

STATEMENT OF WARD GOODMAN, DIRECTOR OF HIGHWAYS, ARKANSAS HIGHWAY DEPARTMENT, CHAIRMAN, AASHO COMMITTEE ON BRIDGES AND STRUCTURES; HEARING S. 2658, ROADS SUBCOMMITTEE OF THE HOUSE PUBLIC WORKS COMMITTEE, MAY 28, 1968

Mr. Chairman, and Gentlemen of the Committee, I am Ward Goodman, Director of Highways for the State of Arkansas and Chairman of the Bridges and Structures Committee of the American Association of State Highway Officials.

I am pleased to have the opportunity of appearing before you and express our views on S. 2658, to amend Section 127 of Title 23, U.S. Code, relating to weight and size limitations on the Interstate System which is a part of the Federal Aid Primary System. For your convenience, my statements are listed first and the discussion follows.

This statement pertains to the effect of the weight provisions of S. 2658 on bridges only. Discussions pertain to main carrying members. Overstress in secondary members and floor system is just as critical but failure is not as catastrophic.

The revised formula in S. 2658 adds 4,000 pounds to every value listed in Table I of AASHO "Policy of Maximum Dimensions and Weights of Motor Vehicles to be operated over the highways of the United States."

The proposed changes by S. 2658 will have little adverse effect on bridges designed for HS 20-44 design load.

However, for all bridges in the United States, those designed for HS 20-44 represent a small percentage of all the bridges, which are presently confined to the Interstate System.

Practically all bridges off the interstate system are designed for H 15-44 or less.

The provisions of S. 2658 will overstress bridges designed for H 15 or less to a dangerous extent.

Fatigue stress loss will reduce the safe life of a majority of bridges.

In a recent ballot, 18 Chief Highway Administrators who are charged with the operation and maintenance of bridges and highways voted against raising the present allowable 32,000 lbs. on a tandem axle by AASHO policy to 34,000 lbs. allowable, and all but a couple of the bridge committee members opposed going above the design loading of 32,000 lbs.

It is important that the gross weight bridge formula will not only apply to the overall wheel base of the vehicle or combination vehicle, but also apply to intermediate axle groupings of the vehicle or combination vehicle.

It is our hope that the final version of the bill will contain a table similar to that contained in the AASHO recommended policy showing maximum permissible gross weights to guard against misinterpretations and to aid in administration.

It hasn't been too many years since the builders of bridges were building them on the basis of intuition and experience. When the design of railroad bridges became a scientific analysis based on assumed sequence of wheel loads spaced very similar to an actual train, much progress had been made. The railroads have been largely successful in keeping the applied loads today very much in line with those used to design railroad bridges even as early as those designed prior to the nineteen hundreds. Equality of design and actual load on railroad bridges remains so today because of the railroads' strict enforcement on their own, and peculiarities of track requirements. Highway people have not been so fortunate because no one could foresee the future of traffic wanting to use the highway bridges, either in profile of vehicles or application of load. Such flexibility could not be predicted. When highway bridge builders first began to design highway bridges, they borrowed from their friends the architects and assumed a uniform dead load to represent the coming live loads. Later it will be seen that our predecessors did a fine job in their assumptions. The application of a uniform load over the entire structure to take care of live load simply does not represent the actual condition of a live load moving across a bridge. Some members are over designed, some are under designed and none are designed for a reversal stress. Fatigue as a feature in design in the early years was practically unheard of and not taken into the design of a bridge at all and there was practically no uniformity in the load to be assumed. Some designers were concerned about impact, others were not.

Even until 1920 each state, city or other municipality developed its own specification for live load for highway bridge structures in this manner. Some called for impact, others did not.

Table I shows some typical uniform loadings for steel truss bridges (note year 1916). It is interesting to note that an analysis of these loadings give moments