PLANNING FOR TOMORROW:
Developing Comprehensive Bridge Management Plans for Sustainable Infrastructure Resilience in MN

FY 2023/2024 BRIDGE INVESTMENT PROGRAM (BIP)
PLANNING AND BRIDGE PROJECT GRANTS

Project Name: Planning for Tomorrow: Developing Comprehensive Bridge Management Plans for Sustainable Infrastructure Resilience in MN

Project Type: Planning Project

Future Eligible Project Costs: $2.88 million

2023/2024 BIP Funds Requested $2.304 million

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DEPARTMENT OF TRANSPORTATION

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BASIC PROJECT INFORMATION

1. Project Description

The Minnesota Department of Transportation (MnDOT) is requesting $2.304 million of Bridge Investment Program (BIP) grant funding to **develop strategic asset management plans for seven high priority bridges across the state's Trunk Highway System**. Consistent with Goal #2 of the BIP Program, this project will identify key preservation and maintenance activities that improve the condition of bridges, extend structure service life, reduce the number of bridges that deteriorate to poor condition, and ultimately reduce the total person and freight miles over poor condition bridges.

***Planning Goal:** Maximize the service life of key structures across Minnesota's Trunk Highway system through proactive planning for short- and long-term bridge rehabilitation, preservation, and protection projects.*

Due to increasing infrastructure costs and construction needs, MnDOT is working to protect and extend the usable life of existing infrastructure through strategic asset management planning. The Department has found that the most fiscally responsible way to maintain the statewide Trunk Highway System is to first focus on system preservation. This approach requires proactive planning for maintenance and preservation activities before transportation assets deteriorate to poor condition. Through this approach, MnDOT is able to extend the useful life of structures by postponing or entirely preventing significant rehabilitation or reconstruction of these bridges and make more efficient use of limited financial resources.

Beginning in 2019, MnDOT developed a Bridge Priority Preservation List, with 26 high-priority preservation bridges, where completing rehabilitation, preservation, and protection activities that extend bridge lifespan will be prioritized. These bridges cross major rivers, support elevated levels of traffic volume, and, if they need to be replaced, will be high-cost projects. In scoping this planning process MnDOT evaluated the 26 bridges to first, identify the bridges that need full bridge management plans (due to complexity, age, and other factors), and second, prioritize those bridges from greatest need to lower need. As a result, seven bridges, or pairs of bridges, have been identified and prioritized for bridge management plan development. Each of the plans will be developed as its own document, thus as funding is available, MnDOT can scale the project based on the identified structure priority.

Planning for this project will be completed in accordance with MnDOT's Transportation Asset Management Plan (TAMP) which was first adopted in 2012 to comply with the Moving Ahead for Progress in the 21st Century Act and was most recently updated in July 2022. The TAMP addresses a wide range of both federally required and other categories of transportation assets. MnDOT's overall Vision for Asset Management is to effectively manage transportation assets by mitigating risks, optimizing return on investment, and using the best available information and tools.

Bridge management plans are MnDOT's most intensive strategic bridge asset management planning document. **The plans, developed only for the highest priority and complex bridges in the state, provide a detailed plan that evaluates maintenance scenarios in comparison to existing conditions.** The plan is used as a guide for the maintenance, preservation, rehabilitation, and replacement strategies that will minimize lifetime costs and extend the useful life of the bridge.

MnDOT Asset Management Objectives:

- **Use data effectively to strategically manage investments and assets, within available resources, in a proactive and holistic way to reduce life-cycle costs and maintain the value of MnDOT's most critical assets.**
- **Improve the ability to evaluate trade-offs between investment options in a consistent and transparent way that maximizes system performance.**
- **Integrate asset management into MnDOT's culture through effective communication and a workforce with the skills needed to successfully fulfill their asset management duties and responsibilities.**

2. Project Location

MnDOT has identified seven bridges or pairs of bridges that will be included in this planning process. Each of the structures are identified on the Department's Bridge Priority Preservation List and due to their unique nature, require full bridge management plans to guide effective maintenance into the future.

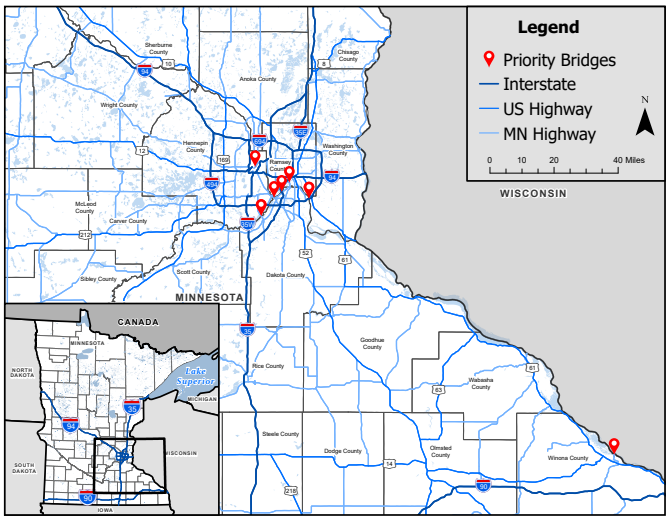
Table 1 Bridge Location

MnDOT Planning Priority	Bridge Name	Bridge #(s)	Carrying Facility	Crossing Feature	Census Tract(s)	Area of Persistent Poverty (APP)	Historically Disadvantaged Community (HDC)	Urban/ Rural
1	Mendota Bridge	4190	TH 55	Minnesota River, Railroad, Streets	27037060605 2703706004	No No	No No	Urban (MSP)
2	Winona	5900	TH 43	Mississippi River, Black River	27169670400 27169670500 5011690500	Yes Yes No	No No No	Rural
3	3rd Avenue	2440	TH 65 (3rd Avenue S)	Mississippi River	27053126101 27053103600 27053103700	Yes Yes Yes	No No No	Urban (MSP)
4	Cedar	9600N 9600S	TH 77	Minnesota River	27053025100 27037060748	Yes No	No No	Urban (MSP)
5	Smith Avenue High Bridge	62090	TH 149	Mississippi River, Streets	27123036000 27123037000 27123037100	No No Yes	No No Yes	Urban (MSP)
6	Wakota	82855 82856	I-494	Mississippi River	27037060301 27037060402 27163071003	No No No	No No	Urban (MSP)
7	35E	62912	I-35E	Mississippi River	27123037604 27123036700 27037060604 27037060603	Yes No No No	Yes No No No	Urban (MSP)

The bridges are all located in the southeast portion of the state and provide crossings over the Mississippi or Minnesota Rivers, supporting vital community and regional connections across major impediments to human and freight mobility.

- Five bridges are located entirely or partially within a Census Tract that is identified as an Area of Persistent Poverty (APP) (Census Tracts 27169670400, 27169670500, 27053126101, 27053103600, 27053103700, 27053025100, 27123037100, and 27123037604).

Figure 1 Project Locations



- Two bridges are located entirely or partially within a Census Tract that is identified as a Historically Disadvantaged Community (HDC) (Census Tracts 27123037100 and 27123037604) under the Climate and Economic Justice Screening Tool (CEJST).
- Six bridges are located within the Minneapolis-St. Paul Urbanized Area (MSP).
- One bridge (Bridge Number 5900) is located on the border between Minnesota and Wisconsin.

As discussed above, each of the bridges included in this project are identified by MnDOT as a high priority for pres-ervation. Each bridge provides a major river crossing, experiences high levels of traffic volume, and would have substantial replacement costs.

Fort Snelling-Mendota Bridge

PLANNING PRIORITY				
1	**Bridge Number**	4190	**Year Built**	1926
	Carrying Facility	MN Highway 55	**Over**	Minnesota River
	AADT	47,417	**HCADT**	2,800
	Bridge Length (ft.)	4,114	**Inspection Report**	8/15/2022

Description: The historic Fort Snelling-Mendota Bridge carries TH 55 over the Minnesota River between Fort Snelling, an unorganized territory (population 322) in Hennepin County, just to the east of the Minneapolis– St Paul International Airport, and Mendota Heights (population 11,744), a suburb of the Twin Cities in Dakota County. Comprised of 13 rib-arch main spans of 304 feet each, it was the longest continuous, concrete arch bridge in the world when it was built in 1926. The bridge is within Fort Snelling State Park and the Fort Snelling Historic District, which is a National Historic Landmark.

A major rehabilitation in 1992 replaced the deck of the bridge and reconstructed the pedestrians railings. A Historic Bridge Management Plan was created in 2006 and amended in 2014 that is intended to help manage the historic aspects of the bridge.

Bridge Management Planning Special Considerations: The Mendota Bridge is identified as a Historic Bridge. Through a Memorandum of Understanding (MOU) with the State Historic Preservation Officer (SHPO) and Programmatic Agreement (PA) with FHWA and SHPO, MnDOT has made a commitment to preserve the bridge for continued vehicular-use into perpetuity.

The Mendota Bridge carries State Highway 55 and MN 62 traffic over the Minnesota River.

Mendota Bridge Location Map

Winona Bridge

PLANNING PRIORITY				
2	**Bridge Number**	5900	**Year Built**	1942
	Carrying Facility	MN Highway 43	**Over**	Mississippi River
	AADT	9,809	**HCADT**	343
	Bridge Length (ft.)	2,282	**Inspection Report**	6/7/2023

Description: The historic Winona Bridges carries Minnesota State Highway 43 over the Mississippi River, between the city of Winona (pop. 25,964) in Winona County, Minnesota, and the town of Buffalo (pop. 1,015) in Buffalo County, Wisconsin. The bridge includes a three-span, steel, riveted cantilever through-truss with deck truss approach spans. It is Minnesota's only surviving example of a pre-1946 cantilever through truss bridge and is a significant main arterial route which connects the two states.

In 2016, a new bridge was constructed, which carries Minnesota bound traffic. Between 2016 and 2019, the historic Winona Bridge, which carries Wisconsin bound traffic was fully rehabilitated with the cantilevered through-truss main spans receiving extensive steel repairs. At that time, the deck-truss approach spans were also replaced with new replica spans and the concrete approach spans were replaced with new prestressed-concrete spans.

Bridge Management Planning Special Considerations: The Winona Bridge is identified on the Register of Historic Places. It is also susceptible to scour issues (classified as a scour critical bridge), which will require and necessitate special planning and maintenance activities.

The Winona Bridge carries MN 43 over the Mississippi River between Minnesota and Wisconsin

Winona Bridge Location Map

Highway 65/Third Avenue Bridge

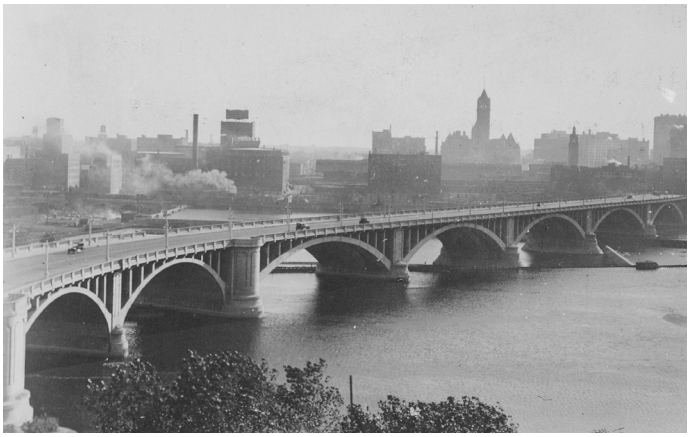
PLANNING PRIORITY				
3	**Bridge Number**	2440	**Year Built**	1918
	Carrying Facility	MN Highway 65/ Third Avenue	**Over**	Mississippi River
	AADT	14,500	**HCADT**	145
	Bridge Length (ft.)	2,223	**Inspection Report**	10/9/2023

Description: Also known as the Highway 65/Third Avenue Bridge, the 102-year-old historic bridge connects downtown Minneapolis (pop. 56,748) with Central Avenue across the Mississippi River. Constructed between 1914 and 1918, it is an example of Melan arch construction which uses a concrete reinforcing system with metal I-beams curved to the form of the arch and embedded in concrete. The Third Avenue Bridge features five concrete arch spans, each carried by three arched ribs.

A historic Bridge Management Plan was created in 2006 with an update to the plan occurring in 2014. Major rehabilitation of the bridge occurred between spring 2020 and winter 2023 with improvements to the bridge costing just over $129.3 million. Repairs

and preservation maintenance for the bridge will extend its life by an estimated 50 years. Bridge 2440 is a contributing feature in the St. Anthony Falls Historic District which was listed in the National Register of Historic Places in 1971, and the bridge was previously determined individually eligible for its engineering significance. A new management plan is necessary to incorporate the most recent bridge rehabilitation and complete the next phase of planning for bridge maintenance.

Bridge Management Planning Special Considerations: The Third Avenue Bridge is identified as a Historic Bridge. Through a Memorandum of Understanding (MOU) with the State Historic Preservation Officer (SHPO) and Programmatic Agreement with FHWA and SHPO MnDOT has made a commitment to preserve the bridge into perpetuity. The bridge is being considered for inclusion on the National Register of Historic Places.



The Third Avenue Bridge is a 102-year-old historic bridge that connects Downtown Minneapolis with Central Avenue.

Third Avenue Bridge Location Map

Cedar Avenue Bridge

PLANNING PRIORITY				
4	**Bridge Number**	9600N, 9600S	**Year Built**	1979
	Carrying Facility	MN Highway 77	**Over**	Minnesota River
	AADT	45,951 (northbound) 45,951 (southbound)	**HCADT**	3,217 (northbound) 1,379 (southbound)
	Bridge Length (ft.)	5,159 (northbound) 5,185 (southbound)	**Inspection Report**	7/21/2022 7/21/2022

Description: The Cedar Avenue Bridge carries Minnesota State Highway 77 across the Minnesota River between the Minneapolis-St. Paul suburbs of Boomington (pop. 89,987) in Hennepin County and Eagan (pop. 68,855) in Dakota County. Consisting of two separate structures, the crossing was built in 1979 and superseded an older swing bridge by the same name that was composed of low-lying truss segments.

There are two bridges, one carrying northbound traffic, and one carrying southbound traffic, that are similar, but not identical. Both bridges have 43 spans, with a steel tied-arch main span, and prestressed concrete beam approach spans, for a total structure length of just under 1-mile for each bridge.

Bridge Management Planning Special Considerations: The bridge has some unique features that necessitate special consideration in the management planning process (e.g. cables). The bridge has non-redundant steel tension members with bolted connections located in areas of high exposure to chlorides and moisture. Pier caps are currently rating such that the bridge cannot carry additional lanes of traffic. If additional lanes of traffic are desired in the future, then pier caps would need to be strengthened.

The Cedar Avenue Bridges providing crossing over the Minnesota River.

Cedar Avenue Bridge Location Map

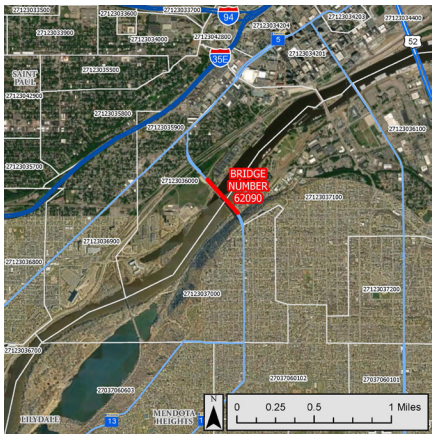
Smith Avenue High Bridge

PLANNING PRIORITY				
5	**Bridge Number**	62090	**Year Built**	1987
	Carrying Facility	MN Highway 149/ Smith Avenue	**Over**	Mississippi River
	AADT	14,900	**HCADT**	298
	Bridge Length (ft.)	2,770	**Inspection Report**	6/5/2023

Description: Also referred to simply as the High Bridge, the 2,770 foot inverted arch bridge carries Minnesota State Highway 149 and Smith Avenue over the Mississippi River in Saint Paul (pop. 307,193). Originally constructed in 1987, it is the highest bridge in St. Paul with a deck height of 160 ft and a clearance below of 149 ft. The ornamental ironwork on the bridge was built using iron from the Warren Deck Bridge which it replaced when the older bridge was demolished in 1985. The bridge was temporarily closed in 2018 for a complete redecking completed in tandem with the reconstruction of Smith Avenue on both sides of the bridge.

Bridge Management Planning Special Considerations: Due to the recent rehab work completed on this bridge, there is an extensive amount of data already available, which despite the structure's unique features, will make the planning process similar to and consistent with a typical management plan.

The Smith High Bridge with downtown St. Paul in the background



Smith Avenue Bridge Location Map

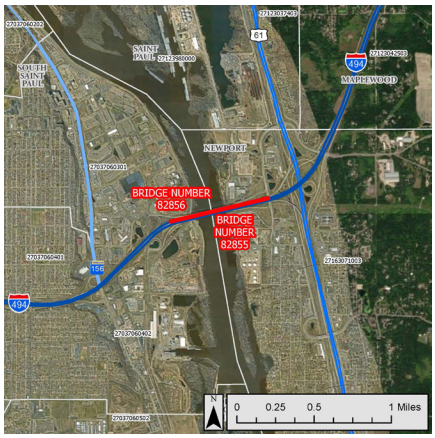
Wakota Bridge

PLANNING PRIORITY				
6	**Bridge Number**	82855, 82856	**Year Built**	2010
	Carrying Facility	Interstate 494	**Over**	Mississippi River
	AADT	102,471 (combined)	**HCADT**	10,248 (combined)
	Bridge Length (ft.)	1,889	**Inspection Report**	8/23/2023 8/23/2023

Description: One the widest bridges in Minnesota, the Wakota Bridge is a 10-lane bridge which carries Interstate 494 over the Mississippi River between the St. Paul suburbs of South Saint Paul (pop. 20,536) in Dakota County and Newport (pop. 4,328) in Washington County. A pair of structures make up the bridge's portfolio with one structure carrying westbound traffic and the other carrying eastbound traffic. The 1,889 foot bridge was completed in 2010 and replaced a four-lane span which was built in 1959. It is tied with the I-35W Saint Anthony Falls Bridge in Minneapolis for being the widest bridge in Minnesota in number of lanes. Resurfacing of westbound lanes of the bridge occurred in 2022.

Bridge Management Planning Special Considerations: Due to this bridge's more recent construction, the bridge management planning process will be similar to a typical management plan.

The Wakota Bridge, carrying I-494 over the Mississippi River.



Wakota Bridge Location Map

Interstate 35E/Lexington Bridge

PLANNING PRIORITY				
7	**Bridge Number**	62912	**Year Built**	2001
	Carrying Facility	Interstate 494	**Over**	Mississippi River
	AADT	96,000	**HCADT**	1,920
	Bridge Length (ft.)	1,406	**Inspection Report**	9/25/2023

Description: The 35E Bridge, also known as the Lexington Bridge, is a 1,406 foot steel continuous-beam span bridge that was built in 2001 and remodeled in 2011. The bridge carries Interstate 35 East over the Mississippi River between the cities of Saint Paul (pop. 303,176) in Ramsey County and Lilydale (pop. 809) in Dakota County.

Bridge Management Planning Special Considerations: Due to the modern nature of the bridge, The Interstate 35E/Lexington Bridge will only require a typical management plan. It is unlikely that any special assessment will be required as a part of the planning process.

The 35E/Lexington Bridge carries I-35E over the Mississippi River, exceeding 95,00 vehicles per day

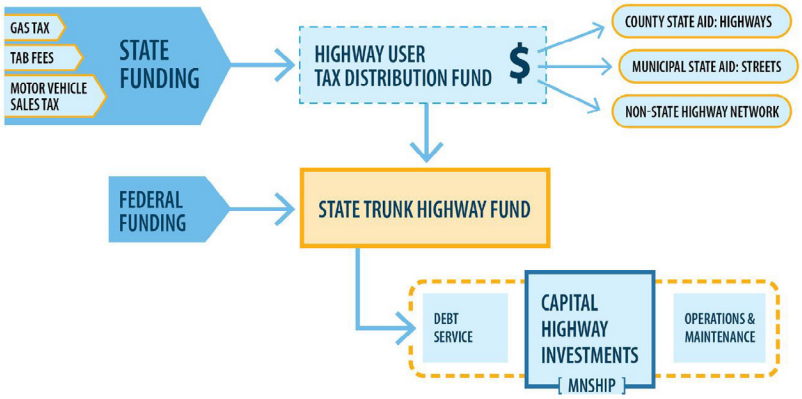
35E/Lexington Bridge Location Map

3. Lead Applicant

MnDOT is the lead applicant for the proposed project and will be responsible for the receipt and expenditure of BIP Planning Grant funds. MnDOT has extensive experience with procuring and developing transportation improvement projects. With over 14,000 miles of trunk highway (including interstates) and 4,500 bridges under their ownership, MnDOT is experienced and committed to the maintenance of the roadway system. Within the past decade MnDOT has procured dozens of federal discretionary grants used to increase the efficiency and safety of the Trunk Highway System.

MnDOT is committed to implementing timely investments in capital and preventative maintenance treatments to extend the service of assets while reducing lifecycle costs. Ongoing operating and maintenance (O&M) costs on the state highway system are funded by taxes and fees from four main revenue sources: 1) state gas tax (motor fuel excise tax); 2) State tab fees (motor vehicle registration tax); 3) State motor vehicle sales tax; and 4) Federal highway funds including highway user tax distributions, flexible highway account, and County State Aid Highway Fund (see Figure 2).

Figure 2 **MnDOT Primary Funding Sources**



MnDOT developed its first Transportation Asset Management Plan (TAMP) in accordance with the 2012 Moving Ahead for Progress in the 21st Century Act (MAP-21). The TAMP was then extended beyond MAP-21's minimum requirements to include the entire state highway system and other infrastructure within the right-of-way. MnDOT's TAMP was a national pilot project and serves as a guide for other states. The current TAMP was adopted by MnDOT in 2022 and is used as a guide to analyze asset life-cycle costs, evaluate risks, develop mitigation strategies, establish asset condition performance measures and targets, and develop investment strategies.

This project will be led by MnDOT's Bridge Office, which has a goal to provide structural and hydraulic leadership for district offices, consultants, and other units of government to build and maintain Minnesota's bridges and structures. The Bridge Office will collaborate with MnDOT's Metro District and District 6 in the development and implementation of the management plans.

4. Other Public and Private Parties

Local Jurisdictions and Other State Agencies

While this planning effort is primarily internal to MnDOT, some collaboration will be necessary throughout the planning process and plan implementation. In the implementation of management plans, MnDOT will work with local jurisdictions, including cities and counties, to plan the timing of major construction activities. Further, the Winona Bridge (Bridge Number 5900), provides transportation across the Minnesota and Wisconsin border. Consistent with agreements between MnDOT and the Wisconsin Department of Transportation (WisDOT), collaboration between the two agencies will occur during plan development.

Further, MnDOT has a working collaboration with the Minnesota State Preservation Officer (SHPO) to help identify and preserve historic bridges throughout the state. As a part of that collaboration, MnDOT entered into a Memo of Understanding (MOU) agreeing to preserve a subset of historic bridges into perpetuity and develop management plans for the historic aspects of the bridges.

II. NATIONAL BRIDGE INVENTORY DATA

1. NBI Information for Affected Bridges

Partial National Bridge Inventory data for affected bridges is below. For a full list of NBI information please see the attached Excel Application for the project.

Table 2 National Bridge Inventory Data

State Code & Name	Structure Number	Record Type	County Code	Feature Intersected	Facility Carried	Latitude	Longitude
MN	2440	1	053	Miss Rvr; Main; W Rvr Pk	MN 65	44590030	093153189
MN	4190	1	037	Minn River Rr Street	MN 62	44530646	093102482
MN	5900	1	169	Miss Rvr Rr Streets	MN 43	44032801	091382273
MN	62090	1	123	Streets; Miss Rvr; Rr	MN 149	44555974	093061560
MN	62912	1	123	Mississippi; Up Rr	I 35E	44541607	093082089
MN	82855	1	163	Mississippi R; Up Rr	I 494	44525830	093005710
MN	82856	1	163	Mississippi R; Up Rr	I 494	44525933	093005732
MN	9600N	1	053	Minnesota R; Black Dog	MN 77	44493820	093135267
MN	9600S	1	053	Minnesota R; Black Dog	MN 77	44493749	093135413

III. PROJECT BUDGET

1. Project Costs

The cost of an individual Bridge Management Plan depends on a number of factors, including the age of the bridge in question and the type of analysis needed. The general scope of tasks for developing an individual plan includes the following:

- Special Structure Inspection
- Materials Testing
- Load Rating (if applicable)
- Service Life Analysis

- Recommended options for optimal LCCA life cycle costs (maintenance, preservation and repair strategies, costs, expected deterioration rates, recommended actions, and years of selected actions)

Additionally, to account for variability in costs, workload and resource constraints, and inflation, the cost estimate includes a 20 percent contingency for each bridge.

Table 3 Project Budget

Bridge Name	Bridge Number(s)	Estimated Cost	20% Contingency	Total Cost
Mendota Bridge	4190	$800,000	$160,000	$960,000
Winona	5900	$400,000	$80,000	$480,000
3rd Ave	2440	$200,000	$40,000	$240,000
Cedar	9600N 9600S	$400,000	$80,000	$480,000
Smith Ave High Bridge	62090	$200,000	$40,000	$240,000
Wakota	82855 82856	$200,000	$40,000	$240,000
I-35 East	62912	$200,000	$40,000	$240,000
Total Cost		**$2,400,000**	**$488,000**	**$2,880,000**

2. Non-Federal Funding Sources

State of Minnesota IIJA Matching Funds

During Minnesota's 2023 legislative session, funds for future fiscal years were allocated from the state's general fund for IIJA discretionary grant local matches. These funds are available to all entities eligible to submit IIJA discretionary grant applications, including MnDOT.

MnDOT created the IIJA Discretionary Match Program with $216.4 million in general funds provided by the Minnesota Legislature in the 2023 Session (Chapter 68, Article 4, Section 111). This funding is available to grant recipients that have directly received a federal discretionary award for a transportation-related purpose under IIJA and will be used as matching funds. If awarded a discretionary grant, MnDOT will apply for the local portion of these funds of the BIP Planning Project.

If awarded and the IIJA Discretionary Match Program is not able to provide the local match, the BIP Planning project will apply for local match funding through the MnDOT Resource Investment Committee (RIC) process.

3. BIP Funds

MnDOT is requesting $2.304 million (80 percent of total eligible project costs) in BIP Planning funding.

4. Other Federal Funds

No other Federal Funds are expected for this project.

IV. MERIT CRITERIA

1. BIP Program Goals

The overall goal of this planning project is to implement key aspects of the State of Minnesota TAMP by maximizing the useful life of key infrastructure on the Trunk Highway system. **The project will improve the reliability of vital bridges, allowing limited**

highway dollars to be spread to other portions of the transportation system. In developing and implementing bridge management plans, the project will achieve all three of the BIP Program Goals:

1. To improve the safety, efficiency, and reliability of the movement of people and freight over bridges;

A key aspect of maintaining a safe and reliable transportation system is to ensure redundancy, especially in the crossing of natural features that create impediments to mobility. In Minnesota, and in the Twin Cities Metropolitan area in particular, is bisected by the Mississippi and Minnesota Rivers. Due to the size of the rivers, bridge crossings are limited, and the cost and work associated with the construction of new or replacement bridges is prohibitive. For those reasons, the reliability of the overall transportation system is dependent on the continued safe operation of existing structures.

In recent years, MnDOT has turned to an asset management approach that prioritizes preventative over reactive maintenance. In an effort to maximize limited financial resources, enhance the reliability of the Minnesota Trunk Highway System, and ensure that bridges stay in service as long as possible, MnDOT has elected to take a proactive approach in the maintenance of its priority bridges. The seven bridges included in this application play a key role in local, statewide, and regional movement of people and freight. Each bridge provides a major river crossing, where alternate routes are limited, and are likely to have significant replacement costs.

Development and implementation of bridge management plans extends the useful life of structures and is the most fiscally responsible method to maintaining the system. As is demonstrated in the St. Croix Crossing Bridge Management Plan, **maintenance scenarios that include higher levels of preventative maintenance result in significantly lower lifecycle and average annual costs** (see Table 4).

Table 4 St. Croix Crossing Bridge Management Plan Lifecycle Cost Projections

Maintenance Scenario	Assumed Life Expectancy	Total Life Cycle Cost	Average Annual Cost over 100 years
Scenario #1: Annual maintenance, regular preservation & PPC OL, avoid rehab	110 years	$31 million	$310 thousand
Scenario #2 - minimal maintenance, regular preservation, avoid rehab	100 years	$38.2 million	$380 thousand
Scenario #3 - Annual maintenance, minimal preservation, reactive rehabilitation	80 years	$127.6 million	$1.28 million
Scenario #4 - Very little maintenance and preservation, reactive rehabilitation	75 years	$158 million	$1.58 million
Scenario #5 - No work at all until bridge is replaced. Do nothing strategy.	60 years	$171 million	$1.71 million

2. To improve the condition of bridges in the United States by:

a. *Reducing the number of bridges in poor condition or in fair condition and at risk of falling into poor condition within the next 3 years,*

b. *Reducing the total person miles traveled over bridges in poor condition, or in fair condition and at risk of falling into poor condition within the next 3 years,*

c. *Reducing the number of bridges that do not meet current geometric design standards, or cannot meet the load and traffic requirements typical of the regional transportation network, and*

d. *Reducing the total person miles traveled over bridges that do not meet current geometric design standards, or cannot meet the load and traffic requirements typical of the regional transportation network;*

MnDOT has determined that the most efficient method to limit and reduce the number of bridges at poor condition is to take a proactive planning approach to scheduling maintenance activities. As a natural progression, without key maintenance activities, bridges will deteriorate to poor condition. Once they deteriorate enough, MnDOT's only option is to complete a costly full replacement. Without proper maintenance, these bridges will deteriorate to poor condition, and it is unlikely that the financial resources will be available to replace them all. This project looks to develop plans that will map out maintenance and rehabilitation activities that will extend each bridge's useful life, keeping it from falling into disrepair. Key rehabilitation and maintenance activities can address this in two ways:

- Complete periodic preventative maintenance activities that will keep the bridge ratings from declining.
- Complete preservation activities that improve the bridge condition before replacement is necessary.

The development of these plans will model and document rehabilitation and maintenance activities and identify the ideal maintenance plan that will reduce the risk of each bridge from reaching poor condition. Further, the bridges included in this project see some of the highest traffic volumes in the state. Over the life of the bridges, completion and implementation of management plans will reduce the total person and freight miles on poor or nearing poor condition bridges.

3. To provide financial assistance that leverages and encourages non-Federal contributions from sponsors and stakeholders involved in the planning, design, and construction of eligible projects.

The development of bridge management plans will identify a series of projects, many of which will be developed and funded by MnDOT and local jurisdictions. Without planning funding, the plans that will guide this work will not be created and many of the projects will not be completed. As such, investment of federal dollars in the planning process will help to facilitate additional local and statewide contributions in bridges throughout the state of Minnesota.

2. Project Description

This project is intended to further MnDOT's strategic asset management objectives, by planning for short- and long-term rehabilitation, restoration, and protection activities on some of the state's most important bridge assets. Project funding will be used to develop Bridge Management Plans for seven bridges, including two pairs of bridges, that are identified on the Department's High Priority Bridge Preservation List. **Plans are intended identify a series of future bridge rehabilitation, preservation, and protection projects, eligible for future BIP Project funding, to extend the service life of bridges, reduce lifetime infrastructure costs, and keep bridges from falling into poor condition for as long as possible.**

For MnDOT, strategic asset management planning high priority preservation bridges occurs in two main phases, depending on the individual needs of the structure: 1) Bridge Preservation Planning; and 2) Bridge Management Planning. Development of a bridge management plan includes a higher level of work and detail than preservation planning. For some structures, a simple preservation plan is sufficient, while for other more complex bridges, a more detailed and resource intensive management plan will need to be developed.

Both preservation and management plans are intended to map out a strategy, including identifying actions, schedule, and costs, for long-term structure preservation. As will be explored in more detail below, bridge management plans are designed to document the current condition of the bridge and give a matrix of options for how to manage the bridge with timely maintenance, preservation, rehabilitation and lastly replacement scenarios.

Bridge Priority Preservation List

All of the seven bridges included in this project have been formally identified by MnDOT as High Priority Preservation Bridges. Starting in 2019, as a part of the Department's strategic asset management planning, MnDOT identified 26 bridges that would benefit from the development of a bridge management plan to advise and guide investment, bridge programming, and maintenance decisions. Through development of the Priority Preservation Bridge List and creation of the Department's first management

plan for the St. Croix Crossing (Bridge Number 82045), **MnDOT confirmed that the most cost-effective ownership approach for complex structures is to adopt a proactive preservation strategy** that extends bridge service life.

In developing the Bridge Priority Preservation List, MnDOT explored four main factors: 1) complexity; 2) replacement cost; 3) deck area; and 4) engineering judgment. Engineering judgment considers structure importance, superstructure type, structure age, and projected next work type.

For all bridges on the list, MnDOT's Bridge Office has been tasked to coordinate with Districts to develop management plans. MnDOT currently programs approximately $10 million per year to fund maintenance, rehabilitation, and protection actions for bridges on the Priority Preservation List that align with a bridge management plan.

Bridge Preservation Programs

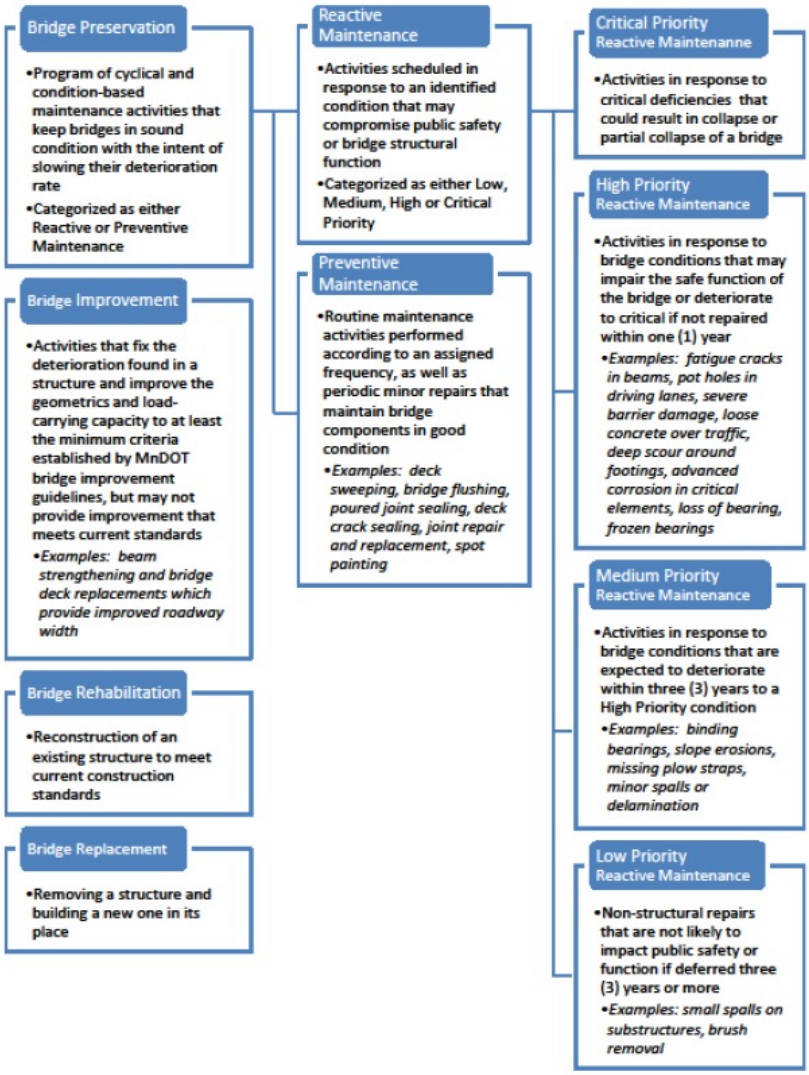
According to the Federal Highway Administration (FHWA), bridge preservation programs typically include cost-effective cyclical and condition-based preventative maintenance activities that seek to prolong the service life of bridges and delay the need for rehabilitation or replacement. Additionally, the MnDOT Bridge Maintenance Manual states that assets should be managed with a focus on increasing public safety and minimizing lifecycle costs. MnDOT bridge management is made up three main components:

- **Assessment:** The collection and maintenance of bridge data. MnDOT provides a complete bridge inventory and detailed condition information on every bridge that carries or crosses a public roadway.
- **Preservation:** Cyclical and condition-based maintenance activities that slow bridge deterioration, restore a bridge's function, keep bridges in sound condition and extend their life.
- **Improvement:** Major rehabilitation and replacement. When a bridge deteriorates to a condition in which preservation is not viable or cost-effective, a major capital improvement or complete bridge replacement must be performed

Preservation programs, as identified by FHWA, prioritize routine inspections of bridges in order to "track and monitor conditions of wearing surfaces, coatings, surface sealers, and joint seals." Data collected by inspection teams informs potential maintenance issues before problems arise.

Bridge preservation efforts oftentimes lead to bridge maintenance activities which when performed in a strategic timeframe can minimize major service interruptions and extend the bridge's service life. Bridge maintenance activities are typically categorized as either preventative maintenance or reactive maintenance.

- **Preventative Maintenance:** Preventative maintenance includes routine maintenance activities performed according to an assigned frequency, as well as



periodic minor condition-based repairs with the intent of preserving the bridge. These routine maintenance activities increase the lifespan of the bridge by slowing the deterioration caused by traffic and the environment. Preventative bridge maintenance includes activities such as bridge flushing, sweeping, debris removal, joint repair and reestablishment, graffiti removal, spot painting, and minor concrete and steel repairs.

- **Reactive Maintenance:** Reactive maintenance activities are scheduled in response to an identified condition that may compromise public safety or bridge structure function. Reactive bridge maintenance items are typically identified during routine bridge inspections and include activities such as replacement of missing plow fingers, repair of impact damage, deck spall repair, and resetting misaligned bearings.

MnDOT Bridge Preservation Plans utilize high-level analysis of bridge inspection data to recommend proactive maintenance work. A MnDOT Bridge Preservation Plan typically includes an internal memo describing the recommendations with estimated costs and preferred scenario worksheets highlighting when each activity should occur.

In an effort to better plan maintenance of bridges on the High Priority Preservation List, MnDOT has committed to developing more detailed bridge management plans, which provide a more complete look at the actions that are necessary to maximize the bridges useful life.

Bridge Management Plans

The main purpose for bridge management plans is to provide decision makers with information to program the most cost-effective work strategies over the expected life of the bridge. Plans are used to assist MnDOT engineers and planners in managing bridge assets under their jurisdiction. These plans explore existing bridge condition, critical elements, potential risks and concerns, mitigation of risks, and potential options for long-term cost-efficient work. Plans are intended to be "living documents" that should be renewed every three to five years to account for changes to bridge condition, repair costs, and overall MnDOT processes. However, the initial development of these plans is the most time and resource intensive.

Example Management Plans

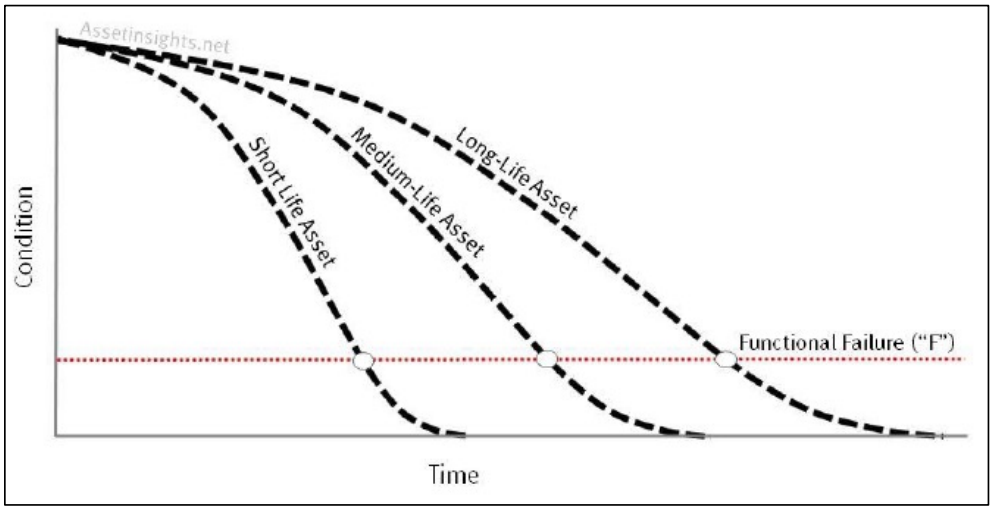
1. St. Croix Crossing **(Bridge Number 82045) adopted in 2020**
2. I-90 Dresbach Bridge **(Bridge Numbers 85801 & 85802) adopted in 2019**
3. St. Anthony Falls Bridge **(Bridge Numbers 27409 & 27410) adopted in 2010**

Plans evaluate a variety of scenarios that explore a range of potential maintenance actions for the structure. As a part of the evaluation, a recommended scenario identified and the anticipated additional costs if the selected scenario is not followed is modeled and documented. Further, each plan will provide and evaluate modeling to estimate deterioration rates of the bridge, which are built from condition information that is tracked in the Department's Bridge Management System (BMS).

A typical bridge management plan is intended to be a guide in helping MnDOT make optimal bridge funding decisions, by addressing investment strategies for bridge assets, including maintenance, preservation, rehabilitation, and replacement activities. These activities are aligned to develop a systematic approach to maintenance actions that minimizes cost, delays the need for costly bridge replacement, and ensure the full useful life of the bridge is realized.

Varying levels of preventative maintenance will result in different bridge deterioration rates. Figure 3, below, depicts three asset life curves across three different scenarios: 1) long-life asset – if routine preventive maintenance and preservation work is done; 2) medium-life asset – if some maintenance and preservation work is done; and 3) short-life asset – if only reactive maintenance work is done.

Figure 3 **Asset Life Curves Under Three Preventative Maintenance Scenarios**



Development of management plans typically includes the following tasks, however, depending on the specific needs of individual structures, additional steps or level of analysis may be necessary:

1. **Special Structure Inspection** – Current inspection data will support an assessment of the condition of major bridge elements such as deck, joints, beams, substructures, and other unique features. The better the accuracy of current condition, the more accurate the modeling of the bridge management plan will be. Quality and confidence of condition data will determine appropriate inspection type and tool: Visual, hands-on sounding for delamination, thermal imaging, coring and chloride analysis, section loss measurements and other nondestructive testing.
2. **Materials Testing** – Testing of the in-place materials of the bridge is used to inform and assess existing bridge condition and strength of the bridge elements.
3. **Load Rating (if applicable)** – Often completed as in pristine condition than later in concurrence with the inspection and testing investigation, to be used to identify the hot spots that can be investigated during inspection.
4. **Service Life Analysis** – An accurate deterioration model of various bridge elements based on actual conditions for the service environment in which the bridge operates. This is used to elicit key pieces of information for defining deterioration rates and how quickly individual bridge elements are expected to show more deterioration. This information is necessary to determine the needs and the timing of a future completion of rehabilitation, preservation, and protection actions. Common tools used in this analysis include chloride diffusion modeling, analysis of the condition history, development of a deck preservation matrix, and use of engineering judgment.
5. **Recommended options for optimal LCCA life cycle costs** – Using the analysis above, a recommended strategy for optimal investment and actions is developed, which includes maintenance, preservation and repair strategies with consideration of costs, expected deterioration rates and timing of selected actions.

MnDOT Bridge Office Replacement and Improvement System (BORIS)

For bridges in Minnesota, MnDOT's policy is for inspections to occur at least once every two years. MnDOT follows the National Bridge Inspection Standards, the Specification for the National Bridge Inventory Bridge Elements, and the MnDOT Bridge and Structure Inspection Program Manual for requirements surrounding the collection of bridge data. Data from these inspections, including the condition of a bridge's deck, superstructure, and substructure, is then uploaded to Bridge Office Replacement and Improvement System (BORIS) where the current condition of the bridge can be compared with its historical conditions to see how quickly the structure is deteriorating and what bridge investments might be necessary in the future. The software follows federal minimum standards for developing and operating a bridge management system, but also provides additional data that MnDOT officials find helpful for decision making purposes. Bridge inventory and condition are also stored in MnDOT's Structure Information Management System (SIMS) which is a database that includes National Highway System bridges owned

by other agencies. The SIMS database feeds MnDOT reporting and analysis tools, including the national AASHTOWare Bridge Management software that the agency utilizes.

Currently the central decision-making tool for MnDOT Bridge investments, BORIS includes bridge inventory and inspection data so that users can view, analyze, and make decisions based on customized logic principals developed by MnDOT using the agency's best practices and procedures. BORIS is also used to forecast future bridge conditions by applying deterioration curves which are developed using aggregated deck inspection data. It further uses risk assessment methods to determine the bridge's probability of a service interruption and analyzes bridge inspection and inventory data to predict the replacement or improvement needs for each individual bridge and on a statewide basis, based on expected deterioration for each bridge. This analysis results in a draft list of needed bridge projects, including anticipated costs and schedules for review by MnDOT bridge experts.

The result of this process is a bridge program that better addresses the priorities and needs of Minnesota bridges and is consistent with MnDOT's mission to provide a safe, accessible, and reliable transportation system.

How MnDOT Scores and Selects Bridge Projects

MnDOT scores bridge condition needs when selecting projects for its ten-year Capital Highway Investment Plan (CHIP). The selection of bridge projects is informed by district staff, experts from MnDOT's Bridge Office, and the Bridge Office Replacement and Improvement System (BORIS). MnDOT's statewide performance measures for bridges are based on National Bridge Inventory (NBI) condition ratings and the risk of service interruption. MnDOT has developed the Bridge Planning Index (BPI) to complement its risk-based prioritization system. BPI weighs the risks associated with the condition and fatigue of the bridge structure, potential damage from flooding and/or heavy loads, and impacts of detours. In addition to its BPI rating, MnDOT uses a Project Selection Policy (PSP) Score. Built from the BPI and other scores such as Remaining Service Life (RSL), the NBI deck rating, and the deck area of the bridge, PSP scores are assigned for all projects providing an overall rating for project priority, which is used by MnDOT staff when identifying and selecting bridges for prioritization. Pavement and bridges on the National Highway System are scored and selected separately from pavement and bridges off the system.

Once selected, MnDOT then identifies and evaluates alternatives and other needs, legal requirements, issues, and opportunities in coordination with local partners, and considers public input. In the process, non-bridge work may be added to a bridge project, or a bridge project may be combined with a nearby pavement project. The Department follows a context-sensitive complete streets approach, which considers the needs of all users.

Bridge/Large Bridge Project Merit Criteria Overview

This project will lead to future BIP eligible projects across each of the seven bridges or sets of bridges that are included in this application. The planning project will identify near and far term bridge rehabilitation, preservation, and protection projects for each of the seven bridges identified in the application.

Criteria #1: State of Good Repair

Long-range bridge management planning plays a pivotal role in ensuring that bridges remain in a "State of Good Repair," a critical objective for transportation infrastructure management and BIP. According to data from the American Society of Civil Engineers (ASCE), nearly 7.5 percent of the nation's bridges were structurally deficient as of 2020. Of the 13,502 bridges in Minnesota, 582, or 4.3 percent, were classified as structurally deficient as of June 2023. The Congressional Research Office estimates that in order to eliminate the investment backlog of deficient bridges nationwide by 2034, a total of $24.6 billion will need to be invested annually into bridge maintenance and repair. While these numbers can be concerning to both transportation officials and policymakers, proactive maintenance strategies, that extend the service life of existing structures, can significantly reduce this percentage.

Research conducted by the Federal Highway Administration (FHWA) suggests that for every dollar spent on preventive maintenance, up to $5.20 in future rehabilitation or replacement costs can be saved, underscoring the cost-effectiveness of management

planning in preserving bridge infrastructure. By implementing the proposed long-range comprehensive management plans, MnDOT will proactively address potential issues before they escalate into more significant and expensive problems.

This project will enable MnDOT to realize those fiscal efficiencies, allocate resources effectively, and reduce the life time costs associated with the seven bridges. Bridges which are subject to regular inspection and maintenance interventions have lower rates of structural deficiencies and are less likely to be classified as unsafe compared to those with irregular maintenance schedules. By forecasting maintenance needs over an extended timeframe, MnDOT planners will be able to develop budgets and funding strategies that adequately support ongoing maintenance activities. This proactive approach will help prevent the need for costly emergency repairs or even bridge closures due to sudden structural deficiencies. Moreover, it will allow for the prioritization of maintenance projects based on the condition and criticality of each bridge, ensuring that limited resources are allocated where they are most needed to uphold the "State of Good Repair" across the state's entire bridge inventory.

Criteria #2: Safety and Mobility

The bridge management plans proposed by this project will be instrumental in enhancing both safety and mobility within the Minnesota transportation network. As mentioned previously, by systematically scheduling inspections, assessments, and necessary repairs over extended periods, these plans will help identify and address potential safety hazards before they escalate into more significant issues. Regular maintenance activities such as bridge deck repairs, corrosion prevention, and structural reinforcements will ensure that the bridges remain structurally sound and capable of withstanding the stresses of daily use. This proactive approach to maintenance will significantly reduce the risk of bridge failures or collapses, safeguarding the safety of motorists, pedestrians, and other bridge users.

Furthermore, these long-range management plans will contribute to the overall reliability and resilience of the local transportation system by minimizing disruptions to mobility. The prioritized bridges are critical links within their local and regional transportation networks, facilitating the movement of people and goods across rivers, highways, and other geographical barriers. Any unplanned closures or restrictions due to bridge deficiencies can lead to significant disruptions, traffic congestion, and delays. By implementing this planning project, MnDOT will minimize the likelihood of sudden bridge closures and ensure that the prioritized bridges remain open and accessible for uninterrupted travel, thereby enhancing mobility and connectivity for residents.

Criteria #3: Economic Competitiveness and Opportunity

Reliable and well-maintained bridges reduce transportation costs, enhance connectivity between markets, and improve access to employment centers, thereby fostering economic activity and competitiveness within a region. The proposed long-term bridge management plans from this project will play a significant role in bolstering Minnesota's economic competitiveness and create opportunities for growth and development. All of the identified bridges are vital components of transportation infrastructure, facilitating the movement of goods, services, and people across the Minneapolis/St. Paul metropolitan area, the City of Winona, and Greater Minnesota. Combined, the bridges facilitate tens of thousands of commuters and heavy freight vehicles every day. According to the American Society of Civil Engineers (ASCE), failing infrastructure, including bridges, costs the average American family $3,400 annually in disposable income due to increased transportation costs, lost time, and productivity. By ensuring the prioritized bridges are well-maintained and in a State of Good Repair, the long-term management plans will contribute to the efficiency and reliability of transportation networks in which the bridges are located within, ensuring the continuing economic vitality of Minnesota's communities and the safeguarding of its residents' income.

Moreover, long-term bridge management plans support economic development by providing businesses with reliable access to markets and supply chains. Well-maintained bridges enable efficient transportation of goods and services, reducing shipping times and costs for businesses. This improved accessibility encourages investment and entrepreneurship by lowering barriers to market entry and expanding opportunities for trade and commerce. Additionally, reliable transportation infrastructure enhances the attractiveness of a region to businesses seeking to establish or expand operations, as it ensures consistent access to suppliers, customers, and labor markets. With the presence of well-maintained infrastructure, MnDOT will be able to enhance the

overall quality of life and livability of the region, assisting the state's businesses in attracting and retaining a talented workforce essential for driving innovation and economic growth.

Finally, the implementation of maintenance activities associated with this project, such as inspections, repairs, and rehabilitation projects, will also generate employment opportunities for skilled workers in various sectors, including engineering, construction, and transportation. For every $1 billion invested in infrastructure projects, FHWA estimates that approximately 13,000 jobs are created across various sectors, including construction, manufacturing, and professional services. According to the Brookings Institute, infrastructure occupations pay wages that are 30 percent higher for workers at lower income levels which in turn supports more equitable career pathways. In Minnesota alone, the number of infrastructure jobs is estimated to be between 197,510 to 493,580.

Criteria #4: Climate Change, Sustainability, Resiliency, and the Environment

The long-term bridge management plans proposed by this project will be integral to addressing the challenges posed by climate change, promoting sustainability, enhancing resilience, and protecting the environment. Climate change impacts, such as extreme weather events and temperature fluctuations can accelerate the deterioration of bridge infrastructure. Long-term management plans that incorporate climate resilience measures help mitigate these risks by ensuring that bridges are designed, constructed, and maintained to withstand the changing environmental conditions. By integrating climate data and projections into its management planning processes, MnDOT will be able to identify vulnerable bridges and prioritize adaptation strategies to enhance their resilience.

Additionally, these long-term bridge management plans will also play a crucial role in promoting sustainability by extending the lifespan of existing infrastructure and reducing the need for new construction. The embodied energy and environmental impact associated with building new bridges is substantial, oftentimes including raw material extraction, manufacturing processes, and transportation emissions. By preserving and maintaining existing bridges through regular inspections, repairs, and rehabilitation projects, MnDOT will be able to minimize the environmental footprint of infrastructure development and promote sustainable practices. The incorporation of sustainable materials and construction techniques will also be considered as part of this project and may further reduce MnDOT's environmental impact and promote resource efficiency.

Finally, MnDOT's long-term bridge management plans for the prioritized bridges will contribute to environmental protection by incorporating measures to minimize the ecological footprint of maintenance activities. MnDOT prioritizes environmentally sensitive approaches, such as erosion control, habitat restoration, and pollution prevention, during bridge maintenance projects. These measures help mitigate adverse impacts on ecosystems and wildlife habitats, preserving biodiversity and ecological integrity. By integrating green infrastructure elements, such as vegetated buffers and permeable pavements, into bridge management plans MnDOT will be able to enhance stormwater management, reduce runoff pollution, and improve water quality, further supporting the Department's environmental sustainability goals.

Criteria #5: Equity and Quality of Life

This project will be instrumental in promoting equity and enhancing the quality of life for Minnesota's communities by ensuring equitable access to safe and reliable transportation infrastructure. The prioritized bridges serve as critical links within their transportation networks, connecting neighborhoods and facilitating access to essential services, employment opportunities, education, and healthcare. By implementing the proposed comprehensive management plans, MnDOT will be able to prioritize the upkeep of these essential bridges which benefit a wide array of residents with varying socioeconomic statuses, ensuring that all residents have equal access to safe and efficient transportation options, thereby promoting equity and social inclusion.

As previously mentioned, almost all of the prioritized bridges are located within census tracts which are designated as historically disadvantaged or in areas of persistent poverty. Research conducted by Transit Center, a philanthropic organization based in New York City that works to improve public transportation in the United States, reveals that communities of color and low-income neighborhoods are disproportionately affected by deficient infrastructure, including bridges. These communities often bear the brunt of deteriorating bridges, experiencing increased travel times, limited access to essential services, and higher rates of

accidents and fatalities. Long-term bridge management plans such as the ones proposed by this project can catalyze economic development and prosperity in underserved communities by improving connectivity and access to economic opportunities. Reliable transportation infrastructure attracts investment which encourages business growth and creates job opportunities, particularly in areas with historically limited access to transportation networks. By prioritizing maintenance activities that enhance the functionality and safety of the identified bridges, MnDOT will be able to address longstanding disparities in infrastructure investment and promote equitable economic development. This targeted approach to infrastructure maintenance will help bridge the gap between communities and ensures that all residents can benefit from the economic opportunities and improved quality of life facilitated by well-maintained bridges.

In addition to the above, this project will also contribute to the improvement of public health and safety by reducing the risk of accidents, injuries, and fatalities associated with deteriorating infrastructure. Well-maintained bridges provide reliable routes for emergency response vehicles, enabling timely access to medical facilities during emergencies. By minimizing congestion, travel delays, and air pollution, efficient transportation infrastructure enhances the overall quality of life for residents, promoting physical and mental well-being. Communities with well-maintained bridges experience fewer disruptions to daily life, allowing residents to spend more time with their families, pursue recreational activities, and engage in community events, ultimately contributing to a higher quality of life.

Criteria #6: Innovation

This project incorporates an innovative approach to asset management, by proactively planning for the short- and long-term maintenance of key transportation assets. Under MnDOT's Bridge Priority Preservation Program, MnDOT has identified the most important bridges on the Minnesota Trunk Highway system for planning. Each of these structures plays a vital role in the statewide, regional, and local transportation network by supporting the movement of freight and people.

MnDOT's approach to bridge management planning will minimize lifecycle maintenance costs, postpone the need for costly bridge replacement, and ensure these key structures are maintenance in a state of good repair. By focusing on proactive maintenance over replacement, MnDOT's limited dollars can be stretched further, allowing it to better support the entire highway network.

Further, MnDOT has embraced numerous innovative project delivery methods, including design build, best-value contracting, construction manager/general contractor, among others. As bridge rehabilitation, preservation, and protection projects are identified by this project and included in MnDOT's program, innovative delivery methods will be considered.

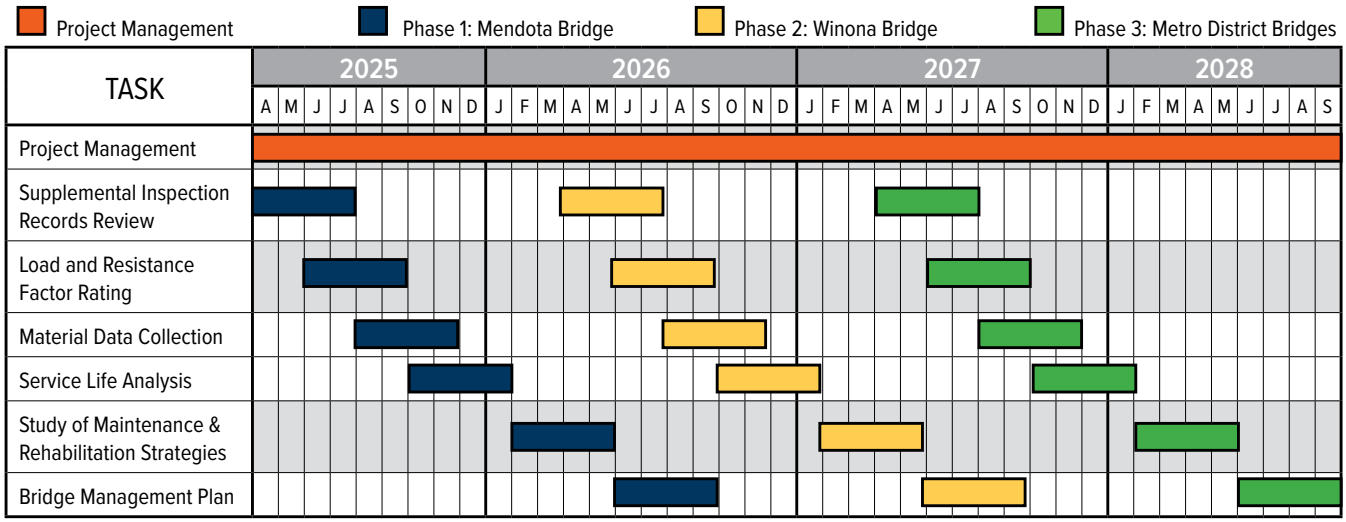
3. Project Schedule

Each bridge management plan requires different levels of analysis. To ensure timely plan development, MnDOT plans to develop the bridge management plans in three phases:

- **Phase 1: Mendota Bridge**
  - The Mendota Bridge (Bridge Number 4190) is MnDOT's number one priority for the development of a Bridge Management Plan. Due to a number of unique factors (e.g., Historic Nature) it will require the most complex planning effort. As such, the planning process for it will occur first and it will not be bundled with other bridges.
- **Phase 2: Winona Bridge**
  - The Winona Bridge (Bridge Number 5900) is MnDOT's second priority for Bridge Management Planning. It is the only bridge located in MnDOT's District 6; thus the planning process will not be bundled with other bridges.
- **Phase 3: Metro District Bridges**
  - The third phase will include the remainder of the bridges located in MnDOT's Metro District (Bridge Numbers 2440, 9600N & 9600S, 62090, 82855 & 82856, and 61912). Since these bridges are located in the same district, bundling will bring efficiency to the process by allowing consistent coordination between the Bridge Office Staff and Metro District Staff.

Building from lessons learned through past bridge management planning processes, MnDOT has developed a project schedule where each phase is expected to span approximately 18 months and due to the cadence of the work, each phase will overlap by about six months. Work is expected to fall into six different tasks, with field work scheduled to occur in the Spring of 2025, 2026 and 2027:

Figure 4 **Schedule**



Building from the planning process, MnDOT will have identified various near and far term maintenance, rehabilitation, preservation, and protection activities. Those activities will then be programed and BIP capital funding will be sought to ensure all necessary projects are funded.

4. Project Budget

Total Project Cost: $2.88 million

Total Request: $2.304 million (80 percent of total project costs)

Project costs associated with the development of each bridge management plan is variable, based on the unique features of each structure. A estimated cost for the development of each plan has been developed by MnDOT, based on the cost of past similar projects and the steps necessary for each specific structure. Additionally, to account for variability in costs, workload constraints, and inflation, the cost estimate includes a 20 percent contingency for each bridge.

As discussed elsewhere, due to the separate nature of the planning documents, this project is scalable. As such, depending on the amount of funding available, MnDOT will develop plans based on identified structure priority (reflected in the table below).

MnDOT will fund the remaining 20 percent of the project. In order to fulfil the required local match, MnDOT may pursue money through the IIJA Discretionary Match Program. In 2023, the Minnesota Legislature allocated $216.4 million in general funds that are available to grant recipients that have directly received a federal discretionary award for a transportation-related purpose under IIJA. If awarded a discretionary grant, MnDOT will apply for the local portion of these funds of the BIP Planning Project.

If awarded and the IIJA Discretionary Match Program is not able to provide the local match, the BIP Planning project will apply for local match funding through the MnDOT Resource Investment Committee (RIC) process.

Table 5 Project Budget and Funding

Bridge Name	Bridge Number(s)		Non-Federal State		Total Project Costs	
	Amount	Percent of total eligible	Amount	Percent of total eligible	Amount	Percent of total eligible
Mendota Bridge	$768,000	27%	$192,000	7%	$960,000	33%
Winona	$384,000	13%	$96,000	3%	$480,000	17%
3rd Ave	$192,000	7%	$48,000	2%	$240,000	8%
Cedar	$384,000	13%	$96,000	3%	$480,000	17%
Smith Ave High Bridge	$192,000	7%	$48,000	2%	$240,000	8%
Wakota	$192,000	7%	$48,000	2%	$240,000	8%
I-35 East	$192,000	7%	$48,000	2%	$240,000	8%
Total Cost	**$2.304 million**	**80%**	**$576,000**	**20%**	**$2.88 million**	**100%**

V. ADMINISTRATION PRIORITIES AND DEPARTMENTAL STRATEGIC PLAN GOALS

1. Safety

The National Roadway Safety Strategy (NRSS) outlines a Safe System Approach to improving overall safety of the transportation system, mitigate risks associated with the system, and addressing safety at a systemwide level. The approach outlines six key principles: 1) Death and Serious Injuries are Unacceptable; 2) Humans Make Mistakes; 3) Humans are Vulnerable; 4) Responsibility is Shared; 5) **Safety is Proactive;** and 6) **Redundancy is Critical.**

This project directly addresses two of the key principles of the Safe System Approach:

- **Safety in Proactive -** Proactive tools should be used to identify and address safety issues in the transportation system, rather than waiting for crashes to occur and reacting afterwards.
- **Redundancy is Critical** - Reducing risks requires that all parts of the transportation system be strengthened, so that if one part fails, the other parts still protect people.

For the Minnesota Transportation System, major river crossings create significant obstacles to providing safe and redundant transportation options. In the Minneapolis-St. Paul Metropolitan Area, the most populated portion of the state, the Minnesota and Mississippi Rivers present major impediments to surface transportation, emphasizing the role of the seven bridges included in this planning effort. Each plays a key role in providing the safe transport of goods and people over the river crossings.

The NRSS Safe System Approach states that "reducing risks requires that all parts of the transportation system be strengthened, so that if one part fails, the other parts still protect people." With this project, MnDOT will ensure the continued safety of these key bridges with routine maintenance activities. Bridge management plans include in-depth analysis of bridge conditions and materials inspections that go beyond that of a typical bridge inspection. As a result, the process may result in the discovery of

structural or other safety issues that would not be discovered through typical inspections. Further, funding of this project will allow for MnDOT to complete proactive and detailed planning for some of the highest priority bridges in the state. This approach will lead to improved safety outcomes and accomplish the "Safety is Proactive" pillar of the NRSS Safe System Approach. Additionally, by planning for long-term bridge preservation, MnDOT will be able to schedule maintenance activities so that minimal overlap occurs, decreasing the number of bridges that may need to close for repairs / detours that may occur simultaneously. This in turn provides redundancy by ensuring the long-term operation of bridge assets where alternate routes are often limited.

INTERSTATE 35W BRIDGE COLLAPSE

MnDOT is no stranger to the risks posed by aging bridge infrastructure in this area. In 2007, the Interstate 35W bridge over the Mississippi River in downtown Minneapolis collapsed during rush hour, sending vehicles into the water and rocky shore below. A total of 13 people were killed and 145 were injured in the collapse. At the time of the collapse, the bridge was classified as structurally deficient and rated as fracture critical, "meaning the failure of just one vital component could cause the whole bridge to collapse." While the National Transportation Safety Board determined that it was a design flaw, and not deferred maintenance, neglect, or other problems that caused the 35W bridge to collapse, the tragedy was a wakeup call for the State.

In the 17 years since the bridge collapse, MnDOT and the State of Minnesota have invested heavily in infrastructure safety and maintenance. Within months of the collapse, the Minnesota State Legislature raised the gas tax and funded a $2.5 billion bridge improvement program which funded the repair and replacement of all 172 bridges over the next decade which were found to be structurally deficient or fracture critical in the state. This project is part of the natural progression and demonstrates MnDOT's commitment to safety and proactive maintenance planning in the aftermath of the incident.

2. Climate Change and Sustainability

Extending the life of existing transportation assets is a key aspect to reducing the greenhouse gas and other emissions from the transportation. MnDOT has an ongoing mission to decrease the amount of greenhouse gas emissions in the transportation sector and address the disproportionate negative environmental impacts of transportation on disadvantaged communities. By proactively maintaining bridges, replacement can be delayed, ultimately reducing the lifecycle material and carbon costs associated with construction activities. Additionally, ensuring that bridges stay in operation will maintain a well-connected transportation system, reducing the need for longer reroutes.

Five of the seven bridges that MnDOT has prioritized for this project are within Census Tracts that are categorized as Areas of Persistent Poverty and two of the seven bridges are within Census Tracts that are categorized as Historically Disadvantaged

Communities. Six of the seven bridges are located near pollution heavy areas within the Twin Cities Metropolitan Area. According to data collected from the USDOT Equitable Transportation Community Explorer (ETC Explorer), the majority of Census Tracts in which the seven bridges are located are disadvantaged in the Environmentally Burdened category. This category of the index includes variables measuring factors such as pollution, hazardous facility exposure, water pollution and the built environment. These environmental burdens can have far-reaching consequences such as health disparities, negative educational outcomes, and economic hardship. A total of 10 of the 22 census tracts score 75 or above in this category meaning more than 35,000 Minnesotans affected by the proposed project are living in areas that are among the top 25 percent of environmentally burdened communities in the nation.

According to the U.S. Congressional Budget Office (CBO), the largest source of emissions of carbon dioxide (CO2, the most common greenhouse gas) in the United States is the transportation sector with the majority of emissions coming from cars and trucks. Motor vehicles account for 83 percent of CO2 emissions from transportation. By being able to proactively invest in the bridge maintenance needs of the prioritized bridges, MnDOT will be able to keep these bridges open for use and avoid the creation of lengthy detours which could result in greater environmental harm to the areas in which the bridges are located. Below is a table showing the detour miles that would be required as a result of each bridge closure as well as the subsequent additional carbon emissions emitted by a typical passenger vehicle taking the detour and a typical freight truck taking the detour.

Table 6 Bridge Closure Emissions Costs

Bridge Name	AADT	HCADT	Detour Miles if Closed	Additional Carbon Emissions from Detour Per Passenger Vehicle*	Additional Carbon Emissions from Detour Per Freight Truck**
Mendota Bridge	47,417	2,800	3 miles	1.41 lbs. of CO^2	1.20 lbs. of CO^2
Winona	9,809	347	65 miles	30.55 lbs. of CO^2	26 lbs. of CO^2
3rd Avenue	14,500	145	1 mile	0.47 lbs. of CO^2	0.40 lbs. of CO^2
Cedar	45,951	2,298	8 miles	3.76 lbs. of CO^2	3.20 lbs. of CO^2
Smith Avenue High Bridge	14,900	298	2 miles	0.94 lbs. of CO^2	0.80 lbs. of CO^2
Wakota	102,471	10,248	7 miles	3.29 lbs. of CO^2	2.80 lbs. of CO^2
35E	96,000	10,248	5 miles	2.35 lbs. of CO^2	2.0 lbs. of CO^2

*According to the Congressional Budget Office, 0.47 pounds (lbs.) of carbon dioxide are emitted per passenger mile for cars.

** According to the Congressional Budget Office, 0.40 pounds (lbs.) of carbon dioxide are emitted per ton-mile of freight for trucks.

According to the CBO, "carbon dioxide emissions, per passenger-mile from travel by personal vehicles are higher on a per-mile basis than emissions from other forms of passenger travel." The CBO also notes that traffic congestion and travel speeds, which are influenced by travel growth, can affect the efficiency with which motor vehicles burn fuel and produce emissions and the office further states that "an extra 0.04 billion metric tons of greenhouse gases—about 2 percent of all transportation-related emissions—were emitted in 2019 as a result of congestion." As can be seen in the table above, carbon dioxide emissions from vehicles forced to take detours due to closures of the bridges prioritized by this proposed project would add significant amounts of harmful emissions to the environment which would in turn be compounded by how many vehicles normally utilize the bridge as well as the amount of time the bridge would be closed for. Furthermore, these emissions would be released in communities that are already environmentally burdened. By strategically planning for maintenance needs and activities for these bridges, MnDOT will be able to keep this scenario from taking place and better protect both the environment as well as the people of the great state of Minnesota.

3. Equity

As mentioned previously, five of the seven bridges included in this project are located within Census Tracts which are categorized as being Areas of Persistent Poverty and one bridge is located within a Census Tract that is defined as being a Historically

Disadvantaged Community. Further, six of the seven bridges are located entirely or partially within a Census Tract that meets one or more of the following:

- Area of Persistent Poverty (APP)
- Historically Disadvantaged Community as shown on the Climate and Economic Justice Screening Tool (CEJST)
- Disadvantaged under the Equitable Transportation Community Explorer (ETC)

However, each of the bridges included in this application play a major role in transportation equity that extends beyond the immediate community they are located in. The greater Minneapolis-St. Paul Metropolitan (MSP) area is home to numerous Census Tracts that are identified as disadvantaged by one or more indicators. Further, according to the ETC Explorer, the area has significantly elevated levels of Environmental Burden, Climate and Disaster Risk Burden, and Social Vulnerability relative to the rest of the nation.

These bridges serve a vital role in connecting disadvantaged communities to places of employment, service providers, shopping, schools, and places of worship. By implementing comprehensive management plans, MnDOT will be able to cost effectively keep vital bridges in operation and allocate resources more equitably, focusing on the repairs and upgrades of bridges in areas that have historically been neglected and marginalized.

Table 7 Equitable Transportation Community (ETC) Explorer Indicators

ETC Indicator	Percent of Tracts in the MSP Urbanized Area above the 65th Percentile Nationwide
Environmental Burden	10.19%
Climate and Disaster Risk Burden	14.26%
Social Vulnerability	47.16%
Health Vulnerability	15.72%
Transportation Insecurity	29.69%
Overall Disadvantage Indicator	9.02%

The social vulnerability index of the ETC Explorer, meanwhile, is a measure of socioeconomic indicators that have a direct impact on quality of life. These indicators include lack of employment, educational attainment, poverty, housing tenure, access to broadband internet, and housing cost burdens. Seven of the 20 Census Tracts in which project bridges are located score in the top 50 percent of the most socially vulnerable communities in the nation with one of those Census Tracts (Mendota Bridge, Census Tract #27053980100) ranking in the 94th percentile for social vulnerability. Among the 20 Census Tracts, seven are ranked in the top 50 percent of communities in the nation suffering from health vulnerability – a measure the ETC Explorer uses to assess the increased frequency of health conditions that may result from exposure to air, noise, and water pollution. Lifestyle factors such as poor walkability, car dependency, and long commute times also contribute to this measure.

By maintaining bridges in all neighborhoods, regardless of their affluence, MnDOT will be able to facilitate access to jobs, education, healthcare, and essential services for residents across the socioeconomic spectrum. Moreover, investing in infrastructure in these underserved areas will stimulate economic development and improve the quality of life for residents, fostering a more equitable distribution of resources and opportunities.

4. Workforce Development, Job Quality, and Wealth Creation

Any construction work or maintenance activities that result from the planning efforts of the proposed project will be subject to MnDOT's policies surrounding the creation of good-paying jobs with the free and fair choice to join a union, as well as the Department's goals of focusing on women, people of color, and others who are underrepresented in infrastructure jobs.

MnDOT has proactively developed a strong portfolio of Equity and Inclusion Programs in its appropriations process such as Disadvantaged Business Enterprise (DBE), Targeted Group Business (TGB), and its Equal Employment Opportunity (EEO) Program. MnDOT encourages and awards private business contracts to both minority-owned and women-owned businesses, and over the past five years, has awarded more than $173 million in prime contracts and goods purchases to under-utilized businesses, increasing from $19 million in FY16 to over $38 million FY20.

Additionally, MnDOT is committed to Minnesota's affirmative action efforts and works to ensure that the agency is providing equal opportunity to all employees and applicants in accordance with state and federal affirmative action laws along with the agency's designated plan. Additionally, MnDOT provides reasonable accommodations to qualified individuals with disabilities when such accommodations are related to performing essential functions of the job, applying, or competing for a job, or enjoying the benefits of and privileges of employment.

MnDOT's Office of Equity and Diversity also offers several Diversity, Equity, and Inclusion training programs to its employees. In accordance with 23 CFR Part 200.9(b)(11), MnDOT prepares a Title VI and Nondiscrimination Implementation Plan on an annual basis for the Federal Highway Administration and every three years for the Federal Transit Administration in accordance with FTA Circular 4702.1B. The Minnesota Human Rights Act also prohibits discrimination in the provision of public services on the basis of race, color, creed, religion, national origin, sex, marital status, disability, gender identity, sexual orientation, and status with regard to public assistance. Public services are defined to include any department or agency managed by the State of Minnesota.

Certain businesses contracting with the State of Minnesota, cities, counties, and the University of Minnesota are required to have a Workforce Certificate. Workforce Certificates require contractors to actively work to hire, train, promote, and retain people of color, Indigenous people, women, and/or people with disabilities to ensure that Minnesota's workforce reflects Minnesota's demographics. When agencies sign a contract with a contractor, under the Minnesota Human Rights Act and Minnesota Administrative Rules 5000.3400 through 5000.3600 (Rules), the bid-award entities are required to:

- Provide each bidder and contractor with documentation describing the Minnesota Human Rights Act and Rules.
- Send a list of prospective bidders to the Minnesota Department of Human Rights (MDHR) before a bid opens.
- Include in each contract is the affirmative action clause stating the intention of the bid-award entity to carry out its responsibility for requiring affirmative action by its contractors and the consequences for failure to implement affirmative action.
- Include in each contract the contractor's obligations under the Minnesota Human Rights Act and Minnesota Administrative Rules.
- Provide information to MDHR with information or assistance deemed necessary to seek compliance with the Minnesota Human Rights Act and Minnesota Administrative Rules.
- Provide information to MDHR indicating that a business or firm is not in compliance with the Minnesota Human Rights Act and Minnesota Administrative Rules.
- Cooperate with the Commissioner of the MDHR in implementing the Minnesota Human Rights Ace and Minnesota Administrative Rules.

MDHR maintains a list of contractors that have current Workforce Certificates and Equal Pay Certificates, and contractors that have had their certificate expired, surrendered, suspended, or revoked. MDHR also posts workforce participation rates on large state construction projects on a regular basis because of the impact these projects have on employment opportunities in Minnesota for people of color, Indigenous people, and/or women.

VI. ADDITIONAL DOCUMENTATION

All supporting documents and the BIP grant application narrative are also available to view at the following webpage:

https://www.srfconsulting.com/mndot-bridge-office/