



**Washington State
Department of Transportation**

Transportation Structures Preservation Manual

M 23-11

December 2018

Bridge & Structures
Bridge Administration Section

Americans with Disabilities Act (ADA) Information

English

Title VI Notice to Public It is the Washington State Department of Transportation's (WSDOT) policy to assure that no person shall, on the grounds of race, color, national origin or sex, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against under any of its federally funded programs and activities. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equal Opportunity (OEO). For additional information regarding Title VI complaint procedures and/or information regarding our non-discrimination obligations, please contact OEO's Title VI Coordinator at 360-705-7090.

Americans with Disabilities Act (ADA) Information This material can be made available in an alternate format by emailing the Office of Equal Opportunity at wsdotada@wsdot.wa.gov or by calling toll free, 855-362-4ADA(4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.

Spanish

Notificación de Título VI al Público Es la póliza de el Departamento de Transportes del Estado de Washington de asegurar que ninguna persona sea excluida de participación o sea negado los beneficios, o sea discriminado bajo cualquiera de sus programas y actividades financiado con fondos federales sobre la base de raza, color, origen nacional o sexo, como proveído por el Título VI de el Acto de Derechos Civiles de 1964. Cualquier persona que cree que sus protecciones de Título VI han sido violadas, puede hacer una queja con la Oficina de Igualdad de Oportunidades (OEO). Para información adicional con respecto a procedimientos de quejas de Título VI y/o información con respecto a nuestras obligaciones sin discriminación, por favor de comunicarse con el Coordinador de Título VI de la Oficina de Igualdad de Oportunidades (OEO) 360-705-7090.

Información del Acta Americans with Disabilities Act (ADA)

Este material es disponible en un formato alternative. Envíe su petición por correo electrónico al equipo de Oficina de Igualdad de Oportunidades (OEO) en wsdotada@wsdot.wa.gov o llamando gratis, 855-362-4ADA (4232). Personas sordas o con problemas de audición pueden solicitar llamando el relé de estado de Washington al 711. For public events (like Open Houses, etc) English Accommodation requests for people with disabilities can be made by contacting the WSDOT Diversity/ADA Affairs team at wsdotada@wsdot.wa.gov or by calling toll-free, 855-362-4ADA (4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711. Spanish Solicitudes de alojamiento para personas con discapacidad pueden hacer comunicándose con el equipo de Asuntos de diversidad/ADA WSDOT en wsdotada@wsdot.wa.gov o llamando al número gratuito, 855-362-4ADA (4232). Personas sordas o con problemas de audición pueden solicitar llamando el relé del estado de Washington al 711.

To get the latest information on WSDOT publications, sign up for individual email updates at www.wsdot.wa.gov/publications/manuals.

Foreword

The department strives for public safety and preservation of its transportation structures by:

- A. Maintaining a program of inspections to ensure the structural integrity of all transportation structures. (Where applicable, the National Bridge Inspection Program (NBIP), National Bridge Inspection Standards (NBIS), and National Tunnel Inspection Standards (NTIS) are followed.) This program includes:
 - 1. Structural inspections on all bridges, tunnels ferry terminals, and sign bridges performed by licensed civil engineers.
 - 2. Special emphasis on ongoing inspection and maintenance of all floating, movable, suspension, and cable stayed bridges.
- B. Performing maintenance inspections on all transportation structures.
- C. Performing preventive and corrective maintenance when required.
- D. Performing rehabilitation or replacement work when needed.
- E. Support region maintenance with specialty engineering in Bailey bridge construction and heat straightening of damaged steel bridges.

The purpose of this document is to assign responsibilities for the inventory, inspection, rating, maintenance, and damage repair of the department's transportation structures and for the analysis of their structural capacity to carry loads. Guidance for the department's responsibilities in the inventory and inspection of local agency-owned bridges; and cooperative inspection, rating and maintenance of bridges between Washington and other states or agencies is also included.

This manual supersedes and replaces the directive D 23-11 *Bridge Inspection Structural Capacity, Rating and Maintenance*, dated May 6, 1980.

Harvey Coffman
Bridge Preservation Engineer

Contents

Foreword 3

Responsibilities..... 5

Rules 10

Appendix 1 Glossary..... 15

Appendix 2 References..... 19

Appendix 3 Bridge Inspection and Maintenance Agreements 22

Appendix 4 WSDOT Movable Bridges 23

Appendix 5 WSDOT Tunnels 24

Appendix 6 Floating Bridge Random Inspections..... 25

Responsibilities

A. Assistant Secretary for Multimodal Development and Delivery with further assignment/delegation as follows:

- Delegates Program Manager authority to the Bridge Preservation Engineer for the statewide bridge inspection program per 23 [CFR Part 650](#) Bridge and Structures, subpart 'C' NBIS and subpart 'E' NTIS.
- Delegates authority for the load restriction and posting of bridges.

1. Bridge and Structures Engineer

- a. Exercises staff responsibility for the technical engineering aspects of inspection, maintenance, and repair of the department's transportation structures except for geotechnical aspects of tunnels, and major culvert inspection, maintenance and repair.
- b. Maintains an inventory of all transportation structures on the department's and local agency public roads in Washington.
- c. Publishes a listing of all the department's bridges, tunnels and ferry terminals every two years in [Bridge List Manual](#) M 23-09.
- d. Maintains a historical file of all the department's bridges, tunnels and ferry terminals.
- e. Performs structural inspections of all bridges, tunnels, and ferry terminals on the department's transportation system, as required by the National Bridge Inspection Standards and the National Tunnel Inspection Standards. These inspections are intended to verify structural integrity, identify the need for corrective maintenance, and identify the need for reconstruction or replacement.
- f. Provides routine nondestructive testing services on mechanical components of movable bridges for the region and assists the region in arranging for any outside nondestructive testing required by structure age and operating conditions. See National Bridge Inspection Standards (NBIS), National Tunnel Inspection Standards (NTIS), AASHTO Manual for Bridge Evaluation.
- g. Performs in-depth mechanical and electrical inspections on a maximum six-year interval or as system age and operating conditions require.
- h. Provides recommended repair lists based on structural, mechanical, and electrical inspections. See WSDOT Bridge and Structures website "BEIS" webpage.
- i. Develops and maintains operations, inspection and maintenance manuals for movable bridges and tunnels. See [Appendix 4](#) and 5.
- j. Monitors preventive maintenance activities to ensure compliance with established procedures and schedules.

- k. Provides technical assistance to the region during abnormal conditions or operations.
 - l. Assists the region in preparing contract PS&E for bridge repairs and renovations.
 - m. Performs random inspections on floating bridges to verify water tightness of the bridge pontoons and the reliability of mechanical and electrical systems. See Blue Ribbon Commissioner's Report.
 - n. Develops and maintains a rating of the load-carrying capacity of all the department's highway bridges; see AASHTO Manual for Bridge Evaluation, and [Bridge Design Manual](#) M 23-50.
 - o. Develops and maintains an overall preventive and corrective maintenance program for all the department's bridges, and tunnels except major culverts.
 - p. Provides the Regional Administrators, the Maintenance and Operations Director, and the Assistant Secretary Washington State Ferries Division with maintenance recommendations and priorities based on needs identified during structural inspections; furnishes drawings showing recommended repair or strengthening details if needed.
 - q. Provides technical assistance as requested by the Commercial Vehicles Services Administrator for the issuance of over legal (super loads) weight permits, see [Permit and Desk Guide](#) M 3037.
 - r. Performs, or provides technical assistance to Regional Administrators for heat straightening of damaged steel components of bridges.
 - s. Provides assistance and services related to structural problems as requested by the Assistant Secretary Washington State Ferries Division.
 - t. Provides assistance and services as requested by Local Agencies in the structural inspections and load rating of local agency bridges and in the training of local agency bridge inspection personnel.
 - u. Coordinates interdisciplinary evaluation of scour potential at bridges (geotechnical [Materials], hydraulic [Design], and structural [Bridge and Structures]) and performs flood inspections.
 - v. Prepares and processes agreements with local agencies for the structural inspection(s) of local agency bridges, tunnels and bridge engineering services provided by the state.
2. Bridge Preservation Engineer
- a. Provide delegated authority for Program Manager to other State office which meet the qualifications of the NBIS and NTIS. Currently consisting of the Local Programs Bridge Engineer and the WSF Marine Project Engineer.

3. State Hydraulic Engineer
 - a. Exercises staff responsibility for the technical engineering aspects of major culvert inspection, maintenance, and repair.
 - b. Develops and maintains an overall preventive and corrective maintenance program for all major culverts.
4. Maintenance and Operations Director
 - a. Exercises staff responsibility for implementation of a preventive and corrective maintenance program for the department's transportation structures, excluding ferry terminals.
 - b. Exercises staff responsibility for the issuance of permits to operate vehicles of a size or weight greater than the legal maximum on the department's highway bridges.
 - c. Provides guidance and assistance to the regions in preparation of the program and budget for bridge preventive and corrective maintenance.
5. State Materials Engineer
 - a. Exercises staff responsibility for the geotechnical aspects of tunnel inspection, maintenance, and damage repair.
 - b. Develops and maintains an overall preventive and corrective maintenance program for all tunnels.
 - c. Provides assistance to the Bridge and Structures Office in the inspection of tunnels.
6. Commercial Vehicle Services Administrator
 - a. Exercises staff responsibility for the issuance of permits to operate vehicles of a size or weight greater than the legal maximum on the department's highway bridges.
 - b. Publishes lists of bridges with load restrictions and postings as identified by the Bridge and Structures office.
 - c. Do not remove bridges from the published list of restricted and posted bridges without the direct written approval by the Bridge Preservation Engineer.

B. Assistant Secretary Washington State Ferries Division

1. Develops and implements a preventive and corrective maintenance program and budget for ferry terminals.
2. Develops and maintains a rating of the load carrying capacity of all vehicle transfer spans and holding areas.
3. Performs routine inspections of all electrical, mechanical, and hoist systems for ferry terminals.
4. Performs maintenance inspections on ferry terminals.
5. Performs preventative and corrective maintenance on ferry terminals.
6. Provides assistance to the Bridge and Structures Office as requested for the structural inspection of ferry terminals.
7. Maintains a Marine Project Engineer qualified to delegate Program Manager responsibility for ferry structure inventory in accordance with the NBIS.

C. Regional Administrators

1. Performs maintenance inspections of bridges on the department's transportation system.
2. Performs preventive and corrective maintenance on the department's bridges.
3. Implements a preventive maintenance program for all movable bridges in accordance with the operations, inspection and maintenance manuals (see Appendix 4) or [Maintenance Manual](#) M 51-01.
4. Establishes a schedule to perform inspection, testing, and maintenance as prescribed in the operations, inspection, and maintenance manuals or the respective maintenance manual for the movable bridge. See the list of bridges in appendix 4.
5. Schedules and performs additional maintenance as required to maintain the operational status of movable spans in compliance with 33 CFR Section 117, Drawbridge Operation Regulations.
6. Performs monthly trial openings of all movable spans (except those noted in [Appendix 4](#) as "no longer opened for marine traffic") to ensure proper operation. Any traffic opening will satisfy the trial opening requirement.
7. Informs the Bridge and Structures Office promptly of mechanical and/or electrical failure or misoperation, bridge damage, or of any inadequacies or errors in the operation, inspection and maintenance manuals or preventive maintenance manuals.

7. Provides quarterly movable bridge opening logs to the Bridge Preservation Engineer. Refer to the log form in the respective bridge O, I & M manual in Appendix 4.
8. Programs and budgets for preventive and corrective maintenance and rehabilitation or replacement for the department's bridges.
9. Erects and maintains signing for traffic restrictions (loads, vertical clearance, etc.) in accordance with federal [Manual on Uniform Traffic Control Devices for Streets and Highways](#) (MUTCD); [Washington State Modifications to MUTCD M 24-01](#); and [Traffic Manual M 51-02](#).
10. Provides traffic control needed during structural inspections of bridges and sign bridges performed by the Bridge and Structures Office.
11. Advises the Bridge and Structures Engineer and the Maintenance and Operations Director of any transportation structure damaged by vehicles, by ship collisions, or by natural phenomenon.
12. Advises the Bridge and Structures Engineer of significant floods which occur at department highway bridges.

D. Highways and Local Programs Director

1. Maintains a Local Programs Bridge Engineer that meets the qualifications as delegated program manager for local agencies.
2. Exercises the administrative responsibility for local agency compliance with the National Bridge Inspection Standards.
3. Coordinates all local agency use of the Washington State Bridge Inventory System (WSBIS).
4. Provides training to local agency bridge and tunnel inspection personnel in bridge and tunnel inspection, load rating, and inventory updates.
5. Provides data and status of local agency bridge inspections as required by CFR, WSBIM, and as requested by FHWA Division Bridge Engineer or the Statewide Program Manager.

Rules

A. Bridge Inventory and Inspection Rules

1. The Bridge and Structures Engineer transmits inventory data for all bridges on public highways to the Federal Highway Administration (FHWA) in accordance with the National Bridge and Tunnel Inspection Standards.
2. The Bridge and Structures Engineer performs the following:
 - a. Routine structural, mechanical, electrical inspections on all department-owned bridges and tunnels in the [Bridge List](#) M 23-09 (except those identified in [Appendix 3](#) as the inspection responsibility of other agencies) at the following maximum intervals in accordance with the NBIS, NTIS, and the *Washington State Bridge Inspection Manual* M 36-64.
 - b. Random inspections on all floating bridges as follows:
 - (1) Verification of the water tightness of the bridge pontoons.
 - (2) Verification of the reliability of mechanical and electrical systems at.
 - c. Routine and in-depth inspections of ferry terminals at the following maximum intervals:
 - (1) Vehicle transfer spans — Routine inspection annually. In-depth inspection every two years.
 - (2) All other ferry terminal structures including vehicle holding areas and pedestrian transfer spans, but excluding buildings — Routine inspection annually. In-depth inspection every two years.
 - (3) Annual depth soundings in the vicinity of all vehicle transfer spans.
A copy of all soundings shall be transmitted to the Bridge and Structures Engineer.
 - d. Inventory or initial inspection on all bridges and tunnels.
 - e. Fracture critical inspections as required but at maximum two-year intervals. Including NDE inspection and specific special and unique features such as pins anchor bolts.
 - f. Underwater inspections as required but at maximum five-year intervals. Diving to 100 fsw and ROV inspection at depth greater than 100 fsw.
 - g. Bathometric survey to accompany all underwater inspections for structures over large bodies of water.
 - h. Scour inspections as required but at maximum two-year intervals.
 - i. Flood, damage, in-depth, and/or interim inspections as warranted.

- j. Safety structural inspections of all transportation structures, crossing over state highways owned by others, at maximum five-year intervals.
 - k. Assists the region in arranging for any nondestructive testing required by age and operating conditions.
 - l. Routine mechanical and electrical inspections on all bridges and tunnels with in the states inventory which have mechanical and electrical systems.
 - m. In-depth mechanical and electrical inspections for bridges and tunnels on a maximum six-year interval or as age and operating conditions require.
 - n. Provides recommended repairs based on structural, mechanical, and electrical inspections; furnishes drawings showing recommended repair or strengthening details, if needed.
 - o. In-depth or special inspections on major bridges and tunnels as warranted; develops an inspection program for these bridges and tunnels outlining the procedures for the inspection; supplements the inspection as necessary by analytical, physical, and chemical analysis to verify the adequacy of the structure using state-of-the-art analytical and testing procedures.
 - p. Inspection of sign bridges on 5 year interval or as warranted by age and deterioration.
3. The Regional Administrator performs the following:
- a. Maintenance inspections on bridges annually.
 - b. Furnishes traffic control as requested by the Bridge and Structures Office for performing inspections, upon receipt of reasonable notice.
 - c. Establishes a schedule to perform inspection (including testing) and maintenance for movable bridges, floating bridges, and other major transportation structures requiring special inspection and maintenance procedures, as prescribed in the operations, inspection, & maintenance manuals or maintenance manuals.
 - d. Performs monthly trial openings of all movable spans (except those noted in this document in [Appendix 4](#) as “no longer opened for marine traffic”) to ensure proper operation. Any traffic opening will satisfy the trial opening requirement.
 - e. Track, log and report all water removal pumping activity for every floating bridge identified and reported by cell. Logs are to be submitted to the Bridge and Structures office on an annual basis.
4. The Assistant Secretary of the Washington State Ferries performs:
- a. Annual maintenance inspections on all ferry terminals;
 - b. Annual routine inspections of all ferry terminal machinery, electrical systems, and hoist systems; and

B. Bridge Load Rating Rules

1. The Bridge and Structures Engineer performs the following:
 - a. Prepares and maintains a current load rating for all of the department's highway bridges and major culverts.
 - b. Develops and maintains bridge load rating software for state, local agencies and consultants as a free for use "open source" program.
 - c. Reports all ratings which require load restrictions or reduced overload capacity (including temporary ratings which result from damage or construction activities) to the Motor Carrier Services Administrator and the Regional Administrators.
 - d. Notifies Regional Administrators and Commercial Vehicles Services of the need to post or restrict bridges where necessary. Call for signing of load posting or restrictions of state structures.
 - e. Bridge Preservation Engineer is delegated the statewide program manager responsibilities by the Assistant Secretary of Multimodal Development and Delivery as required by the Federal regulations of the NBIS and NTIS.
2. The Regional Administrator erects and maintains load posting and vertical clearance signs on all bridges and tunnels as directed by the Bridge and Structures Engineer in accordance with the federal [Manual on Uniform Traffic Control Devices for Streets and Highways](#) and *Washington State Modifications to MUTCD WAC 468-95 Traffic Manual*. All sign's are to be placed within 90 days of notice.
3. The Secretary of the Washington State Ferries performs the following:
 - a. Prepares and maintains a current load rating for all vehicle transfer spans and holding areas.
 - b. Keeps all official records for ferry structures per NBIS.
 - c. Prepares and maintains a current load rating for all vehicle transfer spans and holding areas.
 - d. Erects and maintains load posting signs in accordance with the federal "Manual on Uniform Traffic Control Devices for Streets and Highways" at all ferry terminals rated below legal load limits.

C. Rules for Maintenance of Bridges

1. The Bridge and Structures Engineer performs the following:
 - a. Prepares and furnishes to the Regional Administrators and the Director of Maintenance and Operations, the Secretary of the Washington State Ferries, and local agencies under agreement for inspection services, recommendations for preventive and corrective maintenance of bridges and ferry terminals based on structural, mechanical or electrical inspections.

- b. Develops and maintains operations, inspection and maintenance manuals and preventive maintenance manuals for movable bridges, floating bridges, tunnels and other major transportation structures requiring special inspection and maintenance procedures.
 - c. Monitors preventive maintenance activities to ensure compliance with established procedures and schedules.
2. The Regional Administrator performs the following:
- a. Budgets for programs, and performs required preventive and corrective maintenance identified during maintenance or structural inspections on all the department's transportation structures except ferry terminals.
 - b. Upon completion of repairs on bridges and tunnels, prepares and furnishes maintenance reports to the Bridge and Structures Engineer.
 - c. Implements a preventive maintenance program for all movable bridges, floating bridges, tunnels and other major transportation structures requiring special inspection and maintenance procedures, in accordance with the operations, inspection and maintenance manuals or the maintenance manuals.
 - d. Schedules and performs additional maintenance as required to maintain the operational status of the movable spans in compliance with 33 CFR 117 Drawbridge Operation Regulations.
 - e. Informs the Bridge and Structures Office promptly of inadequacies or errors in the operations, inspection and maintenance manuals.
3. The Secretary of the Washington State Ferries develops and implements a preventive maintenance program for all ferry terminals; and budgets for, programs, and performs required preventive and corrective maintenance identified during maintenance or structural inspections on ferry terminals.

D. Bridge Damage/Emergency Repair Rules

1. The Regional Administrator performs the following:
- a. Immediately makes an on-site investigation whenever reports of vehicle or ship collision or other damage to any transportation structure except ferry terminals are received;
 - b. Takes suitable action to stop or restrict traffic and/or protect a structure when warranted.
 - c. Notifies the Bridge and Structures Engineer (call BPO emergency phone) and the Director Operation and Maintenance promptly of bridge damage, or in the case of movable bridges, mechanical and/or electrical failure or problems (including an accurate and detailed description of the damage and all emergency actions taken).
 - d. Initiates and acquires programming approval for the work.

- e. Makes immediate repairs and institutes traffic restrictions as advised by the Bridge and Structures Engineer.
 - f. Bridge closed for structural damage or deterioration require approval of the Bridge Preservation Engineer for reopening of the bridge and/or removing vehicle restrictions.
 - g. Immediately advises the Thirteenth U.S. Coast Guard District when a malfunction or accident involving a movable bridge will prevent the bridge from opening for marine traffic.
 - h. Obtains the necessary information and institutes timely action to recover costs. Notify the Director of Risk Management and Legal Services of the damaged structure.
 - i. Furnishes personnel and equipment to work under the supervision of Bridge Preservation Engineer as required for heat straightening or Bailey bridge construction.
 - j. Administers construction of the repair(s).
2. The Bridge and Structures Engineer performs the following.
- a. Inspects bridge damage and/or mechanical or electrical system problems immediately after receiving notice unless it can be positively determined from the region report that the damage is minor; requests that the region post the bridge for restrictive conditions if warranted.
 - b. Advises the FHWA Washington Division Bridge Engineer if bridge damage is such that closure or traffic restrictions are required. Submit Critical Bridge Damage Repair Report, CBDRR, within 24 hours.
 - c. Provides the Regional Administrator with an assessment of damage and with recommendations for permanent or temporary repairs; mobilizes and dispatches heat straightening crew if needed; if necessary, initiates the dispatching of Bailey bridge components and provides assistance in the Bailey bridge planning, installation, and subsequent removal.
 - d. Furnishes the Regional Administrator with plans and specifications for use in ordering any necessary new steel components.
 - e. Furnishes drawings showing recommended repair or strengthening details to the Regional Administrator, if needed.
 - f. Coordinates a schedule for accomplishing repairs with the Regional Administrator.
 - g. Assists the region, as needed, during construction of the repair(s).
 - h. Inspects the repair upon completion of construction.
 - i. Monitors the integrity of the repair during subsequent inspections.
 - j. Advises the FHWA Washington Division Bridge Engineer when a bridge closed or restricted due to damage has been reopened and/or traffic restrictions have been removed. Update CBDRR.

Appendix 1 Glossary

AASHTO: American Association of State Highway and Transportation Officials

Bridges: All of the following: highway bridges, major bridges, movable bridges, pedestrian bridges, railroad bridges; small span highway bridges, highway lids, tunnels, major culverts; a subcategory of transportation structures.

Corrective Maintenance: Maintenance that is performed to correct an identified deficiency.

Damage Inspection: Unscheduled inspections to assess structural damage to transportation structures caused by humans or nature; a subcategory of structural inspection.

Department: Washington State Department of Transportation.

Ferry Terminals: All facilities operated by the Washington State Ferries Division which transfer highway and pedestrian traffic between ferry vessels and public roads, including vehicle transfer spans, vehicle holding areas, pedestrian transfer spans, and pedestrian ramps; a subcategory of transportation structures.

Flood Inspection: Inspections performed on all bridges designated as scour potential sites during or after significant floods; a subcategory of structural inspection.

Fracture Critical Structural Element: Tension member or tension component of members whose failure could result in collapse of the structure.

Fracture Critical Inspection: A detailed inspection of all fracture critical elements of a bridge; a subcategory of structural inspection.

Highway Bridges: All structures longer than 20 feet which directly support vehicular traffic; a subcategory of bridges.

Highway Lids: All structures supporting multipurpose nonvehicular loads over highway traffic; a subcategory of bridges.

Historical File: All records of a specific transportation structure, including but not limited to design and load rating calculations, geotechnical reports, post-construction reports, as-built plans, inspection and maintenance reports, and accident and damage reports.

Initial inspection (Tunnels): The term “initial inspection” means the first inspection of a tunnel to provide all inventory, appraisal, and other data necessary to determine the baseline condition of the structural elements and functional systems.

In-depth Inspection: Inspections performed to detect any deficiencies not readily visible during routine inspections; may involve special equipment, non-destructive testing or disassembly of selected structural elements; a subcategory of structural inspection; also known as special inspection.

Interim Inspection: Inspections performed between routine inspection intervals for the purpose of monitoring and evaluating the condition of: (1) spans or primary members with known or suspected deficiencies, and/or (2) primary members highly susceptible to deterioration; a subcategory of structural inspection.

Inventory: A list identifying all transportation structures for which the department or local agency is responsible for inspection, rating, and maintenance. The list should include, but not be limited to, structure identification (name and number), location, structure type, critical dimensions, and year built.

Inventory Inspection: The first inspection of 1) a transportation structure as it becomes part of the transportation structure inventory, or of 2) an inventoried transportation structure which has been modified.

Local Agency: Local jurisdictions within Washington State responsible for the maintenance of transportation structures on public roads.

Maintenance Inspection: Visual inspections by region maintenance crews primarily to determine the need for routine preventative or corrective maintenance. Generally, these inspections are not intended to identify structural defects.

Major Bridges: All department highway bridges which both represent a major investment based on its size and have bridge design and/or construction techniques which are complex or unique; major bridges are a subcategory of bridges.

Major Culverts: All culverts over 20 feet in span measured parallel to the roadway; a subcategory of bridges.

Movable Bridge: Any bridge with a span or spans that can lift, draw, swing, or rotate in a vertical or horizontal plane to open a clear passage or to provide increased vertical clearance for marine traffic in navigable channels; a subcategory of bridges.

National Bridge Inspection Program: United States code title 23, chapter 1, subchapter I, sec. 151 (a) "National Bridge Inspection Program", establishes "the Secretary, in consultation with the State transportation departments and interested and knowledgeable private organizations and individuals, shall establish the national bridge inspection standards for the proper safety inspection and evaluation of all highway bridges.

National Bridge Inspection Standards: [23 CFR Part 650](#) Subpart 'C' National Bridge Inspection Standards that establishes requires for each state to have a bridge inspection program and the qualifications, rules and procedures which apply.

National Tunnel Inspection Standards: [23 CFR Part 650](#) Subpart 'E' National Tunnel Inspection Standards that establishes requirement for each state to have a tunnel inspection program and the qualifications, rules and procedures which apply.

Pedestrian Bridges: All structures which carry only foot or bicycle traffic; a subcategory of bridges.

Pedestrian Transfer Spans: All movable bridges which allow passage of foot traffic directly to or from the ferry vessel; a subcategory of ferry terminal.

Preventive Maintenance: Maintenance that is performed on a predetermined schedule to prevent excessive wear of components through normal use and to prevent deterioration from environmental conditions.

Private Structural Inspection: Inspections performed on privately owned structures which cross over state highways for the purpose of: (1) ensuring they pose no hazard to the traffic below, and (2) maintaining accurate underclearance measurements; a subcategory of structural inspection.

Railroad Bridges: All structures which carry railroad traffic only; a subcategory of bridges.

Random Inspection: An unannounced inspection focusing on verifying the water tightness, and mechanical and electrical system reliability of the department's floating bridges.

Routine Inspection: A regularly scheduled inspection relying primarily on visual observations of all elements with the use of special inspection equipment to provide access where required; a subcategory of structural inspection.

Scour Inspection: Inspections performed on all bridges which are vulnerable to damage from waterway scour; a subcategory of structural inspection.

Small Span Highway Bridges: All structures shorter than 20 feet which support vehicular traffic; a subcategory of bridges.

Special Inspection: See In-depth Inspection.

Specification's for the National Tunnel Inventory: FHWA publication no. FHWA-HIF-15-006, July 2015, This document was developed in coordination with the National Tunnel Inspection Standards (NTIS) regulation [23 CFR 650](#) Subpart E and the Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual. It is intended to supplement the NTIS and provide the specifications for coding data required to be submitted to the National Tunnel Inventory (NTI).

Structural Inspection: Periodic on-site investigation to identify structural condition, to determine the need for preventive and corrective maintenance, to ensure structure safety, and to establish a recommendation for rehabilitation or replacement where appropriate; includes routine inspection, fracture critical inspection, underwater inspection, scour inspection, flood inspection, damage inspection, interim inspection, and in-depth inspection. See also Private Structural Inspection (does not include maintenance inspections).

Transportation Structures: Bridges and ferry terminals.

Tunnel Operations, Maintenance, Inspection, and Evaluation Manual: FHWA publication no. FHWA-HIF-15-005, July 2015, this Manual describes methods for improving the safety and performance of roadway tunnel operation, maintenance, inspection, and evaluation programs.

Tunnels: an enclosed roadway for motor vehicle traffic with vehicle access limited to portals, regardless of type of structure or method of construction, that requires, based on the owner's determination, special design considerations that may include lighting, ventilation, fire protection systems, and emergency egress capacity. The terms "tunnel" does not include bridges or culverts inspected under the National Bridge Inventory.

Underwater Inspection: Inspections performed on those structural elements located in water too deep to allow visual inspection by wading (water depth of 4' or less); a subcategory of structural inspection.

Vehicle Holding Areas: All stationary structures which support vehicle traffic and/or parking; a subcategory of ferry terminal.

Vehicle Transfer Spans: All movable bridges which allow passage of vehicle traffic directly to or from the ferry vessel; a subcategory of ferry terminal.

WSBIS: Washington State Bridge Inventory System, The corporate database that maintains the structural inventory of federal and state data.

Appendix 2 References

1. Code of Federal Regulations (CFR), Chapter 23 Part 650, Subpart 'C' December 24, 2009, "National Bridge Inspection Standards"
2. Code of Federal Regulations (CFR), Chapter 23 Part 650, Subpart 'E' July 14, 2015, "National Tunnel Inspection Standards"
3. "Code of Federal Regulations," Chapter 33, Section 117 "Drawbridge Operation Regulations"
4. "Manual Bridge Evaluation, 3rd edition, 2018" American Association of State Highway and Transportation Officials (AASHTO)
5. Movable Bridge Inspection, Evaluation, and Maintenance Manual, 2nd edition, 2017, American Association of State Highway and Transportation Officials (AASHTO).
6. M 23-09, "Bridge List"
7. M 23-50, "Bridge Design Manual LRFD"
8. M 24-01, "Uniform Traffic Control Devices for Streets and Highways"
9. M 51-01, "Maintenance Manual"
10. M 3037, "Permits Desk Guide"
11. FHWA Bridge Inspector Reference Manual, pub# FHWA-NHI-12-049
12. Washington State Department of Transportation Bridge Engineering Information System, BEIS, <http://beist/InventoryAndRepair/Inventory/BRIDGE>
13. The Governor of Washington State Commissioned Blue Ribbon Panel on the "Investigation into the Sinking of the I-90 Lacey V. Murrow Bridge", R 3037, 2017 Officials (AASHTO),e structural inventory the qualifications, rules and procedures which apply private organizations report issued May 2, 1991
14. Directive Memo by S. A. Moon "Floating Bridge Random Inspections," June 18, 1993. See Appendix 6.
15. Agreement No. AA 7-0515 with City of Seattle re: Park Plaza (Nos.5/549 PN, PS, PW)
16. Agreement No. GM236 (GC 1039B) with Oregon Department of Transportation re: Columbia River Bridge @ Astoria (No.101/1)
17. Agreement No. GC 7435 with Oregon Department of Transportation re: Columbia River Bridges (Nos. 205/1E and 205/1W)
18. Agreement No. GC 8254 with Metro re: Metro OC (No.5/594)
19. Agreement No. GM 20 with City of Seattle re: Montlake Bridge (No.513/12)

20. Agreement No. GM 34 with Idaho Department of Transportation re: Snake River Bridge at Clarkston (No.12/915)
21. Agreement No. GCA 1546 with Idaho Department of Transportation re: SR 41 Over BNRR (Br. # 41/10)
22. Agreement No. GM 395 with Oregon Department of Transportation re: Columbia River Bridges at Vancouver (Bridges 5/1E and 5/1W)
23. Agreement No. GM 772 with Oregon Department of Transportation re: Columbia River Bridge at Longview (No.433/1)
24. Agreement No. GM 781 with Oregon Department of Transportation re: Columbia River Bridge at The Dalles (No.197/1)
25. Agreement No. GM 782 with Oregon Department of Transportation re: Columbia River Bridges at Umatilla (Nos. 82/280N and 82/280S)
26. Agreement No. GM 832 with Oregon Department of Transportation re: Columbia River Bridge at Biggs Rapids (No.97/1)
27. Agreement No. GM 1230 with Washington State Convention and Trade Center re: Washington State Convention and Trade Center (No.5/549 CNC)
28. Agreement No. GM 1238 with City of Seattle re: 12th Ave S. of I-90 (Br. # 90/15)
29. Agreement No. GM 1325/GC9922 with National Parks Services re: SR 123 Tunnel (Br. # 123/106)
30. M 23-32, "Preventive Maintenance Manual," Snohomish River Bridge (Hewitt Avenue) (No. 2/5S)
31. Manual," Wishkah River Bridge (Heron Street) (No. 12/12S)
32. Manual," Wishkah River Bridge (No. 12/12N)
33. "Operations, Inspection, and Maintenance Manual," Snake River Bridge (No. 12/915), June 1996
34. "Operations, Inspection, and Maintenance Manual," Tacoma Narrows Bridge (No. 16/110), June 1995
35. "Operations, Inspection, and Maintenance Manual," Lacey V. Murrow Bridge (No. 90/25S), and Homer Hadley "Third Lake Bridge" (No. 90/25N), December 1993
36. "I-90 Mt. Baker Ridge Tunnel Complex - Structural Inspection and Maintenance Manuals," April 1993
37. "I-90 First Hill Lid, Mercer Island - Structural Inspection and Maintenance Manuals," April 1993
38. "Operations, Inspection, and Maintenance Manual," Duwamish River Bridge at 1st Avenue South (No. 99/530E)

39. Operations, Inspection, and Maintenance Manual," Duwamish River Bridge at 1st Avenue South (No. 99/530W)
40. "Operations, Inspection, and Maintenance Manual," Chehalis River Bridge (No. 101/115)
41. "Operations, Inspection, and Maintenance Manual," Riverside Bridge (No. 101/125E), June 1997
42. "Operations, Inspection, and Maintenance Manual," Hoquiam River Bridge at Simpson Avenue (No. 101/125W)
43. "Operations, Inspection, and Maintenance Manual," Hood Canal Bridge (No. 104/5.1 & 5.2), June 1996
44. "Operations, Inspection, and Maintenance Manual," Montlake Bridge (No. 513/12)
45. "Operations, Inspection, and Maintenance Manual," Snohomish River Bridge (No. 529/10E)
46. "Operations, Inspection, and Maintenance Manual," Snohomish River Bridge (No. 529/10W)
47. "Operations, Inspection, and Maintenance Manual," Steamboat Slough Bridge (No. 529/20E)
48. "Operations, Inspection, and Maintenance Manual," Steamboat Slough Bridge (No. 529/20W)

Appendix 3 *Bridge Inspection and Maintenance Agreements*

Bridge Agreements

Bridge Number(s)	Bridge Name	Agreement With	Agreement Number
5/1 E 5/1 W	Columbia River at Vancouver	Oregon DOT ^{1, 2}	GM 395
5/548 PN, PS, PW	Park Plaza	City of Seattle ²	AA 7-0515
5/549 CNC	Washington State Convention and Trade Center	Washington State ² Convention and Trade Center	GM 1230
5/594	Metro OC	Metro ²	GC 8254
12/915	Snake River at Clarkston	Idaho DOT	GM 34
41/10	SR 41 Over Railroad	Idaho DOT	GCA1546
82/280 N 82/280 S	Columbia River at Umatilla	Oregon DOT	GM 782
97/1	Columbia River at Biggs Rapids	Oregon DOT	GM 832
101/1	Columbia River at Astoria	Oregon DOT ^{1, 2}	GM 236 (GC 1039-B) & LOU 4/21/09
123/106	SR 123 Tunnel	National Parks Services	GM 1325/GC9922
197/1	Columbia River at the Dalles	Oregon DOT ^{1, 2}	GM 781
205/1E 205/1W	Columbia River	Oregon DOT ^{1, 2}	GC 7435
262/10, 262/15C, 262/17	O'Sullivan Dam Spillway, Headwork's and Powerhouse	US Bureau of Reclamation	Under blanket agreement w/ USBR
433/1	Columbia River at Longview	Oregon DOT ³	GM 772
513/12	Montlake Bridge	City of Seattle ²	GM 20

¹ Listed agency has responsibility for performing inventory, inspection and maintenance.

² Listed agency has responsibility for operation and maintenance.

³ Every other inspection to be performed jointly by the two states.

Joint jurisdiction bridges with unfounded agreements with shared ownership, operation, maintenance or route authority include: 2/419C, 2/420, 17/401, 82/244C. Copies of these agreements along with others are being researched by Bridge and Structures office.

Appendix 4 WSDOT Movable Bridges

Bridge No.	Bridge Name	Region	O, I, & M Manual (Appendix 2 Reference Number)
5/1E(1)	Columbia River	SW	None
5/1W(1)	Columbia River	SW	None
12/12S	Wishkah River (Heron St.)	OLYMPIC	#30
12/12N	Wishkah River	OLYMPIC	#31
12/915	Snake River (Clarkston)	SC	#32
99/530E	Duwamish River (I st Ave. S.)	NW	#37
99/530W	Duwamish River (1st Ave S.)	NW	#38
101/115	Chehalis River	OLYMPIC	#39
101/125E	Hoquiam River (Riverside)	OLYMPIC	#40
101/125W	Hoquiam River (Simpson Ave.)	OLYMPIC	#41
104/5.1 & 5.2	Hood Canal	OLYMPIC	#42
513/12	Montlake Bridge	NW	#43
529/10E	Snohomish River	NW	#44
529/10W	Snohomish River	NW	#45
529/20E	Steamboat Slough	NW	#46
529/20W	Steamboat Slough	NW	#47
536/15(2)	Skagit River	NW	None

Notes:

(1) Inspected, operated and maintained by ODOT (GM 395).

(2) No longer opened for marine traffic.

Appendix 5 WSDOT Tunnels

Tunnel Number	Tunnel Name	Region	O, I, & M or PM Manual (Appendix 2 Reference Number)
5/546REN	5TH-EXP TUNNEL	NW	None
5/548PN	I-5 UNDER N PARK PLAZA	NW	
5/548PS	I-5 UNDER S PARK PLAZA	NW	
5/549CNC	WASH ST CONVENTION CENTER	NW	#23
5/553R	EXPRESS LANES TUNNEL	NW	
5/555E-S	E-S RAMP TUNNEL	NW	
5/555N-W	N-W RAMP TUNNEL	NW	
5/568S-E	I-5 OVER S-E RAMP TUNNEL	NW	
5/577E-S	RAVENNA-S RAMP TUNNEL	NW	
20/316	TUNNEL	NW	
90/16S-E	S-E RAMP TUNNEL	NW	
90/22LID	MARTIN L KING LID	NW	
90/24N	MT BAKER RIDGE TUNNEL	NW	#30
90/24S	MT BAKER RIDGE TUNNEL	NW	#30
90/26LID	FIRST HILL LID	NW	#31
90/33E-S	E-S RAMP TUNNEL	NW	
90/33N-W	N-W RAMP TUNNEL	NW	
90/33RE-S	REV E-S RAMP TUNNEL	NW	
90/35LID	LUTHER BURBANK LID	NW	
90/55	SE 35TH ST TUNNEL UNDER I-90	NW	
97/359ALT	KNAPPS HILL TUNNEL	NC	
99/540	ALASKAN WAY TUNNEL	NW	Opening 2019
99/541	BATTERY ST TUNNEL	NW	Removal planned 2019
101/3	FORT COLUMBIA TUNNEL	SW	
304/9	BREMERTON TUNNEL	OLYMPIC	
405/22A	HOUSER WAY TUNNEL	NW	
405/35N-W	I-90 OVER N-W RAMP TUNNEL	NW	
405/35S-E	I-90 OVER S-E RAMP TUNNEL	NW	
520/9LID	EVERGREEN POINT ROAD LID	NW	
520/11LID	84TH AVE NE OVER SR 520	NW	
520/12LID	92ND AVE NE OVER SR 520	NW	
522/15	ROOSEVELT WAY TUNNEL	NW	
525/1S-S	S-S RAMP OVER S-E RAMP	NW	
526/12	SR 526 OVER E-N RAMP TUNNEL	NW	
526/22E-N	SR 526 OVER E-N RAMP TUNNEL	NW	



Washington State
Department of Transportation

Memorandum

Date: June 8, 1993

From: A. H. Wall
J. F. Conrad

Subject: Floating Bridge
Random Inspections

Thru: E. R. Burch
J. R. Buss

To: S. A. Moon

As directed by the Transportation Commission, random inspections have been conducted on the three state floating bridges. Based on our office's evaluation of the initial inspections, we request your approval of the following proposals on the process to be used in the future:

1. Responsibility for planning and conducting the random inspections should be delegated to the Bridge Office, and clearly defined in Directive D23-11.
2. A report on findings on each inspection should be prepared by the Bridge Office and sent to the Chief Maintenance Engineer for further transmittals to the districts.
3. Annual random inspections should be conducted to verify water-tightness of the bridge pontoons.

Random inspections focusing on reliability of mechanical and electrical systems of the bridges should be conducted at two year intervals.

The following background is provided to assist in your consideration of the above proposals:

The Report issued on May 2, 1991 by the Blue Ribbon Panel investigating the sinking of the Lacey V. Murrow Bridge included a recommendation for "Independent Random Inspections" of the state's floating bridges. These inspections were to be "in addition to the scheduled major inspections" and were to be conducted "by people not responsible for bridge maintenance". Emphasis of the inspections was to be "placed on the water-tightness of the bridge and on the reliability of electrical and mechanical systems."

S. A. Moon
June 8, 1993
Page 2

Transportation Commission Resolution 398 directed the department to "carefully review, analyze and, if feasible incorporate certain recommendations of the Blue Ribbon Panel". The Resolution's "implementing action document" directs us to address random inspections as follows:

"The Department will hire a consultant or utilize an independent division internal to the Department to provide random inspections on the floating bridges. These inspections are to occur unannounced at least once a year for each bridge and will be an in-depth review of the water-tightness of the structure plus an inspection of the mechanical and electrical component of each bridge. A detailed report will be required."

Copies of pertinent sections of the Blue Ribbon Panel Report and Resolution 398 are attached.

An initial random inspection was conducted on the Hood Canal, Evergreen Point and 3rd Lake Floating Bridges in August and September of 1992. The inspection team consisted of members from the Bridge and Structures and Marine Transportation Offices and from the office of the State's mechanical and electrical consultant; the Sverdrup Corporation. Reports on inspection findings were prepared by the Bridge Office and provided to the districts through the HQ Maintenance Office. Inspection recommendations are now being implemented or considered for implementation by the districts.

A post inspection review of the random inspection process by our offices led to the recommendations in this letter. Responsibilities for these inspections need to be clearly defined in a Department Directive. Also, although a one year interval for random inspection of pontoon watertightness appears to be appropriate, a longer interval is needed between random inspections of the electrical and mechanical systems. The longer interval is needed to provide sufficient time to cost effectively address any problems identified on these complex systems.

AHW/JFC:sf
ORG
Attachments

Approval: S. A. Moon
Deputy Secretary of Transportation

Date: 6-22-93