

Stressing Our Future



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An adequate and safe road system is critical to the timely and efficient transportation of grain and farm machinery at harvest time. However, changes in agricultural operations over the past 30 years are having a dramatic impact on Iowa's road system, and are affecting our ability to maintain that system.

The average size of an Iowa farm has increased to 339 acres today, nearly 70 percent greater than in 1970. Modern agricultural practices have also produced higher yields per acre, which mean more grain to haul to market.



In order to increase efficiency, farmers are beginning to use 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 roads and bridges beyond the current capabilities to maintain them.

Since stress to pavements is related to a vehicle's axle weight, Iowa laws regulate the axle weights of most heavy vehicles using the roadways. The legal weight limits are 20,000 pounds for a single axle and 34,000 pounds for a tandem axle. Most vehicles used as "implements of husbandry" are exempt from regulation for weight limits. Consequently, many vehicles used in farming operations exceed those weights.



The heavier weight carried on tractor-semitrailers is distributed over more axles to minimize pavement










damage. The design of some farm equipment such as combines and tractors also results in minimizing stress on roadways. However, the vehicles which 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 roadways. These farm implements are traveling with loads that are well over the maximum axle weights which are permitted for large commercial vehicles. As a result, the vehicles carrying heavy loads on a limited number of axles are using up the life of the pavement with significantly fewer passes.

Stress on bridges is also significantly increased by certain vehicle types. This stress, compounded by the fact that most implements of husbandry are exempt from bridge embargoes, may create serious safety concerns.



Effect of different vehicles on roadway pavement

The following chart compares the stress on pavement created by a variety of heavy vehicles. The number of passes to failure indicates that some vehicle types shorten the life of pavement with significantly fewer passes.

| Type | Axes | # Passes to failure 6" PCC* | # Passes to failure 7" PCC* |
|--|---------------------------------------|-----------------------------|-----------------------------|
|  5-Axle Tractor-Semitrailer 80,000 lbs. | 1 Single/2 Tandems | 12,000 | 135,000 |
|  7-Axle Tractor-Semitrailer 96,000 lbs. | 1 Single/2 Tridem | 78,000 | 175,000 |
|  Grain Cart - 900 bu. 58,000 lbs. (20% on tow vehicle) | Tandem | 200 | 6,000 |
|  Grain Cart - 875 bu. 57,000 lbs. (20% on tow vehicle) | Single | < 10 | < 30 |
| Grain Cart - 650 bu. 42,000 lbs. (20% on tow vehicle) | Single | < 30 | 270 |
|  Grain Wagon - 775 bu. 49,000 lbs. | 2 Singles | 1,000 | 60,000 |
|  2 Grain Wagons - 450 bu. 31,000 lbs. each | 4 Singles | 106,000 | 239,000 |
|  Combine - Empty | 2 Singles (1 tire on pavement) | | |
| 27,500 lbs. w/o corn head | 18,000 front/9,500 rear | 3,790,000 | 8,468,000 |
| 32,000 lbs. w/corn head | 26,000 front/6,000 rear | 887,000 | 1,980,000 |
| Combine - w/240 bu. | 2 Singles (1 tire on pavement) | | |
| 41,000 lbs. w/o corn head | 27,500 front/13,500 rear | 712,000 | 1,591,000 |
| 46,000 lbs. w/corn head | 36,000 front/10,000 rear | 100,000 | 456,000 |
|  Large Row Crop Tractor 18,000 lbs. | 2 Singles 11,000 front/7,000 rear | 1,525,000 | 3,410,000 |
|  Liquid Manure Tanks 10,000 gallon - 96,000 lbs | 2 Tandems 26,000 front/70,000 rear | < 10 | < 30 |
| 7,500 gallon - 71,000 lbs | 1 Tandem | < 10 | < 30 |

* PCC - Portland Cement Concrete

Note - Structurally equivalent asphalt concrete pavements have similar impacts.



Some facts about county roadways in Iowa

Miles of paved county roads 15,505

Number of bridges on county roads 20,387

Number of embargoed bridges on county roads 6,933

For more information, contact



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