

In the same hearings, Mr. John O. Morton, President of AASHO, testified that the current practice is to design highway bridges for the 32,000-lb. axle loading. This limitation applies to our current Interstate bridges.

Mr. Frank Masters, Jr., consulting engineer for the firm of Modjeski and Masters, testified before the same Senate committee that the conservative design of many old bridges incorporates a safety factor which has enabled them up to now to carry increased weight and an increased frequency of heavier loads than was forecasted when they were built. However, he noted that "—the bridges which we are designing today are being limited by specifications and standards to structures with capacities slightly in excess of what is expected on the day such spans open."

He goes on to say:

"In fact, the narrowing margins of safety on many older bridges is of such common knowledge within the engineering profession that even the civil engineering exhibit at the Smithsonian Institution comments on it by citing the mammoth modern day traffic loads being handled by bridges designed in an era of horse-drawn wagons."

He also stated:

"Adding significantly to the problem is the growth of freight being carried by the trucking industry in vehicles which are now averaging loads of more than 13 tons as compared to 7½ tons per vehicle carried in 1940."

And one final quotation from Mr. Masters:

"I understand that legislation now before Congress proposes a new standard of axle weights that will, in effect, permit 76,000 lbs. and larger vehicles. This is difficult to comprehend when you consider the fact that almost half the bridges and even fewer highways in the Federal-aid Primary and Secondary Systems are designed for vehicles of 15 tons."

Early this year, the AAA conducted a nationwide survey of state highway departments to determine the loading characteristics of bridges on Defense Requirement Routes. These routes are routes for military movements in a national emergency. For the most part these routes are used today for the great bulk of our long distance truck traffic.

The alarming report by the highway departments of 38 states and the District of Columbia is that more than two-thirds of all these bridges are inadequate for today's heavy truck traffic. Further, nearly half of these bridges are seriously inadequate. You will note from the attached tabulation that 67.8% of the bridges were reported to be of a design standard less than the H-20-S-16. This bridge design is one which will accommodate a 32,000-lb. tandem axle loading. It is the current standard for Interstate bridges. However, almost half of the bridges reported in the AAA survey were of H-15 design or less. Such a design accommodates only 30,000 lb. without experiencing stresses beyond the design limit.

There is no practical way to strengthen a bridge to carry a heavier weight than that for which it was originally designed. And there is no maintenance effort that can be applied to the bridge which would offset overstressing and fatigue of principal bridge members.

Although it is doubtful that immediate bridge failure would result from overstress, even the bridge experts refrain from speculating on what the margin of safety would be for fatigue-weakened bridges.

This unknown quantity makes the safety factor all the more critical, because it is unmeasurable and unpredictable.

In opposing weights proposed in S. 2658, similar to those proposed under H.R. 14474, Mr. Virden E. Staff, Chief Highway Engineer for the State of Illinois, stated:

"S. 2658 will permit vehicles on HS-20 bridges to produce stresses beyond the present design limits * * * on H-15 bridges to produce stresses in the unsafe range * * * on less than H-15 bridges to produce stresses that can be expected to result in failure."

(Note: HS-20 bridges are designed for 40,000 lbs.)

Mr. Ward Goodman, Director of Highways for the State of Arkansas and Chairman of AASHO's Committee on Bridges and Structures, told the Senate Public Works Committee:

"The provisions of S. 2658 will overstress bridge design for H-15 or less to a dangerous extent, even up to 40%."

He noted: