

RECOMMENDATIONS FOR THE INSPECTION AND MAINTENANCE OF STEEL BRIDGES

The purpose of this set of recommendations is to suggest some minimum guidelines for inspection and maintenance of Steel Bridges, in order to maintain the overall structural integrity and user safety throughout the serviceable life of the structure. These procedures are not all inclusive and more detailed procedures may be warranted depending upon bridge location, environment, and usage. Establishing the requirements for, and verifying the performance of, all field inspection and maintenance is the responsibility of the owner.

INSPECTION

I. User Safety (Inspection by others)

A. Each bridge should be inspected at regular intervals (at least once per year) to ensure that all items of user safety are accounted for and performing properly. Areas of inspection should include:

1. All safety rails, handrails, rubrails, fencing or other types of safety features should be in place with complete structural integrity and capacity. There shall be no sharp edges or protrusions on any feature that could produce bodily harm to be a hazard to the user.
2. All deck surfaces should be without gaps, cracks or projections that could create a trip hazard or interfere with the user in any way. Special consideration should be given to any smooth deck surface that could also create a possible slip hazard.

II. Structural Integrity (Inspection by others)

A. Each bridge should be inspected at regular intervals not to exceed one year (1) year. This visual inspection should include, but not be limited to, the following:

1. Check the decking to insure it is in satisfactory condition. Inspect timber decks at their contact surfaces where they bear on stringers.

2. All steel surfaces should be inspected to insure that they are performing satisfactorily. Check for any excessive corrosion on weathering steel bridges, or paint and caulk integrity on painted bridges. Areas of inspection should include:

a. All steel below the deck, particularly the tops of stringers supporting wood decks.

b. Truss or floor system joints where debris or water may accumulate.

c. Anywhere vegetation or other material may have come in contact with the steel.

NOTE: Weathering steel surface not exposed to the atmosphere should be checked to insure it has formed its protected oxide layer.

3. Check all steel surfaces and welded and bolted connections for cracks. Pay attention to the welded truss and floor beam joints in all bridges subject to fatigue stresses.

4. Check the ends of the bridge for any damage which may have been caused by vehicular impact.

5. Check the integrity of concrete abutments and/or piers for scour due to water flow if applicable, etc., per AASHTO's Manual for Maintenance Inspection or the foundation engineer's recommendations.

6. Check anchor bolts for damage and see that they are secure. Examine all bearings to ascertain that they are functioning properly. Expansion bearings and the expansion joints at the ends of the bridge must be checked to see that they can move freely and are clear of all foreign material.

7. Spliced Bridges:

a. Check the bolted splices for any excessive corrosion or cracking of the steel or fasteners.

b. Make sure all weep holes are open and clear of debris to allow for complete drainage of any moisture which may collect on the interior tube surfaces.

B. If problems are seen during the inspection procedure, cleaning and repair or replacement of weathering steel bridge components may be necessary; painted bridges may require cleaning and repainting or replacement of all members.

MAINTENANCE FOR WEATHERING BRIDGES

The following steps will help increase the life span of your Self-Weathering bridge:

- A. Try to avoid using de-icing salts for snow removal.
- B. Avoid retention of debris on the steel surfaces. Flush bridges at areas which accumulate debris (including salt) on a regular basis.
- C. Prevent weathering steel from contact with soil, vegetation, masonry, or other materials so that the weathering process can proceed on a natural basis.

MAINTENANCE FOR PAINTED BRIDGES

Painted bridges, like any painted structure, require periodic inspections and painting. The following steps will help increase the life span of your bridge:

- A. After inspections, or any time loss or damage of the paint coat is noticeable, problem areas should be repaired as follows:
 - 1. Select a maintenance coating system based on the following:
 - a. Inspection report findings
 - b. Environment (identify any corrosives)
 - c. Degree of surface preparation attainable
 - d. Current paint compatibility

NOTES:

- * Generic type compatibility is a major factor in the selection of a system (some coating systems are not recommended over a particular type of existing material.)
- * Depending upon the surface performance, an upgrade in the coating system may be necessary at this time.

2. Clean all applicable surfaces as dictated by the repair system chosen (i.e. pressure wash, brush off, blast clean, etc.)

3. Apply repair coats per the coating manufacturer's recommendations.

4. Caulk all unwelded seams which are in need of repair with a good quality clear silicone caulk suitable for exterior use.

B. The entire bridge structure will require periodic repainting dependent upon varying factors such as the existing paint system, bridge usage, atmospheric environment, etc. Repainting will typically be required every 2-10 years. The frequency of painting will need to be determined by the inspector.

The following steps should be followed when repainting the bridge structures:

1. Remove wood decking or grating, fencing, wood rubrails, and any other non-painted items which will not be receiving new paint. Concrete and asphalt decked bridges will be painted with the deck in place, unless these decks have deteriorated to the point of replacement. If this is the case, remove the deck prior to painting.

2. Select a coating system paying attention to the following items:

- * Environment, specifically any corrosives identified during inspections
- * Substrate condition
- * Surface preparation limitations

3. After selecting a system compatible with all existing surface conditions and site limitations, clean all surfaces and apply according to the coating manufacturer's recommendations.

4. After the coating system has properly cured, caulk all unwelded seams with a good quality clear silicon caulk suitable for exterior use and inspect the decking, fencing, etc., which were removed prior to cleaning and repainting the structure. This would be a good time to replace any wood that shows any signs of deterioration.

MAINTENANCE FOR DECKING

Wood is a natural material, which exhibits volume changes with variations in moisture content and time, particularly in the width direction, which can cause gaps to form between the planks. Cupping and splits may occur which need to be repaired. Deck maintenance is the Bridge owners responsibility

A. Replace all planks that have deteriorated past a useful life.

B. Eliminate gaps between the planks that might be large enough for a high-heeled shoe to become lodged. Eliminating gaps can be done the following way:

1. Remove all deck bolts.
2. Remove plank hold down angles. Be sure to mark their locations for ease of reinstallation.
3. Slide wood planks together.
4. Add new plank or planks to fill up the excess space.
5. Reinstall plank hold down angles.
6. Drill new holes in wood planks.
7. Install new deck bolts (see shop drawings for size and material).

C. Replacement planks may be purchased through Art Thureson, Inc.

NOTE: On two layered deck systems, the top layer can be easily removed, flipped and reattached.

GENERAL MAINTENANCE

A. Soil Clearance

Soil or dirt must not be left in contact with bare weathering or painted steel surfaces. In addition, adequate clearance for ventilation must be maintained between the ground and weathering steel surfaces to allow the steel to dry after wetting, forming its protective patina. If the initial construction of abutments and back slopes did not allow for adequate ventilation (approximately 18"-24"), enough soil, debris, and/or vegetation should be removed and kept cut back to allow for adequate airflow. If this is not possible, a coating designed for "ground contact" protection of steel may be applied to the members in the affected area.

B. Snow Removal

Due to the possible accumulation of chlorides at truss joints, in the gaps between planks on structures with timber decks, on below deck members, and/or along the edges of decks where runoff occurs, the use of de-icing salts should be avoided on these structures. The best and safest way to remove snow from these bridges, as far as the issue of steel corrosion is concerned, is by shoveling or plowing snow from the bridge deck. Non-corrosive traction aids such as sand may be used on the deck surfaces; however, if corrosive de-icing agents are used on the structure; accelerated corrosion of members which are exposed to the agent will take place, voiding the bridge warranty and necessitating repair or replacement of affected members. Care must still be taken to maintain the structure by cleaning or rinsing areas where water drains or salt get thrown onto ungalvanized steel surfaces by wheel traffic, spreading, etc.