be transported through the intermodal service. Boxes are measured in TEUs in terms of the spaces (slots) they utilize when loaded on a mode of transport. For instance, a flat rack with a cargo over 8 feet 6 inches high may take two TEU slots when loaded into the hold of a container vessel.

The North American intermodal service uses ISO boxes, along with domestic 48- and 53-foot domestic containers designed to stack with the ISO boxes. The domestic service also employs trailers on flat cars (TOFC) or piggy back. The market value of the North American intermodal service exceeds $40 billion (IANA, 2018). In 2017, the North American intermodal service moved more than 34 million TEUs and is growing at the rate of 6 percent per year. The growth of computer power has enabled the electronic transfer of the critical information required to manage millions of boxes and funds to pay for operations.

Stakeholders in intermodal service

The four principal parties that are involved in the intermodal service are shippers with cargo, carriers that move the cargo, third-party logistics providers (3PLs), including intermodal marketing companies (IMCs) that coordinate between carriers, shippers, consignees, and, finally, the citizens who interact with the intermodal service.

A typical international intermodal shipment exported from Minnesota may involve up to five carriers. The truck movements at the beginning and end of the intermodal system are called the

first and last mile. An optimal intermodal operation will move the container on schedule in a seamless manner through the entire intermodal service.

For security and safety reasons, only approved trucks and drivers can call at rail or port intermodal terminals. In North America, more than 7,000 trucking companies employ about 400,000 drivers draying international and domestic containers. There are 36 approved drayage companies serving the Twin Cities (Drayage Directory, 2018). Minnesota-based Dart Transit is one example of a major intermodal drayage company. The North American railroads move more than 17 million containers annually.

Rail intermodal generates about 25 percent of the total revenue for Class 1 operators. The 3PLs arrange more than 6 million container moves annually. CH Robinson, headquartered in Minnesota, is one of the largest 3PLs in North America. Citizens are customers that benefit from lower prices, employees of the intermodal service, and members of communities being affected by the intermodal service.

Intermodal operations require a close partnership. That partnership is most successful when there is open communication, collaboration, and compatible corporate cultures.

The complex intermodal system

North America has two overlapping intermodal systems servicing international and domestic boxes. Both of these services have seen continued growth. Terminal operations for these services are virtually the same with the exception of domestic trailers. Box availability, paperwork, rates, marketing, and the non-rail service providers vary between international and domestic service. All interviewees rated reliability as the most critical requirement for both services. Both intermodal systems comprise multiple parts requiring accurate tracking and matching to achieve full potential. Empty boxes need to be available for cargo in a timely manner, and chassis and approved drayage trucks need to be available for the first and last mile. Exponentially expanding computing capabilities have improved the ability to track, forecast, and manage the system. Experienced and talented humans are essential for proper operation.

The intermodal system is almost exclusively collaborative private enterprises. Safety and profitability are the principal driving forces that maintain and shape the system. Like all developing systems, there were failures, missed opportunities, and overreaching. As the North American intermodal service has matured, successful (profitable) operational parameters, such as intermodal unit trains, have been adopted by each segment of the industry. The parameters have the goal of providing a safe, efficient intermodal service with a reasonable return on investment.

Essential to international intermodal service are: rail equipment, a track network, and specialized intermodal terminal equipment to lift the boxes between modes, along with vessels that can be loaded and unloaded quickly to move the boxes worldwide. In the 1970s and 1980s,

container vessel operators were the principal risk takers, owning the boxes and chassis. Ship owners developed and owned the first intermodal rail well cars.

International ocean container movements require dedicated container ships in liner service that take years to build, often costing in excess of $100 million with a 20-year useful life. The economies of scale in ocean transportation encourage the use of large vessels. For example, the OOCL Hong Kong has a capacity of 21,413 TEUs (Marine Insight, 2017). Overbuilding of container ships without corresponding cargo growth results in excess capacity, and overcapacity drives down ocean rates. Continued low rates can result in bankruptcy, as happened to Hanjin Lines in 2016. Poor performing lines are bought out or merged with major carriers resulting in fewer and larger companies. Ocean carriers also form alliances where vessel space is shared to maximize utilization.

ISO boxes are mostly vessel-owned and are a significant expense. Ocean carriers need to own three boxes for each slot on a ship—one on the ship and one being loaded and another being unloaded, each in different ports. The longer a box is away from a ship, the more boxes are needed to maintain service. A 2012 study found moving a box inland from the port of Vancouver reduced the container's ability to make transpacific roundtrips from eight to six per year (Rodrique, 2012). ISO box owners promote transferring the contents of ISO boxes to 53-foot domestic boxes at locations close to gateway ports. This transfer keeps boxes close to ports and can reduce inland transportation costs.

Empty ISO boxes are stored at depots where truckers can pick them up. Problems cited during interviews were the congestion, short working hours, and understaffing found at depots in the Twin Cities, causing inefficiency and unreliability in the intermodal service. ISO boxes can be used in the United States for domestic moves where the box is being repositioned to take on an international cargo after the domestic cargo is unloaded.

Boxes moving loaded in both directions results in lane balance. Seasonal cargo, population densities, trade regulations, export vs. import demand, and other factors make lane balance a complex goal. Ocean carriers move loaded import boxes into Chicago for unloading at distribution centers and will keep the box near Chicago to load for back haul and to reduce box cycle time. A Rochester, Minnesota, shipper will pay hundreds of dollars to dray an empty box for export cargo to their loading dock. As one company pointed out, the cost of drayage from Chicago can exceed the ocean freight rate to move the box across the Pacific.

Shippers contact ocean carriers or private firms such as Loadmatch or 3PLs to access empty boxes (Stewart, 2013). The U.S. Department of Agriculture for many years tracked and disseminated the availability of empty boxes. The consolidation of ocean carriers impaired business confidentiality and the tracking system was stopped in January 2018 (USDA, 2018). For both domestic and international intermodal service, the chassis and railcars are owned by investors who make the equipment available through pools. The pool operators maintain, update, replace, track, and limit availability of equipment. Rail routing can be more complex.

Domestic box ownership is by major shippers such as Hub, JB Hunt, and Schneider, with additional boxes in pools. Unlike international boxes, domestic containers do not need to tie back to an ocean carrier and are more versatile in where they can go and who may use them.

For rail intermodal to be cost-effective, there needs to be high volume, long distance, and minimal stops to realize the benefits of economies of scale. Typically, the minimum rail length of haul is about 300 miles for East Coast railroads and 500 miles for Western railroads. On the BNSF container rail line going west from Minneapolis, there is no intermodal container rail service yard until Seattle. Intermodal rail is competitive with trucking at these distances depending on variable costs of fuel, labor, and congestion. Railroads prefer to keep cargo on their own network. Interline transfers to another railroad can increase rail line-haul charges along with additional billing and insurance costs.

In the 2000s, Class 1 railroads shifted from multiple intermodal terminals to fewer terminals located farther apart. For example, when Canadian National Railway (CN) acquired Wisconsin Central Railroad in 2001, it closed three intermodal terminals in Wisconsin and consolidated traffic. This decision reduced operating expenses for CN but increased drayage costs for shippers.

Some Class 1 railroads have dedicated trains, routes, and terminals to serve either domestic or international cargo but not both. Class 1 railroads will not open new terminals or routes without a dedicated, diverse customer base, year-round volume, lane balance, and a network fit. The combination needs to provide an acceptable return on investment (ROI). These requirements make it very difficult to start a new intermodal terminal in a rural area. For example, at one time Canadian Pacific Railway (CP) had an intermodal terminal in Thief River Falls, Minnesota. The intermodal terminal was closed in November of 2001 due to lane balance issues and poor harvest years (Stewart, 2003). BNSF Railway closed their terminal in Dilworth, Minnesota, for similar reasons.

Intermodal shipping rates

Intermodal movements incur charges for marine and rail line-haul operations, terminal charges, storage, and drayage. Delays result in detention, and cargoes such as refrigerated or hazardous materials will incur additional fees. Risk management expenses such as insurance and cargo-tracking will add costs. International intermodal adds complexity with currency exchange, customs clearance, trade terms, and tariffs. New intermodal shippers face a daunting task to determine reasonable rates and payment procedures. A 3PL will buy bulk intermodal spaces, provide services, issue a through bill-of lading (B/L), and bundle all charges in a single bill. Ocean carriers do not have rates to all locations and may not be able issue a door-to-door through B/L, instead requiring the shipper or their representative to coordinate the individual movements. CN's new Duluth terminal does not have ocean door-to-door rates, but it will likely do so as volume increases. Volume, lane balance, terms of payment, and personal relationships all affect rates.

Rates have to capture the costs of inefficient operations in the supply chain. For example, excessive and unplanned delays for the shipper's access to boxes or chassis, truckers delayed at the shipper's plant, dwell-time issues, and poor communication all send costly ripples through the supply chain.

Advantages of intermodal operations to stakeholders

The intermodal service has reduced costs, increased productivity, and improved supply-chain operations for thousands of industries. An FEU can be loaded on or off of a well car or truck chassis in a matter of minutes using intermodal handling equipment. Truck drivers are engaged in drayage for the first and last mile rather than long-haul, cross-country trips and are more inclined to extend their length of career. Vessels can be unloaded in hours instead of days with a fraction of the longshore labor required for break-bulk vessels. Shippers have their products moved in boxes that protect the cargo from the elements, pilferage, and minimize damage from excessive handling. Railroads are able to operate trains longer than 10,000 feet that carry 400 FEUs. Customers receive their product on-time, at a lower cost, and with minimal damage, if any. The intermodal service reduces highway congestion, energy consumption, and noxious air emissions.

Intermodal service and terminals can also be a catalyst for economic development. BNSF's Alliance Terminal in Dallas, Texas, has adjacent distribution centers and related services creating a logistics cluster. Logistics clusters add value by generating other industrial activities and creating jobs (Sheffi, 2012). A 2015 study by the State and Local Policy Program at the University of Minnesota Humphrey School of Public Affairs identified seven rail-dependent business clusters in Minnesota. Philip Romero's 2016 study determined that freight rail, including intermodal, contributes at least 7 percent to Minnesota's employment, roughly 250,000 jobs and more than $40 billion in economic activity. One interviewee pointed out that an efficient intermodal system can be the lifeline for small and midsize companies by giving them access to global markets.

Intermodal service use and expansion can reduce freight rates and create economic benefits. Three benefits are:

1. Reduced supply-chain costs generate increased sales, broader market penetration, and new geographic reach for current business enterprises.
2. Lower freight costs are attractive to new enterprises locating in the region.
3. Intermodal service expands the overall freight-hauling capacity of the region.

Federal, state, and local funds all have been used to support the development of intermodal terminals. Each of the terminals will have a catchment area where it is advantageous for containerizable cargo to use the terminal. The shape and size of the catchment area is impacted by the location of competing terminals, highway congestion, containerizable cargo availability, and rail networks. Ultimately, the intermodal system must offer a reliable and cost-effective service that brings economic benefits to all carriers, shippers, and the community.

Current Minnesota Intermodal Service

According to the Minnesota Department of Transportation Statewide Freight System and Investment Plan, in 2012, approximately 35 percent (1.4 million units) of rail traffic in Minnesota used intermodal equipment (MnDOT, 2018).

Minnesota intermodal terminals

There are three Minnesota intermodal terminals tied to Class 1 railroads providing intermodal service to Minnesota, Wisconsin, and North Dakota shippers.

Table 1: Minnesota intermodal terminals and their destinations

MINNESOTA'S INTERMODAL TERMINALS				
Railroad	**Facility name**	**Location**	**Domestic service destinations on their rail network**	**Principal ocean gateway destinations by direct rail**
CP	Minneapolis Terminal	615 30th Ave NE Minneapolis, MN	Chicago, IL	Vancouver, BC Montreal, QC
BNSF	St. Paul Intermodal Facility	1701 Pierce Butler Route, St. Paul, MN	Chicago, IL Seattle, WA	Seattle, WA Tacoma, WA Portland, OR
CN	Duluth Terminal	1310 Port Terminal Drive, Duluth, MN		Vancouver, BC Halifax, NS Montreal, QC Prince Rupert, BC Mobile, AL New Orleans, LA

The three intermodal terminals are inland ports integrated with ocean gateway maritime terminals in the Pacific Northwest directly served on their rail networks (*see* Table 1). The terminals have logistical clusters supporting freight movement. Each of the terminals has a catchment area, from which it draws cargo. There is overlap within the areas. Interviewees reported service delays at ports in the Pacific Northwest due to vessel and port congestion.

CN's Duluth terminal does move international cargo on-demand to ports on the Atlantic coast of Canada, the Gulf Coast, and the Pacific Northwest, but currently there is no regularly scheduled service to those locations.

BNSF provides domestic intermodal service for containers and trailers. CP provides domestic intermodal service to Chicago, including linkage to railroads serving eastern U.S. markets. CN's terminal provides unscheduled domestic service that is primarily repositioning ISO boxes by hauling a domestic load.

Several interviewees noted that the CP terminal has a problem with track location because trains parked on the track limit access by trucks and cause significant delays. The U.S. Government's BUILD grant program may be an option to explore a public/private partnership to solve this problem at the CP terminal.

Minnesota intermodal service to outstate intermodal terminals

Minnesota boxes destined to the East Coast or southeastern states must be drayed by truck or rail to either Chicago or Kansas City intermodal terminals to connect with railroads. There are 18 active intermodal terminals in Chicago. Many of the newer terminals were constructed at the southern periphery of Chicago to avoid downtown traffic. Railroads having more than one Chicago terminal may dedicate terminals to specific corridors and destination clusters. They may also operate separate domestic and international terminals. The nature of rail networks and lack of physical interconnectedness means that boxes arriving in Chicago from Minnesota may have to be lifted off the rail cars, then drayed by truck to another railroad's terminal before being lifted onto that railroad's cars. This rubber-tire transfer adds to the cost and time of intermodal shipments. The Chicago terminals are used by Minnesota shippers for direct access to East Coast railroads, service to Southern California (SoCal), and empty boxes.

CN has a "paper ramp" in Northeast Minneapolis (132 31st Ave NE, Minneapolis, MN 55418). Containers are dropped off in the lot and then drayed to the CN intermodal terminal in Chippewa Falls, Wisconsin. This terminal is constricted in capacity and is off CN's main line network, adding to the shipping costs and time. There is a private intermodal terminal in Arcadia, Wisconsin, close to the Minnesota border. The principal customer at this terminal is Ashley Furniture, and it is located off CN's mainline. The other Class 1 railroad with track in Minnesota is Union Pacific Railroad. UP has four intermodal terminals in Chicago and one in Council Bluffs, Iowa. Minnesota cargo is drayed by truck to UP terminals. Companies located in northwestern Minnesota also use CP and CN intermodal terminals in Winnipeg, Canada. Winnipeg terminal use is driven by drayage costs, rail schedules, and box availability.

The Future of Minnesota Intermodal Transportation

Factors driving the expansion of intermodal service

Domestic intermodal rail traffic represents only a small fraction of the total truck traffic on routes over 500 miles. Industry experts have opined that under the right market forces intermodal could capture a portion of the truck traffic with the potential to double current rail intermodal service. This opportunity for increased market share is driven by the combined factors of increased costs for trucking, traffic congestion, and a lack of revenue to maintain highways. Drayage availability and costs have been affected by the 2018 requirement for electronic logbooks. U.S. truckload rates posted a double-digit rise in 2017. Shippers are paying on average 17 percent to 25 percent more than they did in 2016. Several interviewees stated that they currently have to reserve drayage almost a month in advance and that they are seeing a significant rise in surcharges to compensate for congestion delays in Chicago. They believe congestion surcharges could come to the Twin Cities.

The Minnesota Department of Transportation and regional planning agencies have been working to optimize the highway system within their physical and economic limits. Population increases along with suburban sprawl have increased highway congestion. Traffic congestion costs trucks in time, fuel, and labor. Improved gas mileage and lower vehicle miles traveled have reduced highway tax revenue. Fuel tax rates have not kept pace with inflation. Inadequate funding to maintain existing highways or build new highways has created additional capacity problems. Finding the required revenue may result in higher fees and taxes, further increasing trucking costs.

Theoretically those factors would drive an expansion of intermodal rail service. The rail industry has been spending billions to upgrade their rail systems. However, the availability to put down new rail lines or even expand existing routes is very difficult. Despite the environmental and economic advantages of rail over trucks in long-haul transportation, citizens have been reluctant to approve rail-growth agendas, instead believing communities may be adversely affected by increased traffic congestion and noise. The opposition, in part, may be because the public does not fully understand the benefits an upgraded intermodal system can bring.

Minnesota's potential for expanded intermodal service

Rail intermodal service

The two Twin Cities intermodal terminals are not operating at the levels reached in 2006 and have potential for growth. Recent additions of automated gates at the BNSF and CP terminals and other streamlining measures at the existing Twin Cities terminals may further increase capacity. However, community concerns, particularly from adjacent residents, may arise that could limit physical expansion of these terminals. The Duluth terminal indicates it has room for expansion. The current business models of these three Class 1 railroads, which prudently avoid overinvestment, duplication, and redundancy, do not favor building additional new terminals when there still is unused capacity at existing terminals.

UP is the only Class 1 railroad operation in Minnesota that does not have an intermodal terminal located in the state. UP's spine line, which comes to the Twin Cities from the south, provides a direct route to Kansas City. From Kansas City, UP has direct fast service to and from southern California. The SoCal ports of Los Angeles and Long Beach are the two largest container ports in volume for imports and exports in the United States. Also, the larger number of ocean carrier vessels calling there often offer more direct service to ports in Southeast and South Asia— growing markets for Minnesota export shippers.

A decision by UP to establish an intermodal terminal in Minnesota would be based on an available location, market potential, the overall impact on network velocity, and an acceptable return on investment for UP. The new traffic would need to not adversely impact the efficiency of UP's origin, destination, and intermediate terminals.

There are 17 short line railroads with about 1,000 miles of track in Minnesota. In theory, they could build intermodal terminals. However, short lines would need to connect to Class 1 rail networks for the terminal to provide international or domestic intermodal service. The USDOT awarded Iowa DOT a $25.65 million FASTLANE grant to aid in the construction of a full-service logistics terminal in Cedar Rapids, Iowa, and this facility (when completed in 2019) may offer limited intermodal service to customers in Southeastern Minnesota. Due to the nature of the rail networks, expanded intermodal service in Minnesota will not directly link the state by rail to the East Coast. This means that there will be continued drayage either by truck or rail to Chicago.

Marine intermodal service

Minnesota is connected to navigable water through Mississippi River and Duluth ports. European river and coastal intermodal service has seen continued growth, and waterways marine intermodal is heavily used in the Baltic. Duluth saw the intermodal movement of trailers on vessels as early as 1959 and had a container quay crane for many years. Ocean container ships in the 800 TEU range used the Saint Lawrence Seaway in the 1960s and 1970s, but this service was abandoned as the size of container ships increased. In 2014, break-bulk and container cargo service was established between Cleveland and Antwerp. There was discussion about similar service to Duluth but that service never started. A number of studies examined moving containers by barge on U.S. domestic waterways with some leading to startup operations, but these have yet to evolve into lasting services.

Several factors inhibit the growth of marine intermodal service for Minnesota. Marine transportation is slower but more fuel-efficient than either rail or truck intermodal service. However, U.S. fuel prices are one-third of Europe's, making the trade-off of increased transit time vs. reduced cost far less attractive in the U.S. than in Europe. The winter weather results in the closure of the waterways for two or more months each year. Halting marine service creates a broken supply chain where shippers either stop shipping or seek another mode to transport their cargo. The non-marine modes have historically charged marine customers a premium to

carry cargo during the winter season. Increased truck rates, traffic congestion, and climate change could create a tipping point where marine transportation becomes cost-effective. However, the locks on all the waterways are in need of repair, and, in the case of the Soo, another lock would need to be constructed. Intermodal vessels and marine terminals also would need to be built.

Conclusion

Minnesota is the third largest agricultural exporting state in the Union. There is an ever-increasing domestic and global movement of agricultural products in containers. Minnesota has vibrant clusters of production manufacturing, forest products, printing and publishing, retail, processed foods, and heavy machinery. Many of these products have the potential to move as containerized freight. Trucking costs will continue to increase and adversely impact regions dependent on long-distance trucking. Approximately 70 percent of all containerized freight movements go by truck for at least the first and last mile. Expanded intermodal service that replaces long-haul truck traffic could free up drivers for local drayage (Vantuono, 2018). Truck automation may bring benefits to drayage, but it is too early for the application of the technology and its affects to be clearly understood.

A University of Minnesota study found intermodal transportation policy represents an important new arena for ensuring the continued performance of freight transportation (Munnich, et al, 2015). MnDOT, state freight, rail, and investment plans cite the importance of integrating intermodal transportation and terminals into state policy (MnDOT, 2015, 2016, and 2018). In order to carry out the goals of these thoughtful plans, the IANA definition of intermodal transportation needs to be adopted and adhered to. The terms transloading, multimodal, and intermodal are used interchangeably, which creates confusion. The intermodal benchmark study, expert summit, and creation of an on-going task force proposed in the Humphrey School study should all be carried out. The creation of a permanent intermodal group within MnDOT that engages in outreach to intermodal partners and policy makers would support efforts to improve Minnesota intermodal service. A knowledgeable MnDOT intermodal group would reduce confusion, ensure a corporate memory, and create lasting relationships. One interviewee cited the critical need for all parties to address intermodal issues on a multi-state region level. A North Dakota terminal that provides service to western Minnesota businesses benefits Minnesota.

Intermodal improvements can be funded through private investment, the development of public-private partnerships, and transportation funding for related public infrastructure. Allowing drayage of heavy weight containers maximizes the benefits of rails ability to carry heavy boxes and reduces dray costs and congestion. North Dakota recently passed legislation and worked with the Federal government to allow a 129,000-pound weight limit on interstate highways. This allows two loaded TEUs to move on an approved chassis. One interviewee noted that Minnesota should explore ways to improve weight-limit restrictions on its highway system and that the federal government needs to consider improvements for the interstate system. Ideally, road weight limits would be uniform across states.

The FAST Act allows up to 10 percent of the freight funds to be spent on intermodal investments. The Duluth Port Authority was successful in obtaining a TIGER grant for intermodal development as have state agencies in Kansas and Iowa. There have been unsuccessful applications such as Iowa's proposed hub in Manley. Examining these proposals may help guide grant applications.

Intermodal operations will continue to grow in importance nationally, but the current structure of rail networks will limit accessibility and volume. In the short term, there are opportunities to address operational inefficiencies, such as congested depot access, that can increase capacity and reduce supply-chain costs. Long-range opportunities can include new intermodal corridors, increased highway weight limits, track repositioning, and a terminal. Intermodal improvements are long-term investments by private and public entities that need planning, outreach, commitment, and a clear understanding of the benefits and costs. Intermodal's systems approach requires the active interaction of multiple partners to be successful in both development and operation. Minnesota needs to be ready to reap benefits from improvements to the intermodal system, jointly undertaken with adjacent states and private industry.

About MFAC

The Minnesota Freight Advisory Committee (MFAC) was established in 1998 to advise the Minnesota Department of Transportation (MnDOT) and other public agencies and officials on the performance and importance of Minnesota's freight transportation system to support the state's economic competitiveness.

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