REPORT CARD FOR MINNESOTA'S INFRASTRUCTURE

2018

Minnesota Section of the American Society of Civil Engineers

INFRASTRUCTUREREPORTCARD.ORG/MINNESOTA

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COVER PHOTO: Duluth Harbor

EXECUTIVE SUMMARY

Our public infrastructure is comprised of the big, expensive, and long-lived public investments underpinning our communities that we mostly take for granted until there is a crisis. These public systems serve *everyone* and are critical for our economy and our people to thrive. This report card looks at roads, bridges, transit, drinking water, wastewater, dams, ports, aviation, and energy. Minnesota is doing better than the national average in several areas. However, there are challenges for which better approaches still need to be developed.

For the first time, local engineers have conducted an exhaustive evaluation of Minnesota's infrastructure, divided into nine categories. The American Society of Civil Engineers (ASCE) national organization reported in 2017 that America's cumulative GPA was once again a D+. We are pleased to report that Minnesota's C grade is above the national average, but we also learned we have more work to do.

Much of Minnesota's infrastructure is aging and reaching the end of its expected lifespan. The majority of our systems were built in the 20th century before much of today's modern technology was developed. In addition, new materials and expanded environmental awareness and regulation require upgrades to wastewater and drinking water treatment plants. The energy grid, transportation systems, sewers, and drinking water systems, built decades ago, need upgrading to better prepare for larger storm events, increased use of renewable fuels, and a changing population.

Ribbon-cuttings are an exciting opportunity for lawmakers, designers, contractors, and the public to celebrate a finished infrastructure project. Regular maintenance and repairs of these projects,

while less exciting, are just as important to keep our public systems working. In fact, it's actually more cost-effective to pay attention to regular maintenance than for systems to require major repair or replacement.

Asset management systems can help inform systematic operations, maintenance, and upgrades, but these systems are not widely used. Because we aren't comprehensively tracking the infrastructure we have, the backlog of maintenance and repairs will lead to more frequent emergency work. Emergency work is expensive and can be avoided with proper maintenance, which starts with better asset management.

There has been a multidecade shift from federal funding to state and local funding for much of our basic infrastructure needs. We need to recognize that federal funding alone is insufficient. Instead, we need to help ourselves by raising revenue at the state and local level to support these infrastructure systems, our economy, and our quality of life.

Minnesotans value the personal and economic advantages that come from regular investment in maintaining a modern, safe, and efficient infrastructure network. Key policymakers and stakeholders have been debating how best to fund infrastructure projects for the last decade, with limited success. How important to you is our infrastructure? What value do you place on the role that clean water, drivable roads, and reliable transit play in your life?

This document was created to help Minnesotans understand the state of our infrastructure. The American Society of Civil Engineers has a strong track record in analyzing infrastructure. Our primary job is to ensure the health, safety, and capacity of the public infrastructure system in Minnesota. This very first Minnesota Report Card provides an opportunity to share our knowledge with the public and will serve as a benchmark for Minnesotans, including our business community, local governments, and policymakers in St. Paul. It is an opportunity to add to the conversation about where we are and where we need to be.

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OVERALL RECOMMENDATIONS

The work necessary to raise the grades will be difficult and unavoidably expensive, but it is indeed doable. We need to increase our efforts NOW. Here are some actions we suggest:

- **Recognize that there has been a multi-decade, profound shift from federal funding to state and local funding for systems like highways, water treatment, and wastewater treatment.** What worked for funding in the 1980s and 1990s is not likely to work well in the 2020s. The shortfalls tabulated in this report should spur legislative efforts to forge a consensus about how maintenance of each of these systems can be funded under today's reality of limited federal assistance—or under what situations service levels are reduced.

- **End the stop-and-go transportation funding by providing sustainable, long-term revenue and encourage dedicated local option transportation taxes.** To modernize and maintain Minnesota's roads, bridges, and transit we need more predictable and robust funding. Without sustainable revenue, we will continue to be hamstrung by an inability to make strategic decisions and plan long term, and Minnesotans will pay the price in traffic congestion and poor roadway conditions.

- **Citizens must be able to monitor levels of deferred maintenance.** Infrastructure, like our Social Security system, needs to be regularly funded to meet future obligations. Local governments should communicate status of systems to citizens who can then ask elected officials about their plan to improve and maintain our infrastructure.

- **Implement robust asset management programs so that entities may better prioritize limited available funding and make smart decisions.** The state should aid in the establishment of an office(s) dedicated to dispersing asset management assistance to local governments. Knowledge is power when it comes to identifying deficiencies in our infrastructure and finding ways to address those deficiencies. Collecting and tracking data is the first step toward making the most of limited funding dollars.

- **Balance the infrastructure needs of diverse communities.** Communities in Minnesota have varying infrastructure challenges, each as unique as the community itself. Cities with older neighborhoods, often with lower-income residents, tend to have the oldest infrastructure. What works in a rural city may not be useful for a newer suburb. Flexible funding solutions will ensure that the needs of each community are met fairly and effectively.

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Check the MN Legislative Tracker to find legislation that you care about (hint... infrastructure

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Now that you know who your Elected Officials are, EMAIL THEM and let them know that you care about Minnesota's infrastructure

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ABOUT THE INFRASTRUCTURE REPORT CARD

GRADING CRITERIA

ASCE-MN's 2018 Report Card Committee is a group of dedicated civil and environmental engineers from Minnesota, who volunteered their time to collect and analyze data; prepare, review, and revise each section; and develop the final Report Card. Committee members worked with ASCE's Committee on America's Infrastructure and ASCE Infrastructure Initiative staff to develop this snapshot of Minnesota's infrastructure.

The Report Card Sections are analyzed based on the following eight criteria:

CAPACITY Does the infrastructure's capacity meet current and future demands?

CONDITION What is the infrastructure's existing and near-future physical condition?

FUNDING What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?

FUTURE NEED What is the cost to improve the infrastructure? Will future funding prospects address the need?

OPERATION AND MAINTENANCE What is the owners' ability to operate and maintain the infrastructure properly? Is the infrastructure in compliance with government regulations?

PUBLIC SAFETY To what extent is the public's safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?

RESILIENCE What is the infrastructure system's capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?

INNOVATION What new and innovative techniques, materials, technologies, and delivery methods are being implemented to improve the infrastructure?

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GRADING SCALE

A — EXCEPTIONAL: FIT FOR THE FUTURE

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.

B — GOOD: ADEQUATE FOR NOW

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.

C — MEDIOCRE: REQUIRES ATTENTION

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.

D — POOR: AT RISK

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.

F — FAILING/CRITICAL: UNFIT FOR PURPOSE

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.

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AVIATION
GRADE: B

EXECUTIVE SUMMARY

The Minnesota aviation system services 2.3 million aircraft operations (takeoffs and landings) annually, and includes 135 airports, 97 of which are a part of the National Plan of Integrated Airport Systems. Nine airports provide commercial airline service, including Minneapolis-St. Paul (MSP), which accommodated a record 18.4 million enplanements in 2017. MSP and the reliever airports have undergone considerable upgrades over the past five years, including $455 million in improvements in 2017 alone. From 2018–2022, MSP and its reliever airports forecast needs of $170 million per year while airports in Greater Minnesota (outside the Twin Cities Metropolitan Area) forecast needs of approximately $96 million per year. The condition of Minnesota's airports is reasonably good, and minimal capacity issues are foreseen in the near future. Safety records are solid, and sustainability is proactively integrated within infrastructure and operational decisions.

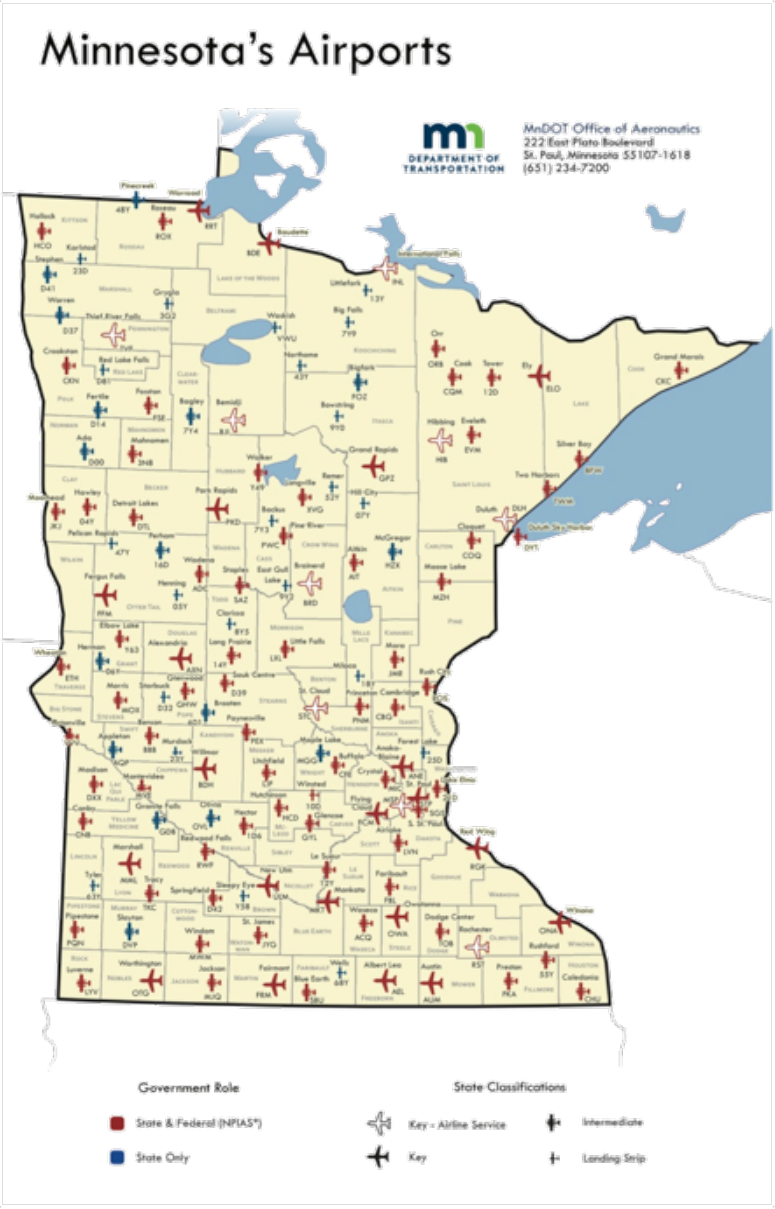
BACKGROUND

The Minnesota aviation system encompasses 135 airports that service, on average, 2.3 million aircraft operations annually. Of these, 97 are part of the National Plan of Integrated Airport Systems (NPIAS) and eligible for federal funding. Of these, nine currently provide commercial airline service. They are: MSP International, Rochester, St. Cloud, Brainerd, Duluth, Hibbing, Bemidji, Thief River Falls, and International Falls. The system is augmented by a number of private airports, heliports, and sea bases.

In 1933 the Minnesota Aeronautics Commission was formed, and in 1943 the state Legislature transformed it into the Department of Aeronautics. That same year, the Metropolitan Airports Commission (MAC) was created as an "owner/operator" of airports throughout the Twin Cities Metropolitan Area. These include MSP International and six reliever airports that include Anoka County/Blaine, Flying Cloud, Crystal, Airlake, St. Paul Downtown, and Lake Elmo.

Of the airports served by airlines in 2016, MSP accommodated roughly 98% of statewide passenger enplanements totaling 18,123,844 and set a record in 2017 of 18,397,148. Since 2010, this represents an annual growth rate of 2.6%, outpacing the 1.6% growth forecast by FAA. As of May 2018, MSP passengers utilize 17 carriers to access 160 destinations globally. It is followed by Rochester and Duluth, which had 143,614 and 122,717 enplanements, respectively, in 2017.

FIGURE 1 – MN AIRPORTS (2018)
COURTESY MNDOT AERONAUTICS



The economic role of Minnesota's aviation system is significant. In 2009, Minnesota airports contributed $12.2 billion to the state's economy, of which $11.8 billion was generated by MSP, Rochester, and Duluth. By 2016, MSP's contribution alone rose to $15.9 billion in total economic output; tax revenue generated was $973 million. According to a recent report, the six metro-area reliever airports contributed $756 million in 2016 and generated $27 million in tax revenue.

CAPACITY
Commercial (MSP)

MSP has undergone considerable upgrades over the past five years. In 2017, MSP's reported operations were 415,703, roughly 76% of its 2004 peak. Delays rose in 2015 and 2016 to 5,515 and 4,958. By 2017, however, delays dropped to 1,628 — nearly back to figures from the early 2000s. Forecasts in Metropolitan Airports Commission data estimate aircraft operations will total around 511,000 per year, short of the 2004 peak.

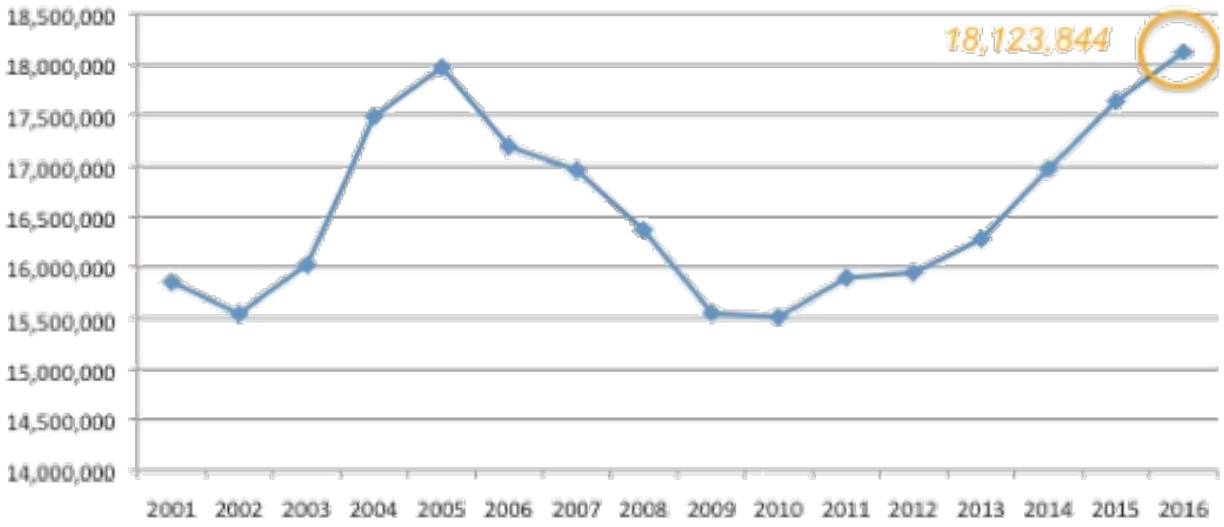
MSP's terminals will shoulder different concerns before 2035 regarding aircraft and passenger needs, the first being the number of available gates.

- (Main Terminal I) Lindberg – 119 gates needed by 2035 / 104 today
- (Satellite Terminal II) Humphrey – 36 gates needed by 2035 / 14 today

MAC plans to address this in part by expanding Terminal I by eight gates, and Terminal II by 12 gates by 2035.

Despite a reduced number of aircraft operations, MSP set a record for enplanements of 18,397,148, which translates to a total accommodation of over 38,000,000 passengers, three years ahead of forecast for the year 2020. The year 2030 is expected to see 48 million, and by 2035 reach 54 million. Capacity analysis for ticketing, security checkpoints, and baggage claim are expected to be sufficient until around 2025. Expansions at both terminals are underway to address this need. Recent parking enhancements should suffice until new facilities are required to meet 2035 demands. Plans are in plan to address future needs when demand requires MSP to do so.

FIGURE 2 - ENPLANEMENT TRENDS - MSP INT. AIRPORT



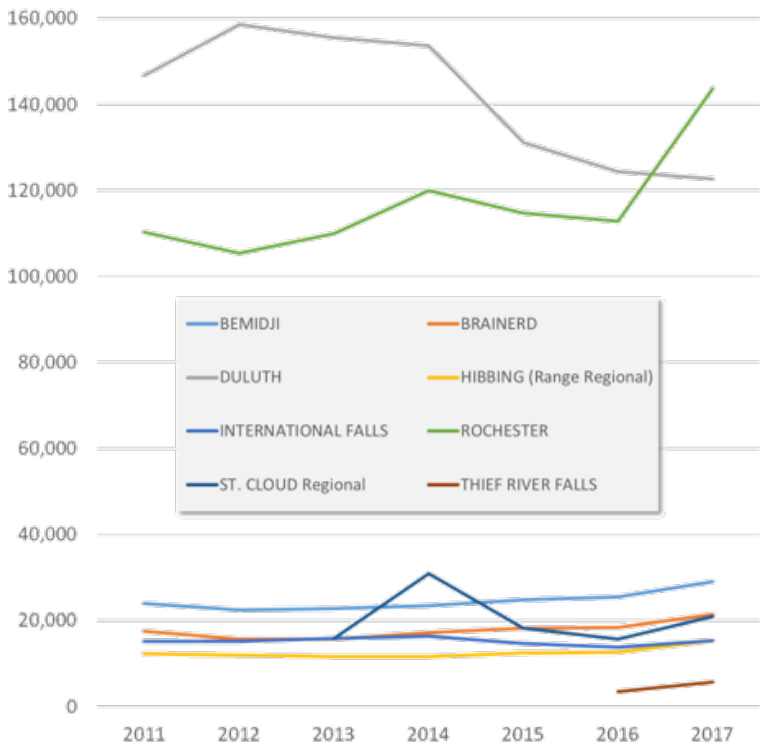
Commercial (Greater Minnesota)

In 2017, all Greater Minnesota commercial airports experienced increases in enplanements except Duluth, which experienced an increase in operations of more than 6%, while Rochester's declined by nearly 7%. Landside and airside improvements over recent years, together with current trends, do not appear to indicate capacity issues for the near future.

Accessibility to the National Air Transportation System is a concern for many Greater Minnesota residents who rely on the Essential Air Service (EAS) program. As of October 2016, the FAA recognizes five Minnesota communities as eligible under the EAS program. They are Bemidji, Brainerd, Hibbing, International Falls, and Thief River Falls.

EAS requires reliable funding and available pilots for the airlines to fly routes to/from these airports. The latter was identified as a significant issue in a 2017 USDOT working group report on air service to small communities.

FIGURE 3 - ENPLANEMENT TRENDS FOR COMMERCIAL AIRPORTS



CONDITION

Condition of the aviation system was evaluated on two fronts: airside pavement condition, and terminals at the commercial airports. Pavement included runways and taxiways at 107 paved public airports and was based on pavement condition index (PCI) by square footage. PCI was also used for all six reliever airports under MAC, but due to limited data only runways were assessed. PCI data for MSP was unavailable; however, it should be noted that MSP utilizes concrete, which significantly improves the lifespan of a runway. Additionally, a regular maintenance program is in place.

MNDOT PCI RATING SCALE

Excellent	100 > PCI > 85
Very Good	85 > PCI > 70
Good	70 > PCI > 55
Fair	55 > PCI > 40
Poor	40 > PCI > 25
Very Poor	25 > PCI > 10
Failed	10 > PCI > 0

MnDOT's performance metrics for PCI were used. Available data for 113 airports ranged from 2013–2016 and were combined to generate the results below.

MNDOT PCI PERFORMANCE METRIC	% OF PAVEMENT FINDING
At least **84%** of pavements must have **>55 PCI**	**93.5%**
No more than **4%** of pavements can have **<40 PCI**	**4.12%**

Terminals were assessed qualitatively based on leading improvements and how recently those improvements were made. Most Greater Minnesota commercial airport terminals have seen significant improvements over the past 10 years up to and including full replacement. Many terminal projects also included hangar expansions, additional parking, encouragement for local business, and environmentally conscious installations such as geothermal heating/cooling systems.

COMMERCIAL AIRPORT TERMINAL PROJECTS (NON-MSP)		
AIRPORT	**YEAR(s)**	**Leading Improvements**
Bemidji	2009-14	More Gates, Doubled SF, Security, ADA, Parking, Fire & Rescue
Brainerd	2012	Sky-bridge, Security, ADA
Duluth	2013	Replacement of Terminal Buildings
Hibbing	2015	Full Terminal Replacement
Int. Falls	2017-18	Full Terminal Replacement
Rochester	2018	Modernize existing for security, ADA, facility life-extension
St. Cloud	2009	90% Expansion, Security, ADA
Thief River Falls	2011	Roof replacement, Heating & Air

Overall, Minnesota's commercial airport terminals are in good to excellent condition. Pavement data on the high end surpass MnDOT's performance threshold comfortably, while available data on the low range were reasonable.

FUNDING AND FUTURE NEED

Projects at airports are funded through a variety of sources, including investments from federal, state, and local levels. The largest program is the Airport Improvement Program (AIP), administered through the FAA. AIP provides grants for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS). Historically, federal AIP grants to Minnesota have averaged $48.3 million/year (2010–2017).

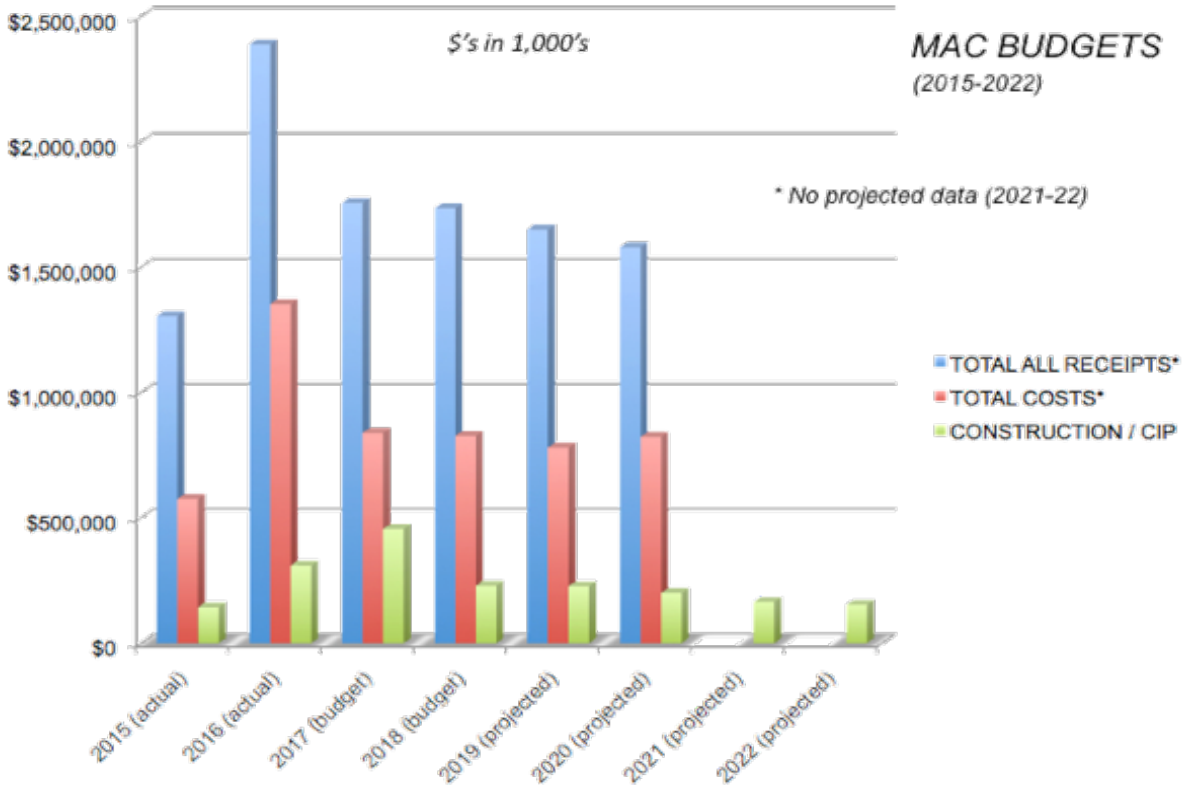
Federal grants require a local match (10%). Prior to 2015, that burden was fully shouldered by local airport owners. This caused some reluctance to submit eligible needs to the Airports Capital Improvement Plan (CIP). Statewide aviation needs in Minnesota appeared to trend downward, and by 2015 available funds exceeded demand (approximately $6.5 million). MnDOT then changed its rate structure allowing for half of the 10% match to be shouldered by the state, while initiating more comprehensive and highly effective Needs Meetings. The resulting CIP demand from local airport owners exceeded $30 million by 2017.

The State Airport Fund (SAF) is the operating fund for the MnDOT Office of Aeronautics. From 2012 thru 2016, annual revenues to the Minnesota SAF averaged $22 million. Most of this came from taxes collected through airline flight property, aircraft sales and use, and aircraft registrations. For FY 2017–2018, expected receipts are on track to reach that. Expenditures including grants for airport development, operation and maintenance, navigational system aids, and aeronautics operations averaged $20.7 million. As of this report, the CIP for all Greater Minnesota general aviation (GA) and commercial airports from 2018–2022 is $480,325,962, or approximately $96 million/year. Demand outpaces funding.

Commercial airports can collect passenger facilities charges (PFCs). This charge is capped at $4.50 per enplaned passenger per flight segment, to a maximum of four segments (or $18). Since 1992, more than $2.1 billion has been collected in Minnesota, and $1.78 billion of PFC collections for current projects have been approved by FAA. PFC collections and interest have generated over $50 million for the first eight months of 2018. PFC funds must be used at the specific airports from which they are collected. Additional revenue is provided from parking, on-site concessions, fuel sales, hangar rentals, and land leases to aid these communities with AIP matches.

For MAC airports, CIP totals from 2018–2022 are $854,050,000, or approximately $170 million/year. Based on historic performance and recent or active projects, initial review of MAC indicates no near-term gap in its ability to operate and support CIP needs.

FIGURE 4 - APPROX. MAC BUDGETS (2015 - 2022)



Looking forward to 2035, Metropolitan Airports Commission data project expansions needed at MSP will cost $2.54 billion, translating to an average of $127 million per year over 20 years.

MAINTENANCE AND OPERATION

MnDOT reimburses Greater Minnesota airports for maintenance efforts annually, an amount of nearly $5 million. These reimbursements reduce funding challenges for local airports and ensure year-round, safe operations, yet address only part of a more than $14 million maintenance and operations (M&O) need. In 2016, MnDOT increased its participation rates from 66% to 75% for M&O as part of an overall rate increase to Greater Minnesota airports.

MnDOT operates and maintains a number of the state's navigational aids and weather reporting systems to ensure a higher level of coverage and access to current/accurate weather information for pilots. MnDOT and MAC are both heavily involved in snow removal operations as a means to reduce pavement damage and enhance travel.

The maintenance budget for MAC, including all reliever airports for 2017–18, averages $38 million per year of which 11% ($4.2 million) goes toward airfield maintenance, and 39% ($14.8 million) goes toward buildings.

PUBLIC SAFETY

A runway incursion is an incident in which an unauthorized vehicle, person, or aircraft is on the runway. At MSP, runway incursion incidents have been few; only seven from 2010–2016, and only one from 2014–2016. At the six non-MSP metro airports, reported events are higher, a total of 46 from 2010–2016.

Initial review of the NTSB accident database from 2010–2016 revealed no fatalities due to infrastructure, the navigation system, or air traffic control-related causes.

RESILIENCE

Despite its performance record of uptime (99%) for navigation systems, MnDOT is facing a workforce shortage of qualified personnel (in-agency and contractors) to respond to equipment failures. This is due to pending retirements and the difficulties in attracting young talent to replace them. Contractors already comprise part of MnDOT's navigation system team, and other states share this situation.

Older portions of the nation's airway navigational system are undergoing decommissioning (such as nondirectional beacons and VOR's, a type of short-range radio navigation system) to make way for FAA's NextGEN (based on GPS). Rollout started in 2007 but is not expected to have major components operational until 2025, raising some concern over how this will be addressed. NextGEN components such as RNAV (area navigation) and DataCOMM (data communications) have found their way into operations at MSP, yet full implementation is still reliant on national efforts.

MAC features two power feeds from Xcel Energy, which allows one source to feed the airport should the other fail. This issue arose from the 12-hour blackout at Atlanta International in 2017 due to a fire in a power generation facility. Following this event, MAC modified MSP's electrical systems to prevent such an occurrence. MAC also institutes a comprehensive resilience strategy for key personnel of all its airports. The following outlines its leading accomplishments in 2016: active shooter training (400 employees), community emergency response teams training (250 employees), animal rescue training (100 employees), and firefighting training (300 employees).

INNOVATION

Nearly all commercial airports in Minnesota that have made significant improvements in the past 10 years have implemented a practice and/or infrastructure directly relevant to sustainability. Examples include use of geothermal energy, facilities retrofits to reduce water and energy consumption, use of more locally produced and more durable fixtures, green roofs to reduce stormwater runoff, use of solar power, and energy-efficient parking ramp lighting.

RAISE THE GRADE

To raise the aviation infrastructure grade in Minnesota, the following actions are recommended:

- **Congress should remove the $4.50 collection cap, which would allow airports to raise PFC's towards generating revenue and enable them to leverage state and federal grants.**
- **Congress should protect the EAS for Bemidji, Brainerd, Hibbing, International Falls, and Thief River Falls. This will require funding enhancements to the EAS program and addressing pilot shortages, which directly impact small community air service.**
- **Foster early adoption of NextGEN equipment and training for GA aircraft owners and pilots and accelerate NextGEN implementation efforts.**
- **Toward enhancing GA, reform the non-primary entitlements (NPE) portion of AIP, allowing rollover beyond the current four years, and foster an environment where public/private engagement and investment can more effectively coexist.**
- **Concurrent to reforming AIP (banking entitlements to save for future projects without losing to another state), create a simple means of sharing current statewide CIP needs among local decision-makers so they may coordinate priorities with each other.**
- **Reinforce the proactive efforts of MnDOT Needs Meetings for Greater Minnesota communities, particularly to inspire local business participation and the development of young aviators.**

SOURCES

- 2018 Minnesota Airport Directory and Travel Guide
- FAA Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports
- FAA U.S. Civil Airmen Statistics
- FAA Airport Capacity Profiles – July 2014
- MnDOT 2012 State Aviation System Plan (SASP)
- 2030 Twin Cities Aviation System Technical Report (2009), Metropolitan Council
- W. Gartner, B. Tuck, D. Erkkila, (2011) *"Study of the Economic Impact of Minnesota Airports"* CTS 11-01, UMN Center for Transportation Studies
- Minneapolis-St. Paul International Airport – Economic Impact of its Operations, InterVISTAS, (2016)
- MAC - Economic Impact of the Reliever Airports – InterVISTAS, (2018)
- Minnesota Aviation Tax Report – June 30, 2016
- 2017 Annual Report – Metropolitan Airports Commission
- 2006 Minnesota Aviation System Plan
- MSP Airport Capacity Profile – 2014
- MnDOT SASP Technical Advisory Committee Supporting Material
- Annual Minnesota Transportation Performance Report – 2015
- 2017 Summer Flight Delay Study: Best and Worst Airports Ranked – Milecards.com
- 2016 Metropolitan Airports Commission Sustainability Update
- Minnesota GO SASP Public Involvement Plan – 2017
- 2015 - 2018 Operating Budgets – Metropolitan Airports Commission
- Metropolitan Airports Commission data
- Assessment of Environmental Impact Affects Seven-Year CIP: 2018-2024 (2017)
- December 2016 MAC Pavement Condition Index Report (PCI Exhibits)
- Reliever Airports 2025 Long Term Comprehensive Plan (2010-2016), MAC
- FAA 2013-2014 FAA National Runway Safety Report (2015)
- S. Pope, (2017), *"On Course: Do Millennials Want to Learn to Fly?"*, Flying Mag.
- FAA Air Traffic Activity System (ATADS)
- "What is NextGen?" FAA website
- Report of the Working Group on Improving Air Service to Small Communities, May 2017, USDOT

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BRIDGES
GRADE: C

EXECUTIVE SUMMARY

One result of the I-35W bridge collapse was a decadelong effort to address long-deferred bridgework. But there is more work to be done. Much is known of the condition of the 19,776 bridges in Minnesota. Thousands of Minnesota bridges are nearing the end of their design service life. Statewide, 5.4% of bridges are structurally deficient, and state and local agencies struggle to obtain funding for necessary projects. Due to congestion, there are several large interchanges in the Twin Cities with sizable bridge structures that will soon need to be upgraded. Additionally, there are over 500 bridges posted with signs stating they have a reduced or substandard load capacity, and over 400 bridges that do not meet geometric standards. Bridges in the state need $5.4 billion in funding over the next 20 years. Only $3.22 billion in funding has been identified, leaving a shortfall of $2.18 billion, or $108.8 million each year.

BACKGROUND

Bridges in Minnesota are owned by a variety of different agencies, levels of government, and the private sector. Counties, cities, and other local government units own 15,187 bridges across the state. These bridges are typically somewhat smaller in size and carry city streets, county routes, and township roads. The Minnesota Department of Transportation (MnDOT) owns 4,589 bridges, primarily on Interstate routes and other major corridors. There are also hundreds of bridges located on trails in parks throughout Minnesota that are owned and maintained by local and regional park systems and the Minnesota Department of Natural Resources (DNR). This bridge assessment utilizes the Minnesota definition of a bridge with a length of at least 10 feet. It has not considered private bridges within networks owned by railroads or others.

CAPACITY

The capacity of a bridge is typically presented in terms of its load-carrying ability (e.g., how big a truck can cross the bridge) or its geometric standards. The appropriate geometric standard varies with the number of lanes and the number of vehicles using the bridge.

There are 448 bridges in Minnesota that don't meet geometric standards. This can be associated with narrow lanes and/or shoulders on the bridge or could be associated with poor geometrics below or at each end of a bridge.

Roadway system rehabilitation projects often lead to public requests that additional modes of traffic, such as pedestrian and bicycle lanes, be accommodated by bridges. This can be problematic if the request will result in a bridge with poor geometrics for vehicles.

The load capacity of a bridge is considered adequate if it can safely carry Minnesota's legal loads. If it can't carry legal loads, the bridge is posted with signage to inform truckers of the reduced capacity of the bridge. In Minnesota there are 547 load posted bridges.

Businesses often cite load restrictions on bridges as being a hindrance to the movement of goods and services throughout the state. Milk haulers, for example, use rural roads to access area farms. These bridges are vital to local businesses but are seldom part of the "Corridors of Commerce" program, created by the Minnesota Legislature in 2013.

CONDITION

Bridges in Minnesota are inspected by trained and certified personnel at least once every two years. Inspections may be required annually or more frequently on bridges with certain details or attributes, or those that are in poor condition.

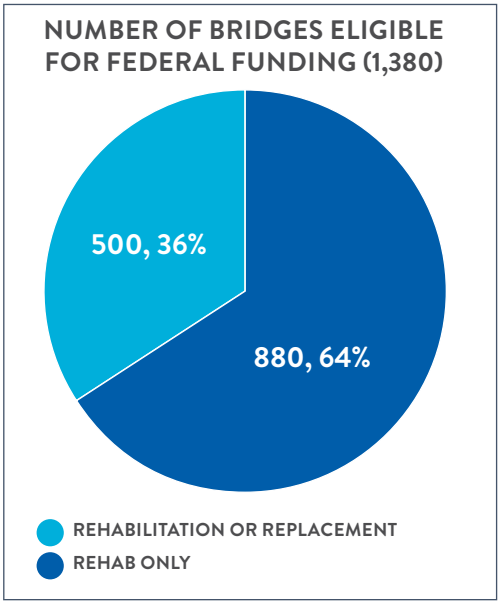
Different scales are used by inspectors to describe the condition of different components of a bridge. The most common is a 0-9 scale utilized by the Federal Highway Administration (FHWA) to describe the general condition of the entire component on a scale from 0, representing a totally failed condition, to 9, representing an excellent condition. As bridges age, their condition deteriorates and they receive lower condition codes from inspectors. A condition code 4 is assigned to a component that is in "poor condition": that is, the component exhibits advanced section loss, deterioration, spalling, or scour.

Sample images from MnDOT's "Bridge Inspector's Reference Manual" for bridge components in poor condition.

There are 1,080 bridges in poor condition in Minnesota.

Another measure of the condition or fitness of a bridge is its sufficiency rating. This rating uses a formula developed by the FHWA and is used on the local system. The formula uses condition values for each of 19 different characteristics of a bridge. The sufficiency rating is primarily used to determine if a bridge is eligible for federal funding for rehabilitation or replacement.

There are 1,380 bridges in Minnesota in poor enough condition to be eligible for federal funding. All of these bridges would be eligible for funds for a rehabilitation project. Of this set of bridges, there are 500 that have sufficiency ratings low enough to qualify for bridge replacement funding.



FUNDING AND FUTURE NEED

Bridges are a key component of our infrastructure. They are expensive to construct, rehabilitate, and maintain. A large number of the state's bridges were constructed as part of the Interstate system in the 1960s and 1970s. These bridges are reaching the end of their design life.

A significant investment in bridges on the state's highway system was made following the collapse of the I-35W bridge in August 2007. The 10-year Chapter 152 program was targeted at improving 172 trunk highway bridges. It added substantial funding to the delivery and construction of trunk highway bridges and replaced or substantially improved the condition of dozens of large bridges across Minnesota. The Chapter 152 program is sunsetting in 2018.

Between 2009 and 2018, the average annual expenditure on bridges on the state highway system was $202.7 million/year. As the Chapter 152 program funding sunsets, funding levels drop dramatically. The average expenditure on bridges on the state highway system between 2019 and 2021 is expected to be just $101.2 million/year, just 50% of the prior 10-year average. On the state highway system, approximately 80 bridges per year are reaching the end of their design life. Replacement bridges on average costs $2 million each. This results in a need of $160 million per year.

On the local highway system, the needs are $100 million per year and the typical funding level has been approximately $60 million per year.

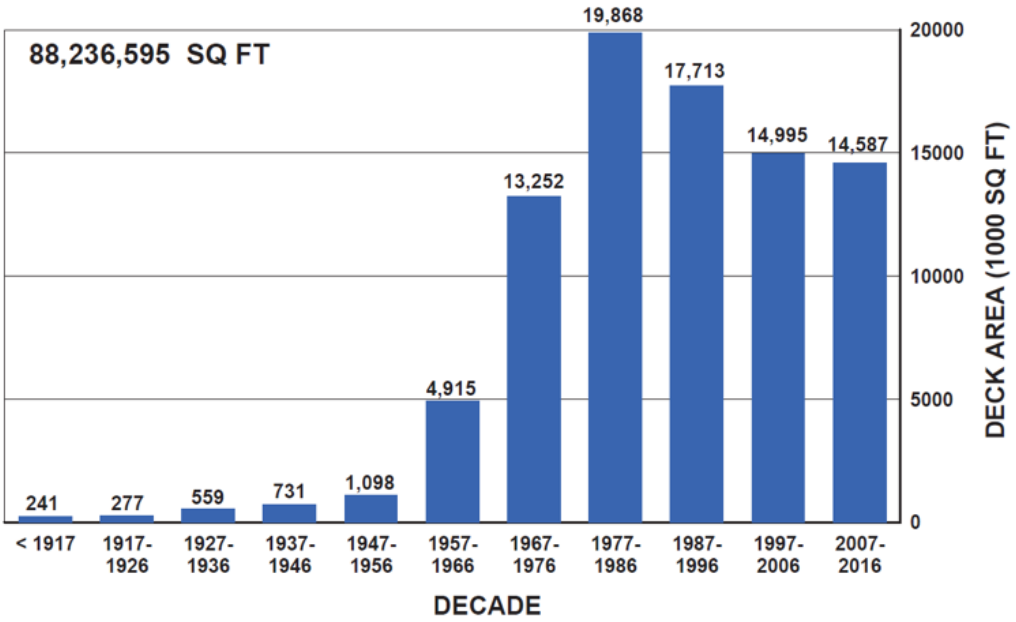
The following table from the Minnesota Bridge Report illustrates the age of bridges on each of the highway systems. The table illustrates a dramatic increase in the number of bridges constructed after 1956. In a nutshell, it shows that the bridges built during the Interstate era are nearing the end of their design life.

AGE OF STRUCTURES 10 FT AND OVER

ROUTE SYSTEM	# OF STRUCT	DECK AREA	PRE 1917	1917-1926	1927-1936	1937-1946	1947-1956	1957-1966	1967-1976	1977-1986	1987-1996	1997-2006	2007-2016
INTERSTATE	1,267	22,661,153	0	1	0	0	0	196	408	205	201	104	152
TRUNK HWY	3,322	29,291,930	2	19	212	153	289	240	366	547	549	492	453
COUNTY	7,804	22,025,473	48	100	172	253	283	756	1,065	1,382	1,237	1,358	1,150
TOWNSHIP	6,220	8,350,785	100	128	118	118	124	257	470	1,655	1,182	1,287	781
CITY	1,163	5,907,254	45	43	44	31	22	57	135	180	207	208	191
TOTAL	19,776	88,236,595	195	291	546	555	718	1,506	2,444	3,969	3,376	3,449	2,727

It is estimated to cost $22 million per year to inspect Minnesota's bridges.

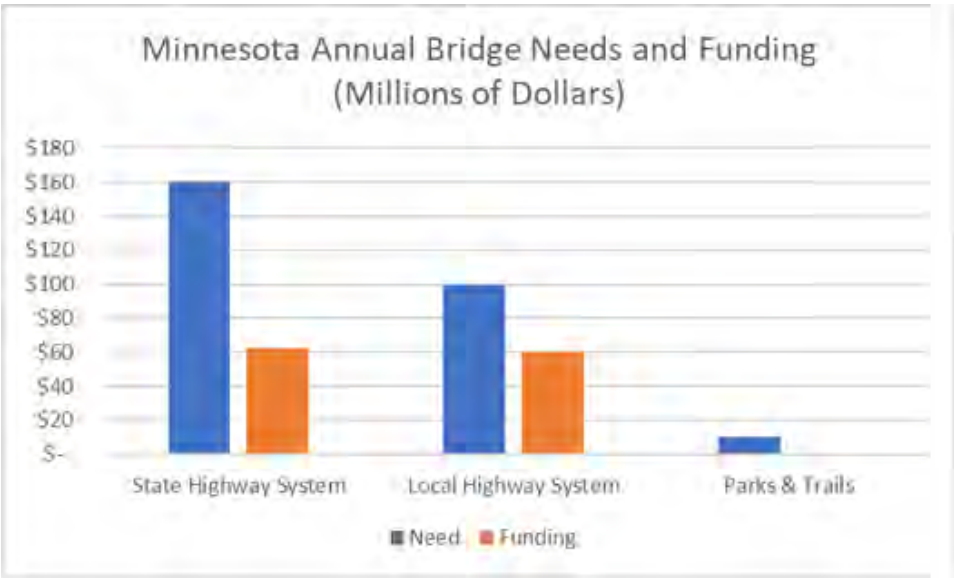
The following figure from the Minnesota Bridge Report provides a breakdown of the bridge deck area in Minnesota by decade of construction.



At times the Minnesota Legislature has provided "one-time" money to address bridge needs. These non-sustained investments complicate the delivery of bridge projects. The need to ramp up and subsequently reduce staffing levels and shift staff assignments is an inefficient way to approach systemwide bridge needs.

The figure above illustrates the "bulge" of Interstate bridges reaching the end of their 50-year-design life. A sustained funding program needs to be provided to address the needs associated with the aging bridges on the I-35, I-90, and I-94 corridors.

Over the next 20 years $5.4 billion of funding is needed. Nearly $3.22 billion in expected funding is identified, leaving a shortfall of $2.18 billion, or $108.8 million/year.



With reduced funding, most of the available dollars will need to be focused on small maintenance activities such as mill and overlay projects and addressing emergency projects. Increased funding allows owners to invest in larger maintenance projects that significantly extend the service life of a bridge. Examples include bridge painting projects that stop corrosion on steel components or fixing leaky deck joints that lead to the deterioration of components below the joint.

Older bridges that are part of large river crossings are difficult to fund. Project costs for repair or replacement of these bridges can be too large for a government agency to readily pay for. It will likely mean that the resources planned to address many smaller bridges in poor condition will be deferred to cover the costs associated with the large bridges.

Currently there is no dedicated source of funding available to owners of park and trail bridges. With hundreds of bridges in this network (many of them old railroad bridges), there are significant needs; however, the needs have not been consolidated but are expected to be at least $10 million per year.

SAFETY AND RESILIENCE

MnDOT considers several risk factors while assembling the priority of bridge projects on the state highway system. These factors include traffic interruptions, load restrictions, and the likelihood of full service interruptions.

Among the 3,800 bridges in Minnesota that are more than 50 years old, many were built according to old design standards. These bridges often have narrow lanes and narrow shoulders.

When local bridges in rural areas are out of service, long detours often are necessary. When first responders, ambulances, and fire engines responding to emergencies are detoured because of structurally deficient rural bridges, response times can be significantly increased.

INNOVATION

MnDOT and the DNR have embraced innovation to help assess existing bridges and ensure that replacements bridges are durable. Examples of innovative bridge assessment techniques include utilizing drones for bridge inspections and using sophisticated timber testing tools to determine the internal condition of timber bridges. High-performance concrete has been integrated into many projects, and new bridge decks include fiber reinforcement to minimize cracking.

MnDOT has utilized innovative project delivery methods (D/B and CMGC) to complete bridge projects. Accelerated Bridge Construction (ABC) has also been used to minimize the length of traffic closures and the impacts to the traveling public.

RAISE THE GRADE

To raise the bridge infrastructure grade in Minnesota, the following actions are recommended:

- **Provide a reliable funding stream for bridges. The dramatic drop-off in funding for bridges after 2018 will not allow the highway system to maintain its current condition. Additional funding must be provided to prevent the grade from dropping.**
- **Identify a source of dedicated funding for Park and Trail bridges.**
- **Perform research on the state and local bridge systems to identify the "sweet spot" for investments in:**

  a) operation and maintenance

  b) minor projects with deck overlays,

  c) major rehabilitation projects with deck replacements, and

  d) total bridge replacements.

SOURCES

- State of Minnesota – Bridge and Structure Inspection Program Manual – Minnesota Department of Transportation – May 2017
- Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, FHWA Report No. FHWA-PD-96-001, Office of Engineering, Bridge Division – December 1995
- Trunk Highway Bridge Improvement Program – Chapter 152 – Minnesota Department of Transportation – January 2018
- Email correspondence with Amber Blanchard – MnDOT Bridge Planning Engineer – March 2018
- Email correspondence with Kevin Western - MnDOT State Bridge Engineer – June 2018
- Email correspondence with David Conkel – MnDOT State Aid Bridge Engineer – June 2018
- Email correspondence with Amber Blanchard – MnDOT Bridge Planning Engineer – June 2018

REPORT CARD FOR MINNESOTA'S INFRASTRUCTURE 2018

DAMS
GRADE: C

EXECUTIVE SUMMARY

The majority of Minnesota's dams are at least 50 years old and 50 years is the typical dam design life, according to the Minnesota Department of Natural Resources (DNR). Dams provide flood control, fish and wildlife protection, recreational areas, and hydroelectric power, among other social and economic benefits. A dam is classified based on the probable losses to the public if the dam were to fail. Minnesota has 199 high- or significant-hazard dams and 83 of these have an emergency action plan. Both the state and federal government have programs to help fund repairs or removals of dams when the dam becomes a threat to the public. The lack of funds to perform needed maintenance and the fact that many dams were not designed to handle the larger rain events we are now experiencing are major challenges for Minnesota. An estimated $114 million is needed over the next 20 years to assure public state-regulated dams remain in a safe and stable condition.

CONDITION

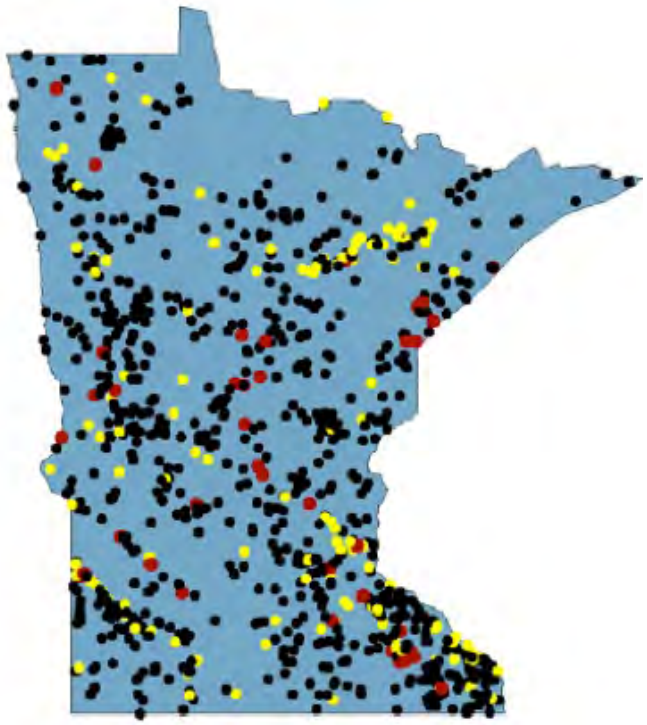
Both the DNR and U.S. Army Corps of Engineers (USACE) keep databases of all of Minnesota's dams. These databases differ in their criteria for inclusion of dams but monitor similar physical and safety-related information. According to the DNR's criteria, there are 1,097 dams in Minnesota. Of Minnesota's high- and significant-hazard dams, there are 32 dams which have a condition rating of poor or unsatisfactory.

The DNR defines a state-regulated dam as being greater than six feet in height and retaining more than 15 acre-feet of water.

The USACE National Inventory of Dams (NID) database includes dams meeting one of the following criteria:

1. Loss of human life likely if dam were to fail.
2. Economic loss, environmental damage, disruption of lifeline facilities, or other impacts to the public if dam were to fail.
3. Greater than or equal to 25 feet in height and retaining more than 15 acre-feet of water.
4. Greater than six feet in height and greater than or equal to 50 acre-feet of water storage.

Minnesota's dams are a variety of sizes and materials, built to different heights with different water storage volumes. These dams are located throughout the state as shown in the figure, right (ASDSO Dam Safety Performance Report). The associated definitions are also defined within the ASDSO Dam Safety Performance Report.



Sources: Association of State Dam Safety Officials, Minnesota Performance Report

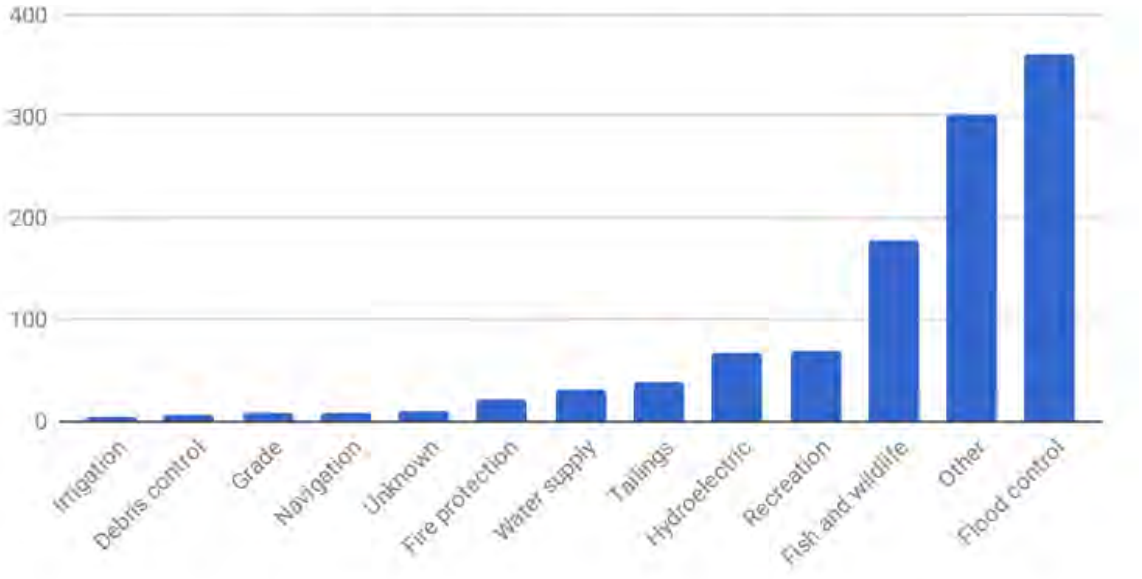
RED indicates high-hazard potential dams, typically defined as a dam whose failure or mis-operation would probably cause loss of human life and/or significant property damage. There are 55 high-hazard potential dams in Minnesota listed in the NID.

YELLOW indicates significant-hazard potential dams, typically defined as a dam whose failure or mis-operation could potentially cause significant property damage. There are 144 significant-hazard potential dams in Minnesota, according to NID.

BLACK indicates low-hazard potential dams, typically defined as a dam whose failure or mis-operation would likely only cause minimal property damage. There are 898 low-hazard potential dams in Minnesota, according to NID.

The public most commonly thinks of high-profile dams that provide hydroelectric power or regional water supply, but Minnesota's dams serve many purposes, while many serve more than one purpose. Flood control is the primary purpose for most dams in Minnesota, followed by fish and wildlife management, recreation, hydroelectric, tailings, and water supply, among others.

TABLE 1: DAMS BY PRIMARY PURPOSE



Of these dams, about one-third serve more than one purpose. Both the DNR and USACE have grants that provide funds for rehabilitation and removal of dams. Rehabilitation commonly involves increasing the functionality of the dam while also repairing deficiencies to improve dam safety. Dam removal can occur where a dam either no longer serves its primary purpose or poses unacceptable risk to downstream populations.

Minnesota's dams are maintained by their owners, whether they are private, local, state, or federal. Each dam owner is required to maintain the dam, but these requirements vary by permit. Owners may be required to record items such as the average water storage, latest inspection date, and in-place safety measures based on the dam's classification.

CAPACITY AND OPERATION AND MAINTENANCE

Maintenance of dam structures and/or embankments while safely operating these facilities is paramount to properly fulfill the dams' intended purposes. Proper operation and maintenance helps reduce the risk of dam failure. Minnesota legislation provides regulations for state-regulated dams related to hazard classification, disaster mitigation, emergency repairs, and inspection frequency, among other qualities that are in effect to protect the public.

The majority of Minnesota's dams are older than 50 years. These structures not only continue to age but become subject to stricter criteria as downstream populations increase and natural disaster prediction becomes more advanced. What may have been suitable for design 50 years ago may not be suitable today.

Minnesota legislation provides for dam inspections of state-regulated dams as funding and staffing allow, while owners of dams are required to maintain dams to ensure their integrity. Minnesota's dam inspection program has met or come close to reaching its annual inspections requirements for several years. Federally regulated, power-producing dams are regulated by the Federal Energy Regulatory Commission and also require regular inspections. There are 111 federally owned dams listed in the NID. Dams are to be inspected based on their hazard ranking.

CLASS	HAZARD POTENTIAL	STATE INSPECTION FREQUENCY	FEDERAL INSPECTION FREQUENCY
I	High	1 every year	1 every year
II	Significant	1 every 4 years	1 every year
III	Low	1 every 8 years	1 every 3 years

When a state-regulated dam becomes a hindrance to the community/environment and no longer serves its intended purpose, the state may provide up to 100% of the funds for removal for cities, counties, townships, and watershed districts, but not to owners of privately owned dams.

PUBLIC SAFETY AND RESILIENCE

To maintain and improve public safety, the risk of dam failure needs to be reduced. According to the DNR, an estimated $114 million is needed over the next 20 years to assure public state-regulated dams remain in a safe and stable condition. Over the past 20 years, the DNR has been appropriated around $2 million per year in funding.

The failure of a dam not only damages the dam itself and poses an immediate risk to public safety, but it also can damage roads, bridges, and utilities—all of which would be needed to help care for the public immediately following an event and before full community functionality can be restored.

The DNR defines an Emergency Action Plan (EAP) as "a formal document that identifies potential emergency conditions at a dam and specifies preplanned actions to be followed in order to minimize property damage or loss of life in the case of a dam failure." Minnesota law requires all high-hazard dams to have an EAP. Of Minnesota's 199 high- or significant-hazard dams, 83 have an emergency action plan. Minnesota legislation requires that these EAPs be communicated to communities that could be affected. If there is no EAP for a high- or significant-hazard dam, this information must be communicated to affected communities. The USDA Natural Resources Conservation Service (NRCS) and the Association of State Dam Safety Officials (ASDSO) have worked to create a sample EAP that is available online to assist dam owners.

Another piece of public safety, as with any infrastructure system, is educating dam owners, those that rely on dams, and those whose economies or lives could be impacted by the failure of a dam. ASDSO and FEMA have prepared handbooks (also available as e-books) to help answer questions about dams, including their purposes, associated risks, and how individuals should react if they are affected by dam operations and/or failures.

As with any infrastructure, it is important to understand proper usage and risks. Owners should understand the implications when their dam is functioning properly, during flood and low-flow events, when their dam is damaged, and then how to implement their EAP if the dam were to fail or is not operating as intended. This information should be shared with the public, as appropriate, and the public needs to understand how to respond in various situations.

FUNDING

Increased funds are needed to rehabilitate deficient dams and to provide sufficient staffing to maintain and improve dam structures. As populations continue to grow and precipitation patterns change, dam safety programs will require continued investment to keep operations running properly and to meet regulations. These environmental and community changes can increase the hazard classification of a dam as the population downstream grows. The upgrades needed to meet a higher hazard classification can be costly and require significant funding. Dam owners are required to improve the dam to meet the criteria under the higher classification and could be found liable for damages incurred, specifically when the dam is not compliant with current standards. Funds and grants need to be available for both public and private dam owners through different agencies to improve these aging facilities.

The DNR creates a Project Priority Needs List through its Dam Safety Program every odd-numbered year to present to the state Legislature to request funding. This list includes recently completed projects, current projects, and projects that still need funding, as well as total estimated cost and cumulative state cost. The 2017 list included:

- 51 ranked projects totaling over $26 million in total estimated costs.
- 70 projects overall totaling over $32 million in total estimated costs.
- 32 projects where the project's primary funding need is for safety-related repairs.

While Minnesota has decreased the number of regulated dams per staff and increased the state safety budget per dam over the past 20 years (data available through 2015), the 2018 governor's bonding bill appropriated no funds for dam safety and repair projects. This is not on trend with recent years, where about $1 million was typically budgeted in the bonding bill for dam safety and repair projects. With continued inadequate funding, repair costs for deferred, lower-priority projects will continue to rise. This will result in an increase in the number of repairs and increased costs over time. Dam owners and agencies need to work together to obtain proper funding to repair deficient dams to protect the public.

RAISE THE GRADE

To raise the dams infrastructure grade in Minnesota, the following actions are recommended:

- **Fund state dam safety programs and repair and removal grants.**
- **Develop EAPs for all high- and significant-hazard dams.**
- **Educate the public so individuals learn where dams are and the safety hazards and risks associated with dams.**
- **Educate government entities on the increased need for funding as dams reach their serviceable ages and require increased maintenance.**
- **Provide and increase funding and staffing for regular dam inspections on state-regulated dams.**
- **Design dams to meet current design standards.**

SOURCES

- Association of State Dam Safety Officials, Minnesota Performance Report
- Minnesota Department of Natural Resources, Dams and Dam Safety
- U.S. Army Corps of Engineers, National Inventory of Dams

REPORT CARD FOR MINNESOTA'S INFRASTRUCTURE 2018

DRINKING WATER

GRADE: C-

EXECUTIVE SUMMARY

Approximately 79% of Minnesotans are served by community water systems while 21% of the population relies on private wells for drinking water. In total, about 75% of drinking water is sourced from groundwater and the remaining portion from surface water. The U.S. Environmental Protection Agency estimates the 20-year drinking water infrastructure need for Minnesota is over $7.5 billion—and unless funding is increased, most of this will be raised through local utility fees, which are climbing to meet costs of pumping, treating, storing, and distributing water. Aging infrastructure and increasingly high demands for funding lower the grade. Although large communities' drinking water systems have consistently met federal standards, far less is known about the private wells many people in rural Minnesota rely on.

BACKGROUND

Drinking water and wastewater systems are often considered "invisible" assets since many aspects of these systems are buried or maintained out of the public eye. Water systems are not in the headlines until there is a problem. Infrastructure failure of drinking water treatment and distribution systems can have major impacts on communities. Most importantly, people's health can be at risk when treatment does not comply with standards or when infrastructure damage allows contaminants to enter the water system or prevents reliable fire protection. In addition to their impacts on public health, failures in drinking water distribution such as water main breaks can have environmental and economic impacts. Water losses can lead to business closures and a strain on water resources.

Minnesotans receive drinking water from two main sources: surface water, such as a river or lake, and groundwater. Drinking water is either conveyed from a public water system or a private well. The breakdown is shown in Table 1.

TABLE 1

SOURCE OF DRINKING WATER FOR MINNESOTANS*	ESTIMATED POPULATION (MILLIONS)	PERCENT OF POPULATION
Public groundwater (Community system)	3.0	54%
Public surface water (Community system)	1.4	25%
Private wells	1.2	21%

*Estimates provided in Minnesota Department of Health "Drinking Water by the Numbers"

Approximately 79% of Minnesota residents are served by community water systems. Community water systems include all systems that serve at least 15 service connections or serve an average of at least 25 people for at least 60 days a year. There are 6,787 such systems in Minnesota: 967 community systems, including 731 municipal systems, provide water to consumers in their places of residence and 5,820 noncommunity systems provide drinking water in settings like factories, schools, restaurants, and highway rest stops.

Drinking water systems can be broken into several components: source, treatment, and storage and distribution. Depending on the community and the needs of each individual community, drinking water treatment and distribution may encounter different challenges related to source water, aging infrastructure, changes in population, and more.

CAPACITY

In general, the capacity of drinking water treatment plants in Minnesota is adequate. However, as populations increase in some areas, there is a need to modify existing drinking water treatment plants or construct new water treatment plants to provide treatment. These projects can be expensive, and face considerable competition for infrastructure funding, as discussed below in the Investment and Funding Section.

CONDITION

Much of the drinking water infrastructure in Minnesota is over 50 years old. Some system components are closer to 100 years old and reaching the end of their useful life. As this infrastructure ages, communities may be faced with huge multiyear projects to replace large portions of the entire water system.

In Minneapolis, the Water Treatment and Distribution Service manages more than 1,000 miles of water mains, over 15,000 isolation valves, nine pump stations, and eight finished water reservoirs. As of 2013, Minneapolis averaged approximately 40 prominent water main breaks a year and most pipes involved were over 100 years old. In St. Paul, where the infrastructure is also 100 years old, the city averaged 140 to 150 water main breaks along its 1,200 miles of service lines from 1993-2013. However, the city has instituted an effective annual replacement program, which aims to replace 11 to 12 miles of mains each year.

OPERATION AND MAINTENANCE

Asset Management

Asset management is a tool for managing a utility's assets and can assist utilities with making good decisions on caring for their aging assets. The goal of asset management is to ensure the long-term sustainability of the water and/or wastewater utility. As a water system ages over time, the asset deteriorates and loses value. As this happens, the level of service that the utility's customers desire may become compromised, operation and maintenance costs can increase, and the utility may have extreme and unpredictable costs that it can't afford. Effective asset management can be a valuable tool for utilities to use to maintain their systems and minimize the risk of aging infrastructure.

In 2015 and 2016, Minnesota 2050, a project led by the Minnesota section of the American Public Works Association, conducted a statewide survey of the asset management practices of Minnesota cities, counties, the Metropolitan Council and Minnesota Department of Transportation (MnDOT). Of the cities, counties, and state agencies that participated in the survey, only 13% indicated that they had completed an asset management plan. Of the participants with drinking water systems, 34% indicated that they do not employ an asset management system.

In addition to the challenges of managing aging infrastructure systems, small communities have identified the task of retaining institutional knowledge as water operators and other water system staff retire as another significant challenge. To help water utilities develop asset management plans and retain knowledge, the Minnesota Department of Health (MDH) and Minnesota Rural Water Association developed an asset management planning spreadsheet for small water systems.

FUNDING AND FUTURE NEED

Treatment plants and distribution systems are expensive to build, operate, and maintain. Distribution projects often require work in the street, which can involve extensive planning to minimize disruptions to the public. Investment in existing systems and funding for future infrastructure are essential to asset management. Financial assistance for water infrastructure is currently available in the form of low interest rate loans. Limited grant funds are also available to communities based on project cost and average household income. Funding also comes from revenue generated by ratepayers; however, a user's water bill is often lower than the true cost of service.

The U.S. Environmental Protection Agency (USEPA) assesses the nation's drinking water infrastructure needs every four years and uses the findings to allocate funds for the states' Drinking Water State Revolving Fund programs. The results of the 2015 Drinking Water Infrastructure Needs Survey and Assessment determined that the 20-year drinking water infrastructure need for Minnesota is over $7.5 billion. The breakdown of these costs by public water system size are shown in Table 2 below.

TABLE 2: MINNESOTA 20-YEAR NEED REPORTED BY SYSTEM SIZE*

SYSTEM SIZE	20-YEAR NEED (IN MILLIONS OF JANUARY 2015 DOLLARS)
Large – serving over 100,000 people	$1,110.0
Medium – serving 3,301 to 100,000 people	$4,322.9
Small – serving 3,300 and fewer people	$1,735.5
Not-for-Profit Noncommunity Water Systems	$339.5
Total:	**$7,507.9**

*Information obtained from the USEPA "Drinking Water Infrastructure Needs Survey and Assessment"

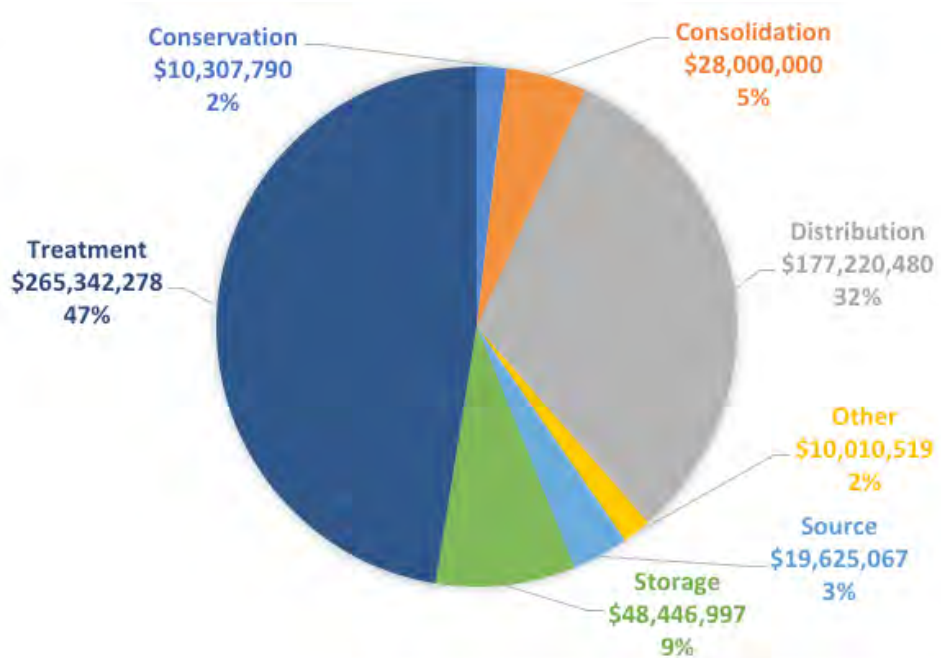
The Drinking Water Revolving Fund provides financing for municipal drinking water systems, including treatment plants, water towers, water mains, wells, and pumphouses. Demand for drinking water loans is driven by the need to replace aging facilities, provide additional treatment to meet public health standards, and replace old water mains to minimize water loss and potential contamination problems. Since the program's inception in 1998, the state's Drinking Water Revolving Fund has funded more than $810 million in projects through this program.

Projects that the Public Facilities Authority (PFA) intends to fund from the Drinking Water Revolving Fund (DWRF) within a state fiscal year are identified in an Intended Use Plan (IUP). To fund these projects and activities for 2018 (fiscal year from July 1, 2017 to June 30, 2018), the PFA will use a combination of funds from the 2017 federal capitalization grant, loan repayments and PFA revenue bond proceeds.

Demand for DWRF financing has grown in recent years. Total requests for the 2018 IUP exceed $260 million, almost seven times the sustainable long-term lending capacity of the fund. To maintain balance between current demand and future lending capacity, each year the PFA in consultation with the MDH determines a fundable range for new projects listed on the IUP based on Project Priority List (PPL) priority points. It is important to note that while there is a significant gap between requests and capacity, the total requests may overestimate the annual funding need due to requests from systems that are not ready for construction or are also seeking state grant funds to offset some of the loan.

The five-year need identified by the 2017 Drinking Water PPL has increased by over 60% in the last two years to a total of 330 projects at a cost of $559 million. Smaller cities with population under 2,500 account for 268 projects at a cost of $300 million. Project types vary from water supply source development to distribution systems (a breakdown is shown below).

FIGURE 1: 2017 DRINKING WATER PROJECT PRIORITY LIST COST AND PROJECT TYPE



Information from MDH 2016 Annual Drinking Water Report

To help cover costs incurred by MDH to provide inspection services, protection plans, and technical assistance for the 6,800 public water systems in Minnesota, the Minnesota Legislature established the Safe Drinking Water Connection Fee. This annual connection fee is an important component of the funding MDH needs to aid Minnesota's drinking water systems. The Safe Drinking Water Connection Fee has not been increased since 2005, when it was increased from $5.21 to $6.36 per connection.

SAFETY AND RESILIENCE

In recent years, more than 99% of the state's population has drinking water that meets federal standards. Achieving 100% compliance is no easy task when considering the effect of storms, accidents, and failing infrastructure and equipment, but as part of a USEPA regulatory measure, MDH has committed to a goal whereby 97% of the population has drinking water that meets federal standards. Although Minnesota has been successful at meeting safe drinking water standards, communities must continue to actively protect and maintain the quality of their drinking water.

TABLE 3: PERCENT OF THE POPULATION WITH DRINKING WATER THAT MEETS FEDERAL STANDARDS

2013	2014	2015	2016
99.2%	99.3%	99.2%	99.4%

Based on information provided in the MDH 2016 Annual Drinking Water Report

As technology and research increase our understanding of contaminants and treatment options, drinking water utilities may face new challenges as they strive to meet state regulations and fund alternative treatment technologies.

Our understanding of drinking water contaminants, for example, has improved through the unregulated contaminants list created by the USEPA. These contaminants have been identified as potentially present in drinking water but require further study before regulatory action is taken. The fourth Unregulated Contaminant Monitoring Rule includes 30 contaminants that will require monitoring between 2018 and 2020. Should any of these contaminants occur at high enough frequencies or concentrations, they may be regulated in the future. This could require expensive upgrades to treatment plants.

Lead and Copper

Lead has been recognized as an environmental hazard for many years and returned to the national spotlight due to events in Washington, D.C. and Flint, Michigan. Lead is a harmful contaminant that can have long-term health effects, particularly in children. Lead contamination in water is most often attributed to distribution system components such as lead service lines, fixtures, and solder.

The federal Safe Drinking Water Act is enforced by the Minnesota Department of Health and contains the Lead and Copper Rule (1991), which regulates testing and controlling lead and copper in drinking water. If a public water supply exceeds the action level, the drinking water utility is required to act to reduce lead and/or copper by taking steps such as conducting corrosion control studies, installing corrosion control treatment, and removing lead service lines.

In 2017, the Minnesota Legislature passed a law requiring all public schools to test their public drinking water for lead and make the information available to the public. In addition to this legislation, MDH provides guidance and education tools to help schools and communities better understand how they can protect their drinking water quality.

In 2016, six community systems in Minnesota exceeded the lead action level and 23 community systems exceeded the copper action level; seven noncommunity systems exceeded the lead action level, and 10 noncommunity systems exceeded the copper action level. MDH is conducting public education programs and working with the drinking water utilities within these communities to return them to compliance.

Harmful Algal Blooms

Algal blooms in water bodies can result from warm temperatures and high levels of nutrients such as nitrogen and phosphorus. Some Minnesota lakes used as a drinking water source have had periodic harmful algal blooms (HAB). MDH is not aware of any incidents where drinking water has exceeded safe levels of HAB contaminants. MDH has developed a health guidance value of 0.1 parts per billion for Microcystin – LR, one of the most harmful HAB contaminants. The safest approach to protecting the public is to prevent algal blooms; however, communities should be prepared to act should an HAB occur within their water supply.

RESILIENCE

Approximately 75% of Minnesotans have drinking water that is sourced from groundwater, which may be provided by a private well or a public water system. As a result, sustainable groundwater use is important to maintaining the drinking water supply in the state. MDH has developed Groundwater Restoration and Protection Strategies (GRAPS) reports for watersheds in Minnesota. The GRAPS process involves translating ongoing groundwater and drinking water programs and data to the watershed scale and working with other agencies to develop watershed-scale groundwater and drinking water management strategies to integrate into local water management plans. Groundwater is an important source of drinking water for Minnesotans and sustainable practices are imperative.

The three cities with treatment plants located along the Mississippi River—St. Cloud, St. Paul, and Minneapolis—have surface water intake protection plans. In the event of an upstream spill, all three cities have plans in place to close their intakes and rely on storage until the contamination plume has passed. In addition, St. Paul has wells that can be put into service if needed.

Minnesota has an active Water and Wastewater Agency Response Network (MNWARN) whereby cities can provide mutual assistance during emergencies or catastrophic events. In addition, the governor has called out the Minnesota National Guard during catastrophic events such as floods and tornadoes. The Legislature also has approved or provided funding assistance when it is in session. The MNWARN system is an organization that the Minnesota Legislature may wish to consider for future funding.

RAISE THE GRADE

To raise the drinking water infrastructure grade in Minnesota, the following actions are recommended:

- **Increase funding for the Drinking Water Revolving Fund. This will augment the annual lending capacity maintained by the PFA. Increased grant funding is also needed to help address affordability needs for communities with high-priority projects. Completion of these projects will reduce the risk of infrastructure failures. Funding for infrastructure improvements could be obtained from a drinking water tax specifically earmarked for this purpose, increased user rates, or from other general funding sources.**
- **Encourage the use of asset management and development of asset management plans at the local level. This will provide more valuable information on the needs of drinking water systems statewide. Asset management can improve operations and maintenance and delay loss of condition within a drinking water system by focusing resources as needed. A better understanding of infrastructure needs statewide would better inform the funding process.**
- **Increase the Safe Drinking Water Fee so that the Minnesota Department of Health has adequate funding to support Minnesota's drinking water systems. The Legislature has not increased this fee since 2005 and it is insufficient. More funding would improve the ability of MDH to provide services to Minnesota drinking water systems, including assistance with asset management and asset management planning.**
- **Act to educate the public on water quality issues and the challenges involved in maintaining a drinking water system. A well-informed community will be engaged and can better advocate for the needs of their community.**

SOURCES

- FACT SHEET - *Summary Drinking Water Infrastructure Needs and Capital Costs*, Minnesota Department of Health, March 2017
- Minnesota Drinking Water 2017 Annual Report for 2016, Minnesota Department of Health, June 2017
- Basic Information about Lead in Drinking Water, USEPA. https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water
- Asset Management Guidance for Water and Wastewater Systems, Minnesota Rural Water Association
- 2015 State of the Infrastructure – Charts and Graphs, MN 2050
- Drinking Water Revolving Fund 2018 Intended Use Plan, Minnesota Public Facilities Authority, September 2017
- Indicators: Algal Toxins (microcystin), USEPA, July 2017. https://www.epa.gov/national-aquatic-resource-surveys/indicators-algal-toxins-microcystin
- Groundwater Restoration and Protection Strategies (GRAPS), Minnesota Department of Health. http://www.health.state.mn.us/divs/eh/water/dwp_cwl/localimplem/index.html
- Drinking Water Infrastructure Needs Survey and Assessment Sixth Report to Congress, USEPA, March 2018
- 2018 Public Facilities Authority Preliminary Capital Requests, Public Facilities Authority, July 2017
- Fourth Unregulated Contaminant Monitoring Rule (UCMR 4), USEPA, March 15, 2018. http://www.health.state.mn.us/divs/eh/water/com/ucmr4.html
- Drinking Water by the Numbers – Numbers to be Used During Fiscal Year 2018 (Based on Data from Fiscal Year 2017), MDH.
- Source: http://www.startribune.com/july-10-most-of-minneapolis-water-pipes-a-century-old/215006001/
- Source: http://www.startribune.com/july-10-most-of-minneapolis-water-pipes-a-century-old/215006001/

ENERGY
GRADE: C

EXECUTIVE SUMMARY

The state's energy portfolio has changed significantly over the past decade to successfully meet greenhouse gas emissions reduction goals by bringing on more renewable energy, wind, and solar, and reducing the use of coal. The energy industry is working hard to meet these goals. But challenges remain. The industry must prepare for growing consumption, especially during the summer months. The region's summer demand is projected to grow 0.85% per year for the next seven years. Ensuring reliable and dependent access to energy is critical; without it, Minnesota's economy grinds to a halt.

BACKGROUND

Electrical utilities in Minnesota are classified as investor-owned, cooperative utilities, or municipal utilities. The Minnesota Public Utilities Commission (MPUC) regulates all investor-owned utilities. MPUC regulates rate changes, service areas, mergers and acquisitions, facility planning—including large electrical power plants and electrical transmission lines—in addition to other items.

Most Minnesota utilities belong to Midcontinent Independent System Operators (MISO). MISO is responsible for the delivery of electricity across 15 states, including Minnesota.

The bulk of Minnesota's electricity is produced by coal—39% in 2017. This is a reduction from 2014, when 49% of electricity was produced by coal. Minnesota's two nuclear power plants, Monticello and Prairie Island, accounted for 23% of the state's net electricity generation in 2017. Renewable energy surpassed nuclear in net electricity generation in 2017. Renewable energy now accounts for 25% of total net generation.

The state's largest coal fire plant, Sherburne County Generation Station, is scheduled to be replaced in 2026. Extensive planning will be required to replace Minnesota's largest power plant.

In the table below, Minnesota's electricity prices per kWh are compared to the U.S. average.

Electricity	Minnesota	U.S. Average	Period
Residential	12.56 cents/kWh	12.62 cents/kWh	Feb-18
Commercial	10.01 cents/kWh	10.60 cents/kWh	Feb-18
Industrial	7.70 cents/kWh	6.75 cents/kWh	Feb-18

Source: https://www.eia.gov/state/data.php?sid=MN#Prices

Minnesota must maintain affordable energy prices, continue the reliable and resilient delivery of electricity, and keep public safety at the forefront to maintain strong economic growth for our future.

CAPACITY

Minnesota produces electricity from five general sources. In order of most to least, these are coal, nonhydroelectric renewables, nuclear, natural gas, and hydroelectric. Over the last decade, Minnesota has expanded the use of renewable energy sources to produce electricity. This has reduced the state's dependence on nonrenewable resources and has mitigated environmental impacts from decades of use of nonrenewable resources. In 2005, 6% of Minnesota's electricity generation was from renewables. Compare that to 2017, where slightly more than 25% of Minnesota's electricity generation was from renewables.

With nonrenewable resources becoming less available and their environmental impacts becoming better understood, the state will need cleaner energy generation as fossil fuel plants are phased out. Xcel Energy, Minnesota's largest investor-owned utility, has proposed beginning to phase out coal-fired and nuclear plants within the next decade, while increasing wind and solar generation to bridge that electricity generation gap.

Adding capacity to Minnesota's decades-old grid requires years of advanced planning and forecasting, as well as communication between the state's utility operators, investors, regulators, and the end users. Minnesota legislation requires that utilities file proposed Integrated Resource Plans (IRP) every two years to present their 15-year demand forecast and proposed changes to meet anticipated demand. Within the IRP, the utility details its plan to meet customer needs and reliability in a cost-effective manner. It also includes information regarding improvements in energy conservation and demand-side management, changes to power plants, and transmission lines. The IRP is also used by the Minnesota Public Utilities Commission (MPUC) to determine whether a utility is reasonably attempting to meet Minnesota's Renewable Energy Standard (RES). The state's regulated electric utilities have indicated in their recent IRPs that they will need additional resources to meet the demands of Minnesota's projected population growth while also meeting RES requirements.

In 2007, the Minnesota Legislature established the state's mandatory RES requirements. These requirements set renewable standards for public utilities, generation and transmission electric cooperatives, municipal power agencies, and power districts operating in the state. The standard requires that at least 25% of retail electricity sales be generated or procured using eligible renewable sources by

2025. Of Xcel Energy's retail electricity sales, at least 30% must be generated or procured using eligible renewable sources by 2025. Currently, Xcel Energy is on track to meet this requirement.

The Minnesota Department of Commerce "expects that the need to replace aging fossil fuel generation will surpass the contribution of conservation and demand-side management toward balancing supply and demand in a cost-effective manner."

CONDITIONS AND OPERATION AND MAINTENANCE

Minnesota's four investor-owned utilities—and all but six of the other electric utilities that operate in Minnesota—are a part of the Midcontinent Independent System Operator (MISO). This membership allows MISO to control transmission facilities while the utilities keep ownership. MISO is an "independent system operator" third-party organization that manages transmission and power generation while looking out for end-use customers. In doing so, MISO develops policies and procedures to maximize overall systems operation, generation, transmission, and delivery.

Minnesota's transmission system operates across borders through the Upper Midwest, Eastern United States, and Canada. Minnesota's primary electric load centers are the seven-county Twin Cities Metropolitan Area, Duluth, Mankato, Rochester, and St. Cloud. As populations grow and technology advances, these centers, as well as Greater Minnesota, will require more capacity and reliability. Additionally, with the retirement of base load plants, increased storage capacity will become part of the mix that will affect the transmission system.

According to Minnesota's Energy Policy and Conservation Quadrennial Report, many transmission lines into, out of, and through Minnesota are near or at operational limits. Transmission bottlenecks are developing where supply and/or demand exceed the power that can be transmitted. Just like roadways can become congested during peak hours, electricity grids can also become overpowered. MISO works with the utility owners to advocate for system upgrades to power generation, transmission, and usage.

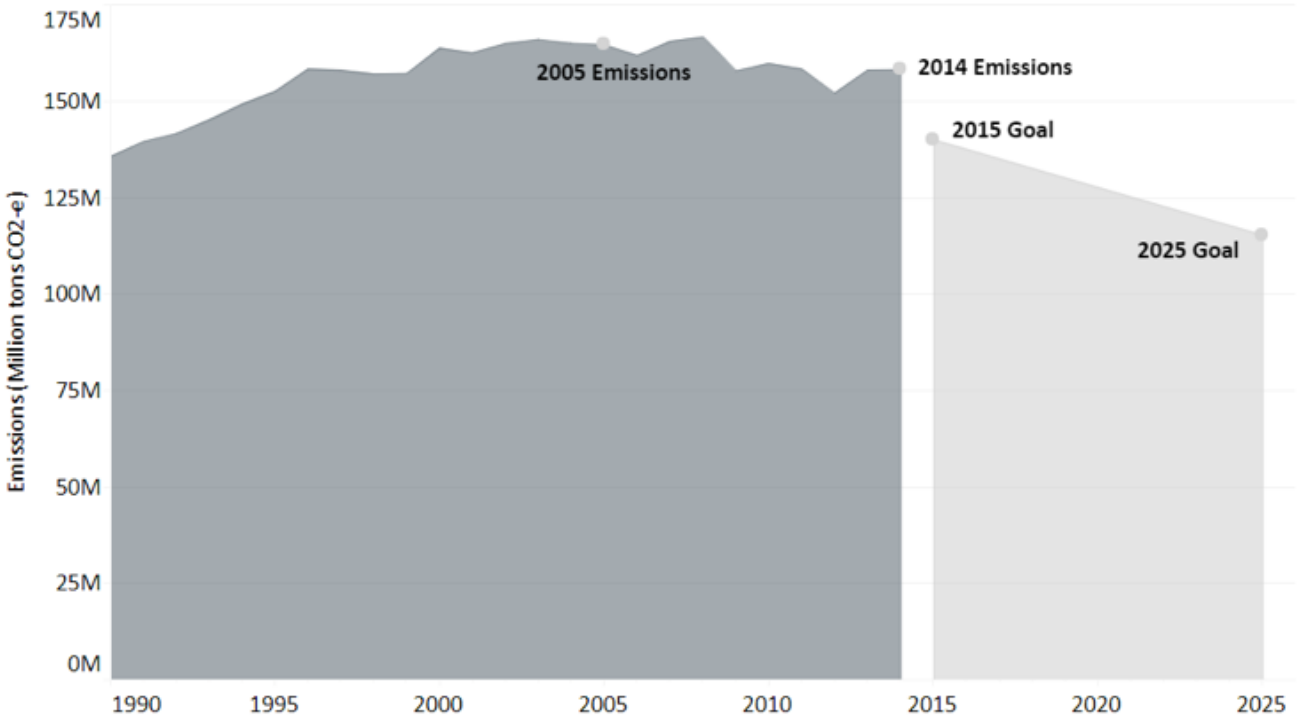
Another key part of Minnesota's growing grid is energy storage. Minnesota currently has 13 energy storage projects, generally located in population centers. The Minnesota Energy Storage Alliance of the University of Minnesota Energy Transition Lab partners with electric operators and owners to help advocate for and provide expert recommendations for Minnesota regulators and policymakers. Part of the Alliance's work involves advocating for increased integration of utilities to combat shortages and high demands, as well as pairing energy storage with renewable energy sources to create higher reliability.

PUBLIC SAFETY AND RESILIENCE

Minnesota energy policies have always been proactive in addressing public safety and resilience.

In terms of public health (safety), Minnesota state energy mandates have set ambitious goals for greenhouse gas emissions reduction. The goal was set to reduce greenhouse gas emissions by 15% from baseline 2005-2015. The state achieved only about a 4% reduction in greenhouse gas emissions. However, the electricity generation industry achieved a laudable 17% reduction in emissions.

FIGURE 1: MINNESOTA'S GREENHOUSE GAS EMISSIONS FROM 1990-2014



https://www.pca.state.mn.us/air/greenhouse-gas-emissions-data

Minnesota ranked 22nd in states affected by power outages in 2016 and 2017. In 2017 there were 56 reportage outages. On average, 1,378 people were affected per outage. The duration of each outage averaged 76 minutes.

FIGURE 2: NUMBER OF REPORTED POWER OUTAGES BY STATE

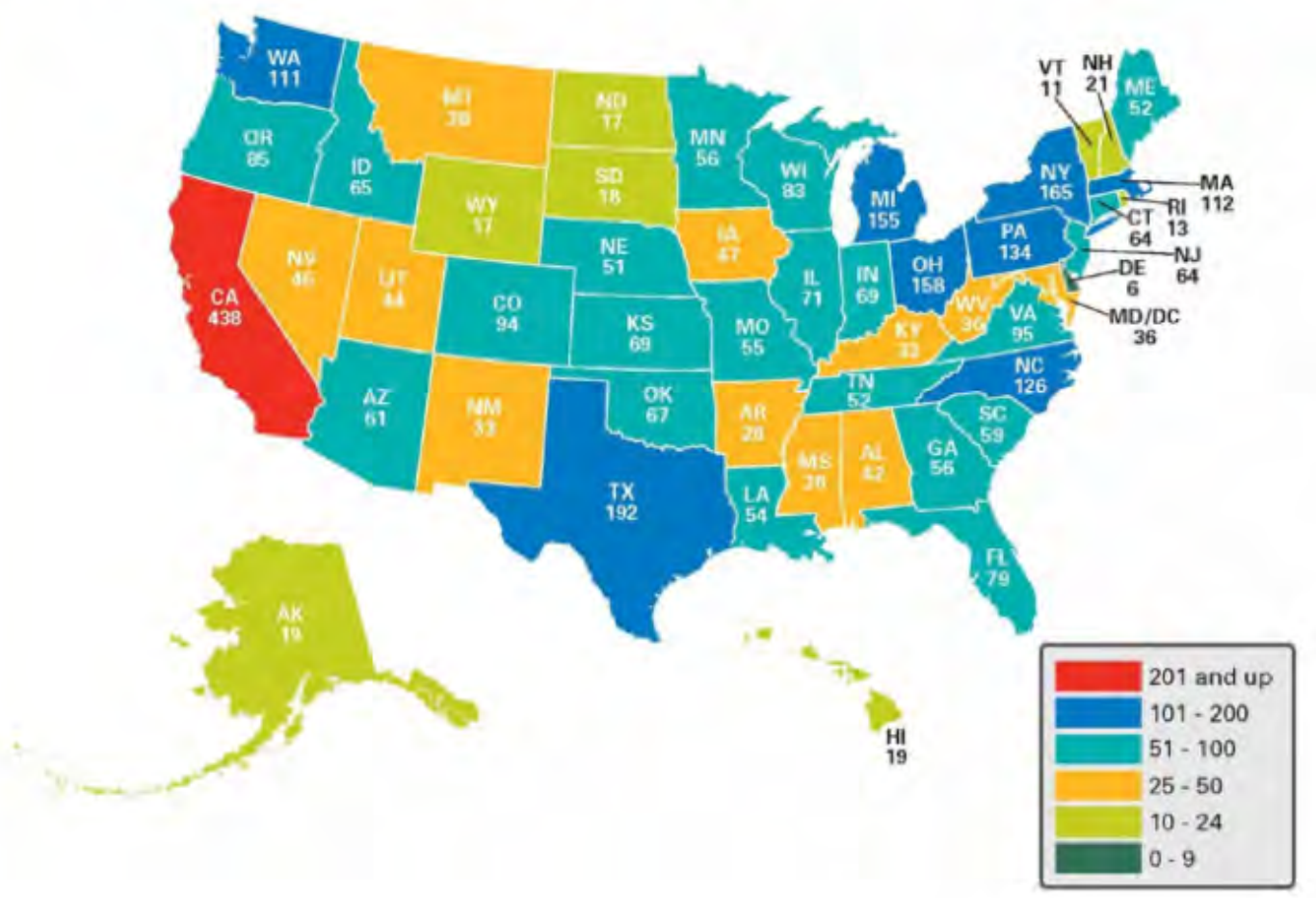
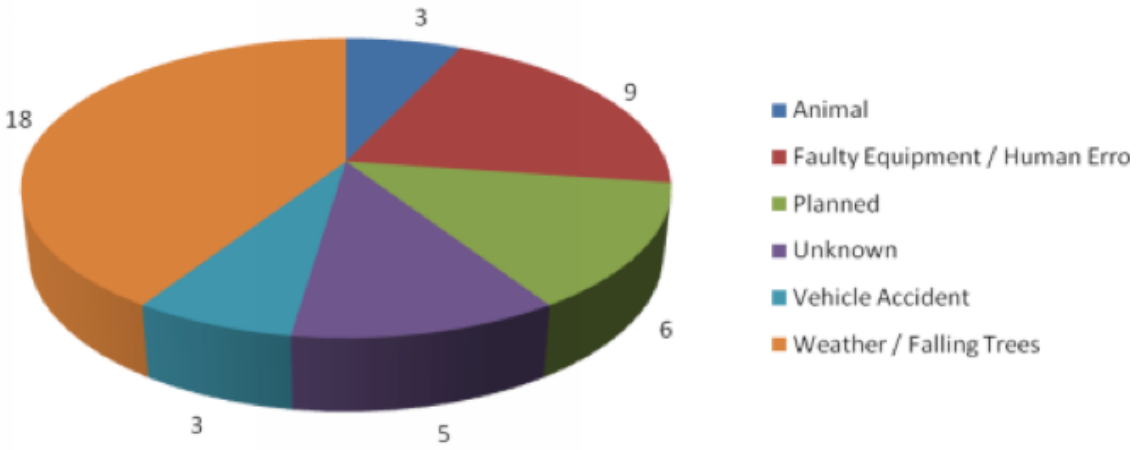


FIGURE 3: NUMBER OF REPORTED POWER OUTAGES BY CAUSE, MINNESOTA



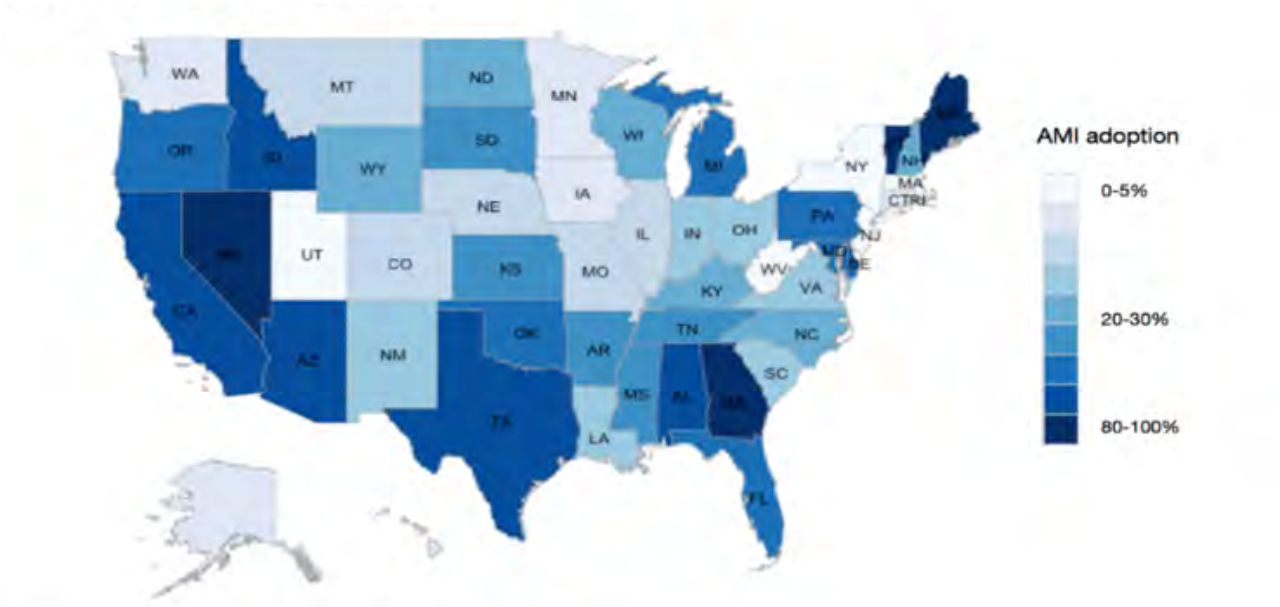
INNOVATION

Minnesota state policies are highly invested in the production of energy via renewable sources. The Minnesota 2025 Energy Action Plan project (funded by a U.S. Energy Department grant) summarizes the Minnesota State Statutes.

AREA	GOAL/REQUIREMENT	STATUS
Conservation Improvement Program (M.S. 216B.241)	Energy savings of 1.5% of gross annual retail sales for all electric and natural gas utilities	On track – Utilities are meeting their energy efficiency goals
Renewable Energy Goal (M.S. 216C.05)	Derive 25% of total energy used in the state from renewable resources by 2025	Caution – Minnesota obtained 14% of its energy from renewable resources in 2014
Renewable Electricity Standard (M.S. 216B.1691)	Derive 25% of retail electricity sold in the state from renewable resources by 2025; 30% for Xcel Energy by 2020	On track – Utilities retired Renewable Energy Credits (RECs) representing 14.8% of 2014 total retail sales in Minnesota. Utilities are planning for renewable generation to meet or exceed future RES milestones
Solar Electricity Standard (M.S. 216B.1691)	Generate 1.5% of public utility retail electricity sales from solar energy by 2020. Goal: Generate 10% of all retail electricity sales from solar energy by 2030	On track – Utilities are planning for solar generation to meet or exceed the 1.5% standard.
Greenhouse Gas Emissions Reduction (M.S. 216H.02)	Reduce state greenhouse gas emissions 15% below 2005 base levels by 2015, 30% by 2025, and 80% by 2050	Not on track – According to a recent MPCA analysis, Minnesota is not on track to meet the 2025 goals

Electricity meters serve as the interface between utilities and customers. However, even as an increasing share of modern life becomes more data-rich and connected, the way in which we measure electricity use looks much the same as it has for the last century. Most meters in Minnesota only record total energy used on a daily or even monthly basis and offer no capability for two-way communications between utility operators and the meter. To address these limitations, utilities in many states have adopted a newer technology known as advanced metering infrastructure (AMI), or "smart meters." Nationwide, there were more than 50 million smart meters deployed to utility customers as of mid-2014, or 36% of the total number of meters. However, in Minnesota, only 12% of customers were connected to AMI as of 2014.

FIGURE 4: AMI ADOPTION BY STATE 2014



Source: U.S. Energy Information Administration, Form 861

Minimal data is available in the public domain about the state's efforts toward adoption of policies intended to protect the grid from cyberattacks. However, according to an interview provided by Xcel Energy CEO Ben Fowke to the Minneapolis Star Tribune, it is known that all utility companies in Minnesota adhere to recommendations provided by the National Infrastructure Advisory Council (under the Department of Homeland Security).

FUNDING AND FUTURE NEED

Minnesota's energy needs are expected to increase. Minnesota utilities are members of the Midwest Reliability Organization (MRO). The MRO region has a peak demand that occurs in the summer season. The MRO summer peak demand is expected to increase at an average rate of 0.85% per year during 2016 through 2025. Energy conservation and demand-side management programs are important resources in Minnesota. These programs not only help manage load growth but are the cheapest and most environmentally friendly way to meet the demand. Nevertheless, the Minnesota Department of Commerce expects that the need to replace aging fossil fuel generation will surpass the contribution of conservation and demand-side management toward balancing supply and demand in a cost-effective manner. In recent years, regulated utilities' IRP have generally indicated a need for additional resources to meet Minnesota's projected demand for electricity and to replace retiring coal-fueled and other generating plants. Analyses done in the IRP process consider energy conservation and demand-side management resources integrally in both the assessment of forecasted demand and in the selection of potential resources to meet an identified need. Consistent with the nation and region, new generation and transmission facilities will continue to be needed as generating units are retired and demand for electricity in the state continues to grow.

The 2016 MISO Transmission Expansion Plan (MTEP) recommended approval of approximately $2.7 billion in new transmission infrastructure investment to maintain reliability for the 10-year period through the year 2024. The 2017 Biennial Transmission Projects Report identifies more than 90 separate transmission inadequacies across the state, including 50 new ones identified in the 2017 report.

RAISE THE GRADE

To raise the energy infrastructure grade in Minnesota, the following actions are recommended:

- **Promote energy conservation and demand-side management including technologies such as advanced metering infrastructure.**
- **Promote energy storage research.**
- **Increase energy storage capacity and distribution.**
- **Fund transmission infrastructure needs.**

SOURCES

- https://www.eia.gov/electricity/state/
- https://www.eia.gov/electricity/state/Minnesota/
- Eaton Blackout Tracker United States 2017 report
- https://www.eia.gov/state/?sid=MN Quick Facts
- Bloomberg New Energy Finance State Energy Factsheet Minnesota March 2018
- Minnesota Commerce Dept. Energy Policy and Conservation Quadrennial Report 2016
- Minnesota Commerce Dept. Minnesota Renewable Energy Standard: Utility Compliance Jan. 15, 2015
- Xcel Energy's 2015 Biennial Distribution Grid Modernization Report, E002/M-15-962
- http://www.startribune.com/xcel-other-utility-companies-combating-heightened-possibility-of-cyberattacks/469022383/
- NERC 2015 Long Term Reliability Assessment
- IRP dockets: Xcel Energy – Docket No. 15-21; Minnesota Power – Docket No. 15-690; OtterTail Power – Docket No. 16-386.
- 2017 Biennial Transmission Projects Report

REPORT CARD FOR MINNESOTA'S INFRASTRUCTURE 2018

PORTS
GRADE: C+

EXECUTIVE SUMMARY

Of Minnesota's port capacity, 80% is contained in ports along Lake Superior (Saint Lawrence Seaway), with the remaining 20% of capacity contained in ports along the Mississippi River. Ports are major economic drivers linking cities to world markets. While capacity in Minnesota's ports is sufficient, the ability of each facility to secure funding to improve the condition of its infrastructure varies. The condition of the ports require attention in the future as the structures typically have a 50-year design and a fair portion are at or near the end of their design service life. Other challenges that facilities are grappling with include corrosion of steel structures, dredging backlogs, dock wall construction, creation of new storage facilities, building/road rehabilitation, improving land access to the ports, gentrification, and upgrades to meet safety codes.

ANALYSIS

Approximately 60 million tons of cargo is moved through the ports in Minnesota each year. For reference, a table showing 2016 tonnage is located below:

PORT	2016 NET TONS	PERCENTAGE
DULUTH-SUPERIOR	30,098,753	49.8%
TWO HARBORS	15,431,524	25.5%
SAINT PAUL	6,887,022	11.4%
SILVER BAY	3,339,616	5.5%
SAVAGE	2,123,201	3.5%
WINONA	1,707,910	2.8%
RED WING	684,935	1.1%
TACONITE HARBOR	208,870	0.3%
TOTALS	60,481,831	100%

The largest port in Minnesota is the Port of Duluth-Superior, a bistate international port at the far western end of the Great Lakes/St. Lawrence Seaway. Located within the natural estuary of the St. Louis River, the port has 19 miles of federally dredged navigation channels. The shipping season is seasonal, with an approximately two-month closure for domestic shipments and three-month closure for overseas shipments.

Cargoes generally are dry bulk and not containerized, and the largest tonnages are of iron ore, coal, limestone, grain, and salt. Break-bulk cargoes of mining and energy industry equipment, steel, lumber, paper products, etc. are handled at docks owned by the Duluth Seaway Port Authority.

As an example of the importance of these cargoes to the North American economy, the iron ore in a single, 70,000-ton cargo shipment on a 1,000-foot Laker will be utilized in the manufacture of over $2 billion in finished products within the North American economy. In 2017, total iron ore tonnage through the Port of Duluth-Superior alone was projected to be in excess of 18 million, which translates into more than $500 billion of finished goods.

The Saint Paul Port Authority owns a majority of the multimodal Mississippi River Terminal property, where commodities are loaded on and off barges throughout the shipping season. Nearly 5.5 million tons of commodities passed through the river terminals in 2014, including corn, soybeans, and wheat. Imports included sand, gravel, fertilizer, salt, cement, and coal.

CAPACITY

The ports reviewed during this exercise, including the Port of Duluth-Superior, do not report capacity as a critical issue at this time. However, an emerging trend is the gentrification of land in and near port areas. Land that is considered ideal for freight shipping purposes is increasingly in competition with residential, commercial, and recreational land uses. This has begun to displace the potential for freight terminals along shorelines and reduced the availability of land for marine freight transport.

A portion of the upper Mississippi River was designated a Marine Highway by the Maritime Administration (MARAD) in 2014. The M-35 corridor, also known as the "Waterway of the Saints," runs between Saint Louis, Missouri, and Minneapolis and Saint Paul. This designation is anticipated to assist in providing a seamless transition across freight modes by leveraging marine services and locations to complement landside surface transportation routes. This expands Minnesota shippers' ability to distribute freight to the region and the world.

CONDITION

The physical condition of docks (both above water and below), the adjacent slip (or vessel access to the dock), and the facility on land are all important elements of port condition. One challenge facing the Lake Superior ports is that steel structures in the upper six feet of the water column are exposed to a high rate of corrosion that must be mitigated by routine painting or other maintenance activities.

In general, conditions of docks varied widely. Some poorly maintained docks have been completely taken out of service with little hope of future repair. Other docks have recently undergone significant seawall repairs and are in near-new condition.

Overall, the condition of the ports requires attention in the future as the structures typically have a 50-year design and a fair portion have exceeded (or are near exceeding) their working life. Property owners need to allocate proper resources to maintain their facilities in good condition and keep up with the ongoing battle with corrosion before those facilities are deemed unsafe and failing.

FUNDING AND FUTURE NEED

Minnesota limits eligibility for its repair and construction program, the Port Development Assistance Program (PDAP), to publicly owned properties. This makes Minnesota slightly less competitive when compared with the neighboring state of Wisconsin, as the Wisconsin Harbor Assistance Program (HAP) supports dock repair and construction projects for both municipal and private docks. If the Minnesota PDAP grant program is ever modified to include privately owned facilities, the physical condition and future competitiveness of the facilities in Minnesota ports will benefit.

The four ports in Minnesota that most recently sought funds from the PDAP had project needs of more than $34 million. Project needs included dredging in dock areas, dock wall construction, creation of new storage facilities, building/road rehabilitation, improving land access to the ports, and upgrades to meet safety codes. However, only $5 million was awarded in 2018.

Federal grant programs such as TIGER and Port Security Grants have been utilized recently to support:

- a major corrosion protection project at the Duluth Seaway Port Authority,
- the recent redevelopment of the Duluth Seaway Port Authority's Garfield C&D dock — now called Berths 8, 9, 10 and 11, and
- security upgrades at private docks.

The Army Corps of Engineers also increased funding in the last few years (and for the foreseeable future) with additional Great Lakes Restoration Initiative dredging dollars and a larger allocation of the Harbor Maintenance Trust Fund dollars. Current work to delist the harbor as an Area of Concern (AOC) brought federal dollars through the Great Lakes Restoration Initiative (GLRI) to relieve the multiyear dredging backlog and restore 1,700 acres of nearshore shallow water habitat.

Along the Mississippi river system, commercial barge operators pay a user fee of 29 cents per gallon of fuel purchased. These dollars fund half of major federal lock structure improvements. While these improvements may technically lie outside of the scope of this chapter, dredging and lock improvements on the Mississippi need to be adequately funded to ensure that ships traveling downstream do not need to be "light-loaded."

Finally, numerous docks have undergone significant upgrades to their facilities or dock wall in the last 10-plus years, largely due to corrosion issues and increased long-term investment in the property.

OPERATION AND MAINTENANCE

Port owners/operators react differently to operation and maintenance issues. Some repair immediately upon initial notice, while others wait for issues to go beyond critical. The rate of inspections is also inconsistent—some facilities conduct them annually, where others do not.

Current and long-term condition is also an operation and maintenance consideration; some properties have recently undergone significant upgrades. As a result, their maintenance and inspection schedule needs are significantly lower than others'.

Finally, the productivity of a dock operation at a facility (i.e. ship loading/unloading, rail car or truck loading/unloading) can be compared to industry averages as a useful indicator of overall operation and maintenance levels. The majority of the facilities have adapted to a productive and intermodal operation, while a few are accessible by only one form of transportation.

The Mississippi River system is maintained by the U.S. Army Corps of Engineers, which dredges the width and depth of the channel to accommodate barges of up to a nine-foot draft.

PUBLIC SAFETY

Public safety is always important. There are several facilities with high exposure and general public foot traffic, but the majority of properties have little to no public exposure. Most are located within an industrial area and away from high traffic or even visible areas, which allows operations to be conducted without any potential harm to the general public. However, not one port in Minnesota is completely inaccessible, as there is always water access, and some have nothing but signage up to keep trespassers away.

RESILIENCE

Port facilities in Minnesota must withstand ongoing corrosion issues and extreme weather conditions, including flash floods, high/low water elevation fluctuation, ice, and heavy winds.

Facilities must also effectively respond to short-term economic changes and product flexibility for each facility. Several of the docks have the capability to import/export multiple types of products (i.e. grain industry facilities, Port Authority facilities, and general bulk material storage docks), while others are currently dedicated to a single product (i.e. iron ore, coal, and fuel) and tonnage on/off that dock is strictly tied to a single demand.

INNOVATION

Within the wide range of docks and facilities in the various harbors and ports, there is a large gap in the use of innovative technology. The area with the most innovation in the past 15 years has been steel corrosion protection: many steel dock structures now incorporate an epoxy coating for protection. Owners of some significantly older docks have upgraded their wood structures to new forms of steel sheet pile in the past 20 years. Several dock operators have lacked the capacity or funding to modernize or innovate their facilities, or simply have no need to do so.

Federal and local agencies responsible for dredging operations have creatively reused dredge material in capping/remediating historically contaminated areas of harbors.

RAISE THE GRADE

To raise the ports infrastructure grade in Minnesota, the following actions are recommended:

- **Port Authorities such as the Port of Duluth/Superior should continue to preserve land uses, maximize the efficiency of rail/truck/ship (intermodal) connections, and continue to seek new cargo potentials.**
- **Expand the State of Minnesota's Port Development Assistance Program (PDAP) to provide access to grants for private dock owners.**
- **Continue to protect the federal Harbor Maintenance Trust Fund to prevent and address dredging backlogs in the system and support USACE structural repairs.**
- **Maintain federal Great Lakes Restoration Initiative (GRLI) funding and incorporate into dredging projects.**

NOTE: Portions of this chapter were previously published in the Twin Ports Area's 2018 Infrastructure Report Card. This report can be found here: https://www.infrastructurereportcard.org/twinportsarea/

SOURCES

Panel of professionals grading the properties included: Jim Sharrow PE (Director of Planning and Resiliency, Duluth Seaway Port Authority), Nick Patterson PE (Project Manager, Marine Tech), Chad Scott PE (Principal, AMI Consulting Engineers), Mike Wenholz (Senior Planner, Duluth-Superior Metropolitan Interstate Council), and Gene Clark PE (Coastal Engineering Specialist, University of Wisconsin Sea Grant Institute – Lake Superior Field Office).

Other documents referenced:

- Port of Duluth-Superior, PORT FACILITIES/PRINCIPAL DOCKS (by Duluth Seaway Port Authority, 2017)
- The ECONOMIC IMPACTS of the PORT OF DULUTH-SUPERIOR (by Martin Associates, Lancaster, PA, 2011)
- Minnesota Department of Transportation "Ports and Waterways" website: http://www.dot.state.mn.us/ofrw/waterways/commercial.html
- Saint Paul Port Authority website: https://www.sppa.com/harbor-management/harbor-overview
- 2014 State Ports & Waterways Plan (http://www.dot.state.mn.us/ofrw/PDF/portswaterwaysplan.pdf

REPORT CARD FOR MINNESOTA'S INFRASTRUCTURE 2018

ROADS
GRADE: D+

EXECUTIVE SUMMARY

Minnesota has the fifth-highest number of public roadway miles in the U.S. Even as our economy remains strong, Minnesota is facing a growing transportation funding shortfall with no clear remedy. The Minnesota State Highway Investment Plan (MnSHIP), published in 2017, estimates that state roads are underfunded by $17.7 billion over the next 20 years, an annual funding gap of $885 million. Without significant public investment, our roads and bridges will continue to fall into disrepair. The primary sources of state funding are fuel, registration, and vehicle sales taxes. Relatively small adjustments to any or each of these could help bridge known funding gaps. Condition of roads is not the only concern, either. Congestion is a major problem in the Twin Cities: the average driver spends 41 peak hours in congestion each year, averaging a cost of $1,332 per driver. And the problem is only going to get worse. The metro area gained 43,000 new people in 2017 and 250,000 since 2010, according to the U.S. Census Bureau.

BACKGROUND

The state of Minnesota has over 140,000 miles of public roadway, the fifth-highest number of miles in the U.S. Of this mileage, 116,000 miles are rural; the remaining miles of public roads, less than 16% of the total, are urban. Urban or rural, the state's transportation system is vital to Minnesota's economic strength. The support required to maintain and fund these streets and roadways not only comes from the federal and state government, but also its counties, cities, and townships.

CONDITION

Each year, the Minnesota Department of Transportation (MnDOT) uses a sophisticated inspection vehicle to collect pavement roughness and digital imagery data on the entire state highway system and on a percentage of the county state aid highway system. The roughness of the pavement is reported on MnDOT's rating scale: ride quality index (RQI). The RQI is a combination of the measured international roughness index (IRI) and the perceived roughness as determined by a rating panel consisting of 30 to 40 people. A roadway is determined to be in "good," "fair," or "poor" condition based on its RQI rating.

The state highway system makes up 8% of the total miles in Minnesota. Of those highway miles, 13% are Interstate highways, 41% are other National Highway System (NHS) highways, and 46% are non-NHS highways. Over the last decade, the percentage of

highway miles considered to be in "good" condition and their remaining service life has increased for each highway category, exceeding MnDOT's performance targets. However, the gains made can easily be lost. Once pavement falls into the "poor" category, it typically requires major rehabilitation or reconstruction to restore any meaningful amount of service life. These types of repairs are expensive, inconvenience roadway users, and require a hefty time commitment. The projected percentage of highways that will fall into the "poor" condition in the next decade is anticipated to increase significantly, based on the projects currently listed in the State Transportation Improvement Program (STIP). The repairs required once more highways receive the "poor" rating will be expensive, thus making it much more difficult to continue making progress on a limited budget.

HIGHWAY SYSTEM	2017 CONDITION (% POOR)	MNDOT TARGET (% POOR)	10-YEAR EXPECTED OUTCOME (% POOR)
Interstate	1.1	≤2	5.3
Other-NHS	1.7	≤4	6.8
Non-NHS	4.4	≤10	9.1

As for the remaining 92% of Minnesota's roadways, which include state aid roads and county, city, and township roads, condition data is very limited. Although some condition data may exist scattered throughout the county, city, and township systems, the data is not collected, rated, or stored in a uniform way such that it can be easily combined or compared. However, based on current funding, it is anticipated that the pavement conditions along these roads will deteriorate significantly over time unless new funding sources are found.

CAPACITY

An analysis of 300 urban areas across the United States found that one of Minnesota's urban areas, the Twin Cities, has the 17th-worst level of traffic congestion of all urban areas in the U.S. The average driver in the Twin Cities spends 41 peak hours in congestion per year, averaging a cost of $1,332 per driver. These costs total more than $2.3 billion lost due to congestion in just one area, each year. The Twin Cities has five of the worst 100 bottlenecks in the U.S., just behind Atlanta and Houston. These include:

- I-94 & US 52 in St. Paul
- I-35W at I-494
- I-35W at I-94
- I-35E at I-94
- I-35W at I-694

FUNDING AND FUTURE NEED

Funding for the state's roadway systems is derived from several sources:

- Federal aid
- State motor fuel tax
- State vehicle registration tax (tab fees)
- Motor vehicle sales tax (MVST)
- Local taxes (property tax, sales tax, assessments)
- Other income

Most of the revenue is derived from federal and state motor fuel taxes, which are a fixed portion of fuel price and not tied to inflation. While the cost of transportation infrastructure rises annually, the buying power of these revenue sources declines. The federal gas tax of 18.4 cents per gallon (diesel, 24.4 cents) was last raised in 1993. Since that time, inflation has risen by more than 65%. The Minnesota fuel tax was last raised in 2012 to 28.5 cents.

The Minnesota Constitution requires that 100% of the state fuel tax and tab fees and not more than 60% of the MVST be deposited into the Highway User Tax Distribution Fund (HUTDF) and used only for highway purposes. Furthermore, the HUTDF must suballocate 62% of total revenue to the Trunk Highway Fund (THF) and 38% to County State Aid Highway Fund (CSAH) and Municipal State Aid Highway Fund (MSAS) roadways.

The Minnesota Transportation Finance Advisory Committee (TFAC) was created in January 2012 by the governor to provide recommendations to reverse the decline of the state's highways, roads, and bridges as well as all other modes of transportation over the next 20 years (2013–2032).

The committee's report, published in December 2012, determined the following for the 20-year time frame:

- The state highway system anticipated base revenues of $18 billion. An additional $5 billion over the base would be needed just to maintain current system performance. An additional $12 billion would be needed to provide an economically competitive system. This is the equivalent of a funding gap of $600 million per year for the next 20 years just for the state highway system.
- Base revenues of $6.6 billion were projected for county and municipal state aid roadways; an additional $4 billion is needed to maintain current performance. An additional $11 billion over the base would be required to provide for an economically competitive system, a $550 million annual funding gap.
- Anticipated revenue figures were not identified for the remaining county, city, and township roadways. However, $9.3 billion would be needed above baseline to meet current performance on these roadways and $17.5 billion would be required above the base to provide an economically competitive system, an $875 million annual funding gap.

Please note, these figures include the cost of bridges.

I-15 resurfacing near the Bonneville County line

The 20 Year State Highway Investment Plan (MnSHIP) prioritizes future investments to address the widening gap between highway revenues and construction costs. This 20-year plan, prepared by MnDOT, is updated every four years. The current plan, 2018–2037, was published in 2017. MnSHIP identifies revenue and needs to meet performance goals as established by the guiding principles of Minnesota GO. Minnesota GO was created by MnDOT in 2011 to establish a 50-year vision for all forms of transportation in Minnesota.

MnSHIP provides data for the state highway system only. The figures are summarized as follows (excluding bridges):

- Projected investment – $18.7 billion
- Investment need – $36.4 billion
- Unfunded shortfall – $17.7 billion
- Unfunded percentage – 48.6%
- Annual funding gap – $885 million

The unfunded shortfall (excluding bridges) from the previous report in 2013 was $13.9 billion, equivalent to an annual funding gap of $695 million. This indicates the gap between anticipated revenue and estimated needs is widening.

INNOVATION

As Minnesota's roads have aged and become more congested, the state has become increasingly more reliant on innovation. Minnesota has a deep interest in transportation and roadway innovation, and many Minnesotans take pride in the early adoption of these practices. Several examples of this type of innovation are:

MnROAD Pavement Research – MnDOT's materials lab is finding ways to extend road life and improve performance, reduce construction and maintenance costs, speed up construction, and reduce environmental impacts. MnDOT is currently working with 17 states and over 50 partners (universities, industry, and consultants) on two major research efforts with the National Road Research Alliance (NRRA) and the MnROAD/NCAT partnership. MnROAD's research data from more than 50 unique test sections not only is impacting roadways in Minnesota but across the U.S.

Contract Procurement/Delivery Methods – MnDOT utilizes several different types of contract procurement and project delivery, including two that many other states have yet to adopt: the Construction Manager/General Contractor program (CMGC) and the Design-Build program (DB).

Intelligent Construction – MnDOT has pioneered the use of intelligent compaction and thermal profiling in the construction of hot-mixed asphalt (HMA) pavements. MnDOT leads the nation in the continued advancement of this technology through a variety of efforts, including the development of the Veta Intelligent Construction software. This technology will significantly improve the performance of HMA pavement.

MnPASS Lanes – MnPASS is a strategy for managing and reducing congestion on some of the state's busiest roads. Congestion pricing on a MnPASS lane varies from $0.25 to $8.00 per trip and is used to keep traffic in the lane flowing at speeds between 50 and 55 miles per hour.

OPERATION AND MAINTENANCE

The cost of maintaining pavements in a serviceable condition increases as these pavements approach the end of their serviceable life. However, Minnesota weather requires that more attention be given to other factors than just the condition of the pavement. Keeping pavements clear, whether it be clear of snow and ice or free from large debris, is major factor of road operation and maintenance. The capability to keep pavements clear can be affected by the availability of materials, equipment, and staffing.

Salt is one of the main materials used in Minnesota to keep pavements clear of ice through the winter. The price of salt alone rose from $29.33 per ton in state fiscal year 2001 to $69.16 per ton in state fiscal year 2019. Limited financial resources require owners of roadways to prioritize services such as snow and ice control. Increases in materials prices force roadway owners to redirect money from other priority areas. This results in lower levels of service in other maintenance areas such as surface repair, drainage, roadside maintenance, etc.

Minnesota transportation users not only expect clear roads, but also safe roads. One of the best benefit/cost solutions for safety is the use of guardrail along many high-speed roadways. However, as more guardrail and high-tension cable barrier is installed, the demand on maintenance crews to keep up with these facilities increases. In 2010, cable median barrier in Minnesota averaged over 5 hits/mile, all requiring that time and money be expended for repairs. As Minnesota advances the use of these products, we must also staff and fund their repair. Whenever possible, repair costs are recovered through insurance companies of the individuals responsible for the damage.

PUBLIC SAFETY AND RESILIENCE

Safety can be measured in many ways—Toward Zero Deaths, the state's cornerstone traffic safety program, for example. Minnesota's traffic fatality rate of 0.67 deaths per 100 million vehicle miles of travel is better than the national average of 1.18 deaths per 100 million vehicle miles. However, that still means 392 fatalities occur each year on Minnesota roads. A closer look raises further concern. In 2014, the fatality rate in Minnesota on urban roads was 0.29 per 100 million vehicle miles while the fatality rate in Minnesota on rural roads was 1.12 per 100 million (Minnesota Department of Public Safety, 2016 Minnesota Annual Report). As 84% of Minnesota's roadway system mileage is classified as rural, safety obviously still needs to be addressed across the state, not just in urban areas.

To measure the resiliency of the roadway system, MnDOT recently developed a comprehensive electronic system to track projects that require the use of emergency funds. The resiliency of roads will be measured through this system based on how often emergencies occur within a given road section and for how long after the emergency funding is still being requested for the same roadway segments. The initial program tracks events from 1997 to present and concludes that no one section of roadway has required repair on two or more occasions due to an emergency event.

HIGHWAY IMPROVEMENTS TO INCREASE PUBLIC SAFETY

- Increase sight distances at existing intersections
- Remove obstacles from the highway clear zone
- Add medians, and improve existing medians
- Widen shoulders where there is minimal existing shoulder
- Improve traffic flow (increased capacity), which could reduce incident-related delays.
- Implement low-cost/high-benefit highway improvements including:
  - Rumble strips/stripes
  - Cable median guardrail
  - Rural intersection lighting
  - Curve chevrons
  - Signpost reflectors
  - Traffic signal reflectorized background shields

Projects which have been improved through this emergency funding include:

- Highway 169 from Mankato to St. Peter: A project to raise the grade of the highway above the 100-year flood elevation in four flood-prone areas.
- I-35W Minnesota River Bridge: A project located near Cliff Road that will raise I-35W out of the flood plain.

MnDOT and the Minnesota State Patrol have been working together under an Open Roads Policy that is focused on clearing incidents more quickly from the roadway to help reduce incident-related congestion. Operations of the Regional Transportation Management Center (RTMC) to improve communications between Traffic Operations, Maintenance Dispatch, and State Patrol Dispatch work to clear incidents more quickly. MnDOT has a roving freeway service patrol known as FIRST (Freeway Incident Response Safety Team) whose role is to detect, verify, and quickly address incidents.

RAISE THE GRADE

To raise the roads infrastructure grade in Minnesota, the following actions are recommended:

- **Raise the fuel tax to close the existing transportation funding gap.**
- **Index revenue sources, such as the fuel tax, to inflation to create a more sustainable, long-term funding source.**
- **Encourage the implementation of asset management programs among local agencies statewide similar to the asset management program currently in use at MnDOT.**
- **Promote innovative practices that reduce costs and improve project delivery.**
- **Improve Twin Cities Metro Area freeway mobility/reliability through the use of active traffic management, spot mobility improvements, expansion of MnPASS lanes, and strategic capacity enhancements.**
- **State and local agencies should search for opportunities to partner with the private sector to provide new mobility projects.**
- **Continue improving connections to pedestrian, bicycle, and transit networks that enhance safety and improve opportunities for all people.**

SOURCES

- "Asset Management Plans," 2016, 23 CFR Part 515, https://www.gpo.gov/fdsys/pkg/FR-2016-10-24/pdf/2016-25117.pdf page 73263, Code of Federal Regulations.
- "Asset Management, https://www.fhwa.dot.gov/asset/, Federal Highway Administration.
- "County State Aid Highway Distribution," 2018, Minnesota Department of Transportation.
- "Local Roads and Bridges Highway Users Tax Distribution Fund," 2017, Minnesota Department of Transportation.
- "Highway Statistics Series," https://www.fhwa.dot.gov/policyinformation/statistics.cfm Federal Highway Administration.
- "Minnesota Traffic Crashes in 2016: Overview," 2017, Minnesota Department of Public Safety, Office of Traffic Safety
- "Minnesota Moving Ahead: Transportation Funding and Financing for the Next 20 Years," 2012, Transportation Finance Advisory Committee.
- "Minnesota 20-Year State Highway Investment Plan," 2017, Minnesota Department of Transportation.
- "Municipal State Aid Street Apportionment Data," 2018, Minnesota Department of Transportation.
- "Statewide Highway Systems Operation Plan," 2012, Minnesota Department of Transportation.
- "Statewide Multimodal Transportation Plan," 2017, Minnesota Department of Transportation.
- "Sustainability Report: Establishing a Baseline (2016)," 2017, Minnesota Department of Transportation.
- "Transportation Asset Management Plan (Draft)," 2018, Minnesota Department of Transportation.
- "Transportation Investment and Economic Development in Minnesota Counties," 2015, Final Report 2015-12, Minnesota Department of Transportation.
- "2015 Urban Mobility Scorecard," 2015, Texas A&M Transportation Institute.

REPORT CARD FOR MINNESOTA'S INFRASTRUCTURE 2018

TRANSIT
GRADE: C-

EXECUTIVE SUMMARY

Public transportation provides 111 million rides each year in Minnesota. Although the Twin Cities has the lion's share of transit infrastructure, Greater Minnesota has more than 50 public transit systems and has seen a dramatic increase in ridership over the last decade. A $450 million investment over the next five years is needed to keep our existing transit infrastructure in working order. That figure grows to $5 billion for the next 20 years. Despite this need, current funding levels are not enough to take care of what we have and meet the demand of continually increasing ridership. Efficiency and quality of service can be improved, but innovative thinking cannot replace an appropriate level of infrastructure funding. Funding for public transit is complex, but state and local leaders can adopt measures that would ensure a long-term, dedicated, and sustainable revenue stream for public transit similar to how the gas tax funds roads and bridges. A strong investment in public transit infrastructure ensures that the buses, vans, and trains will continue to take Minnesota's growing population to the places they need to be.

INTRODUCTION

In 2015, public transit operations in Minnesota provided over 111 million rides through cities and towns across the state. The Twin Cities Metro Area ridership is about 99 million; in Greater Minnesota, it is about 12 million.

The state public transit system is composed of coordinated modes of services in the form of:

- Fixed bus routes
- Light rail transit (LRT)
- Commuter rail
- Bus rapid transit (BRT)
- Express bus
- Demand response or "Dial-a-Ride"
- Route deviation
- Paratransit (for the elderly and disabled)

The mobility provided by transit systems supports the alleviation of traffic congestion; protects the environment through reductions in air pollution and energy consumption; supports the state and local economy by connecting people to jobs, health care, education, and recreation; and improves Minnesotans' overall quality of life.

CAPACITY

There are over 50 transit providers in Minnesota that provide essential services in urban, suburban, and rural areas across the state. The systems are operated at a local or regional level, and the state assists in funding and planning.

Greater Minnesota (80 counties)
43 transit providers

- Seven small urban
- 30 rural
- Six elderly and disabled

Twin Cities Metro Area (seven counties)
Seven transit providers

- All metro-area transit lines and most bus routes are operated by Metro Transit, a division of the Metropolitan Council.
- Other Twin Cities transit providers include the University of Minnesota and five suburban transit systems operators: MN Valley Transit Authority, Southwest Transit, Maple Grove Transit, Plymouth Metrolink, and Prior Lake/Shakopee.
- Metropolitan Council services constitute the single largest transit system in Minnesota, and accounted for approximately 81% of statewide ridership in 2015.

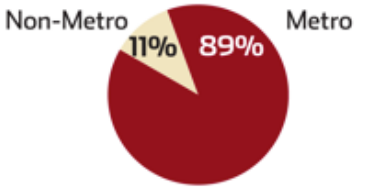
Transit ridership has steadily increased both in Greater Minnesota and in the Twin Cities Metro Area. During the last decade, Greater Minnesota transit ridership has increased 32.4%, while service hours increased 21%. In 2015, its ridership and service hours reached record highs with 12.2 million rides and 1.24 million hours of revenue service.

In the Twin Cities Metro Area, transit ridership increased 16.1% from 2006 to 2015. In 2015, Metro Transit set a new annual ridership record of 85.8 million rides on buses and trains. The Metro LRT Blue Line reached its highest annual ridership of 10.6 million rides since it opened in mid-2004. Likewise, Metro LRT Green Line, connecting downtown Saint Paul and downtown Minneapolis, experienced a very strong ridership of 12.4 million rides during its first full year of operation. Metro LRT Green Line also attracted over $5.8 billion in development within the corridor, with more than half outside downtown Minneapolis. As of January 2018, development investments within the LRT corridors in the Twin Cities have netted over $8.4 billion in economic activities.

Who rides transit?

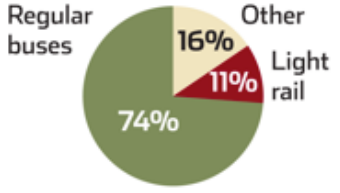
Most transit riders in Minnesota take buses in the metro. Light rail amounts to 11 percent of riders. Greater Minnesota has about 12 million riders, mostly in larger cities.

Transit riders



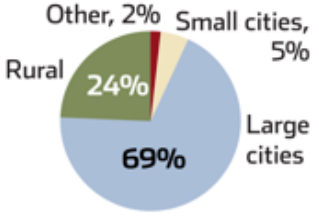
Total: 107 million riders

Metro-area transit



Total: 95 million riders

Greater Minnesota transit



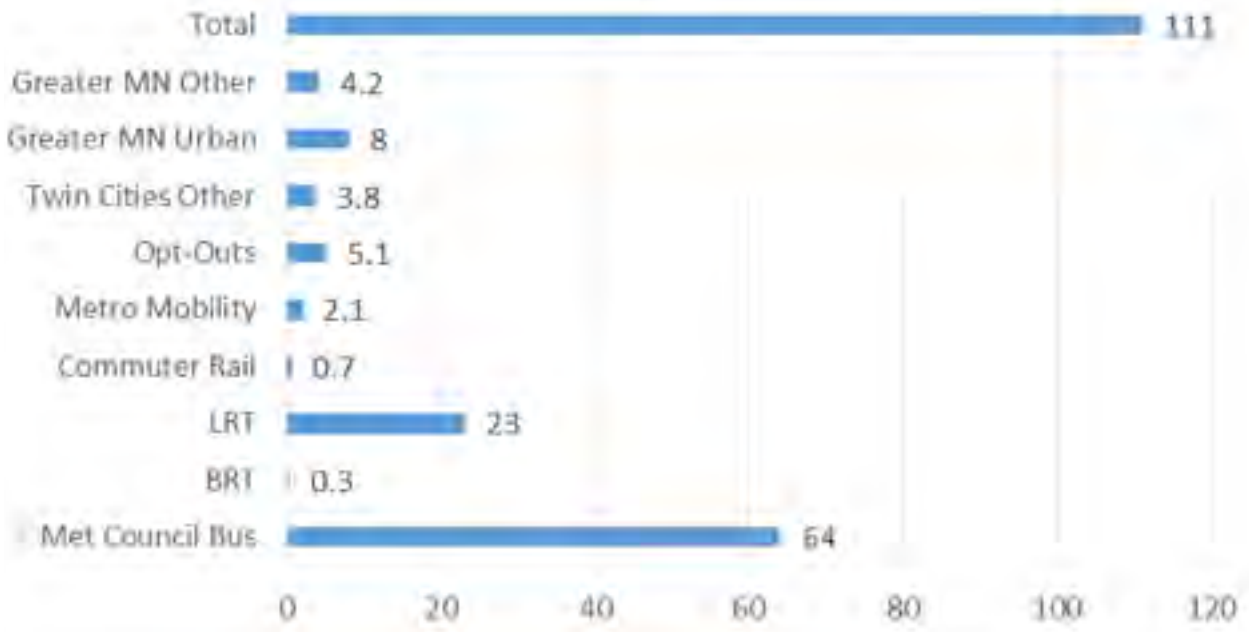
Total: 12 million riders

+ Other metro-area transit includes paratransit, commuter rail and suburban routes.
+ Large cities in Greater Minnesota include Duluth, Rochester and St. Cloud. Small cities include Albert Lea and St. Peter. "Other" is service for the elderly & disabled and a connection to metro commuter rail.

Source: Minnesota Department of Transportation, 2014 Transit Report

PIONEER PRESS

FIGURE 1: CY 2015 RIDERSHIP (IN MILLIONS)



CONDITION

Overall, Minnesota's transit system is in good condition. In the Twin Cities Metro Area, there are two light rail transit (LRT) lines. The Blue Line LRT (Hiawatha Avenue) opened in 2004 and the Green Line LRT (University Avenue) opened in 2014. Both have very strong ridership and each has exceeded its forecasted ridership within the first few years of operation. The 86 active light rail vehicles have an average age of 5.5 years and are in good condition. However, these fleets need to be maintained and rehabilitated in order to continue to provide reliable service.

One of Metro Transit's focus areas is to develop an asset management program. Performance measures for service efficiency and effectiveness are established as a benchmark.

In the absence of formal condition ratings for transit infrastructures, the average age of fleet of vehicles were evaluated in comparison to the national average. There are more than 3,300 vehicle fleets in Minnesota. Of those, over 1,500 vehicle fleets are in Greater Minnesota and over 1,800 in the Twin Cities Metro Area. The average age of these vehicle fleets is 5.6 years, which is somewhat better than the national average of 7.4 years. However, a transit vehicle's useful life is based on the combination of miles and years it has been in service. The target is for 90% of vehicles to be within their useful life and the minimum threshold is 80%. In 2016, 22% of the state's vehicle fleets were past their useful life and therefore do not meet the minimum threshold.

Spare ratio, another key consideration, represents the percentage of fleet vehicles that are not in use during peak service. A standard spare ratio for transit agencies is 20%. Metro Transit operates more than 900 buses in the Twin Cities. In 2016, Metro Transit's spare ratio was below standard at 16.4%. Future improvements to the public transit systems fleet are needed to meet the minimum thresholds for these performance targets.

FUNDING

Current transit funding in Minnesota comes from federal, state, and local funding sources. Federal programs constitute the majority of federal transit formula funding in Minnesota and provide operating and capital funds through grants to large urban, small urban, and rural areas. Figures 2 and 3 show Greater Minnesota and the Twin Cities Area operating budgets in 2017.

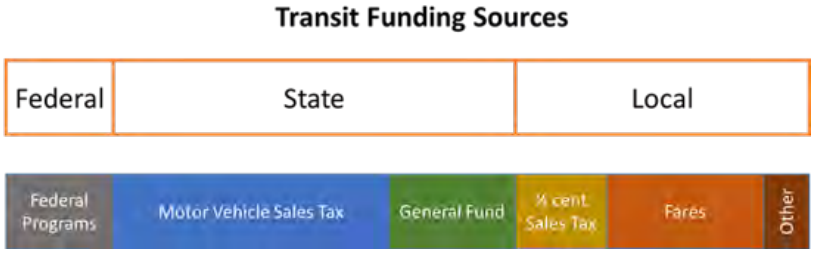


FIGURE 2: GREATER MINNESOTA TRANSIT OPERATING BUDGET (2017)

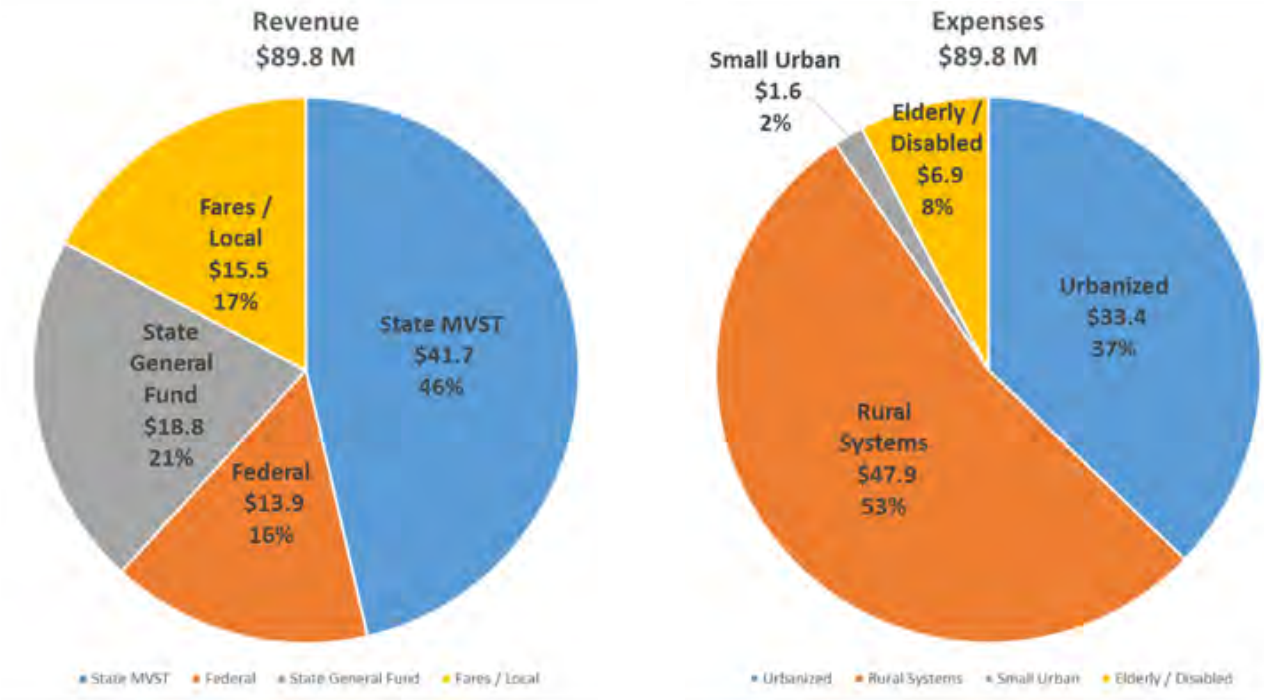
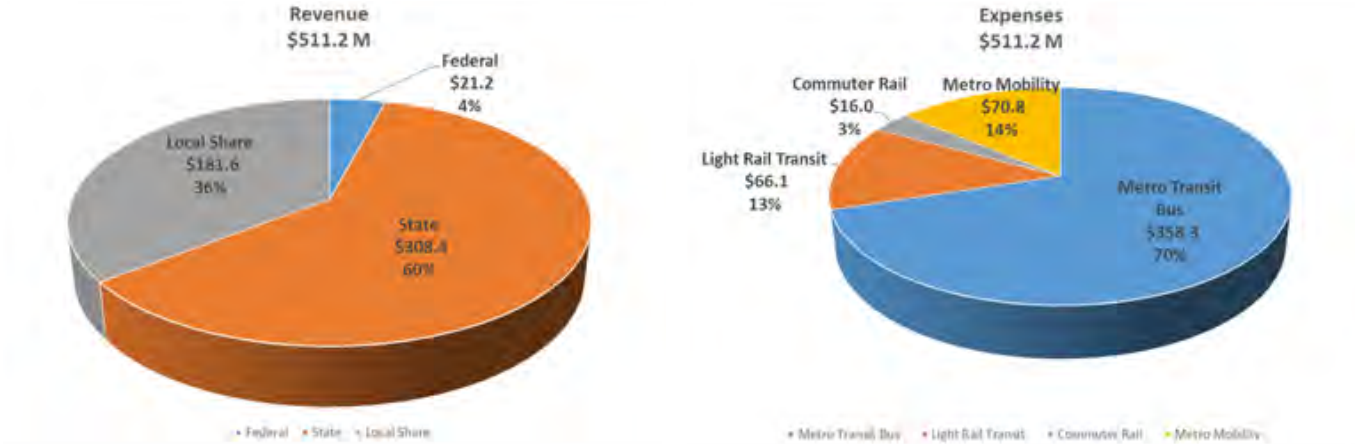


FIGURE 3: TWIN CITIES METRO AREA METROPOLITAN TRANSIT OPERATING BUDGET (2017)



State funding also provides a substantial amount to Minnesota transit systems. In 2017, the state covered approximately 62% of transit system operating costs. By statute, the Legislature mandates that a minimum of 40% of the state's Motor Vehicle Sales Tax (MVST) revenue go to transit. Of that 40%, 36% goes to the seven-county Twin Cities Metro Area and 4% goes to Greater Minnesota. In addition, Greater Minnesota receives a portion of MVST from leased vehicles, which are split between the state aid general fund and county state-aid highways.

Minnesota state law requires local funding participation of 15 to 20% for public transit services that receive federal and state funding. Fare and contract revenues sometimes satisfy the local share requirement. In 2017, the local share averaged 33%.

FUTURE NEED

Statewide, Minnesota transit systems require over $5 billion in the next 20 years to meet the transit needs in Minnesota. Greater Minnesota and the Twin Cities' transit systems require over $450 million in the next five years to efficiently maintain the infrastructure system in a state of good repair and enhance capacity to address ridership demands. The current funding level will not sustain Minnesota's transit infrastructure needs. While it is evident that Minnesota transit providers continue to find ways to improve efficiency and achieve a quality level of service, innovative thinking cannot replace an appropriate level of infrastructure funding.

Greater Minnesota

Between 2017 and 2030, projections indicate that transit need will grow from 15.1 million to 20.1 million passenger trips per year. To serve these trips, Greater Minnesota public transit systems would need to provide 1.53 million hours of service in 2017, increasing to 2.03 million hours of service in 2030. Table 1 illustrates these figures and the total funds required to provide this additional transit service.

TABLE 1: PROJECTED TRANSIT NEED AND COST (IN MILLIONS) TO MEET 100% OF NEED, 2017-2030

CATEGORY	2017	2020	2025	2030
Total passenger demand (millions of trips)	15.1	16.9	18.9	20.1
Millions of service hours to meet demand	1.53	1.71	1.91	2.03
Annual operating cost	$105.0	$131.6	$170.9	$211.3
Average annual capital cost	$35.8	$26.6	$29.6	$34.6
Total	**$140.7**	**$158.2**	**$200.5**	**$246.0**

Without funding increases, Greater Minnesota's public transit systems will not be able to sustain or expand the number of service hours currently provided.

Twin Cities Metro Area

Investments in the region's transportation system depend on a complex mix of funds and funding sources, including tax dollars from local, county, state, and federal sources, and user fees and fares.

In conjunction with the Metropolitan Council's Transportation Policy Plan (2015–2040), it is estimated that $92 billion will be available for transportation funding in the region. This will be considered as the current revenue scenario. Of these, about 48% of funds are from local sources (taxes, fares); 38% are from state taxes and fees; and 14% are from federal sources. When spending these funds, about 45% are designated for local transportation, 38% for transit, and 17% for highways. This funding level will not meet the needs of the region's transportation system over time, and inadequate transportation funding remains a major issue facing the region.

FIGURE 4:
REGIONAL TRANSPORTATION REVENUE 2015-2040
$92B CURRENT REVENUE SCENARIO (BILLIONS)

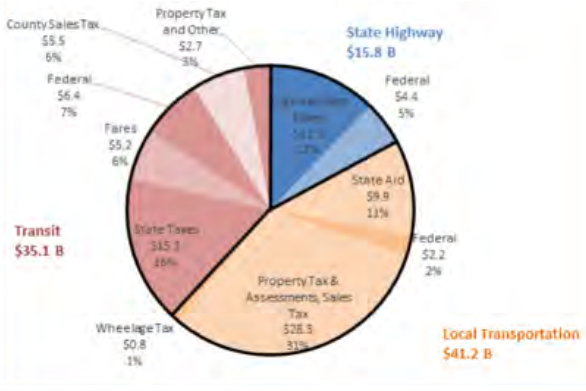
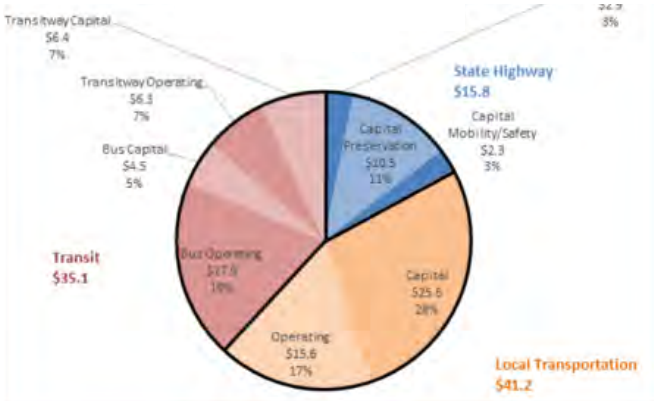


FIGURE 5:
REGIONAL TRANSPORTATION SPENDING 2015-2040
$92B CURRENT REVENUE SCENARIO (BILLIONS)



In 2012, the Governor's Transportation Finance Advisory Committee (TFAC) looked at this issue in detail and concluded that building a competitive regional economy would require approximately $4.2 billion to $5.7 billion in new metropolitan area transit revenue over a 20-year period.

OPERATION AND MAINTENANCE

Operation and maintenance of a transit system is impacted by the demand for transit services. As transit ridership in Minnesota continues to grow, it requires attention for improved operational efficiencies and better life cycle maintenance programs.

Transit operating costs in Greater Minnesota increased by 35% (more than $20 million) during the five-year period from 2010 to 2015. During this time, hours of service and ridership increased by 14.2% and 9.6%, respectively, while inflation accounted for much of the remainder.

TABLE 2: GREATER MINNESOTA PUBLIC TRANSIT ANNUAL OPERATING COST, 2010-2015

SYSTEM	2010	2011	2012	2013	2014	2015	% CHANGE (2010-15)
Urbanized				$28,737,075	$30,219,815		34.0%
ADA-	$4,475,654	$4,739,045	$4,702,382	$4,730,007	$5,281,240	$6,098,096	36.3%
Small Urban *	$4,317,571	$4,549,283	$3,904,818	$2,565,824	$2,238,184	$2,134,513	-50.6%
Rural				$31,233,351	$35,761,854	$37,927,260	41.4%
Transit For Our Future	**	**	**	$278,798	$784,613	$470,581	**
Other Transit Services	**	**	**	$436,711	$465,532	$1,782,702	**
Greater Minnesota				$68,261,171	$74,751,238	$79,102,247	35.2%

*Greater Mankato Transit System, previously a small urban system, was reclassified as an urbanized system in 2013. Source: MnDOT Transit Report 2011-2016

Transit operating cost per hour in the Twin Cities Metro Area, when adjusted for inflation, increased 6.9% between 2011 and 2015, compared to 1% for peer regions.

FIGURE 6: 2015 OPERATING COST PER HOUR FOR TWIN CITIES AND PEER REGION AVERAGE

Farebox recovery is a key performance measure for transit operations. Farebox recovery is the percentage of operating costs covered by passenger fares. Figure 7 shows the Twin Cities Metro Area's farebox recovery as compared to its peer cities. The Twin Cities farebox recovery is slightly lower than the peer group average. Fares covered 23% of the transit operating costs compared to 24% for peer regions.

FIGURE 7: TWIN CITIES FAREBOX RECOVERY AND PEER REGION AVERAGE

PUBLIC SAFETY

In comparison with other travel modes as shown on Table 3, traveling by urban mass transit is almost 20 times safer per mile than traveling by automobile.

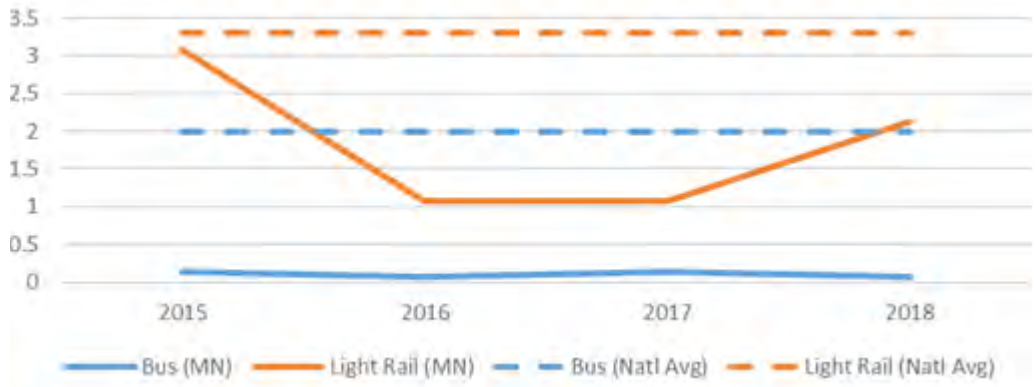
The safety performance record of transit modes in Minnesota is better than the national average as shown on Figure 8.

Transit infrastructure design elements are another important safety component. These include investments in security cameras on transit vehicles and stations, and improved lighting for transit stops and stations. Other crime prevention technologies and principles also play an important role. In addition, Metro Transit continues to promote safety awareness and educational campaigns to improve transit safety.

TABLE 3: ANNUAL FATALITY RATES PER 100 MILLION PASSENGER MILES TRAVELED BY MODE IN THE U.S.A., 2000-2014

TRAVEL MODE	FATALITIES PER 100 MILLION PASSENGER MILES TRAVELED
Motorcycle	2,375.7
Car or light truck driver or passenger	65.3
Local ferry boat	24.6
Commuter rail and Amtrak	3.6
Urban mass transit (subway or light rail)	3.3
Bus (transit, intercity, school, charter)	2.0
Commercial aviation	0.2

FIGURE 8: ANNUAL TRANSIT FATALITY RATES PER 100 MILLION PASSENGER MILES TRAVELED IN MINNESOTA,2015-2018



RESILIENCE

Resilience of transit systems is often challenged by threats from extreme weather and natural disasters as well as manmade threats. It is critical that transit agencies prepare for such emergencies and be able to sustain damage while maintaining service. The Metropolitan Council and Metro Transit have developed and continue to maintain an emergency management plan. This plan provides for coordination between Metro Transit and various regional and state public safety agencies in the event of an emergency situation.

INNOVATION

Many innovative ideas and programs have contributed to the success and ongoing strong demand for transit services in Minnesota. An open-minded approach has also allowed agencies the freedom to look for continuous improvement of services.

- Use of bus-only shoulder lanes within the Twin Cities Metro Area provides a transit advantage. With over 300 miles of bus-only shoulder, it is considered one of the most extensive bus-only shoulder networks in the U.S.
- Bike sharing, ride sharing, and Park & Ride facilities complement and address first-mile and last-mile issues for transit riders.
- Real-time updates provide higher quality of service and customer satisfaction.
- Technology has been used to test the feasibility of autonomous vehicle corridors. Autonomous buses were tested and featured during SuperBowl LII in February 2018.
- Metrics for highway capacity are shifted based on people-moving capacity and reliability.
- Best management practices for transit system designs such as efficiency of station spacing, level boarding platform for quicker dwell time, and signal timing coordination have been implemented.
- Opportunities for private-public partnerships on transit projects are solicited.
- Transportation safety funds/programs for transit projects are utilized. It's been well documented that commuters reduce their crash risk by more than 90% when taking public transit.

RAISE THE GRADE

To raise the transit infrastructure grade in Minnesota, the following actions are recommended:

- **Establish a sustainable funding sources for public transit similar to how the gas tax funds roads and bridges.**
- **Adequately fund maintenance of transit vehicles and facilities to keep systems in a state of good repair and improve life cycle costs.**
- **Invest in and develop asset management for more efficient evaluation of system performance and replacement and rehabilitation programs.**
- **Continue developing methodologies to strategically create and identify transit market areas.**
- **Increase access to transit in urban, suburban, and rural communities so that citizens have better transportation choices.**
- **Continue developing comprehensive transportation plans to address transit needs in urban, suburban, and rural communities in Minnesota.**
- **Coordinate rides and services when necessary to improve productivity and efficiency.**

SOURCES

- 2040 Thrive MSP: Transportation Policy Plan; Metropolitan Council, Draft 2018
- Minnesota GO: Greater Minnesota Transit Investment Plan 2017-2037; MnDOT, 2017
- National Transit Database; Federal Transit Administration, 2018
- Transportation System Performance Evaluation; Metropolitan Council, 2016
- Transit Report: A Guide to Minnesota's Public Transit System; MnDOT, 2017

REPORT CARD FOR MINNESOTA'S INFRASTRUCTURE 2018

WASTEWATER
GRADE: C

EXECUTIVE SUMMARY

About 84% of Minnesota residents receive wastewater treatment from a centralized collection and treatment system, while the remaining 16% rely on an on-site collection and treatment system such as a septic system. Although capacity is adequate at most facilities throughout the state, funding for upgrading and replacing treatment and collection systems at the end of their planned service life is lacking. There is an estimated annual need of $236 million, of which local communities will provide about one-third, for current wastewater needs. Ratepayers were charged an average annual rate of $268 in 2016 in the metro area for operation and maintenance and capital investments. In Greater Minnesota, user fees are much higher and will continue to rise as decreasing populations shoulder more of the burden of increasing rates.

INTRODUCTION

Wastewater infrastructure is critical to our public health. In the late 19th century, many sewers were constructed in urban areas to remove both stormwater and human wastewater. However, it was not until the 1930s in the United States that treatment of wastewater (often commingled with stormwater) began.

In the Twin Cities metropolitan area, the first wastewater treatment plant on the Mississippi River was constructed and placed in service in 1938. Water quality in the Mississippi River improved almost immediately as a result. Periodic expansions and upgrades to the Metropolitan Wastewater Treatment Plant have continued to produce a higher-quality effluent over the ensuing years.

Today, approximately 84% of Minnesota residents receive wastewater treatment either from a centralized collection and treatment system, while approximately 16% rely on an on-site collection and treatment system, such as a septic system. This estimate was determined based on the state's population estimated to live in a community served by a central collection and treatment system (shown in Table 1).

TABLE 1: MINNESOTA POPULATION SERVED BY WASTEWATER COLLECTION AND TREATMENT, BY CITY SIZE[a].

>100,000	50 – 100,000	25 – 50,000	10 – 25,000	<10,000	TOTALS
State total					5,528,630
837,725	1,056,854	646,456	951,478	1,121,798	4,614,311
Rural total					914,319

[a] Includes served township areas

CAPACITY

Most wastewater treatment plants in Minnesota have adequate capacity at the present time. However, as populations increase in some areas, there is a need for plant modifications to provide treatment for increased flows. This situation is generally uncommon in Minnesota, except in the seven-county Twin Cities Metropolitan Area, where the population has been increasing.

Within the metropolitan area, the largest facility is the Metropolitan Wastewater Treatment Plant located on the Mississippi River in St. Paul. It currently has reserve capacity and is able to handle additional flows. This additional flow capacity is the result of a program of flow reduction implemented over the past three decades. A sewer separation program was pursued in Minneapolis and St. Paul in the 1990s and early 2000s that separated combined sewers into separate stormwater and sanitary sewer systems. Now that the stormwater systems no longer connect to the treatment facility, additional capacity is available. In addition, a program to reduce inflow and infiltration (I/I) in the tributary wastewater collection systems of many suburban cities freed up additional capacity. These programs resulted in improved Mississippi River water quality and provided reserve capacity at the Metropolitan Wastewater Treatment Plant.

The need for additional capacity in wastewater treatment plants statewide is largely being driven by changing requirements for plant discharges to meet higher water quality standards. These changes not only reduce discharge limits for conventional pollutants, but more importantly, involve increased removal of other pollutants. These other pollutants include nutrients (phosphorus and nitrogen in its various forms) and emerging contaminants of concern such as chlorides, sulfates, and pharmaceuticals. It is expected that, in time, other pollutants may also be regulated for the protection of the environment and public health.

CONDITION

There are two components to wastewater systems in Minnesota: collection and treatment. These components need to be looked at separately since they have different life expectancies and their condition is different.

Collection Systems

Wastewater collection systems in Minnesota vary in age. This is true within the seven-county Twin Cities Metropolitan Area: for sewers within the cities of Minneapolis and St. Paul, 85% are more than 50 years old. Collection systems typically have a life expectancy on the order of 100 years. Substantial portions of the sewers located in older suburban areas of the seven counties, cities such as Crystal, Golden Valley, Richfield, Roseville, and St. Louis Park, are more than 50 years in age; however, in nearby newer suburbs, only 20% of the sewers are more than 50 years old.

In Greater Minnesota, wastewater collection systems are generally newer: 32% were installed more than 50 years ago, 26% were installed between 30 and 50 years ago, and 42% are less than 30 years old.

Treatment Plants

Wastewater treatment plants are somewhat newer, simply because the cities of Minneapolis and St. Paul constructed their plants several years after the sewer collection systems were installed. For example, the Metropolitan Wastewater Treatment Plant was originally constructed in the 1930s; major upgrades took place beginning in the 1960s through the early 2000s. Although this plant continues to be upgraded to meet effluent water quality requirements, many of the basic plant components now exceed 45 years in age.

Of the wastewater treatment plants in Greater Minnesota, 20% are more than 40 years in age, 14% are between 31 and 40 years old, 24% are between 21 and 30 years old, 22% are between 11 and 20 years old, and 19% are less than 10 years in age. It is important to remember that the life expectancy of a wastewater treatment plant is in the range of 40 to 50 years. As a result, some 20% of these plants in Greater Minnesota may need upgrades or complete replacement in the near future.

OPERATION AND MAINTENANCE

Operation and maintenance expenses, along with local shares of capital expenditures, are paid for by the users, i.e. customers that contribute discharge to a wastewater treatment plant. As a result, these costs are included in the rates charged to users by the community in which they live. For example, in the seven-county Twin Cities Metropolitan Area, the median charge per household was $268 annually in 2016. The costs in Greater Minnesota are generally higher, although summaries for Greater Minnesota were not available. However, a search of several communities' rates revealed household rates for 2017 in the range of $300 to $800 per household or up to almost three times those in the seven-county Twin Cities Metropolitan Area. Generally, the rate charged for operation and maintenance of a wastewater treatment plant increases as the number of customers served decreases (i.e. smaller communities have higher annual rates).

INVESTMENT, FUNDING, AND FUTURE NEED

Non-local support for wastewater projects in Minnesota is dependent on state appropriations and annual federal funding and financing. State annual appropriations range from approximately $25 to $112 million and are distributed as grants. Additionally, federal funding and financing is provided through several programs, including the U.S. Department of Agriculture (USDA) Rural Development and the Clean Water State Revolving Fund (CWSRF). The CWSRF and other loan programs are administered by the Minnesota Public Facilities Authority (PFA), which assists local governments with the construction of wastewater facilities.

For fiscal year 2018, the PFA received requests for loans and grants that exceeded the available funds by a factor of three. This indicates there are currently shortfalls in available funds. However, since there are other sources of funds for wastewater investment in wastewater infrastructure, the actual shortfall is less. Our estimate of the actual shortfall is that it is more likely to be in the range of $100 – $200 million (see Tables 5, 6 and 7 for more information). Based on requested dollars, it would take 45 years to renew or replace the wastewater infrastructure currently in place. Based on the PFA's current funding levels, it would take 134 years to renew or replace that infrastructure.

In addition to the grants and loans for wastewater infrastructure in Minnesota, local units of government provide funding for wastewater infrastructure. This has been estimated by the PFA to be at least $50 – $100 million per year. These funds would be in addition to any of the requests for grants and loans for wastewater infrastructure.

TABLE 2: ESTIMATED REPLACEMENT VALUE OF WASTEWATER COLLECTION SYSTEMS AND TREATMENT PLANTS STATEWIDE (JULY 2017 DOLLARS)

SYSTEM TYPE	NUMBER OF SYSTEMS	WWTPS ($X10^6$ DOLLARS)[1]	COLLECTION SYSTEMS ($X10^6$ DOLLARS)[2]	TOTAL ($X10^6$ DOLLARS)
Collection only	237	$ included below	$ included below	$ included below
Collect & treat	-	-	-	-
EPA Major & Minor Dischargers	526	$ 5,190	$ 10,380	$ 15,570
Minor Dischargers	53	$ 140	$ 220	$ 360
Subtotal	579	NA	NA	NA
TOTALS	816	$ 5,330	$ 10,600	$ 15,930[3]

[1] Based on MCES WWTP costs projected statewide for WWTPs (2017 dollars)

[2] Based on MCES WWTP costs projected to collection systems (2017 dollars) as being 2x WWTP costs. The value for collection systems is low since there was no readily available method to value the investment in the estimated 2,700 miles of local collection system costs in the seven-county Twin Cities Metropolitan Area

[3] MN2050 State of the Infrastructure estimated this value to be $12,444 x 10^6 (2015 dollars).

TABLE 3: ESTIMATED REPLACEMENT VALUE OF WASTEWATER COLLECTION SYSTEMS AND TREATMENT PLANTS IN THE 7-COUNTY METROPOLITAN AREA (JULY 2017 DOLLARS)

SYSTEM TYPE	NUMBER OF SYSTEMS	WWTPS ($X10^6$ DOLLARS)[1]	COLLECTION SYSTEMS ($X10^6$ DOLLARS)[2]	TOTAL ($X10^6$ DOLLARS)
Collection only	108	$ included below	$ included below	$ included below
Collect & treat	-	-	-	-
EPA Major & Minor Dischargers	7[3]	$ 2,660	$ 5,320	$ 7,980
Minor Dischargers	16	$ 60	$ 120	$ 180
Subtotal	23	NA	NA	NA
TOTALS	131	$ 2,720	$ 5,440[4]	$ 8,160

[1] Based on MCES WWTP costs (2017 dollars) projected statewide for WWTPs.

[2] Based on MCES WWTP costs (2017 dollars) projected to collection systems as being 2x WWTP costs.

[3] Seven of eight MCES WWTPs considered Major Dischargers. MCES's East Bethel WWTP effluent does not have a surface discharge (discharge is to a groundwater recharge system) and is therefore not included in the number of WWTPs.

[4] MCES evaluates the value of its collection systems at $2,700 x 10^6, and there are an estimated 2,700 miles of local collection systems. This total value estimate is, therefore, very likely low.

TABLE 4: ESTIMATED REPLACEMENT VALUE OF WASTEWATER COLLECTION SYSTEMS AND TREATMENT PLANTS IN GREATER MINNESOTA (JULY 2017 DOLLARS)

SYSTEM TYPE	NUMBER OF SYSTEMS	WWTPS ($X10^6$ DOLLARS)[1]	COLLECTION SYSTEMS ($X10^6$ DOLLARS)[2]	TOTAL ($X10^6$ DOLLARS)
Collection only	129	$ included below	$ included below	$ included below
Collect & treat	-	-	-	-
EPA Major & Minor Dischargers	519	$ 2,530	$ 5,060	$ 7,590
Minor Dischargers	37	$ 80	$ 100	$ 180
Subtotal	556	NA	NA	NA
TOTALS	685	$ 2,610	$ 5,160	$ 7,770

[1] Based on MCES WWTP costs (2017 dollars) projected statewide for WWTPs.

[2] Based on MCES WWTP costs (2017 dollars) projected to collection systems as being 2x WWTP costs.

Planned investments (from fiscal year 2018 PFA) are $119 million — $94 million in loans and $25 million in grants — for wastewater infrastructure.

SAFETY AND RESILIENCE

The health, safety, and welfare of Minnesotans are not in any immediate danger from the state's wastewater collection and treatment systems. However, this may not be the case if underfunding continues. For example, unexpected catastrophic failure of treatment systems due to a lack of needed maintenance could contaminate drinking water sources. Also, ongoing revisions to water quality standards, especially those directed at protection of the environment, could have unintended consequences of diverting funds needed for operation and maintenance. There could be negative impacts on public health if these water quality revisions do not receive the necessary funding dollars they require. Degradation of wastewater collection and treatment facilities could compromise the protection of public health from acute diseases.

Minnesota has an active Water and Wastewater Agency Response Network (MNWARN) whereby cities can provide mutual assistance during emergencies or catastrophic events. In addition, the governor has called out the National Guard during catastrophic events such as floods and tornadoes. The Legislature also has approved or provided funding assistance when it is in session. The MNWARN system is an organization that the Minnesota Legislature may wish to consider for future funding.

INNOVATION

Metropolitan Council Environmental Services (MCES) completed construction of a zero-discharge wastewater treatment plant in the city of East Bethel recently. This facility utilizes highly treated wastewater effluent to recharge groundwater and thereby has eliminated the need to discharge to a surface water body.

RAISE THE GRADE

To raise the wastewater infrastructure grade in Minnesota, the following actions are recommended:

- **Increase funding for the Clean Water Revolving Fund (which funds wastewater infrastructure) to provide the requisite lending capacity from the PFA. Increased funding will pay for a larger number of priority projects. This will reduce the risk of failure from wastewater infrastructure projects that need to be completed but must wait for available funding. Additional funding sources could include some combination of additional federal funding, state appropriations from the general fund, or specific taxes enacted to pay for wastewater infrastructure.**
- **The Legislature should consider using Clean Water Legacy funds for wastewater treatment plant projects rather than just nonpoint source stormwater projects. Many of the recent more stringent water quality standards can be met with additional funding for more highly treated effluents from WWTPs**
- **To provide more valuable information regarding the needs of wastewater systems, asset management and the development of asset management plans need to be encouraged across the state at the local level. Asset management can improve the operations and maintenance and delay loss of condition within wastewater systems by focusing resources as needed. A better understanding of infrastructure needs statewide would better inform the funding process.**
- **Educate the public on the potential impacts that inadequate wastewater infrastructure can have on water quality and public health by harnessing the volunteer efforts of community groups and individuals. An informed public can play a vital role in increasing support for adequate funding of wastewater infrastructure.**
- **Consider implementing necessary changes to the pricing (revenue) used to cover expenses for wastewater systems. Historically, revenue has not been adequate to cover the needs (expenses) for this vital resource to protect the public health, safety, and welfare.**

SOURCES

The following Sources were utilized in developing this report:

- Minnesota population information determined from Minnesota State Demographic Center https://mn.gov/admin/demography/data-by-topic/population-data/our-estimates/pop-finder2.jsp
- Future Wastewater Infrastructure Needs and Capital Costs (WINS) – Fiscal Year 2017 Biennial Survey of Wastewater Collection and Treatment, Minnesota Pollution Control Agency, January 2018

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