

(c) *Assignment of responsibility.* The owner of the track carried by a bridge may assign responsibility for maintenance of the bridge to another party as long as the assignment ensures that responsibility for the safety of the bridge is not diminished.

2. Capacity of bridges.

(a) *Determination.* The safe capacity of bridges should be determined by competent engineers using accepted principles of structural design and analysis.

(b) *Analysis.* Proper analysis of a bridge requires knowledge of the actual dimensions, materials and properties of the structural members of the bridge, their condition, and the stresses imposed in those members by the service loads.

(c) *Rating.* The factors which were used for the design of a bridge can generally be used to determine and rate the load capacity of a bridge provided:

- (i) The condition of the bridge has not changed significantly, and
- (ii) The stresses resulting from the service loads can be correlated to the stresses for which the bridge was designed or rated.

3. Bridge loads.

(a) *Control of loads.* The operating instructions for each railroad operating over bridges should include provisions to restrict the movement of cars and locomotives whose weight or configuration exceed the nominal capacity of the bridges.

(b) *Authority for exceptions.* Equipment exceeding the nominal weight restriction on a bridge should be operated only under conditions determined by a competent engineer who has properly analyzed the stresses resulting from the proposed loads.

(c) *Operating conditions.* Operating conditions for exceptional loads may include speed restrictions, restriction of traffic from adjacent multiple tracks, and weight limitations on adjacent cars in the same train.

4. Bridge records.

(a) The organization responsible for the safety of a bridge should keep design, construction, maintenance and repair records readily accessible to permit the determination of safe loads. Having design or rating drawings and calculations that conform to the actual structure greatly simplifies the process of making accurate determinations of safe bridge loads.

(b) Organizations acquiring railroad property should obtain original or usable copies of all bridge records and drawings, and protect or maintain knowledge of the location of the original records.

5. Specifications for design and rating.

(a) The recommended specifications for the design and rating of bridges are those found in the "Manual for Railway Engineering" published by the American Railway Engineering Association (AREA). These specifications incorporate recognized principles of structural design and analysis. They are continually reviewed and revised by committees of competent engineers. Other specifications for design and rating, however, have been successfully used by some railroads and may also be suitable now.

(b) A bridge can be rated for capacity according to current specifications regardless of the specification to which it was originally designed.

6. Periodic inspections.

(a) Periodic bridge inspections by competent inspectors are necessary to determine whether a structure conforms to its design or rating condition and, if not, or the degree of nonconformity.

(b) The prevailing practice throughout the railroad industry is to inspect railroad bridges at least annually. Inspections at more frequent intervals may be indicated by the nature or condition of a structure or intensive traffic levels.

7. Underwater inspections.

(a) Inspections of bridges should include measuring and recording the condition of substructure support at locations subject to erosion from moving water.

(b) Stream beds are often not visible to the inspector. Indirect measurements by sounding, probing, or any other appropriate means are necessary in those cases. A series of records of those readings will provide the best information should unexpected changes suddenly occur. Where such indirect measurements do not provide the necessary assurance of foundation integrity, diving inspections should be performed as prescribed by a competent engineer.

8. Special inspections.

(a) A special bridge inspection should be performed after an occurrence that might have reduced the capacity of the bridge, such as a flood, a derailment, or an unusual impact.

(b) When a railroad learns that a bridge might have suffered damage through an unusual occurrence, it should restrict train operation over the bridge until the bridge can be inspected and evaluated.

9. Inspection records.

(a) Bridge inspections should be recorded. Records should identify the structure inspected, the date of the inspection, the name of the inspector,

the components inspected, and their condition.

(b) Information from bridge inspection reports should be incorporated into a bridge management program to ensure that exceptions on the reports are corrected or accounted for. A series of inspection reports over time should be maintained so as to provide a valuable record of trends and rates of degradation of bridge components. The reports should be structured to promote comprehensive inspections and effective communication between an inspector and an engineer who performs an analysis of a bridge.

(c) An inspection report should be comprehensible to a competent person without interpretation by the reporting inspector.

10. Bridge inspectors and engineers.

(a) Bridge inspections should be performed by technicians whose training and experience enable them to detect and record indications of distress on a bridge. Inspectors must provide accurate measurements and other information about the condition of the bridge in enough detail for an engineer to make a proper evaluation of the safety of the bridge.

(b) Accurate information about the condition of a bridge should be evaluated by an engineer who is competent to determine the capacity of the bridge. The inspector and the evaluator are often not the same individual. The quality of the bridge evaluation depends on the quality of the communication between them.

11. Scheduling inspections.

(a) A bridge management program should include a means to ensure that each bridge under the program is inspected at the frequency prescribed for that bridge by a competent engineer.

(b) Bridge inspections should be scheduled from an accurate bridge inventory list that includes the due date of the next inspection.

12. Special considerations for railroad bridges.

Railroad bridges differ from other types of bridges in the types of loads they carry, in their modes of failure and indications of distress, and in their construction details and components. Proper inspection and analysis of railroad bridges requires familiarity with the loads, details and indications of distress that are unique to this class of structure.

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