

2019-2020 Biennial Report on the

Bridge Inspection Quality Assurance and Quality Control

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Legislative Request

This report is issued to comply with [Minnesota Statutes 165.03 subdivision 8.](#)

165.03 STRENGTH OF BRIDGE INSPECTION.

Subdivision 8. Biennial report on bridge inspection quality assurance.

By February 1 of each odd-numbered year, the commissioner shall submit a report electronically to the members of the Minnesota Senate and House of Representatives committees with jurisdiction over transportation policy and finance concerning quality assurance for bridge inspections. At a minimum, the report must:

- (1) summarize the bridge inspection quality assurance and quality control procedures used in Minnesota;
- (2) identify any substantive changes to quality assurance and quality control procedures made in the previous two years;
- (3) summarize and provide a briefing on findings from bridge inspection quality reviews performed in the previous two years;
- (4) identify actions taken and planned in response to findings from bridge inspection quality reviews performed in the previous two years;
- (5) summarize the results of any bridge inspection compliance review by the Federal Highway Administration; and
- (6) identify actions in response to the Federal Highway Administration compliance review taken by the department in order to reach full compliance.

Summary

The Minnesota Department of Transportation Bridge Inspection Program strives to conform to all state and federal laws and regulations. The National Bridge Inspection Standards are issued by the Federal Highway Administration and were last revised in December 2009. The NBIS is the most comprehensive bridge inspection document available and is the basis for the FHWA's annual evaluation of MnDOT's Bridge Inspection Program.

MnDOT maintains the Bridge and Structure Inspection Program Manual, the comprehensive reference that promotes consistent and uniform methods of inspection and documentation of bridge conditions throughout the state. The [BSIPM](#) was last updated in May of 2019, and is referenced frequently in this report.

MnDOT wrote an extensive quality control/quality assurance plan for its bridge inspection program in 2008, which is incorporated into the BSIPM as Chapter E. The plan is primarily a compilation of current practice assembled into a formal document with new processes added to comply with changes to the NBIS and more directly address quality assurance. The plan defines and delegates responsibilities for the statewide inspection programs to districts, counties, municipalities and other agencies. It also describes the certification and training program for qualified bridge inspectors and sets up a process for quality assurance reviews of state and local agency inspection programs.

MnDOT is annually reviewed by the FHWA under its [NBIS Oversight Program](#). This program strives for a standard method of assessing state DOT compliance within the federal requirements. This program splits the NBIS into 23 different focus areas, referred to as metrics. Each metric is assessed by FHWA staff annually, and if certain tolerances are exceeded, the state is required to provide a written plan on how the state DOT will make corrections to re-establish full compliance.

At the end of 2020, MnDOT was in full compliance with 22 of 23 NBIS metrics. The only NBIS metric with a written Plan of Corrective Action was Metric 13, Load Ratings. Load ratings are calculations made by engineers to determine the safe carrying capacity and determine if a bridge needs to be posted for less than legal loads. The calculations need to be adjusted for structure design type, material, any deterioration of the structure and expected vehicle configuration. Minnesota needs to comply with a recent requirement to have all bridges within a mile of the interstate rated for emergency vehicles per the federal FAST Act legislation.

In 2012, the Moving Ahead for Progress in the 21st Century Act, or MAP-21, required National Tunnel Inspection Standards for proper inventory and assessment of tunnel assets. In 2015, MnDOT shifted five tunnels that were previously inspected under NBIS requirements to the NTIS. In 2019, MnDOT added an additional nine tunnels as part of a special agreement with the Metropolitan Airports Commission. Previously these were considered privately owned structures, and the management and inspection were handled by MAC. However, after several meetings between MAC, FHWA and MnDOT it was decided to inventory and inspect these structures under the rules of the NTIS. All tunnels are either on the state system or owned by MAC. All state-owned tunnels are inspected by MnDOT's Bridge Office and district certified tunnel team leaders. All MAC tunnels are inspected by consultants using-certified tunnel team leader inspectors.

FHWA established an [NTIS Oversight Program](#) in 2019, and made its first metric assessments of MnDOT's Tunnel Inspection Program in 2020. MnDOT was found fully compliant in 8 metrics and conditionally compliant in 7 of the 15 NTIS metrics:

- Metric 1 - Tunnel Inspection Organization
- Metric 5 - Inspection Intervals (Damage, In-Depth and Special Inspections)
- Metric 6 - Inspection Procedures (Quality Inspections)
- Metric 7 - Inspection Procedures (Tunnel-Specific Inspection Procedures)
- Metric 8 - Inspection Procedures (Functional Systems Testing)
- Metric 12 - Inspection Procedures (Quality Control and Quality Assurance)
- Metric 13 - Inspection Procedures (Critical Findings)

At the time of this report, MnDOT is developing a new chapter of the BSIPM to address identified deficiencies, and this will be included in the next revision of the BSIPM (expected to be approved in spring 2021).

Bridge Inspection Requirements

At the time of this report, MnDOT owned 4,805 bridges. “Bridge” is defined as a structure, including supports erected over a depression or an obstruction, such as water, a highway or a railway, having a track or passageway for carrying traffic or other moving loads. Bridge is also defined as having an opening measured horizontally along the center of the roadway of 10 feet or more:

- between under copings of abutments
- along a culvert opening
- between the spring lines of arches, or
- between the extreme ends of openings for multiple boxes

Bridges also include multiple culverts or pipes where the clear distance between openings is less than one-half of the smaller contiguous opening and along with all the tunnels. This definition includes only those railroad and pedestrian bridges over a public highway or street.

The table below summarizes the required frequency of bridge inspections for MnDOT-owned bridges. Note that some MnDOT bridges are inspected by local agencies as defined by a partnership agreement. The assigned bridge inspection frequency varies based on different risk factors, such as design of structure and condition of the structure. New or rehabilitated bridges owned by MnDOT are initially assigned a 90-day inspection frequency as required by federal law.

Table 1: Required Frequency Inspections

Required Inspection Frequency [Months]	MnDOT-Owned Bridges to be Inspected Within Required Frequency
3	47*
12	192
24	3,887
48	679

**There are six new bridges inspected on an initial 90-day frequency and once inspected at the 90-day mark will then be put on a 24-month inspection cycle.*

In Minnesota, there are currently 78 fracture critical bridges open to vehicular traffic. A fracture critical bridge is defined by the FHWA as having at least one primary load-carrying steel member in tension, or with a tension element, whose failure would probably cause a portion of, or the entire bridge, to collapse. MnDOT inspects the majority of fracture critical bridges in the state for the different owners of these bridges.

Table 2: Fracture Critical Bridge Inspections Counts

Fracture Critical Bridge Inspections	Count
MnDOT Inspected and Owned	45
MnDOT Inspected – County Owned	12
MnDOT Inspected – City Owned	10
MnDOT Inspected – Department of Natural Resources Owned	5
MnDOT Inspected – Township Owned	3
Consultant Inspected – Railroad Owned	2
Consultant Inspected – Department of Administration Owned	1

MnDOT also administers contracts to perform underwater inspections for 222 MnDOT and 364 locally owned bridges. Underwater inspections involve an in-depth look at bridge components residing underwater and must be accessed with specialized scuba diving equipment. The state inspects these structures on a four-year cycle so the next inspection will occur in 2024.

In 2019, 25 critical findings for bridges were reported in Minnesota. In 2020, there were 10 (as of December 3, 2020). Critical findings are conditions that threaten public safety and, if not promptly corrected, could result in the collapse or partial collapse of a bridge. All critical findings were promptly documented, reported and resolved. Typical causes for critical findings include scour, deterioration, bridge hits from over-height vehicles and settlement. Table 3 below is a summary of the critical finding details for 2019 and 2020.

Table 3: Critical Finding Summary

Date	Bridge	Owner	Description
3/22/2019	91691	Township	Culvert roadway washout.
3/26/2019	L4818	Township	Steel culvert deformation.
4/8/2019	67501	County	Timber pile deterioration due to ice flow damage.
4/9/2019	9071	Metro	Impact damage.
4/23/2019	L1649	Township	Steel culvert deterioration
4/23/2019	932	Township	Slope erosion.
5/14/2019	L9402	Township	Pier timber pile failure.
5/21/2019	L9221	City	Partial collapse of culvert.
5/24/2019	74546	Private	Washout at north approach.
5/30/2019	3459	DNR	Gusset plate distortion.
6/28/2019	77J05	County	Soil cavity in roadway found during paving operations.
7/1/2019	55031	City	Scour at both abutments.
7/14/2019	5060	District 3	Washout under approach panel.
7/22/2019	37517	Township	Approach washout behind abutment.
8/2/2019	92532	County	Culvert wingwall washout.
8/5/2019	9420	Metro	Traffic impact.
8/5/2019	9892	Metro	Traffic impact.
8/27/2019	58813	D1	Impact damage.
9/12/2019	L7619	Railroad	Timber column deterioration.
9/30/2019	9779	Metro	Impact damage.
10/9/2019	L0072	County	Settlement west abutment.
10/23/2019	R0855	D4	Culvert distortion.
11/7/2019	22552	Township	Timber pier cap failure.
12/4/2019	L9057	County	Pier cap movement/settlement.
12/11/2019	3995	County	Load rating closure.
3/31/2020	L0736	Township	Pier wall advanced deterioration.
5/15/2020	27647	City	Elastomeric bearing movement.
5/28/2020	L9175	Township	Hole in road behind abutment.
7/8/2020	93199	County	Pier CIP shell section loss.
7/9/2020	L5981	Township	Steel culvert seam separation.
8/12/2020	L0030	County	Timber pile failure.

Date	Bridge	Owner	Description
9/11/2020	56527	County	Charred timber elements.
9/16/2020	L5391	City	Section loss floor beams and stringers.
9/28/2020	L9384	City	Steel culvert section loss and barrel distortion.
10/30/2020	L4982	Township	Hole in deck.

There are currently 125 MnDOT employees and 304 other (DNR, city, county, private, etc.) agency employees and consultants certified to perform bridge inspections. Certification requires either an engineering degree or five years of experience performing bridge inspections. Also required are two weeks of training in an FHWA approved course and successfully passing the Minnesota-designed field proficiency exam. Once certified, inspectors attend a one-day bridge inspection refresher seminar twice in a four-year period to maintain their certification.

MnDOT's Bridge Office presented inspection seminars at seven locations statewide in 2019. MnDOT was scheduled to provide this training at seven locations again in 2020, but COVID-19 restrictions resulted in the termination of the last two course offerings. In addition to these seminars, the Bridge Office coordinated the delivery of the National Highway Institute's comprehensive inspection classes in 2019 and again in 2020. These two-week classes are required in addition to the regular bridge certification courses to become certified as an inspection team leader.

In response to findings by the Legislative Auditor in 2008, MnDOT created new performance measures to document the timeliness of bridge inspections and follow-up maintenance actions. For the 2018 inspection season, 100 percent of all routine bridge inspections were completed on time. During the 2019 inspection season, 99 percent of all routine bridge inspections were performed on time. At the time of this report, inspection data is still being reported from inspectors, so it is not possible to report on-time inspections for 2020.

MnDOT's Bridge Office evaluated the bridge inspection programs of all Minnesota's inspection agencies in 2019 and 2020. Twenty percent of agencies received an in-depth review. The in-depth review includes several random bridge site visits, a more thorough review of the program, and a report with findings and improvement recommendations. In 2019, one local agency was determined to be out of compliance with the NBIS for failing to comply with inspection frequency requirements, quality standards and load posting signage. In 2020, two local agencies were found out of compliance for failing to meet inspection quality standards. Both of these local agencies submitted a plan of corrective action with steps to correct deficiencies and get back in compliance.

During these in-depth examinations, important findings from the local agency are reviewed with state and local bridge inspection staff who attended the annual bridge inspections seminars.

Additionally, each agency has access to MnDOT's website listing custom reports the agency can use to review the current status of its bridges. Even the agencies that did not have a full, formal program evaluation are asked to provide additional information and documentation concerning out-of-date bridge ratings, plans to monitor scour and late or incomplete inspections.

Bridge Inspection Quality Assurance & Quality Control Procedures

MnDOT's quality assurance and quality control procedures governing its statewide inspection program are described comprehensively in Chapter E of the [BSIPM](#).

Below is a summary of the major components of the program.

Quality Control Responsibilities

Within MnDOT, there is a bridge and tunnel inspection program manager. The specific responsibilities of MnDOT's bridge inspection program manager are described along with those responsibilities delegated to district and local agency program administrators and inspection team leaders.

Inspection Program Qualifications

MnDOT maintains a program to certify bridge inspectors as team leaders and approves the appointment of program administrators who meet the NBIS minimum experience and training requirements. Program administrators are required to be registered professional engineers. Inspection team leaders are required to be engineers, or have five years of bridge inspection experience, and have completed a FHWA approved two-week bridge inspector training course.

In addition, MnDOT certification requires inspection team leaders to pass a field proficiency test. All program administrators and team leaders are required to attend two days of refresher training every four years and must submit documentation that they have competently performed their duties and responsibilities. Failure to maintain qualifications can result in decertification or denial of appointment, making the person ineligible to perform bridge safety inspection activities.

At the time of this report, Minnesota's state and local bridge inspections are conducted by 211 different entities (MnDOT districts, counties, cities and other agencies). Within these agencies, there are 139 appointed program administrators and 302 active bridge inspection team leaders. Many program administrators serve dual roles for different agencies. It is not uncommon for the county engineer to also represent a city, or for one consultant to serve as a program administrator for many cities. Nor is it uncommon for a team leader to serve multiple inspection agencies.

Inspection Quality and Frequencies

MnDOT sets minimum requirements on the frequency of bridge inspections based on criteria established by the MnDOT Bridge Office. Generally, the higher risk structures are inspected on a 12-month cycle and the lower risk structures on a 24- or 48-month cycle. Higher risk structures are defined as having at least one component in 'Poor' condition or containing a fracture critical component. Lower risk structures are bridges that have all

components in ‘Fair’ or better condition. According to the NBIS, all new structures owned by the state need to be inspected within 90 days of the structure opening to traffic and 180 days for all other owners. Once the bridge receives the initial inspection, the bridge is set on a 24-month inspection cycle. If the structure meets the defined criteria, the new frequency is granted until the structure no longer meets the criteria, or the agency requests it to be changed.

Training

MnDOT offers several inspector training classes and seminars each year. An introductory, one-week class, “Engineering Concepts for Bridge Inspectors,” is required for new inspectors who do not meet the experience or education requirements for team leader. Prior to certification as a team leader, inspectors must take the two-week course entitled, “Safety Inspections of In-Service Bridges.” The course is taught by instructors from the National Highway Institute and is an FHWA-approved comprehensive bridge inspection training course. Other National Highway Institute courses on advanced topics are scheduled periodically.

Attendance for classes taught in 2019 and 2020 is shown below.

Table 4: 2019 and 2020 Attendance

Course	2019 Attendees	2020 Attendees
Safety Inspections of In-Service Bridges	15 MnDOT 9 Local 0 Federal 3 Consultants	12 MnDOT 8 Local 1 Federal 4 Consultants

In addition to these courses, MnDOT staff annually conducts refresher training seminars for program administrators and inspection team leaders. The seminars are held at various locations throughout the state. Topics typically include sharing best practices, a review of deficiencies found during inspection program quality reviews, FHWA compliance review findings, load rating issues and inspection manual updates. MnDOT conducted 12 training seminars around the state in 2019 and 2020 (two were cancelled due to COVID-19). There were 433 attendees in 2019 and 401 attendees in 2020.

All tunnel inspection team leaders and the program manager must be recertified every five years. In 2020, MnDOT hosted a recertification training for the three team leaders and program manager in addition to other regional attendees.

Compliance and Quality Reviews

FHWA performs an annual review of each state agency’s bridge and tunnel inspection program. The purpose of the review is to evaluate whether the state’s policies, procedures and operating practices meet the requirements of the NBIS and NTIS. The focus of the review varies from year to year, but typically includes a random assessment of inspector qualifications, timeliness of bridge inspections, quality of notes for the correct elements, load ratings and fracture critical and bridge scour documents.

Similarly, MnDOT reviews the bridge inspection programs of all 211 Minnesota agencies each year. A series of database queries is used to estimate the level of compliance with the NBIS for each of the agencies. In-depth review is usually recommended when there is a poor-performing agency or for an agency that has not been reviewed for five years.

The in-depth review involves a meeting with the bridge inspection program administrator and a field review with the bridge inspection team leader(s). Agencies selected for the in-depth review and the agencies reviewed solely by database queries are sent a report of their compliance for the year. MnDOT then annually follows up with each agency to ensure action. Additional information regarding this practice is detailed in [Summary of Findings from Bridge Inspection Quality Assurance Reviews](#) of this document.

A new chapter of the BSIPM is being developed for tunnels, including a section to describe the process for compliance and quality reviews.

Changes to Quality Assurance & Quality Control Procedures

Most of the quality control and quality assurance processes used by MnDOT were not modified in the past two years. Substantive recent changes are described in this section.

Bridge Office Monitoring of Inspection Timelines

Since the federal requirement allows locally owned structures 180 days to update their inspection data in the state inventory, it limits MnDOT's ability to effectively monitor if inspection frequencies are being met. For example, if a bridge is due for inspection in May, the agency has until November to fill out an inspection report. By electronic records review, MnDOT has no idea if the inspection has been completed but not entered or not inspected at all.

MnDOT has corrected this issue for Metric 6 by invoking two changes:

1. Authored a new policy requiring Minnesota inspection agencies to start an electronic report in the Structure Information Management System within 3 months of the inspection due date.
2. Authored software to monitor the inspection database and email agencies who fail to meet this requirement. This starts a correspondence to ensure that the bridge was inspected, and if not inspected, allows an agency to correct the issue before the deadline is beyond tolerances.

Inspection Equipment

The 2009 NBIS changes increased the frequency of fracture critical bridge inspections. The increased frequency and number of inspections required the purchase of additional inspection equipment. Prior to 2007, MnDOT operated four under-bridge inspection vehicles. Since then, additional UBIVs were purchased to accommodate the more frequent inspection mandate. The fracture critical bridge inspection fleet currently consists of the equipment listed in Table 5.

Table 5: Current Bridge Inspection Assets and Status

Vehicle	Reach	Purchased	Comments	Location
UB75	75 feet	2000	Complete factory rebuild in 2012.	Oakdale
UB30	30 feet	2000	Complete factory rebuild in 2014.	Oakdale
UB62	62 feet	2008		Carlton
UB62	62 feet	2011		Rochester
UB62	62 feet	2012		Bemidji
Moog	15 feet	2009	Lighter weight platform for posted bridges.	Oakdale
UB62	62 feet	2017	Specialized to access bridges with a wide sidewalk.	St. Cloud

In addition, the Bridge Office, most districts, some local agencies and several consultants have purchased drones to help inspection access. The drones will be used extensively in the 2021 inspection season for better quality and worker safety.

Summary of Findings from Bridge Inspection Quality Assurance Reviews

MnDOT's Bridge Office each year conducts National Bridge Inspection Standards quality assurance reviews of local agency inspection programs. A new process for evaluating agencies began in 2012. The review now aims to mirror the FHWA metric evaluation of Minnesota and apply the same appraisal to local agencies using the FHWA [Metrics for the Oversight of the National Bridge Inspection Program](#) manual. The review annually assesses a compliance level for all agencies statewide based on eight of the 23 metrics using a series of database queries. Listed below are the eight metrics assessed with this method.

- #2: Qualifications of personnel – Program Administrator
- #3: Qualifications of personnel – Team Leader(s)
- #6: Routine inspection frequency – Lower risk bridges
- #7: Routine inspection frequency – Higher risk bridges
- #12: Inspection procedures – Quality Inspections
- #13: Inspection procedures – Load Rating
- #14: Inspection procedures – Post or Restrict
- #23: Inventory – Timely Updating of Data

In-depth reviews are scheduled with agencies every year. Agencies are selected for an in-depth review based on poor performance with the eight metrics or because the agency has not had an in-depth review in the past five years. In-depth reviews incorporate the assessment of five additional metrics. These reviews require a field review and an office meeting with agency personnel. Listed below are the five additional metrics assessed during an in-depth review.

- #15: Inspection procedures – Bridge Files
- #17: Inspection procedures – Underwater
- #18: Inspection procedures – Scour Critical Bridges
- #21: Inspection procedures – Critical Findings
- #22: Inventory – Prepare and Maintain

In 2019 and 2020, in-depth reviews were performed for the agencies and organizations listed in Table 6.

Table 6: 2019-2020 Locations of In-Depth Reviews

State Agencies	Counties	Cities	Other Bridge Owners
MN Dept of Administration	Aitkin County	City of Anoka	Metropolitan Airports Commission
MN Dept of Natural Resources	Benton County	City of Arden Hills	Metro Transit (LRT)
MnDOT Metro District	Carlton County	City of Brooklyn Center	Minnesota Ballpark Authority
MnDOT District 1	City of Alexandria	City of Brooklyn Park	Minnesota Dakota & Western RR
MnDOT District 3	Crow Wing County	City of Cambridge	
	Dakota County	City of Champlin	
	Faribault County	City of Chaska	
	Goodhue County	City of Cloquet	
	Grant County	City of Duluth	
	Isanti County	City of East Bethel	
	Itasca County	City of Eden Prairie	
	Kanabec County	City of Elk River	
	Koochiching County	City of Forest Lake	
	Lac Qui Parle County	City of Hugo	
	Lake County	City of Inver Grove Heights	
	Martin County	City of Lake Elmo	
	Mille Lacs County	City of Mendota Heights	
	Mower County	City of Minneapolis	
	Norman County	City of Minnetonka	
	Pine County	City of Moorhead	
	Redwood County	City of Morris	
	Roseau County	City of New Brighton	
	Saint Louis County	City of North Branch	
	Sherburne County	City of North Oaks	
	St. Louis County	City of Northfield	
	Stearns County	City of Roseville	
	Steele County	City of Saint Paul	
	Swift County	City of Shakopee	
	Wadena County	City of Shorewood	
	Wilkin County	City of St. Anthony	
	Wright County	City of St. Paul Park	
		City of Victoria	
		City of Virginia	
		City of Waconia	
		City of Wayzata	
		City of Woodbury	
		City of Wyoming	

Actions Responding to Findings from Bridge Inspection Quality Assurance Reviews

Quality Assurance Review Findings and Follow-up

MnDOT's Bridge Office follows up on quality assurance review findings by sending a letter to each agency to notify it of areas where improvement is needed. Agencies falling out of compliance are subject to additional review and may need to provide a Plan of Corrective Action. MnDOT's State Aid Division may withhold funding from agencies that are repeatedly out of compliance with NBIS rules or with the AASHTO Manual for Bridge Evaluation. In addition to notifying agencies about their specific levels of compliance with the NBIS, the letters list the individual performance for each metric and the data that was used to compute the compliance level. This allows the agency to see which areas need improvement and offers an opportunity to check the data for accuracy. Agencies selected for the in-depth review were generally receptive to the findings about areas needing improvement and indicated they will take steps to do so. Agencies that do not adequately improve by the next cycle may be selected again for another in-depth review and then may be required to provide a PCA to ensure improvement of the program.

Findings Discussed at Bridge Inspection Seminars

Since each agency receives an in-depth review roughly once every five years, it is important MnDOT develop other methods to more frequently communicate some of the more common problems found during agency reviews. MnDOT uses the annual bridge inspection seminars for that purpose. Agendas for the seminars are designed to address the common deficiencies found during agency reviews.

National Bridge and Tunnel Inspection Program Review

The 2019-2020 program assesses metrics, or focus areas, derived from the Code of Federal Regulations specific to the NBIS and NTIS. Each of the metrics is cyclically reviewed by the FHWA on an intermediate or in-depth level, and if the state is not operating to a defined level of expected performance, an agreement (either called an Improvement Plan or Plan of Corrective Action) between FHWA and MnDOT is put into place.

If the state then operates under the agreement, the state will be considered in conditional compliance until the terms of the agreement expire. For the NBIS, Minnesota is currently in full compliance with 22 of the 23 metrics and conditional compliance for one metric:

NBIS Metric 13 – Load Ratings

On November 3, 2016, the Federal Highway Administration (FHWA) issued a memorandum on Load Rating for the FAST Act's Emergency Vehicles. Minnesota has been working on implementing FHWA memorandum to all bridges (non-culverts) since 2017. However, the evaluation of the culverts on the Interstate System and within 1 road mile boundary of the Interstate System will not be

completed in time, and an agreement is necessary to work out an extended timeline to meet the requirements of the FAST Act.

For the NTIS, Minnesota is currently in full compliance with 8 of the 15 metrics and in conditional compliance for 7 metrics:

NTIS Metric 1 – Tunnel Inspection Organization

This assignment was made because Minnesota does not have a document defining the policies and procedures for the inspection of tunnels in Minnesota.

NTIS Metric 5 – Inspection Intervals (Damage, In-Depth and Special Inspections)

This determination was made because Minnesota does not have a document defining the level of inspection and frequency for these three inspection types.

NTIS Metric 6 – Inspection Procedures (Quality Inspections)

This determination was made because MnDOT did not have enough tunnel inspectors and did not have enough access equipment during some of the 2019 NTIS inspections.

NTIS Metric 7 – Inspection Procedures (Tunnel-Specific Inspection Procedures)

This determination was made because Minnesota has not yet developed tunnel-specific inspection procedures.

NTIS Metric 8 – Inspection Procedures (Functional Systems Testing)

This determination was made because Minnesota has not yet developed procedures for the testing of specific tunnel functional systems.

NTIS Metric 12 – Inspection Procedures - QC/QA

This determination was made because Minnesota has not yet created a developed quality control and quality assurance procedures for NTIS tunnel inspections.

NTIS Metric 13 – Inspection Procedures - Critical Findings

This determination was made because Minnesota has not yet developed a policy for the reporting and response to critical findings discovered during NTIS inspections.

Response to FHWA Compliance Review Findings

The following is a summary of MnDOT responses corresponding to each of the compliance reviews listed in the previous section, which were created after the FHWA reviews. MnDOT has formulated written plans to address the deficiencies in its inspection program as highlighted by these metric assessments.

Annual National Bridge Inspection Standards Compliance Review

No follow-up action was needed by MnDOT for any of the 30 metrics (22 on NBIS, 8 on NTIS) that are currently in full compliance. MnDOT developed agreements with the FHWA to address the issues with the eight (1 NBIS, 7 NTIS) conditionally compliant metrics:

NBIS Metric 13: Load Rating – estimated completion date June 2022

Action Item 1: MnDOT will load rate the culverts on the Interstate (or within a reasonable access distance of the Interstate) for EV2/EV3 emergency vehicles.

Action Item 2: MnDOT will update FHWA with progress on this initiative quarterly. The quarterly report will include the number of culverts to be rated, number of culverts completed to date, and load rating results.

NTIS Metric 1: Tunnel Inspection Organization – estimated completion date March 2021

Action Item 1: MnDOT will author a new tunnel chapter in the Minnesota Bridge and Structures Inspection Program Manual specifically addressing tunnels. The chapter will have the following:

- a. Responsibility for the NTIS will be assigned to a qualified program manager.
- b. Additional NTIS organizational roles and responsibilities will be apportioned.
- c. Delegated functions will be clearly defined with the necessary authority established.
- d. A registry of nationally certified tunnel inspectors that work in the State will be up-to-date and comprehensive.
- e. Critical finding policies and procedures.

Action Item 2: MnDOT will apply the current bridge Critical Finding procedures on tunnels until 1e) of this PCA is complete.

Action Item 3: MnDOT will update the FHWA quarterly.

NTIS Metric 5: Inspection Intervals – estimated completion date June 2021

Action Item 1: Minnesota DOT will author a new tunnel chapter in the Minnesota Bridge and Structures Inspection Program Manual specifically addressing tunnels.

- a. Section 3.3.3 will define damage inspections of NTIS tunnels.
- b. Section 3.3.4 will define in-depth inspections of NTIS tunnels.
- c. Section 3.3.5 will define special inspections of NTIS tunnels.

NTIS Metric 6: Quality Inspections – estimated completion date July 2023

Action Item 1: MnDOT will identify which functional systems must be inspected in accordance with the Tunnel Operations, Maintenance, Inspection, and Evaluation Manual and the NTIS.

Action Item 2: MnDOT will document inspection procedures for tunnel functional systems and train our inspectors to follow these procedures.

Action Item 3: MnDOT will document inspection procedures for tunnel functional systems by July 1, 2023.

NTIS Metric 7: Tunnel-Specific Inspection Procedures – estimated completion date July 2023

Action Item 1: Owners will develop detailed inspection procedures for each NTIS tunnel by July 1, 2023.

NTIS Metric 8: Functional Systems Testing – estimated completion date July 2023

Action Item 1: Owners will identify which functional systems require testing and develop testing procedures for those specific tunnel functional systems for each NTIS tunnel by July 1, 2023.

Action Item 2: Owners will develop detailed inspection procedures for each NTIS tunnel by July 1, 2023.

NTIS Metric 12: Quality Control & Quality Assurance – estimated completion date June 2023

Action Item 1: MnDOT will develop a quality control and quality assurance process for NTIS tunnel inspections as part of the new tunnel chapter in the BSIPM. MnDOT will publish the NTIS Tunnel Chapter by June 31, 2021.

NTIS Metric 13: Critical Findings – estimated completion date June 2021

Action Item 1: MnDOT will define Critical Findings and outline the response, documentation, and reporting procedures. in the new tunnel chapter in the Minnesota Bridge and Structures Inspection Program Manual. MnDOT will publish the NTIS Tunnel Chapter by June 31, 2021.

Appendix A: List of Acronyms

AASHTO: American Association of State Highway and Transportation Officials

BII: Bridge Inventory Inspection database used for reporting and compliance assessments

BrM: AASHTO-developed bridge management system; SIMS feeds data to BrM

BSIPM: Bridge and Structure Inspection Program Manual

CFR: Code of Federal Regulations

FC: Fracture Critical. This is a type of special bridge inspection for non-load path redundant structures

FHWA: Federal Highway Administration

MnDOT: Minnesota Department of Transportation

NBIS: National Bridge Inspection Standards

NTIS: National Tunnel Inspection Standards

PA: Pinned Assembly-type of bridge design detail that requires a specialized equipment/inspection

PCA: Plan of Corrective Action

QA: Quality assurance

QC: Quality control

SHV: Specialized Hauling Vehicle

SIMS: Structure Information Management System

UBIV: Under Bridge Inspection Vehicle

UW: Underwater. This is a type of special bridge inspection that requires dive equipment for bridges in deep water.