

## TR-421 Use of Railroad Flat Cars for Low Volume Bridges

Key Words: Railroad Flat Cars, Bridges, Low Volume Roads

### ABSTRACT

In an attempt to solve the bridge problem faced by many county engineers, this investigation focused on a low cost bridge alternative that consists of using railroad flatcars (RRFC) as the bridge superstructure. The intent of this study is to determine whether these types of bridges are structurally adequate and potentially feasible for use on low volume roads.

A questionnaire was sent to the Bridge Committee members of the American Association of State Highway and Transportation Officials (AASHTO) to determine their use of RRFC bridges and to assess the pros and cons of these bridges based on others' experiences. It was found that these types of bridges are widely used in many states with large rural populations and they are reported to be a viable bridge alternative due to their low cost, quick and easy installation, and low maintenance.

A main focus of this investigation was to study an existing RRFC bridge that is located in Tama County, IA. This bridge was analyzed using computer modeling and field load testing. The dimensions of the major structural members of the flatcars in this bridge were measured and their properties calculated and used in an analytical grillage model. The analytical results were compared with those obtained in the field tests, which involved instrumenting the bridge and loading it with a fully loaded rear tandem axle truck. Both sets of data (experimental and theoretical) show that the Tama County Bridge (TCB) experienced very low strains and deflections when loaded and the RRFCs appeared to be structurally adequate to serve as a bridge superstructure. A calculated load rating of the TCB agrees with this conclusion.

Because many different types of flatcars exist, other flatcars were modeled and analyzed. It was very difficult to obtain the structural plans of RRFCs; thus, only two additional flatcars were analyzed. The results of these analyses also yielded very low strains and displacements.

Taking into account the experiences of other states, the inspection of several RRFC bridges in Oklahoma, the field test and computer analysis of the TCB, and the computer analysis of two additional flatcars, RRFC bridges appear to provide a safe and feasible bridge alternative for low volume roads.