

# Just for street and road workers

*Editor's note:* The two articles on page 6–8 are the latest in a series based on information in Iowa's Local Roads Maintenance Workers' Manual. The manual was developed by CTRE and sponsored by the Iowa Highway Research Board (TR-514). The series began with the July–August 2006 issue of Technology News. Previous topics included maintaining gravel roads and identifying/repairing pavement distresses.

## Routine bridge observation activities

A bridge failure can be catastrophic. It can cause injury or death and can be very expensive to restore. Defects, damage, erosion, or other serious flaws need to be addressed quickly.

City and county road maintenance workers should always be alert for and tell your supervisor about any signs of bridge problems. As you drive over bridges or work in their vicinity, be aware of the signs of bridge stresses.

Conduct these informal observations on a routine, ongoing basis during all seasons of the year. When spring arrives, look particularly at bridge approaches and bridge decks for deterioration from freeze-thaw action.

### Bridge approach

On gravel road approaches to bridges, look for the following potential problems:

- Poor crown transition from the road to the bridge deck.
- Too much aggregate and/or inadequate crust on the bridge approach, so that the aggregate migrates onto the bridge deck. Aggregate on the bridge deck may, in effect, narrow the operating width of the bridge.
- Standing water or erosion at the shoulder line.

On paved road approaches to bridges, look for the following potential problems:

- Pavement distresses and excessive cracking
- Joint failures
- Erosion at the pavement edges
- Cracking or settlement of approach slabs
- Poor condition of expansion joint where the slab meets the bridge deck
- Poor ride
- W-beam rail sections badly bent out of shape

- Loose bolts
- Loose, broken, or rotted wooden posts
- Bent or badly off line steel posts
- Inadequate guardrail blister offering too little support of the end section
- Holes or ruts under the guardrail that vehicle wheels could drop into
- Traffic damage
- Too low or too high rail
- Overgrown vegetation under and around the rail

### Bridge decks

In Iowa, bridge decks can be timber, concrete, or steel.

**Timber decks.** Potential problems:

- Loose nails, spikes, or fasteners
- Openings between planks over abutments and piers which allow dirt to sift through
- Split, worn, broken, or decayed planks

**Concrete decks.** Potential problems:

- Cracking
- Leaching
- Exposed reinforcing
- Scaling
- Potholes
- Spalling
- Other evidence of deterioration

**Steel decks.** Potential problems:

- Corrosion
- Unsound welds
- Loose welds where the deck is fastened to the stringers
- Dirt collected in open-grid decking on top of stringers
- Deteriorated paint



Check under the bridge for seepage, calcium deposits, and cracks in the deck or beams

### Traffic control devices

Typical traffic control devices (TCDs) at bridges include object markers, delineators, pavement markings, and signing. All TCDs should be easily visible and not damaged or worn.

### Structural members

Observe the condition of trusses by sighting along the roadway rail or curb and along the truss chord members. Look for truss misalignment, either vertical or horizontal. Bent trusses may reduce the bridge's operating width and/or reduce the structure's soundness.

Note any members damaged by vehicles.

**Underside of the deck.** Potential problems:

- Seepage
- Calcium deposits
- Cracks in the deck
- Exposed reinforcing

**Structural members.** Potential problems with steel or pre-stressed concrete beams, bridge abutments, and backwalls:

- Steel beams that are corroded, discolored, or bent from being hit
- Pre-stressed beams that are cracked or have pieces missing, particularly on the bottom flanges
- Backwalls that are eroded or pushed out of alignment

- Abutments that are deteriorated or have erosion problems or leaking deck joint
- Bearings that are corroded or frozen up due to rusting

**Piers and columns.** Potential problems:

- Erosion at the bottom of the columns
- Deteriorated concrete in the columns
- Pier caps that are cracked or out of alignment
- Piers that are damaged due to ice or other debris

### Slope protection

The purpose of bridge slope protection is to control erosion and vegetation growth. On paved slope protection, look for the following potential problems:

- Broken panels (Broken panels may not need to be replaced if they are seated and generally conform to the slope.)
- Cracks (Although cracks themselves are not detrimental to the performance of slope protection, they should be sealed to prevent water intrusion, which may cause settlement and/or sliding of the panels.)

Most slope protection is riprap or revetment. Look for the following problems:

- Bare areas
- Exposed fabric
- Erosion
- Inadequate rock size

## Characteristics of well-maintained bridges

- The operating lanes are as wide as they were when the bridge was constructed.
- Structural members are free from damage and corrosion and are in the same alignment as when they were built.
- The deck is free of debris and deterioration.
- All traffic control devices are in place, well maintained, and visible.
- The channel is free of erosion.
- The channel and structural members are clear of debris.
- The bridge railing is in good condition.
- Any approach guardrail is in place and properly aligned.
- The approach provides smooth access to the bridge deck.

### Drainage systems and waterways

Drainage systems should be repaired or replaced as necessary to prevent further damage. Look for the following potential problems along the waterways:

- Debris collecting near piers or in the stream channel. Debris accumulations may cause scour, redirect the stream channel, apply excessive hydraulic loads, or become a fire hazard. They should be removed as soon as possible.
- Damage to wing dams, etc., which protect the bridge or control the streambed. Such damage should be scheduled for repair as soon as possible.
- Sand and gravel bars that divert water flow and perhaps cause scour.

### For more information

For in-depth bridge inspection and repair documents and courses, contact Iowa LTAP librarian Jim Hogan, 515-294-2481, hoganj@iastate.edu. ■