APPENDIX D
TRACK SAFETY STANDARDS

Excerpts from the Code of Federal Regulations
49 - Part 213
Appendix C to Part 213 – Statement of Agency Policy on the Safety of Railroad Bridges

Guidelines

1. Responsibility for Safety of Railroad Bridges

(a) Track owner. The owner of the track on a bridge, or another person assuming responsibility for the compliance of that track with this Part under provisions of Sec. 213.5, is responsible for ensuring that the bridge is capable of safely carrying all railroad traffic operated on that track, and for specifying the maximum loads that may be operated over the bridge.

(b) Divided ownership. Where the owner of the track on a bridge does not own the bridge, the track owner should ensure that the bridge owner is following a program that will maintain the integrity of the bridge. The track owner either should participate in the inspection of the bridge, or should obtain and review reports of inspections performed by the bridge owner. The track owner should maintain current information regarding loads that may be operated over the bridge, either from its own engineering evaluations or as provided by a competent engineer representing the bridge owner. Information on permissible loads may be communicated by the bridge owner either in terms of specific car and locomotive configurations and weights, or as values representing a standard railroad bridge rating reference system. The most common standard bridge rating reference system incorporated in the "Manual for Railway Engineering" of the American Railway Engineering and Maintenance-of-Way Association is the dimensional and proportional load configuration devised by Theodore Cooper. Other reference systems may be used where convenient provided their effects could be defined in terms of shear, bending, and pier reactions as necessary for a comprehensive evaluation and statement of the capacity of a bridge.

(c) Other railroads. The owner of the track on a bridge should advise other railroads operating on that track of the maximum loads permitted on the bridge stated in terms of car and locomotive configurations and weights. No railroad should operate a load that exceeds those limits without specific authority from, and in accordance with restrictions placed by, the track owner.

2. Capacity of Railroad 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 means 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 that 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. Railroad 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. Railroad 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 of Railroad Bridges

(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 and Maintenance-of-Way Association. These specifications incorporate recognized principles of structural design and analysis to provide for the safe and economic utilization of railroad bridges during their expected useful lives. These specifications 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 continue to be suitable.

(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 of Railroad Bridges

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

(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 often are 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 in the event 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. Seismic Considerations

(a) Owners of bridges should be aware of the risks posed by earthquakes in the areas in which their bridges are located. Precautions should be taken to protect the safety of trains and the public following an earthquake.

(b) Contingency plans for seismic events should be prepared in advance, taking into account the potential for seismic activity in an area.

(c) The predicted attenuation of ground motion varies considerably within the United States. Local ground motion attenuation values and the magnitude of an earthquake both influence the extent of the area affected by an earthquake. Regions with low frequency of seismic events produce less data from which to predict attenuation factors. That uncertainty should be considered when designating the area in which precautions should be taken following the first notice of an earthquake. In fact, earthquakes in such regions might propagate their effects over much wider areas than earthquakes of the same magnitude occurring in regions with frequent seismic activity.

9. Special Inspections of Railroad Bridges

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

(b) When a railroad’s managers learn that a bridge might have suffered damage through an unusual occurrence, they should restrict train operations over the bridge until the bridge is inspected and evaluated.

10. Railroad Bridge 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 prepared 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.

11. Railroad 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 should provide accurate measurements and other information about the condition of the bridge in enough detail so that an engineer can 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 often are not the same individual. The quality of the bridge evaluation depends on the quality of the communication between them.

12. 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.

13. 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 require familiarity with the loads, details, and indications of distress that are unique to this class of structure. Particular care should be taken that modifications to railroad bridges, including retrofits for protection against the effects of earthquakes, are suitable for the structure to which they are to be applied. Modifications should not adversely affect the serviceability of the bridge or its accessibility for periodic or special inspection.