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6.1 INSPECTION PROGRAM OVERVIEW

6.1.1 Introduction

It is important for the safety of the driving public that qualified personnel inspect Wisconsin's Tunnels. The Tunnel Team Leader and other tunnel personnel are required to render judgment on a regular basis pertaining to the safety and integrity of the structures inspected.

The individuals involved in the Wisconsin Tunnel Inspection Program (WisTIP) have critical input on many issues, including the allocation of scarce and limited rehabilitation funds and the decision to close tunnels. It is important that the Tunnel Team Leader and Inspectors are highly trained and proficient; he/she must understand the mechanics, behavior trends, and economics of a wide range of Tunnel types.

The mission of the program is as noted below:

1. Ensure public safety.
2. Provide for the efficient use of resources in maintaining the serviceability of Wisconsin's tunnels.
3. Comply with all federal and state laws, rules, and policies.
4. The State is given the responsibility to accurately inventory, inspect or cause to inspect all highway tunnels on public roads.
5. If a tunnel is not assigned to be inspected by the state inspectors, then the failure of a county or city to perform these responsibilities may cause a loss of Federal funding. The State shall have the authority to take the appropriate action to assure tunnel safety. These assurances will include that the tunnel has been inspected at the proper frequency, that if necessary, the tunnel is posted, and that the posting is done in a timely manner. The State shall have the authority to close unsafe tunnels.

6.1.2 Inspection Program

The Wisconsin Tunnel Inspection Program (WisTIP) is federally mandated and was formalized in 2021. The program policies are based on the National Tunnel Inspection Standards (NTIS), the Specifications for National Tunnel Inventory (SNTI), and the Tunnel Operations, Maintenance, Inspection, and Evaluation (TOMIE) Manual. Tunnel inspection reports and records are stored in the Tunnel Inventory Database.

The National Tunnel Inventory XML file is developed and forwarded to the FHWA on an annual basis.

NTIS define a tunnel as:

“an enclosed roadway for motor vehicular traffic with vehicle access limited to portals, regardless of type of structure or method of construction. Tunnels do not include bridges or culverts inspected under the National Bridge Inspection Standards (23 CFR 650- Subpart C- National Bridge Inspection Standards). Tunnels are structures that require, based on owner’s determination, special design considerations that may include lighting, ventilation, fire protection systems, and emergency egress capacity.”



This definition is consistent with the definition used by the American Association of State Highway and Transportation Officials (AASHTO). This manual will address all highway tunnels that meet this definition.

6.1.3 Organization

The State Program Manager (SPM) is charged with administrating the WisTIP. The Assistant State Program Managers (ASPM), Regional Program Manager (RPM), Tunnel Team Leaders (TTL), and Tunnel Team Members (TTM) report to the SPM. The SPM, ASPM, RPM and TTL are required to be certified Tunnel Inspectors.

The organization of the Tunnel Program is shown in Figure 1.1 and described in detail later in this section.

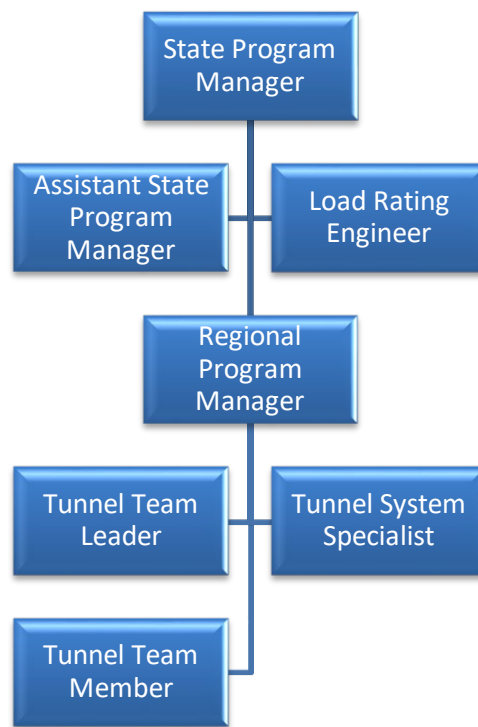


Figure 1.1 Organizational Structure

6.1.4 Qualifications and Responsibilities

Below are listed the qualifications required for the tunnel inspection positions and categories. The Qualifications Record Form for Structural Inspection Program (DT2001) must be submitted to the SPM for each of the tunnel inspection positions. Qualifications have been determined for the following tunnel positions:

- 1) State Program Manager (SPM)
- 2) Assistant State Program Manager (ASPM)
- 3) Regional Program Manager (RPM)



- 4) Tunnel Team Leader (TTL)
- 5) Tunnel Team Member (TTM)
- 6) Load Rating Engineer (LRE)
- 7) Tunnel System Specialists (TSS)

For more information, refer to Section 4.4 of the TOMIE manual.

All certified Tunnel Inspectors in the state of Wisconsin must have their credentials on file with the Wisconsin Department of Transportation's Bureau of Structures.

6.1.4.1 State Program Manager (SPM)

The SPM is responsible for setting all tunnel inspection policies and procedures, and for all tunnel inspections and related reporting in the state.

SPM Minimum Qualifications

The SPM must meet the following minimum qualifications:

- 1. Capable of overseeing the Tunnel Team Leaders (TTL) in Wisconsin, and other assigned Tunnel personnel.
- 2. Sound background in tunnel inspection and/ or bridge inspection.
- 3. Specialized knowledge and skills in bridge or tunnel design, construction, soils, construction materials, or emergency repair techniques.
- 4. Successful completion of Tunnel Safety Inspection (FHWA-NHI-130110) course.
- 5. Registered Professional Engineer (PE) in the state of Wisconsin.

OR

Has a minimum of 10 years of experience in either bridge and/or tunnel inspections.

- 6. Complete a cumulative of 18 hours of approved tunnel inspection refresher training over each 60 months period.
- 7. Be a nationally certified tunnel inspector (NCTI).

SPM Responsibilities

As a part of the responsibilities of this position, the SPM shall:

- 1. Establish statewide policies for NTIS tunnels.
- 2. Oversee the WisDOT or consultant Tunnel Team Leaders (TTLs).
- 3. Manage the statewide tunnel inspection and inventory programs.
- 4. Ensure all tunnels in the state are inspected at a frequency and by a method consistent with the NTIS.
- 5. Ensure that tunnel inspection data is uploaded to the NTI within mandated time frames.



6. Ensure load ratings are completed in accordance with all federal requirements under the direct supervision of a registered professional engineer.
7. Oversee quality assurance and quality control of all tunnel inspection programs.
8. Coordinate with federal, state, county, and local governmental agencies.
9. Formulate and monitor unique or special features requiring additional attention during inspection to assure the safety of such structures.
10. Notify FHWA of all critical findings based on requirements within this manual within 24 hours of finding.
11. Ensure proper signage is in place for tunnels that require load posting or other restrictions, and ensuring load posting signage is in place no later than 30 days after completion of a valid load rating or notification of missing or improper signage following an inspection.
12. Formulate and administer programs and policies.
13. Develop, implement, and evaluate inspection and preservation policies, standards, procedures, and programs.
14. Lead prompt, decisive, and effective responses to emergencies such as floods, earthquakes, and major tunnel damage.
15. Train tunnel inspection personnel when needed.
16. Develop, monitor, and update training programs for state and consultant inspectors.
17. Arrange or conduct inspection training programs and refresher programs as necessary.
18. Provide training on proper access, equipment operation, and safety procedures.
19. Review and approve all qualifications for ASPM, RPM, TSS, TTL, LRE, and TTM.
20. Maintain a list of all qualified Tunnel Team Leaders. The list will identify training required to keep the qualifications up to date.
21. Evaluate Tunnel Team Leaders and other tunnel personnel that require additional training as necessary.
22. Maintain their own documentation for national certification.
23. Be able to determine when Tunnel Team Leaders must meet additional requirements for complex or other tunnels.
24. Provide advice on technical issues concerning problems or deficiencies discovered during inspections.
25. Act as a Tunnel Team Leader, as needed.
26. Monitor inspections and develop a good, general knowledge of all tunnels in the state and their inspection records.
27. Manage state tunnel inspection personnel and consultants to meet the needs of the State Tunnel Inspection Program.
28. Manage state-owned tunnel access equipment to assist in the inspection of tunnels statewide.



6.1.4.2 Assistant State Program Manager (ASPM)

The ASPM is responsible for assisting the SPM and to help ensure that National Tunnel Inventory (NTI) Data is being collected in a timely manner and stored in the Tunnel Inspection Database properly and reported to the FHWA as required.

ASPM Minimum Qualifications

The ASPM must meet the following minimum qualifications:

1. Capable of overseeing the Tunnel Team Leaders (TTL) in Wisconsin, and other assigned Tunnel personnel.
2. Be a nationally certified tunnel inspector (NCTI)
3. Sound background in tunnel inspection and/ or bridge inspection.
4. Specialized knowledge and skills in bridge or tunnel design, construction, soils, construction materials, or emergency repair techniques.
5. Successful completion of Tunnel Safety Inspection (FHWA-NHI-130110) course.
6. Registered Professional Engineer (PE) in the state of Wisconsin.
7. Has a minimum of 5 years of experience in either bridge and/or tunnel inspections.
8. Complete a cumulative of 18 hours of approved tunnel inspection refresher training over each 60 months period.

ASPM Responsibilities

The ASPM serves as the assistant to the SPM. He/she has functions delegated by the SPM and is responsible for carrying out those functions.

6.1.4.3 Regional Program Manager (RPM)

The RPM is responsible for assisting the SPM and ASPM and to help ensure that National Tunnel Inventory (NTI) Data is being collected in a timely manner and stored in the Tunnel Inspection Database properly and reported to the FHWA as required.

RPM Minimum Qualifications

The RPM must meet the following minimum qualifications:

1. Capable of overseeing the Tunnel Team Leaders (TTL) in Wisconsin, and other assigned Tunnel personnel.
2. Sound background in tunnel inspection and/ or bridge inspection.
3. Specialized knowledge and skills in bridge or tunnel design, construction, soils, construction materials, or emergency repair techniques.



4. Successful completion of Tunnel Safety Inspection (FHWA-NHI-130110) course.
5. Registered Professional Engineer (PE) in the state of Wisconsin.
6. Has a minimum of 5 years of experience in either bridge and/or tunnel inspections.
7. Complete a cumulative of 18 hours of approved tunnel inspection refresher training over each 60 months period.
8. Be a nationally certified tunnel inspector (NCTI).

RPM Responsibilities

The RPM serves as the assistant to the SPM and ASPM. He/she has functions delegated by the SPM and/or ASPM and is responsible for carrying out those functions.

6.1.4.4 Tunnel Team Leader (TTL)

The TTL is responsible for the tunnel inspection and reporting for all assigned tunnels. In addition, TTL is responsible for ensuring the tunnel inspection work is filed properly and has ensured that ASPM and RPM has received such documentation. Consultant TTL may inspect any local or county tunnels when assigned by local or county government.

Tunnel Team Leader (TTL) Minimum Qualifications

The TTL must meet the following qualifications:

1. Successful completion of Tunnel Safety Inspection (FHWA-NHI-130110) course.
2. Be a nationally certified tunnel inspector (NCTI).
3. Complete a cumulative total of 18 hours of FHWA-approved tunnel inspection refresher training over each 60-month period.
4. Capable of overseeing Tunnel Team Members (TTM).
5. Demonstrate a strong background in such areas as bridge or tunnel structural engineering, structural behavior trends and bridge or tunnel rehabilitation techniques.
6. Demonstrate thorough familiarity with NTIS, this manual and applicable WisDOT guidelines.
7. In addition to the above qualifications, all TTL's must meet qualifications in 23 CFR 650, Part E.
8. Good eyesight and the ability to walk and climb over uneven surfaces. In addition, be comfortable working at heights, near water, in confined spaces and close to live traffic.

Tunnel Team Leader (TTL) Responsibilities

As a part of the responsibilities of this position, the TTL shall:

1. Coordinate inspections to ensure that all inspections are completed in compliance with this manual and the TOMIE, including team leader being on-site during the inspection process.



2. Oversee TTMs.
3. Ensure that all tunnel inspection results are approved and sent to the SPM or ASPM and RPM within 60 days of the date of the inspection and within seven days for all closures and emergency inspections.
4. Notify the SPM and ASPM of all tunnel critical findings in accordance with this manual.
5. Maintain their own documentation for national certification.

6.1.4.5 Tunnel Team Member (TTM)

The Tunnel Team Member (TTM) is the person responsible for assisting the Tunnel Team Leader (TTL). Preferably, the tunnel inspection team should consist of at least two persons: a TTL and an TTM or two TTL(s). When deemed appropriate by the SPM, ASPM, or RPM other tunnel specialty personnel may be required.

Tunnel Team Member (TTM) Minimum Qualifications

The TTM must meet the following qualifications:

1. Be responsible in assisting in the field work and be on site during the inspection.
2. Demonstrate a strong background in such areas as bridge or tunnel structural engineering, structural behavior trends, and bridge or tunnel rehabilitation techniques.
3. Good eyesight, the ability to walk and climb over uneven surfaces, and the ability to work at heights, near water, in confined spaces, and close to live traffic.
4. Recommended that TTM are registered and nationally certified tunnel Inspectors; however, this is not a mandatory requirement.

Tunnel Team Member Responsibilities

The Tunnel Team Member is responsible for the following:

1. Following all Tunnel Team Leader (TTL) instructions in a safe and appropriate manner.
2. Assisting the TTL in the field.
3. Documenting his/her participation and experience.

6.1.4.6 Load Rating Engineer (LRE)

Routine load ratings of state-owned tunnels are generally performed and maintained by WISDOT's Load Rating Engineer in the Bureau of Structures – Development Section.

Locally owned structures shall provide their own load rating engineer, when necessary, to perform calculations related to capacity.

LRE Minimum Qualifications



The LRE must meet the qualifications listed below:

1. Have experience calculating load ratings for bridge structures and tunnels and knowledge of load capacity rating computer programs.
2. Registered PE licensed in the state of Wisconsin, qualified to oversee, review and certify all load capacity ratings performed under his/her supervision.

LRE Responsibilities

The LRE must:

1. Provide engineering judgment to those performing the load ratings.
2. Be actively involved in reviewing the quality and accuracy of all tunnel load ratings.

6.1.4.7 Tunnel System Specialists (TSS)

Tunnels may include several functional systems (mechanical, electrical, lighting, fire detection, etc.) that require personnel with specialized skills to inspect, test and maintain.

The specific qualifications required for tunnel system specialists will vary based upon the type of functional system and should be detailed in the tunnel-specific inspection procedures documentation. It should be noted that these personnel require very specific certifications to perform their inspection work: For more information, refer to Sections 4.4.3 and 4.4.4 of the TOMIE manual. These personnel are not required to be nationally certified tunnel inspectors.

Tunnel System Specialists Minimum Qualifications

When complex civil/structural, mechanical, or electrical systems need to be inspected, the tunnel team leader should assign tunnel specific specialists (TSS) with suitable training, qualifications, and experience to help conduct these inspections and these criteria should be addressed in the tunnel specific procedures.

TSS are beneficial when the regular inspection staff lacks the specialized skills and experience necessary to inspect sophisticated equipment or complex systems such as power distribution systems, fire protection and detection systems, and security systems. It is advisable to use qualified specialty contractors when inspecting complex units that pose elevated risks to safety such as boiler units, electrical systems, or energized equipment like transformers. This may help to minimize health and safety risks to the inspection crew and prevent damage to very expensive equipment.

Tunnel System Specialists Responsibilities

The TSS are responsible for the following:

1. Following all Tunnel Team Leader (TTL) instructions in a safe and appropriate manner.
2. Assisting the TTL in the field.



3. Documenting his/her participation and experience.
4. Adhere to the assigned TSS specific duties in Sections 4.4.3 and 4.4.4 of the TOMIE manual.

6.1.5 Tunnel Inventory Database

As the Lead Agency in interactions with FHWA, it is WISDOT's responsibility to maintain an inventory of all tunnels within Wisconsin. All tunnel data shall be electronically stored on the Department online file storage system in a location designated by the SPM.

Data Included in Database:

1. Inventory Information required by the NTIS and SNTI (incorporated by reference)
2. Field inspection information including sketches and photographs showing typical and deteriorated conditions, entered within 3 months after completion of work.
3. Data for tunnel modifications and new tunnels entered within 3 months after completion of work.
4. Data for tunnel load restrictions and closures entered within 3 months after completion of work.
5. Tunnel Files.
6. Critical Findings in accordance with this manual
7. Tunnel Specific Inspection Procedures
8. Load Rating Information
9. Posting Documentation
10. Inspection reports including conditions of each structural and functional system component
11. Maintenance and repair records
12. Photos, diagrams, and sketches.
13. Functional System Testing Logs.
14. Plans and as-builts.