
DEPARTMENT OF TRANSPORTATION
District 1 Freight Plan
December, 2019
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Front Cover Image: View of I-35 from Port of Duluth. Source: Eric Oberhart
Back Cover Image: Duluth Lift Bridge. Source: MnDOT

Chapter 1: Where are we going?

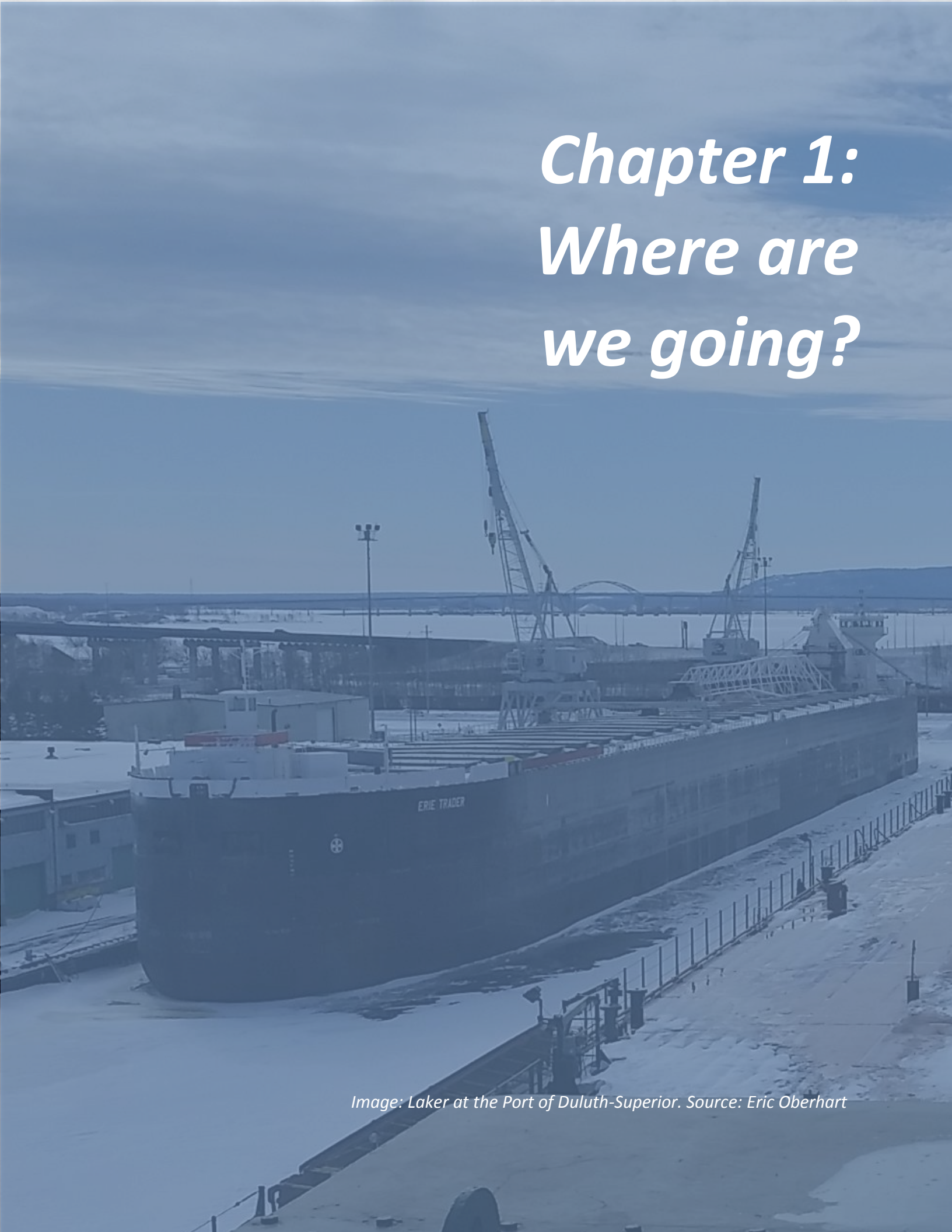


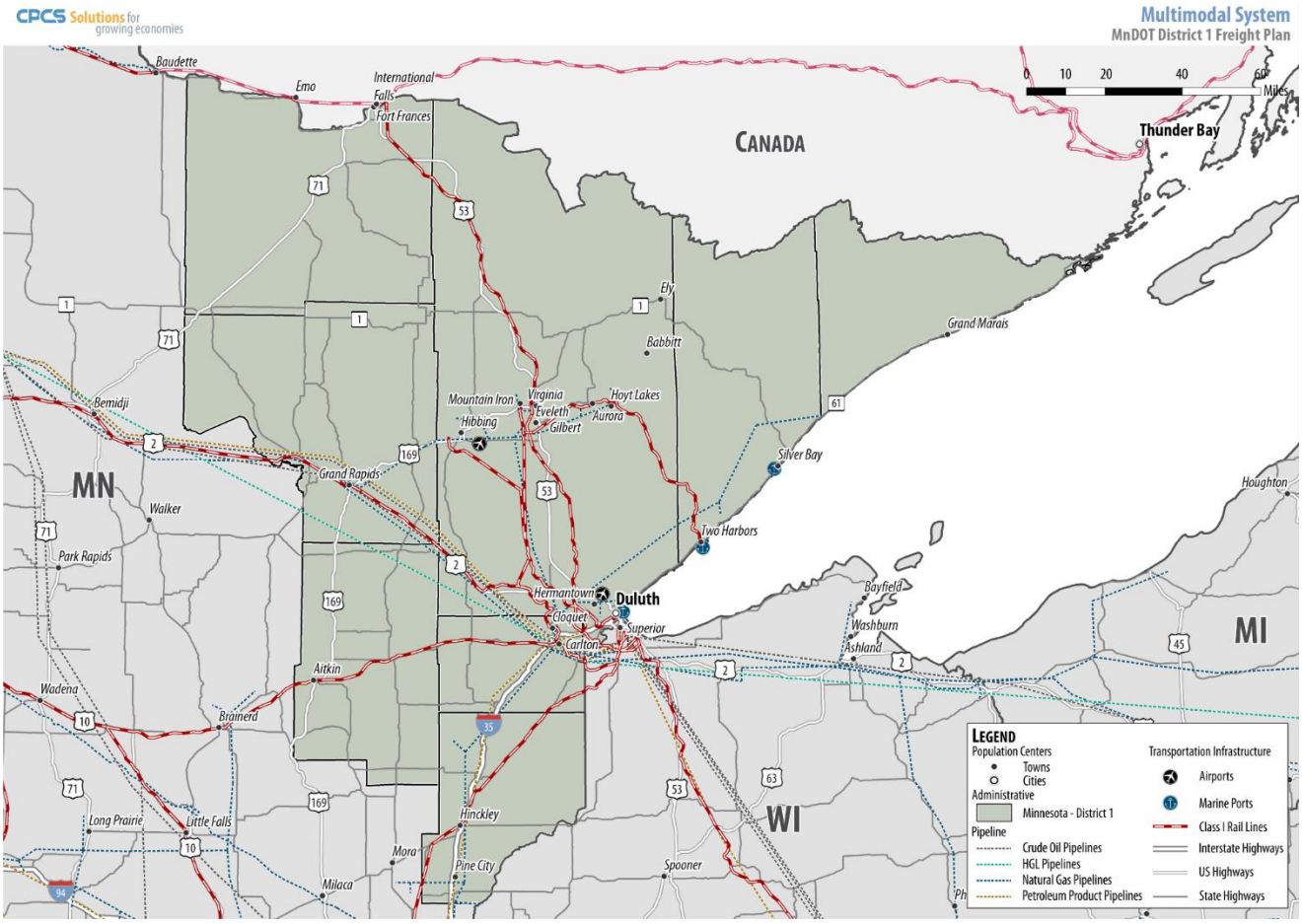
Image: Laker at the Port of Duluth-Superior. Source: Eric Oberhart

Chapter 1: Vision for the Future

About the District 1 Freight Plan

The Minnesota Department of Transportation's (MnDOT) District 1 covers almost one-quarter of Minnesota's land area and includes eight counties: Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, Pine and St. Louis. The region owes its historical development and continued economic well-being to a multimodal freight transportation system that supports the safe and efficient movement of bulk freight products such as iron ore, timber, and manufactured goods such as metal and paper products. This system includes interstate, state, and local highways, as well as major railway lines, multiple pipelines, two commercial service airports, and three ports. Figure 1 illustrates the extent of the District's freight network and connections to neighboring regions.

Figure 1: District 1's Multimodal Freight Network



Source: CPCS Transcom Inc.

In order for MnDOT and its partners to provide a transportation system that attracts new businesses while enabling existing ones to maintain and grow their presence in the region, it is essential that MnDOT and its local partners have access to recent, relevant, and easily-updated data and tools that provide insights into the Districts' key industries.

The District 1 Freight Plan provides MnDOT with a clear understanding of the multimodal freight system, how local industries use the system and their needs and issues, so policy and programming decisions can be better informed in the District.

In addition to informing planning, investment and operations at the District level, findings from the District 1 Freight Plan will help inform the next Minnesota Statewide Freight System and Investment Plan.

Relationship to Other State and District Plans

To aid in management, maintenance, and development of the transportation system, MnDOT creates plans individually for each mode, as well as together for the multimodal system as a whole. In particular, the Minnesota GO plan provides a vision for the Statewide Multimodal Transportation Plan, which is Minnesota's highest-level policy plan for transportation. More specific plans, such as Minnesota Statewide Freight System and Investment Plan (State Freight Plan) or State Rail Plan are oriented toward the vision and goals set forth in Minnesota GO and the Statewide Multimodal Transportation Plan.

Therefore, some of MnDOT's previous plans and studies were used to provide guidance for the development of the District 1 Freight Plan. In particular, the State Freight Plan provided a guiding framework for the evaluation of needs and issues and the creation of recommendations, and the statewide freight vision (policy) and goals were applied at the District level to ensure that the District assessment was in sync with statewide guidance. Figure 2 shows the process used to develop the District 1 Freight Plan, which ensured that District 1's freight recommendations were linked to overarching state-level guidance.

Figure 2: "Connecting the Dots" between Statewide Guidance and District 1 Freight Plan Recommendations

Source: CPCS Transcom Inc.

The State Freight Plan statewide freight vision is to:

> *Provide an integrated system of freight transportation in Minnesota – highway, rail, water, air cargo, and intermodal terminals –that offers safe, reliable and competitive access to statewide, national and international markets.*

The State Freight Plan also identified five goals to reflect those aspects of the multimodal freight system that are most important to the public and private sector freight stakeholders in the state. These goal areas remain the focus for the District 1 Freight Plan:

- Support Minnesota's Economy
- Improve Minnesota's Mobility
- Preserve Minnesota's Infrastructure
- Safeguard Minnesotans
- Protect Minnesota's Environment and Communities

District 1 Freight Plan Development and Data Sources

The creation of the District 1 Freight Plan was developed using three main sources of information: previous studies and plans, analysis of quantitative data, and stakeholder engagement.

Previous Studies & Plans

In addition to providing guidance for planning processes, previous plans and studies were been reviewed to collect qualitative and quantitative information specific or relevant to District 1. An in-depth review and synthesis of needs and issues identified in previous plans and studies was conducted, and a particularly important study was the 2017 *Manufacturers' Perspectives Study*, for which MnDOT staff conducted their own in-depth stakeholder consultations. Appendix A provides a list of the additional plans that were used to provide input for the District 1 Freight Plan.

Data Analysis

Evaluations of safety, mobility, and condition were completed using data provided by MnDOT. Examples of data sources include historic road accident data, road crash risk assessments, railroad grade crossing risk assessments, vehicle counts, and vehicle speed data.

Stakeholder Engagement

A comprehensive stakeholder engagement process was conducted to ensure every voice was heard during Freight Plan development, including public and private sector freight system interests. Engagement took three main forms:

Advisory Committee and Technical Team Meetings: The Advisory Committee was comprised of public and private system stakeholders, and was created to provide "big picture" guidance in the development of the District 1 Freight Plan. The Technical Team was smaller, made up of agency staff, and provided guidance on how the plan will be used to inform investment decisions. Appendix B lists the membership of these two groups.

Stakeholder Consultations: 27 phone and in-person consultations were conducted with private and public freight stakeholders between June and December 2018.

Open Houses: Feedback from public and private stakeholders were collected during two open houses held at MnDOT's District 1 headquarters in Duluth.

Additional Resources

The development of this final report was supported by the creation of five intermediate Working Papers, which provide a greater level of detail on District 1's freight assets, needs and issues, project prioritization, project feasibility, and other analyses. These Working Papers include:

- Working Paper 1: Communications Plan
- Working Paper 2: Freight System Profile – Economy, Inventory, Demand and Performance
- Working Paper 3: Needs, Issues, and Opportunities
- Working Paper 4: Freight Investment Priorities
- Working Paper 5: Draft Project Concepts

Copies of these Working Papers can be found on MnDOT's District 1 Freight Plan web site, at: http://www.dot.state.mn.us/ofrw/freight/districtfreightplan/d1.html

Chapter 2: Where Are We Now?

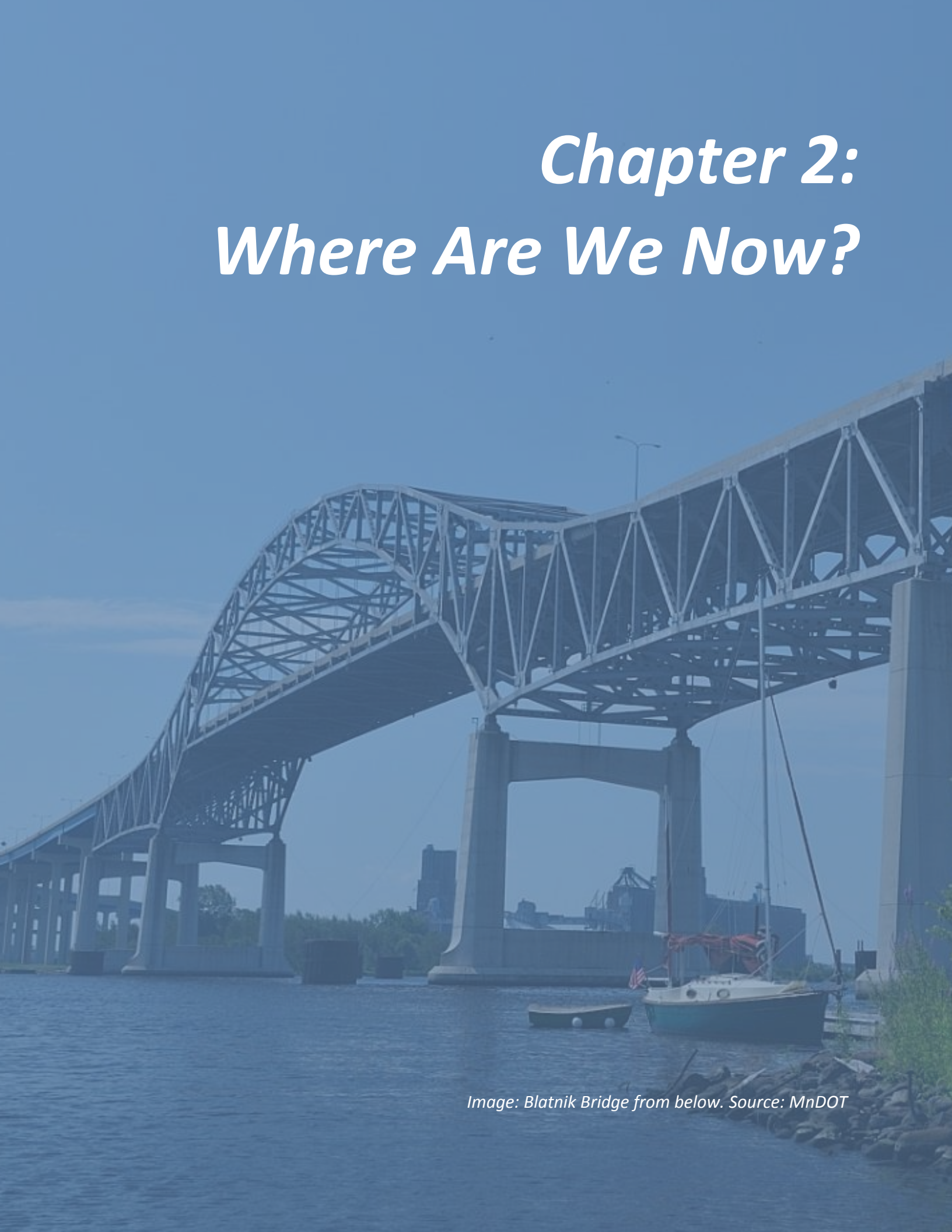


Image: Blatnik Bridge from below. Source: MnDOT

Chapter 2: Existing System Conditions

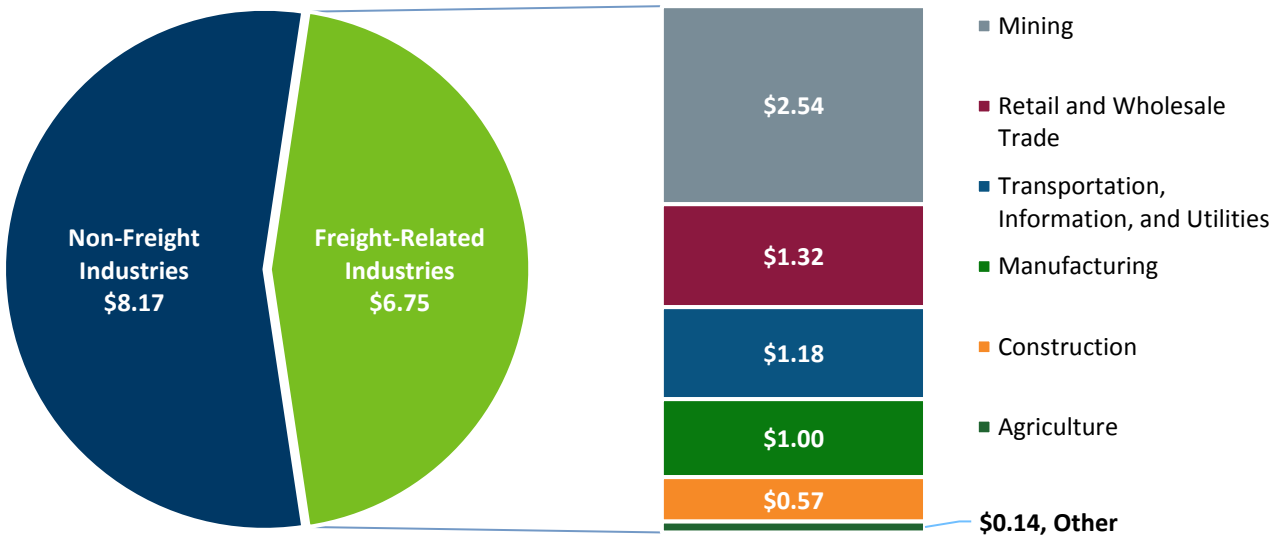
The Importance of Freight to District 1

Freight-dependent businesses that rely on the transportation of physical goods to support their operations comprise about 29 percent of District 1's employment and 45 percent of the District's Gross Domestic Product (GDP). In particular, mining, manufacturing, and forestry stand out as important freight-dependent industries in the District. An aging population and shrinking workforce are potential economic challenges that could affect the District's transportation system and freight-dependent industry in the future, as skilled and semi-skilled employees may be difficult to find.

45%	$6.75b	29%
District 1 GDP generated by freight-relevant industries	District 1 GDP generated by freight-relevant industries	District 1 workers employed by freight-relevant industries

Source: University of Minnesota Duluth. CPCS Analysis of Full-Time and Part-Time Employment by NAICS Industry 2016, Bureau of Economic Analysis.

Figure 3: District 1's Freight-Dependent Gross Domestic Product



District 1 Freight-Related Industry Locations

Figure 5 highlights the location freight-related businesses with more than 20 employees in District 1. Most of these businesses are congregated in the center of St. Louis County (mining, wholesale trade, transportation, and warehousing) as well as in the Duluth-Superior metropolitan area (construction, transportation and warehousing, and manufacturing). Some business concentrations also exist in the cities of International Falls (transportation and warehousing) and Grand Rapids (utilities, construction, and transportation and warehousing). Each of these businesses relies on District 1's multimodal freight transportation system for their day-to-day activities, and most importantly to get goods to market.

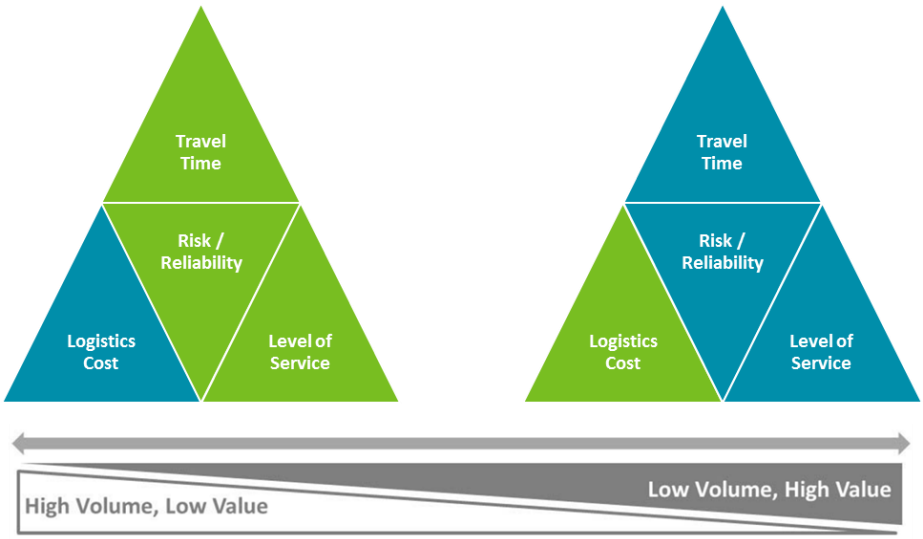
The transportation needs of District 1's businesses depend on their service needs and cargo characteristics. Based on these needs and characteristics, freight transportation options exist on service "spectrum". A freight shipper balances two service and cargo characteristics (cost and travel speed) when determining what mode to transport cargo. On the right side of the spectrum – where reliability/risk, transit time, and level of service are most important – shippers use air cargo and premium trucking services.

However, shippers must pay relatively higher shipping rates for these services. On the left side of the spectrum, where logistics cost is more important, shippers may favor barge or bulk rail to move heavy and low unit-cost materials such as mining, agriculture, and forestry products. In this case, shipments may move more slowly. In the middle, shippers use truck and rail, which are well-suited for transporting a variety of middle-priced freight such as manufactured goods, bulk goods, and a variety of consumer products.

For example, when moving high volume, lower value cargoes (like grain or coal), shippers are most concerned with logistics cost. However, transit time and reliability of service are often more important with smaller, higher-value shipments, such as medical devices, or just-in-time components.

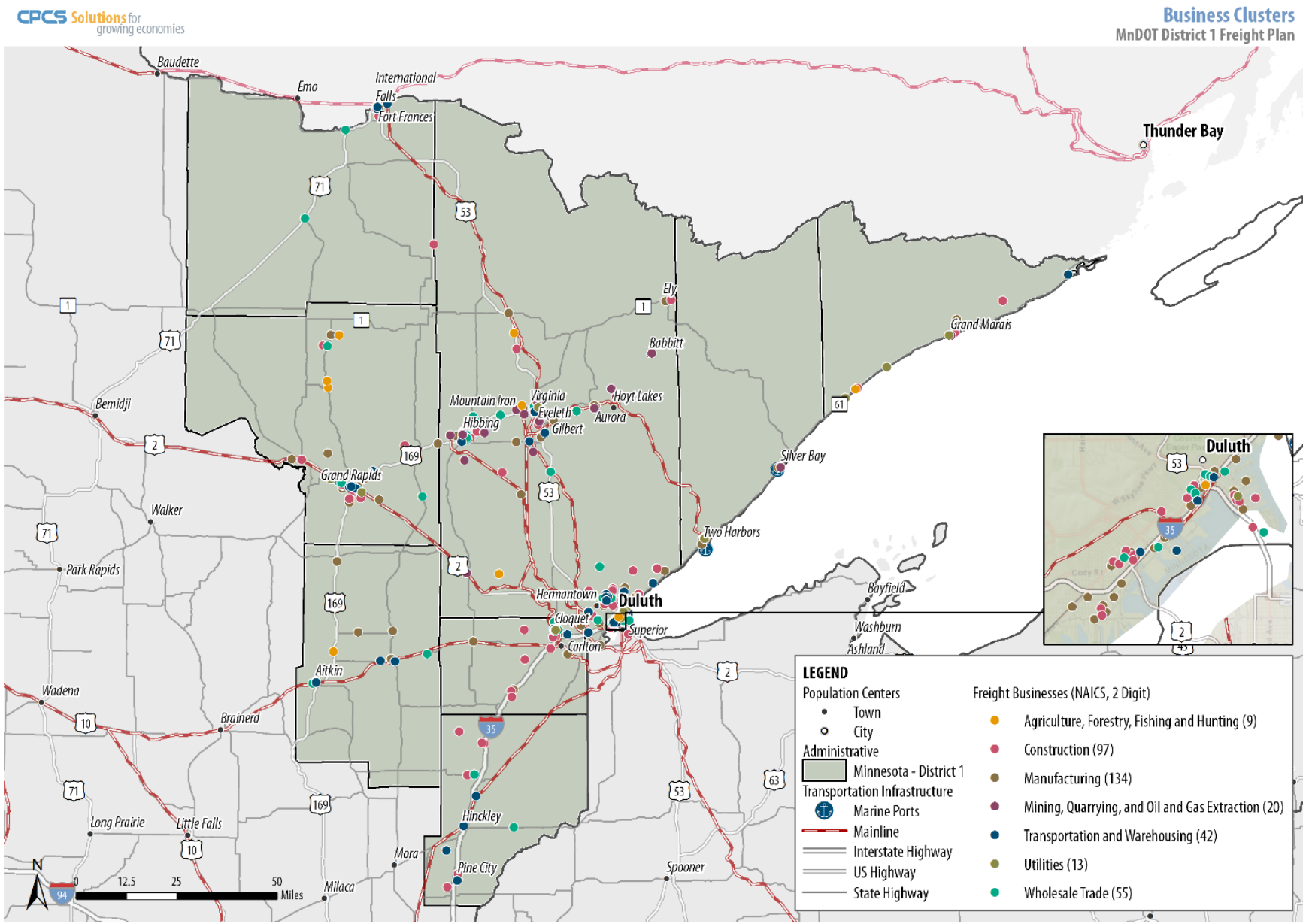
District 1 businesses that ship freight must balance shipping costs against faster or more reliable service.

Figure 4: Freight Transportation Service Spectrum



Source: CPCS Transcom Inc.

Figure 5: District 1 Freight-Related Business Clusters



Source: CPCS Transcom Inc. analysis of Reference USA Data 2016

Mining

District 1 is a major center for the mining industry in Minnesota, and the state is the largest producer of iron ore in the US. Mining employment represents a significant share of GDP in District 1 (about 17 percent). District 1's mining establishments are concentrated along the Mesabi Iron Range (Figure 6), and the District's rail and port system are well-suited to handle the heavy, high volumes of taconite iron ore that are produced. Taconite is moved by rail to three ports: Duluth-Superior, Two Harbors, or Silver Bay. Within the Iron Range, there are 12-14 trains a day dedicated to carrying ore to ports. From these ports, the ore is shipped across the Great Lakes to steel mills in other Great Lake states and provinces, or to Quebec for further export.

While the rail and maritime system play a key role in the outbound shipment of taconite, the road network is a critical asset for the inbound movement of materials supporting the mining industry, including equipment and fuel. Many of these truck-borne loads are either oversized or overweight. Transportation needs for mining-related truck operations include the creation of extra acceleration and deceleration/turning lanes where large trucks may be entering or leaving high-speed trunk highways. Additionally, roundabouts with mountable curbs pose navigational hazards for trailers and side-by-side oversize/overweight loads.

Economic measures like employment and payroll expenditures measures indicate that the importance of mining for the District continues to hold steady. However, demand for mined material is tied to the health of the US and global steel markets, as well as changing production methods. For example, District 1 exported large amounts of taconite to Asia in 2017, but this continued trade may be jeopardized by continued trade disputes. At the same time, steel producers in the US and globally are increasingly relying on smaller-scale electric arc furnaces, rather than basic oxygen furnaces. Electric arc steelmaking processes utilize larger volumes of scrap metal relative to "fresh" ore, and continued adoption of electric arc techniques in the US and abroad may reduce demand for taconite.

While mining is a very small portion of the United States' and Minnesota's total GDP, mining is the largest single industry contributing to District 1's GDP.

Forestry

Like mining, forestry was one of the key industries that drove the growth of District 1's economy in the 19th and 20th centuries. Today, forestry remains an important industry for the region, which is home to a large number of paper and other forest product manufacturers. Furthermore, the presence of both forest resources and forestry products companies means that wood products are one of the key commodities moving on the District's road network.

Minnesota's forestry industry is primarily concentrated in District 1 (Figure 7) and wood products are one of the key commodities moving on the District's roads. While forestry's contribution to the state GDP is low (between 1.7 and 2.1 percent), the industry has an outsized importance in District 1 due to the District's concentration of wood product manufacturers. Since 2000, the industry has provided between 2,000 and 3,000 jobs for the state.

Forestry-related manufacturing occurs in central St. Louis County, Itasca County, and around Duluth-Superior, but the extraction of forest products occurs across the District. The forestry industry's freight needs involve rail, truckload, and maritime modes of transportation. Some of the

industry's transportation concerns are similar to mining suppliers: extra acceleration and deceleration lanes are needed for logging trucks to safely enter and exit trunk highways. Additionally, District 1's road network system consists of many narrow local roads with narrow to no shoulders. These narrow roads pose a hazard for truckers serving local logging operations, as there is less room for trucks to maneuver on local roads. Industry stakeholders also expressed interest in having Minnesota ease permitting and regulatory burdens of the railroads or promoting the expansion of railroad tracks.

Wood products in District 1 appear to be declining in competitiveness, independent of national industry and employment trends over the last seven years. This is measured by the decline in forestry-related employment at faster rates than the US forestry industry as a whole. Furthermore, continued trade disputes between the US and China could result in lower foreign demand for forest products.

Manufacturing

While much of District 1's economy was initially built on natural resources, the District also has a diverse manufacturing sector that brings trade into the region from other states and countries. St. Louis, Carlton, and Itasca counties stand out as particularly important centers for manufacturing employment, with towns such as Grand Rapids, Virginia, and Duluth hosting concentrations of manufacturing jobs. The manufacturing industry's freight needs are varied due to the wide variation in the types of products and value. However, trucking and rail are the most commonly used modes for manufacturing-related firms. Since manufacturing firms are often engaged in trade with other states or countries, strong and reliable connections to other regions outside of District 1 are key considerations for many firms.

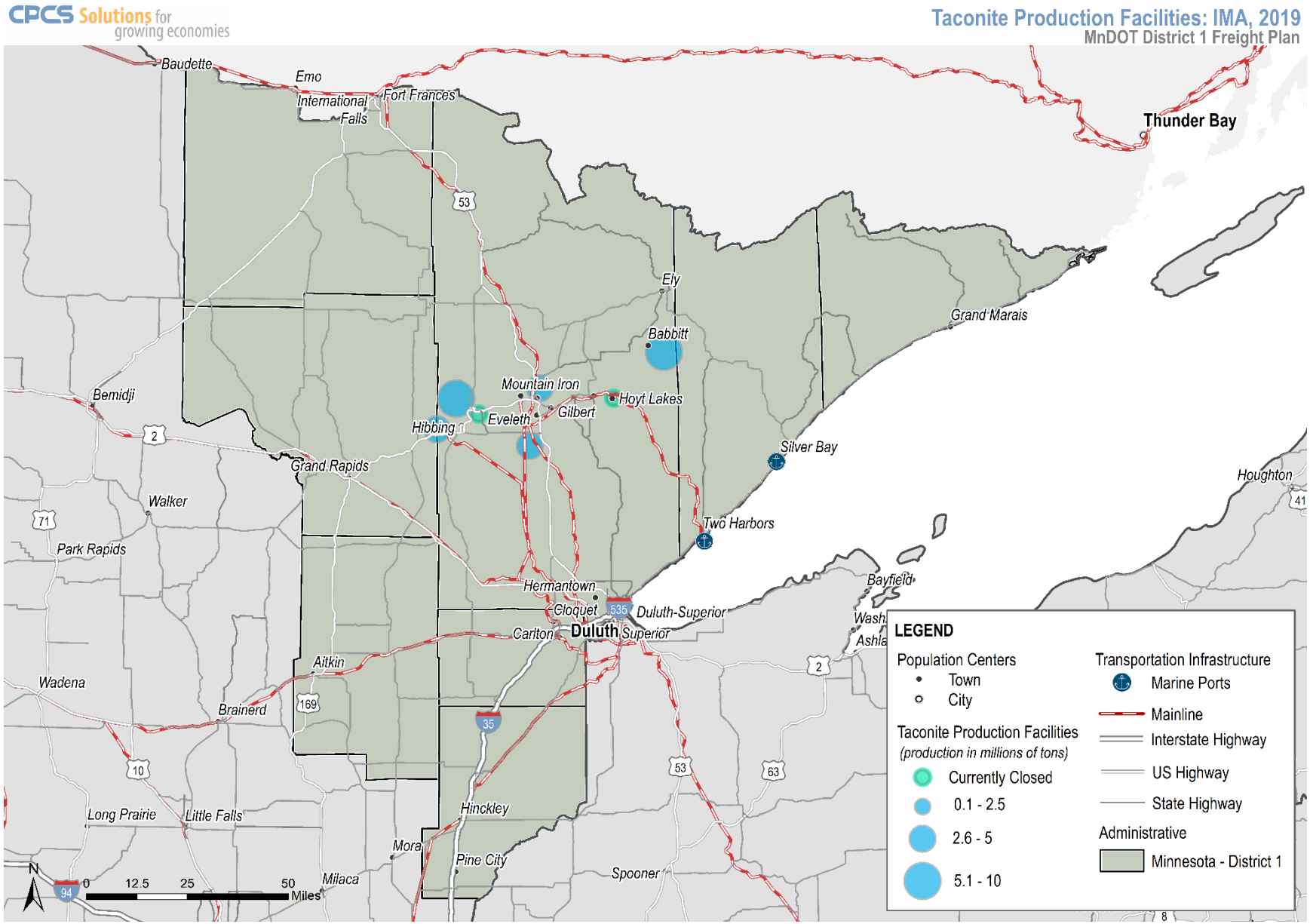
The state's manufacturing share of GDP remains steady between 13.7 and 15.0 percent, higher than that of the US as a whole. In District 1, some manufacturing industries such as machinery, non-metallic minerals, and plastics and rubber are increasing in competitiveness, while others such as computers and electronic products, chemicals, apparel, and wood products are declining in competitiveness.

While manufacturing's contribution to Minnesota's GDP remains steady, District 1's manufacturing industry is declining in competitiveness.

However, when broken out into different industry groups, District 1's machinery, non-metallic mineral, and plastics and rubber manufacturing industries have increased in competitiveness independent of national industry and employment trends over the last 7 years. Wood product, apparel, and chemical manufacturing are decreasing in competitiveness.

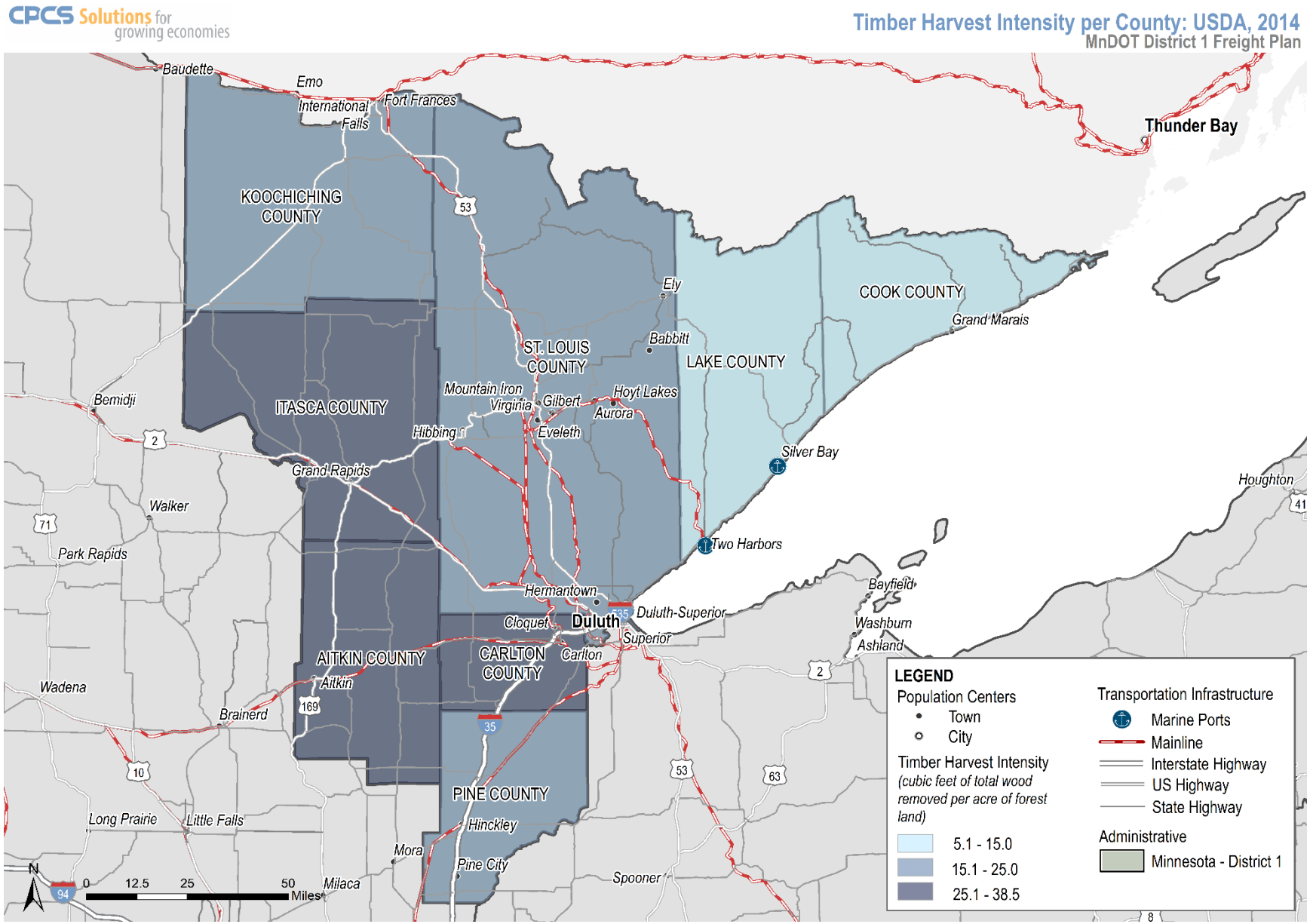
While the manufacturing outlook of District 1 is uncertain, the freight system will need to accommodate varied manufacturing needs due to the diverse types of products produced in the region. This is especially critical in Grand Rapids, Virginia, and Duluth, which are important centers for manufacturing employment.

Figure 6: District 1 Taconite Production Facilities



Source: CPCS Transcom Inc. analysis of Reference USA Data 2016

Figure 7: District 1 Lumber Harvest Intensity by County



Source: CPCS Transcom Inc. analysis of Reference USA Data 2016

District 1's Multimodal Freight System

District 1 is uniquely located at the far southwestern end of Lake Superior, giving it access to the Atlantic Ocean via the Great Lakes and St. Lawrence Seaway. This geographic advantage, along with a diversified multimodal freight system has made the region, and Duluth-Superior in particular, a key regional transportation hub since the late 1800s.

District 1 serves as a regional transportation hub for Northern Minnesota and Wisconsin, and western portions of the Upper Peninsula.

Since its initial development, District 1's multimodal freight system has grown to include highway connections to the Central Midwest via I-35, and Chicago via US-53 and I-94. Additionally, multiple railroads provide service to all corners of the US. As a result of the confluence of these systems, District 1 serves as a key regional freight hub for Minnesota, northern Wisconsin, Michigan's western Upper Peninsula, eastern North Dakota, and parts of northern Ontario. Figure 8 shows the District's freight transportation assets, and their connections to nearby regions.

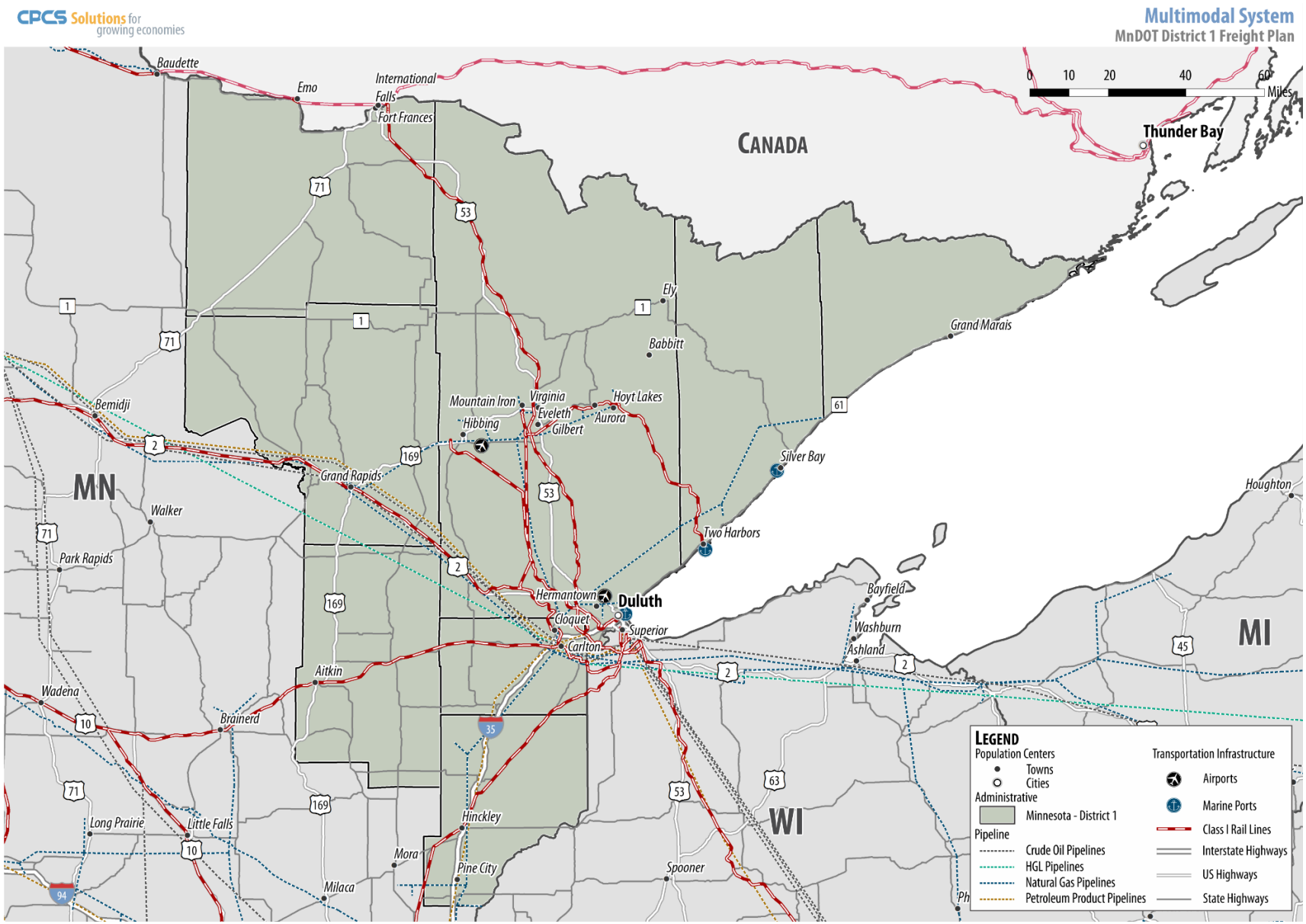
100	1,500	860	3	3	8
Miles of Interstate	**Miles of US and State Highways**	**Miles of Rail**	**Great Lakes Ports**	**Commercial Airports**	**Pipelines**

Roadways

The District's road network consists of a variety of road types, including interstates, US highways, state highways, and county roads. The road network is important because it provides direct connections to all of the District's businesses and to other modal systems. Figure 9 lists the mileages of some elements of the District's roads, and Figure 8 provides a visual overview of the routes within the system.

Interstate service in District 1 is relatively limited, so US and state trunk highways serve as critical road connections for much of the region.

Figure 8: The District 1 Multimodal Freight Transportation System



Source: CPCS Transcom Inc. analysis of National Transportation Atlas Database

Figure 9: District 1 Road System Mileages

	District 1	Minnesota
Interstate	95	912
US Highway	475	3,295
State Highway	1,314	7.080

Source: CPCS Transcom Inc. analysis of FHWA Data

District 1's commodity profile from the State Freight Plan provides insight into the unique qualities of the District's transportation system. Specific differences between District 1 and Statewide commodities include:

- **Cereal Grains** made up a much larger share of Minnesota's truck tonnage (27 percent) than District 1's truck tonnage (7 percent). This is likely due to the high levels of agriculture activity in other Districts relative to District 1.
- **Logs** which made up 7 percent of District 1's truck tonnage, but only 2 percent of Minnesota's truck tonnage. This difference reflects the fact that District 1 is home to forestry firms, as well as paper and other wood product manufacturers.
- **Gravel** made up 26 percent of District 1's truck tonnage, but only 9 percent of Minnesota's truck tonnage. **Natural Sands** also made up 7 percent of District 1's tonnage, but less than 2 percent of Minnesota's.
- **Live Animals and Fish** made up 5 percent of District's truck tonnage, but less than 2 percent of Minnesota's.

Projections for 2040 anticipate a 56 percent increase in the cereal grain tonnage, 104 percent increase in animal feed tonnage, 153 percent increase in agricultural products tonnage, and 21 percent increase in gravel tonnage carried via trucks by 2040.[1] Given that each of these commodities is a major commodity for District 1's network as well, it is likely that truck tonnages in this District are likely to increase in the future, although they may do so at a rate slower than Minnesota as a whole, given District 1's flat population growth.

District 1's truck tonnages are likely to increase in the future, although their growth may be slower than Minnesota's overall truck tonnages due to slow population growth.

[1] MnDOT "Statewide Freight System Plan" (2016). https://www.dot.state.mn.us/planning/freightplan/pdf/mn-statewide-freight-system-plan.pdf

Figure 10: District 1's Major Commodities by Total Truck Tonnage, 2012

Commodity	Tonnage	Percent	Percent (%) Originating in D1
Gravel	8,823,326	26%	70%
Animal Feed	3,615,966	11%	86%
Non-metal Mineral Products	2,484,173	7%	53%
Natural Sands	2,448,661	7%	83%
Logs	2,355,326	7%	31%
Cereal Grains	2,344,533	7%	56%
Waste/Scrap	1,669,910	5%	33%
Live Animals/Fish	1,525,623	5%	97%
Coal	994,631	3%	63%
Other Agricultural Products	982,729	3%	17%
All Others	6,324,515	19%	41%

Source: MnDOT Statewide Freight System Plan Technical Memo 3.

Key Corridors and Facilities

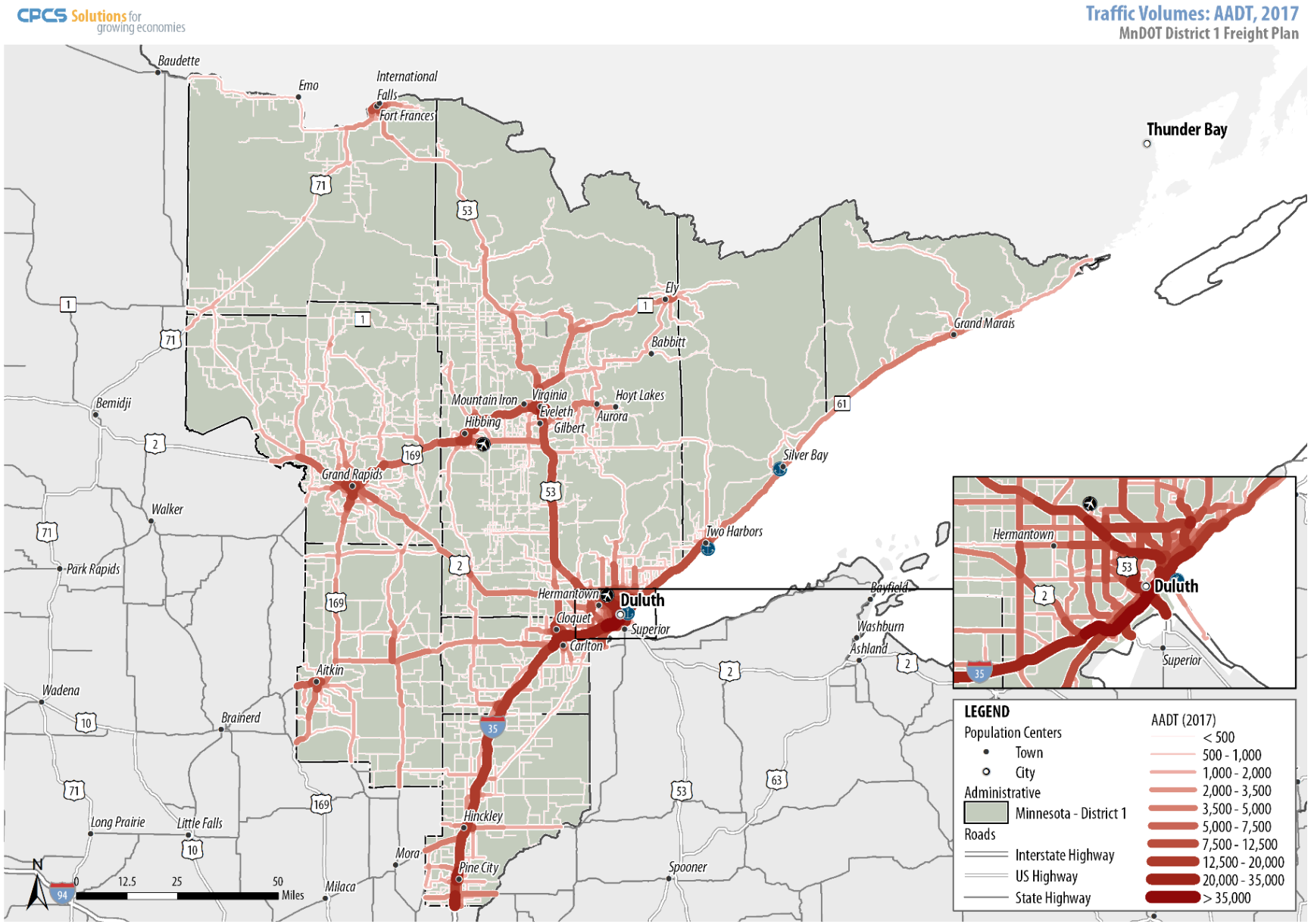
I-35 is the only major interstate within District 1 and is a key truck route as it directly links Duluth and the Twin Cities, and provides access between much of the Central Midwest and Lake Superior. In the absence of more interstates, trucking activities in the District are reliant on US Highways and State Routes, especially US-2 and US-53. Figure 11 and Figure 12 provide a respective overview of all vehicle and truck-specific traffic volumes in the region and help to show which routes are most important based on vehicle volume.

The Bong and Blatnik Bridges between Duluth and Superior are critical freight links for the District.

Figure 12 shows how the District's road network and truck traffic is centered on the Duluth area, with I-35 connecting the District to the Twin Cities, and US-53 and US-2 providing links to the Range Cities and Grand Rapids. US-169, MN-61, and MN-210 also provide links to other sections of the District.

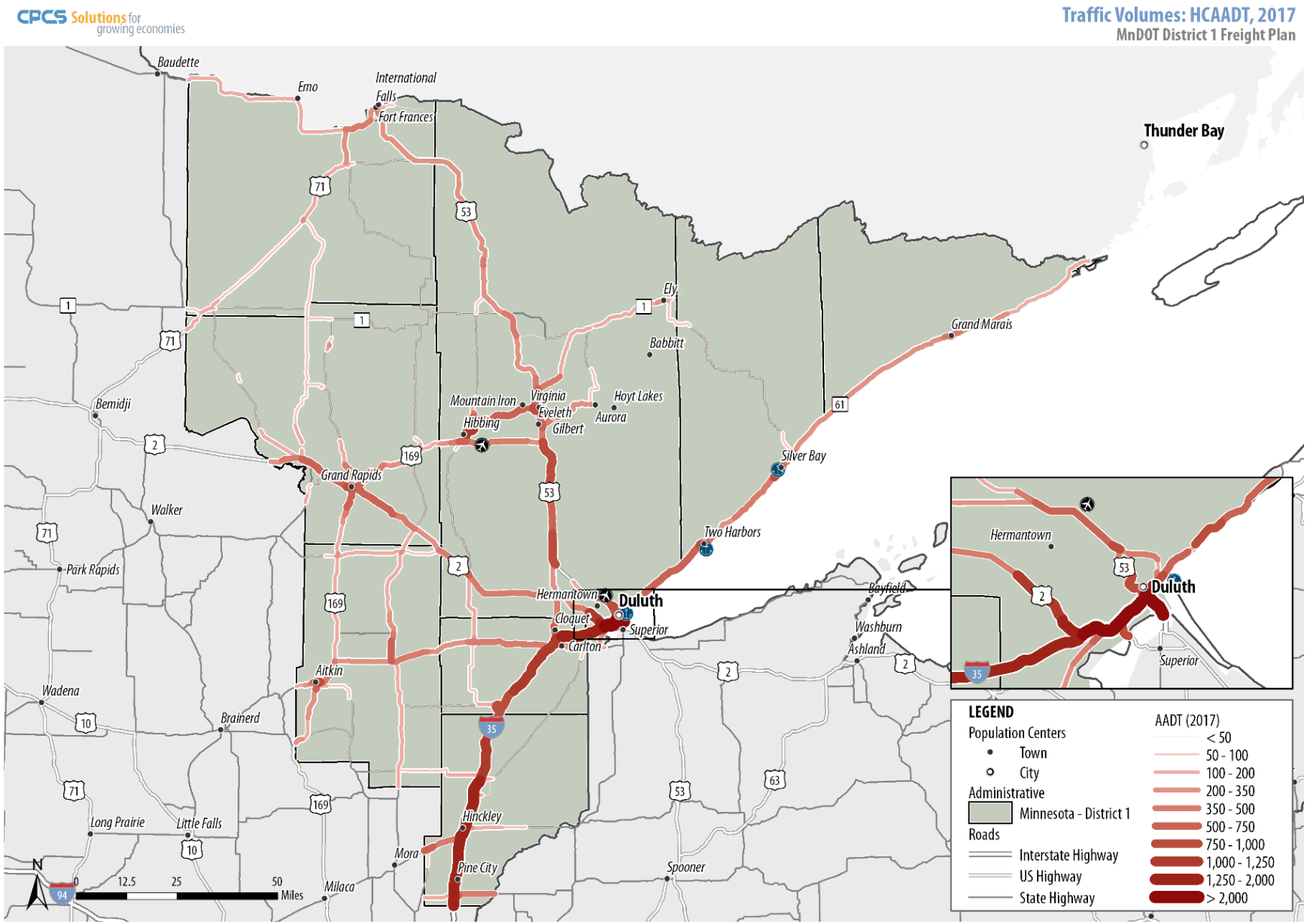
The Bong and Blatnik bridges connecting Duluth and Superior are also critical network elements for the District. However, since 2008, trucks over 40 tons are diverted to Bong Bridge to cross the St. Louis River, making the Bong Bridge a particularly critical network link for heavy trucks traveling in the region. If the Bong Bridge was impassable, the truckers destined for Superior have to either use the Blatnik Bridge or take an at least 120-mile detour to get to WI-35 and then travel another 50 miles north to reach Superior.

Figure 11: District 1 Average Annual Daily Traffic Volumes (all vehicles)



Source: CPCS Transcom Inc. analysis of MnDOT and NTAD data. 2017.

Figure 12: District 1 Annual Average Daily Truck Traffic Volume



Source: CPCS Transcom Inc. analysis of MnDOT and NTAD data. 2017.

Railways

Rail has historically played a large role in District 1's freight system, as it provided all-season service to haul heavy commodities like iron ore and timber. Today, rail still serves as a key mode in the District and provides connections to markets such as Chicago and the Pacific, Atlantic, and Gulf coasts. District 1 is served by four Class I and four short line railroads, which operate over 860 miles of track. 411 railway and roadway crossings exist in the District, and 40 percent of these crossings are actively-protected with lights or gates.

The Burlington Northern Santa Fe (BNSF) and Canadian National (CN) are the two Class I railroads that own trackage in the District. The Union Pacific (UP) and Canadian Pacific (CP) railroads also operate in the District, through trackage agreements with the CN and BNSF. Figure 13 and Figure 15 highlight the trackage and crossings held by the BNSF and CN, and Figure 16 shows the train volumes and speed limits on each Class I line.

1,049	18.9%	161	279	4
Miles of Track	of the State's Total Track Miles	Actively-Protected Public Crossings	Passively-Protected Public Crossings	Class I Freight Rail Operators

Figure 13: Freight Railroad System of the District

Railroad	System Miles in the District	Number of Mainline Tracks	Public Road Crossings
BNSF	435	1	219
CN	497	1	158
Northshore Mining (NMCZ)	47	1	4
North Shore Scenic Railroad (NSSR)	25	1	26
St. Croix Valley (SCXY)	36	1	25
Cloquet Terminal Railroad (CTRR)	3	1	2
Minnesota Dakota & Western (MDW)	6	1	6

Source: Minnesota State Rail Plan, 2015. MnDOT Grade Crossing Safety Data, 2015. National Transportation Atlas Database, 2017.

Note: for the purpose of GIS data queries, District 1 as defined here includes the full extent of Aitkin, Koochiching, and Itasca Counties. Therefore, track mileage and crossing counts are slightly higher than would otherwise be reported for District 1. This figure does not include the Lake Superior and Mississippi Railroad (LSMR), which does not provide freight service.

Information on the tonnages of specific rail-borne commodities carried within District 1 is unavailable. However, information from the State Freight plan provides insight into potential trends for the District's freight system. Most notably, metallic ores are the second-highest rail-borne commodity in Minnesota by tonnage and are handled almost entirely within District 1. The extremely large volume of iron ore moving in District 1, combined with a forecasted 4 percent decrease in metallic ore tonnage will mean that the overall tonnage moved on the District's rail system may actually decrease, depending on the remaining rail cargo makeup in the District.

In regards to rail assets, District 1's network is home to connections of international importance. In particular, the Ranier Rail Bridge is the US' second most heavily-used port of entry, thanks to its role in facilitating the movement of container trains between Chicago and the Pacific coast.

Another regionally-notable rail asset is the Duluth Intermodal Terminal, located at the Port of Duluth. This road-rail terminal is important because it provides District 1's businesses with more transportation options, easier access to foreign markets, and the potential for lower logistics costs.

Maritime

District 1 lies at the western end of one of North America's most important maritime trade corridors: the Great Lakes and St. Lawrence Seaway. The lakes and Seaway provide District 1 with access to the Atlantic Ocean and foreign markets. In particular, they serve as an important trade corridor for bulk goods such as iron ore from District 1, grain from the Great Plains, and coal from Wyoming.

The Great Lakes and St. Lawrence Seaway provides District 1 with access to the Atlantic Ocean – and foreign markets.

The District's three active lake ports are Duluth-Superior, Two Harbors, and Silver Bay. Two Harbors and Silver Bay nearly exclusively serve the iron mining industry, while Duluth-Superior's services are more varied, including substantial iron, grain, coal, cement, limestone, and other dry bulk terminals, as well as a public terminal capable of handling project cargoes. Even though Lake Superior is closed to shipping from mid-January to the end of March due to winter ice, District 1's ports are among the most heavily-used ports on the Great Lakes System. In particular, Duluth is frequently cited as the world's biggest freshwater port by tonnage handled.[2] In 2016, nearly 49 million tons of cargo were handled at District 1's three ports.

Figure 14 and Figure 17 illustrates the location of maritime facilities located in District 1, as well as the rail and road connections to these facilities.

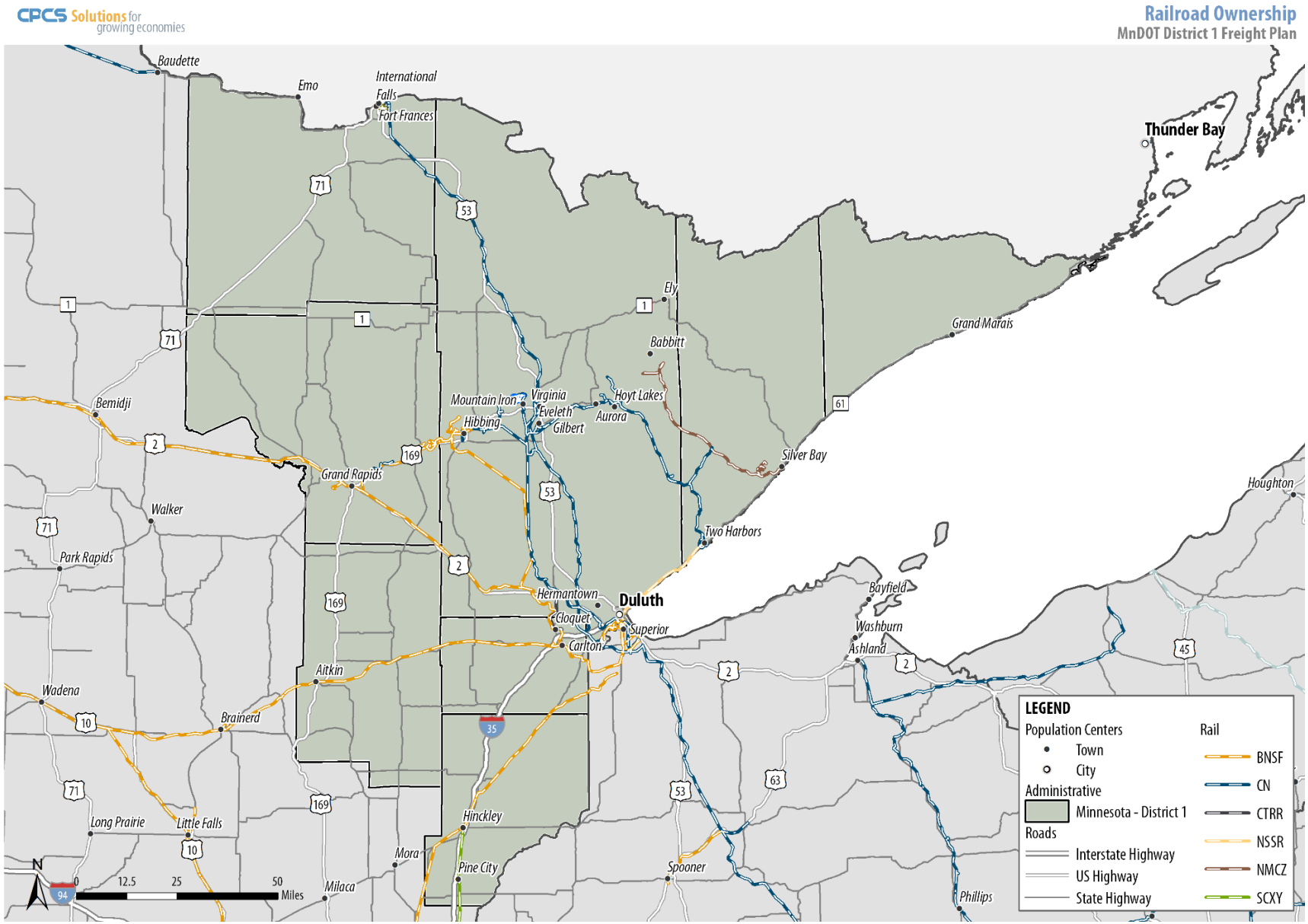
Figure 14: Annual Waterborne Freight Statistics of the District

Port	Total Tonnage	Domestic Tonnage	Foreign Tonnage	Imports Tonnage	Exports Tonnage
Duluth-Superior	30,277,995	22,644,517	7,633,478	425,767	7,207,711
Silver Bay	3,399,616	3,399,616	0	0	0
Two Harbors	15,431,524	15,080,841	350,683	0	350,683

Source: CPCS Transcom Inc. analysis of USACE 2016 Data.

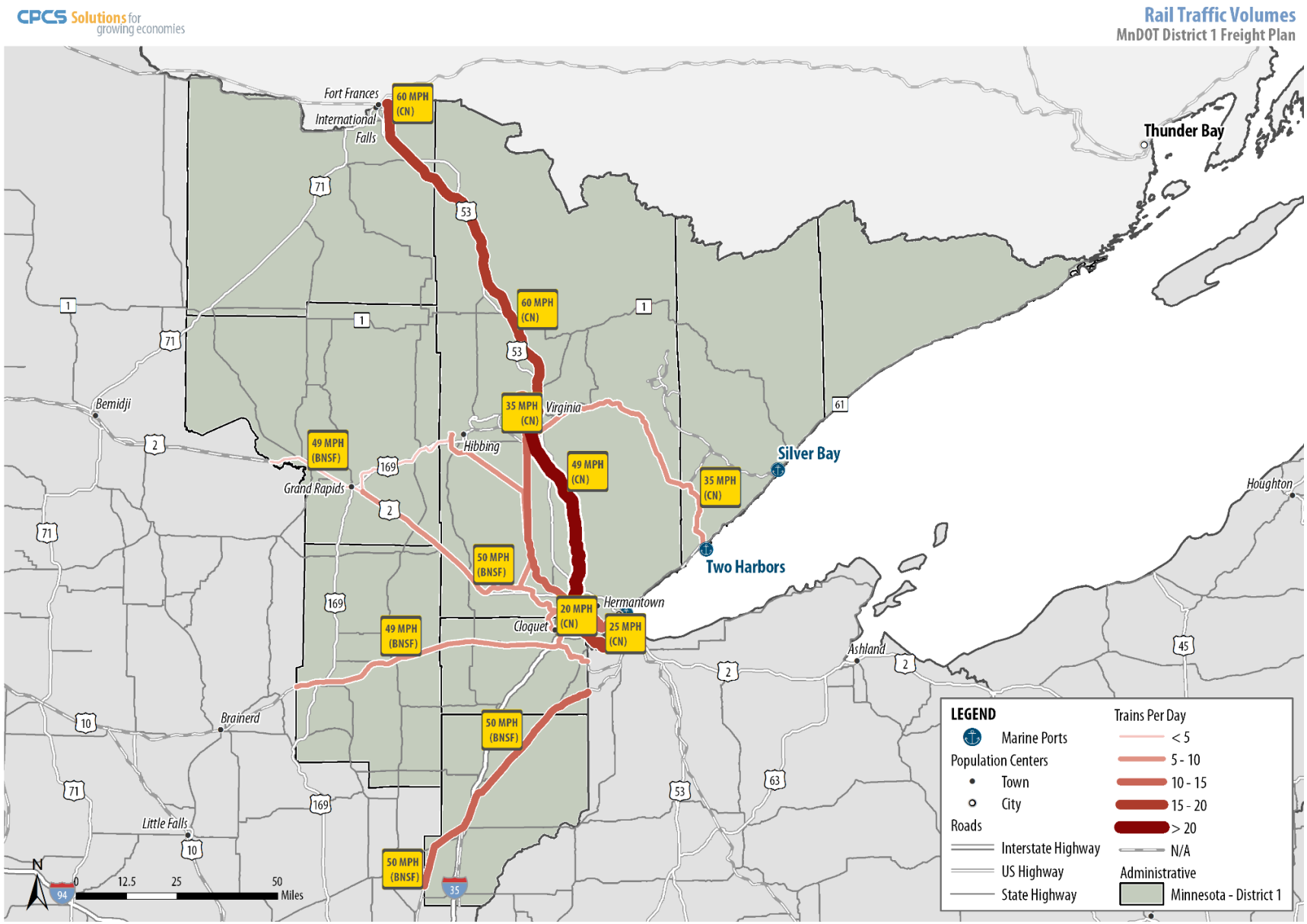
[2] Duluth-Superior Port Authority

Figure 15: District 1 Railroad Lines and Owners



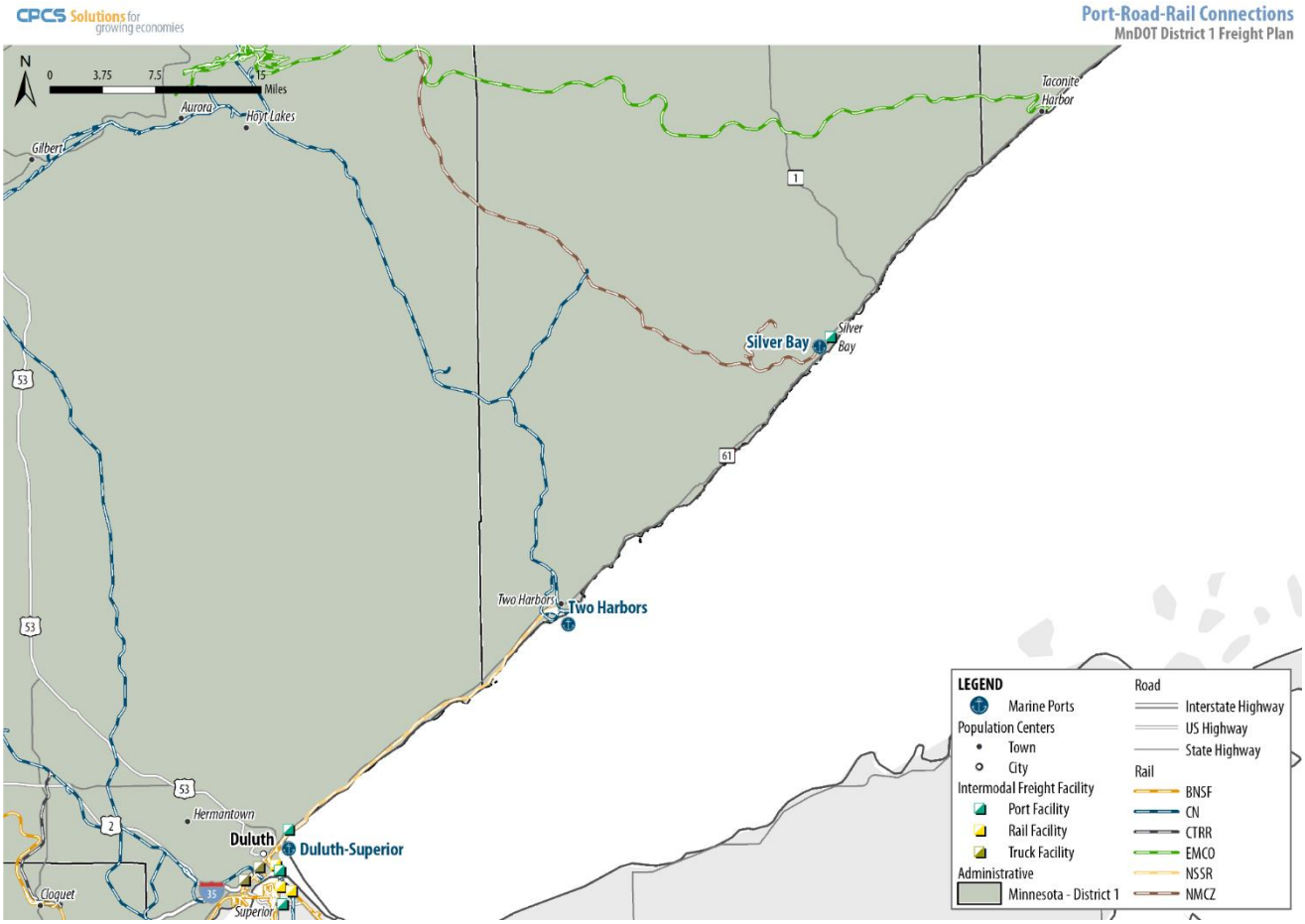
Source: CPCS Transcom Inc. analysis of National Transportation Atlas Database. 2017.

Figure 16: District 1 Rail Volumes and Average Track Speeds



Source: CPCS Transcom Inc. analysis of National Transportation Atlas Database. (2017) and MnDOT Freight Railroad Map.

Figure 17: District 1 Ports and their Multimodal Connections



Source: CPCS Transcom Inc. analysis of National Transportation Atlas Database. 2017.

Among the District's three ports, the Port of Duluth-Superior is particularly important as it is the largest freshwater port in the US, is ranked among the top 20 US ports in terms of cargo tonnage, and hosts an annual average of nearly 900 vessel calls. In 2017, the Port of Duluth-Superior handled a total of about 35.3 million tons of cargo. Of this total tonnage, 31.1 million tons (88%) was outbound from the port, and about 75% was domestic tonnage. Iron ore, grain, and coal are the main commodities served at the port, but the Port also has a public terminal, the Clure Public Terminal, that can handle a wide range of cargoes such as wind turbine components, mining equipment, heavy machinery, and specialty bulk products. This ability to handle a wide range of cargoes has made Duluth's port relevant to a wide range of industries through and surrounding District 1.

Aviation

Aviation plays a much smaller role in moving cargo but can be extremely important for businesses dealing in high-value, time-sensitive cargoes such as electronics or pharmaceuticals. Figure 18 shows the commercial airports that are located in the District. Duluth International Airport (DLH) is the largest facility, but the Falls International Airport (INL) and the Range Regional Airport (HIB) are also part of the air cargo network. INL and HIB are both primarily dedicated to general operation, however limited passenger services at both airports are subsidized through *Essential Air Service (EAS) Act*.[3]

Figure 18: District 1 Commercial Service Airports

Airport	ID	Location	2017 Enplanement	2016 Enplanement
Duluth International	DLH	Duluth	122,717	124,284
Range Regional	HIB	Hibbing	15,377	12,654
Falls International-Einarson Field	INL	International Falls	15,278	13,831

Source: FAA "Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports" (2017).

Other than the three commercial airports located in the District, the area is close to Bemidji Regional Airport (BJI) and the Brainerd Lakes Regional Airport (BRD). In addition, DLH is located 160 highway miles from Minneapolis-St. Paul International Airport (MSP).

Duluth International Airport

The cargo terminal at DLH has two major operators: FedEx and UPS. In the case of FedEx, small feeder aircraft are either destined for Minneapolis–St. Paul International Airport (MSP) or Rochester International Airport (RST). UPS also collects cargo from DLH and carries it to its freight hub at MSP.

Range Regional Airport

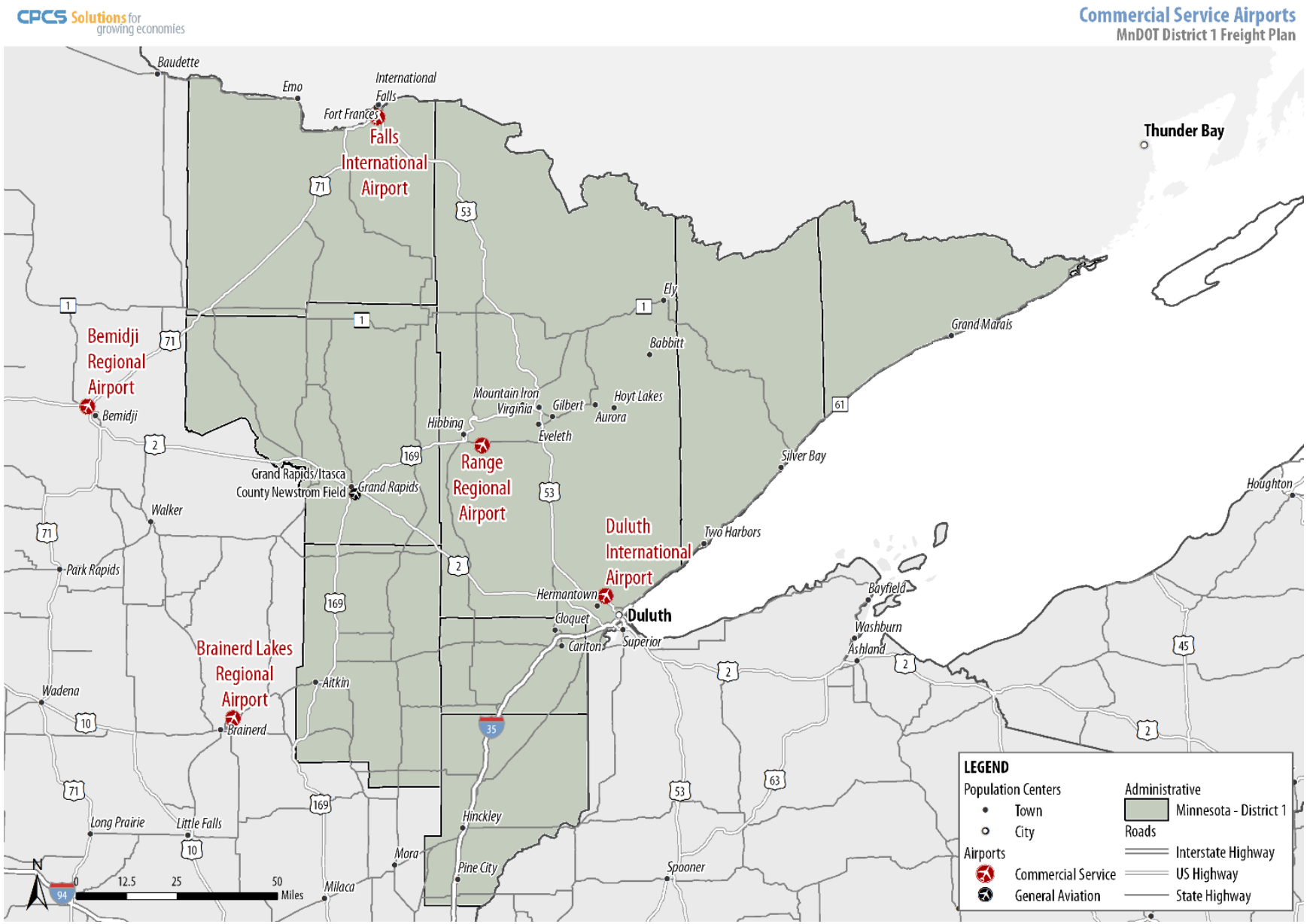
Range Regional Airport (HIB) is a commercial airport in Hibbing. The airport is mostly used for general aviation and Delta Connection is the only commercial airline serving HIB, with connections to MSP. HIB is also home to the Range Regional Airpark, 60 acres of industrially-zoned land with access to both the airport and MN-37. The Iron Range Resources and Rehabilitation Board (IRRRB) and other local partners have been using the Airpark to attract local economic development.

Falls International Airport

Falls International Airport (INL) in International Falls is also served by Delta Connection, with routes to Minneapolis (MSP airport) and Hibbing.

[3] EAS was enacted as a response to *Airline Deregulation Act* of 1978 which enabled the airlines to define their own market and fare system. EAS ensures that small communities have a minimum level of scheduled air service. For more information see the USDOT's aviation policy page at: https://www.transportation.gov/policy/aviation-policy/small-community-rural-air-service/essential-air-service

Figure 19: Commercial Airports in the District



Source: CPCS Transcom Inc. analysis of National Transportation Atlas Database (February 2018)

Chapter 3: How is District 1 Changing?

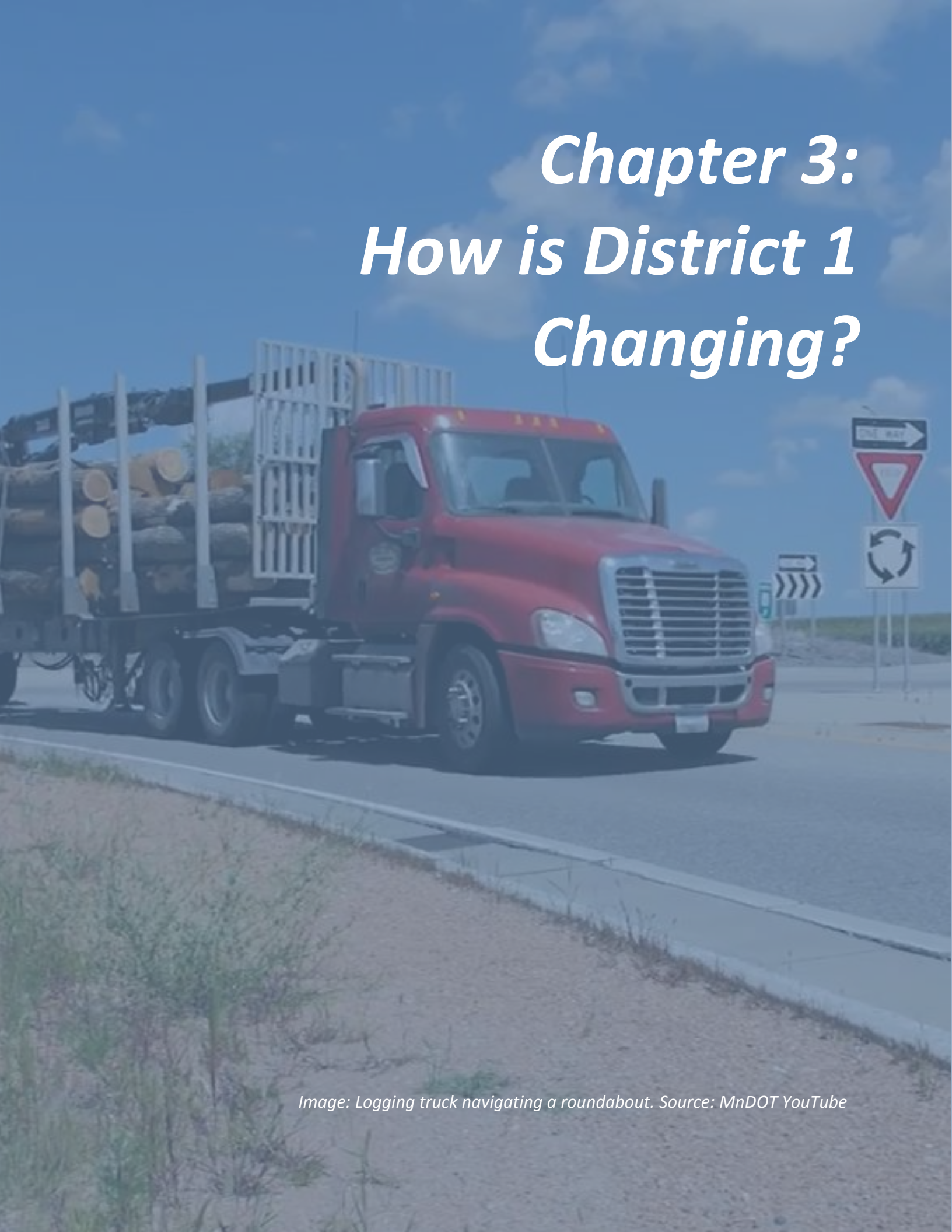


Image: Logging truck navigating a roundabout. Source: MnDOT YouTube

Chapter 3: Key Needs, Issues and Challenges

District 1 Freight System Needs and Issues

District 1's freight needs and issues are complex, and many needs and issues have shared causes or solutions. This complexity and "overlap" can make categorization of needs and issues difficult. For example, the need for additional passing lanes on the District's two-lane freight corridors is related to both the issues of mobility and safety: slower-moving trucks can reduce the free-flowing speed of traffic, and passenger vehicle drivers may attempt to pass on two-lane roads, increasing the potential for collisions.

For simplicity, the needs and issues discussed in this Chapter are described on a mode-by-mode basis. Within each mode, needs and issues are placed in three categories that were adapted from the Minnesota State Freight Investment Plan criteria:

Safety, which is primarily related to crash rates for roads as well as railroad grade crossings, and MnDOT's previous safety risk factor analyses.

Mobility, which is related to the performance of the system and the speed and ease with which freight can move in the region. This includes topics like congestion, weight limits and bridge clearances.

Condition, which relates to the level of adequate maintenance of roads and bridges.

Identification of needs, issues, and challenges was accomplished using five sources of data, described in Chapter 1 of this report:

Analysis of quantitative data from MnDOT

Review of findings from previous plans and studies

Stakeholder consultations

Advisory Committee and Technical Team feedback

Feedback received at open houses

The key needs, issues, and challenges in this section reflect findings from all five data sources. It is important to note that the topics discussed here are only the "top" issues for District 1, and more detailed analysis for Needs, Issues, and Challenges is available in Working Paper 3: Needs, Issues, and Opportunities.

Roadways

This road-related majority share of needs and issues reflects the fact that trucking is the most commonly used mode for freight transportation, carrying about 63 percent of Minnesota's freight tonnage. Additionally, MnDOT and its local partners have the most control over road investments and the largest amount of their funding is available for road investments. By comparison, these agencies have relatively limited control over, or funds for rail, port, or aviation improvements.

Road- and trucking-related needs and issues make up the majority of District 1's freight needs and issues.

Safety

Passenger and Freight Conflicts

There are two main conflicts between passenger and freight traffic, and both relate to the fact that these two kinds of traffic must share the same routes in the District. First, trucks are generally slower than passenger vehicles, and may be particularly slow on hills and when accelerating from stops. As a result, there are concerns with safety-related to passenger vehicles passing trucks on two-lane roads, particularly in hilly areas.

Second, there were concerns about potential conflicts between tourist traffic and truck traffic. These concerns included comments about road safety with tourists pulling over on shoulders to take pictures on Highway 61, general tourist congestion on I-35 and MN-61 on weekends, and congestion generated by tourist traffic at major attractions and events, such as Grandma's Marathon, Bentleyville in Duluth, and some casinos, such as Fortune Bay Casino near Tower.

Intersections

Many of the intersection safety needs and issues for trucks are related to their relatively slow speed and acceleration compared to passenger traffic, and their need for adequate space to safely turn and accelerate. Stakeholder feedback on safety issues covered the entire District and focused on intersections in or near urban or suburban areas, including Duluth, Virginia, Hibbing. Ultimately, stakeholders noted relatively few safety issues in rural areas, with the exception of northern St. Louis County.

Many intersection needs and issues relate to trucks' slow speed relative fast-moving traffic when turning or entering traffic, and trucks' need for greater space to accelerate, decelerate, and turn.

These needs and issues can be described by key themes:

- **Highway 169** was mentioned in one-quarter of the Manufacturers' Study comments about intersection safety, due to tight turns and sight obstructions, as well as congestion in some of the Range Cities.
- **Concerns about space for turning, acceleration, and for traffic to pass stopped trucks were common** among stakeholders, and a need for turning or bypass lanes was mentioned frequently on trunk highways outside of the Duluth area such as US-169, US-2, US-53, and MN-61. Specific locations for additional turning or bypass lanes included: US-169 and MN-47 near Aitkin, MN-61 in Two Harbors, US-169 and County 5 between Chisholm and Buhl, and US-53 and P&H Road, which provides access to ArcelorMittal's Minorca mine as well as a large mining equipment supplier.
- **Inadequate stopping sight distances for trucks** means safely stopping at intersections can be a concern. During the Manufacturers' Perspectives study, about 25 percent of businesses mentioned a need for advance warning for intersections or traffic signals, such as warning lights. Particularly important areas for these improvements were US-53 in Virginia, US-169 and County 92 in Hibbing and US-2 in Adolph. These improvements could also improve mobility, as advance notification of upcoming traffic light changes prior to an intersection could help truck drivers know if they should prepare to stop, or are OK to proceed through an upcoming intersection.
- Visibility of oncoming traffic, or **impaired sightlines at skewed intersections** was a common safety-related intersection concern, particularly in relation to hills, turns, or trees, however relatively little information on specific locations was provided.
- Driver behavior at intersections, such as **failure to stop** was also a concern, but stakeholders did not provide much information on specific locations where drivers were running stop signs or red lights.
- Some **railroad grade crossing** issues were noted, and are discussed in Section 2.3.

Stakeholders identified many more intersection safety needs and issues than were identified from an analysis of previous truck-involved crashes, and generally, there was little overlap between data-identified needs and issues, and stakeholder-identified needs and issues. Notable overlaps between stakeholder- and analysis-identified needs and issues were:

- The I-35/MN-45 interchange near Cloquet.
- The intersection of Swan Lake Road and US-53 in Independence.
- Intersections on US-2 near the UPM Blandin plant in Grand Rapids, where a stakeholder noted a need for an additional traffic signal.

In general, stakeholders' comments about safety tended to be clustered in more developed areas, including Duluth, Virginia, Chisholm, Hibbing, Two Harbors, and Aitkin. However, previous crashes and the District 1 risk assessment identified needs and issues were focused on rural areas. This difference is likely due to the fact that stakeholder concerns about safety included both "minor" and "major" safety concerns, while the crash data focused on more severe crashes and risk analysis was not conducted for truck-specific factors but reflects risk for all road users as a whole. Ultimately, this gap suggests that until truck-specific safety/risk factors are developed and implemented, stakeholder feedback may be a useful means of informing truck-specific safety investments, providing a complement to MnDOT's approach to assessing risk for all road users.

Corridors

As with intersections, some safety concerns for corridors are related to trucks' slower performance relative to passenger traffic. The two major safety-related needs and issues for corridors were (1) a need for wider and/or paved "hard" shoulders, and (2) a need for additional passing lanes.

Harder and wider shoulders are desirable because they give truckers extra room to control their vehicles and avoid potential hazards. Stakeholders generally noted a need for wider or harder shoulders on less-traveled state trunk highways and county highways, including MN-210, MN-73, MN-38, MN-65, MN-37, and St. Louis CSAH 5. However, details provided by stakeholders were often vague: stakeholders often noted that all or most of a route needed passing lanes or improved shoulders. Because of this relatively vague feedback, stakeholder-recommended areas for shoulder improvements cover more routes than areas that MnDOT data identified as having potential safety problems.

In addition to harder or wider shoulders, many stakeholders noted that the District needed more passing and climbing lanes, to allow traffic to safely pass slow-moving trucks without danger of collision with oncoming traffic. Specific areas where passing or bypass lanes were recommended included MN-37 from Hibbing to US-53, and US-169 around Aitkin. More generally, stakeholders contacted during the Manufacturers' Perspectives study recommended that rural highways have passing lanes every five to ten miles.

Many stakeholders would like wider or paved shoulders, as well as passing lanes, but less have specific requests for the placement of this infrastructure.

The overlap between stakeholder and data-identified corridor safety needs is relatively limited and includes:

- US-169 from Aitkin to Hill City
- MN-65 north of Nashwauk
- US-53 around the Miller Hill area of Duluth
- US-169 and local routes near Hibbing

Additionally, many stakeholders noted that MN-210 is an important trucking corridor with no shoulders. As before, this small overlap between stakeholder-identified and data-identified issues is likely due to the fact that industry stakeholders provided more generalized feedback on long stretches of roadway.

Ultimately, the general nature of stakeholder feedback on corridor-related safety issues suggests that MnDOT should consider the creation of additional passing lanes or wider shoulders while re-building existing roads, but standalone projects to add this infrastructure may not be warranted.

Weigh Station and Commercial Vehicle Enforcement

During the Manufacturers' Perspectives Studies, some stakeholders noted that a lack of consistent commercial vehicle enforcement practices was a problem, as some regulations were interpreted differently by different officers. As a result, it was difficult for truck operators to fully understand what actions they needed to take to be in compliance with Minnesota's truck laws.

The recently completed *Minnesota Weight Enforcement Investment Plan* also notes that the Blatnik Bridge is one of Minnesota's highest-ranked sites in need of further enforcement investments, as the bridge is a critical connection,

is weight-posted, and is due for reconstruction in the future. The bridge's location in the Twin Ports area leaves limited space for current weight enforcement activities, and the *Weight Enforcement Investment Plan* recommends the development of a specific plan for weight enforcement for the Blatnik Bridge. The re-activation of an I-35 weigh station in Carlton could help screen traffic using the Blatnik Bridge. A second District 1 issue (albeit less important) is the pull-off weight enforcement site along US-2 in Saginaw which also has long-term improvement needs.

Mobility

Mobility considerations include topics that affect the ease or efficiency of truck movements in District 1. These topics include things like traffic congestion, truck routing, bridge clearances, and weight limits. Many of the mobility considerations also have strong relevance to safety.

Intersections

An intersection concern related to mobility is the challenge roundabouts create for truck operations. While District 1 has very few roundabouts, stakeholders consulted for the Manufacturers' Study, the DSMIC Truck Route study, and this Freight Plan asked that future roundabouts be designed to accommodate a wider range of trailers beyond 53' dry vans and flatbeds, including over-length trailers and low-boy trailers.

Another intersection mobility improvement noted by some stakeholders was a desire for additional traffic lights or re-timed traffic lights. US-2 in Grand Rapids, MN-61 in Two Harbors, and MN-65 and US-210 near Nashwauk were all areas where additional traffic lights or signal timing adjustments were recommended.

Corridors

One measure of corridor mobility, traffic congestion, is not an issue in District 1. Very few stakeholders mentioned congestion as a problem, and only seven relatively short road segments were identified as having a relatively high level of congestion. The only congested areas identified by stakeholders were downtown Two Harbors, and the Twin Ports Interchange, while data analysis also identified some minor congestion in downtown areas of the Range Cities, primarily Virginia.

Traffic congestion is not a mobility concern for District 1.

Regional Connectivity

Freight does not stop at District 1's boundaries, and connections to other regions or global markets are critical for many of the District's businesses. Needs and issues both inside and outside of the District can affect its connections to other areas and the well-being of businesses that rely on the freight system. The District's connectivity needs and issues are:

Lack of redundancy. During Advisory Committee meetings, a commonly-mentioned issue for District 1 is its lack of redundant roads for critical corridors. For example, Highway 61 is the only route connecting much of the North Shore, and the only route to Thunder Bay. Similarly, US-2 and US-53 provide critical connections to Range Cities but lack parallel routes that could easily accommodate

detoured traffic while providing similar travel times or distances. This lack of redundancy extends to other highways as well, such as US-2, and US-53 in Wisconsin, which provide District 1 with connections to the Upper Peninsula and Chicago, respectively. This lack of redundancy is a concern because road closures (due to events such as accidents or severe weather) mean that trucks must make long detours. For example a brief shutdown of MN-61 at Taconite Harbor in 2017 resulted in a 27+ mile detour, mostly on dirt or gravel roads. In the future, this lack of redundancy for key routes could be a threat for the District's businesses, who would have to absorb the cost of longer travel times if a major corridor is impassible for long amounts of time.

Weight Restriction Differences. A commonly-noted issue in District 1 and the Midwest as a whole is asymmetry in weight restrictions between different states. This difference in weight limits means that trucks traveling over state or provincial borders must be sub-optimally loaded. For example, one stakeholder noted that Minnesota's relatively lower weight limits compared to Wisconsin and Ontario meant that trucks sent to Minnesota must be under-loaded, or loads must be broken down and re-organized in Superior.

Route Restrictions

Low Vertical Clearances. Low vertical clearances, particularly under bridges, were identified as a mobility impediment in both stakeholder feedback as well as an analysis of MnDOT's bridge data. Stakeholder feedback included identified issues with bridge clearance on Superior Street and Piedmont Avenue in Duluth, US-2 in Saginaw, US-165 west of Buhl, and Highway 2 in La Prairie. By comparison, analysis of MnDOT's bridge data identified 19 bridges that were lower than FHWA-recommended standards. There was significant overlap between data and stakeholder feedback about low-clearance bridges, such as the bridges listed above.

Spring Restrictions. About one-quarter of businesses consulted for the Manufacturers' study noted that spring load restrictions affect their operations, and these restrictions were particularly relevant for forestry-related businesses, who carry much of their raw lumber at the end of the winter. Ultimately, these restrictions make freight movement less efficient, as trucks cannot carry as much weight when restrictions are in effect. Stakeholders did not note specific locations where spring load restrictions impacted their businesses.

10-Ton Routes. Roads that lacked construction to 10-ton standards were noted as another impediment to freight mobility, although specific mention of a need for 10-ton roads was limited to a few stakeholders in the Manufacturers' study. Analysis of the 10-ton network shows that overall, District 1 has relatively few gaps in 10-ton route designations, with the exception of more minor county highways. This suggests that from a weight perspective, truck mobility is high on major corridors, but there may be first- and last-mile weight-related mobility impediments on local roads.

Restricted routes and movements for OSOW. Together, the height and weight restrictions listed above can create barriers to the efficient and safe movement of Oversize-Overweight or even "regular" freight in District 1. For example, two-thirds of the Manufacturers' study participants noted that weight limits adversely affected their truck operations.

Other Mobility Needs and Issues

Snow and Ice Removal. District 1 has some of the highest snowfall of any portion of Minnesota, and snow and ice have the potential to seriously disrupt trucking operations. During the Manufacturers' study, stakeholders provided input on areas to improve snow and ice removal. Stakeholders also expressed concern about the use of chemical and brine de-icing solutions, which were rapidly corroding trucks and trailers, resulting in higher equipment maintenance costs.

Construction and Closure Announcements. During previous outreach for the Manufacturers' Perspectives study, some stakeholders indicated that they would like better communication from MnDOT about road closures and construction so that they could adequately plan their truck operations. Suggested solutions included better use of social media and improved signage listing dates and times of potential construction.

Infrastructure Condition

Infrastructure condition is important for two reasons. First, poorly-maintained infrastructure can damage vehicles and cargo, or force trucks to travel at slower speeds, effectively increasing travel costs for District businesses. Second, structurally-deficient infrastructure may necessitate lower weight limits, which could result in longer routes for trucks. This discussion of infrastructure condition is broken down into two parts: pavement condition and bridge condition.

Pavement Condition

Stakeholders have indicated that smooth pavement is important for the safe shipment of their goods, as rough pavement can result in damaged cargo. Small portions of the District have a MnDOT-assessed ride quality that is considered "poor" or worse, but stakeholders identified a relatively large number of road segments as being particularly rough. By comparison, MnDOT's Ride Quality Index ratings identified a separate set of issues, including shorter segments of rural roads. The difference between MnDOT- and stakeholder-identified needs is likely due to the fact that stakeholders have the most experience operating on major freight corridors, while MnDOT's pavement assessment considers less-traveled trunk highways as well as major corridors. In either case, MnDOT has indicated that condition needs and issues identified during analysis all have programmed improvement investments in coming years, so condition is a long-term need or issue for the District.

Bridge Condition

While some stakeholders are concerned about bridge clearances, the condition of the District's bridges was not mentioned as a need or issue. This lack of stakeholder concern generally aligns with previous findings that District 1's trunk highway bridges are in relatively good repair. However, MnDOT bridge inventory data indicates that bridge condition problems are focused on the local road network, and District 1 has the lowest overall average bridge sufficiency rating of any District.

Ultimately, the lack of stakeholder concern about bridge condition, and the low number of deficient bridges on the interstate and truck system suggests that bridge condition is not a major impediment to freight in the District.

District 1 has a large number of structurally deficient bridges, but these are concentrated on local roads and have not been an impediment to freight movement.

Railroads

Safety

Grade Crossings

Relative to other road-related topics, grade crossings received much less mention from stakeholders. In general, stakeholders mentioned problems with congestion and delays caused by rail traffic, particularly in Ranier and Hinckley.

From a data perspective, MnDOT's safety analysis of District 1's grade crossings identified the CN mainlines between Duluth and Canada as corridors with the highest levels of risk, along with crossings near Duluth and Hinckley. These areas of highest risk for incidents generally align with stakeholder feedback, with the exception of the Scenic Highway 61 crossing near Two Harbors, which was not considered high risk. However, MnDOT's risk analyses identified far more "risky" crossings than were identified by stakeholders. This difference in perceived risk between stakeholders and analysis could be due to the fact that grade crossing incidents are relatively rare in District 1 (and thus not a key concern for stakeholders), while a risk assessment evaluates risk on a variety of factors beyond previous crash history.

Mobility

Historically, many past studies and plans noted a need for truck-rail intermodal service as a key rail mobility concern for the District. Since the creation of the Duluth Cargo Connect intermodal terminal, this key need has been addressed. However, concerns about the competitiveness and reliability of rail service remain, particularly in the Range Cities.

Competitive and Reliable Service

In general, the operation of four Class I railroads in the District, particularly in Duluth, is seen as a competitive advantage. However, some firms outside of Duluth expressed a desire for more competitive rail service. In particular, rail service quality is a major concern, as declines in the reliability of rail service threaten the competitiveness of firms and force freight onto the road network. The recently-completed *Northeast Minnesota Freight Rail Opportunity Study* provides deeper up-to-date insight on these concerns, and examples include:

- Railroad mergers and management changes resulting in a reduced focus on quality service in the Iron Range in favor of supporting cross-continental intermodal unit trains.
- Energy booms in the United States and Canada reducing available motive power and employee resources for operations in Minnesota.
- Railroad motive power and employee shortages reducing service quality in Minnesota.
- Captive markets served by only one Class I railroad, with less-favorable rates or service quality as a result.

Since railroads are privately owned and operated, there may be little opportunity to introduce new rail competition into most areas of District 1. The Northeast Minnesota Freight Rail Opportunity Study reached a similar conclusion, noting that creation of a short line railroad could be legally and operationally difficult, and may not yield many benefits due to ongoing operational problems on the Class I railroads a short line would connect to. Instead, the study investigated the feasibility, costs, and benefits of various infrastructure improvements on Class I railroads in the District.

Infrastructure Condition

Bridge Condition

This District 1 Freight Plan does not include a detailed assessment of railroad bridge conditions, however, the 2015 State Rail Plan noted two areas in the District where bridge improvement or replacement is needed:

- **Grassy Point Bridge.** The Grassy Point Bridge between Duluth and Superior was built in 1912 and may need to be replaced in the future. A proposed replacement that could provide faster service between Superior and Duluth was estimated to cost $51 million.
- **BNSF Bridges on Hinckley Subdivision.** The BNSF line from Duluth to the Twin Cities has four single-track bridges that need replacement. The cost to replace these bridges was estimated at $25 million.

Track Condition

Generally speaking, the District's railroad assets are in good condition, and capable of handling large volumes of freight at relatively high (45+ mph) speeds. The exceptions to this are the CN's connections between the Iron Range and Two Harbors, and short line railroads like the Northshore Mining line to Silver Bay, St. Croix Valley, and NSSR, which have slower speed limits.[4]

Ports and Waterways

Many of the port and waterway needs and issues related to road needs and issues discussed above, as truck access to the port, was a frequent concern. However, there are also some unique maritime needs and issues related to maintenance of channels and harbors, and preservation of port adjacent land use.

Mobility

Improve OSOW access to Duluth-Superior

The Port of Duluth handles a large volume of oversize-overweight (OSOW) freight that arrives or departs from the Port via truck. There are three potential barriers to the movement of these oversized loads that were mentioned by stakeholders, and identified in data analysis:

- Low-clearance bridges, particularly Jenswold Street immediately west of the CN ore docks.
- Steep hills for leaving the port and traveling, west, south, or north.
- Tight curves and blind merges by the Blatnik Bridge and Twin Ports Interchange.

Some of these access issues will be addressed by the ongoing development of the new Twin Ports Interchange.

[4] Minnesota Freight Railroad Map. OFCVO. June 2015.

Infrastructure Condition

Harbor and Channel Maintenance

Port stakeholders noted that maintaining adequate harbor and channel depth can be a challenge because dredged materials contaminated with industrial runoff or other pollution must be treated or disposed of properly, and there is limited space to dispose of dredged material onshore. Furthermore, the US Army Corps of Engineers, which administers dredging programs, has a dredging backlog, which means that dredging needs may not be met in a timely manner.

Preserve Harbor Land for Industrial Use

Waterfront property suitable for industrial use may also be attractive to commercial and residential development, creating potential land use and passenger-freight conflicts if waterfront industrial land is re-developed as residential or commercial property. Port-related stakeholders have recognized the importance of preserving land for industrial use, and the Duluth-Superior Port Land Use Plan provides local stakeholders with information on port land use, and guidance on how industrial land uses should be preserved.

Anticipating and Interpreting Future Changes

District 1's freight system and freight operations are closely intertwined with the US, Canadian, and global economies, and changes in District 1's system and operations are influenced by a wide combination of Social, Technological, Environmental, Economic, and Political (STEEP) factors. Given the complexity of supply chains and the factors that affect them, it can be difficult to forecast how freight system use may change in the future. However, considering STEEP factors provides a "lens" through which future changes may be anticipated and interpreted.

Freight supply chains and industry operations reflect market conditions that are determined by a myriad of potential factors. Understanding major factors can help planners anticipate potential freight changes in the future.

Population

The population of District 1 as a whole is aging and some areas have shrinking populations. While productivity has increased in places such as the Iron Range, it has become more difficult for some companies to find employees. For example, local firms are occasionally forced to retain poorly-performing employees due to an inability to find replacement workers.[5] This declining population base may continue to make it harder for the District's freight-reliant firms to find employees and put the District at an economic disadvantage to more-populated areas. In turn, this decline could reduce use of the freight system.

[5] Consultation with Carlton County Economic Development Association

Smart Technology

The proliferation of smart technology – smartphones, wearable devices, as well as the rise of the "Internet of Things" – sensors and actuators embedded in physical objects that are linked through networks, will continue, providing increasing information connectivity. In the transportation sector, this smart technology includes mapping applications on smartphones, in-vehicle GPS units, and roadside data collection systems such as cameras equipped with vehicle-recognition software, or weigh-in-motion systems. These transportation technologies are generating a wealth of data for both private and public stakeholders. Additionally, their real-time nature is helping to improve operations, including timely incident response and management, truck availability communications, and plowing operations. These improvements may help District 1's freight transportation system (particularly trucking) operate more efficiently in the future.

Connected and Autonomous Vehicles

Autonomous and driverless vehicles are likely to become integrated components of transportation systems for both freight and passenger users in the future. Nearly a dozen companies are currently testing driverless cars, and for freight, (semi-) autonomous trucking is being spearheaded by a handful of companies including Volvo, Daimler, Peloton and others, with fully autonomous trucking on the near-term horizon. Adoption of connected and autonomous vehicles is likely to have impacts on the District's traffic safety, trucking company business models, and as overall use of the transportation system.

Climate Change

The Earth's average temperature has risen by 1.5°F over the last hundred years and is projected to continue to rise over the next century. A warmer climate in Minnesota will result in more freeze-thaw cycles each year, with a likely increase in pavement damage. Furthermore, these milder winters are already reducing the available winter harvest season and viable tree species for forestry products, a major freight system user in District 1. In addition to milder winters, the District is also more likely to experience severe rainfall events, and these events can weaken road and bridge structures, and may disrupt transportation routes.[6] Routing disruptions will substantially affect the freight system as there are not redundant trunk highways in some part of the District. Ultimately, the District may need to make further investments in bridges, culverts, and other storm water control methods to improve highway infrastructure's resiliency for severe rainfall events.

[6] Midwest Economic Policy Institute https://midwestepi.org/2017/10/10/new-study-warns-of-changing-climates-impact-on-midwest-infrastructure/

Changing Energy Future

Minnesota's state leadership and many other US states have expressed a desire to focus efforts on reducing air emissions, which will likely impact the freight transportation system through possible changes to motor fuel taxes or regulations.[7] A drive to reduce emissions has also supported development of robust wind power resources, the components for which are often routed through the Port of Duluth and other trunk highways. Additionally, rail traffic patterns in the District may change as coal-fired power plants are taken off-line in favor of natural gas and renewables, and coal unit train traffic is reduced.

US-Canadian Partnerships

The topic of partnership between the US and Canada is particularly relevant to District 1 because it shares a land border with Ontario, has access to markets in Greater Ontario and Quebec via the Great Lakes and the St. Lawrence Seaway, and has strong links to the steel industry in Ontario and Quebec. Some transportation-related political considerations between the US and Canada include potential changes of Hours of Service at border crossings and continued investment in the St. Lawrence Seaway.

Evolving US and Global Trade Policies

The newly-formed US-Mexico-Canada Agreement (USMCA) was a key priority of the Trump administration, and some of the current amendments from NAFTA for the USMCA relate to automotive production practices and part sources, both of which could create greater demand for iron ore in District 1. The ongoing US-China Trade War is also altering District 1's freight patterns. In 2017, 30 percent of Duluth-Superior's loaded ore was bound for foreign markets (primarily China). However, the tariffs imposed by the US have resulted in a boost to the US steelmaking industry. Indeed, ore, slag, and ash exports are up 52 percent from 2017, though the sustainability of these exports is in question given continued trade conflict.

Infrastructure Investment – Soo Locks

A number of key investments are influencing global trade patterns, but most pertinent to the Great Lakes-St. Lawrence system is the aging infrastructure of the Soo Locks. Minnesota and the Upper Peninsula of Michigan are the main sources of iron ore for the United States, and maritime transportation is the most cost-effective method of transporting ore to Great Lakes steel mills. As a result, the supply chain of iron mining, steel production, and steel-based manufacturing is dependent on the Soo Locks. Continued funding for upgrades to the locks and routine maintenance is needed to ensure that the US steel-based manufacturing sector is not impeded, and a failure of the Soo Locks could paralyze District 1's mining industry.

[7] Dunbar, E "New Environment Commissioners Talk Climate Change, Water Quality", MPR News, Jan 4, 2019 https://www.mprnews.org/story/2019/01/04/new-environment-commissioners-talk-climate-change-water-qualitym

Chapter 4: How Will We Guide Ourselves Moving Forward?

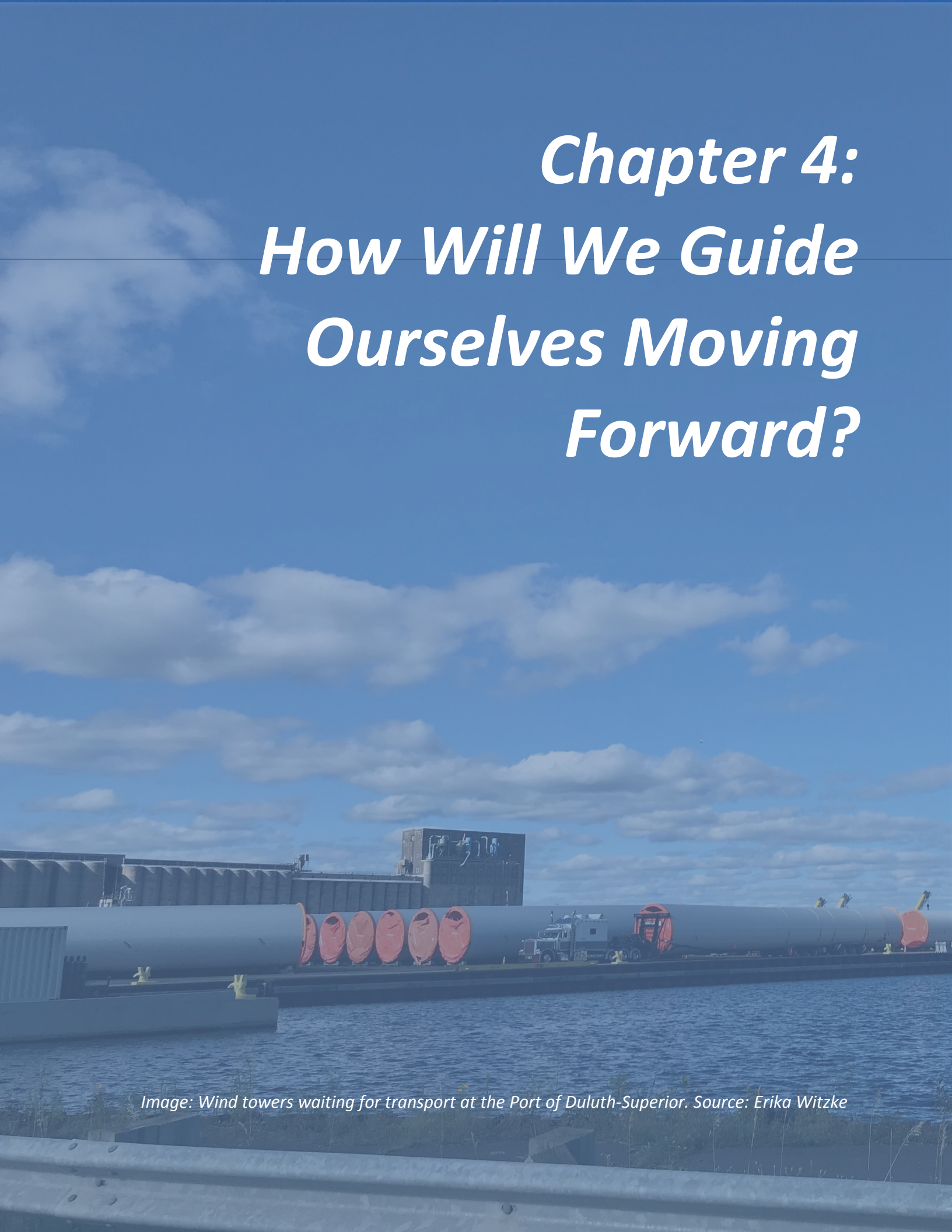


Image: Wind towers waiting for transport at the Port of Duluth-Superior. Source: Erika Witzke

Chapter 4: Project Funding and Prioritization

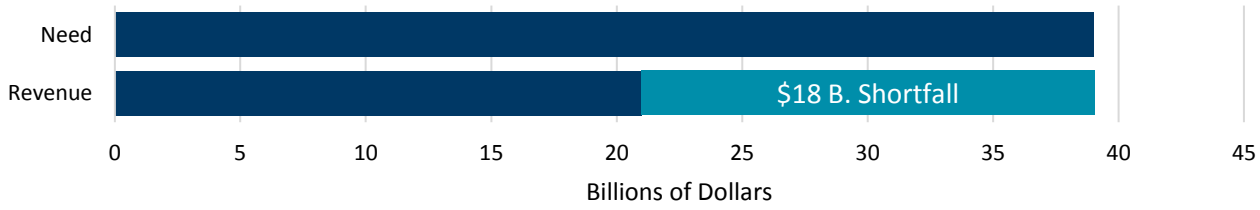
Funding Sources for Freight Improvements

Minnesota State Highway Investment Plan

Previous plans for District 1, Minnesota, and the nation as a whole have indicated that a relative lack of funding for transportation infrastructure maintenance, improvement, and expansion is a key challenge. For example, MnDOT's fiscally-constrained capital program, the 2018-2037 Minnesota State Highway Investment Plan (MnSHIP), estimates that over the next 20 years, $39 billion of investments are needed to support the state highway system, but only $21 billion will be available. As a result, there is an estimated $18 billion funding gap.

This lack of funding has two major causes: construction costs are growing more quickly than revenue, while revenue growth continues to slow down. The revenue gap is particularly relevant to District 1, which has an extensive transportation system but lacks the population (and thus tax base) to support the level of investment needed to maintain the system.

Figure 20: Minnesota Highway Investment Need and Forecasted Revenue, 2017-2037



Source: Adapted from Minnesota State Highway Investment Plan, 2017

The condition of the District's freight system will be more difficult to maintain in the future, as revenue will grow more slowly than increases in maintenance costs.

The Minnesota State Highway Investment Plan outlines the strategic direction for the state and aims to balance competing investment priorities that include enhancing the condition of the existing system and building new infrastructure. This is a challenge given the gap between available revenue and system need. But, to aid MnDOT in ensuring adequate funds are being directed toward system needs, the MnSHIP has established investment objectives and investment categories – wherein a single MnDOT project may include investment from multiple categories, and MnDOT can track that overall investments are being made in priority areas. Figure 21 illustrates this investment direction and highlights the fact that the System Stewardship objective, which is focused on strategically building, managing, maintaining, and operating all transportation assets, receives nearly 70 percent ($14.46 billion) of available funds. Projects that improve pavement condition (49 percent) and bridge condition (11 percent) receive most of this Stewardship funding.

Project delivery ($3.27 billion, 16 percent) is the second-largest category behind pavement condition and is aimed at implementation, which is key to improving the system.

The 2018-37 MnSHIP marks the first time MnDOT identified dedicated freight funding for projects.

The Critical Connections objective ($1.55 billion, 7.4 percent) is focused on maintaining and improving multimodal transportation connections, as well as strategically considering new connections. This objective includes a freight-specific investment category ($610 million, 2.9 percent) that is directly linked to the *FAST Act*-established National Highway Freight Program (NHFP). As part of this program, Minnesota will receive approximately $20 million a year to make freight-related improvements to the highway system. However, up to 10 percent of the funds can be used for public or private freight facilities such as rail, water, and intermodal facilities. MnDOT has established the Minnesota Highway Freight Program (MHFP) with these funds.

Figure 21: Minnesota's 20-Year Capital Highway Investment Direction

Investment Objective	Investment Category	2018-2037 $ (B)	Percent Share
System Stewardship	Pavement Condition	$10.31	69.2%
	Bridge Condition	$2.38	
	Roadside Infrastructure	$1.60	
	Jurisdictional Transfer	$0.09	
	Facilities	$0.08	
Transportation Safety	Traveler Safety	$0.67	3.2%
Critical Connections	Twin Cities Mobility	$0.24	7.4%
	Greater Minnesota Mobility	$0.03	
	Freight	$0.61	
	Bicycle Infrastructure	$0.14	
	Accessible Pedestrian Infrastructure	$0.53	
Healthy Communities	Regional and Community Improvement Priorities	$0.31	1.5%
Other	Project Delivery	$3.27	18.7%
	Small Programs	$0.6	
	Total	$20.89	100%

Source: Adapted from Minnesota State Highway Investment Plan, 2017

Freight and passenger benefits are often complementary, and it is important for planners to remember that freight benefits can be gained through non-freight-specific program spending, for example, programs that fund routine roadway maintenance provide benefits to cars and trucks, alike. Leveraging these sources of funding that are not traditionally considered "freight funding sources" may require planners to make adjustments to their routine planning processes, so that freight needs and issues can be addressed as part of ongoing capital, operations, and maintenance activities.

Freight-Specific Funding

The *FAST Act* ushered in a new era of freight project implementation by establishing the National Highway Freight Program, and MnDOT recognized this by introducing an investment category dedicated to freight in the MnSHIP. However, MnDOT has a history of providing grant and loan funding for freight-related projects as shown in Figure 22.

Figure 22: Overview of MnDOT Freight-Related Funding Programs

Source	Funding Available	Eligible Uses
Minnesota Highway Freight Program (MHFP)	**$98 million** total programmed through 2022	Program funds are broad and include improvements such as climbing lanes, traffic signal optimization, and railway-highway grade separation, among others.
Railroad At-Grade Crossing Safety Program (Section 130)	**~$6 million** per year, federal and state match	Closures/consolidations of railroad crossings and railroad crossing safety projects at high-risk locations.
Minnesota Railroad Service Improvement Program (MRSI)	**~$900,000** per year, not regular	Projects that improve "fixed assets" such as railroad roadbed, tracks, turnouts, bridges, buildings, and fixed loading/unloading equipment.
Port Development Assistance Program	**~$3-5 million** every bonding year	Projects that improve or develop a commercial navigation facility or its components, including dock and terminal repair, on-dock equipment, etc.
Weigh Station and Commercial Vehicle Safety/ Enforcement Program	**$2 million** per year, state funds	Projects that maintain or improve commercial vehicle enforcement and safety.

Source: Adapted from MnDOT Office of Freight and Commercial Vehicle Operations.

These freight-related funding programs have helped the state address critical freight system needs. In particular, MnDOT's programs have made significant investments in the maritime and rail systems – two modes where traditional highway dollars cannot be applied. However, a challenge with these programs is that the level of funding is low compared to the need, and not all funding programs are available on regular basis (e.g., yearly), nor guaranteed they will be available in the future.

MnDOT's maritime and rail funding programs have helped address freight system needs where traditional highway system funds could not.

Approach to Freight Project Selection and Prioritization

Minnesota Highway Freight Program

As part of the National Highway Freight Program, MnDOT was apportioned funds and empowered to determine its own process for selecting projects to receive this funding, as long as it is used for freight-related investments. MnDOT elected to select projects through a competitive process and evaluated applicants on criteria that included truck volume, safety, mobility, facility access, and other factors as shown in Figure 23.

Figure 23: Minnesota State Freight Investment Plan Criteria

Criteria	Measures
Truck Volume	HCAADT
Safety	• Crash rate reduction • Addresses a sustained crash location (Y/N) OR Not sustained crash location, but addresses a safety issue identified in a district or county safety plan (Y/N). If so, provide risk rating • For truck parking projects: truck parking utilization at existing rest stops
Freight Mobility	• Truck Travel Time Reliability • Removes a geometric or temporary (e.g. flooding) barrier or avoids future load restriction on an OSOW route (Y/N) • Upgrades a roadway to 10-ton standards
Freight Facility Access	Daily truckload equivalents entering and exiting a freight facility or facilities
Cost-Effectiveness	Divide amount of points awarded above by amount of requested funds divided by 1000
Project Readiness	A variety of measures including: Environmental Documentation, Review of Sec 106 Historic Resources, Review of Sec 4f/6f Resources, Right-of-Way, Construction Plans/ Documentation, Railroad Involvement, and Funding

Source: Adapted from Minnesota State Freight Investment Plan for State Fiscal Years 2016-2027, November 2017

In total, 36 applications were received requesting $248 million. Using available funds, $98 million of those requests were programmed through 2022, again indicating that freight transportation system needs far outweighs available resources. Additionally, this MHFP solicitation program was a one-time opportunity and may not continue in the future, as these funds may not be authorized again at the Federal-level, or MnDOT's Office of Freight and Commercial Vehicle Operations may elect to use a different process to select projects (e.g., through statewide and District freight system planning efforts).

The MHFP solicitation program was a one-time opportunity and may not continue in the future

In District 1, MnDOT and the City of Duluth submitted applications requesting $20,525,565, and the Twin Ports interchange was awarded $6 million. In addition, the MHFP solicitation specifically requested ports and waterways intermodal project submissions, and the Duluth Port Intermodal Terminal Expansion was awarded $1.9 million. If MnDOT's MHFP solicitation program does continue in the future, it will likely continue to use a similar process for future project selections.

The District 1 Prioritization Process (Needs)

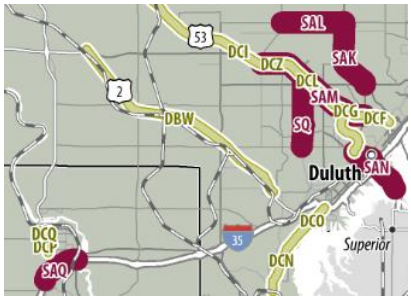
The 2017 Minnesota Highway Freight Program (MHFP) provided a starting point for the creation of a District 1-specific scoring and ranking method. This methodology is focused on District 1's regional needs, and other criteria may be used for other District, as well as a Minnesota statewide system evaluation.

Lessons learned from the statewide MHFP solicitation were used to help guide the development of the District 1 methodology. Two primary lessons from the MHFP process were (1) that it prioritized highest-traffic routes including Interstates and Trunk Highways compared to local routes, and (2) that it relied on the availability of data (e.g., truck counts) that may not be available the local level. These were considered in forming the District 1 prioritization process.

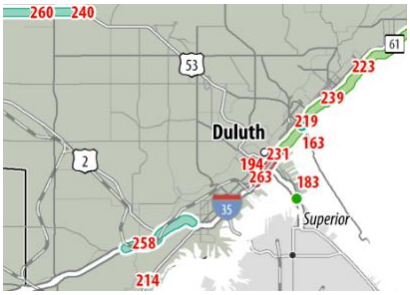
Based on the review of MnDOT's past process for evaluating and ranking freight system projects, District 1 stakeholder comments, and the overall intent of prioritizing unaddressed needs for the District 1 Freight Plan, an approach to conducting an evaluation and ranking those unaddressed needs ("gaps") has been developed. Figure 24 provides a visual overview of the gap identification process, with the evaluation process described below.

Figure 24: Gap Identification Process

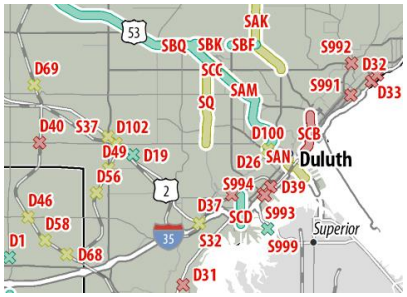
1. Map needs and issues



2. Map planned projects



3. Identify "gaps": issues not overlapped by planned projects.



The evaluation approach is intended to:

- Evaluate/screen "gaps" (potential project concepts), not concrete, defined projects,
- Focus on regional issues (i.e., known to be important to District 1) vs. those that may be more important to the Metro District or more urban areas, and
- Use as much data available at the local level, as possible.

Process

Figure 25 lists the categories and measures for District 1's freight "gap" evaluation. In this evaluation process, all measures are weighted equally, and a high overall score is intended to identify what "gaps" (potential project concepts) have the greatest potential to provide freight benefits (referred to in this report as "pure ranking"). A sub-set evaluation has been considered to highlight needs in safety, condition and performance categories. Additional information on the criteria for each category and measure is provided in Working Paper 4: Freight Plan Investment Priorities.

Figure 25: Categories and Measures for Gap Evaluation

Category	Measures	Safety	Condition	Performance
Truck Activity	HCAADT	X	X	X
	Truck percent (%) of total vehicles	X	X	X
Safety	Addresses a sustained crash location	X		
	An issue identified in a district or county safety plan	X		
	Addresses at-grade crossing safety risk	X		
Freight Mobility	Truck Travel Time Reliability			X
	Addresses a vertical clearance restriction			X
	Addresses a weight limited bridge		X	X
Condition	Bridge condition rating		X	
Stakeholder Need	Y/N if this issue overlaps with a stakeholder identified need	X	X	X

Evaluation Results

The evaluation resulted in a rank order of priority needs for the District to address, as well as sub-rankings of projects deemed to provide the greatest benefits to freight system safety, condition, and mobility. While these projects are "ranked" it is ultimately left to MnDOT District 1 and key stakeholders to determine which projects may be in the best interest of the region to advance. This decision-making process may also include those key freight projects that were not highway infrastructure-related, and may not have been prioritized during evaluation (e.g., projects that are rail, port or related to other highway facilities –like truck parking). Appendix C provides a list of the "pure" ranks of projects. Safety, condition, and mobility rankings are available in Working Paper 4: Freight Plan Investment Priorities. A subset of ranked projects was selected for advancement to pre-feasibility studies, which are described in Chapter 5.

Chapter 5: What Comes Next?

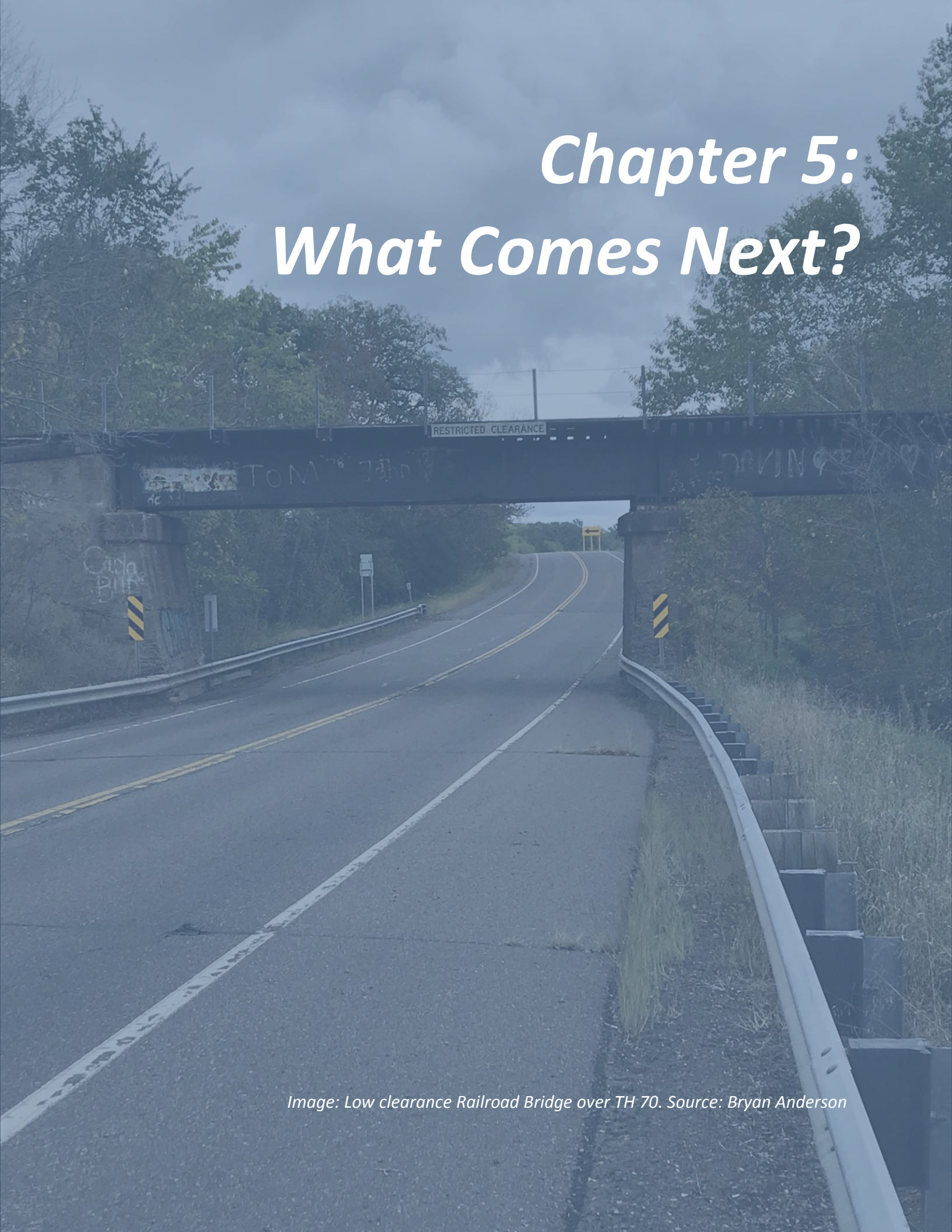


Image: Low clearance Railroad Bridge over TH 70. Source: Bryan Anderson

Chapter 5: Recommended Actions

Recent Progress

Before considering future plans for improvement in the District, it is important to recognize recent and ongoing projects or policy changes that have addressed needs and issues identified in previous plans, such as the 2017 Manufacturer's Perspectives study. Figure 26 highlights these items, aligned with state freight planning goal areas, in the District 1 Freight Planning Report Card.

Figure 26: District 1 Freight Planning Report Card

Goal Area	Mode	Progress
Support Minnesota's Economy	Intermodal	The Duluth Cargo Connect road-rail intermodal terminal began service in 2017.
	Multimodal	Completed Manufacturers' Perspectives Study.
	Multimodal	Completed District 1 Freight Plan.
Improve Minnesota's Mobility	Road/Truck	Construction of an improved Twin Ports Interchange is scheduled to begin in 2020.
	Road/Truck	Replaced low-clearance bridge on MN-37 at US-53.
	Road/Truck	Removed an unused low-clearance railroad bridge on MN-37, and lowered US-53 beneath an active rail bridge.
	Road/Truck	$13.5 million (average) spent on snow and ice plowing 3,746 miles of roads each year.
Preserve Minnesota's Infrastructure	Road/Truck	Between 2015 and 2019 District 1 repaved nearly 500 trunk highway centerline miles.
	Railroad	Removal of large "hump" on MN-37 railroad crossing causing trucks to bottom out.
	Maritime	In 2016 just over 300,000 cubic yards, and in 2017 323,000 cubic yards, were dredged at the Port of Duluth-Superior. (Most recent available data)
	Maritime	In 2018 MnDOT's Port Development Assistance Program awarded $2.2 million to the Port of Duluth-Superior for vessel mooring and storage area improvements.
Safeguard Minnesotans	Road/Truck	Improved traffic signals and turn lanes on MN-61 in Two Harbors.
	Road/Truck	Programmed improvements for US-169 Bridge near Nashwauk.
	Road/Truck	Funded safety improvements for US-2 and MN-65 at Swan River.
	Road/Truck	Shoulder improvements programmed for US-169 between Aitkin and Mississippi River.
	Railroad	Grade crossing improvements on Scenic 61 studied in recent NW Minnesota Rail study.
Protect Minnesota's Environment & Communities	Road/Truck	DSMIC Truck Route Study completed in 2019.
	Road/Truck	Studying improvements for Central Entrance in Duluth.
	Road/Truck	Studying improvements for US-169 in Grand Rapids

Recommendations

While District 1's freight system is not without its needs and issues, it also has many advantages, and there are opportunities to improve the system. These opportunities have been cast as recommendation and have been categorized in four groups:

- **Projects** that improve and expand infrastructure.
- **Policies** to govern the development, operation, and maintenance of the freight system.
- **Programs** designed to broadly improve and enhance the freight transportation system.
- **Partnerships** with local stakeholders to better understand each other's needs and issues, and to collaboratively advance strategies to improve the system.

Projects

Projects are the area where MnDOT has an opportunity to make impactful physical system changes. An assessment of gaps between freight needs and issues and planned transportation improvement projects is shown in Figure 28. Generally, there was a high level of overlap between identified freight needs and issues and planned transportation projects (although these projects are not explicitly intended to address the identified freight needs and issues). Currently, there are about 151 identified freight needs and issue points on District 1's system that are likely not addressed by programmed projects, compared with 195 needs and issues that did overlap with state or local funding projects (as funded project listings were available). Notable gaps between programmed projects and needs and issues include:

Safety gaps were the most common gap, making up two-thirds of the identified gaps. These were distributed across almost all areas of the District, but were particularly focused on smaller highways in St. Louis and Itasca Counties, as well as around Duluth.

Performance-related gaps only made up about 12 percent of identified gaps, and all were related to lack of mobility/maneuverability at low-clearance bridges. These problems were primarily concentrated around the Duluth area.

Condition gaps made up about one-fifth of identified gaps and included 18 bridges identified as potentially deficient, as well as 15 issues identified by stakeholders or previous plans. Interestingly, few pavement condition gaps were found, which supports feedback from District 1 staff who noted that the District was proactive in programming improvements to address pavement needs.

Many types of highway transportation projects are in fact freight-benefitting projects.

While these project needs were identified during development of a freight plan, these need categories reflect some of the investment categories and funding available through the Minnesota State Highway Investment Program (MnSHIP).

Pre-Feasibility Assessment

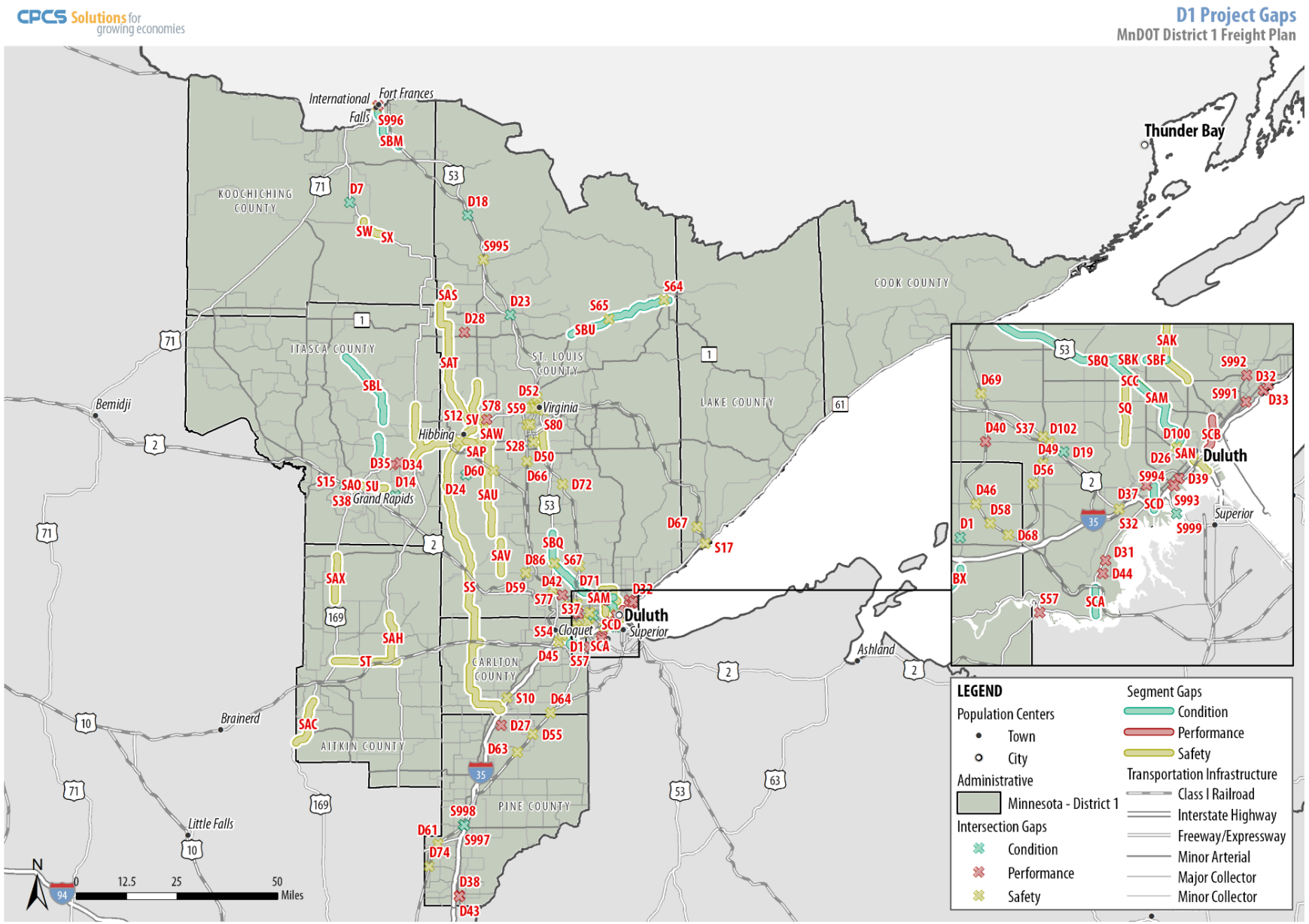
One of the aims of the District 1 Freight Plan is to ensure that the critical needs in the region have the potential to be addressed by future rounds of funding (including dedicated freight, safety, mobility, condition, or other appropriate sources). One way to do this is to take steps to prepare data and information to support the full slate of criteria used in evaluating/scoring projects in the MHFP process. This includes further developing unaddressed "gaps"/project concepts into clear projects/solutions so that they can be scored and considered when future investment decisions are made.

The full slate of unaddressed needs is shown in Figure 28. A subset of these unaddressed needs were advanced to pre-feasibility to assess 1) potential conceptual design options to address the need, and 2) order-of-magnitude construction cost estimating for each option. Figure 27 lists the unaddressed needs that underwent pre-feasibility assessment, and Figure 29 shows these on a map. Appendix C has a full list of all gaps shown in Figure 28.

Figure 27: List Unaddressed Needs Included in Pre-Feasibility Assessment

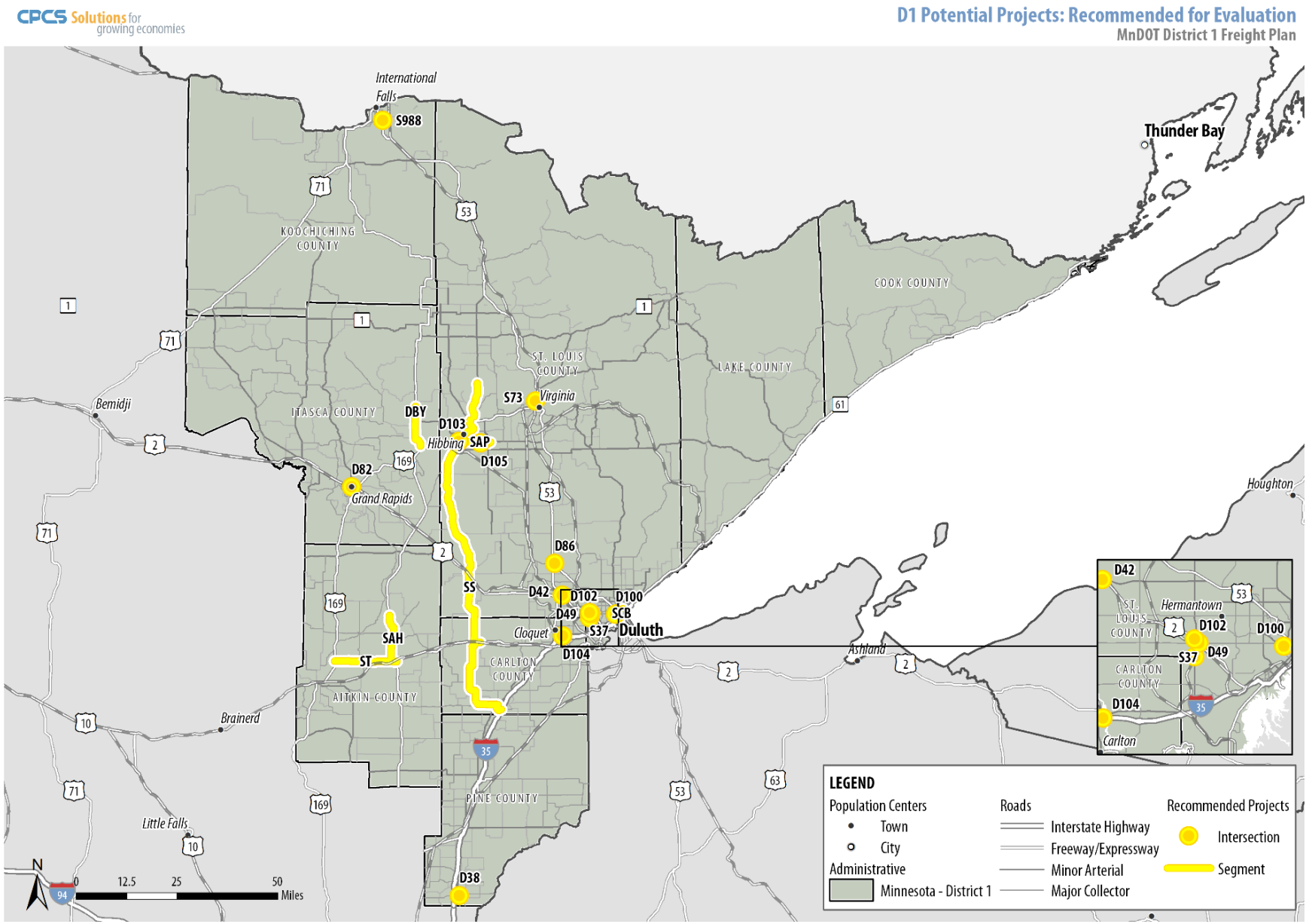
Project ID	Location	Need or Issue
D104	I-35/CSAH 45 interchange near Cloquet	Safety
D102	CSAH 56 and CR 392	Safety
S37	US 2 at Midway Road	Safety
D86	US 53/TH 33	Safety
D82	US 2 and US 169 in Grand Rapids	Safety
D100	US 53 and Piedmont Avenue	Safety
S73	US 53/P&H Road intersection north of Virginia	Safety
D38	TH 70 east of I-35 between Rush City and Pine City	Mobility
DCR/SAP/D105	TH 37 from Hibbing to CSAH 5	Safety
D103	US 169 and TH 73 in Hibbing	Safety
D42	CN railroad bridge over US 2	Mobility
SAH	TH 65 between McGregor and Big Sandy Lake	Safety
ST	TH 210 between US 169 and McGregor	Safety
SS	TH 73 between Moose Lake and Hibbing	Safety
SCB	Mesaba Avenue between I-35 and TH 19	Mobility
DBY	TH 65 between Nashwauk and County Road 540	Safety
D49	Midway Road and St. Louis River Road	Safety
S988	US 53 and CSAH 332 near International Falls	Safety

Figure 28: Gaps between Projects and Needs



Source: CPCS Transcom Inc.

Figure 29: Map of Project Concepts with Pre-Feasibility Assessment



Source: CPCS Transcom Inc.

Policies, Programs, and Partnerships

To support the advancement of project recommendations, other supporting actions were identified and categorized as policies, programs, and partnerships. Generally, policies are established to inform project and program investments, and partnerships are required for effective implementation.

Recommended actions are organized in the following sections by state freight planning goal area in order to link actions to broader statewide aspirations for the multimodal freight transportation system.

Support Minnesota's Economy

The ability of businesses and industries in Minnesota to compete in the marketplace relies in part on an efficient freight transportation system that effectively moves goods. The freight system that these businesses depend on is multimodal, transports products not only within Minnesota but also throughout the U.S., and provides connections to trading partners throughout the world. Minnesota's freight system needs to respond and adjust to changing state, U.S., and world economic conditions. Recommended actions to support this goal in District 1 are shown in the following figure.

Figure 30: Recommendations to Support Minnesota's Economy

Type	Description
Policies	N/A
Programs	• Update or "refresh" the Manufacturers' Perspectives study on a 5 or 10-year basis, to gather relevant feedback and evaluate how freight needs and issues are changing over time. • Utilize MRSI or other railroad-related funding to improve rail access for firms.
Partnerships	• Collaborate with local economic development agencies to market the region's competitive location and assets: attract new business by emphasizing the presence of four Class I railroads and access to St. Lawrence Seaway as major competitive assets. • Collaborate with local economic development agencies and (if possible) railroads to explore the potential to expand or improve rail service in communities outside of Duluth.

Improve Minnesota's Mobility

Freight system mobility can be described in several ways. Delay, slow travel speeds, and vertical clearance restrictions are ways to measure mobility, and each translates into a freight transportation system that may have limited maneuverability and not provide a competitive advantage to industry. Minnesota's freight system needs to offer access for all freight users and reliable service with minimal chokepoints. Recommended actions to support this goal in District 1 are shown in the following figure.

Figure 31: Recommendations to Improve Minnesota's Mobility

Type	Description
Policies	• Identify, create, or designate super-heavy oversize/overweight corridors, focused on cargo traveling to or from the Port of Duluth. In particular, general truck and (when relevant) oversize/overweight needs should be factored into designs for new infrastructures, such as roundabouts.

Type	Description
	• Harmonize Minnesota's truck weight policies to more closely match Ontario and Wisconsin's policies, which has the potential to make interstate and international trucking operations more efficient.
Programs	• Develop a freight mobility program in District 1 to systematically address the mobility (performance) issues identified as "unaddressed" (as shown in Figure 28). This program should focus on eliminating vertical clearance restrictions, in order to provide improved system redundancy. This program should also support "closing gaps" on the county portions of the Districts' 10-ton network. • Improve incident/construction management systems to include freight (trucker)-specific information so that that advance notice of disruptions to critical routes is provided.
Partnerships	• Engage with neighbor state and provincial transportation agencies to ensure that highways critical to freight in District 1 (US-2, US-53 in Wisconsin) are adequately maintained. Other topics for collaboration include weight limit harmonization and the creation or preservation of oversize/overweight truck corridors. • Conduct further outreach around corridor mobility on the US169 and I35 Corridors and develop a study with regional partners on the future mobility needs of the Cross Range Expressway.

Preserve Minnesota's Infrastructure

The expected growth in goods movement on all modal networks will stress Minnesota's transportation infrastructure. Strategic improvements in multimodal freight system infrastructure to ensure critical segments and connections are both available and in a state of good repair are essential for Minnesota to meet expected demand. Recommended actions to support this goal in District 1 are shown in the following figure.

Figure 32: Recommendations to Preserve Minnesota's Infrastructure

Type	Description
Policies	• Incorporate freight considerations into existing MnDOT funding programs, or determine the potential freight benefits or impacts of specific CHIP, STIP, TIP, and county projects. Including these considerations may help the District address freight needs and issues without the assistance of a dedicated freight funding program. • Focus on maintaining the good condition of existing assets, rather than expanding capacity of the system (primarily roads). The policy reflects the fact that funding shortfalls are expected in the future, and maintenance costs may be better controlled if new infrastructure is limited.
Programs	• Develop a freight infrastructure program in District 1 to systematically address the condition issues identified as "unaddressed" (as shown in Figure 28). As District 1 has few pavement condition issues, this should focus on improving bridge condition, in particular on the local network.
Partnerships	• Encourage state and federal lawmakers to develop stable funding policies and sources for freight, and the transportation system in general. • Use feedback from the Manufacturers' Perspectives study to better understand business needs in District 1, and improve existing planning processes and maintenance programs. • Engage with federal lawmakers and the US Army Corps of Engineers to advocate for reducing the harbor and channel dredging backlog.

Safeguard Minnesotans

Safety is a high priority for both public and private organizations involved in freight transportation. In Minnesota, a multifaceted approach to enhance safety has resulted in a historic trend of decreasing fatalities for both passenger and commercial vehicles. Minnesota needs to enhance freight system safety and ensure plans are in place to protect areas where freight activity and the public interface. Recommended actions to support this goal in District 1 are shown in the following figure.

Figure 33: Recommendations to Safeguard Minnesotans

Type	Description
Policies	N/A
Programs	• Develop a freight safety program in District 1 to systematically address the safety issues identified as "unaddressed" (as shown in Figure 28). This could effectively be incorporated in existing District safety activities, with an emphasis on addressing those most pressing freight-related needs (e.g., adding turning, accelerating and passing lanes; improving sight lines and warnings for shot stopping distances; widening and strengthening shoulders). • The re-activation of an I-35 weigh station in Carlton could help screen traffic using the Blatnik Bridge. A second District 1 issue (albeit less important) is the pull-off weigh enforcement site along US-2 in Saginaw which also has long-term improvement needs.
Partnerships	• Partner with local communities and railroads to advance grade crossing improvements as key locations (as shown in Figure 28).

Protect Minnesota's Environment and Communities

Minnesota's residents and businesses rely on freight transportation to support their economies; however, freight facilities and services sometimes negatively impact communities and the environment. Some of these impacts relate to air quality and noise, the presence of trucks in neighborhoods, and land use conflicts. Freight may affect Minnesota's traditionally underrepresented communities, such as racial and ethnic minorities, households without vehicles, and persons who are low-income. It is necessary to plan, design, develop, and preserve the freight system in a way that respects and complements the natural, cultural, and social context and is consistent with the principles of context sensitive solutions. Recommended actions to support this goal in District 1 are shown in the following figure.

Figure 34: Recommendations to Protect Minnesota's Environment and Communities

Type	Description
Policies	• Investigate potential of using modal shift (from truck to rail or vessel) as a means of reducing carbon emissions associated with freight transportation.
Programs	• Improve incident management systems and collaborate with local first responders to ensure that disruptions to critical routes without redundancies are minimized.
Partnerships	• Offer assistance to county and local governments with long-range planning. Many freight issues occur off of MnDOT's trunk highway network, so collaboration with local governments may be necessary to solve first- and last-mile freight movement needs and issues. • Continue port land use planning efforts and engagement with the Duluth-Superior Harbor Technical Advisory Committee.

Appendices

Image: Grain train at Port of Duluth-Superior. Source: Erika Witzke

Appendix A: Previous Plans

Agency	Year	Plan or Study Name
SLRRA	2019	Northeast Minnesota Freight Rail Opportunity Study
MnDOT	2019	Statewide Truck Parking Study (draft)
MnDOT	2019	Commercial Vehicle Weight and Safety Enforcement Plan
DSMIC	2019	Duluth-Superior Area Truck Route Study
MnDOT	2018	Statewide Freight System and Investment Plan
MnDOT	2017	State Highway Investment Plan, 2018-2037
MnDOT	2017	State Transportation Improvement Plan, 2018-2021
MnDOT	2017	Manufacturer's Perspectives on Minnesota's Transportation System, District 1
ARDC	2017	Northeast Minnesota Comprehensive Economic Development Strategy
MnDOT	2016	Annual Minnesota Transportation Performance Report
DSMIC	2016	Duluth-Superior Port Land Use Plan
MnDOT	2016	Evaluation Criteria for the Minnesota Highway Freight Program
UW-S	2015	Duluth Airport Authority Air Cargo Study
MnDOT	2015	Statewide Rail Plan
U of M	2015	Exploratory Study of Competitive Industry Clusters and Transportation in Minnesota
MnDOT	2014	Minnesota Statewide Ports & Waterways Plan
DSMIC	2014	Connections 2040 Long-Range Transportation Plan
DSMIC	2009	Northern Minnesota/Northwestern Wisconsin Regional Freight Plan

Appendix B: Advisory Committee and Technical Team Membership

Advisory Committee

- Andy Hubley, *Arrowhead Regional Development Commission*
- Bryan Anderson/Duane Hill, *MnDOT District One*
- Charles Lemon, *Minnesota Department of Public Safety* (DPS)
- Chris Ismil, *Iron Range Resources and Rehabilitation Board (IRRRB)*
- Cindy Voigt, *City of Duluth*
- Darren Juntunen, *Minnesota Department of Public Safety* (DPS)
- Deb DeLuca, *Duluth Seaway Port Authority*
- Dena Young, *Wisconsin Department of Transportation (WisDOT)*
- Jim Foldesi, *St. Louis County*
- John Barnes, *Canadian National Intermodal*
- Kelsey Johnson, *Iron Mining Association*
- Ken Gerasimos, *Great Lakes Fleet*
- Kris Reisenburg, *Federal Highway Administration (FHWA*)
- Leo Naumann, *Jeff Foster Trucking*
- Andrew Andrusko, *MnDOT Office of Freight and Commercial Vehicle Operations*
- Ray Higgins, *Minnesota Timber Producers Association*
- Ron Dvorak, *Minnesota Freight Advisory Committee*
- Ron Chicka, *Duluth Superior Metropolitan Interstate Council*
- Richard Stewart, *University of Wisconsin Superior*
- Shaker Rabban, *MnDOT Office of Transportation System Management*

Technical Team

- Andy Hubley, *Arrowhead Regional Development Commission*
- Bryan Anderson, *MnDOT District One*
- Deb DeLuca, *Duluth Seaway Port Authority*
- Andrew Andrusko, *MnDOT Office of Freight and Commercial Vehicle Operations*
- Ron Chicka, *Duluth Superior Metropolitan Interstate Council*
- Shaker Rabban, *MnDOT Office of Transportation System Management*

Appendix C: Pure Project Ranks

The figure below lists pure rank for each project "gap" identified in District 1. High Capacity Annual Average Daily Traffic (HCAADT), a measure of truck traffic volumes, was used as a tiebreaker to help determine which projects may be more relevant to freight operations in District 1.

Project ID	Highway	Location	Pure Rank	Pure Rank (w HCAADT)
DBY	Central Ave	Nashwauk	1	3
D26	MUN 361	Duluth	2	4
D14	UTWN 446	Trout Lake Township	3	7
D27	Sturgeon Island Road	Sturgeon Lake	3	7
D28	CR 931	Sturgeon River	3	7
DCH	Miller Trunk Hwy	Eveleth (Heading South)	4	1
SAM	State Hwy 194	Duluth	5	2
D76	2nd Avenue W	International Falls	6	29
D102	US 2	Saint Louis County	7	5
D104	USTH 35	Carlton County	8	11
S15	Hwy 2/Cty Road 63	Corner of Hwy 2 and Cty Road 63	9	6
SBM	US Highway 53	Orr to International Falls	9	6
S37	Highway 2	Going downhill into	10	8
D105	MNTH 37	Saint Louis County	11	9
DCR/SAP	MNTH 37	Hibbing (Heading East)	12	10
SAN	US Highway 53	Duluth	13	17
D100	USTH 53	Saint Louis County	14	12
D45	Old Carlton Road	Cloquet	15	22
D46	N Cloquet Road E	Carlton County	15	22
D48	CSAH 7	Mountain Iron	15	22
D49	Midway Road	Saint Louis County	15	22
D52	Mineral Avenue	Mountain Iron	15	22
D55	Kkein Road	Kerrick	15	22
D56	Stark Road	Saint Louis County	15	22

Project ID	Highway	Location	Pure Rank	Pure Rank (w HCAADT)
D57	Maple Grove Road	Saint Louis County	15	22
D58	E HARNEY RD	Carlton County	15	22
D59	Duluth Saint Vincent Road	Saint Louis County	15	22
D60	Maki Road	Saint Louis County	15	22
D63	Pine Street	Bruno	15	22
D64	CR145	Carlton County	15	22
D65	Independence Road	Saint Louis County	15	22
D66	Norway Ridge Road	Saint Louis County	15	22
D67	Big Rock Road	Lake County	15	22
D68	Ratika Road	Carlton County	15	22
D69	Munger Shaw Road	Saint Louis County	15	22
D71	Batchelor Road	Saint Louis County	15	22
D72	Melrude Road	Saint Louis County	15	22
S996	International Bridge at International Falls	International Falls	15	37
SBQ	US Highway 53	Duluth	15	13
D23	MUN 10	Cook	16	23
D37	CSAH 89	Duluth	16	23
S989	36th Avenue East	Duluth	16	23
S990	32nd Avenue East	Duluth	16	23
D19	MUN 85	Duluth	16	23
D86	USTH 53	Saint Louis County	17	14
SS	State Highway 73	Entire Highway	18	15
SAP	State Highway 37	Hibbing	19	16
D103	USTH 169	Saint Louis County	20	18
SBU	State Highway 1	Tower to Ely	21	19
SAO	State Highway 38	Grand Rapids	22	28
D38	MN 70	Rock Creek	23	30
DCJ	Miller Trunk Hwy	Eveleth (Heading South)	24	20
D82	4th ST NW	Grand Rapids	25	21

Project ID	Highway	Location	Pure Rank	Pure Rank (w HCAADT)
SCB	Mesaba Avenue	Duluth	26	27
D1	CSAH 1	Cloquet	27	33
D42	US 2	Duluth	28	34
SAH	State Highway 65	Calumet to McGregor	29	24
ST	State Highway 210	Aitkin to Cloquet	30	25
D61	3RD ST N	Brook Park	31	26
D7	CNTY 70	Little Fork	32	36
D50	MNTH 37	Saint Louis County	33	31
S54	45	Kwik Trip in Cloquet	34	41
D101	USTH 169	Itasca County	35	32
D34	CSAH 80	Marble	36	39
DCW	USTH 169	Swan Lake to Hibbing	37	35
S77	HWY 2	Saginaw	38	38
SW	State Highway 65	Bois Forte Reservation to Little Fork	39	43
SX	State Highway 65	Bois Forte Reservation	39	43
S67	Swan Lake Road Bridge	Independence	40	40
S32	I35/Proctor exit	Duluth	41	42
S53	7 and 53	Intersections near Walmart (Hwy 169 and Mud Lake Road)	42	47
S52	7 and 53	Intersections near Walmart (Hwy 7 and 53)	43	48
S80	HWY 53/LANDFILL RD	Virginia	44	53
D51	Fayal Rd	Mountain Iron	45	37
S17	2	Cty 2	45	49
D18	UT 8146	Ash Lake	46	50
D24	TWNS 883	West Swan River	46	50
D31	MSAS 101	Duluth	46	50
D32	32nd Avenue E	Duluth	46	50
D33	36th Avenue E	Duluth	46	50
D35	Gary Street	Marble	46	50

Project ID	Highway	Location	Pure Rank	Pure Rank (w HCAADT)
SAX	US Highway 169	Hill City	47	44
S10	1-35	Bridge 09823 1-35 over Moose Horn River at Milepost 219.556	48	45
S38	TH 2/2nd Ave NW	Grand Rapids	49	46
S59	53 Southbound	North of 169, Virginia	50	52
D44	IDAHO ST	Duluth	51	39
S78	HWY 169	BUHL	52	51
S74	HWY 5/HWY 169	Hibbing	53	49
S995	Orr RR Crossing	ORR	53	49
D74	Pokegama Ave	Henriette	54	54
D39	Superior Street	Duluth	55	55
SAC	US Highway 169	Aitkin (Heading South)	56	56
S73	HWY 53	Virginia	57	57
S12	Iron World Road and 169	Chisholm	58	58
SV	US Highway 169	Hibbing to Virginia	58	58
S64	Hwy 21	Sheridan St and Central	59	59
S991	Superior Street and 21st Avenue East	Duluth	60	62
S993	S. 40th Avenue W and Oneota Street	Duluth	60	62
S994	40th Ave East and London Road	Duluth	60	62
SCA	Grand Avenue	Duluth	60	60
SCD	Central Avenue	Duluth	60	62
S65	HWY 169	Six Mile Road	61	61
D40	Morris Thomas Rd	Duluth	62	63
D43	CSAH 61	Rock Creek	62	63
S57	TH 23	Munger Trail Bridge	63	64
DCC	CSAH 5	Chisolm (Heading South)	64	65
S992	Woodland Ave and W. Arrowhead Road	Duluth	64	65

Project ID	Highway	Location	Pure Rank	Pure Rank (w HCAADT)
S997	BNSF Bridges on Hinckley Subdivision	Hinckley	64	65
S998	BNSF Bridges on Hinckley Subdivision	Hinckley	64	65
S999	Grassy Point Bridge	Duluth	64	65
SAK	Rice Lake Rd	Duluth	64	65
SAL	Caribou Lake Rd	Duluth	64	65
SAS	County Highway 5	Meadow Brook	64	65
SAT	County Highway 5	Hibbing (Heading North)	64	65
SAU	County Highway 5	Hibbing (Heading South)	64	65
SAV	County Highway 5	Meadowlands	64	65
SAW	County Highway 5	Hibbing	64	65
SBF	Airport Rd	Duluth	64	65
SBK	Airport Rd	Duluth	64	65
SBL	County Highway 7	Taconite to Big Fork	64	65
SBX	Thompson Rd	Cloquet	64	65
SCC	Arrowhead Rd	Duluth	64	65
SQ	Stebner Rd	Duluth	64	65
SU	County Highway 21	Grand Rapids	64	65
SXC	Repair rail crossing CR15 Taconite	Taconite	63	65