3 Forecasts

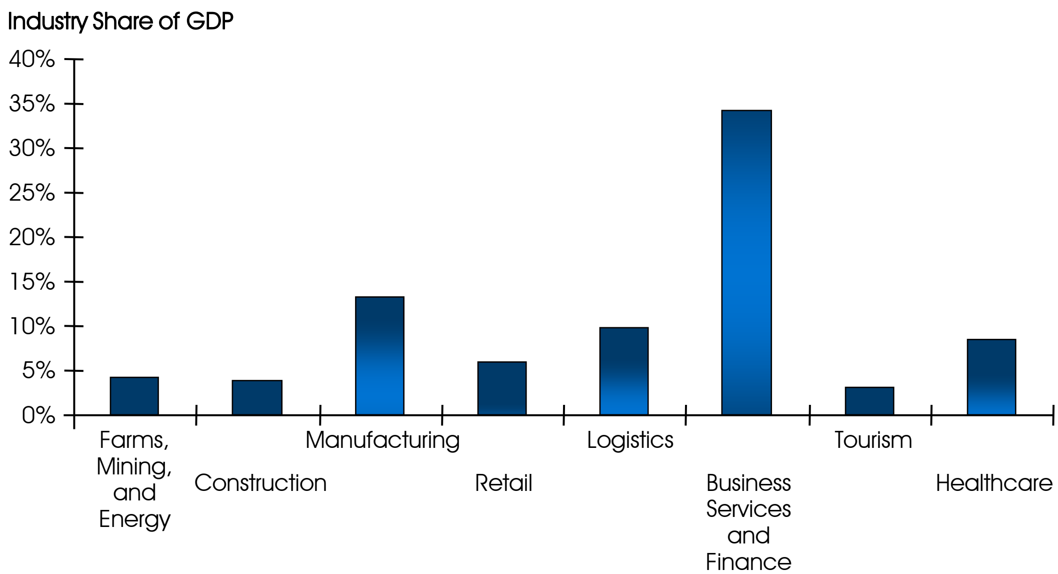
This chapter presents forecasts for overall economic growth in Minnesota (3.1), Freight Demand (3.2), and Intercity Rail Passenger Demand (3.3). These forecasts drive the Needs Assessment presented in Section 4.0.

3.1 Minnesota Economic Overview

3.1.1 Existing Conditions

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 how it is expected to change by examining employment and population projections.

Figure 3.1 Minnesota GSP by Industry Sector
2007



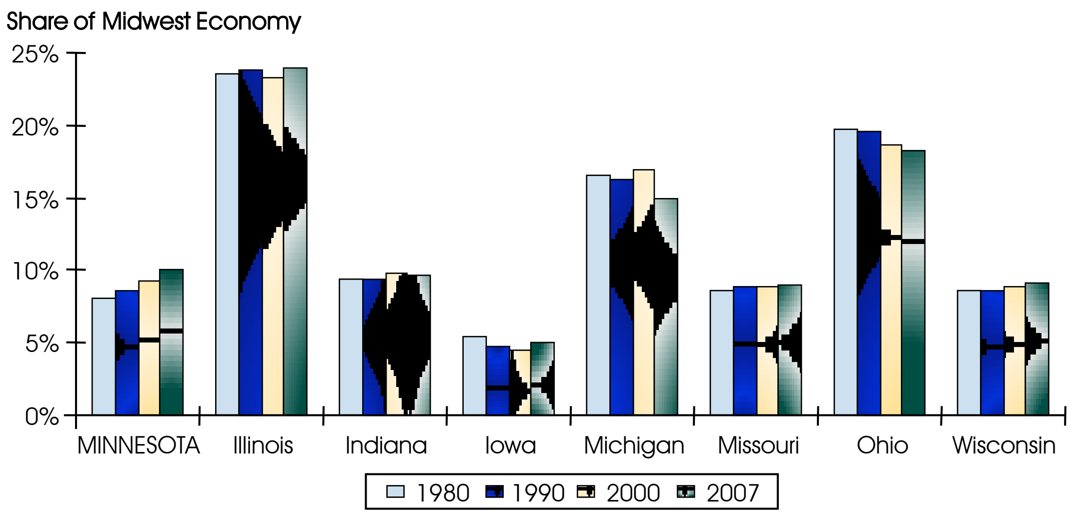
Source: Bureau of Economic Analysis, 2007.

Figure 3.1 shows the relative shares of gross state product (GSP) contributed by major industries in Minnesota.[17]

The economy is dominated by four sectors: business services and finance, manufacturing and logistics (i.e., transportation, warehousing and distribution), and healthcare. All four are dependent on truck, intermodal rail, and air cargo services. The other significant sectors are retailing, farming/mining/energy, construction, and tourism. Retailing also is dependent on truck, intermodal and air cargo services, while farming/mining/energy are dependent on carload rail, water, and truck services. Tourism is dependent on auto, air, and rail passenger services.

> Relative to the rest of the Midwest states, Minnesota's economy is stronger in business services and finance; health care; logistics; and farming, mining and energy. Between 1980 and 2007, Minnesota's economy grew significantly faster compared to other Midwest states, as shown in Figure 3.2, accounting for a steadily rising share of the Midwestern economy. This highlights the need for continued investment in Minnesota's infrastructure such that this enviable record of economic growth can continue into the future.

Figure 3.2 Share of Midwestern Economy by State
1980 to 2007



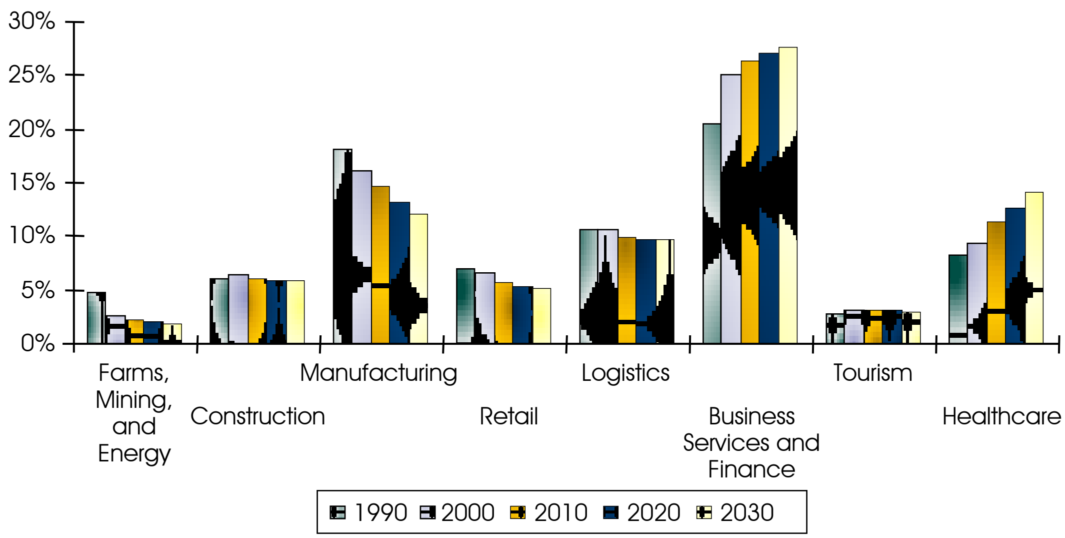
The Twin Cities of Minneapolis and St. Paul are the third-largest economy in the region behind only Chicago and Detroit. Depending on the future of the automotive industry and new initiatives in the Michigan-Ohio-Indiana region, the Twin Cities could become the second largest metropolitan economy in the region. This trend underscores the importance of examining the role of freight and passenger rail in linking the Twin Cities to Chicago, other parts of the Midwest, and to the global economy.

[17] Gross state product (GSP), or gross domestic product (GDP) for the nation as a whole, is a measure of the output – the market value – of all final goods and services produced by labor and property in a year.

3.1.2 Forecasts

Figure 3.3 shows how the structure of the Minnesota economy has changed since 1990 and how it is projected to change between now and 2030. These projections look at long-term trends, averaging out the effects of short-term business cycles. The recovery from the current recession may shift economic development patterns and trends more significantly than currently forecast. It is still expected that over time Minnesota will see continued strong growth in business services, finance, and healthcare. Construction and tourism are expected to remain stable, while farming/mining/energy, retailing and logistics may contract modestly.

Figure 3.3 Projected Change in Earnings by Industry
1990 to 2030



Source: Woods & Poole (forecast); industry share earnings.

While unemployment spiked in Minnesota during 2009 as in the rest of the nation, the Minnesota employment growth rate is expected to recover and exceed the average growth rates for both the Midwest and the U.S. as a whole. This anticipated growth rate suggests that Minnesota will see a steady growth in demand for employees' commuting and related business travel.

Projection of employment by county of job location indicates how jobs and the economic growth underpinning them will be distributed across the State. Figure 3.4 shows the forecast percentage change in employment by county from 2007 through 2030. The map shows that the majority of Minnesota counties will experience positive growth in employment over the next two decades. The areas showing a relative decline in employment growth are primarily in the southwest and western counties and in a few of the far northern counties. These counties are dominated by agricultural and/or mineral extraction industries.

Figure 3.4 Minnesota Employment, Net Change by County
2007 to 2030

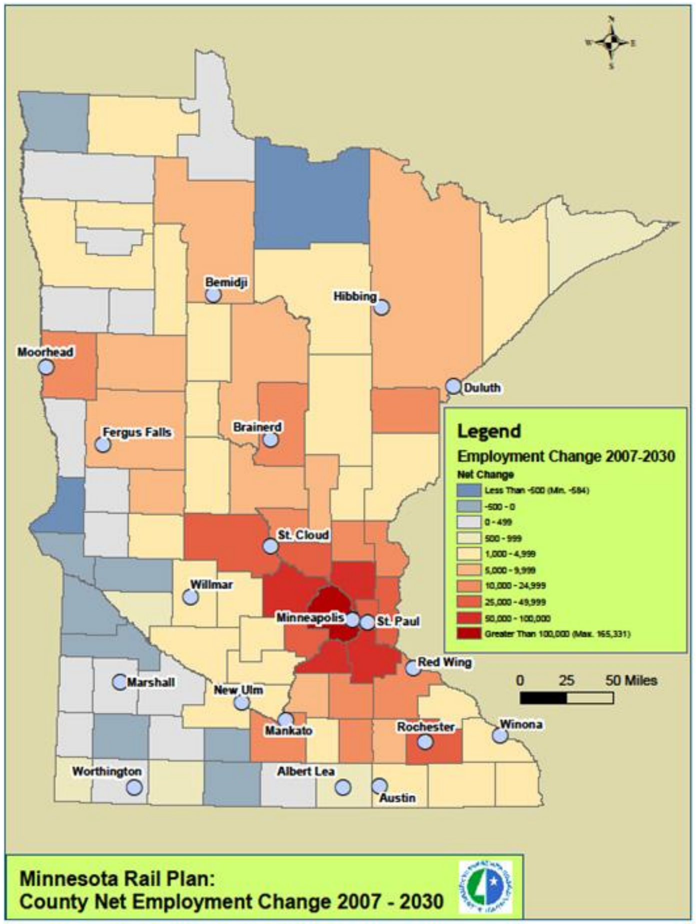
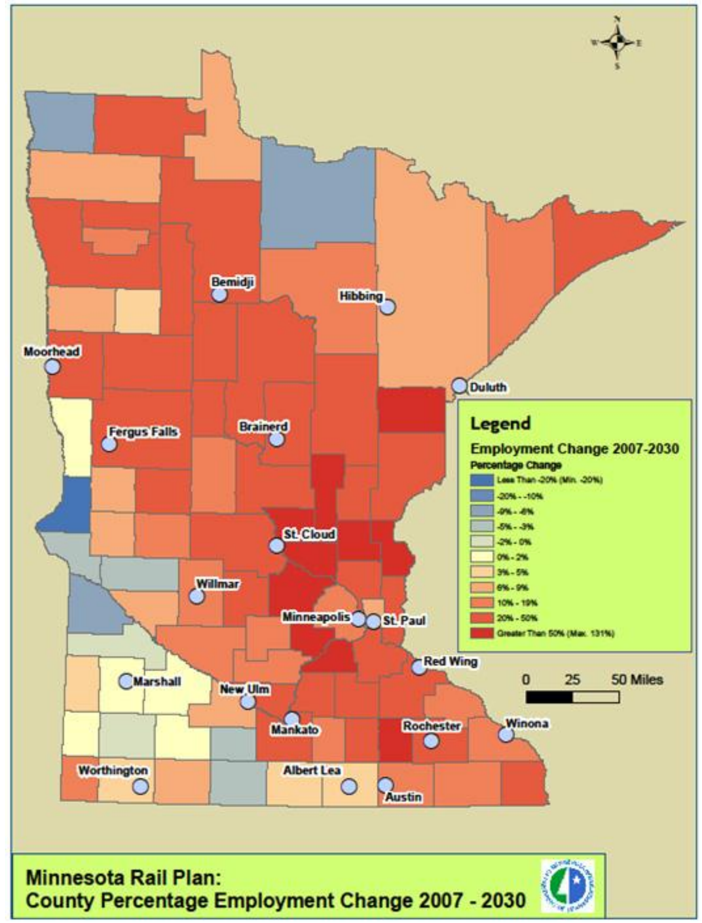


Figure 3.5 Minnesota Employment, Percentage Change by County
2007 to 2030



Source: Cambridge Systematics, Inc., based on Minnesota State Demographic Center and Woods & Poole data.

A more precise picture emerges if we look at net employment growth by county as shown in Figure 3.5. This map shows a decided concentration of growth in the Twin Cities region and northward along the I-94 corridor toward St. Cloud. This pattern reinforces the importance of connecting the Twin Cities metropolitan economy with the Chicago economy and also examining opportunities to link smaller cities around the State to the Twin Cities by passenger rail where the volumes will support sufficiently frequent services.

Minnesota's State Demographic Center and the U.S. Census Bureau projections show that Minnesota's population will grow apace with the U.S. average and significantly faster than the Midwest region as a whole. Figure 3.6 shows the forecast percentage changes in population by Minnesota County from 2007 through 2030. The map shows that about one-half of Minnesota's counties will experience positive growth in population. The counties in the southwest and western regions of the State, and a few of the far northern counties, will see little or no population growth.

Figure 3.7 shows the forecast net change in population by county from 2007 to 2030. An analysis of the changing settlement patterns shows pronounced growth in the exurban areas, especially northwest and south of the Twin Cities. Time-series data show that until about 25 years ago, migration into the Twin Cities area was focused tightly within the metropolitan area. In recent decades, development has become less focused within the metropolitan area, spreading into exurban areas at a fairly rapid pace. Much of this growth will be at commuter rail or the shorter intercity rail distances from the core of the Twin Cities. Expansion of rail services could serve forecast growth along the I-94 corridor north of the Twin Cities toward St. Cloud (Northstar began to service this market in 2009), and south toward Rochester.[18]

The industry, employment, and population forecasts indicate that Minnesota will continue to grow at a robust rate relative to its Midwestern peer states. This growth will generate more demand for transportation services for housing materials, food, clothing and merchandise to support a growing population; of materials, parts, and finished products to support the State's substantial manufacturing sector; and of people for commuting, recreational and business travel. There also will be a continuing demand for transportation services to support the State's agricultural and resource extraction industries, which while not projected to grow as fast as other economic sectors, are still productive and profitable, generating jobs and sustaining many Minnesota communities.

[18] Ramsey County/St. Paul is forecast to experience a slight population decline through 2030 according to the Minnesota State Demographic Center, but the Metropolitan Council forecasts higher urban core growth rates for both Ramsey and Hennepin (Minneapolis) counties. Decisions regarding rail investments could influence the outcome of these forecasts.

Figure 3.6 Minnesota Population, Percentage Change by County

2007 to 2030

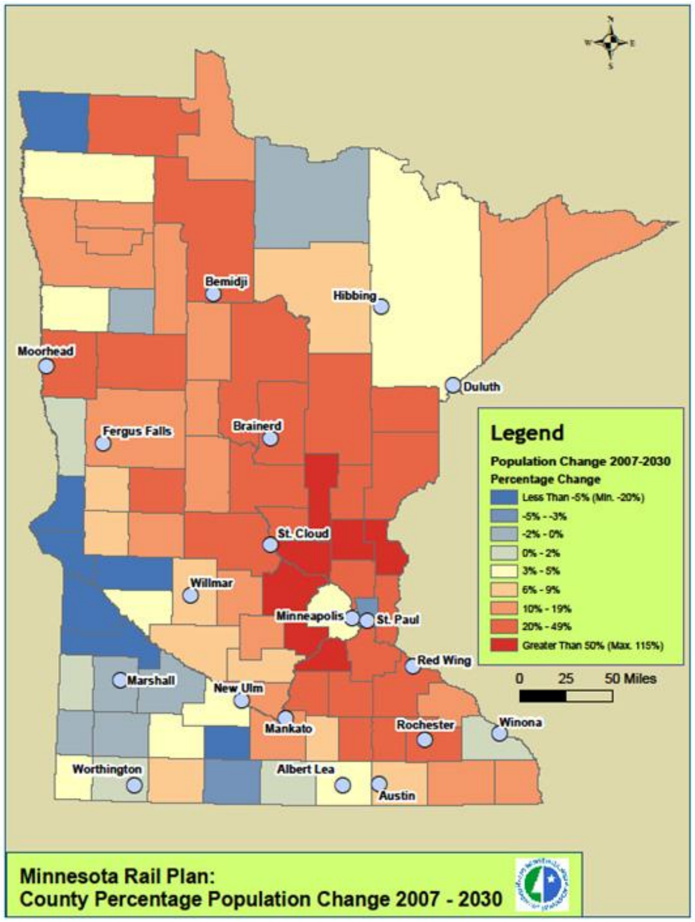
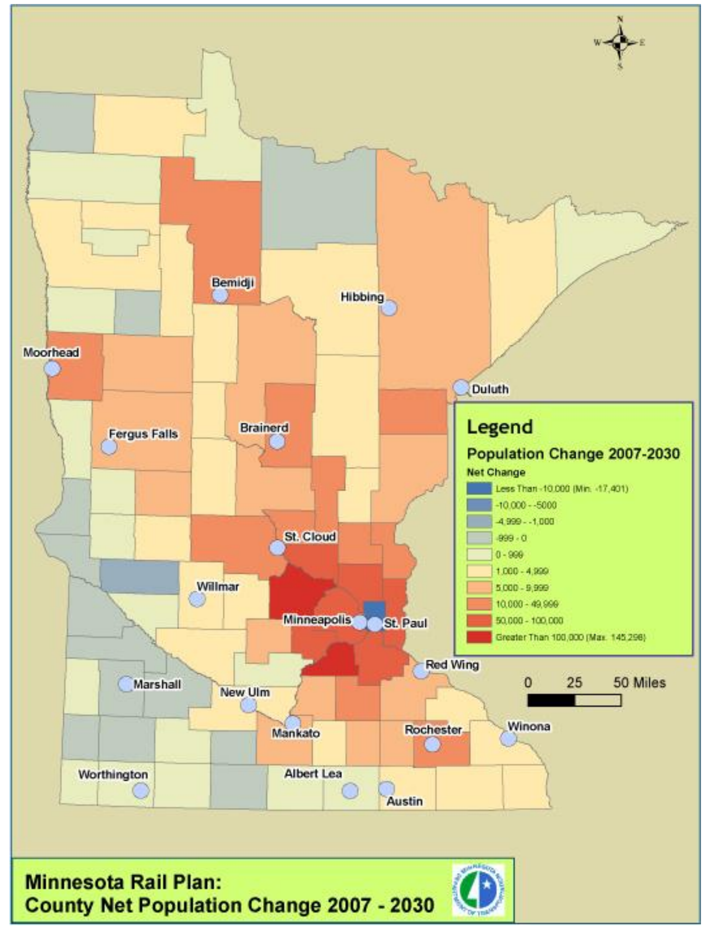


Figure 3.7 Minnesota Population, Net Change by County

2007 to 2030



Source: Cambridge Systematics, Inc., based on Minnesota State Demographic Center Data.

The pattern of development suggest that growth will be focused around the Twin Cities, but that there also will be development northwest toward St. Cloud and southeast toward Rochester and the river cities of Red Wing and Winona. The latter will be strongly influenced by the strength and patterns of future economic development along the mega-corridor between Chicago and the Twin Cities.

The coming decades could see either a reconcentration of growth in the Twin Cities region or a more diffuse development pattern along the I-94 corridor. For example, rising fuel costs – whether driven by supply and demand or climate change policies – are factors which could make travel by auto and truck more expensive than it is today, pushing more employment and population growth into the Twin Cities region.

The following highlights recent and historical economic activity for each of Minnesota's Metropolitan Statistical areas:

- **Duluth –** Duluth's growth has focused on business services, finance, healthcare, and regional tourism. The traditional industries of iron ore mining and logistics are declining in terms of relative job numbers; however iron ore and steel making are both undergoing a resurgence.
- **Fargo-Moorhead –** This resilient economy has not experienced job losses on a par with other regions during the recession, and continues to experience growth in business services, finance, and manufacturing. Fargo-Moorhead is a regional retail center for a vast area. It also is a center for grain transport (much of it by rail) and grain storage for the Red River Valley.
- **Mankato –** Mankato's recent growth has centered on business services, finance, and as a regional retail center. Mankato is located in the heart of the State's corn and soybean growing areas, though the farming sector's share of jobs is declining. Mankato has a larger manufacturing sector than the State as a whole primarily in food processing, feed preparation, and farm machinery. Manufacturing is more dependent on freight transportation than most other sectors.
- **Minneapolis-St. Paul –** The Twin Cities comprise two-thirds of the Minnesota economy, with growth mostly in the business services, finance, and healthcare sectors. The Twin Cities are the transportation and retail hub for the North Central U.S. Although construction activity has slowed during the recession, the region will remain the focus of much of the State's (and the North Central U.S.'s) long-term population growth. Construction depends on the reliability of the rail and roadway networks to ensure on-time delivery of building material. The region's population growth will drive future demand for commuter, recreational and business travel by auto or other modes such as passenger rail.
- **Rochester –** Rochester is a center of healthcare services, technology, and biosciences due to the presence of the Mayo Clinic, the University of Minnesota-Rochester, the Hormel Institute, and others. Healthcare accounts for 30 percent of the region's jobs compared to only 12 percent statewide. Rochester's relative competitiveness in healthcare and life science industries is expected to sustain long-term economic growth for the region, and drive demand for passenger travel and low volume high value freight movement.

- **St. Cloud –** The St. Cloud region is on the western fringe of the expanding greater Twin Cities region. Population and economic growth will sustain growth in St. Cloud's already sizeable construction industry and on the importance of passenger transportation connections to and from the Twin Cities. As a regional center, St. Cloud also has a relatively large retail sector. At the heart of Minnesota's dairy industry, St. Cloud has a large farming sector, although its relative share of state jobs is declining. St. Cloud has a larger manufacturing sector than the State as a whole focused on food processing, optics and appliances.

To account for these possibilities in developing a rail plan for Minnesota, we examined two development and settlement patterns in projecting ridership demand for passenger rail in Section 3.3:

- **Future A: Twin Cities-Centered Development.** This future would assume that growth and development are concentrated in the Twin Cities region with some expansion toward St. Cloud. It would look to intercity rail along the Chicago-Twin Cities-St. Cloud corridor to support continued radial development.
- **Future B: Multicentered Development.** This future would assume multicentered growth and development, with substantial growth in the Twin Cities region, but also high growth rates in St. Cloud, Rochester, and Duluth. It would look to intercity rail between Chicago and the Twin Cities, but anticipate a more corridor-oriented pattern of development with stronger intercity links to the regional trade centers such as Duluth.

We also estimated what would happen to each of these scenarios if overall growth rates were 10 percent higher than currently forecast, and if gasoline prices spiked again to the $4 per gallon range.

3.2 Freight Demand in Minnesota

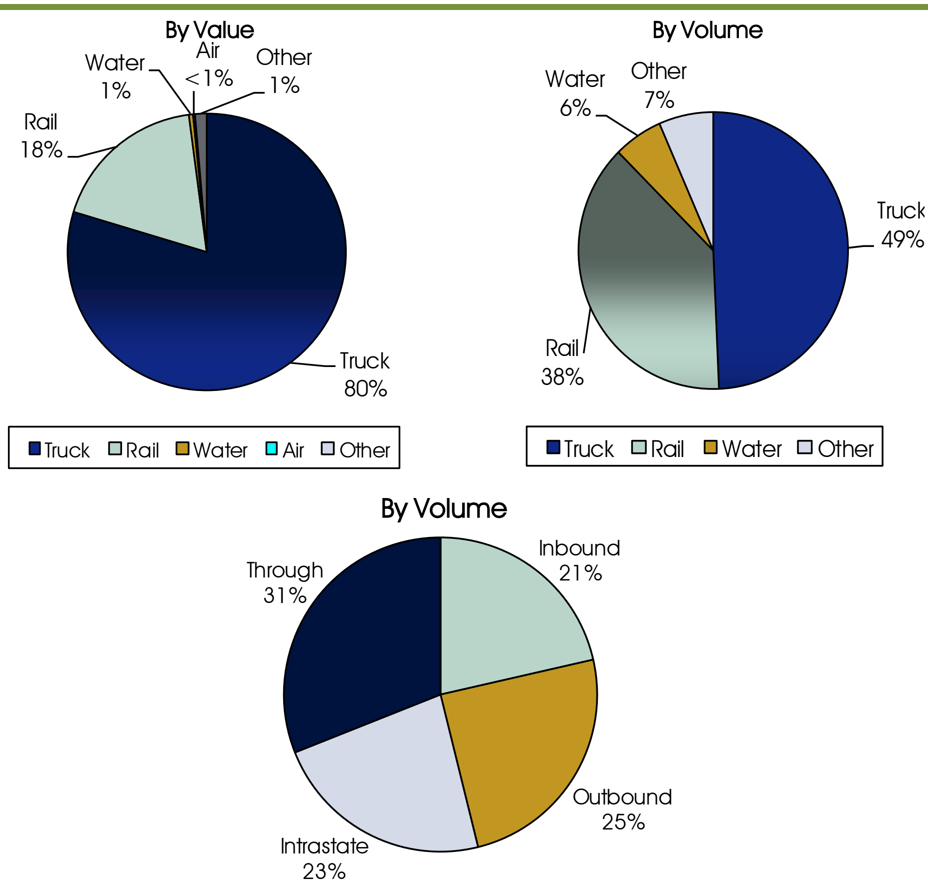
This section provides more detail on the regions and economic sectors which drive freight movement in the State. The analysis of freight traffic is based on IHS-Global Insight's 2007 TRANSEARCH INSIGHT database, and the U.S. Surface Transportation Board's 2007 Rail Waybill Sample. TRANSEARCH provided information on traffic flows for all primary modes. Geographic resolution varied from county-level within Minnesota to the Census' Bureau of Economic Analysis (BEA)-level beyond the State. The Waybill sample provides detailed information on rail traffic. In general, traffic is characterized by volume (tons and value), commodity, and trading pattern. Future traffic forecasts were developed by using the TRANSEARCH INSIGHT database projections for 2030. This forecast depicts the demand for goods movement between regions, and is not a general economic projection. The forecast takes into account industry, regional, national and international economic trends to estimate commodity-level trade flows. These are the standard tools used in freight analysis and forecasting across the country.

3.2.1 Existing Conditions

With a total volume of 630 million tons and a value of slightly over $1 trillion annually, Minnesota hosted nine percent by value and five percent by tonnage of all intercity freight transported in the U.S. in 2007. As in most states, highways handled the majority of goods in Minnesota, with modal share for all inbound, outbound, local and through intercity shipments amounting to 81 percent of value and 49 percent of tonnage. However, at 19 percent for value and 38 percent for tonnage, the State has more rail traffic and less truck traffic than the U.S. as a whole, where market share by value is only four percent. Shipments by water represent six percent of total tonnage, versus four percent nationally. The relatively higher portion of freight traffic carried by rail and water in Minnesota is due to the mix of industries in the State and a geographic location that plays to the railroads' strengths of handling large volumes of traffic over long distances. This pattern is most clearly evident in that approximately 50 percent of all rail traffic neither originated nor terminated in the State. An increasing part of Minnesota's rail traffic has been cross-border with Canada, which accounted for 18 percent of rail traffic tonnage in 2007.

Figure 3.8 summarizes patterns of freight movement by tonnage, mode, value, and type of move for Minnesota.

Figure 3.8 Minnesota Freight Movement
2007



Source: TRANSEARCH.

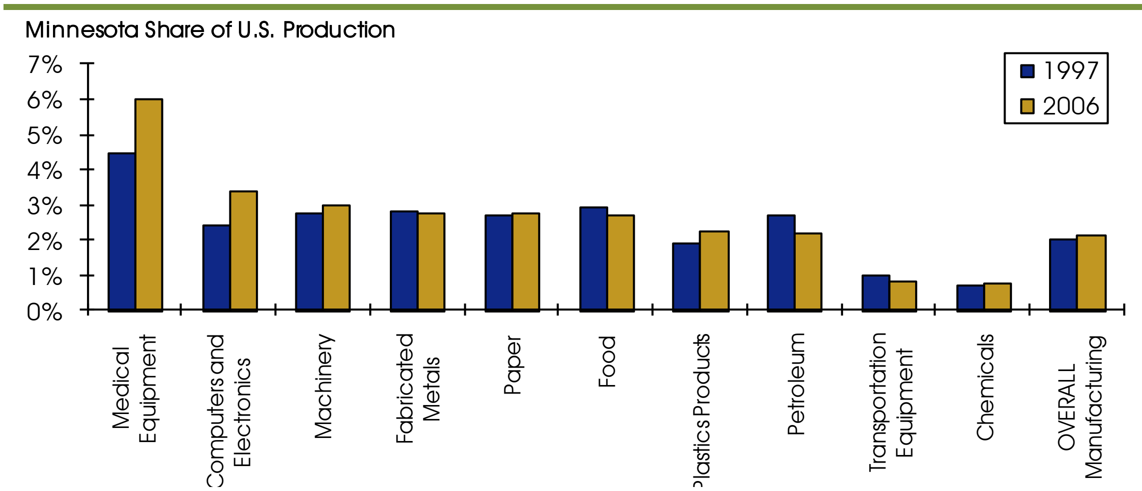
Within Minnesota, several industries are key players within the State's economy due to their size, growth opportunities, and strategic importance; and highly dependent on efficient freight transportation to keep supply chains flowing, manage costs, and remain productive in very competitive national and global markets. These are the shippers that depend on Minnesota's freight transportation network and services to transport their goods in the global marketplace, to stock their shelves with the latest products for Minnesota residents and visitors, and to haul construction materials to keep pace with infrastructure, commercial and residential building projects.

According to the STB Waybill Sample, Minnesota's short line, regional, and switching railroads handled over 110,000 cars in 2007. The short line's importance to the State's shippers is shown with originating traffic, where they accounted for one out of every 12 carloads. In spite of the State's large size, short line participation in intrastate shipments is quite small at 2.3 percent; the majority of this traffic consists of ores moving from the iron range to the Lake Superior ports, which is handled by Class I railroads.

Eight specific industries were selected as being especially sensitive to the performance of the State's rail freight transportation system, and/or strategically significant to the State's future economic competitiveness. The trends do not reflect the impact of the current recession.

- **Manufacturing –** Minnesota's manufacturing sector employs approximately 360,000 people or 10 percent of all state jobs, about equal to the U.S. as a whole. While employment in Minnesota's manufacturing sector has been dropping (similar to almost all states), the value of goods manufactured in Minnesota has been rising. Minnesota manufacturers have invested heavily in automation and sophisticated process technologies, reducing their need for labor while maintaining and increasing output. Output surged in the emerging medical equipment industry, doubling from $1.7 billion in 1997 to $3.4 billion in 2006, increasing the State's share of this industry nationally from 4.5 to six percent (see Figure 3.9). Manufacturing relies on all modes of transportation to move raw materials to industrial sites, and finished products to markets.

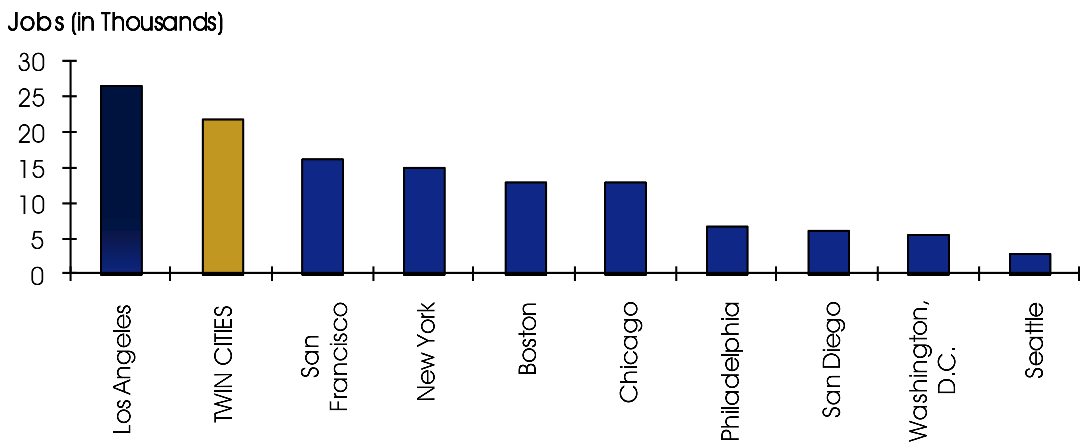
Figure 3.9 Minnesota's Share of U.S. Production by Manufacturing Industry *1997 to 2006*



Source: U.S. Census Bureau, Census of Manufactures and Annual Survey of Manufactures.

- **Life Sciences –** Beginning with the Mayo Clinic in Rochester, Minnesota has developed a strong health care services and medical technology sector. Healthcare is one of the fastest growing compounds of the State's economy, both in terms of job gains and contribution to GSP. Since 1997 healthcare services has accounted for over one-quarter of Minnesota's job growth. The Mayo Clinic is a worldwide medical destination. It employs over 30,000 people and contributes $4 billion per year to the State's economy, or 1.3 percent. Minnesota's life science industries also are among the largest in the U.S. As shown in Figure 3.10, the Twin Cities rank second to the metropolitan Los Angeles region (a much larger area) in total jobs within the life sciences industry. These industries tend to rely on passenger transportation and on air and truck for the movement of high value, just-in-time delivery cargos.

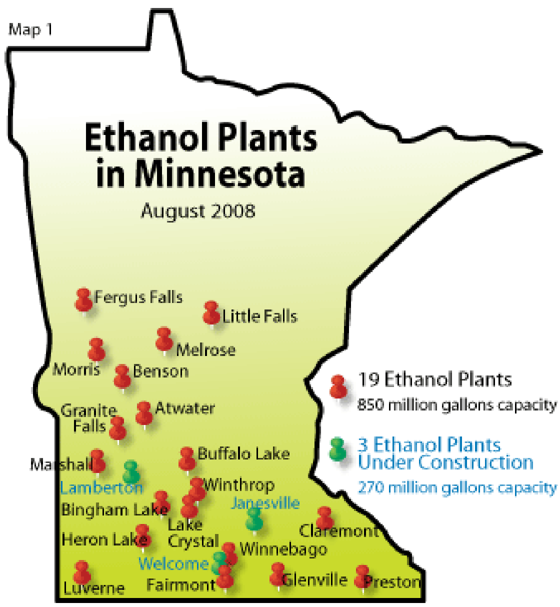
Figure 3.10 Medical Device Employment by Metropolitan Area
2007



Source: Bureau of Labor Statistics, U.S. Census Bureau, Harris Info Source, Milken Institute.

- **Agriculture and Food –** Agriculture and food are interrelated industries. "Agriculture" is the growing of crops and raising of livestock, while "food" is the manufacture of items commonly found on grocery store shelves. Both industries use rail, roadways, and waterways for inputs (fertilizer, feed, etc.) and to transport commodities to markets. Minnesota has the sixth largest agricultural industry in the country, producing crops and livestock valued at $11 billion. The growing use of ethanol as a fuel is an important element in agricultural growth in the State. As shown in Figure 3.11, there are 19 ethanol plants currently operating in the State which combined have the fifth highest ethanol production capacity in the U.S. Ethanol consumption is concentrated in California, Texas, and the Northeast U.S. Most of this traffic is handled by rail in tank cars. Short line railroads play a critical role in moving these supplies.

Figure 3.11 Ethanol Production Facilities



Source: Minnesota Department of Agriculture.

The value of Minnesota's food products output reached $6.4 billion in 2006, ranking Minnesota 15th in the nation and increasing by 31 percent between 1997 and 2006, a rate of increase somewhat below the national average. Minnesota is in the top tier of cheese (#5) and milk (#6) producers.

Rail freight plays a crucial role in these industries, which tend to ship goods that are heavy, bulky, and relatively low in value per ton, and which must often be shipped long distances to markets. This means that transportation costs are a significant portion of the price of delivered shipments and products. The value of the State's agricultural exports has grown in recent years to $3.6 billion, seventh highest in the nation. Rail freight access to the country's international gateways, including the Port of Duluth/Superior, is crucial to maintaining agricultural competitiveness. The agricultural sector now finds itself competing with the retail industry and coal/electrical industries for space on the rail network, which could cause smaller shippers in particular to switch to truck.

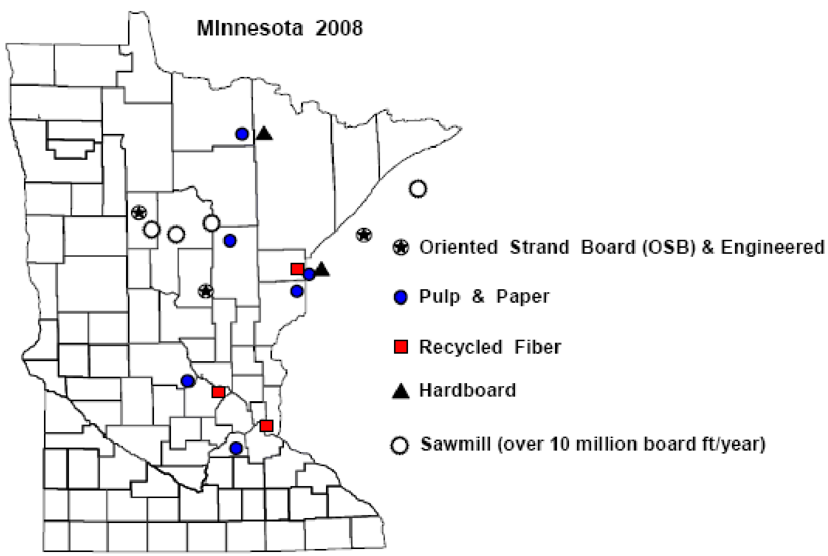
- **Energy –** Electricity costs are a key business climate consideration that affects the site location decisions of companies and influences the willingness of local companies to expand. Due to the intensive use of coal to generate electricity and the high coal volumes hauled on Minnesota's railways, the link between rail freight and energy production is clear. Minnesota's total energy consumption has grown proportionately in recent decades with the State's population growth. Rail currently is the dominant mode of transportation to bring coal into Minnesota, and coal is the top commodity brought into Minnesota accounting for 53 percent (22 million tons) of all goods transportation by rail with a Minnesota destination. The State is the 22nd largest consumer of coal in the U.S., with coal accounting for 20 percent of energy consumption in 13 generating facilities. The future of coal production will be impacted by global policies related to greenhouse gas emissions and global warming, and to the development of clean coal technologies.

Due to the intensive use of coal to generate electricity and the high coal volumes hauled on Minnesota's railways, the link between rail freight and energy production is clear.

- **Construction –** Economic expansion and population growth are the two main drivers of growth in the construction industry. Minnesota accounts for about 1.5 to two percent of total U.S. construction, declining slightly in recent years relative to Sunbelt states. The construction industry is a primary end user of a range of supplies – including lumber, aggregate, and structural steel – that are typically carried by rail due to their bulk, cost, weight, and transport distances. The timeliness of freight deliveries is crucial to the construction industry. Among the major construction-related commodities transported by rail in Minnesota are sand and gravel and taconite tailings for use in roadway construction. Minnesota quarries about 40 to 50 million tons of sand and gravel per year, making it the country's fifth largest producer. Shipments are transported by rail, truck, and barge.

- **Paper and Wood Products –** Minnesota's paper and wood products industry includes logging, sawmills, paper mills and wood products. In 2007, these industries accounted for 38,000 jobs in the State with production valued at $6.6 billion. Minnesota's wood products industry is the 11th largest in the country, but the State is the 2nd largest producer of window and door components. The State's paper and lumber product facilities are shown in Figure 3.12. Rail is a key mode for shipping lumber and wood products to and from the State, in particular for bringing construction lumber into the State.

Figure 3.12 Minnesota Paper and Lumber Products Facilities



Rail is a key mode for shipping lumber and wood products to and from the State, in particular for bringing construction lumber into the State.

Source: Minnesota Department of Natural Resources.

- **Iron Ore and Steel –** Minnesota's Iron Range represents 80 percent of U.S. iron production and has benefited in recent years from increased worldwide demand, in particular from China. This increase in demand has driven up prices changing the economics of supplying imported iron ore to inland U.S. markets. This shift is favoring Minnesota's iron ore producers as inland steel producers transition from consuming imported products (primarily Brazilian) to domestic producers. Iron Range ore has become much more price competitive compared to the landed cost of imported ore, including ocean and inland transport. After years of slow decline, Minnesota iron production started to increase after a low point in 2000. Even during the current recession, major investments in the Iron Range continue to move forward, including a $2 to $3 billion iron concentration facility in Northeast Minnesota undertaken by an Indian Company, Essar Steel. Such development would stimulate demand for rail, truck, and water freight transport.

- **Distribution, Warehousing, and Retail –** The retail industry comprises establishments that sell merchandise and is the final step in the distribution process. Retail is the third largest jobs producer in Minnesota after services and healthcare, accounting for 11 percent of the State's jobs. Growth in retail sales correspond to overall economic and population growth. Retail products are brought to market through sophisticated logistical channels that put demands on Minnesota's intermodal transportation system, including rail. Retail merchandise is often imported through high-volume container port facilities at West and East Coast ports, and then transported by truck or rail to regional distribution facilities, with several located in Minnesota primarily along the I-94 corridor. From these facilities, the merchandise is trucked to retail stores. Retailers strive to minimize fixed inventory to keep costs down. This operational strategy places great importance on a freight transportation system to carry inventory responsively and reliably. The importance of "just-in-time" delivery strategies depends on having roads and railroads functioning at high levels of service.

- **Transshipments –** At the far western end of Lake Superior, the Port of Duluth/Superior is the busiest port on the Great Lakes, handling over 40 million tons of cargo per year. Historically, the Port's highest volume commodity has been iron ore (taconite) mined in the nearby Mesabi Range, and shipped to steel facilities located throughout the Great Lakes/St. Lawrence Seaway region. Beyond locally sourced taconite, the port ships other bulk product, including stone, coal, and grain. The total tonnage of goods handled by the Port has increased since 2000 after remaining fairly steady since the mid-1960s. In recent years coal has surpassed iron ore by a slight margin as the Port's top commodity. The increases in coal and iron have more than offset declines in grain tonnage at the Port. Consistent with its role as a major port, intermodal transfer point and retail center, Duluth/Superior handles significant volumes of rail and truck traffic. Mesabi Range iron ore reaches the Port by rail or truck and is transshipped to ships bound for steel plants along the Great Lakes. Rail is also used to carry iron ore to inland steel plants in other parts of the country (i.e., Utah and Alabama). Unit trains bring Wyoming coal (Powder River Basin) into the port where it is stockpiled and transloaded onto ships for distribution throughout the Midwest and exported overseas.

Unit trains bring Wyoming coal (Powder River Basin) into the port where it is stockpiled and transloaded onto ships for distribution throughout the Midwest and exported overseas.

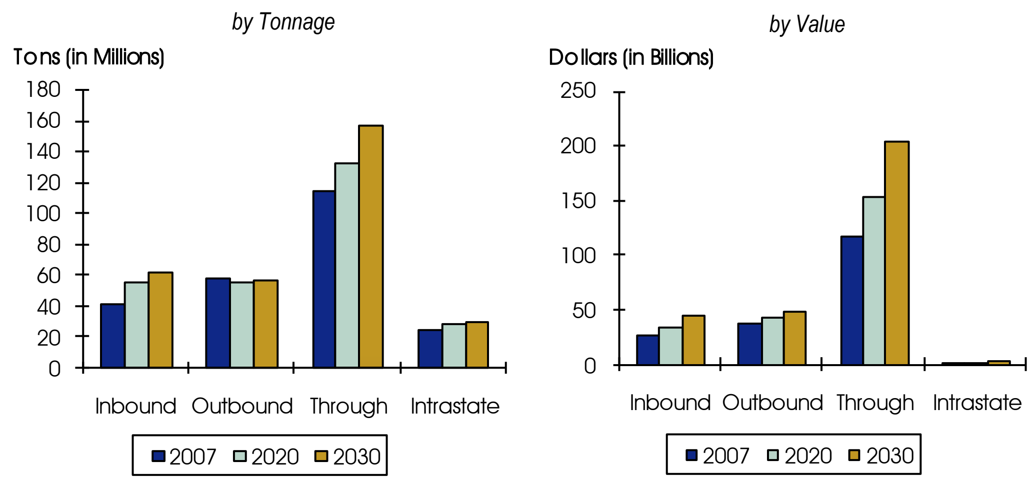
3.2.2 Freight Demand Forecasts

This section describes in detail the demand for rail freight services in 2007 and forecast for 2030. In order to provide a complete picture of freight movement now and in the future in the State, a brief overview also is provided of other major modes – truck, water, and air.

Rail Demand

In 2007, Minnesota's freight railroads moved over 240 millions tons of freight, and by 2030 it is expected that these railroads will carry more than 300 million tons, a 25 percent increase. Figure 3.13 details inbound, outbound, intrastate and through movements by tonnage value for 2007, and forecasts for 2020 and 2030. Clearly, through movements are dominant, with a greater tonnage than inbound and outbound movements combined, and are expected to grow by over 40 million tons over the next two decades. Through, inbound and outbound movements exhibit similar patterns when measured by weight and value. Intrastate movements are considerably less (20 million tons annually) and tend to be concentrated among heavy, low-value goods.

Figure 3.13 Rail Movement Types
2007 to 2030



Source: TRANSEARCH.

When measured by tonnage, carload rail freight is overwhelmingly dominant in Minnesota, with 93 percent of total rail freight tonnage. When measured by number of rail units, intermodal freight becomes much more significant, accounting for 35 percent of all units moved in the State. Intermodal traffic tends to be comprised of higher value lower weight items such as consumer goods, while carload shipments tend to carry heavy lower value goods such as coal, metallic ore, and grain.

The top five rail-bound commodities account for over 80 percent of outbound tonnage: metallic ores, farm products, food products, chemicals, and mixed shipments. The IHS-Global Insight forecast projects a decline in metallic ores and farm products and growth in the next three categories through 2011.[19] Measured by value, mixed shipments, which form most of the traffic carried in trailers and containers, are predicted to be the top commodity by value. The other top commodities by value are food products (highest today), chemicals, transportation equipment, and pulp and paper products.

The top five inbound commodities account for over 80 percent of all inbound tons, with coal accounting for over one-half of all inbound tonnage. The other top commodities are farm products, chemicals, clay etc., and mixed shipments. Mixed shipments are expected to more than double by 2030.

Approximately 10 percent of Minnesota's rail freight tonnage is attributed to intrastate movements and the top five commodities account for 98 percent of the tonnage. Metallic ores alone make up 85 percent of intrastate movements, increasing to 89 percent in 2030. Metallic ores also represent the highest value of intrastate shipments, 26 percent today, and 28 percent in 2030.

Rail traffic that neither originates nor terminates in Minnesota is more diverse than other rail movements, with the top 10 commodities comprising only 71 percent of the total tonnage. Coal holds the largest share of through movements (22 percent), followed by farm products, chemicals, mixed freight (intermodal), lumber, wood products, and food products. Measured by value, intermodal is the top through routed commodity ($33 billion) and is expected to more than double by 2030 ($72 billion).

For inbound commodities by tonnage, the top origins are Billings, Montana and Casper, Wyoming, which reflects the substantial demand for utility coal in the upper Midwest. The other top five trading partners are Chicago, Saskatchewan, and Fargo. All are expected to increase shipments to Minnesota by 2030. When measured by value, Chicago is the top trading partner reflecting the importance of intermodal traffic, Chicago's position as the primary gateway between the eastern and western U.S., and the largest inland origin and destination point for containers moving in the Pacific trade. Seattle is the second largest partner reflecting the role of Pacific Northwest ports in providing a link between Minnesota and Asian markets.

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[19] The TRANSEARCH forecasts supplied for this study indicated continued substantial growth in coal volumes of 50% through 2030, an outcome that most energy experts believe is unlikely to occur, even absent a strong regulatory regime controlling greenhouse gas emissions. Forecasts produced by HIS-Global Insight subsequent to the completion of this analysis indicate flat growth for coal. Counteracting this trend is an expectation by agricultural experts that growth in crop production will be significant and thus place this group of commodities as a significant driver of rail traffic growth.

For outbound shipments, the non-Minnesota portion of the Duluth, Minnesota BEA was by the far the largest destination for Minnesota rail freight due to the iron ore from Minnesota mines being shipped through the Port of Superior, Wisconsin. Chicago and Seattle are the next largest destinations. The top outbound destinations by value are Chicago, Seattle, and Portland (OR), all of which are expected to grow by 2030. Chicago receives over twice as much rail freight from Minnesota by value as any other destination. Both Seattle and Portland serve as primary gateways to Asia for Minnesota industries, and particularly the growing medical sciences sector.

Chicago receives over twice as much rail freight from Minnesota by value as any other destination.

Figures 3.14 and 3.15 show the volume of freight moving on Minnesota's railroads in 2007 and forecast for 2030 based on the freight demand volumes discussed above. The allocation of freight to specific lines as shown in the figures are used to assess demand versus capacity over the State's freight lines for the purpose of identifying capital investment needs in Section 4.0.

The most significant changes in volume are forecast to occur on the BNSF mainline between Minneapolis and Fargo, ND, the CP main connecting Minneapolis to North Dakota, and the CN's former Duluth, Winnipeg, and Pacific route running south from International Falls through Duluth. Both of the CP and CN lines form parts of through routes between Chicago and the Canadian west, with access to the natural resources and Pacific port cities of Vancouver and Prince George, British Columbia.

Figure 3.14 Freight Volume on Minnesota Railroads (2007)

In Tons

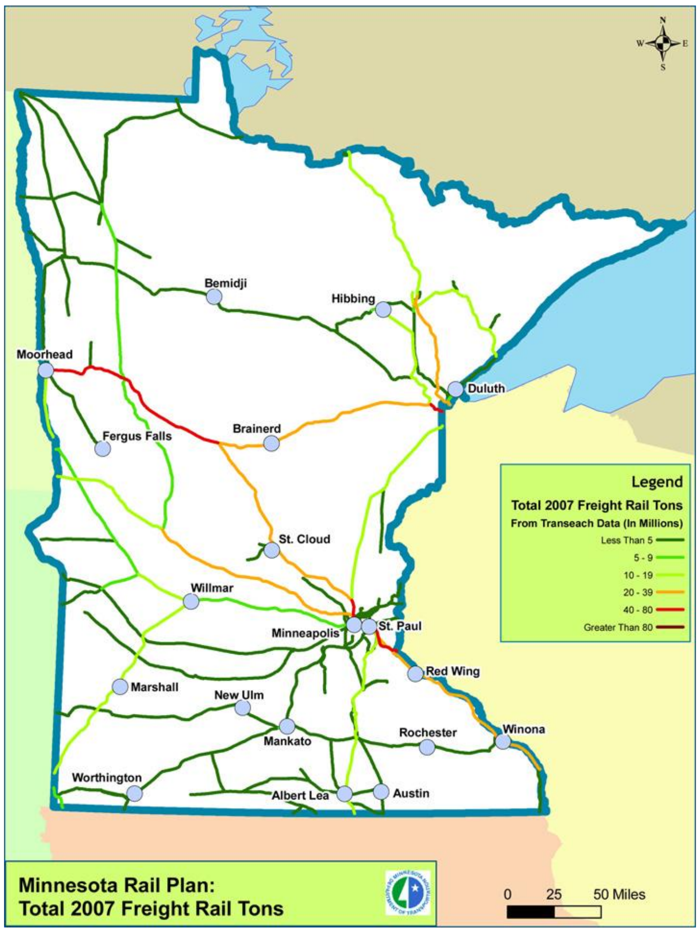
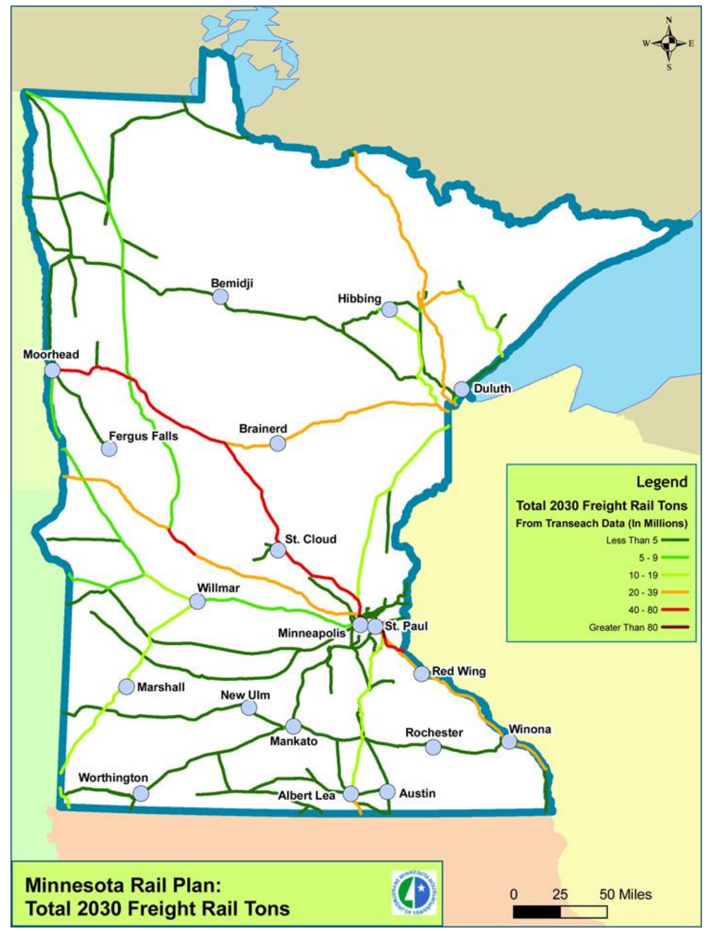


Figure 3.15 Freight Volume on Minnesota Railroads (2030)

In Tons



Source: TRANSEARCH.

Annual volume on the BNSF mainline between Minneapolis and Fargo, currently the highest volume line in Minnesota, is forecast to increase by between 12 and 17 million tons, with some segments near the North Dakota state line expected to carry over 72 million tons in 2030. CP's mainline between Minneapolis and North Dakota is forecast to carry 14 to 18 million tons more than in 2007. Volume on the CN line between International Falls and Duluth is expected to increase by roughly 10 million tons. In 2030, Minnesota's highest volume rail segment, which is located in the Twin Cities, is expected to carry nearly 100 million tons annually, up from less than 70 million tons in 2007. Some of these lines struggle to carry existing volumes. While these expectations for volume growth are substantially lower than those shown in prior forecasts, the expected growth is nevertheless still substantial, and will require significant capital investment to handle it. This will particularly be the case on lines where new or expanded passenger services are introduced.

Figures 3.16 and 3.17 depict the 2007 distribution of originating and terminating tonnage by county. St. Louis County has by far the most originating tonnage (36 million tons) followed by Itasca (6.6 million) and Washington counties (four million tons). The high volume in Itasca County is due to the iron mining industry in the region. Lake and St. Louis counties, with their Lake Superior ports, have the highest volume of terminating tonnage (13.6 and 12.2 million respectively). Hennepin, Dakota, and Washington counties, located in the Twin Cities region, each had over three million terminating rail tons.

In 2030, Minnesota's highest volume rail segment, which is located in the Twin Cities, is expected to carry nearly 100 million tons annually, up from less than 70 million tons in 2007.

Figure 3.16 Total Tonnage Originating in Minnesota Counties (2007)

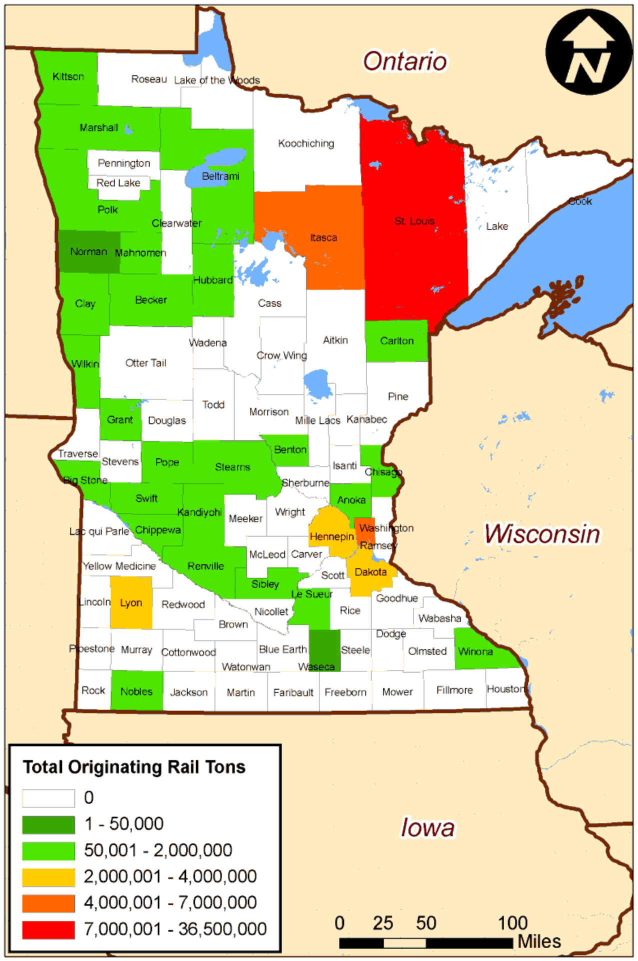
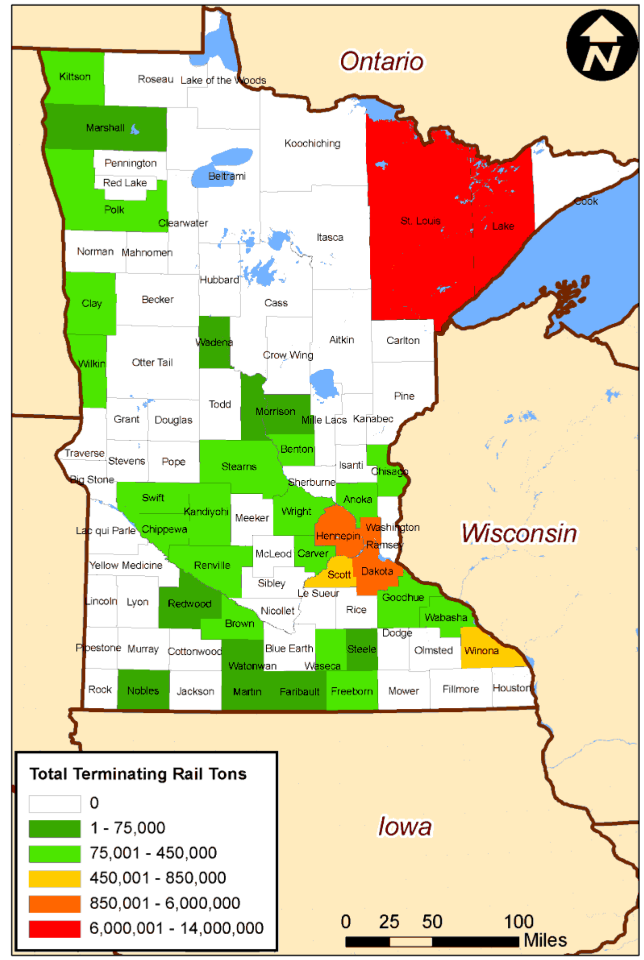


Figure 3.17 Total Tonnage Terminating in Minnesota Counties (2007)

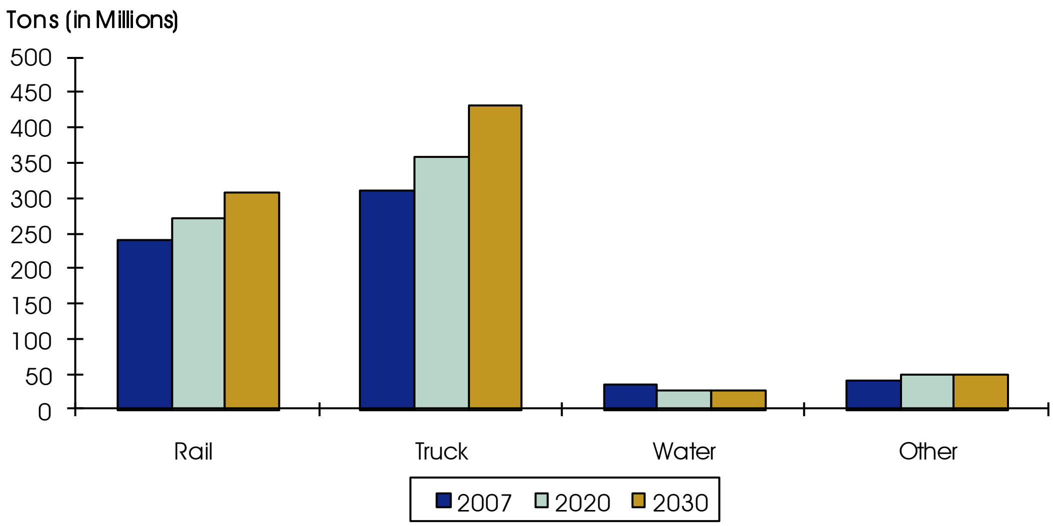


Source: 2007 STB sample.

Non-Rail Demand

In 2007, Minnesota's nonrail freight modes (truck, air, water and others) moved over 390 million tons of freight, as shown in Figure 3.18. Trucks carried the vast majority of this freight, over 311 million tons, and by 2030 trucks are expected to handle over 430 million tons – an increase of more than 30 percent. By value, truck freight is even more dominant, accounting for nearly $820 million in 2007, and a forecast $1.5 trillion in value in 2030. Other freight, primarily pipeline shipments to and from Canada, is expected to grow modestly. Air cargo, which is not shown in the figure, accounted for approximately 480,000 tons and $2.6 billion in value in 2007, and is expected to grow to 600,000 tons and $5.2 billion in value in 2030. The only mode that is expected to lose volume is waterway, which is expected to decline by almost 25 percent, from 37 to 28 million tons in 2030.

Figure 3.18 Modes by Tonnage
2007 to 2030

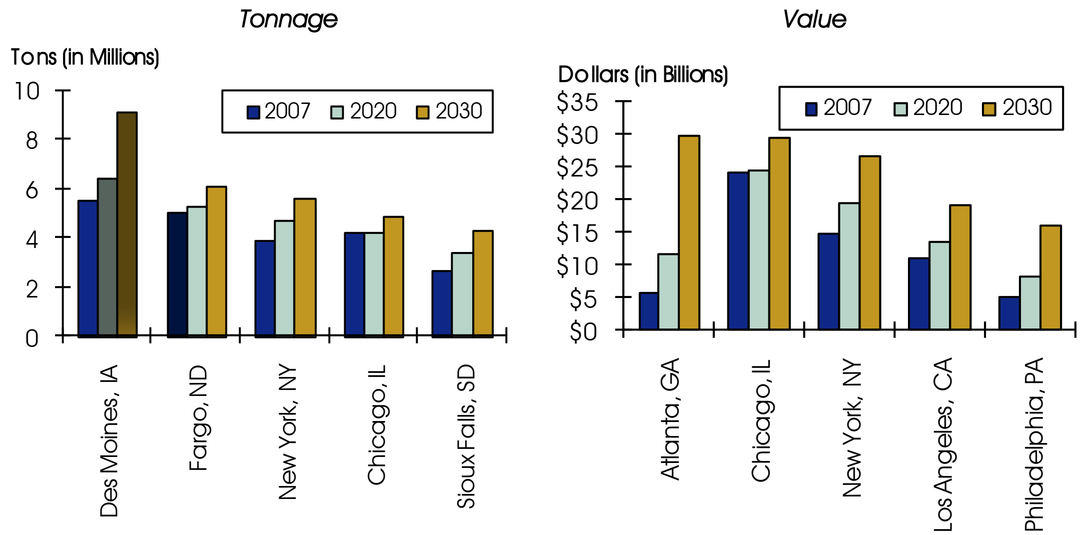


Source: TRANSEARCH.

While rail plays a small role in intrastate movements, the largest single component of truck trips are intrastate, often moving goods between warehouse, distribution centers and retail outlets.

Figure 3.19 shows the top destinations for truck freight from Minnesota by weight and value in 2007 and 2030. Des Moines currently is, and forecast to remain, the top outbound destination. Other top destinations are Fargo, New York City, Chicago, and Sioux Falls, South Dakota. All are expected to remain major destinations in 2030. The biggest forecast change in 2030 is the rise in the value of truck shipments from Minnesota to the Atlanta, Georgia region. This traffic is forecast to increase from $6 billion in 2007 to $30 billion in 2030.

Figure 3.19 Top Five Truck Freight Destinations
2007 to 2030



Source: TRANSEARCH.

Between 2007 and 2030, truck traffic patterns in the State are expected to remain relatively stable, with interstate highways carrying the highest volume and exhibiting some of the most significant growth as shown in Figures 3.20 and 3.21. I-94 will remain the State's most heavily used truck route. The Minneapolis area, at the intersection of I-35 and I-94, also is expected to see a significant growth in truck traffic. I-90, which crosses the southern portion of the State, along with I-35 south of Minneapolis, leading to Des Moines – a top outbound truck destination – are both projected to carry significantly higher volumes of truck traffic in 2030. Among non-Interstate highways, some of the most significant truck traffic growth is expected on U.S. 52 between the Twin Cities and Rochester. This forecast growth in truck volumes point to the need to maintain a robust freight rail system and potentially to invest in passenger rail to relieve congestion on the region's major highways which could constrain economic growth.

Figure 3.20 Minnesota Truck Traffic by Tonnage *2007*

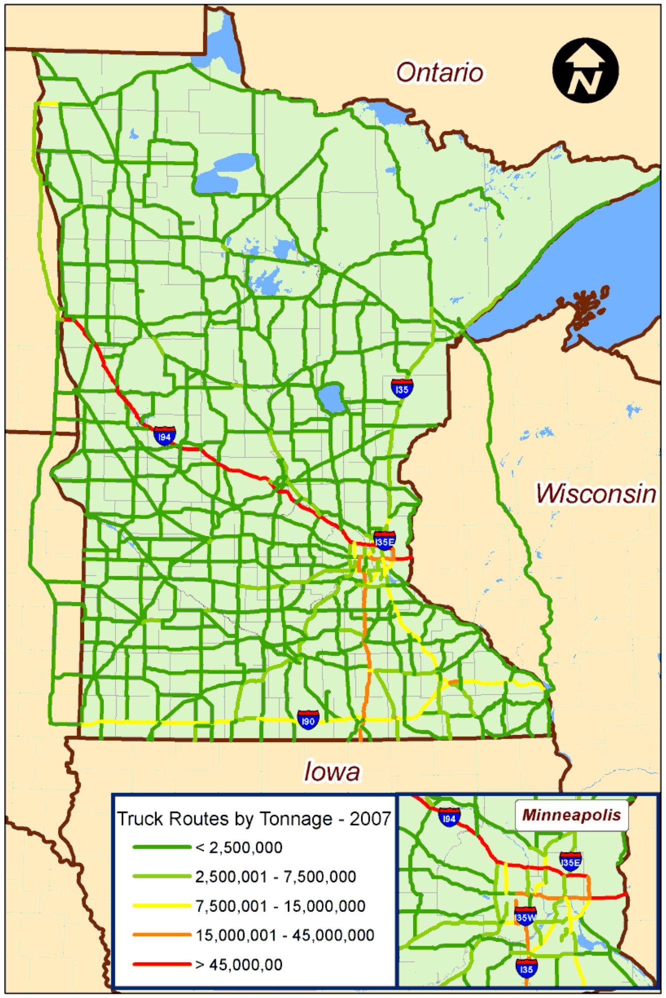
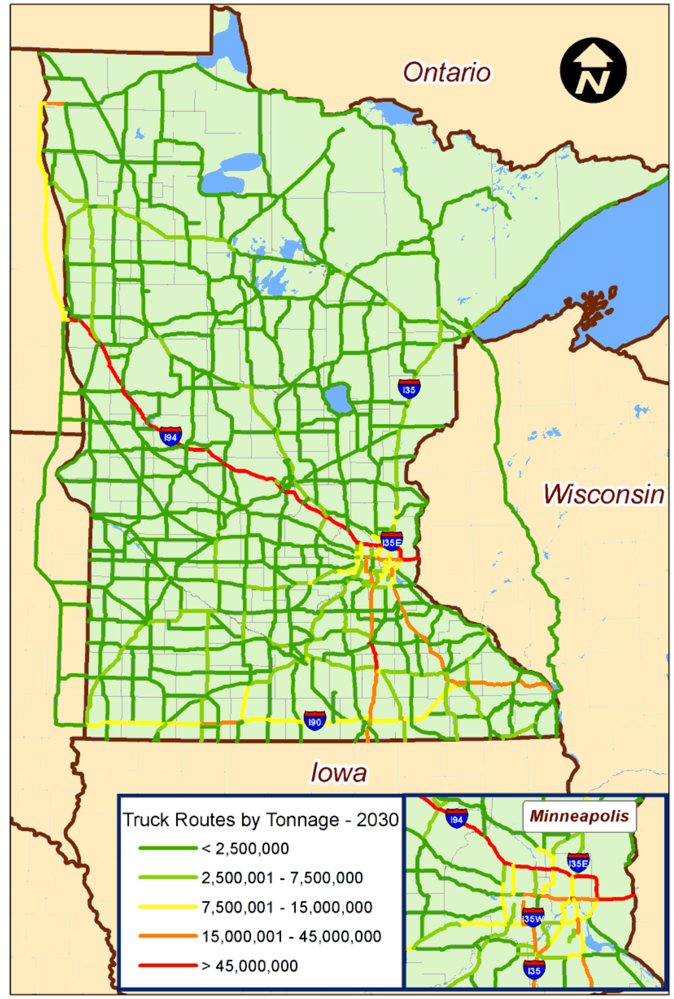


Figure 3.21 Minnesota Truck Traffic by Tonnage *2030*



Source: TRANSEARCH.

Waterborne shipments are dominated in both weight and value by cargo moving outbound from Minnesota. Outbound shipments are forecast to decline from 29 million tons in 2007 to around 17 million tons in 2030, while increasing slightly in value. Today, waterborne freight is dominated by Great Lake movements consisting primarily of metallic ores.

Air freight is typically only used for very high-value, low-weight goods due to its high cost. Air cargo movements are expected to climb steadily over the next two decades in terms of both weight and value, with outbound cargo increasing faster than inbound. While air shipments are expected to more than double during this period, they will still constitute only a tiny fraction of total freight movement in the State. Top commodities are mail, machinery and instruments, with the latter overtaking mail in the future as the largest commodities. Air freight can be a critical component of freight shipment for the State's biomedical sciences and healthcare industries.

North American Free Trade Agreement (NAFTA) trade with primarily Canada and, to a small extent (1.5 percent of the NAFTA total) Mexico, makes up a large and growing sector of total freight movements to and from Minnesota. Total trade today is around 30 million tons and is forecast to increase to over 40 million tons by 2030. While Mexican imports are forecast to double by 2030, Mexican trade will remain a small piece of total NAFTA trade. Petroleum products make up the largest share of inbound commodities from Canada in both weight and value. Metallic ore and transportation equipment are the largest outbound commodities.

3.3 Passenger Demand

Whereas freight demand could be estimated using readily available national databases and forecasts, no such consistent methodology existed for forecasting demand for intercity passenger rail services. Minnesota, like many states, does not have a statewide model. As a result, several individual forecasts have been developed by project proponents and their consultants for some of the most advanced projects, including the Northern Lights Express (NLX) between the Twin Cities and Duluth, HSR service between the Twin Cities and Rochester, and Midwest Regional Rail Initiative (MWRRI) service between Chicago and the Twin Cities. Ridership forecasting is both an art and a science, in which there are a range of acceptable assumptions and methodologies. Project proponents will typically use the most favorable assumptions to optimize projected ridership for their projects. Therefore, it was not possible to stitch together a consistent set of forecasts for all possible intercity rail services in the State from the existing pool of forecasts, since these individual forecasts were developed with inconsistent underlying assumptions about future population and job growth, rail service levels and fares, and external factors such as fuel prices.

Instead, the consultant team developed a high-level, sketch planning, spreadsheet-based approach which could be applied consistently across all possible service options to create an apples to apples comparison for this statewide analysis. Sketch planning has a long history and is commonly used in statewide forecasting in the transportation planning field, particularly when resources do not allow for statewide transportation surveys and models. In developing this approach, we deliberately used conservative (low ridership) assumptions. Therefore, the forecasts which follow may in some cases be lower than other forecasts which have been developed at the individual corridor level. Ultimately, each project will be responsible for developing its own "official" forecasts to support planning, environmental, and engineering analyses as the projects move forward through approval processes. These official forecasts will be thoroughly vetted by permitting and funding agencies.

The forecasts which follow analyzed travel only between the Twin Cities and key outlying markets which have been identified as possible intercity rail origins and destinations. Since a full-scale trip table with all possible origins and destinations does not exist, it was necessary to use this simplified approach. However, we did analyze a limited number of intermediate stops such as Superior, Wisconsin and Hinckley on the NLX line, and the Minneapolis-St. Paul International Airport (MSP) on the Rochester line. We specifically did not consider outlying commuter rail markets such as Cambridge on the NLX line, Rosemount on the Rochester line, or cities inbound of Red Wing on the River Route. We acknowledge the potential for combining some intercity and commuter services, or at the very least creating interchanging opportunities. However, for intercity services to maintain competitive travel times to their longer distance destinations, close-in commuter rail type stops should be few and far between. Ridership demand from commuter rail locations is best analyzed using the Twin Cities Metropolitan Council's regional travel demand modeling. By not analyzing any such services, we maintained a level playing field for all services.

Most demand was estimated using standard demographic data such as population and employment. However, certain institutions – called special generators – have unique demand characteristics. Special generators considered in this analysis include casinos, medical centers, universities, and tourism markets.[20]

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[20]Of particular concern was estimating the demand for casinos. No casino in the U.S. today is served primarily by passenger rail, and no definitive forecasts of the willingness of casino patrons to use rail, such as would be developed by a stated preference survey, were made available. Much of the casino travel today is handled by charter bus services organized by affinity groups for no or nominal costs. Since the business plan for the NLX line proposes to relocate existing rail such as to provide door-to-door service to the Grand Casino Hinckley, we increased current intercity bus demand to Hinckley by 500 percent over what other data, principally from Greyhound, would suggest. As rail and intercity bus are close substitutes, increasing bus travel in the base case in turn increased projected rail ridership. Even with this "bus bonus," the resulting forecasts were lower than other forecasts. It has been suggested that similar demand could be generated by the Treasure Island Casino in Red Wing. Stopping an interstate high speed rail line at a casino in one state could be problematic from an overall service perspective. The Chicago River Route already has among the highest ridership forecasts of the alternatives studied. While the Hinckley casino demand is critical in analyzing the overall performance of the NLX line, it is insignificant in analyzing the overall performance of the Chicago MWRRI River Route. Nevertheless, if rail captured the entire current charter bus market of slightly over 100,000 riders, this would represent between a 5 and 10 percent increment in overall line ridership. It would, however, provide a significant portion of any local (LaCrosse-Winona to the Twin Cities) service offering. In order for this service to capture some of this ridership potential, it will be necessary to coordinate service between the Red Wing and casino stops, and to provide good pedestrian access/shuttle bus service between the casino and the train station.

In order to test the model's sensitivity to potentially different demand characteristics, the following variables were tested in some or all of the markets:

- Train speed – 79 mph (conventional service), 110 and 150 mph (HSR service). HSR speeds were tested only where proposed – NLX, Rochester, and Chicago.
- Fares – $0.20 per mile for conventional and HSR up to 110 mph; $0.32 for 150 mph.
- Trains per day – four for conventional service and eight for HSR.
- Gas prices – $2 and $4 per gallon. The base case used $2. This range reflects the variability of fuel prices over the last two years. (In all cases, constant noninflated prices are used).
- Personal/business travel splits of 90/10 and 50/50. Business travelers tend to have higher values of time (estimated at $31 per hour versus $12 per hour for personal travel) because their travel costs are often reimbursed by employers and clients. Personal travel includes all other recreational, personal business and commuter trips. The 50/50 split was used only for HSR services.
- Growth forecasts – Official state growth forecasts as defined in Section 3.1 were used as the base case. Variables tested included a 10 percent higher forecast, and a forecast which distributed more growth away from the Twin Cities toward the outlying city markets.

The first step in developing a consistent forecasting process is to determine reasonable intercity demand targets for the relevant city pairs – in other words, estimating the total potential number of trips ("the pie") for travel between two cities. There are significant data limitations for estimating targets for intercity travel, since most forecasting is focused on travel within individual metropolitan regions which maintain large detailed travel demand models for this purpose. 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, as described in detail in Technical Memorandum 3.

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, as shown in Table 3.1. Demand estimates are for the year 2005, the most recent year for which consistent data was available.

As shown, the highest total travel demand to/from the Twin Cities is with Chicago and St. Cloud, with nine to 11 million trips respectively. Chicago, of course, is the largest city of the Midwest and a major origin and destination point throughout the region. St. Cloud has elements of both intercity and commuter demand to the Twin Cities. These two city pairs are followed by a second cluster of city pairs in the three to five million trip range which includes Des Moines, Duluth, Eau Claire, Grand Forks, Hinckley, La Crosse, Madison, Mankato, Milwaukee, and Rochester. These cities encompass most of the intercity rail routes under consideration today.

Assembling the modal targets for the base year (2005) was the first step in generating new forecasts. The second step was to estimate costs and travel times for the various modes, since these two factors are the key to forecasting mode choice. These input assumptions are described in detail in Technical Memorandum 3.

From this base year forecast, demand forecasts could be developed for the future analysis year of 2030. Growth forecasts were extracted from Minnesota, Wisconsin, North Dakota and Iowa statewide forecasts, and metropolitan planning organization (MPO) forecasts for Chicago, Northeast Indiana, and Detroit.

Table 3.1 Estimated Annual Demand from/to Twin Cities for 2005

City	Total Annual Demand – 2005
Bemidji, Minnesota	525,305
Central Wisconsin (Wausau)	2,823,015
Chicago, Illinois	9,731,342
Columbus, Wisconsin	452,235
Des Moines, Iowa	2,913,580
Detroit Lakes, Minnesota	711,529
Detroit, Michigan	1,865,987
Duluth, Minnesota	4,314,250
Eau Claire, Wisconsin	5,753,730
Fargo, North Dakota	3,923,654
Grand Forks, North Dakota	2,669,011
Hinckley, Minnesota	5,770,875
Indianapolis, Indiana	637,612
International Falls Minnesota	514,100
Kansas City, Missouri	1,782,201
La Crosse, Wisconsin	2,987,809
Madison, Wisconsin	4,238,230
Mankato, Minnesota	3,742,800
Marshall, Minnesota	612,925
Milwaukee, Wisconsin	4,382,516
Northfield, Minnesota	1,672,200
Oneida/Rhinelander, Wisconsin	1,669,035
Quad Cities, Iowa	1,088,900
Red Wing, Minnesota	1,021,053
Rochester, Minnesota	4,835,215
Sioux City, Iowa	595,810
Sioux Falls, South Dakota	1,657,380
St. Cloud, Minnesota	11,007,431
St. Louis, Missouri	610,396
Thief River Falls, Minnesota	447,743
Tomah, Wisconsin	1,079,395
Willmar, Minnesota	1,580,175
Winona, Minnesota	856,262

Table 3.2 shows the projected total demand for each city pair with significant forecast rail demand for 2030, the rail demand, and the rail mode share. The results show the most favorable demand numbers for each city based on the testing of the variables described earlier

in the section. Except as noted, the base forecast shown assumes 79 mph speed, four trains per day, a rail fare of $0.20 per mile, gas prices of $2, personal/business travel splits of 90/10, and the standard state growth forecast. For the three tested HSR city pairs – Duluth, Rochester and Chicago, 110 mph speed and eight trains per day was assumed with all other factors held constant. The color codes reflect the four distinct ridership brackets.

Table 3.2 Projected 2030 Rail Demand to/from Twin Cities and Selected Cities – Base Case

City	Service Type	Total Demand (Thousands)	Rail Ridership (Thousands)	Rail Mode Share
Chicago[a]	HSR	11,320	1,730	15.3%
St. Cloud	Conventional	12,953	1,044	8.1%
Rochester	HSR	6,085	531	8.7%
Duluth[a]	HSR	3,909	430	11.0%
Eau Claire	Conventional	6,511	257	3.9%
Wisconsin Cities on MWRRI[b]	HSR	14,457	221	1.5%
Mankato	Conventional	4,041	228	5.6%
Red Wing[a, b]	HSR	1,113	163	14.7%
Northfield	Conventional	2,007	111	5.5%
Willmar	Conventional	1,543	81	5.2%
Fargo	Conventional	3,963	37	0.9%
Winona[b]	HSR	789	27	3.3%

[a] Includes Grand Casino Hinckley (Duluth) and Treasure Island Casino Red Wing (Chicago), and assumes that proper service parameters and station stop locations are achieved.

[b] Also included in Chicago total.

As shown in the table, the demand for the top cities can be divided roughly into four brackets. At the top are Chicago and St. Cloud with over one million rail trips. Not surprisingly, planning for extending and/or improving rail service to these cities has long been on the public agenda through MWRRI planning for Chicago, and Northstar planning for St. Cloud. Forecast rail mode shares for these cities are 11.7 percent for Chicago and 8.1 percent for St. Cloud.

The second cluster consists of Rochester and Duluth (NLX) with HSR service and including stops at the MSP Airport for Rochester, and at the Hinckley casino and at Superior (Wisconsin) for NLX. In the case of airport demand, it was assumed that a HSR connection between Rochester and MSP would essentially consume most demand for air travel directly to Rochester.[21] The mode shares of 8.7 and 11.0 percent for Rochester and Duluth hence include the demand for these special generators.

[21] This assumption was made for analytical purposes only to assess the maximum potential demand for HSR service in this market. Potential also exists for connections to other airports such as Brainerd, Duluth, Eau Claire, and La Crosse.

The third cluster consists of cities with demand of between 100,000 and 300,000, including Eau Claire (Wisconsin), the Wisconsin cities and Red Wing along the currently proposed MWRRI route, Mankato, and Northfield. Mode shares are generally between four and six percent. The fourth cluster consists of Willmar, Fargo and Winona, all with demand under 100,000 and mode shares between three and six percent with the exception of Fargo at slightly under one percent. With the exception of Willmar, these cities have current Amtrak service and would certainly continue to enjoy improved Amtrak or other passenger rail service in the future. Willmar, however, does not have current rail service.

The following summarizes the impacts of the variables tested:

- In the cases of HSR service, optimal demand is generated in most cases by the combination of 110 mph service and lower fares ($0.20 per mile). The higher fare of $0.32 per mile may optimize revenue but depress demand, even at the higher 150 mph speed.
- Doubling gas prices from $2 to $4 per gallon could result in almost doubling these ridership forecasts.
- Assumption of the 50/50 personal/business travel split is necessary to optimize ridership on the HSR routes.
- Varying the growth assumptions by 10 percent higher, or by assuming a more dispersed development pattern, did not significantly impact the forecasts.

Table 3.3 shows the forecasts for the best case in which intermediate stop ridership is added, and other external factors (such as higher than assumed fuel prices) is assumed.

Table 3.3 Projected 2030 Rail Demand to/from Twin Cities and Selected Cities – Best Case

City	Service Type	Total Demand (Thousands)	Rail Ridership (Thousands)	Rail Mode Share
Chicago[a]	HSR	11,320	2,500	22.1%
St. Cloud	Conventional	12,953	1,500	11.6%
Rochester	HSR	6,085	750	12.3%
Duluth[a]	HSR	3,909	650	16.6%
Eau Claire	Conventional	6,511	380	5.8%
Wisconsin Cities on MWRRI[b]	HSR	14,457	330	2.3%
Mankato	Conventional	4,041	340	8.4%
Red Wing	HSR	1,113	200	18.0%
Northfield	Conventional	2,007	160	8.0%
Willmar[b]	Conventional	1,543	120	7.8%
Fargo	Conventional	3,963	50	1.3%
Winona[b]	HSR	789	40	5.1%

[a] Includes Grand Casino Hinckley (Duluth) and Treasure Island Casino Red Wing (Chicago), and assumes that proper service parameters and station stop locations are achieved.

[b] Also included in Chicago total.

The top three clusters of cities have forecast rail mode shares generally from five to 11 percent in the base case, and 7.5 to about 16 percent in the best case. Table 3.4 looks at forecast demand for major city pairs in which HSR service continues to be investigated. The study, High-Speed Ground Transportation for America, was prepared by the Federal Railroad Administration (FRA) in 1997. As shown, the FRA study forecast mode shares generally between four and 12 percent, consistent with the forecasts in this study.

Table 3.4 Forecast Rail Mode Share
Other City Pairs – 15 Trains/Day

	90 mph	110 mph	150 mph
SF-LA-SD	4.5%	5.8%	7.4%
Chicago Hub	7.1%	7.9%	8.3%
Chicago-Detroit	6.9%	7.6%	7.5%[a]
Chicago-St. Louis	8.7%	10.5%	11.9%
Florida	3.4%	3.5%	3.8%
Portland-Seattle-Vancouver	6.3%	6.3%	6.6%
Texas Triangle	5.8%	8.5%	10.3%

[a] Mode share may decline due to higher fare and modest time savings for a relatively short trip.