

# Protecting our bridges for the future

Changes in agriculture operations over the past 50 years are having a dramatic impact on Iowa's roads and bridges. The average size of an Iowa farm has increased to 352 acres in 2003, compared to 237 acres in 1970. Modern agricultural practices have also produced higher yields per acre, which means more grain to haul to market.

In order to increase efficiency, farmers are using larger capacity wagons hauling more bushels per trip to the elevator, and using much heavier equipment in their farming operations. This trend is stressing Iowa bridges beyond the current capabilities to maintain them.

Bridges are subject to damage from a combination of the weight on each axle and the spacing of the axles. Iowa laws set maximum gross axle weights of 20,000 pounds for a single axle and 34,000 pounds for a tandem axle on a legal truck.






Most vehicles used as "implements of husbandry" are not required to obey these maximum legal axle weights. Implements of husbandry, considered to be grain carts, tank wagons, or fence-line feeders, are allowed to carry up to 24,000 pounds per axle from Feb. 1 through May 31, and may carry 28,000 pounds per axle from June 1 through Jan. 31 with a maximum gross weight not to exceed 96,000 pounds year-round. These implements of husbandry are restricted to 20,000 pounds per axle and 80,000 pounds gross if they must cross a bridge.

Many bridges in Iowa are over 50 years old. These bridges were designed for lower traffic volumes, smaller vehicles, and lighter loads than are common today. More than 20 percent of Iowa's county bridges are classified as deficient and need to be rehabilitated or replaced. Many of these bridges are deficient because their load-carrying capacity is inadequate for today's traffic.

The weight carried on tractor-semitrailers is distributed over more axles and a greater length to limit the stress on bridges to acceptable levels. The design of some farm equipment, such as combines and tractors, also results in acceptable stress levels. The vehicles that carry heavy loads on a limited number of axles (one- and two-axle grain carts, grain wagons, and liquid manure tanks) are creating significantly more stress on bridges.

These farm implements are traveling on Iowa's roadways with loads that are much higher than the maximum axle weights permitted for large commercial vehicles. The stress this places on bridges, even though it has been limited to 20,000 pounds per axle and 80,000 pound gross, is still excessive for many structures throughout the state. Implements of husbandry are restricted from crossing an embargoed bridge with loads greater than the posted limit, but the stresses caused by these implements of husbandry can be higher than the allowable stress capacity of

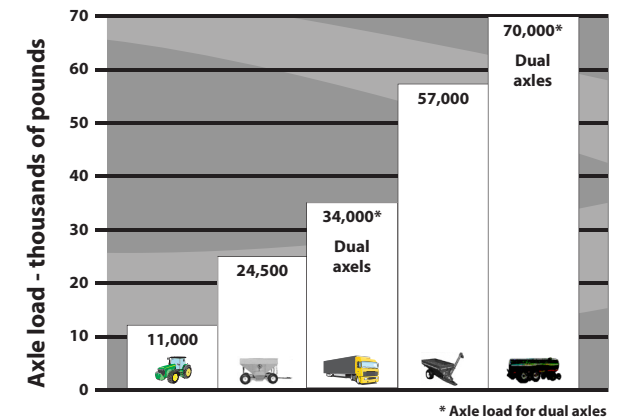
## Axle weight comparisons

	Large row crop tractor 18,000 lbs.	Two single axles 11,000 lbs. front/7,000 lbs. rear
	Grain wagon - 775 bu. 49,000 lbs.	Two single axles 24,500 lbs. each axle
	Five-axle truck 80,000 lbs.	Two dual axles/one single axle 34,000 lbs. duals/ 12,000 lbs. single
	Grain cart - 875 bu. 68,700 lbs.	<b>One single axle</b> <b>57,000 lbs.</b>
	Liquid manure tank 10,000 gal. 96,000 lbs.	<b>Two dual axles</b> <b>70,000 lbs. rear duals</b> <b>26,000 lbs. front duals</b>

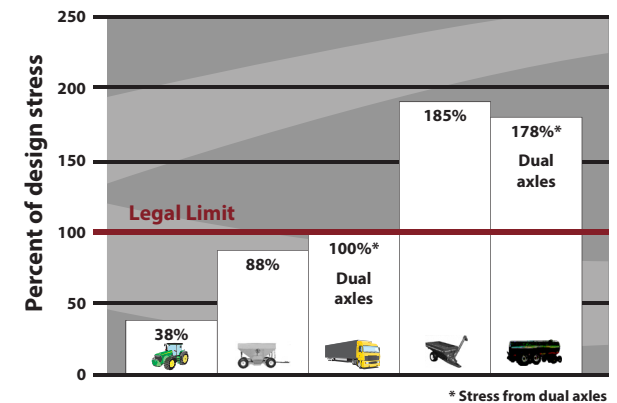
the bridge even at the posted limit. Bridges are posted according to legal truck loads. Posting signs near bridges for possible implement of husbandry loading is impractical and would likely be too restrictive for commercial vehicles.

Subjecting bridges to vehicles that are heavier than the bridges were designed to carry shortens the service life, and can cause both visible and hidden damage. The cumulative effect of the damage caused by these heavy loads will eventually force the roadway jurisdiction owning the bridge to restrict the weight of vehicles using the bridge or, in extreme cases, to close the bridge to all traffic.

## Axle loads



## Stress - standard 20 foot single span bridge



## Results of overstressed bridges.



*Temporary closure to traffic.*



*Cracked timber stringers.*



*Concrete slab spalling.*



### Some facts about bridges in Iowa

Number of bridges on county roads ..... 19,008

Number of embargoed bridges on county roads ..... 4,787

Number of all bridges in Iowa (total) ..... 24,264

For more information contact:  
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