

5-1 **General**

The proper care of structures is vital to the preservation of the highway network and to the safety of the traveling public. This chapter discusses those items in which area maintenance personnel assist in this maintenance effort. Other more comprehensive references are available to the Maintenance Engineer.

For general responsibilities refer to the *Transportation Structures Preservation Manual* M 23-11. For specific responsibilities for movable bridges, refer to the specific *Operation, Inspection, and Maintenance Manual* (OIM).

5-2 **Major Structures**

For maintenance purposes, major structures are identified as those bridges included in the [Bridge List](#) M 23-09. The State Bridge and Structures Engineer is the responsible authority for these structures and must be contacted prior to any major maintenance or modifications to them. The designated contact in Olympia is the Bridge Preservation Engineer.

Bridges and other transportation structures closed due to structural damage, require approval from the Bridge Preservation Engineer before opening.

5-3 **Minor Structures**

For maintenance purposes, minor structures are identified as those drainage structures (culverts, etc.), retaining walls, acoustical barriers, cribbing, etc., that are not listed in the Bridge List. The Region Maintenance Engineer is the responsible authority for minor structures.

Any defects or damage to minor structures should be referred to the Area Maintenance Superintendent, who will coordinate the required action.

The structural components of sign bridges, bridge-mounted sign brackets, and high-mast luminaries are inspected and inventoried by the bridge preservation office. Major maintenance or modifications to these structures is to be coordinated through the Bridge Preservation Office. The designated contact in Olympia is the Bridge Preservation Engineer.

5-4 Inspection

Federal regulations require that all major highway structures be inspected by a crew under the supervision of a professional engineer, at intervals not exceeding two years. This requirement is met by the WSDOT Headquarters' Bridge Preservation Engineer and staff. Certain bridges, such as steel bridges, untreated timber bridges, bridges having a posted load limit, movable bridges, floating structures and bridges with pending repairs are inspected annually.

A bridge's condition can change in much less than two years. The Bridge Preservation Office relies on Region maintenance personnel to be alert for settlement, washout, collision damage, and other problems, and to notify their superintendent as appropriate.

Area maintenance crews are also expected to maintain or repair minor approach settlements, approach guardrail damage, plugged bridge drains, sweeping of bridge decks, asphalt overlays and other items that are considered part of normal maintenance operations.

Additionally, removal of dirt and debris accumulation on timber caps, timber stringers, steel expansion devices (bearings), lower chords of steel bridges and sign bridge bases are considered routine maintenance activity. However, at times these can become critical to a structure and will be added to the repair list.

Modifications to bridges need to be detailed in drawings and submitted to the Bridge Preservation Engineer for as-built documentation and future reference. All bridge structural as-built information is maintained at the Bridge Preservation Office.

All minor structures, related to bridges, should be inspected at least annually by the designated region maintenance supervisors or crews. Inspect more often if warranted by weather conditions or past experience.

The Bridge Preservation Office distributes a list of scour critical bridges to each region Bridge Maintenance office. These bridges are to be closely monitored during high water events. Scour critical bridges require close monitoring due to a high susceptibility to foundation damage caused by high water events. Area Maintenance Superintendents are responsible for monitoring weather conditions in anticipating high water events for scour critical bridges in planning for advance deployment of crews to monitor each bridge's condition. Scour is the number one cause of bridge failures in Washington.

Region bridge maintenance personnel are responsible to inspect all bridges and designated minor structures annually. Record all deficiencies. Keep the records on file until the deficiencies are corrected.

Review bridge inspection report notes, repairs, and photos to identify items to focus on during inspections.

During inspection, the following items should be checked. Deficiencies should be immediately repaired or scheduled for future work.

- **Approach Fills** – Note any deficiency. Pay particular attention to the pavement seats of the structure. Look for sagging, pot holing, scaling, or spalling.
- **Asphalt Wearing Surface** – Note potholes, scaling, wheel rutting, and general pavement condition.
- **Concrete Deck** – Note scaling, spalling, cracks, and any exposed reinforcing steel.
- **Grid Decks** – Look for and note broken welds or clips, loss of a section due to rust and any bent members.
- **Curbs and Railings** – Note any deterioration, cracking, spalling, or damage.
- **Paint** – Note the general condition of the paint. Look for cracking, peeling, fading, and presence of rust or algae.
- **Stringers, Caps, and Floor Beams** – Note any crushing at bearing points, and any warping, cracking or debris buildup.
- **Steel Truss Members** – Note bent or damaged steel, deflection, cracking, vibration, debris buildup on chord members, and deterioration due to rust. Pay particular attention to pinned joints at hinges, excessive rust, vibration, missing nuts, or loose plates. Immediately inform the designated bridge maintenance representative of any known or suspected problems.
- **Wood Truss Members** – Look for and note damaged or broken members, crushing, cracking, warping, vibration, and deterioration due to rot or boring insects.
- **Expansion Joints** – Note loose, banging, and jammed expansion joints. Also, note the presence and condition of the joint material.
- **Abutments, Bulkheads, Piers, and Intermediate Bents** – Note any type of tilting, bulging, and deterioration. Pay particular attention to the buildup of drift debris and any scouring or undermining due to high water and erosion.
- **Bridge Drains** – Note plugged bridge drains. Check pipe outfall areas to see if soil erosion is occurring. Plugged drains may result in saturation of the bridge approach fills and may explain any unusual erosion or undermining of abutments or bulkheads.
- **Waterways** – Note scour and conditions that could cause log jams or ice jams during high water stages. Look for any logs or other debris jammed against piers, bulkheads, or piling. In the winter check all bridges with piers or bulkheads in the water with a floating debris problem during and after each flooding condition.
- **General Conditions** – Look for accumulation of dirt, excessive bird droppings or debris on the roadway at bearing points and on the caps or lower chords. Pay particular attention to the presence of materials that might pose a fire hazard or restrict access for maintenance activities. Note any unauthorized attachments such as private fences. Have electrical fences removed from bridge access areas or clearly mark them with warning signs.

- **Walls and Cribbing** – Inspection can be of a cursory nature according to guidelines designated by the Area Maintenance Superintendent. Check walls for tipping, bulging, cracking, spalling, and water runoff over or through wall. Check all weep holes to assure that they are open. If the structure is wooden, check for rot and the presence of fire hazards.
- **Tunnels** – Condition of walls, ceiling, or liner. Look for cracking, spalling or loose overhead hazards. Note increased water seepage, and the condition of wire retention fabrics. Check for tears or failures that may indicate potential structural hazards and impact on portals or overhead members.

5-5 Bridge Repair Guidelines

Any major or structural repairs need to be coordinated through and approved by the WSDOT Headquarters Bridge Preservation Engineer. If there is any doubt about the structural significance of a damaged or deteriorated bridge component, notify the WSDOT Headquarters Bridge Preservation Engineer. Generally, bridge repairs are identified on the bridge repair list.

There are six priority definitions in the repair lists. “Emergency” or “Urgent” priorities are intended to recognize the various levels of work accomplished by Bridge Maintenance. As maintained previously, these six repair priorities represent a priority level hierarchy; therefore, repairs that are not completed in a timely manner may be moved to a higher priority. Only four priorities will be published on the repair list since “Emergency” and “Urgent” repair lifecycles will be anticipated to be much shorter than the repair list publication cycle. They will be tracked in the Bridge Preservation Office repair database.

The use of “Emergency” and “Urgent” priorities will be authorized by the Bridge Preservation Engineer. These types of repairs will be reported directly to each region.

The priority definitions are as follows:

- **Emergency** – Repair work requiring immediate action when structures are partially or completely closed.
- **Urgent** – Repair work requiring prompt action that must be completed when structural details and bridge crews become available.
- **Priority 1** – Repair work required when damage to primary structural elements directly affects safety, reliability of transportation system, protecting public investment, and maintaining legal mandates. Secondary and minor items will qualify for this priority if they pose a hazard to traffic.
- **Priority 2** – Work should be accomplished within regular work schedule or programmed in the biennial work schedule.
- **Priority 3** – Generally a minor nonstructural or ‘housekeeping’ type of repair, which may evolve into a higher priority if not corrected.
- **Priority 4** – A condition that requires the structure to be monitored primarily by the bridge inspection teams, and may evolve into a higher priority.

The WSDOT Headquarters Movable Bridge Engineer prepares and updates individual maintenance manuals for all movable bridges. Consult these manuals for both routine and specialized maintenance tasks. Direct any questions to the Movable Bridge Engineer in the Bridge and Structures Office in Olympia.

Minor repairs to railings, curbs, concrete decks, expansion joints, etc., can be performed without the individual approval of the WSDOT Headquarters Bridge and Structures Office. Similarly, drift may be removed, clearance lights changed, etc.

5-6 Bridge Information

Bridge information is available to all DOT staff through the Bridge Engineering Information System (BEIST). Go to the [Bridge and Structures](#) website for a link to BEIST.

BEIST contains inventory data, bridge plans, inspection reports, the repair list, and related files. Additionally, BEIST contains the Sign Bridge Repair List and Standard Plans.

5-7 Environmental Aspects

WSDOT environmental staff will provide Maintenance Engineers, Area Superintendents and Maintenance Supervisors with training and education on which regulations apply to specific maintenance activities and what is the appropriate response to the regulatory process.

In addition to federal regulations, state environmental agencies, tribes and city or county health ordinances may have environmental restrictions on work done on or near bridges.

Before initiating bridge repair activities, the Maintenance Engineer, Superintendent, or Supervisor will confirm if environmental permits are required. They will also review the proposed repair method with the environmental staff to determine whether it is both appropriate and/or environmentally sound. The following list provides some of the environmental concern factors that impact bridge maintenance in some localities. This list is not comprehensive or current because the list of environmental factors to be considered continues to change. However, it does provide some insight into the degree to which maintenance is being held to an increasing level of environmental accountability.

- State or federal list of threatened or endangered species.
- Species of high interest to state or federal agencies.
- Migratory waterfowl habitat.
- Anadromous fish habitat.
- Trout and other cold water fish habitat.
- Habitat for birds of prey (Must have Bridge and Structures approval to attach platform, boxes or any other structure to any part of a bridge).
- Wetlands and wetland habitat.
- Riparian habitat.
- Migratory corridors.
- Wintering areas and other critical feeding areas of wildlife.

- Important wildlife reproductive habitat.
- Public water supplies, including important aquifers.
- Islands and other coastal barriers.
- Hazardous waste.
- Regulatory flood ways and other flood plain areas.
- Commercial fish and shellfish production areas.
- Important sport fishing areas.
- Highly erosional soils.
- Listed or proposed wild and scenic rivers.
- Navigable waterways.
- Significant historic resources.
- Natural resource agency holdings or interests (refuges, parks, habitat areas, etc.).

The Bridge and Structures Office is concerned with the placement of temporary or permanent wildlife habitat structures (peregrine falcon platforms, bat boxes, etc.) on state bridges due to their potential negative impact to inspections of all bridges in accordance with the federally-mandated National Bridge Inspection Standards and the potential negative affects to maintain the bridge structure itself. The Bridge and Structures Office discourages the practice of placing these habitat structures on state bridges.

Therefore, all plans to place temporary or permanent wildlife habitat structures on state bridges are to be reviewed by the Bridge Preservation Engineer. This is consistent with the review process for all other attachments to bridges.

Maintenance agreements established with any regulatory agency that includes bridges must have approval from the Bridge and Structures Office. Agreements that define or limit access to a bridge due to the Endangered Species Act, affect inspections and repairs.

5-8 Utility Installations

Bridge Maintenance Superintendents need to work directly with region utility engineers to coordinate utility installations to ensure construction inspectors are aware of the utility installation and inspect the construction for proper installation per the franchise agreement and structural details approved by the Bridge and Structures Office. Scaffolding attached to or setting on any portion of the bridge is to be included in the review by the bridge office.

Construction inspectors are to ensure that the utility contractor is following DOT-prescribed construction practice in accordance with [Standard Specifications](#).