

2.0 THE STATE'S EXISTING RAIL SYSTEM

Minnesota's Existing Rail System

The institutional structure of the rail industry in North America is quite different from the other transportation modes (highways, air, water, etc.) that have typically been the subject of public planning studies and policy development efforts. While the other modes are generally owned and maintained at public expense and accessible to any licensed operator, rail carriers not only provide the service, but also maintain and control the tracks and other facilities that are required to provide service. Physical conditions, service and institutional structure are closely related.

Understanding how the rail industry is structured and the varying scale, ownership and operating arrangements that are present in Minnesota is critical to developing responsive strategies that will meet the goals set forth in a vision for rail. The North American rail system is an integrated network and the individual carriers, ranging from the largest carriers that service much of the nation to very small railroads that operate in only a county or two, have different perspectives and needs.

This chapter provides an overview of Minnesota's railroads, their economic structure, their major differences, and rail service needs and opportunities in Minnesota. It also includes an estimation of the value of the railroad industry to the Minnesota economy using selected metrics, trends and forecasts.

COMPOSITION OF MINNESOTA'S FREIGHT RAILROAD INDUSTRY

Railroads are typically categorized by measures of size and geographic reach. Carrier size is a critical determinant of the rail services that are available in a region, competitive posture, market access, physical condition, and financial strength.

In the United States, railroads are classified by size following a scheme developed by the Association of American Railroads.¹³ This scheme is based on a combination of revenues and carrier characteristics.

- **Class I:** The largest railroads with revenues exceeding \$319.3 million (based on 2004 dollar values). Since 2000, seven such carriers have been operating in the United States, of which four, BNSF Railway, Union Pacific, Canadian National, and Canadian Pacific, have operations in Minnesota.
- **Class II:** A non-Class I line-haul railroad operating 350 miles or more with operating revenues of at least \$40 million but less than \$319.3 million. Class II railroads are called regional railroads, although they are often classified with and referred to as short lines. Minnesota currently has one Class II railroad operating within the state. Genesee & Wyoming, Inc. operates the former Dakota, Minnesota and Eastern railroad line west of Tracy, Minn., after its purchase from CP.
- **Class III:** The remaining railroads that have revenues of less than \$40 million and are engaged in line-haul movement. Class III railroads are commonly referred to as short line railroads.

¹³ The Surface Transportation Board uses a similar but not identical classification scheme that is purely revenue based.

- **Switching or Terminal:** A railroad engaged primarily in switching and/or terminal services for other railroads (i.e., they are not typically involved in line-haul moves between two geographical locations). Switching and terminal railroads are often categorized with short line railroads due to their operational and revenue characteristics, except in cases where they are owned by one or more Class I carriers.

Small railroad ownership takes on many different forms including:

- **Class I Parent(s):** Typically a jointly owned switching or terminal railroad, such as the Terminal Railroad Association (TRRA) of St. Louis and the Belt Railway Company (BRC) in Chicago. Minnesota does not host any Class I Parent railroads at this time.
- **Industry:** Usually operated for one industry, but can provide service to other unrelated firms. The most common owners are steel and forest products companies. Minnesota has had several significant industry-owned railroads, most notably the Duluth Minnesota and Iron Range (DMIR), which was acquired by CN in 2004 from an affiliate of U.S. Steel. A current example is the Cloquet Terminal Railroad Company, a 3-mile switching railroad located in the City of Cloquet that is owned by SAPPI Paper.
- **Holding Company:** A railroad that is owned by a corporation holding several short lines. The largest holding company is Genesee and Wyoming, Inc., with 116 properties worldwide, including two in Minnesota, the Rapid City, Pierre and Eastern, and the Otter Tail Valley Railroad. Anacostia and Pacific, another major short line holding company, operates the Northern Lines Railway.
- **Public:** This includes state- and county/city/municipality-owned railroads, as well as federally-owned (typically for military purposes). At present, there are no publicly-operated railroads in Minnesota; however, several Minnesota short lines operate under a lease agreement over trackage that is owned by Regional Railroad Authorities (RRAs). These include the Minnesota Prairie Line, the North Shore Scenic, and the Minnesota Southern Railway.
- **Independent** – Railroads that are independently owned and operated (e.g., Progressive Rail, Inc., Minnesota Commercial Railway, etc.), with the underlying infrastructure either directly owned by the operator or by a third party, such as a Class I railroad or public agency. Most of the short lines in Minnesota are independently owned, although several, including the Red River Valley & Western, have multiple operating entities in Minnesota and the Dakotas.

In addition to 19 common carriers, Minnesota also hosts two sizeable “captive” railroads, carriers that only handle traffic on their owner’s behalf. These are the Cliffs Erie and Northshore Mining railroads that connect the iron range with Lake Superior ports. The former is presently dormant but not abandoned, while the latter continues to be in operation.

A list of each of Minnesota’s active freight railroads, their parent companies and miles operated is shown in [Table 2.1](#). In the case where the railroad property is owned by a public entity, the owning agency and parent company of the operator are both indicated.

Table 2.1: Freight Railroads Operating in Minnesota

RAILROAD	SCAC ^a	PARENT COMPANY/ OWNING AGENCY	MILES OPERATED IN MINNESOTA	PERCENT OF TOTAL MILES OPERATED
CLASS I RAILROADS				
BNSF Railway	BNSF	-	1,686	28.5%
Canadian National	CN	-	479	8.1%
Canadian Pacific	CP	-	1,804	30.4%
Union Pacific Railroad Co.	UP	-	665	11.2%
REGIONAL AND SHORT LINE RAILROADS				
Minnesota Northern Railroad, Inc.	MNN	KBN Inc.	257	4.3%
Minnesota Prairie Line	MPLI	TCWR (RRVW); Minnesota Valley RRA	94	1.6%
Minnesota Southern Railway, Inc.	MSWY	Independent; Buffalo Ridge RRA	42	0.7%
Minnesota, Dakota, and Western	MDW	Independent	6	0.1%
North Shore Scenic Railroad	NSSR	Independent; St. Louis and Lakes Counties RRA	25	0.4%
Northern Plains Railroad	NPR	Independent	51	0.9%
Otter Tail Valley Railroad	OTVR	Genesee & Wyoming, Inc.	72	1.2%
Progressive Rail, Inc.	PGR	Independent	97	1.6%
Rapid City, Pierre & Eastern Railroad	RCPE	Genesee & Wyoming, Inc.	46	0.8%
Red River Valley and Western Railroad Co.	RRVW	Independent	32	0.5%
St. Croix Valley Railroad, Inc.	SCXY	KBN Inc.	60	1.0%
Twin Cities and Western Railroad Co.	TCWR	Red River Valley and Western	234	3.9%
SWITCHING AND TERMINAL RAILROADS				
Cloquet Terminal Railroad Company, Inc.	CTRR	SAPPI Fine Paper	3	0.1%
Minnesota Commercial Railway	MNNR	Independent	125	2.1%
Northern Lines Railway	NLR	Anacostia and Pacific	28	0.5%
CAPTIVE INDUSTRIAL RAILROADS				
Cliffs Erie Railroad	LTVX	Cliffs Natural Resources	72	1.2%
Northshore Mining Railroad	NMCZ	Cliffs Natural Resources	47	0.8%
TOTAL MILES OPERATED (INCLUDING TRackage RIGHTS)			5,925	100.0%

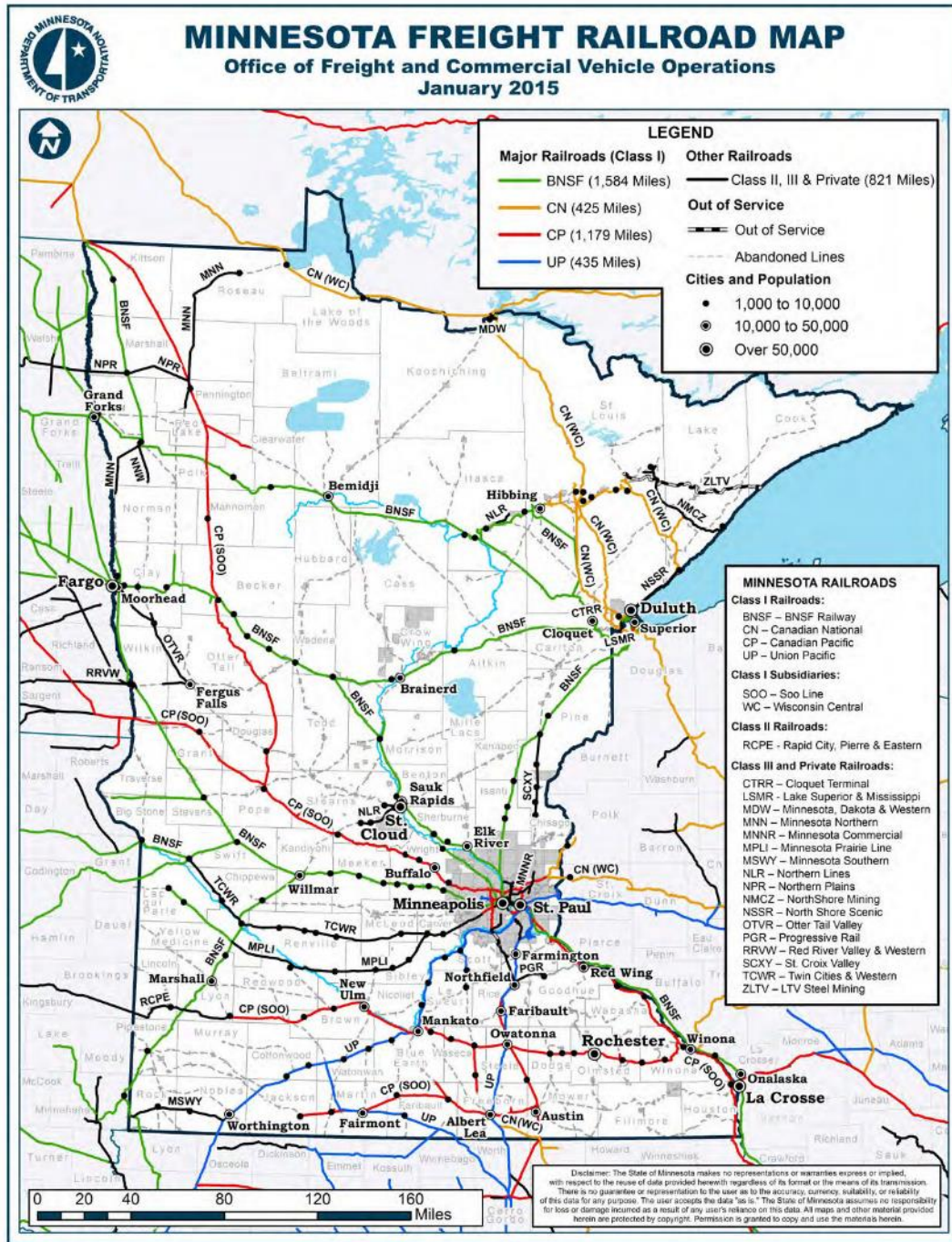
^a Standard Carrier Alpha Code, an industry standard two- to four-letter abbreviation

^b Mileage shown for each carrier includes trackage rights mileages; thus the total miles shown for all carriers exceeds physical mileage

In Minnesota, four Class I railroads and their affiliates provide the substantial majority of rail service from the standpoint of many key measures such as traffic handled and mileage operated (more than 80 percent). Given their importance, it is useful to take a closer look at the characteristics and recent trends of each of these four Class I railroads. Much less public information is available for the smaller railroads, which in most cases are privately held and therefore not subject to public reporting requirements.

The Class I route system is shown in [Figure 2.1](#).

Figure 2.1: Class I Route System



BNSF Railway

A unit of Omaha-based Berkshire Hathaway since 2010, BNSF Railway is one of the four largest U.S. railroads, along with Union Pacific Railroad, CSX, and Norfolk Southern. It operates in 28 states and two Canadian provinces; has 32,500 route-miles (1,671 in Minnesota); and employs 43,000 people systemwide (2,119 in Minnesota). In 2013, the railroad had total assets of \$52.7 billion and annual revenues of \$21.5 billion systemwide.¹⁴ BNSF dominates many markets in Minnesota; its business strategy in the state emphasizes bulk freight consisting primarily of crude oil, coal, ore and agricultural commodities, along with intermodal traffic along the northern corridor “High Line” between the Pacific Northwest, the Twin Cities and Chicago. BNSF intermodal service in the Twin Cities is split between St. Paul’s Hub Center, which handles domestic traffic, and nearby Union Yard in Minneapolis, which serves the international liner trade. While BNSF is the dominant railroad in Minnesota, its operations in the state constitute only a small part of its total network and revenue.

BNSF’s network covers the western half of the United States, serving all of the major markets in the region. The firm connects to eastern markets through all five primary gateways (Chicago, St. Louis, Kansas City, Memphis and New Orleans) and several minor interchange locations, including a southeastern connection at Birmingham, Alabama. North American service is provided through connections with Canadian and Mexican railroads.

BNSF moves more intermodal traffic than any other rail system in the world. In 2013, five million intermodal shipments (truck trailers or containers) were transported on BNSF’s rail lines. According to BNSF, the railroad is one of the largest grain-hauling railroads in the United States, transporting more than 900,000 carloads of agricultural commodities in 2013. Among the industrial products carried by BNSF’s carload services are lumber, newsprint, printing paper, paperboard, propane, lube oil, motor oil, asphalt, canned beverages, coiled sheet steel, recycled iron and steel, cement, asphalt, gypsum, crushed stone, limestone, iron ore, soda ash for glass, and kaolin clay for paper.

Union Pacific Railroad

Union Pacific operates 32,000 route miles in the western United States, and employs 46,500 people, of which 547 work in Minnesota.¹⁵ UP’s 2013 gross freight revenues were \$20.6 billion, and carloads totaled 9.022 million. The railroad serves 23 states, every major West Coast and Gulf Coast port, and the five largest gateways between the East Coast and West Coast at Chicago, St. Louis, Memphis, Kansas City and New Orleans. The railroad has one of the most diversified commodity mixes in the industry, divided among intermodal (20 percent of revenue), coal (19 percent), industrial (18 percent), chemical (17 percent), agriculture (16 percent), and auto (10 percent).¹⁶ UP is the nation’s largest hauler of chemicals, much of which originates along the Gulf Coast near Houston, Texas. With access to the coal-rich Powder River Basin in Wyoming and coalfields in Illinois, Colorado and Utah, the railroad moves more than 250 million tons of coal annually. UP’s intermodal services, which largely parallel BNSF’s network linking the large West Coast ports with major markets in the interior, handled 4.06 million units in 2013, 19 percent less than BNSF. BNSF’s longstanding dominance of the nation’s largest intermodal lane between Los Angeles and Chicago provided a substantial boost over UP; differences in intermodal market strategy account for the rest.¹⁷

UP gained entry to Minnesota through its 1995 acquisition of the Chicago and North Western. At present the firm operates 646 miles of track in the state. UP’s volume in 2013 amounted to 173,000 carloads of freight originating in

¹⁴ Surface Transportation Board, Class I Annual Reports, 2013

¹⁵ Union Pacific State Guide, Minnesota, 2013

¹⁶ Source: Union Pacific Railroad, 2014

¹⁷ Source: Union Pacific Investor 2013 Investor Fact Book

and 78,000 carloads terminating in Minnesota in 2013. UP's business strategy in the region has focused on developing unit train and carload markets, which are heavily oriented toward agricultural crops, ethanol and coal. Intermodal is not much in the picture at present, with the exception being a twice-weekly Road Railer service between Chicago and Minneapolis that is operated under contract with the Norfolk Southern's Triple Crown subsidiary. There has been some interest in starting service to the southern and southwestern United States.

Canadian National

Canadian National Railway Company, headquartered in Montréal, Canada, operates the largest rail network in Canada and the only transcontinental network in North America. CN operates a network of approximately 20,000 track miles in eight Canadian provinces and 16 states. CN's Canadian operations span across Canada from Nova Scotia to British Columbia. Through a series of acquisitions that began in 1999 with the purchase of the Illinois Central, CN gained control of an extensive network in the central United States along the Mississippi River Valley from the Great Lakes to the Gulf of Mexico. CN's revenue was \$9.9 billion in 2012 and the company shipped 5.06 million carloads.

In Minnesota, CN has had a long-standing presence with its Duluth Winnipeg and Pacific subsidiary; however, much of CN's current 380 miles of track came through its acquisitions of the Wisconsin Central (2001) and Duluth, Minnesota and Iron Range (2004). The latter had the well-known operation between the Iron Range and the ports of Twin Harbors and Duluth/Superior, and made the CN the largest carrier of iron ores in North America. The Wisconsin Central acquisition allowed the CN to create a through route to Chicago, forming a transcontinental link from western Canada through the United States. The acquisition also gave the railroad access to St. Paul from the east. Volumes on that route are modest, as CN lacks a yard in the Twin Cities and enters the region over trackage owned by CP. CN does not offer intermodal service in Minnesota, although limited service is available through a terminal in Chippewa Falls, Wisc., and several intermodal trains linking Chicago and western Canada by its northern Minnesota main line daily.

Company-wide, the firm employed an average of 23,000 people in Canada and the United States in 2013, with 540 located in Minnesota. In 2012, gross revenues amounted to \$9.9 billion Canadian and carloads totaled 5.06 million, placing CN in fifth place among the seven Class I railroads. Commodity mix is dominated by intermodal (20 percent of revenue), petroleum/chemicals (17 percent), grain (16 percent), and forest products (13 percent). Forty-six percent of CN's traffic is U.S. domestic and cross-border, 32 percent is international, and 22 percent is Canadian domestic.

Canadian Pacific Railway

Based in Calgary, Alberta, the Canadian Pacific Railway provides freight transportation services with 15,000 employees over a 13,700-mile network in Canada and the United States, of which 1,724 miles and 1,532 employees (does not include Dakota Minnesota and Eastern/Iowa, Chicago, and Eastern) are located in Minnesota. CP's rail network stretches from Vancouver to Montréal, and also serves major cities in the United States such as Minneapolis, Chicago and New York City. In 2013, 2.69 million carloads generated revenues of \$6.1 billion Canadian, placing the firm in sixth place among the Class I railroads, behind CN and ahead of Kansas City Southern (KCS). Over one-half of the CP's freight traffic is in coal, grain and intermodal freight. It also ships automotive parts and automobiles, sulfur, fertilizers, other chemicals, forest products and other commodities. The busiest part of its railway network is along its main line between Calgary and Vancouver.

CP has had a lengthy presence in Minnesota through its controlling ownership of the Soo Line Railroad, which served the upper Midwest. In 1985, CP purchased the remaining assets of the Milwaukee Road, giving it a more direct through route between Chicago and the Twin Cities. Combined with CP's existing lines west of the Twin Cities, a stronger link between Chicago, the upper Midwest and western Canada could be established through gateways at Portal, North Dakota, and Noyes, Minn. Subsequent to the Milwaukee acquisition, CP's Midwestern network shrank considerably through a series of line spin-offs. This trend was reversed in September 2007 when CP initiated acquisition of the Dakota Minnesota and Eastern and its affiliate, the Iowa, Chicago, and Eastern; the latter was spun

off by CP in 1997 and passed through several owners prior to its reacquisition. Combined, the DME and ICE properties added 472 miles of track (564 total, including trackage rights) in Minnesota, and 2,500 route miles throughout the upper Midwest to CP's portfolio. Seven years later, in 2014, CP sold the DME line west of Tracy, Minn., (approximately 660 miles), to Genesee and Wyoming for \$210 million. Headquartered in Rapid City, S.D., the newly-named Rapid City, Pierre & Eastern Railroad carries approximately 52,000 carloads of grain, bentonite clay, ethanol, fertilizer and other products annually.

FREIGHT RAIL INDUSTRY ENVIRONMENT

Economics of Class I Railroads

The railroad industry established itself as the dominant form of land transportation through its ability to move large volumes of passengers and freight much more rapidly and efficiently than any other mode. The railroad industry reached its peak in the 1920s as the system became overbuilt and other modes became competitive for moving freight and passengers. By the 1990s, the size of the rail network declined by almost one-half, and the rail industry's shares of traffic and especially transportation revenue dropped dramatically. Mergers, which began almost as soon as railroads were first constructed, continued until only a handful of major carriers remain.

As the primary railroad network was being consolidated, many lower density lines spun off as small railroads. Short lines have come to perform a critical transportation function for smaller agricultural and industrial product shippers, connecting them to the Class I railroad mainline services, for whom they generate a significant volume of revenue. In addition to rationalizing the network, the industry greatly improved operating efficiency through the use of better technologies for track, equipment, and communications and operations control. For most of the past decades, these investments, along with a trend of long-term economic growth, led to increased traffic measured in tons and ton-miles.

Competitive pricing is a critical factor in the growth of rail traffic. Rail rates to shippers dropped following economic deregulation in 1980, allowing the railroads to hold market share, but at the cost of revenue and profitability. Between 1980 and 2002, railroad freight revenues remained essentially flat in current dollars, and were only partially offset by increases in productivity, asset sales and other business strategies. The result was a relatively low rate of return on investment for the railroads. Adjusted for inflation, average U.S. freight rail rates were 42 percent lower in 2013 than in 1981, according to the Association for American Railroads.

Railroads attain their greatest efficiency and competitive advantage over other modes when handling large volumes of heavy bulk traffic over long distances in point to point service. Coal was the single largest commodity hauled for many years, accounting for around 40 percent of originated tons, followed by chemicals, nonmetallic minerals, and farm products, each with between 7 percent and 10 percent of total tons in 2014. Intermodal is in fifth place with almost 7 percent of originated tons. The actual share is somewhat higher, as figures for the commodity-specific categories include some traffic that moves intermodally in addition to carload and unit train service.¹⁸

For the first time since the economic deregulation of the railroad industry in 1980, the Surface Transportation Board determined the five U.S.-domiciled Class I railroads to be "revenue adequate" for the year 2013, meaning that these carriers achieved a rate of return equal to or greater than the board's calculation of the average cost of capital to the freight rail industry.¹⁹ Railroads must carry the full burden of building and maintaining their own infrastructure, are

¹⁸ The Association of American Railroads, Class I Railroad Statistics. July 15, 2014.

¹⁹ www.railwayage.com/index.php/freight/class-i/stb-five-class-i-railroads-revenue-adequate.html

among the most capital intensive of all industries and require access to large amounts of capital. A railroad cannot divest itself of mainline track or discontinue maintenance during recessions without ceasing revenue-generating service. This situation encourages railroads to be highly risk-averse. Nevertheless, improved rail earnings in recent years have allowed the large carriers to increasingly afford the massive investments they need to achieve and maintain a state of good repair, improve service, and add new capacity to handle the evolving needs of their customers. Particularly in the years following the recession of 2008–2009, these improved earnings allowed the Class I railroads to substantially ramp up their investments in infrastructure and equipment, which totaled around \$25 billion annually from 2011–2013.²⁰

In order to deal with this new business environment, the railroads are pursuing a number of strategies:

- **Focus on their “hook and haul” business**—the high-density, long-haul freight movements where large volumes enable economies of scale in operation and revenue generation—which explains the investments focusing on high-volume unit train-sized movements of coal, intermodal, and other bulk commodities, and the strong interest in developing the crude-by-rail business.
- **Encourage consolidation of carload traffic at centers on their main lines.** Logistics parks, transload centers and grain consolidation facilities enable the railroads to continue to provide carload service, but only in locations where traffic can be concentrated and interference on their main line operations minimized. The Class I railroads also increased their reliance on short line connections to provide carload service to shippers with more modest volumes of traffic. This is an effective strategy in maintaining rail services in some markets, but at the cost of transferring risk to the short line operators and, where trucks are substituted for rail, increased pavement and bridge maintenance costs to the public sector.
- **Increase prices and reduce service by divesting lower-profit traffic.** This happened across many rail markets, where growing bulk and intermodal traffic was squeezing out carload traffic. The use of such strategies to allocate rail service makes business sense from the railroads’ perspective, but for individual shippers and some short lines that are “captive” to a single railroad, higher rail rates and inferior service mean lower profits, smaller market share and, in some cases, the risk of business failure.

Short Lines

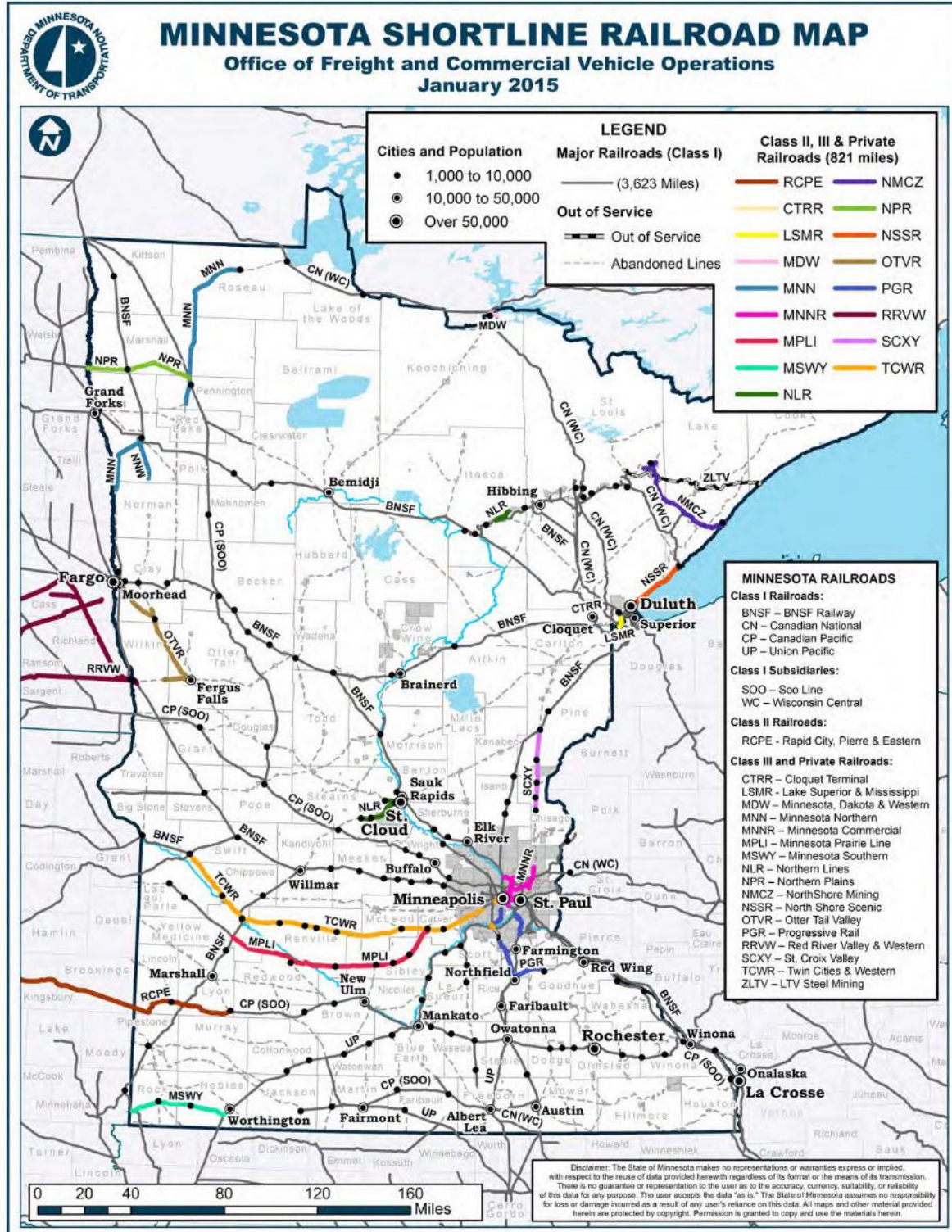
In recent years, the short line industry consisted of a mix of profitable and marginal performers. The short line route network in Minnesota is shown in [Figure 2.2](#).

The volume of traffic handled by a short line has a direct impact on track maintenance levels, speeds, service reliability, and the financial viability of the short line service. High-volume markets and lines have done relatively well; low-volume markets and lines struggled. The national trend toward consolidation of short line ownership and some consolidation of low-density lines and collector/distributor functions improved the business outlook for short lines in some areas. This trend emerged to a lesser degree in Minnesota than elsewhere, which can be attributed to the minimal presence of short line holding company ownership in the state. It is apparent that some short lines operating in Minnesota and elsewhere are not meeting critical volume thresholds, and services and investment in track and equipment are declining. Concurrently, short line railroads are facing pressure for investment as North America’s

²⁰ The Association of American Railroads. *Cost Effectiveness of American’s Freight Railroads*. May, 2014.

Class I railroads move to larger and heavier equipment, and market service options such as transloading centers and high-volume shuttle loading along their network. Short lines need to keep up by fully accommodating modern rail cars and offering distinct services that their Class I connections are unable or unwilling to provide.

Figure 2.2: Regional and Short Line Railroads



Beyond volume, short lines face several challenges as an industry. Infrastructure conditions are inferior to those of the large railroads. Track is less well maintained, with lighter weight rail, inferior tie and ballast conditions, and no active signaling system. As a result, mainline train speeds are lower, typically 40 mph or slower for freight trains, and operations are far less automated. Although these conditions are usually adequate for existing business, many carriers struggle to maintain track at minimal commercially acceptable levels, and are unable to accommodate some modern rolling stock. With the large railroads moving from 263,000 to 286,000 pounds as the standard maximum car weight, the ability to handle standard modern rolling stock has become a particular concern. Without accommodation of these heavier cars, the competitive position of many short lines will be substantially compromised. The state could alleviate some of these challenges by adopting the Federal 45G Short Line Railroad Infrastructure Tax Credit, which would provide Class II and Class III railroads the opportunity to get tax credit for 50 percent of their qualified railroad tax maintenance expenditures.

The availability of suitable rail cars for short line shippers can be a problem. Although rail car supply exceeded demand in recent years, some smaller carriers have difficulty obtaining proper equipment on a timely and cost-effective basis. This issue typically occurs when equipment supply is controlled by contractual agreements with the prior owners of the line.

Smaller railroads, with their narrow geographic coverage, must rely far more heavily on connecting carriers to serve the market needs of their customers. The agreements between short lines and their Class I connections, which are the result of a line's prior history and present ownership, are valuable and vital to the Minnesota's economic growth. The agricultural, ethanol, mining, manufacturing, and food processing industries in Minnesota would benefit from improvements to the freight rail infrastructure in Minnesota since they would improve the efficiency of the network and help short lines connect with Class I railroads. Investing in short line railroads with local funds has the greatest potential for local impact.

A short line may or may not have independent rate making authority, which is the ability to negotiate its own revenue levels for local and interchanged traffic. If carloads are interchanged with one or more railroads, traditionally each rail entity would be entitled to individually establish a rate for its participation in transporting a shipment. In the case of several short lines in Minnesota, this ability to make rates is superseded or preempted by agreements with their Class I connections. These agreements, which were established when the line was spun off by the former Class I owner, often restrict independent rate making, car supply and the interchange of cars to the line's original owner, even if connections to other Class I carriers are available. This process was designed to allow the seller to retain some of the benefits of unique access to businesses on the branch, often in return for favorable purchase terms. These rate and operating restrictions, or the ability of the short line to only interchange with one railroad due lack of other connections, creates what is known as a "captive" short line.

Although most of these restrictive terms are contractually-agreed relationships with advantages or compensation accruing to both parties to the agreement, in a few cases the restrictions led to ongoing inefficiencies, such as unintended increases in short-haul switching moves at or near the interchange point, and insufficient revenue yields with detrimental effects on the carriers' ongoing viability. In some cases, short lines had to forego new business that would have been logically routed onto another connecting Class 1, or divert natural rail traffic onto trucks to reach final destinations that are otherwise rail accessible.

VALUE OF THE FREIGHT RAIL INDUSTRY TO MINNESOTA

The economic development of Minnesota was heavily shaped by the railroads, which opened access to its fertile lands and connected the region through an integrated network. The railroads continue to provide considerable value to the state through their services to shippers, employment of state residents and support of state institutions through various taxes.

Direct measures of value include carrier revenues associated with traffic handled in Minnesota, payroll size, services purchased, taxes paid, capital invested, and valuation of plant and property. More indirect measures include the value of goods transported, indirect employment, and the contribution to state GDP of industries served. This section examines three direct measures:

- Employment, wage and payroll taxes
- Plant and property
- Corporate tax contributions to the state

Employment, Wage and Payroll Taxes

Employment is an indication of the importance of the railroad industry to the state's workforce, directly as a career choice and indirectly as a market to which goods and services can be sold. There is also a multiplier effect from employment-driven economic activity. Given the massive contraction in rail employment during the past 50 years, it is useful to note not only current employment, but also the number of retirees and beneficiaries who are drawing railroad pensions.

Data on industry employment and wages are readily available from several sources. The Railroad Retirement Board, a federal agency that administers the railroad retirement system (which is separate from Social Security), maintains statistics on active and retired employees. Information on aggregate wages paid by the state was drawn from AAR's state fact sheets, for which 2012 is the most current year.²¹

In 2012, Minnesota RRB records indicated employment of 4,566 individuals. The average wages and benefits per freight rail employee was \$113,270. In addition to the 4,566 active employees, 14,518 retired employees or railroad beneficiaries live in Minnesota. Beneficiaries are spouses and survivors of deceased railroad employees. The net payout to these beneficiaries amounted to approximately \$298 million in 2012.

Plant and Property

In Minnesota, railroads pay an annual assessment on the property they use for conducting their business. The Commissioner of Revenue, using data supplied by the railroads, estimates the value of property used for operating purposes annually. The estimate is not based on direct evaluation of each individual property, but rather carrier financial data. For publicly held carriers, property values are calculated on the basis of cost, income, stock price, and debt levels. For privately held firms, original cost and income are used. In Minnesota, these property tax rates are uniform, and the treatment for rail yards and main lines is identical. Property that is not used for operating purposes is assessed and taxed by the local jurisdiction in which it is located.

According to the 2011 ASLRRRA Factbook, Minnesota railroads paid a total of \$2,016,000 and prevented \$33 million in pavement damage and maintenance costs. Each mile of track in Minnesota generates an average of \$450 in tax revenue.²²

Freight also provides value to Minnesota as private railroads make capital investments. All four of the state's Class I railroads—BNSF, CP, CN and UP—made substantial capital investments in recent years and expect to continue to

²¹ www.aar.org/data-center/railroads-states#state/MN

²² Minnesota Department of Transportation & Minnesota Department of Employment and Economic Development, (2013). Freight rail economic development

do so into the foreseeable future. BNSF announced a number of substantial projects in 2015, including relaying 10 miles of second main track on the Staples Subdivision between Big Lake and Becker, double track on the Midway sub, and triple track on the St. Paul sub.²³ UP ramped up its investment in Minnesota, which presently includes expansion of its South St. Paul yards and completion of the Roseport double track project, while CP is projecting to resume construction of a \$60 million expansion of its St. Paul (Pigs Eye) yard.²⁴ In the Duluth region, CN is undertaking a \$30 million capacity expansion project that entails realignment and some second main track on Steelton Hill.²⁵

PASSENGER RAIL

Minnesota has one active intercity passenger rail service, Amtrak's Empire Builder. The Empire Builder operates one train per day between Chicago and Seattle/Portland. Stops in Minnesota include Winona, Red Wing, St. Paul, St. Cloud, Staples, Detroit Lakes, and Fargo/Moorehead.

Although Amtrak's presence in Minnesota is limited to one daily train each way, both the Empire Builder and its patronage by Minnesota riders are standouts in Amtrak performance. In recent years, the Empire Builder held the top spot in ridership for any single train on the Amtrak system. In FY 2014, it slipped to second place because of poor timekeeping associated with massive congestion along its route.

A number of studies examined proposed new intercity passenger services in Minnesota. The Intermodal Surface Transportation Efficiency Act of 1991 identified high-speed rail corridors throughout the nation. At around the same time, the Minnesota, Wisconsin and Illinois departments of transportation were completing the Tri-State Rail Study, outlining route and service alternatives among Chicago, Milwaukee and the Twin Cities.

Minnesota is part of the Midwest Regional Rail Initiative, which is working to establish a High Speed Rail network serving the Midwestern states with a hub in Chicago. Throughout the past 20 years, the MWRRI suggested various routes for HSR between Chicago and the Twin Cities. HSR also is being studied for two other corridors in Minnesota—a connection between the Twin Cities and Duluth/Superior (the Northern Lights Express or NLX), and a connection between the Twin Cities and Rochester (Zip Rail).

In February 2009, the United States Congress enacted the American Recovery and Reinvestment Act of 2009, appropriating \$8 billion for HSR and intercity passenger rail services. This appropriation followed the enactment of the Passenger Rail Investment and Improvement Act in October 2008, which authorized new programs for high-speed and intercity passenger rail. Both of these programs are expired and no longer a potential source of funding for passenger rail projects. More information about these programs is found in **CHAPTER 5**.

Categories of Passenger Rail Service

This study focuses on the development of intercity passenger rail service that would link the Twin Cities with outlying locations in Greater Minnesota and the Upper Midwest. Opportunities also exist for the development of overlapping commuter rail and intercity services in the Twin Cities metropolitan area on many of the proposed intercity passenger lines. It is possible that intercity trains could pick up passengers at a few key outlying commuter stops, or at the very least, interchange with the commuter services. If long-distance intercity trains make frequent commuter rail stops,

²³ www.bnsf.com/media/pdf/2015-capital-expansion-map.pdf

²⁴ UP Governor's Rail Summit PowerPoint presentation, December 2014.

²⁵ trn.trains.com/news/news-wire/2014/10/cn-wraps-up-track-improvements-on-former-duluth-missabe--iron-range

however, they will cease to provide time competitive quality service to more distant origins and destinations. This study acknowledges the potential for such synergies, but a detailed analysis will need to come out of the individual commuter and intercity rail studies.

Table 2.2 provides a description of the different categories of passenger rail services.

Table 2.1: Types of Rail in Minnesota

PASSENGER RAIL TYPE	MINNESOTA EXAMPLE	AVERAGE SPEED	TYPICAL STATION SPACING	TYPICAL ROUTE LENGTH	TYPICAL FREQUENCY
PASSENGER RAIL					
Conventional Intercity Rail	Amtrak service through Twin Cities, connecting Chicago and Seattle/Portland	Up to 79 mph	10+ miles	100–1,000+ miles	Varies; daily, or up to 2 or more round-trips per day
HSR	No example in Minnesota (corridors under study)	Regional: 80–110 mph	Connects major and moderate population centers 100–500 miles apart with some intermediate stops	500 miles	Varies; up to 20 or more round-trips per day
TRANSIT					
Light Rail Transit (LRT)	METRO Blue Line and METRO Green Line	20 mph	0.5–1 mile	10–20 miles	Every 10 minutes
Heavy Rail Transit	No example in Minnesota	30 mph	0.5–5 miles	10–20 miles	Every 5–10 minutes
Commuter Rail	Northstar Commuter Rail between Minneapolis and Big Lake	18–50 mph	2–7 miles	20–50 miles	Every 30+ minutes

Standards for Passenger Rail Services Currently Operating within Minnesota

Minnesota currently has conventional intercity Amtrak service on the Empire Builder. MnDOT currently does not have standards for the minimum service level, frequency, capacity or projected ridership of intercity service. More information on project prioritization is found in CHAPTER 3.

Existing Passenger Rail Performance and Benefits

The performance of intercity passenger rail in Minnesota has recently been declining. The on-time performance of the Empire Builder in 2014 was 26.6 percent, compared to 77.8 percent in 2010 (Figure 2.3). Freight train interference was the primary cause of the increase in delays, accounting for 41.9 percent of the total delay time in 2014, compared to 30.1 percent of the time in 2010. This train interference is primarily caused by an increase in traffic associated with the development of North Dakota's Bakken oil fields.

The Northstar Commuter Rail was also negatively affected by the rapid increase in freight traffic and associated congestion along BNSF's Northern Transcontinental corridor. Consequently, as with the Empire Builder, these delays led to a decrease in ridership. Metro Transit, the transit agency that operates the Northstar Commuter Rail, recently started an "on time or your money back" program to increase ridership.

Figure 2.3: Amtrak Empire Builder On-Time Performance

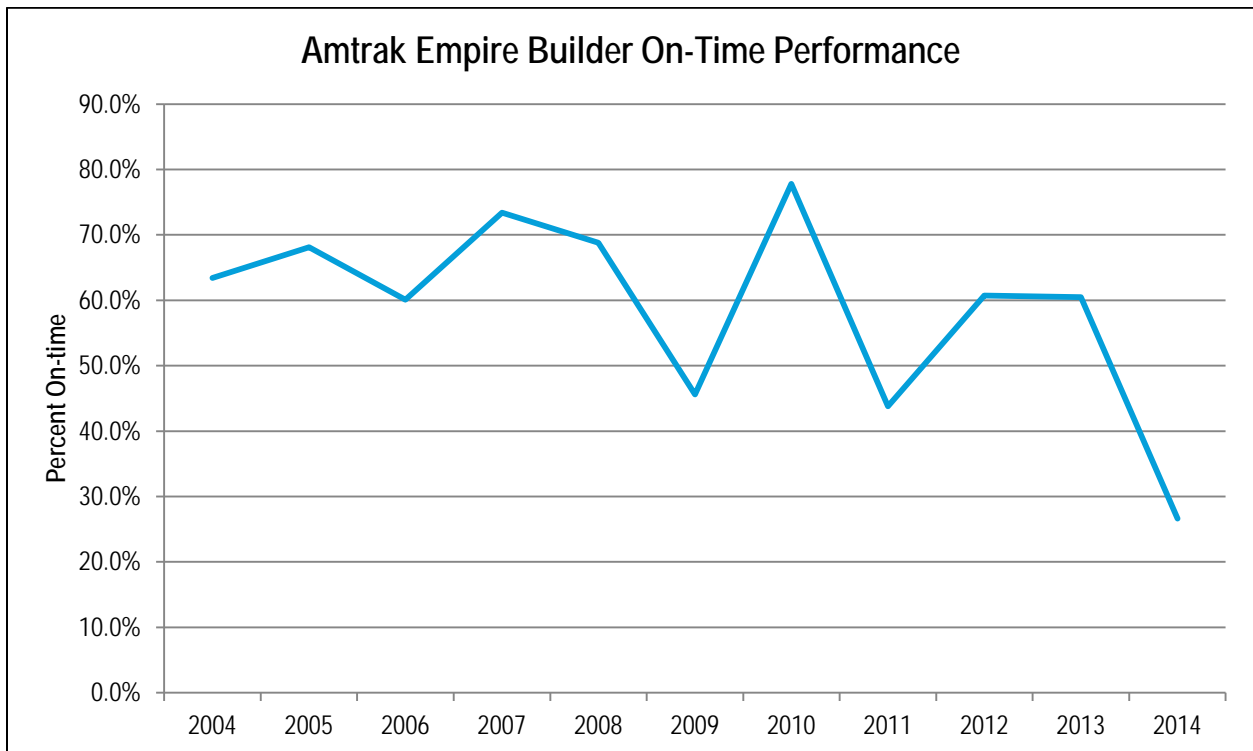
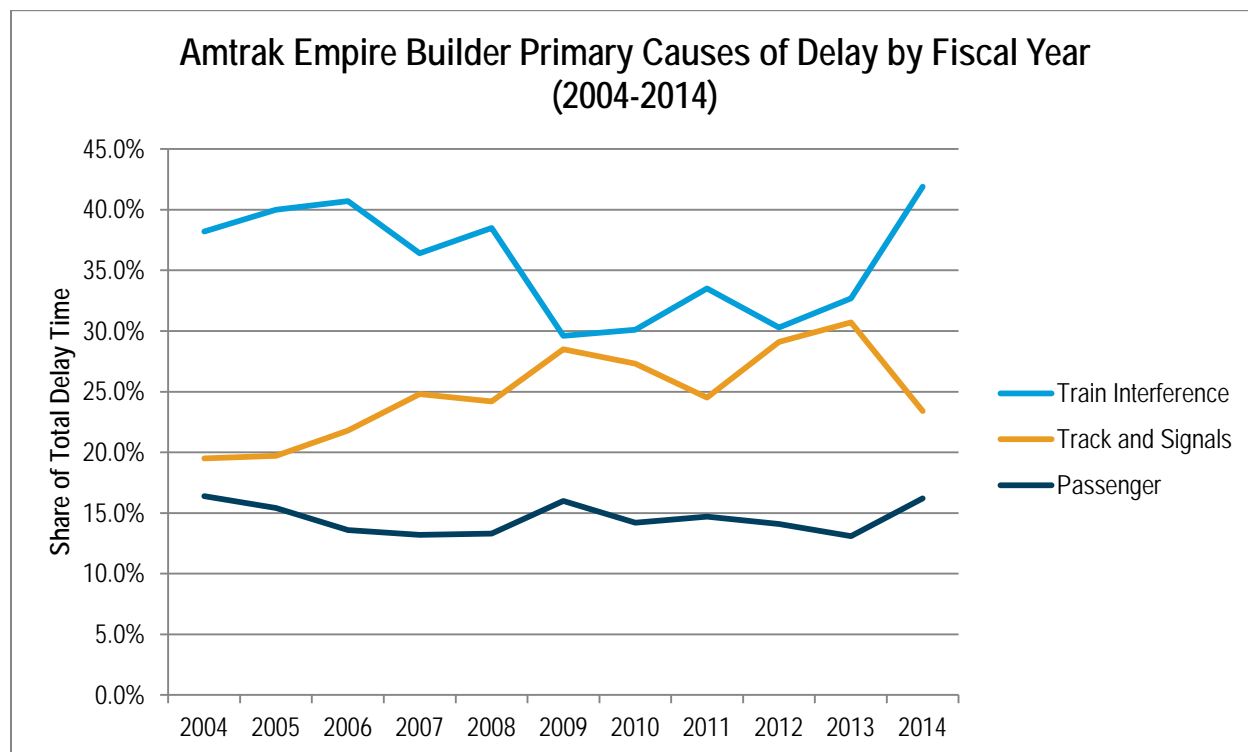


Figure 2.4: Amtrak Empire Builder Primary Causes of Delay by Fiscal Year (2004-2014)



MAJOR FREIGHT AND PASSENGER FACILITIES

There are 14 primary freight and intermodal terminals in Minnesota, listed in [Table 2.3](#). All of these terminals and yards are operated by the Class I railroads, except for Minnesota Commercial's Midway Yard. Three are dedicated to intermodal service for trailers and containers, and one for RoadRailer (UP's East Minneapolis terminal). The other terminals handle carload traffic, of which two— BNSF's Northtown and CP's St. Paul (Pig's Eye)—are system yards that handle substantial volumes of through traffic.

Table 2.2: Major Freight Terminals

FACILITY	OWNER	INTERMODAL
East Minneapolis	UP	✓
Glenwood	CP	
Mankato	UP	
Midway	BNSF	✓
Midway	MNNR	
Minneapolis Union	BNSF	✓
Northtown	BNSF	
Rice's Point	BNSF/CP	
Shoreham	CP	✓
St. Paul (Pigs Eye Yard)	CP	

FACILITY	OWNER	INTERMODAL
South St. Paul	UP	
Thief River Falls	CP	
Twin Ports	CP	
Willmar Yard	BNSF	

There are two major passenger rail stations in the Twin Cities metro area: Target Field Station in Minneapolis and the Union Depot in St. Paul. Target Field Station serves as the terminal for the Northstar Commuter Rail, while the Union Depot is a station for the Amtrak Empire Builder Line. Both of these stations could be used for additional commuter or intercity rail lines in the future. These stations also connect to light rail and bus services, which connect passengers to various destinations throughout the Twin Cities, including the Minneapolis-St. Paul International Airport.

PUBLIC FINANCING FOR RAIL PROJECTS AND SERVICE IN MINNESOTA

Minnesota does not currently have a dedicated funding source for rail. To date, state bonding funds were used to leverage federal funding for passenger rail projects. The governor and legislators prioritized the need for a multimodal transportation funding bill, which could be a prospective funding source. The primary financial program available for rail-related investment within the state is the Minnesota Rail Service Improvement Program. This is a low-interest revolving loan assistance program aimed at helping to finance rail facility improvements, including shipping facilities for private shippers. The impact of this program is limited due to the available funding and a modest maximum loan amount of \$200,000, which is insufficient for many of the capital infrastructure projects. More information about the MRSI Program is provided in [Chapter 5](#).

Approximately one-third of the counties in Minnesota have Regional Railroad Authorities, which are another potential financing source for rail studies and projects. Examples of projects supported by RRAs include the Northstar Commuter Rail Study, the Southeastern Minnesota Freight Rail Capacity Study, the Zip Rail Tier I Environmental Impact Statement, the East Metro Rail Capacity Study, and the Statewide Freight Rail Economic Development Study.

Funding was provided for grade crossings in Minnesota through Federal Highway Administration Section 130 grade crossing safety program funds; however, rail grade crossing safety will need a significant program expansion and dedicated funding to respond adequately to the needs forecast for both increasing freight traffic and high-speed/intercity passenger rail implementation. In addition to at-grade crossing improvements, grade crossing closures, grade separations and an active education component all need to be integrated into an expanded program to be effective in the future.

TIGER grants were awarded to rail projects in the past and provide an opportunity to address some of the state's rail investment needs; given that they are highly competitive, TIGER grants cannot be viewed as a primary and certain source of funding.

PROGRAMS AND PROJECTS INTENDED TO IMPROVE SAFETY

Pertaining to safety planning coordination, MnDOT's Office of Freight and Commercial Vehicle Operations is involved in administering several safety-related initiatives, including Operation Lifesaver, and monitoring of grade crossing and right of way trespassing incidents. In 2008, OFCVO was given responsibility to administer two new safety mandates that are defined by statute:

- **Walkway legislation (Minn. Stat. 219.501).** Effective Aug. 1, 2008, railway companies were required to provide walkways next to portions of rail tracks where employees work on the ground performing switching activities at least one shift per day, five days per week. MnDOT can order modifications to meet set standards for walkways constructed before or after the effective date. Although this mandate is quite limited in scope, the expected benefits have not been quantified, and efforts to expand these provisions could have a disproportionate impact on short lines.
- **Track inspection program (Minn. Stat. 219.015).** Instituted in July 2008, MnDOT was directed to employ a state rail safety inspector to participate in the Federal Railroad Administration Federal State Rail Safety Partnership Program. This inspector collaborates with existing FRA inspectors to examine track, right of way, civil works, and other facilities, including enforcement of the walkway legislation. The cost of the inspector is funded through an assessment of Class I railroads operating in Minnesota. Having an additional resource to inspect track may provide MnDOT with a better picture of conditions in the field, and improve efforts to manage the MRSI program.

In addition to these statewide planning efforts, the 2015 Minnesota State Rail Plan was updated to reflect local and project-level planning documents. At the beginning of the plan update process, a review was conducted of previous studies completed since the 2010 Statewide Freight and Passenger Rail Plan was adopted. This memo is included in [Appendix A](#).

Rail-Highway Grade Crossing Safety Improvement Program

MnDOT's rail-highway grade crossing protection program was established in 1974 to leverage FHWA's 23 USA Section 130 program. Since then, the program participated in the installation of active warning devices (lights, gates or a combination of the two) at more than 1,400 grade crossings out of the approximately 4,500 crossings located in Minnesota. Through improvements in infrastructure and public education, grade crossing incidents declined substantially. While the state experienced 400 vehicle/train collisions and 50 fatalities in 1972, by 2008 vehicle/train collisions had dropped to 52—an 80 percent decline—and six fatalities.

Minnesota has 4,300 public at-grade road crossings of railroads throughout the state and approximately an equal number of private grade crossings. Of the public grade crossings, 1,400 have active warning devices consisting of flashing lights, bells, crossing gates or some combination of these mechanisms. As is consistent nationally, the installation cost and location of the active devices and any passive warnings or signs are the primary responsibility of the respective public agency responsible for the road and its traffic safety, with assistance and consultation with the railroad. The actual operation and maintenance of any active warning device is the responsibility of the railroad, while any installation change, upgrade or replacement of an active device generally becomes the responsibility of the party requiring the change.

MnDOT administers the FHWA Section 130 grade crossing safety program funds for Minnesota, which provides about \$5.5 million annually. MnDOT staff regularly evaluates and prioritizes grade crossing improvement projects based on accident frequency and safety needs, as well as replacement needs. Given the current cost of grade crossing equipment and design, this allows the funding of about 25 major projects each year. While the cost of new installations has been steadily increasing, federal funding has remained relatively static in recent years, resulting in fewer projects being possible each year.

In addition to the Section 130 program, MnDOT also administers about \$600,000 per year in Highway Safety Account state funds for other safety improvements. This funding allows another 30 to 40 projects per year to be completed, consisting of more basic or low-cost enhancements such as line-of-sight corrections, vegetation removal, geometric fixes, sign upgrades, closures, and other betterments. Programming for all of these projects is routed through the eight Area Transportation Partnerships, including the metro area Transportation Advisory Board, and is integrated

into highway project programming. Due to other local transportation priorities, many grade crossing projects are delayed or rejected at this stage, creating deficiencies and inequities in the statewide safety program. The protocol requires a six-year process for planning, programming, approvals, and reviews before any project is funded and awarded for construction. Each project is an independent contract, although this ignores the fact that most work is done by specialty rail contractors and not highway or general contractors. The result of the local prioritization and the programming cycle is to leave 20 to 30 percent of the federal funding unused before expiration, and the contracting requirements are inefficient and administratively complex due to the decentralized and fragmented nature of the process, unlike the more streamlined structure used in other states. Since there is a need to work centrally with the safety evaluation and the railroad's engineering representatives, the MnDOT Rail Office is involved in all rail grade crossing safety even though much of the programming remains decentralized. A workable alternative to this situation is used in many states, such as the Texas program where centralized administration, programming and a master construction contract are used to maximize the program's effectiveness.

MnDOT recently conducted an analysis of grade crossing active warning devices to determine the prevalence of and the need to upgrade aging infrastructure. This analysis estimated that approximately 270 signals are 20 years old or older (as of 2006), while the normal lifespan for an active warning device is 25 years. Aging active warning devices are increasingly difficult to maintain due to being technologically obsolete—often entirely new warning devices must be installed at a cost of \$200,000 to \$500,000, depending on the complexity of the installation. As many signals were installed in the 1980s and 1990s, MnDOT estimates that within 20 years, almost all of the 1,400 warning devices will need upgrading. At current values, it is estimated that \$280 million over 20 years will be needed, with the capacity to install 70 major grade crossing devices each year, not counting new installations for high-speed passenger corridors, quiet zones, and the proposed expanded deployment of an additional 170 devices on paved county roads.

Based on a recommended 25-year replacement cycle, the current grade crossing replacement or upgrade program for major improvements would increase the number of projects three-fold, and require two to three times the funding level in 2009 dollars. HSA funds for basic safety enhancements should be increased under these same assumptions to a level of approximately \$1 million per year. FRA requirements for a complete and current grade crossing inventory are an additional draw on grade crossing safety program funds that is being met only in part with present resources. Proposals to eliminate dedicated funding for grade crossing safety improvements in favor of more flexible funds could negatively impact even those limited funds now in use. This may severely handicap any move toward expanding the current program.

In addition to work on active warning devices, Minnesota has not addressed the issue of road closures and grade crossing separations in its current safety program. Both of these strategies will be appropriate in corridors with high-speed trains, or increasing railroad or highway traffic levels, but are significantly more expensive in the case of grade separations, ranging from \$3 million to \$10 million per overpass or underpass for normal (two-lane) installations. In addition, multiple lane highways and multitrack spans increase the cost significantly.

Concerns regarding grade crossings go beyond simply maintaining and improving what's already present. Industrial development patterns and the urbanization of areas surrounding rail lines necessitate a range of mitigations needed to minimize the interaction between trains, highway vehicles and pedestrians. Pedestrian fatalities in Minnesota due to trespassing are now higher than vehicle grade crossing fatalities, suggesting the need for extended fencing of rights of way and pedestrian warnings and gates at major crossings. Short of grade separations, more advanced barrier systems, such as four-quadrant gates with median barriers and pedestrian amenities are an intermediate alternative, at a somewhat higher cost than a basic active warning installation. These and other technologies for warnings and enforcement are effective at reducing grade crossing incidents. These applications are currently in use in quiet zones and high-speed corridors in other parts of North America.

Undertaking these types of improvements can be substantially more costly than maintaining existing warning systems. As roads are widened and traffic increases, more substantial protection needs to be installed, and double tracking a railroad mainline to accommodate more or faster trains also magnifies the complexity and cost of any

warning installation. Also, the funding of these new installations may be subject to sharing with local jurisdictions, high-speed rail projects or new rail-oriented industrial sites, such as business parks or industrial facilities that will generate both major truck and rail traffic. Centralized and focused planning oversight and approvals that involve MnDOT and an expanded grade crossing safety program would benefit both statewide safety and implementation of a new intercity high-speed passenger rail system.

Grade crossing safety and trespassing also are impacted by public and institutional education. Subjects for public information include informing people who interact with railroad traffic about the increase in train volumes and speeds, the hazards of pedestrians around active railroads, and the surprises that can occur at multiple track crossings with several trains crossing at once. The railroads support the Operation Lifesaver program throughout the United States as a tailor-made program offering this information. MnDOT and other in-state rail associations would be well served to assist in funding and promoting the volunteers working on this national program.

This program functions well, but according to stakeholders, suffers from a number of limitations that reduce its potential efficacy:

- **Funding.** With Minnesota’s rail network being the ninth largest in the nation, the current federal and state funding levels are insufficient to meet continuing needs for new grade crossing projects and replacement of obsolete systems.
- **Replacement of signage and obsolete active crossing warning devices.** Out of the more than 1,400 active systems currently installed, 270 systems, or 21 percent, are over 30 years of age—beyond their typical design life of 20 to 25 years. Once they reach that age, the electronics are obsolete and parts are often difficult to obtain. MnDOT is in the process of designing a statewide lifecycle planning process, which must address replacing approximately 70 crossing systems each year. Additional funding will be necessary to undertake this effort, the source of which has yet to be identified.
- **Program Flexibility.** Many stakeholders indicated a desire to see the program broadened beyond its primary focus on active crossing systems to include the full range of options, including quiet zones, sealed corridors, grade separations, etc. Implementation of expanded passenger operations in particular will result in the demand for a greater variety of solutions to address highway/rail interactions and right of way protection, for which expertise is generally not available at local jurisdictions. This does not mean that a state program should necessarily fund these more expensive solutions, but rather act as a clearinghouse and developer of common standards that can be applied statewide.
- **Project Prioritization.** Although the MnDOT Office of Freight & Commercial Vehicle Operations staff administers the grade crossing program and oversees the evaluation of potential projects, the eight MnDOT districts have considerable autonomy in establishing investment priorities. This leads to inconsistent application of funding to projects and needless delays in implementing improvements at high-priority grade crossings. Planning and distribution of funds should be centralized instead of done by each of the eight MnDOT Districts.

The absence of statewide funding prioritization contributes to the lengthy delays from the time when improvements are initially identified to when they are actually implemented. The backlog is now upward of five years, which is considerably longer than in some other states. Also, once improvements are programmed, it is difficult to adapt funding priorities to changing needs, such as when volumes on a low-density rail line increase substantially.

[Report on the Improvements to Highway-Rail Grade Crossings and Rail Safety](#)

Concerned about the large increase in Bakken oil shipments and the associated safety implications, the 2014 Minnesota Legislature directed MnDOT to conduct a study of highway-rail grade crossing improvements for rail corridors carrying unit trains of crude oil and other hazardous materials. The Legislature also appropriated \$2 million to make a first round of short-term improvements to key crossings around the state. MnDOT determined these initial improvements will take place at crossings in Big Lake, Clear Lake, Elk River, Perham, St. Cloud, St. Paul Park, Wadena and Winona.

From 2005 to 2014, rail traffic carrying Bakken shale oil originating in North Dakota increased from zero to nine loaded unit trains per day, of which five to seven cross through Minnesota. Recent catastrophic rail incidents associated with Bakken crude oil outside of Minnesota demonstrate the potential safety risk of transporting hazardous materials by rail. At the time of the study, more than 700 miles of route miles in Minnesota actively carried Bakken crude oil.

MnDOT investigated areas along this mileage where safety could be improved to reduce public exposure to derailments, spills and fires. The study identified site needs including grade crossing signal systems and alternative railroad grade crossing improvements. The study noted 683 at-grade rail crossings where Bakken crude oil passes. To find the most at-risk crossings, an aggregate score was calculated using a combination of GIS population analysis near crossings, federal crossing safety standards, and frequency of crude traffic on the respected rail line. Of the 100 crossings, 40 were researched further. Improvement recommendations for these 40 were made based on the aggregate score and cost-benefit feasibility of each crossing.

In the long-term, it was determined that Minnesota needs to invest a total of \$244 million to improve at-grade crossings where Bakken oil passes. Depending on the importance and the aggregate score of each crossing, recommended improvements include closing non-essential at-grade crossings, upgrading passive warnings to active signals, improving active signal protection with more effective safety treatments, or constructing new grade separations along the lines.

RAIL TRANSPORTATION'S ECONOMIC AND ENVIRONMENTAL IMPACTS

Economic Impacts

Potential rail investments will generate a range of economic impacts in the areas served by the improvements. This section provides a discussion of the range of impacts these investments may bring about and the methodology by which they are typically quantified.

Impacts are usually categorized into direct and indirect benefits and costs. Direct benefits and costs are those that are directly associated with the investment during planning and construction and subsequent implementation. During construction, typical benefits include construction jobs and direct supplier purchases. Once operational, the range of benefits expand beyond direct system employment and vendor sales to include out-of-pocket cost reductions by system users, time savings, reduced maintenance costs on parallel highways, and gains in safety from a reduction in accidents. Examples include personal time savings for all riders on any train faster than competing auto or air travel, and lowered costs on rail per passenger mile versus automobile use. The largest cost is usually the financial outlay required to build the service, but other direct costs may not be fully reflected in the financial outlay such as uncompensated construction-related impacts on abutters or revenue losses incurred by a competing service provider. For example, introduction of a new passenger rail service could divert traffic from an existing bus service, with the operator suffering a financial loss.

Beyond the direct financial impacts are indirect benefits and costs, which include the broader economic effects that an investment will have on a region's economy and collateral effects. For example, new passenger rail service may expand tourism opportunities and, with it, increase the amount of investment and jobs in that sector. Changes in a region's economy will occur because of changes in the cost of doing business associated with the cost of freight transportation. Transportation costs affect business productivity and profitability. The value of this cost differs by

industry, depending on the extent to which it depends on rail freight, trucking or “on-the-clock” employee travel. Likewise, improvements in passenger rail service also will result in economic benefits, particularly through increased business and tourism travel.

The direct, indirect and induced economic impacts of a proposed transportation investment are usually examined using an economic impact model.²⁶ These models provide a framework for evaluating both user impacts and total regional economic impacts of transportation investments, and can account for both short-term and long-term travel cost impacts, and the effects of changes in market access and spending patterns.

Environmental Impacts

Both passenger and freight rail are energy efficient modes of travel that provide fuel and greenhouse gas savings over automobile, truck or airplane travel. The AAR reports that freight railroads move a ton of freight an average of 476 miles on one gallon of fuel in 2012, and rail freight fuel efficiency has more than doubled since 1980.²⁷ While passenger rail that requires extensive new construction can have harmful environmental impacts, it also has the potential for significant positive environmental impacts, including reducing vehicle miles traveled in single-occupancy vehicles.

There are potentially high environmental impacts associated with construction of new rail corridors, especially . corridors that would require significant new track. This includes high-speed corridors that often need separate track from other services. However, much of Minnesota’s passenger rail service is expected to use shared track with freight railroads, in which case it will have a lower environmental impact . These impacts will be calculated and described in greater detail for individual rail projects as they move through the planning stages.

Trends and Forecasts

DEMOGRAPHIC GROWTH FACTORS

This section presents a recent snapshot and 10-year trends of Minnesota’s population and per capita income. Additionally, the section includes information on cost of living and cost of doing business in Minnesota as compared to its neighbors and the nation as a whole.

Population

Minnesota’s State Demographics Center reports the population of the state, as of 2013, to be 5.4 million. The population is expected to grow to 6 million by 2031, and 6.45 million by 2065, at an annual rate of change of 0.5 percent.²⁸ Approximately 60 percent of Minnesota’s population is centered in the Metro District area near Minneapolis-St. Paul. Hennepin, Ramsey, Dakota, and Anoka Counties in the Metro district area are the most populous counties in the state. Other highly populated areas are in St. Louis County (Duluth), Stearns County (St. Cloud), and Olmsted County (Rochester), and along the corridors connecting these regions to the Twin Cities. This

²⁶ A variety of models are available for this purpose, including the Regional Economic Model, Inc. (REMI), Economic Development Research Group’ (EDRG) Transportation Economic Development Impact System (TREDIS), and the University of Illinois’ Regional Economics Application Laboratory (REAL).

²⁷ The Association of American Railroads, 2013. <https://www.aar.org/newsandevents/Press-Releases/Pages/The-Nations-Freight-Railroads-Average-476-Ton-Miles-Per-Gallon.aspx>

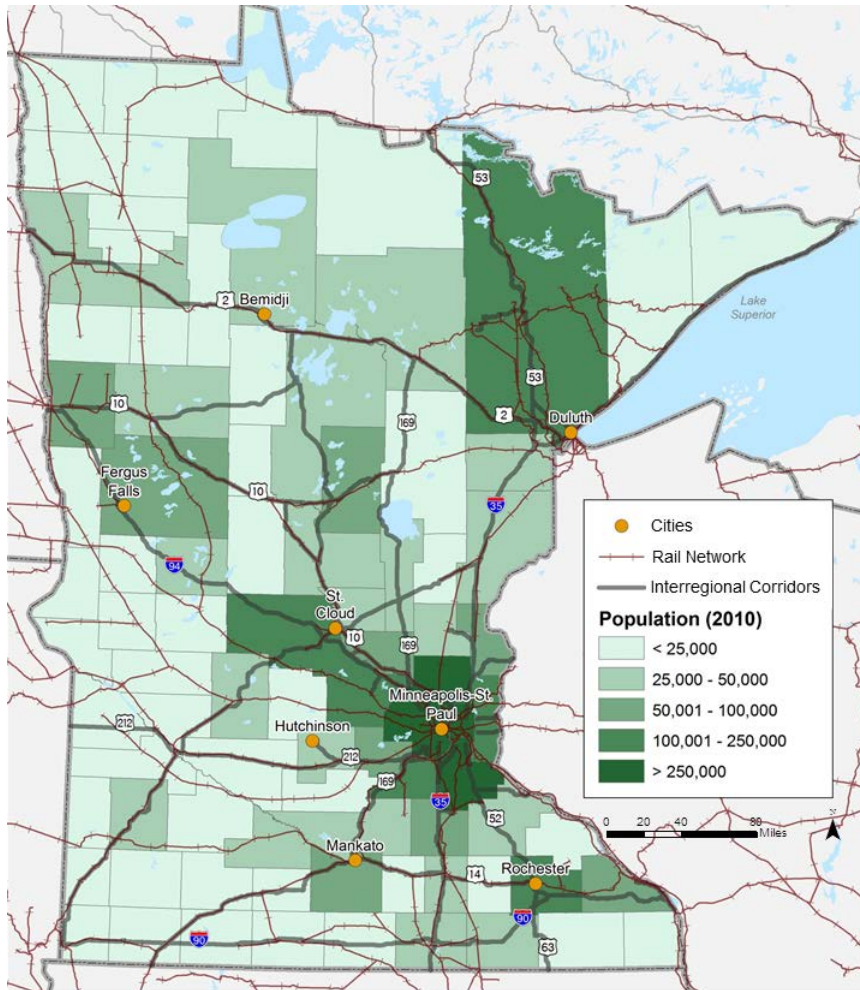
²⁸ Minnesota State Demographic Center Population Data, 2014.

concentrated nature of Minnesota's population, coupled with the large geographic size of the state, means that although both rail and highway networks serve wide rural areas, much of the freight and passenger activity is concentrated in the Twin Cities and the corridors linking the Twin Cities with other major cities in Minnesota and beyond. The least populated county in Minnesota is Traverse County on the South Dakota border, as shown in [Figure 2.5](#).

Since the 1960s, population growth has shifted from the metropolitan core into the exurban regions of the Twin Cities. Although this trend has slowed down in recent years, the Twin Cities collar counties are expected to continue to see the highest rates of population growth between 2010 and 2040. Much of this growth will be at the commuter rail or shorter intercity rail distance from the Twin Cities. Some lower population density counties have also experienced rapid population growth reflecting retirement relocations near lake areas. The northern and southwestern parts of Minnesota are expected to remain less densely populated, with low to negative population growth ([Figure 2.6](#)).

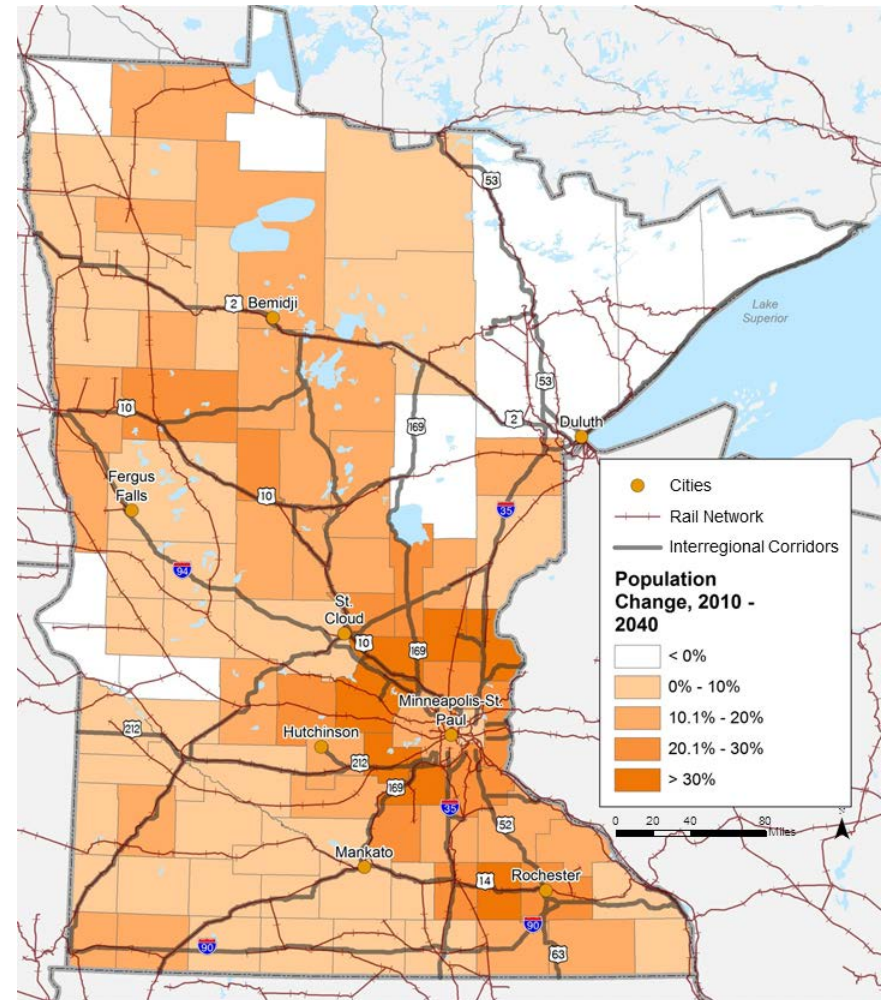
The coming decades could see either a reconcentration of growth in the Twin Cities region or a more diffuse development pattern, especially along key corridors such as I-94 and I-35. For example, changing fuel costs, whether driven by supply and demand or climate change policies, are factors that will continue to influence consumers' choices in transportation and location. Although currently low, if prices resume their rise in future years, it may push more employment and population growth into the Twin Cities region.

Figure 2.5: Minnesota Population by County, 2010



Source: Minnesota State Demographic Center, 2014

Figure 2.6: Minnesota Population Change by County, 2010-2040

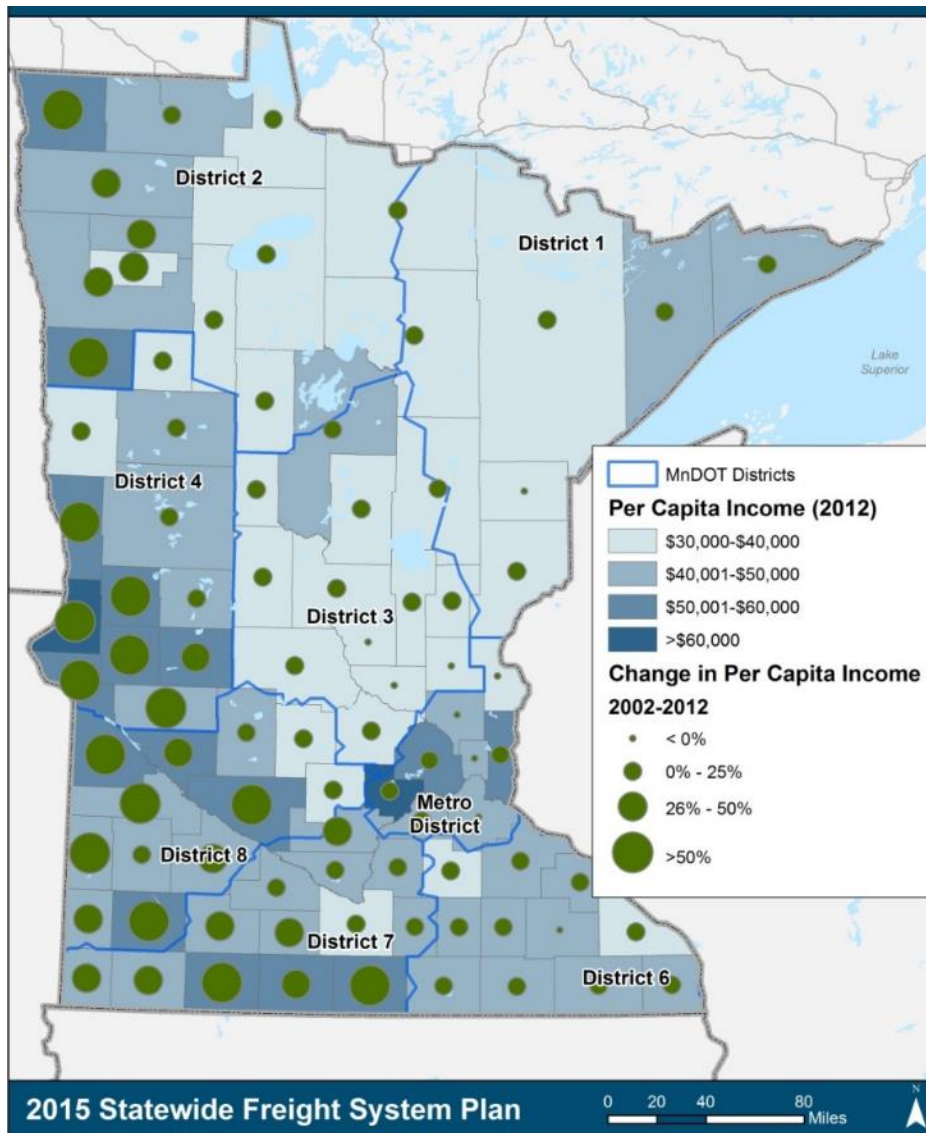


Source: Minnesota State Demographic Center, 2014

Per Capita Income

Minnesota's mean per capita income statewide stands at \$46,925 as of 2012, an increase of 4.6 percent between 2002 and 2012 after adjustment for inflation. At the county level, mean per capita income ranges from \$30,568 in Pine County to \$65,115 in Traverse County. In general, mean per capita incomes are highest in the Metro District, southern and western portions of the state (Figure 2.7). While some counties saw their mean per capita incomes decline during the 2002–2012 period, most experienced a modest increase. Percent changes in income range from a decrease of 4 percent in Anoka County to an increase of 92 percent in Traverse County (adjusted for inflation). Like per capita income, the areas with the greatest percent change are largely in the southern and western portions of the state.

Figure 2.7: Mean per Capita Income by County in Minnesota

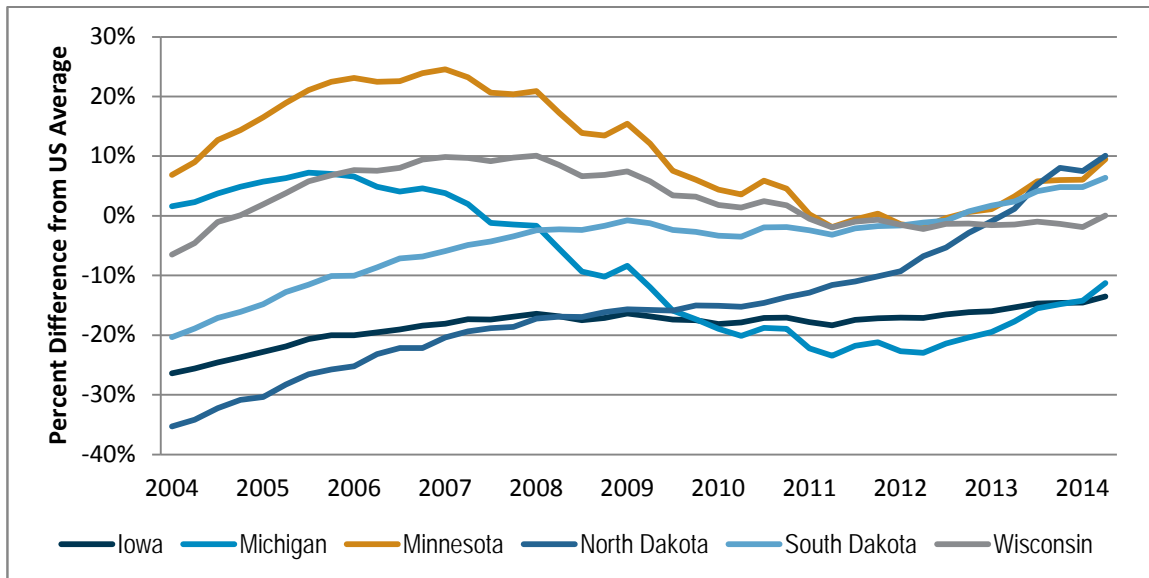


Source: U.S. Bureau of Economic Analysis. Note: Percent change in per capita income adjusted for inflation.

Trends in Cost of Living and Doing Business

Minnesota's housing market continues to be in alignment with peer states in the Midwest region. After being significantly above the national average from the 2004–2010 time period, Minnesota housing prices returned to near average in 2011–2012. A recent uptick in the economy has shown a return to higher than average home prices, as shown in [Figure 2.8](#).

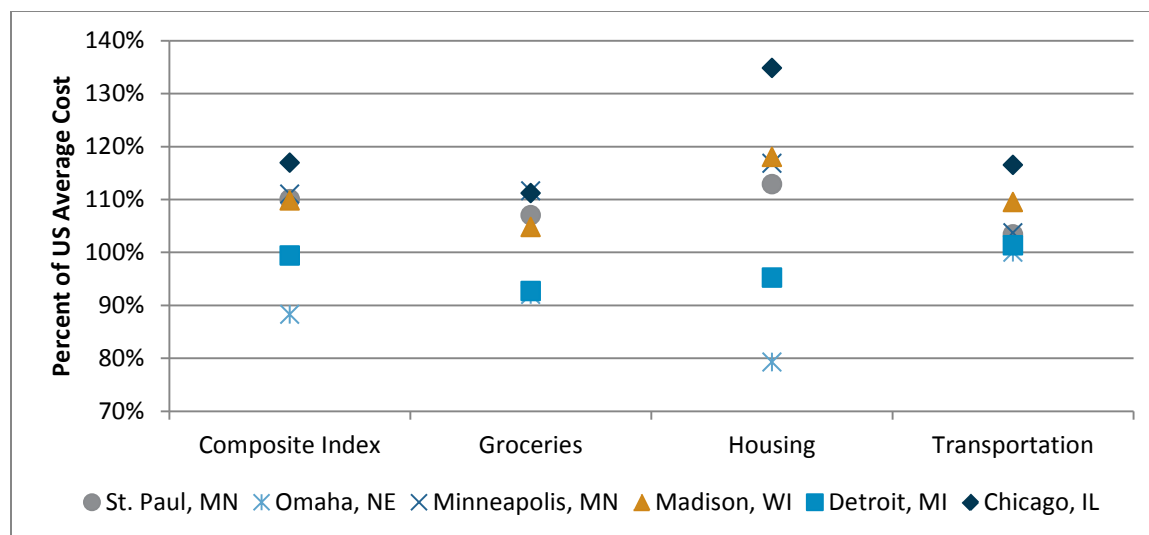
Figure 2.8: Percent Difference in Housing Prices Compared to US Average (By State, 2004-2014)



Source: Federal Housing Finance Agency, Housing Price Index, 2nd Quarter 2014.

Metropolitan cost of living comparisons place Minneapolis and St. Paul both above national averages with respect to the cost of groceries, housing and transportation ([Figure 2.9](#)). Compared to peer cities, Minneapolis has lower costs than Chicago, but remains above the national average for groceries, housing and transportation.

Figure 2.9: Cost of Living Index for Urban Areas – Percent Difference from U.S. Average Cost, 2010

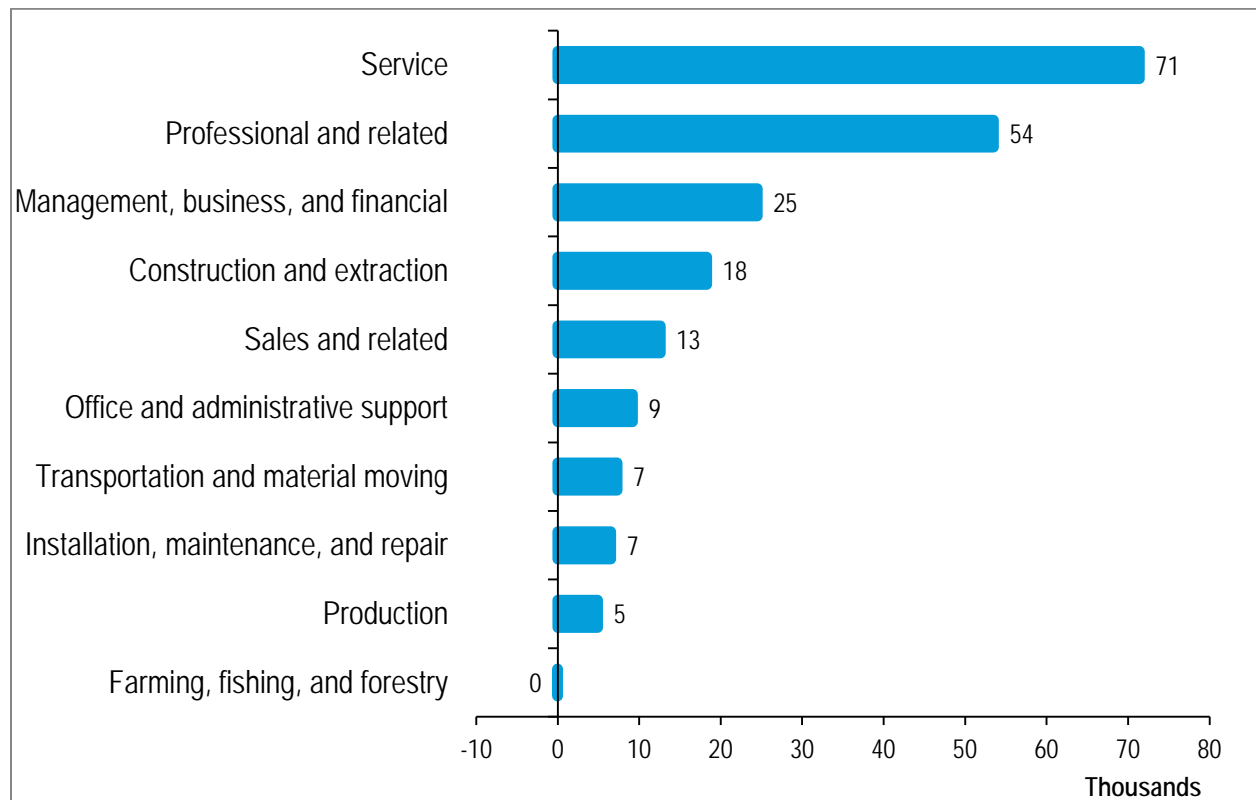


Source: ACCRA Cost of Living Index Annual Average 2010.

Employment

Minnesota's employment rate has historically been higher than the nation as a whole. Although impacted by the recession of 2008–2009, Minnesota regained many of its jobs by November 2014, and its seasonally-adjusted employment rate of 3.7 percent was two points lower than the national average of 5.8 percent. Minnesota's employment is expected to grow at a slower rate (7 percent) than the nation as a whole (10.8 percent) between 2012 and 2022.²⁹ Much of the job growth in Minnesota will be focused on service, professional and management jobs, suggesting a continued growth in demand for commuting and business travel (Figure 2.10). This reinforces the importance of connecting the Twin Cities metropolitan economy with Chicago and other regional centers. It also suggests continuing to examine opportunities to link smaller cities around the state to the Twin Cities by passenger rail where the volumes will support sufficiently frequent services.

Figure 2.10: Job Growth in Minnesota, in Thousands, by Major Occupational Group, 2012–2022



Source: Minnesota Department of Employment and Economic Development, 2014

²⁹ Minnesota Department of Employment and Economic Development, 2014

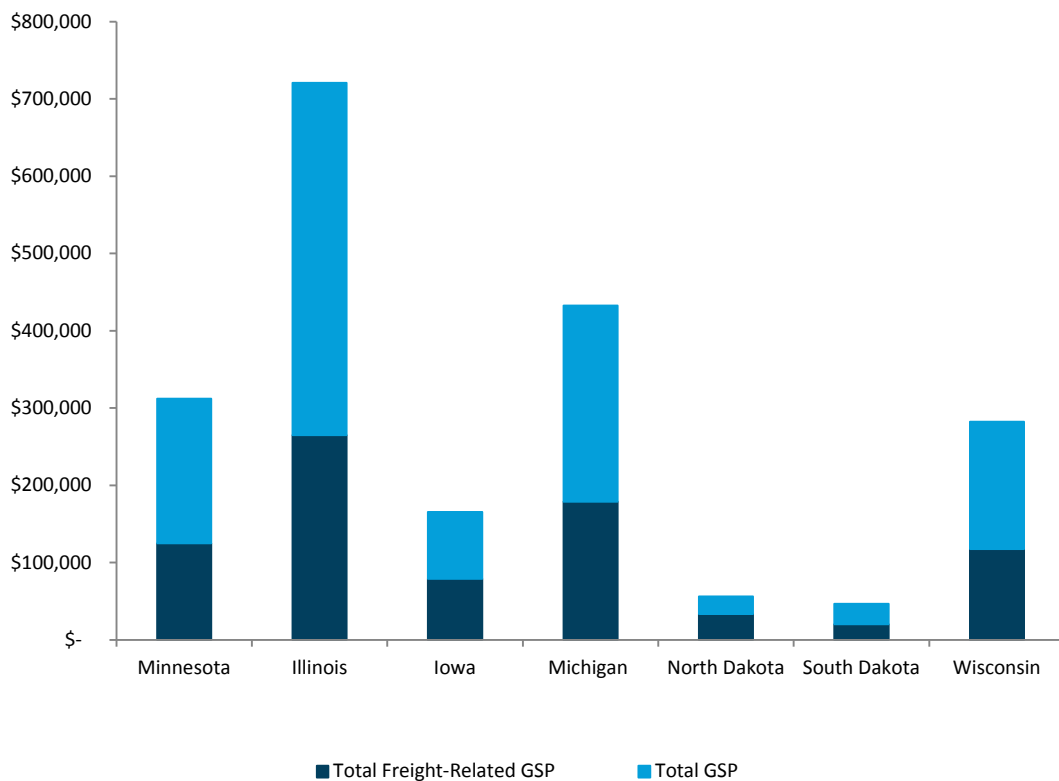
ECONOMIC GROWTH FACTORS

The structure of the Minnesota economy—the types of businesses and industries, their size, location, and trading patterns—determines the volume of freight moving in the state and the potential for passenger rail ridership. Understanding the structure of the economy and how it may change over the next decades provides a foundation for assessing the overall demand for freight and passenger transportation. This section provides an overview of the structure of the Minnesota economy and trends that will affect how it changes in the future.

Minnesota's economy is diverse, and is driven by both “freight intensive” industries— such as agriculture, mining and manufacturing—and other industries, such as business services, finance, and healthcare. All of Minnesota's industries are dependent on the transportation system. Freight intensive industries in particular have historically used and will continue to depend on the rail system; retail and wholesale industries and consumers across the state are increasingly reliant on intermodal rail for delivery of consumer goods, both domestic and imports. Containerized exports are also a growing trend, as agricultural products are shipped from Minnesota and other Midwestern states to international destinations.

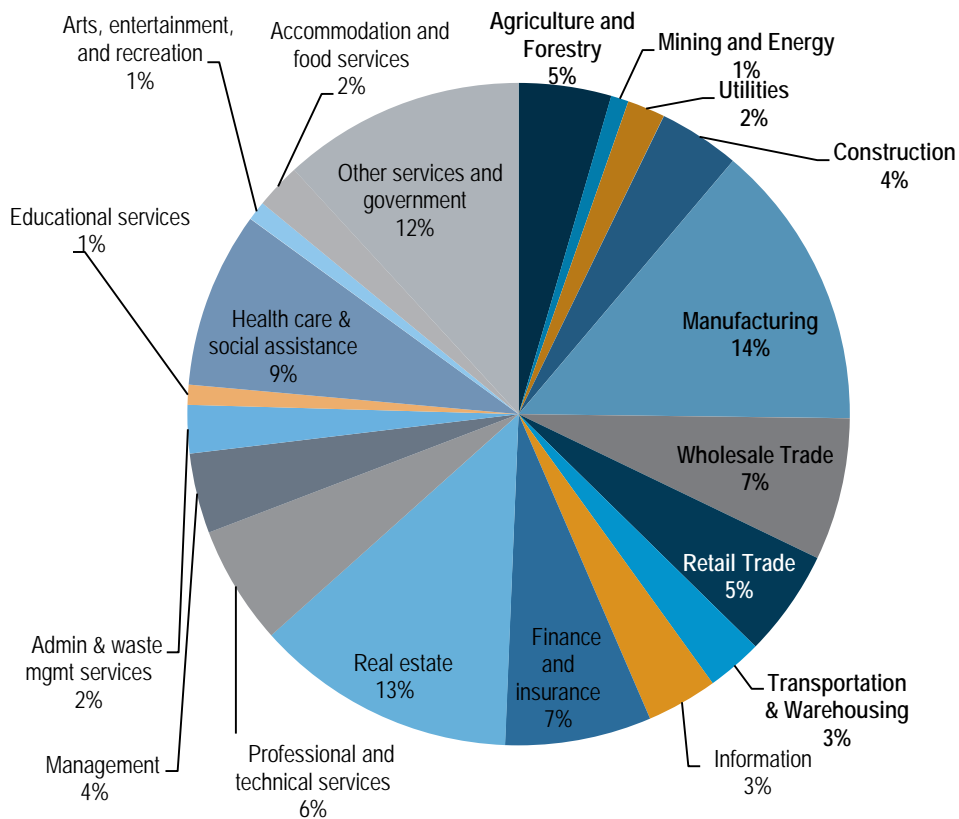
Trade-related industries are also key drivers of the economy in the state. Minnesota is home to the headquarters of 22 Fortune 1000 companies, most of which are located in Minneapolis-St. Paul region. [Figure 2.11](#) shows the contribution of freight-related and other industries to the Gross State Product of Minnesota and neighboring states. Forty percent of Minnesota's GSP is dependent on freight-related industries, a higher percentage than many of its neighboring states. [Figure 2.12](#) details the percentage contribution, by industry sector, to Minnesota's GSP.

Figure 2.11: Gross State Product, Minnesota and Neighboring States (Millions of 2013 \$USD)



Source: U.S. Bureau of Economic Analysis, 2013

Figure 2.12: Industry Sectors as Percent of Minnesota GSP with Freight-related Industries in Bold Text



Source: U.S. Bureau of Economic Analysis, 2013

KEY INDUSTRIAL TRENDS AND OUTLOOK FOR MINNESOTA

Freight movements affecting Minnesota are increasingly national and global in scope, and are sensitive to market forces as well as the decisions of supply chain and logistics professionals within and outside the state. Industries may make business decisions based on these national and global trends, which may often result in effects that are felt locally and can have profound impacts on goods movement within the state. Regional or national decisions made by other transportation agencies and operators can also be felt locally. This section discusses key trends that are affecting the shape of Minnesota's industries and need for freight and passenger rail transportation.

Growth of Minnesota's Export Economy

In 2013, Minnesota exported \$20.7 billion worth of goods. Much of Minnesota's exported goods are high value goods moving by air. Leading exported products were machinery (\$4.0 billion), optics and medical instruments (\$3.3 billion), electrical machinery (\$2.5 billion), and vehicles (\$2.0 billion). Minnesota's top export market is Canada, and Minnesota's raw materials exports consist largely of iron ores and concentrates, which are primarily sold to Canada. Many of these goods, such as taconite, are dependent on the rail system to move within the state, and some exports cross the border via rail. Even manufactured goods within the state, the fastest growing export market which grew 3.3 percent to \$19.3 billion and accounted for 93 percent of exports of goods in 2013, rely on the freight rail system for transport of raw materials and component goods, and on the passenger rail system for movement between cities for commuters and travelers.

Agriculture is another important export for Minnesota, especially corn and corn-derived products, although these products are often not captured in traditional export statistics. The Minnesota Department of Agriculture uses data published by the U.S. Department of Agriculture to estimate agricultural and food-related exports. Based on these estimates, Minnesota exported \$6.5 billion of agricultural commodities in 2012, excluding manufactured food exports (\$1.6 billion).³⁰ Corn represents 12 percent of Minnesota's international agricultural exports totaling \$941 million in product value, one-third of which moved via rail to the Pacific Northwest or Gulf Coast for export to Latin America and the Asia-Pacific region. The UP and BNSF railroads have added additional shuttle trains to move grains from Minnesota elevators to export destinations as well as inland markets.

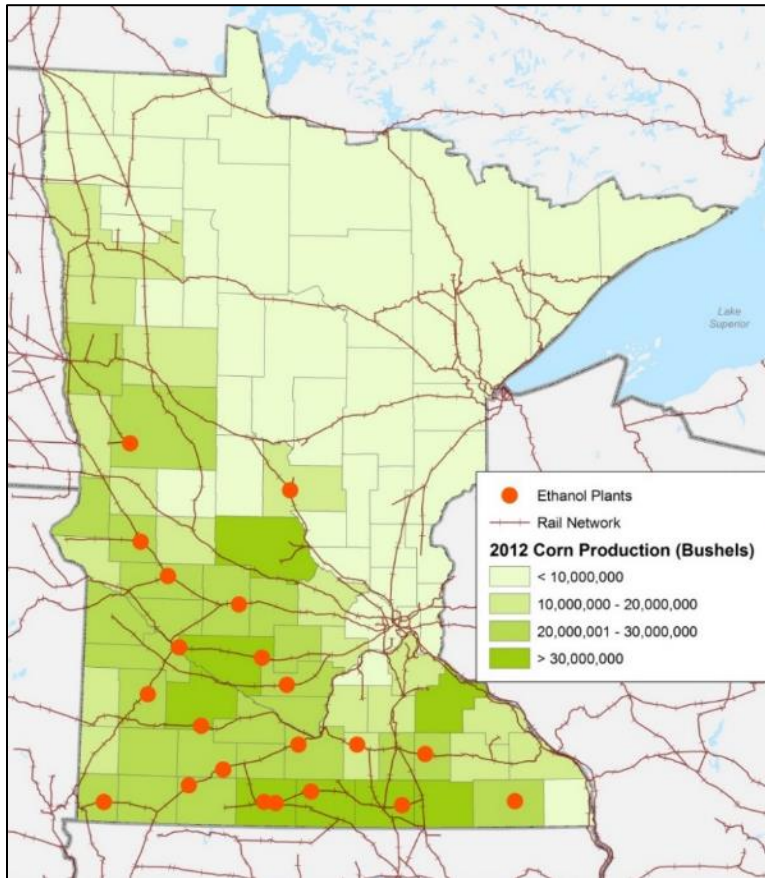
Growth of Corn and Corn-derived Products

Minnesota is the fourth largest producer of corn in the U.S. The combination of abundant water, rich soil, and the right climate for growing corn has been a cornerstone of Minnesota's agricultural efforts throughout the state's history. Minnesota is the nation's fifth leading state in annual farm income, with corn being the state's most valuable crop. More than eight million acres of corn are harvested each year within the state. Harvested corn primarily originates in the southwestern region of the state, as shown in [Figure 2.13](#). Minnesota exports approximately 42 percent of harvested corn to international and other domestic locations, principally used for animal feed. Thirty-nine percent of the corn grown in Minnesota is processed within the state. This local processing includes ethanol production and use in food production supply chains. Seventeen percent of the corn production is used for animal feed uses within the state.

Twenty-one operating ethanol facilities are located within the state. These facilities generally are most reliant on the rail network for processing both inbound corn and finished ethanol products. The locations of these ethanol facilities and the rail network are shown in [Figure 2.13](#). The 21 production facilities account for more than 300 jobs and \$500 million in economic activity. The increasing viability and use of bio-diesel has increased the demand for these products, although ethanol demand has recently stabilized and seen declines as world fuel prices and oil production changes. In addition to finished ethanol, a co-product of the processing, dried distillers' grain is also prepared for export and consumption for animal feed production including livestock and poultry feeds, and primarily moves on the rail network.

³⁰ Minnesota Department of Employment and Economic Development, *Annual Export Report*, 2013.

Figure 2.13: Minnesota Corn Production and Ethanol Plant Locations, 2012



Source: USDA National Agricultural Statistics Service, 2012.

Taconite Production

Taconite is a low-grade iron ore that is mined in northeast Minnesota in the Mesabi Iron Range (Figure 2.14), processed into pellets typically at nearby locations, and shipped to steel mills in Indiana, Ohio and Pennsylvania. The largest taconite production in Minnesota is in Mountain Iron at the U.S. Steel Minntac facility, billed as the Taconite Capital of the world. Although some taconite is transported by rail during the winter, most is transported to the steel mills by ship across the Great Lakes. Within the state, rail is used to transport taconite from the processing facilities to Lake Superior ports. The CN railroad handles most of this product on its lines to Two Harbors and Duluth, where it operates three ship loading docks. The port of Two Harbors receives four to five loaded trains of 116 hopper cars per day from Minntac. Recently, Minnesota's iron ore mines report that they are having trouble getting pellets to market due to a shortage of rail service, leading to heavy stockpiles at industrial facilities in the region. Two Minnesota mines have reportedly begun sending taconite pellets via truck from the Mesabi Iron Range to Duluth.³¹

³¹ "Rail congestion hits taconite shipments" Trains Magazine, September 15, 2014.

Figure 2.14: Taconite/Iron Ore Operations in Northeast Minnesota



Source: Iron Mining Association of Minnesota

Bakken Shale Oil & Gas and Unconventional Petroleum Extraction

The emergence over the course of the last 10 years of the economic extraction of oil and gas from hydrocarbon infused shale rock is largely unexpected, as these sources were considered unexploitable before the advent of advanced technology. High speed and highly accurate directional drilling allows the drillers to tap vast horizontal layers of oil and gas shale. Induced hydraulic fracturing, or fracking, of the rock surrounding the resulting well opens up fissures that are propped open with sand or ‘proppants’ injected with the water during fracking. This ‘frac sand’ allows the continuous flow of hydrocarbons from the fissures in the impervious rock. The process allows for the economical recovery of “captured” gas and liquid petroleum products from several major oil holding shale formations in the U.S., including the Bakken region of North Dakota and the Eagle Ford shale region in Texas. The proliferation of shale gas exploration in North Dakota created substantial increases in freight movement on key corridors across the Upper Midwest.

For Minnesota, the freight related impacts of shale oil extraction occur in two distinct manners— the increased movement of petroleum products extracted from the new wells, and the movement of direct inputs to the fracking process (sand, water and other chemicals, and drilling pipe). A single horizontal well typically uses between 3,000 and 10,000 tons of sand. A typical rail car of frac sand contains around 100 tons. In 2009, Class I railroads originated nearly 112,000 carloads of sand and at the time of the study were on track to originate approximately 375,000

carloads in 2013, likely driven by increased frac sand use at drilling wells.³² Nine mines are in production in Minnesota.

Sand processing consists of moving sand through a series of steps to sift it into size groups for market. A single sand mine may produce several products for different markets across the country. Product differentiation requires separate trucks or rail cars and different final destinations. The Mid-America Freight Coalition completed a case study of Chippewa County, Wisc., (east of the Minnesota border), for sand mining related to hydraulic fracturing and the related consequences for the freight transportation network. After the addition of a new sand mine, heavy usage of the roadway infrastructure by sand and gravel haulers, an increase in loaded train cars, and increases in noise were observed.

The movement of Crude Oil by Rail

The broad adoption of these new extraction technologies to shale oil formations in the Bakken Region of North Dakota, Montana, Saskatchewan, and Manitoba impacts Minnesota's rail system considerably. This development leads to an unprecedented amount of outbound oil and gas products being shipped by rail, the majority of it across Minnesota destined for refineries in the Midwest and East and Gulf Coasts. Although transportation costs for shipment by train are approximately 50 percent higher than pipelines, rail offers competitive advantages over pipeline transfer. Rail serves major refineries on the coasts, as well as inland and Gulf markets, allowing companies the flexibility to ship their products to the highest-margin market. Since pipelines currently have the capacity to handle only about a third of the Bakken's production of 1.2 million barrels per day, the BNSF and CP Railways that serve the Bakken oil fields now originate 10 or more full unit trains per day, with six to eight of those trains traversing Minnesota rail lines.

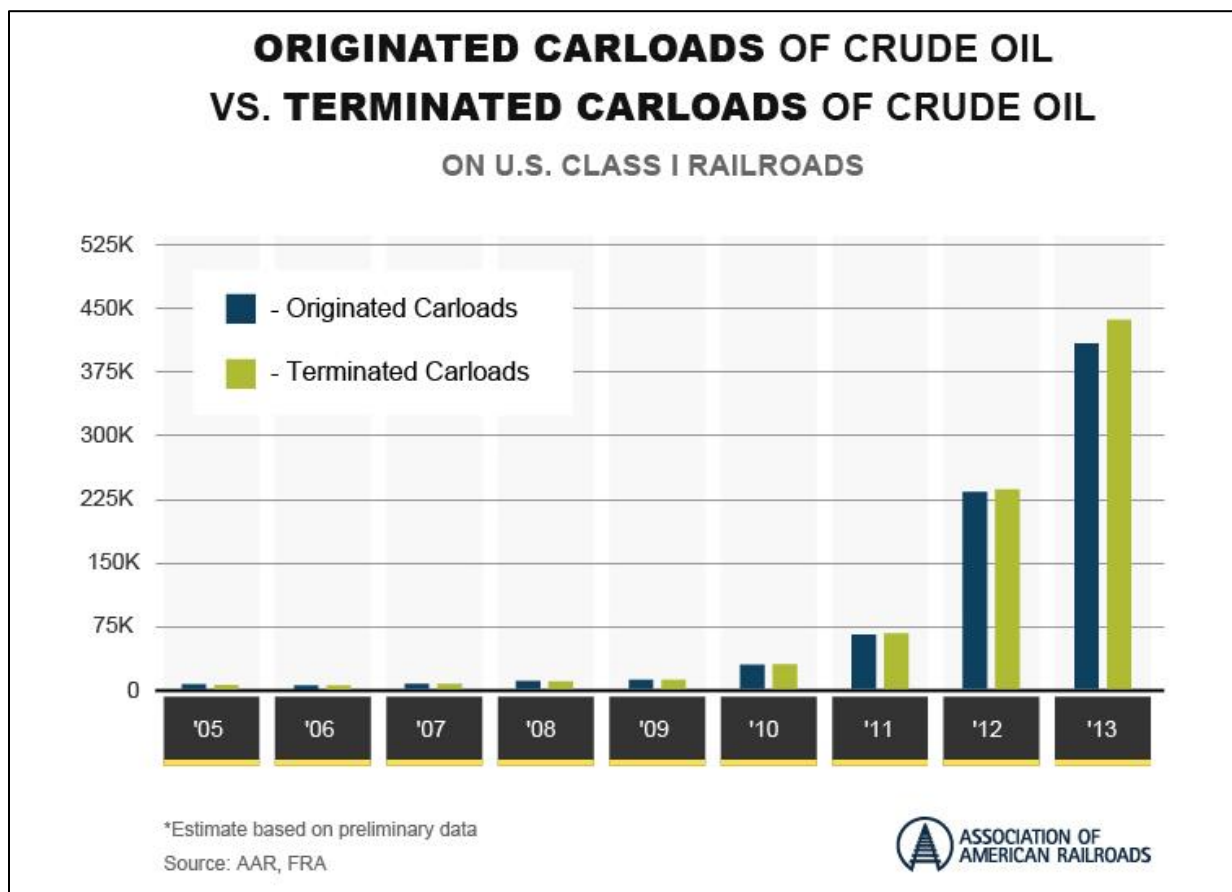
Because this sweet, light crude has a low flash point and boiling point, with a significant percentage of dissolved gases (butanes and propanes) and natural gasolines, the crude oil ignites very easily and burns almost explosively if spilled during a rail accident and subsequent tank car rupture. As a result, this crude is considered a Flammable Class 3, Packing Group 1 hazardous material, signifying a highly dangerous liquid. Catastrophic accidents and fires, including Lac Megantic, Quebec where 47 people died, have occurred with some regularity, resulting in emergency FRA rules for 'High Hazard Unit Train' handling and safety inspections, and PHMSA efforts to implement safer tank car designs.

In the case of unconventional Alberta tar sands crude oil, rail allows for less well-head processing than pipelines (including a lesser need for diluents) and the possibility of shipping heated, undiluted crude oil. Based on the extensive proven reserves of tar sands in western Canada, projections suggest that unit trains of this heavy oil will also travel across Minnesota to access U.S. refineries in the foreseeable future. This material has fewer 'light ends' and is considered less hazardous.

The fracking process also creates demand for substantial volumes of sand and other materials to be shipped to the fields, much of which comes from Southern Minnesota and Central Wisconsin. Overall, the growth curve for crude-by-rail shipments in the U.S. has been dramatic—from about 50,000 carloads in 2010 to about 450,000 today (Figure 2.15). As of late 2014, approximately 50 oil trains per week transport Bakken crude oil across Minnesota, and although short-term drops in oil prices and other trends result in uncertainty regarding near-term growth, it is likely that long-term oil demand and prices will lead to continued growth in Bakken oil production.

³² Association of American Railroads, December 2013. *Moving Crude Oil by Rail*. www.aar.org/safety/Pages/crude-by-rail-facts.aspx#UxdfuXYO_c.

Figure 2.15: Originated and Terminated Carloads of Crude Oil, 2005 to 2013



FREIGHT RAIL TRENDS AND DEMAND GROWTH

The future needs of Minnesota’s rail system are substantially driven by what future freight demand might look like. This section presents existing and future potential demand for rail freight in the state for the plan year of 2040.³³ For this purpose, the Federal Highway Administration’s Freight Analysis Framework version 3.5 (FAF3.5) was applied to the 2012 edition of the Surface Transportation Board’s Confidential Carload Waybill Sample. This forecast provides a “baseline” against which future demand for goods movement by rail can be considered, and thus is not only a reflection of current macro-economic trends, but also the current trends in logistics, distribution, sourcing etc. within the freight-dependent economic sectors. During the next 28 years there will be unanticipated changes in the economy, freight logistics, technology, public policy, and other factors that will greatly influence the general demand for goods movement and that of the individual modes such as rail.

³³ A more detailed commodity flow analysis can be found in [APPENDIX B](#).

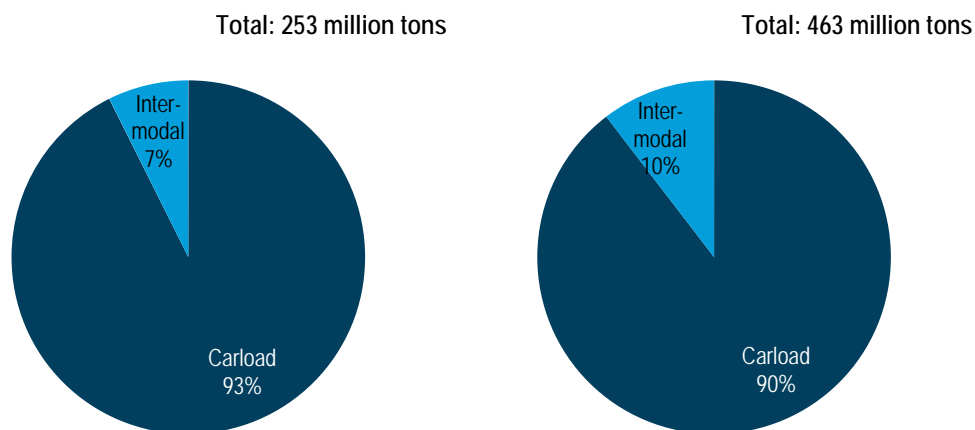
Overview of Freight System Demand

In 2012, one billion tons of freight moved over Minnesota's transportation system. Trucks carried 63 percent of all inbound, outbound, intrastate, and through freight tonnage, while rail (carload and intermodal) carried about 25 percent.³⁴ By 2040, the FAF forecast indicates total volume to amount to 1.8 billion tons, an increase of 44 percent overall. With mode shares somewhat remaining unchanged through the forecast period, rail volumes are expected to grow proportionately. By value, \$912 billion in freight moved over the state's transportation system in 2012, an amount that is expected to grow 161 percent to \$2.3 trillion by 2040. Trucks carried 67 percent of the state's freight value; by 2040 this share is expected to decrease to 63 percent. Rail carried 21 percent of the freight value; this share is expected to remain somewhat constant through 2040. These trends are described in further detail in [Appendix B](#).

Overview of Rail Freight Demand

Minnesota's rail system has some of the highest volumes in the nation, and these flows are projected to continue to grow through 2040. [Figure 2.16](#) and [Figure 2.17](#) show the current and future rail system volumes. In 2012 93 percent of tonnage (234 million tons) was carried in rail cars and 7 percent (19 million tons) in intermodal equipment (containers and trailers). When measured in units of rail cars and intermodal equipment, in 2012 65 percent (2.5 million units) were rail cars and 35 percent (1.4 million units) intermodal equipment. Rail intermodal volume growth is expected to continue to outpace rail carload growth through 2040, with intermodal tonnage increasing to 10 percent and units to 45 percent of all traffic.

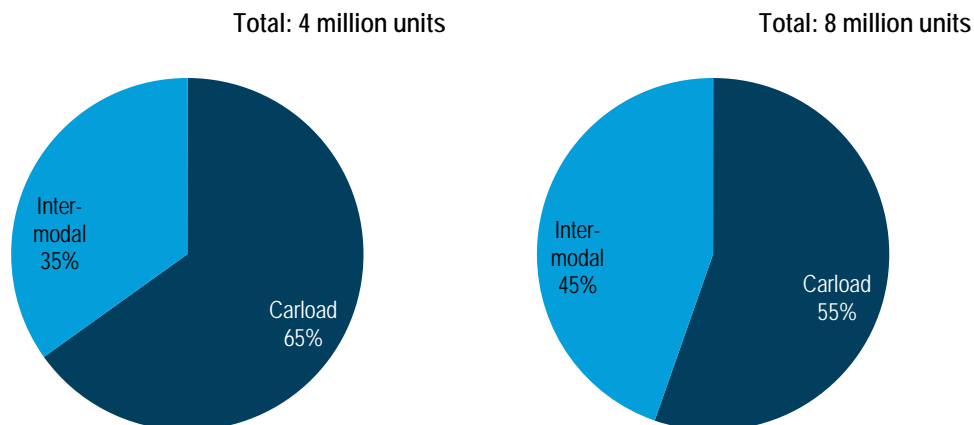
Figure 2.16: Total Rail Tonnage by Equipment Type
2012 (left) and 2040 (right)



Source: STB 2012 Confidential Carload Waybill Sample and FHWA FAF 3.5 forecast for 2040 processed by Cambridge Systematics.

³⁴ The data source for freight demand for other modes but rail was FHWA's Freight Analysis Framework version 3.5 (FAF3.5). FAF utilizes a 2007 base year with synthesized 2012 values, and a 2040 forecast.

Figure 2.17: Total Rail Units by Equipment Type
2012 (left) and 2040 (right)



Source: STB 2012 Confidential Carload Waybill Sample and FHWA FAF 3.5 forecast for 2040 processed by Cambridge Systematics.

Figure 2.18 and 2.19 display the tonnage of freight moving on the national system for goods moving to, from, through or within Minnesota in 2012 and 2040.

Rail Demand by Direction

Figure 2.20 and Figure 2.21 display rail freight flows by direction for weight and value in 2007, 2012 and 2040. Through moves are the largest type of rail flow, accounting for 124 million tons and \$129 billion in 2012. In 2040 through moves are expected to continue to make up the majority—59 percent of the tonnage and 72 percent of the value—of rail freight traffic in Minnesota. The top through commodities by weight were hazardous materials (e.g., crude petroleum); coal; farm products; chemicals and allied products; and freight-all-kinds (i.e., miscellaneous mixed shipments moving as intermodal shipments).

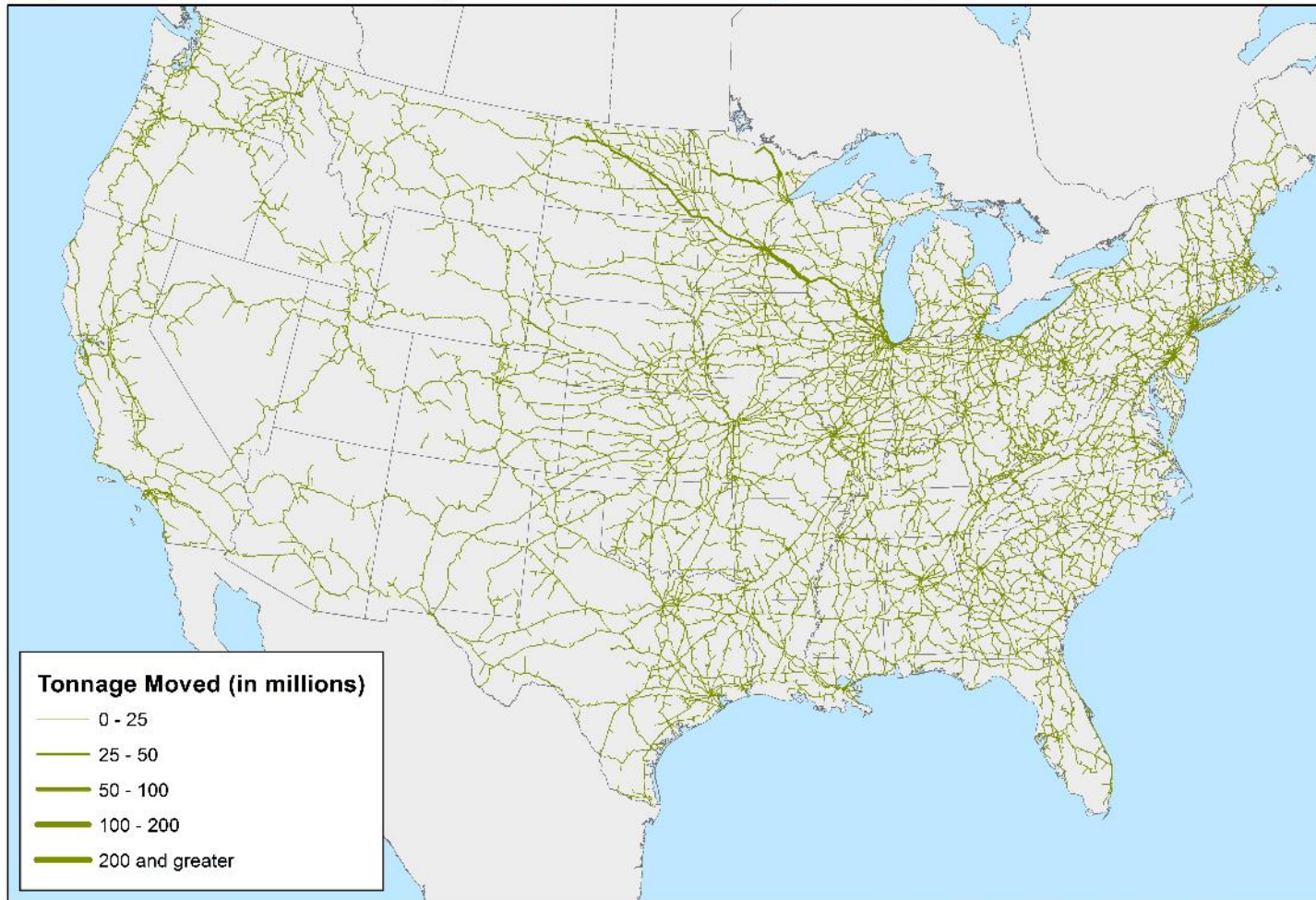
Outbound rail freight amounting to 54 million tons and \$31 billion in 2012 was the second largest component. Outbound shipments include metallic ores; farm products; food and kindred products; freight-all-kinds; and hazardous materials. Inbound movements account for 12 percent (31 million tons) of the rail tonnage and 14 percent (\$26 billion) of the rail value in 2012. These shares for inbound rail are expected to remain constant through 2040. The top inbound commodities are coal; freight-all-kinds, transportation equipment, farm products; chemicals and allied products; primary metal products; and hazardous materials.

Intrastate rail freight amounted to 44 million tons and \$6 billion in 2012. Intrastate movements represented a larger share of tonnage than value, reflecting that the primary intrastate commodity group is metallic ores. Much of these shipments move within St. Louis County, Minn., and from St. Louis County to Lake County, Minn.. The decline in intrastate rail freight is driven by an expected decline in metallic ore shipments.

Figure 2.18: Rail Flow Volumes, 2012



2012 Commodity Flow - All Commodities Tonnage Moved To/From/Through Minnesota



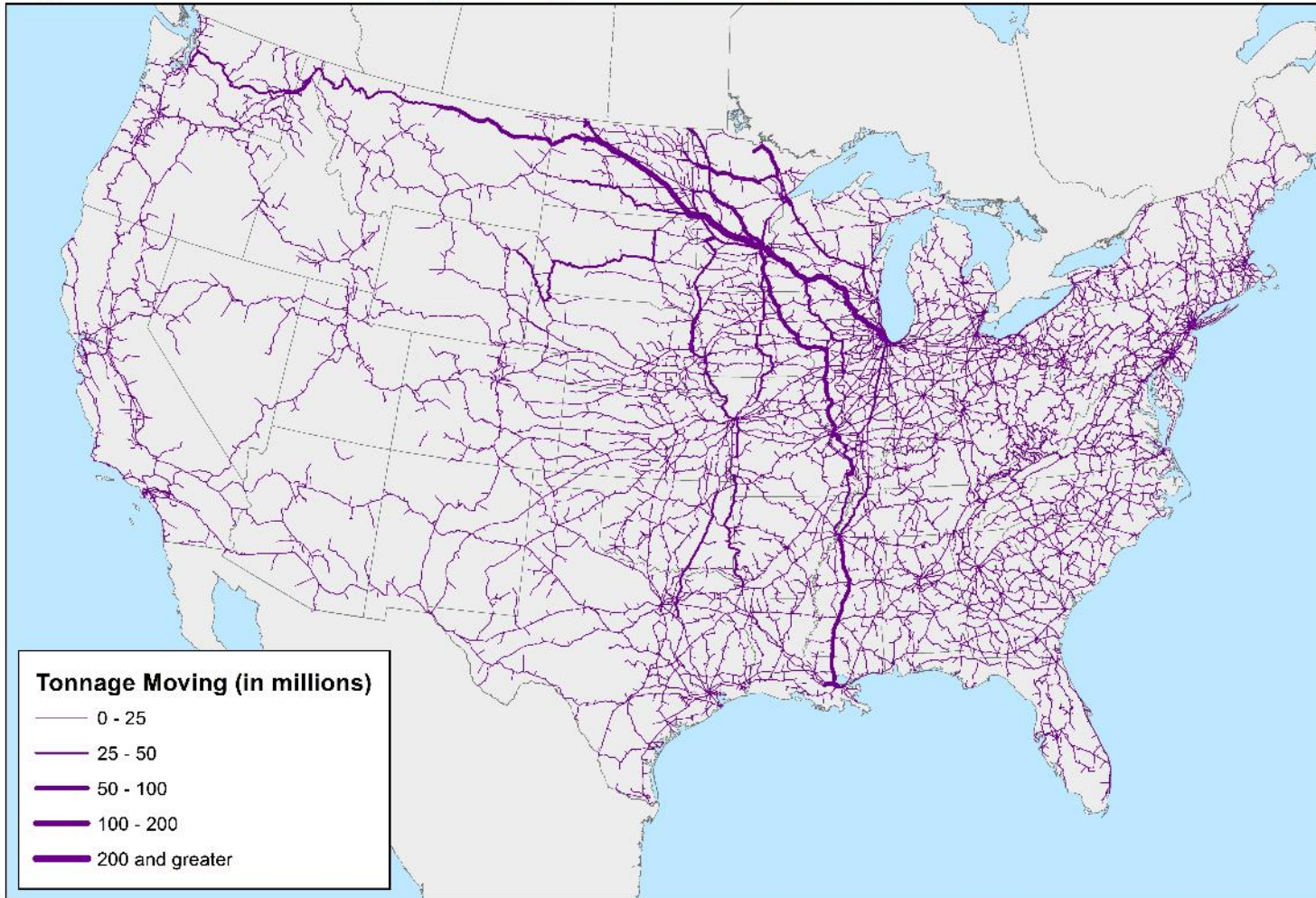
January 2015

Data Sources: Oak Ridge National Laboratory, Surface Transportation Board

Figure 2.19: Rail Flow Volumes, 2040



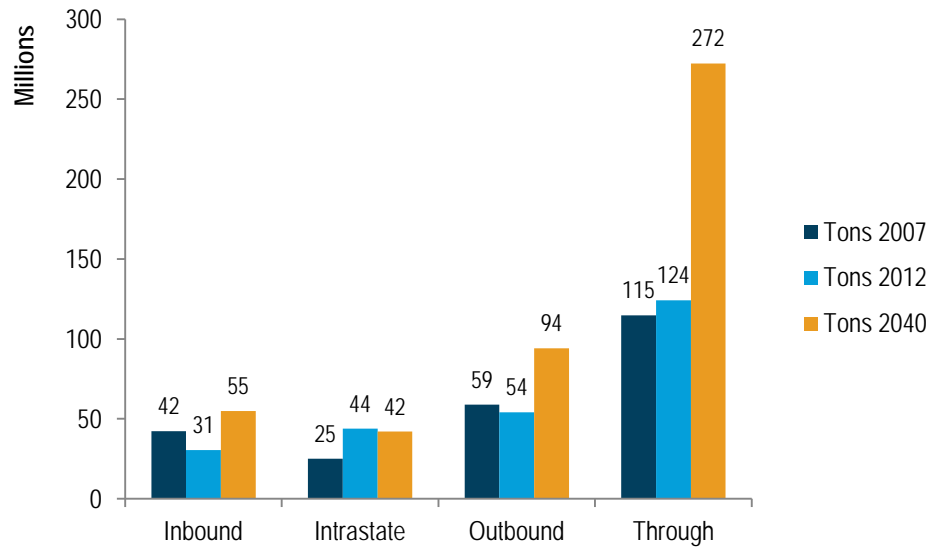
2040 Commodity Flow - All Commodities Tonnage Moving To/From/Through Minnesota



January 2015

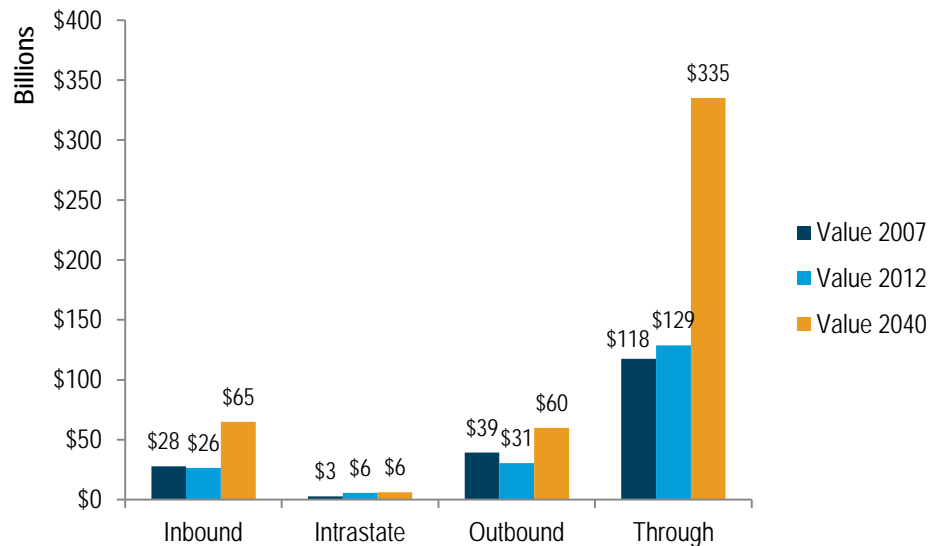
Data Sources: Oak Ridge National Laboratory, Surface Transportation Board

Figure 2.20: Freight Tonnage Growth by Direction
2007, 2012 and 2040



Source: STB 2012 Confidential Carload Waybill Sample and FHWA FAF 3.5 forecast for 2040 processed by Cambridge Systematics; Minnesota Comprehensive Statewide Freight and Passenger Rail Plan for 2007 rail data.

Figure 2.21: Freight Value Growth by Direction
2007, 2012 and 2040



Source: STB 2012 Confidential Carload Waybill Sample and FHWA FAF 3.5 forecast for 2040 processed by Cambridge Systematics; Minnesota Comprehensive Statewide Freight and Passenger Rail Plan for 2007 rail data.

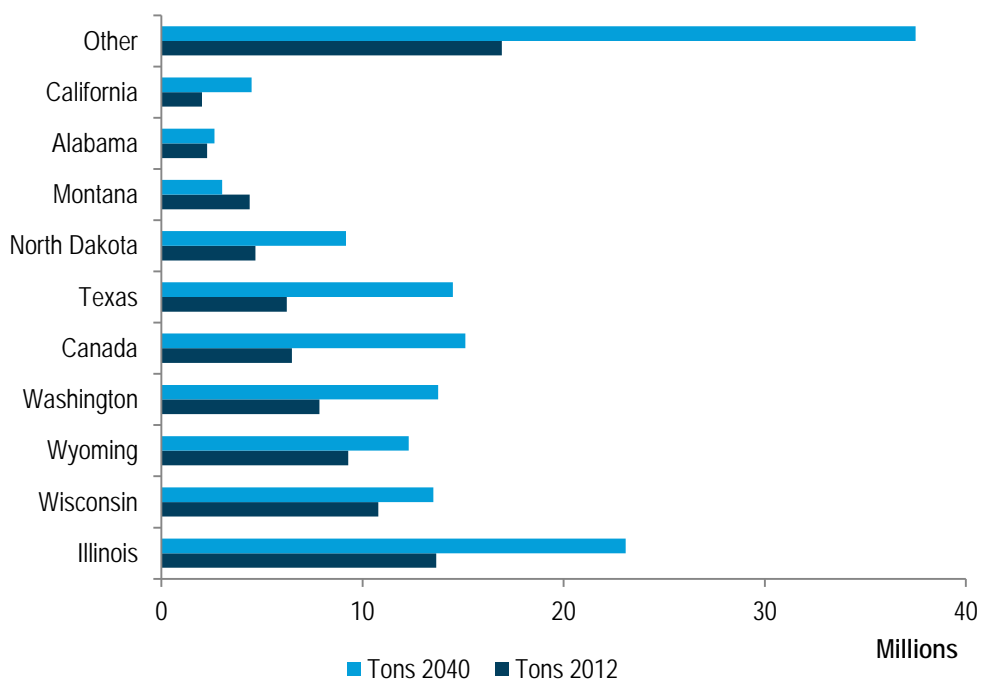
Rail Freight Analysis by Trading Partner

The “trading partners” external to Minnesota are defined as consisting of the states in the United States, and the neighboring countries of Canada and Mexico. Key trading partners are identified by combining the inbound and outbound freight rail flows between Minnesota and the trading partner region. [Figure 2.22](#) displays the current and future tonnage for each of the top trading partners.

Illinois, Wisconsin, Wyoming, Washington, Canada, Texas, and North Dakota were the top rail trading partners in 2012, accounting for 70 percent (59 million tons) of total inbound and outbound rail flows by weight. By 2040 these trading partners are projected to represent 68 percent of Minnesota's rail trade, exhibiting growth of 72 percent to 101 million tons.

Illinois was Minnesota's top rail trading partner in 2012, a position that is expected to remain unchanged through 2040. The top commodity traded between Minnesota and Wisconsin by rail was metallic ores from Minnesota, which reflects the shipment of taconite through Superior's Lake Superior docks. By 2040, metallic ore shipments are expected to grow merely 2 percent. Trade with Wyoming consisted primarily of utility coal. The expected growth of these shipments from Wyoming is a result of the economic recovery from the low volumes of the recession of 2008–2009. The trade with Washington consisted primarily of farm products (e.g., dried soybeans and shelled corn) shipped from Minnesota. Most of the trade between Canada and Minnesota consisted of a wide range of commodities such as chemicals and allied products, farm products, lumber and wood products (excluding furniture), food and kindred products, hazardous materials (e.g., petroleum and coal products, chemicals and allied products, crude petroleum, and non-metallic minerals), primary metal products and freight-all-kinds.

Figure 2.22: Top 10 Rail Trading Partners by Weight
2012-2040



Source: STB 2012 Confidential Carload Waybill Sample and FHWA FAF 3.5 forecast for 2040 processed by Cambridge Systematics.

Freight by Railroad Class

Table 2.4 presents the tons and units carried by class of railroad in Minnesota. In 2012, traffic originating, terminating or going through Minnesota's Class I railroads accounted for 251 million tons carried in 3.9 million rail units—more than a 99.5 percent share of the state's rail volume. Traffic on the short lines accounted for 1 percent (2.9 million tons carried in 24,000 rail units). By 2040, the Class I traffic is projected to grow faster than the short line traffic, accounting for 99.4 percent of the tonnage and 99.8 percent of the rail units.

Table 2.3: Rail Freight Volumes by Minnesota Railroad (2012-2040, in Thousands)

RAILROAD CLASS	TONS 2012	TONS 2040	%CHANGE 2012-2040	UNITS 2012	UNITS 2040	%CHANGE 2012-2040
Class I	251,349	460,613	83%	3,898	8,106	108%
Short Line	2,867	5,051	76%	24	38	56%
TOTAL	252,591	463,426	83%	3,904	8,118	108%

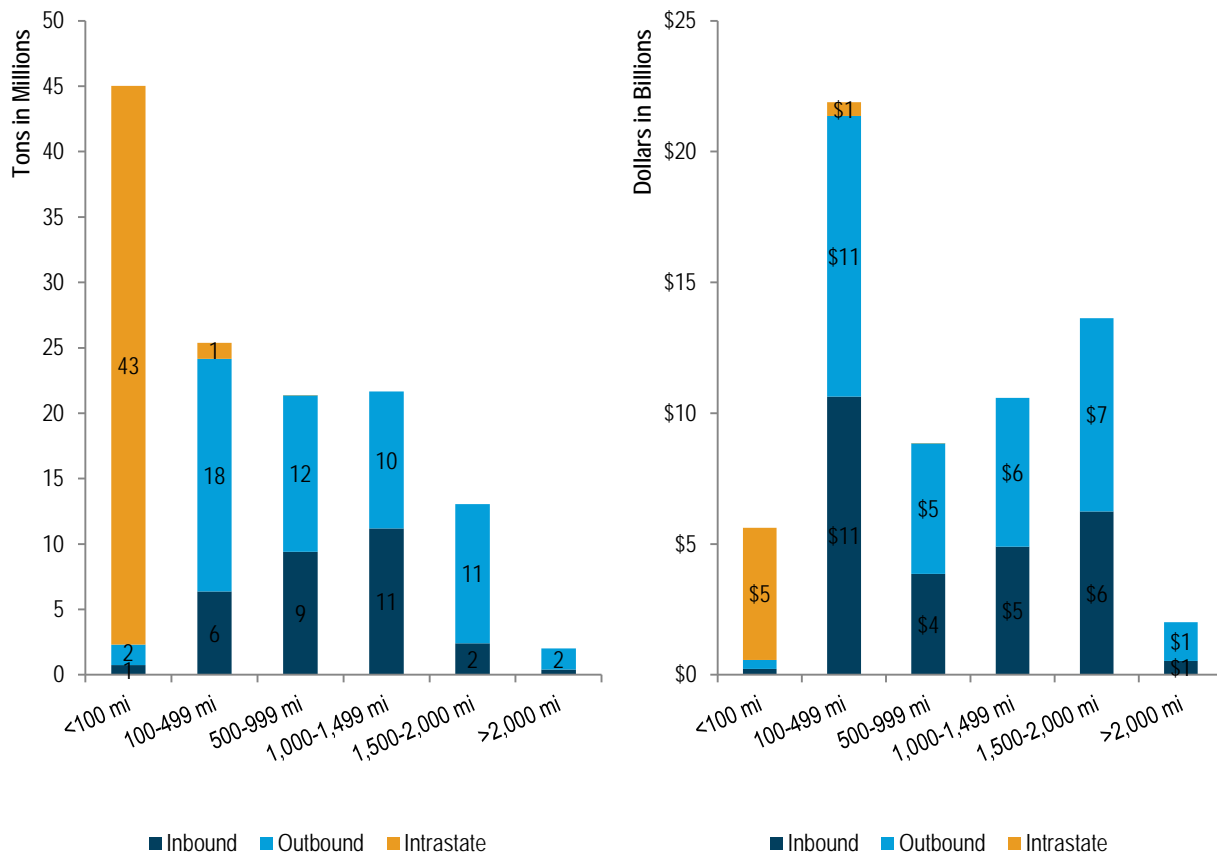
Source: STB 2012 Confidential Carload Waybill Sample and FHWA FAF 3.5 forecast for 2040 processed by Cambridge Systematics.

Note: *Numbers do not add up to the totals because there is tonnage that can go on both Class I railroads and Short Line railroads.

Rail Freight by Distance

Figure 2.23 shows the distribution of rail tonnage and value by direction and distance traveled. Approximately 35 percent of rail tonnage shipped to, from and within the state traveled less than 100 miles; however, when measured in value, only 9 percent of the rail value originating and/or terminating in the state traveled less than 100 miles. Thirty-five percent of the rail value originating or terminating in Minnesota travelled within 100 and 499 miles. More than 45 percent of the rail tonnage and 56 percent of the rail value shipped to/from the state traveled more than 500 miles.

Figure 2.23: Rail Volume by Miles Traveled and Direction 2012, Weight (Left) and Value (Right)



Source: STB 2012 Confidential Carload Waybill Sample.

PASSENGER RAIL TRAVEL DEMAND

In the 2010 State Rail Plan, passenger demand was estimated for a number of potential rail markets and used to develop priority corridors for implementation. As part of the 2015 Minnesota State Rail Plan and due to recent planning efforts, these rail corridors have been divided into three categories: Advanced Planning, Phase I and Phase II. Having had substantive planning work, four projects are designated as being in Advanced Planning. Three are High Speed Rail services (at least 110 mph), and consist of Twin Cities to Milwaukee as part of an overall Chicago hub regional service, Duluth (Northern Lights Express or NLX) and Rochester (Zip Rail). The fourth advanced planning effort entails a second Empire Builder between the Twin Cities and Chicago that would complement the existing single daily train. Robust analyses are being performed of passenger ridership for these rail corridors under active development. Passenger demand estimates from these corridors will be included in updates to this document as they become available.

For Phase I corridors, the passenger travel demand and demand for rail service, by market, was estimated in this 2015 Minnesota State Rail Plan using the methodology developed in the 2010 State Rail Plan. As available, the forecasts were updated using the most currently available data. An overview of the methodology used is included in the following subsection. Additional methodological details are available in the 2010 State Rail Plan Technical Memorandum 3.

Methodological Overview

For Phase I corridors, a high-level, sketch planning, spreadsheet-based approach was applied to develop total passenger demand and rail ridership forecasts in both the 2010 State Rail Plan and in the 2015 State Rail Plan Update. Sketch planning has a long history in statewide transportation planning, and is commonly used, particularly when resources do not allow for statewide transportation surveys and models. Ultimately, each project will be responsible for developing its own detailed forecasts to support planning, environmental, and engineering analyses as the projects move forward through approval processes. For the sketch planning forecasts in this document, a conservative, “low ridership” approach was used in order to avoid artificially inflating the benefits of individual rail corridors.

The forecasts below analyzed travel only between the Twin Cities and key outlying markets that were identified as possible intercity rail origins and destinations as part of Phase I and Phase II projects. Most demand was estimated using standard demographic data such as population and employment; however, special generators—such as casinos, medical centers, universities, and tourism markers—have unique demand characteristics and also were considered.

The first step in forecasting demand for rail is to estimate the total potential number of trips for travel between two cities. Four modes of travel were considered: auto, air, rail, and intercity bus. Different approaches were used to estimate the existing use of each mode depending on availability of existing data. For the 2015 Minnesota State Rail Plan, demand was forecasted using currently available data. These four modal demand inputs were added together to generate the total estimated travel between the Twin Cities and all interstate and intrastate tested origin/destinations. The forecast shown assumes 79 mph speed, four trains per day, a rail fare of 20 cents per mile, gas prices of \$2.00, personal/business travel splits of 90/10, and the standard state growth forecast. Auto, air, rail and bus demand, developed for the 2030 projections presented in the 2010 State Rail Plan, served as the basis of the 2040 projections. The annual growth rates for the previous 2005–2030 forecast were extended out to 2040. The demand along corridors that were projected to have negative growth in the 2010 State Rail Plan, were assumed to remain unchanged. Additional details on this forecasting methodology can be found in the 2010 State Rail Plan Technical Memorandum 3.

Passenger Rail Demand Forecasts for Phase I – Advanced Planning Corridors

Four projects were designated as being in Advanced Planning. Three are High Speed Rail services (at least 110 mph), and consist of Twin Cities to Milwaukee as part of an overall Chicago hub regional service, Duluth (NLX) and

Rochester (Zip Rail). The fourth advanced planning effort entails a second Empire Builder between the Twin Cities and Chicago that would complement the existing single daily train. Robust analyses are being performed of passenger ridership for these rail corridors under active development. Passenger demand estimates from these corridors will be included in updates to this document as they become available.

Passenger Rail Demand Forecasts for Phase I and Phase II Corridors

Table 2.5 shows the projected 2040 total demand and demand for rail service between the Twin Cities and major origins and destinations along Phase I and Phase II corridors. The highest total travel demand to/from the Twin Cities along these corridors is with St. Cloud, with more than one million forecast rail trips annually and a rail share of about 8 percent. This city pair is followed by a second cluster of city pairs with more than 100,000 annual trips, including Eau Claire, Mankato and Northfield, who have rail shares of between about 4 and 5.5 percent. Willmar has an annual rail demand of about 53,000 and a 3.5 percent rail share. Rail shares are forecasted to be less than 2 percent between the Twin Cities and other destinations, leading to annual rail demands of less than 50,000.

Table 2.4: 2012 and 2040 Annual Passenger Demand and 2040 Rail Demand From/To the Twin Cities (Phase I and Phase II Corridors)

CITY	TOTAL ANNUAL DEMAND (TO/FROM TWIN CITIES; 2005)	TOTAL ANNUAL DEMAND (TO/FROM TWIN CITIES; 2040)	RAIL DEMAND (TO/FROM TWIN CITIES; 2040)	RAIL SHARE (TO/FROM TWIN CITIES; 2040)
St. Cloud, MN	11,115,313	13,730,016	1,107,005	8.1%
Eau Claire, WI	5,820,841	6,813,058	268,812	3.9%
Mankato, MN	3,781,513	4,160,051	234,864	5.6%
Northfield, MN	1,685,353	2,139,927	117,746	5.5%
Willmar, MN	1,587,159	1,543,243	53,561	3.5%
Fargo, ND	3,931,143	3,978,633	37,032	0.9%
Des Moines, IA	2,927,518	3,025,124	18,729	0.6%
Sioux Falls, SD	1,680,987	1,504,088	17,987	1.2%
Marshall, MN	622,150	551,251	9,502	1.7%
Sioux City, IA	599,627	628,263	1,907	0.3%

Source: Minnesota Department of Transportation; Cambridge Systematics

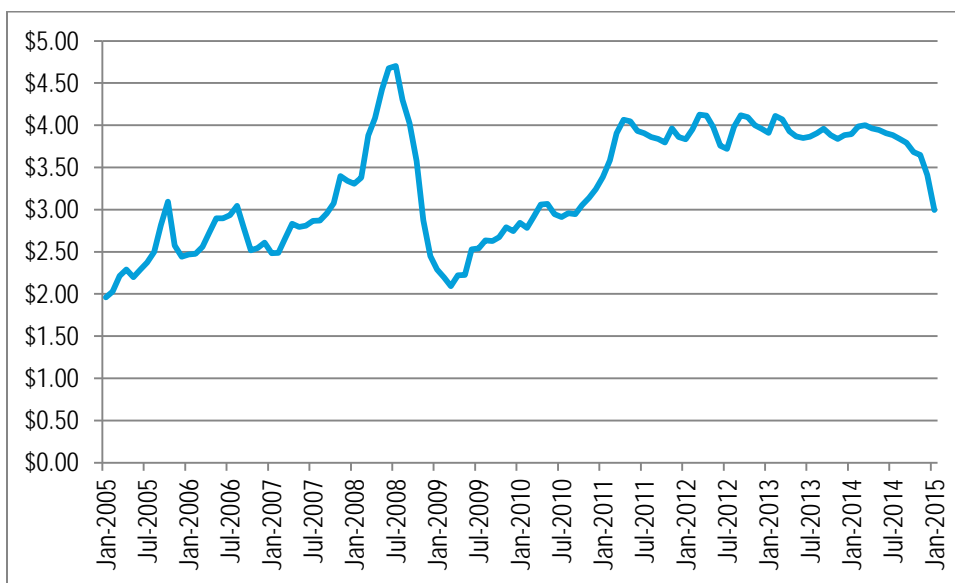
OTHER TRENDS

Fuel Cost

Recent years saw a steady increase in price of all types of fuel. Since the crude oil peak at a record \$145 per barrel in 2008 and the subsequent recession-related drop, the price hovered in the range of \$90 to \$120 per barrel, leading to an extended period of relatively high fuel prices (Figure 2.24); however, oil prices dropped by more than 40 percent in late 2014. In part due to the U.S. shale oil boom increasing the supply on the market, this led to short-term lower fuel prices for all modes of travel, including rail. It also has led to more volatility and uncertainty in the global

fuel market, a trend that is expected to persist through 2015. Nevertheless, the U.S. Energy Information Administration's Short Term Energy Outlook has forecast that prices will begin rising again later in 2015.³⁵

Figure 2.24: Historical Cost of Diesel Fuel



Source: U.S. Energy Information Administration, 2014 Rail Congestion

Network Congestion

Rail congestion in the Midwest has become an increasingly important issue over the last decade, particularly in major hubs like Chicago, Kansas City and Minneapolis-St. Paul. The drop-off in traffic during the recession of 2008–2009 temporarily alleviated congestion, but by 2011 many mainlines and key junctions were again experiencing reduced fluidity from growing intermodal, agricultural, metallic and non-metallic minerals, automotive and other traffic. Compounding this traffic growth from a recovering economy is the new traffic that has arisen from the development of North Dakota’s Bakken oil fields, the Alberta tar sands, the Eagle Ford oil shale formation in Texas, and others. Geography and the existing rail network place Minnesota between the producing regions in North Dakota and Alberta, and refineries located along the eastern seaboard and the gulf. This places particular pressure on some of Minnesota’s primary main lines, which saw large increases in crude-by-rail and related traffic. According to the AAR, in 2008, U.S. Class I railroads originated just 9,500 carloads of crude oil. By 2012, volumes had grown to nearly 234,000 carloads, and were forecast to further increase to around 400,000 carloads in 2013.³⁶

Throughout 2013–2014, the increased crude traffic in North Dakota combined with a record harvest throughout the upper Midwest drove up demand for rail service and led to significant railway congestion. The current “boom” in rail related to extraction of petroleum (not only rail movements of crude itself, but also of the shipping of chemicals and sand components for hydraulic fracturing) diminished the capacity and quality of service that is being provided to Minnesota’s own rail-oriented shippers. Producers of grain, paper, ethanol, taconite and forest products expressed

³⁵ U.S. Energy Information Administration, Short Term Energy Outlook, January 2015.

³⁶ Association of American Railroads, www.aar.org/keyissues/Documents/Background-Papers/Crude-oil-by-rail.pdf.

concerns about the availability of and access to rail shipping as a result of the capacity consumed by energy development, particularly in North Dakota. Due to slower travel times and longer cycle times leading to a lack of rail cars available for grain shipment, grain is currently being stored on the ground at facilities for extended periods of time while awaiting shipment to an export terminal. A 2014 study by the University of Minnesota's Center for Farm Financial Management estimated delays in railroad shipping cost Minnesota's corn, soybean and wheat farmers nearly \$100 million due to lower prices.³⁷

Congestion is also affecting short line traffic. Access to the rail system for smaller customers is becoming more challenging as the Class I carriers increase their focus on transporting single commodities in point to point service in unit trains. Across the country, some Class I railroads are encouraging short line railroads and other customers to provide full trainloads. This can be difficult for short line railroads to accomplish due to physical limitations, e.g., lack of track and storage infrastructure, as well as market conditions for particular commodities and industries. In particular, smaller agricultural producers and grain elevators are affected by the diminishing access to rail service. They must increasingly rely on consolidation facilities and/or transloading to maintain this access, and with varying results.

Along with record traffic, the extreme cold weather in the winter of 2014 led to significant delays on intercity and commuter traffic in Minnesota. In early 2014, the on-time performance of Northstar commuter trains averaged 20 points lower than the contractually specified 95 percent.³⁸ Nationwide, Amtrak on-time performance also suffered. The Empire Builder, which serves the Twin Cities and other Minnesota destinations on its route from Chicago to Seattle, Washington, and Portland, Oregon, ran on time only 21 percent of the time in 2013–2014.³⁹

The BNSF and other carriers responded to the increasing congestion through operational changes and a record level of investment in infrastructure. These efforts clearly helped, as performance improved considerably from the low point reached in late 2013 and early 2014. As described elsewhere in this 2015 Minnesota State Rail Plan, additional investments are on tap in 2015 and 2016 to further increase capacity on select routes; however, it is not evident that they will be sufficient to accommodate significant further growth while providing consistently reliable service. Even with the recent drop in oil prices, it is likely that energy-related traffic will continue to put a strain on capacity on Minnesota's core rail network, which will clearly affect rail freight service and efforts to increase passenger rail service in the state. The unreliability and investment needs on the waterway system may also contribute to future demand for rail traffic. Investments in the rail system, including double tracking in some shared freight and passenger corridors with heavy volumes, will be crucial to maintaining service and providing access for Minnesota's passenger and freight rail customers.

Highway and Airport Congestion

Minnesota's highways continue to be congested, especially within the Twin Cities; however, congestion in the region showed some improvement during the last few years. The 2013 Metropolitan Freeway System Congestion Report showed the percentage of congested freeways decreased by 1.5 percent from 2012. MnDOT completed several projects recently aimed at improving traffic flow in the Twin Cities metro area, including upgrading the Highway 169/Interstate 494 interchange, installing Smart Lanes on Interstate 94 to alert travelers to congestion in the Twin Cities area, and constructing new bridges over Interstate 35W.

³⁷ *Center for Farm Financial Management*. "Minnesota Basis Analysis: Final Report for the Minnesota Department of Agriculture". July 10, 2014

³⁸ *Star Tribune*. "BNSF: Blame the weather, not oil trains, for Northstar's delays." February 27, 2014.

³⁹ *The Washington Post*. "The sorry state of Amtrak's on-time performance, mapped." July 10, 2014.

Trucks carried about 630 million tons, or 63 percent, of goods moving in Minnesota in 2012, a role that is expected to become even larger in the future. The shale oil boom in North Dakota led to an increased demand for sand and raw materials to feed the oil and gas mines. Record harvests in recent years combined with congestion on the rail system also led to an increased need to move grain by truck both within the state and to river and lake ports for export. Increases in manufacturing and demand for goods and services within the population centers are also contributing to increased traffic. As congestion increases on the roadway systems, industry will continue to seek out alternatives, for bulk goods that can move more cost-effectively by rail, and for advanced manufacturing and consumer goods that are more often being moved effectively by intermodal and containerized traffic.

In 2013, the Minneapolis-St. Paul Airport served more than 33 million passengers and accommodated 431,328 landings and takeoffs, making it the 16th largest airport in North America for the number of travelers served. Annual passenger boarding forecasts are expected to grow from 16.4 million in 2009 to 28.4 million in 2030. Over the same time period, total aircraft operations are expected to grow by 40 percent, from 450,000 to 630,000. While runway improvements in the past decade, including the addition of a fourth runway, increased the capacity of the airport, the airport will have to continue to make improvements to its landside and terminal facilities in order to effectively serve increasing airline traffic.⁴⁰ Worldwide, airline fleets are moving towards serving more long-haul domestic and international destinations, and reducing their use of regional jets and point-to-point service. Illustrating this trend, the average size of aircraft has grown by approximately 25 percent worldwide in the past 20 years.⁴¹ Minneapolis-St. Paul saw changes in service consistent with these broader trends, such as increased international service. As the airline market continues to grow and shift towards longer trips, it could lead to an opportunity for increased use of intercity rail to serve both as a feeder to long-haul air travel as well as a substitute for short-haul regional air service within the Midwest.

Land Use

In general, population trends show steady growth in metropolitan areas like the Twin Cities, Rochester, Mankato and Duluth in the past several decades, while also illustrating a population decline in rural Minnesota. These trends will continue to influence demand for livable, workable communities that are connected to convenient transportation options. These options will help meet local mobility needs as well as intercity and regional access for people, goods and services.

These trends continued into the 2010s and have other implications on land use. The total number of farms decreased since the 1930s, while the average size of farms steadily increased. The total amount of farmland also decreased near metropolitan areas due to suburban growth. Although suburban growth stagnated in the past five years, farm land in the exurban regions of the Twin Cities and other metropolitan areas increased in value. With the combination of larger, efficient and more profitable farms and a growing demand for agricultural goods, fertile farmland will contain an elevated land value for the foreseeable future.

⁴⁰ Minneapolis St. Paul International Airport. *Minneapolis-St. Paul International Airport Final Long Term Comprehensive Plan*, 2010.

⁴¹ Airbus Global Market Forecast 2012–2032.

Rail Service Needs and Opportunities

Minnesota identified a number of identified infrastructure, policy, safety and funding needs and opportunities on the state's freight and passenger rail networks. These, as well as best practice opportunities from other states are described in this section.

INFRASTRUCTURE AND SERVICE GAPS

To maintain the economic advantage of traveling and shipping by rail, various improvements are needed in both the short and long term. Intermodal station development in key areas in central and northern Minnesota, and intermodal station expansion in the Twin Cities area and southeastern Minnesota will help to improve freight movements. Double tracking segments within bottleneck areas will alleviate congestion. Passenger rail expansion should occur on both existing and new separated track to meet the cited demand in Greater Minnesota.

Freight Rail Capacity and Bottlenecks

Demand for rail service to transport Minnesota's agricultural products, raw materials and consumer goods is increasingly competing with rail traffic moving through the state, particularly Bakken shale oil. Infrastructure investment and continued work with rail stakeholders will be needed to continue to serve Minnesota's industries as well as passenger traffic.

Although rail trackage extensively covers all regions of Minnesota, there are some bottlenecks. The Hoffman Junction east of the Union Depot in St. Paul is used by BNSF, CP and UP, and carries 120 trains per day. Bottlenecks in the Minneapolis Junction and corridors to the north caused delays for both the Northstar Commuter Rail service and for freight shipments. The East Metro Rail Study, funded jointly by the three Class I railroads and Ramsey County Regional Railroad Authority, identified specific Hoffman Junction-area capacity improvements that are being systematically pursued. Other bottlenecks near La Crescent and Moorhead worsened statewide system performance. Double tracking segments within the bottlenecks, adding/increasing siding length, improving signal systems, and rehabilitating outdated structures will alleviate these problems as freight shipments and passenger rail demand grow.

Intermodal Service

Intermodal freight stations are areas where cargo can be transferred between transportation modes, such as rail to truck transfer. Since the 1980s, the most consistent and broad increase in demand for rail service was associated with intermodal service, with Minnesota being no exception. At present, intermodal service is only available in the Twin Cities. Several studies have illustrated intermodal service gaps in terms of markets served as well as demand in regions of the state beyond the Twin Cities; however, the sole instance of a terminal located outside the Twin Cities—a BNSF-served ramp at Dilworth—was closed in 2011. The primary reason for its closure—modest traffic volumes and the difficulty and cost of obtaining empty containers for loading products—exemplifies the challenges of implementing intermodal service in regions that lack large populations and/or a large and diversified traffic base.

Passenger Rail

Currently, Amtrak's Empire Builder provides the only passenger rail service in Minnesota. Ridership demand and public support for the service steadily increased in recent years, coinciding with a general increase in Amtrak ridership nationwide.¹ In Minnesota, the number of passengers has maintained a range between 180,000 and 190,000 passengers, with the highest number of riders using the St. Paul station, followed by Winona. In the near-term, Amtrak and MnDOT are jointly exploring feasibility of adding a second daily Empire Builder train between Saint Paul and Chicago. In the longer term, there is ongoing interest for alternative and complementary passenger rail services.

As described in [Chapter 3](#), Minnesota has three passenger rail projects in advanced planning: ZipRail, NLX, and Twin Cities-Chicago. MnDOT also recognizes strong demand for passenger service in other markets, particularly from the Twin Cities to Northfield, Minnesota and Eau Claire, Wisconsin, as evidenced by outreach efforts described in [Chapter 6](#).

POLICY NEEDS AND OPPORTUNITIES

Multimodal Connectivity

Connections between the rail, road and port systems are key to Minnesota's transportation infrastructure. A number of commodities, from raw iron ore to agricultural exports, rely on these connections to transport their goods from supplier to customer. Minnesota is currently developing a State Multimodal Freight Network. The MFN will include key multimodal hubs, including ports, rail yards, and container facilities, as well as highway and rail infrastructure in the state. The MFN will allow Minnesota to better track freight activity, develop freight performance measures, and potentially prioritize projects or be incorporated into other planning and programming activities.

Corridor Reclamation

Many unused rail corridors have been preserved through interim uses such as bicycle trails. Converting these corridors back to active rail use is often difficult and costly due to encroachment, regulations, and public opposition.

Passenger and Freight System Coordination

Passenger rail systems that will share infrastructure with Minnesota's freight network will require coordination between operations.

Prioritization of Passenger Rail Projects

Advancing passenger rail projects is complex and competition for limited funding is intense; therefore, great attention is necessary for selecting the best projects, having detailed supporting analyses and focusing on moving them through the process.

RAIL SAFETY

The need for improved safety at highway-rail grade crossing is a concern due to a history of accidents with crossing vehicles, bicyclists and pedestrians. Significant improvement has been made with the safety of rail crossings in Minnesota, but many of the currently installed warning devices will need to be replaced by 2030, and improvements beyond active warning devices also will be necessary in some locations. The recent rapid increase in the transport of Bakken shale oil by rail from North Dakota across Minnesota has posed additional challenges to ensuring safety. While the recent drop in oil prices may slow this trend in the short-term, and increased pipeline capacity could have the same effect in the long-term, new safety standards will need to be developed at the national and state levels to better regulate this service. The Federal Surface Transportation Program dedicates \$220 million to funding improvements in highway-rail grade crossing protection. A number of states augment this federal funding with state resources, aimed at allocating resources on a safety risk-based process. States and railroads update grade crossing inventory information, which is collected and maintained by USDOT and then used by states in making safety improvement decisions. In most states, grade crossings are maintained by the railroad operator (including the road surface between the rails, and active warning devices), although some states provide crossing maintenance assistance to railroads. Grade crossing funds are administered by the Federal Highway Administration, and the FRA provides assistance for overall grade crossing accident education and prevention. Thirty states cooperate in enforcing federal rail safety regulations and in supporting federally certified rail safety inspectors. These state programs, funded solely with state resources, effectively leverage the efforts of the FRA, and are coordinated through the FRA's eight regional safety offices throughout the country.

FUNDING STRATEGIES AND PUBLIC-PRIVATE PARTNERSHIPS

Funding mechanisms vary significantly depending on the type of service. While public monies would be required to develop new passenger rail lines, private freight companies own and maintain almost all track in Minnesota. Obtaining federal financing is highly competitive and much more limited than was the case at the time of the 2010 State Rail Plan. Although opportunities for funding rail projects have changed significantly over the last few years, a number of state, federal, and private-sector options are available for furthering Minnesota's rail investment needs.

Minnesota State Transportation Bill

In his 2014 State of the State address, Minnesota Governor Mark Dayton said that passing a comprehensive, multimodal transportation bill will be a top priority in 2015. Governor Dayton and various state lawmakers have continued to affirm this statement throughout 2014. Studies, improvements and new development could be funded through state sources if rail-specific funding is included in the bill.

Transportation Investment Generating Economic Recovery Grants (TIGER)

In 2014, USDOT awarded \$600 million for 72 projects in 46 states and the District of Columbia through the sixth iteration of its TIGER program. Rail projects have done well throughout the history of this program, offering a substantive opportunity for funding passenger and freight rail development, including infrastructure improvements and technology upgrades; however, there is very intense national competition for a relatively small pool of money of around \$500 to \$600 million in recent years. [Table 2.6](#) summarizes Minnesota's successful experience with TIGER since the program was initiated in 2009.

Table 2.5: Minnesota TIGER Grants Awarded

PROJECT	YEAR AWARDED	AWARD AMOUNT	DESCRIPTION
St. Paul Union Depot	2009	\$35,000,000	Renovate St. Paul's historic Union Depot. Co-locate Amtrak trains with intercity bus services, local transit service, bike, and pedestrian accommodations.
Staples North/South Corridor	2010	\$7,650,000	Construct new US 10 bridge over busy BNSF rail tracks where an at-grade crossing existed before.
St. Paul Complete Streets	2010 Planning	\$250,000	Survey St. Paul streets to examine alternatives for a city-wide complete streets policy and preparation of a reference Planning Book that will guide future street improvements and design.
Northfield Multimodal Integration	2011	\$1,060,000	Construct new walking infrastructure to help pedestrians cross a busy Highway 3 corridor.
Minneapolis Transit Interchange	2011	\$10,000,000	Construct a new passenger platform, storage, staging tracks, and public plaza at Target Field Light Rail Transit Station in downtown Minneapolis. Separately, replace Dale Street bridge in St. Paul with new bridge under current standards.
Minnesota Rural Roads ITS	2013	\$1,457,307	Install intersection conflict warning systems at 15 rural, stop-controlled intersections, which will alert vehicles about oncoming conflicts or dangers.
Port of Duluth Intermodal	2013	\$10,000,000	Rebuild and expand 28-acre cargo dock at the Port of Duluth-Superior and connect the site to existing road & rail infrastructure.

PROJECT	YEAR AWARDED	AWARD AMOUNT	DESCRIPTION
US 10 / CSAH 83 Interchange	2014	\$10,000,000	Remove signalized intersection and construct full interchange at US 10 and CSAH 83. Construct sidewalk and bike trail where none existed before. Close access to several non-signalized cross streets at US 10.
St. Paul to Multimodal Corridor Plan	2014 Planning	\$100,000	Facilitate design study and create master plan to reuse CP Rail Spur as a multimodal corridor for bikes, pedestrians, and potential transit.

Transportation Infrastructure Finance and Innovation Program Loans

The Transportation Infrastructure Finance and Innovation Act (TIFIA) program provides federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance. TIFIA credit assistance provides improved access to capital markets, flexible repayment terms, and potentially more favorable interest rates than can be found in private capital markets for similar instruments. TIFIA can help advance qualified large-scale projects that otherwise might be delayed or deferred because of size, complexity or uncertainty over the timing of revenues. MnDOT has submitted TIFIA applications for past projects such as the Hiawatha LRT line, in conjunction with the Metropolitan Council.

TIFIA funds have been used to fund rail projects such as the Reno Transportation Rail Access Corridor (ReTRAC) project in Reno, Nevada. The ReTRAC project eliminated 10 at-grade street crossings by replacing them with bridges and constructing one new bridge over the trench, minimizing emergency vehicle delay, vehicular delay, impacts from pedestrian conflicts, whistle warning noise and air quality conflicts. The project allows Union Pacific to improve freight capacity by increasing train lengths to 8,000 feet with double-stacked containers. A \$50.5 million TIFIA loan was used, along with other financing methods, to meet the total project cost of \$280 million.⁴²

Public-Private Partnerships

In order to effectively create PPPs, improved communication, coordination and formalized partnerships between public and private stakeholders are needed. Freight rail is privately owned and operated, and many of the lines envisioned for enhanced passenger service are privately owned and operated freight lines. This makes the need for public/private cooperation essential to addressing many freight and passenger rail needs. Although MnDOT has some authority to use PPPs for Design-Build projects, state legal reform will be required to make PPPs truly viable for rail projects.

As this section discusses the institutional and implementation issues for passenger and freight rail projects, such projects can be examined to determine the extent to which the private sector can or should be involved. MnDOT has limited legal authority to implement some of these PPP approaches, but the state of the practice has changed since MnDOT's PPP authorization legislation was created.⁴³ This section describes some of these approaches, how MnDOT programs could be expanded, issues raised by PPP implementation and possible applications for projects identified in this Plan.

TYPES OF PUBLIC-PRIVATE PARTNERSHIPS

The 2004 USDOT Report to Congress on Public-Private Partnerships defines a PPP as:

⁴² www.fhwa.dot.gov/ipd/project_profiles/nv_retrac.aspx

⁴³ www.fhwa.dot.gov/ipd/p3/state_legislation/minnesota.htm

"A public-private partnership is a contractual agreement formed between public and private sector partners, which allow more private sector participation than is traditional. The agreements usually involve a government agency contracting with a private company to renovate, construct, operate, maintain, and/or manage a facility or system. While the public sector usually retains ownership in the facility or system, the private party will be given additional decision rights in determining how the project or task will be completed."⁴⁴

PPPs vary by the extent to which the public sector transfers project responsibility, risk and ownership to the private sector. [Table 2.7](#) describes PPP methods.

Table 2.6: Public Private Partnerships Infrastructure Approaches

APPROACH	DESCRIPTION
TRADITIONAL APPROACH	
Design-Bid-Build (DBB)	The traditional method of project delivery in which the design and construction are awarded separately and sequentially to private firms.
PUBLIC-PRIVATE PARTNERSHIPS APPROACH	
Design-Build (DB)	Combines the design and construction phases into a single fixed-fee contract, thus potentially saving time and cost, improving quality, and sharing risk more equitably than the DBB method.
Private Contract Fee Services/Maintenance Contract	Contracts to private companies for services typically performed in-house (planning and environmental studies, program and financial management, operations and maintenance, etc.)
Construction Manager @ Risk (CM@R)	A contracted construction manager provides constructability, pricing, and sequencing analysis during the design phase. The design team is contracted separately. The CM stays on through the build phase and can negotiate with construction firms to implement the design.
Design-Build with a Warranty	A DB project for which the design builder guarantees to meet material workmanship and/or performance measures for a specified period after the project has been delivered.
Design-Build-Operate-Maintain (DBOM), Build-Operate-Transfer (BOT), or Build-Transfer-Operate (BTO)	The selected contractor designs, constructs, operates, and maintains the facility for a specified period of time meeting specified performance requirements. These delivery approaches increase incentives for high-quality projects because the contractor is responsible for operation of the facility after construction. The public sector retains financial risk, and compensation to the private partner can be in the form of availability payments.
Design-Build-Finance (DBF), Design-Build-Finance-Operate (DBFO), or Design-Build-Finance-Operate-Maintain (DBFOM)	DBF, DBFO, and DBFOM are variations of the DB or DBOM methods for which the private partner provides some or all of the project financing. The project sponsor retains ownership of the facility. Private sector compensation can be in the form of tolls (both traffic and revenue risk transfer) or through shadow tolls (traffic risk transfer only).
Long-Term Lease Agreements/Concessions (Brownfield, Greenfield)	Publicly-financed facilities are leased to private sector concessionaires for specified time periods. The concessionaire may pay an upfront fee to the public agency in return for revenue generated by the facility. The concessionaire must operate and maintain the

⁴⁴ Report found at www.fhwa.dot.gov/reports/pppdec2004/index.htm.

APPROACH	DESCRIPTION
	facility and may be required to make capital improvements. In the case of a new facility, this concession is called a greenfield; for an existing facility, it is called a brownfield.
FULL PRIVATIZATION	
Build-Own-Operate (BOO)	Design, construction, operation and maintenance of the facility are the responsibility of the contractor. The contractor owns the facility and retains all operating revenue risk and surplus revenues for the life of the facility. The Build-Own-Operate-Transfer method is similar, but the infrastructure is transferred to the public agency after a specified time period.
Asset Sale	Public entity fully transfers ownership of publicly financed facilities to the private sector indefinitely.

Source: Public-Sector Decision-Making for Public Private Partnerships, NCHRP Synthesis Report 310, 2009, Table 1.

^aListed from least private involvement to greatest.

Table 2.8 describes some of these PPP methods according to the involvement of the public and private sector in elements of surface transportation projects.

Table 2.7: Types of Public Private Partnership Approaches in Surface Transportation Projects

PPP Method	Responsibility for Project Element					
	Design	Construction	Maintenance	Operations	Financing	Ownership
Traditional Design Bid Build	Public	Public	Public	Public	Public	Public
Fee-Based Contract Services	Public	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private
CM @ Risk	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private
Design Build (DB)	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private
DB with Warranty	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private
DB Operate Maintain (DBOM)	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private
DB Finance Operate (DBFO)	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private
Build Operate Transfer (BOT)	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private	Private
BOO	Public/Private	Public/Private	Public/Private	Public/Private	Public/Private	Private

Source: Connecticut Transportation Strategy Board, Connecticut Electronic Tolls and Congestion Pricing Study- Final Report – Volume 2: Background Report, April 2009, Table 4.1, page 4-4, found at http://www.ct.gov/opm/lib/opm/tsb/reports_tsb/final_report_-_tolling_study.pdf.

Legend: Public Sector Public/Private Private Sector

PUBLIC-PRIVATE PARTNERSHIP GUIDELINES

MnDOT has authority to design and construct transportation projects through DB contracts.⁴⁵ From 1996 through 2002, MnDOT awarded DB contracts on a lowest bid basis; from 2002 onward, awards have been made on a best value basis. Since 2002, MnDOT awarded seven DB highway project contracts, totaling more than \$860 million. Four more projects funded through the American Recovery and Reinvestment Act of 2009 were procured through DB.

Minnesota statutes do not restrict DB projects to highway projects; however, given the structure of the legislation (which limits the number of DB contracts on an annual basis and requires an annual report on DB contracts), MnDOT might seek more explicit authority to use DB for rail projects.

MnDOT has had authority since 1993 to enter into PPPs for toll roads through a development agreement that “may provide for any mode of ownership or operation approved by the road authority,” specifically authorizing BOT or Build-Transfer-Operate methods. This authority does not extend to other transportation projects such as railroad projects.^{46, 47}

APPLICABILITY FOR RAIL PROJECTS

A TRB special report, *Funding Options for Freight Transportation Projects*, describes a number of freight projects funded and implemented through different methods, including some PPPs.⁴⁸ The report also summarizes a number of general provisions for public investments in freight transportation projects.

Projects likely to be chosen for public contributions include:

- Projects with construction cost beyond the capacity of private infrastructure owners/operators or local/regional governments
- Institutionally complex projects, as indicated by the number of public jurisdictions and private sector entities
- Likely availability and cost of financing in the private credit markets to fund the projects
- Eligibility for funding through established federal or state programs (lack of such programs may lead to public funding through PPPs)
- Need for extensive upfront planning (including environmental clearance), coordination and seed money (this is the case for new passenger rail services with revenue risk)
- Project risks associated with the novelty of organizational or technological solutions (high-risk, high-return projects may need governmental assistance)

Effective public management of a PPP program for rail also would contain elements of the freight investment programs cited in the TRB study, such as:

⁴⁵ Minn. Stat., Section 161.3410 to 161.3428.

⁴⁶ Minn. Stat., Section 160.84 to 160.98.

⁴⁷ Section 160.85 (4) (a).

⁴⁸ *Funding Options for Freight Transportation Projects*, TRB Special Report 297, April 2009.

- Strong capabilities to evaluate project benefits and shared costs and standard economic valuation methods
- Decision-making that is transparent and consistent
- Decision-making criteria that defines when state resources are needed (as opposed to regional or local) and when projects qualify for state funding (even if such projects are not uniformly distributed across the state)
- Ability to accomplish state goals:
 - Projects that are part of the state transportation planning process
 - Projects that have measurable external benefits and which would not have been begun or completed without public assistance

PPPs should be subject to periodic reviews to assess the economic value of the completed projects (compared to estimated value) and the projects' success in meeting other goals.

MnDOT has not yet used PPPs for freight or passenger rail projects, but there is precedent set in other states that Minnesota could consider. These practices relate to PPPs for rail line development, as well as operations.

Passenger service between Oklahoma City and Tulsa, Okla. This to-be-initiated service represents an example of privately operated passenger service over a private short line railroad. In May 2014, the state of Oklahoma sold the Sooner Subdivision, a 97.5-mile rail line between Sapulpa and Midwest City, for \$75 million to the highest bidder, Stillwater Central Railroad LLC, a unit of Pittsburg, Kansas-based Watco Companies LLC. (Watco/Stillwater Central). Previously the rail line was owned by the state and operations were leased for freight rail service to Watco/Stillwater Central since 1998. The Oklahoma DOT said the proceeds from the sale of the rail line will go into a revolving fund for improvements to other railroad facilities, including crossings. During sale proceedings, several communities along the Sooner Subdivision passed resolutions urging the state not to sell it, fearing that would put an end to any chance for passenger service along the line.⁴⁹

Watco/Stillwater Central partners with Iowa Pacific Holdings to implement scheduled passenger service. While Iowa Pacific Holdings ran test passenger trains along the line to demonstrate line viability, several steps must be taken before full operation, including receiving approval from the FRA to operate the line, which is expected in 2015.

There were numerous terms of the 2014 Sooner Subdivision sale for Minnesota's consideration, including:

- Watco/Stillwater Central must establish a pilot passenger rail service program within five years or face a \$2.8 million penalty
- The State of Oklahoma retains the right to acquire a passenger rail easement should Watco/Stillwater Central decide not to operate such a service after 10 years
- The line must be accessible to other rail companies and that within seven years Watco/Stillwater Central upgrade the line to enable trains to safely travel at faster speeds

⁴⁹ *Tulsa World*, Oklahoma officials to discuss possible Sooner Sub rail line sale with BNSF, Watco, February 19, 2014

- The track must be improved from a track Class II to Class III; the latter designation will permit freight traffic up to 40 mph and passenger traffic up to 60 mph.

The rail companies pledged to provide twice-daily, round-trip service.

Passenger service between Miami and Orlando, Florida. Currently in development, this \$2 billion initiative is the most ambitious and substantive example of a privately developed, financed, constructed, operated, and maintained passenger rail system. Called All Aboard Florida, the project is being developed by Florida East Coast Industries, LLC, an infrastructure and real estate development company, and parent company of the Florida East Coast Railway. The planned route extends for 230 miles from Miami to Orlando International Airport, with intermediate stops at Fort Lauderdale and West Palm Beach. With speeds of up to 125 miles per hour, a complete trip is expected to take three hours from end to end, and is geared towards business travelers and tourists rather than commuters. Infrastructure improvements will be extensive, and include construction of new stations at all of the planned stops, a new line along Florida State Road 528 between the Orlando International Airport and the FEC main line at Cocoa, and numerous infrastructure improvements to the existing FEC rail corridor. While the project presently plans to rely solely on private funds, the AAF applied for \$1.6 billion in Railroad Rehabilitation and Improvement Financing funds, a loan and loan guarantee program administered by FRA. This required preparation of an environmental assessment and environmental impact statement. FRA issued a Finding of No Significant Impact for the Miami-to-West Palm Beach segment in 2013. The EIS for the full alignment was out for public comment through Dec. 3, 2014, with a decision pending by the FRA. The Miami-to-West Palm Beach segment is currently under construction, rolling stock is on order, and the complete line to Orlando is projected to be fully operational by 2021.⁵⁰

Passenger service between Dallas and Houston, Texas. This future service in the early stages of development represents an example of public-private partner collaboration on planning, with construction, operations and maintenance of the passenger rail system funded by the private sector. Similar to the example in Florida, this project pledges not to use Texas tax dollars for the construction of the project. The 240-mile high-speed rail project from Dallas to Houston was proposed by the Texas Central High-Speed Railway, LLC. TCR is a private, for-profit company that desires to transport riders between the cities in less than 90 minutes (faster than auto and competitive with air). TCR is working with Central Japan Railway Company to develop the N700-I Bullet trains, based on the Tokaido Shinkansen that is currently operating in Japan with a 50-year track record and an average annual delay of less than 1 minute. This high-speed line would operate on a dedicated right of way and would not share track or infrastructure with conventional North American rail operations. FRA and the Texas DOT prepared an EIS; public comments were accepted throughout the process that ended on Jan. 9, 2015. A scoping report is under development. The project is estimated to cost \$10 billion, with construction beginning in 2016, and service expected to begin as early as 2021.⁵¹

BEST-PRACTICE OPPORTUNITIES FROM OTHER STATES

RAIL-ELIGIBLE CORRIDOR INVESTMENTS

Minnesota, along with a number of other states, identified major intercity corridors that enable economic activity, and focus infrastructure investment in modes within these corridors. These programs allow for capacity expansion and congestion relief in road and rail facilities. Examples include:

⁵⁰ All Aboard Florida - Miami to Orlando Passenger Rail Service, www.fra.dot.gov/Page/P0672

⁵¹ Dallas to Houston High-Speed Rail – Passenger Service from Houston to Dallas, www.fra.dot.gov/Page/P0700

- **Interregional Trade Corridors (Minnesota).** In 2000, MnDOT designated a primary set of highways for moving goods and people between regional trade centers in Minnesota. This set, called the Interregional Corridor System, is comprised of 2,939 miles of highways. As described in the Minnesota Statewide Transportation Plan, 2009–2028, the IRC represents only 2 percent of all roadway miles in the state, but carries approximately 27 percent of all vehicle miles traveled and the majority of freight traffic. To complement the IRC system, MnDOT also designated a set of Regional Corridors that connect smaller trade centers with larger ones or with IRCs. As highlighted in the STP, “many of the Regional Corridor routes serve as the primary transportation linkage into and out of entire regions, especially in Greater Minnesota, providing critical support to the region’s ability to move people and freight in a cost-effective way.” These corridors could serve as a primary focus for investment in rail projects as well as highway, and are consistent with many of the major freight rail and potential passenger rail corridors.
- **Goods Movement Action Plan (California).** California’s cabinet agencies for transportation and environmental issues cooperated to identify a program of investment in freight systems that increase capacity, reduce freight-related greenhouse gas emissions and improve security. The program, which allocates \$3.1 billion in bond financing, identified and evaluated projects with assistance of stakeholders.⁵²
- **Strategic Intermodal System (Florida).** Florida’s Legislature directed the Florida DOT to plan for near- and long-term investments in a network of intermodal transportation infrastructure: commercial airports, ports and waterways, freight rail and transit terminals, passenger and freight rail facilities, and highways. The SIS network carries “more than 99 percent of all commercial air passengers, virtually all waterborne freight tonnage, almost all rail freight and more than 68 percent of all truck traffic and 54 percent of total traffic on the State Highway System.”⁵³
- **Connect Oregon (Oregon).** Oregon created a program allocating lottery-backed bonds to transportation improvements to connect the highway system to other modes, including rail, air, marine, transit, and bicycle/pedestrian. The program is currently in its fifth installment and is administered through a performance-based application review process. A total of \$100 million in allocations were approved in 2005, 2007 and 2009 and \$40 million and \$42 million allocations were made in 2011 and 2013, respectively, bringing total program funding to date of \$382 million. Including the addition of leveraged funds, the program represents approximately \$834 million in direct investment in multimodal transportation improvements. During the first four installments, rail received the largest portion of funds, with 44 percent of the total. A sixth installment of the program is currently being explored for the 2015–2017 biennium.⁵⁴

FREIGHT RAIL IMPROVEMENT PROGRAMS

⁵² Business, Transportation, and Housing Agency and the California Environmental Protection Agency, *Goods Movement Action Plan*, 2007. www.dot.ca.gov/hq/tpp/offices/ogm/gmap.html

⁵³ Florida Department of Transportation, Office of Policy Planning. *SIS Strategic Plan*. www.dot.state.fl.us/planning/sis/strategicplan/

⁵⁴ Connect Oregon V, Oregon Department of Transportation. www.oregon.gov/ODOT/TD/TP/pages/connector.aspx

Many states have programs to offer financial assistance to freight railroad operations. In some cases, these programs are focused on short line or regional railroads and can involve public ownership of rail lines with private operators. Other programs offer tax incentives for expansion of facilities, spurs or lines for new or expanded business development. Some states offer assistance through revolving loan programs while others make direct grants. Examples include:

- **Freight Railroad Preservation Program (Wisconsin).** In addition to a loan program for freight rail improvements, Wisconsin invests appropriated funds in grants to local governments and railroads for public ownership of railroad lines which are operated by private railroads. The program was allocated \$30 million in the state's 2011–2013 biennial budget, and \$52 million in the state's 2013–2015 biennial budget. The current FRPP program replaced the original rail assistance program in 1992. Since 1980, approximately \$175 million in FRPP grants were awarded for more than 75 rail acquisition/rehabilitation projects.^{55, 56}
- **Stimulus-Funded Freight Rail Improvements (Ohio).** Ohio took advantage of modal flexibility in the highway allocations in the American Recovery and Reinvestment Act of 2009, allocating \$61 million to 21 rail-related projects in the summer of 2009. The Ohio Railroad Development Commission is administering the projects, identified through the Commission's planning activities.⁵⁷

PASSENGER RAIL INVESTMENT PROGRAM

Most investments in passenger rail capacity by states are expanding the facilities of freight railroads over which the passenger services will operate. In many cases, these passenger rail investment programs provide operating benefits for the freight railroads and can be characterized as investments in shared corridors. Examples include:

- **North Carolina Railroad Improvements (North Carolina).** The 317-mile railroad between Charlotte, Raleigh and Morehead City is a publicly-owned private railroad. North Carolina has invested \$30 million in track improvements on the corridor between Raleigh and Charlotte (the path of state-supported Piedmont Route passenger service), with \$35.5 million in projects under way and another \$87 million in improvements in planning and engineering stages. The North Carolina DOT prepares design plans and provides construction funds, and Norfolk Southern (which holds an operating lease on the NCRR) produces final plans and performs the construction work.) Improvements since 2001 shortened trip times from Raleigh to Charlotte by 35 minutes.⁵⁸
- **Rail Enhancement Fund (Virginia).** Virginia created a special fund administered by the Virginia Department of Rail and Public Transportation (collected from a portion of car rental taxes) to apply to projects to expand rail facilities for passenger and freight projects. VDRPT created a public benefit methodology that measures prospective fund applications against a series of performance measures. VDRPT, in conjunction with a Rail

⁵⁵ *Freight Railroad Preservation Program*, Wisconsin Department of Transportation. www.dot.wisconsin.gov/localgov/aid/frpp.htm

⁵⁶ "Wisconsin allots \$52 million for freight-rail preservation program." *Progressive Railroading*, July 2013. <http://www.progressiverailroading.com/mow/news/Wisconsin-allots-52-million-for-freightrail-preservation-program--36776>

⁵⁷ www.dot.state.oh.us/Divisions/Rail/Programs/special/Pages/default.aspx

⁵⁸ www.bytrain.org/track/

Advisory Board, recommended a six-year investment plan that allocates \$150 million in enhancement funds to corridor projects for commuter and intercity passenger rail and freight corridors.