THE EFFECTS OF IMPLEMENTS OF HUSBANDRY "FARM EQUIPMENT" ON PAVEMENT PERFORMANCE

Background

Over the past few decades, there have been significant changes in both farm size and farm equipment. In response to market pressure, farms have consolidated and farm size has increased significantly. The farm equipment industry has responded by producing larger and larger application equipment. The shift to larger and heavier equipment has occurred at a fast rate in response to the market demand. For example, it is not unusual to see liquid manure application equipment that hauls 9,000 gallons or more. Innovations such as steer able axles, flotation tires (spreading the load over a much larger area), and new tire designs have been implemented on the equipment in recent years. The length, width and axle loads of the large equipment could potentially create accelerated

damage on roads. However, there is insufficient data to show the effects of the equipment on pavement response and performance. In 2001 the Minnesota Department of Transportation conducted a scoping study on the impact of agricultural equipment (animal husbandry vehicles, grain carts, etc.) on Minnesota's low volume roads. The main purpose of the study was to determine if agricultural equipment

caused excess pavement damage in Minnesota. The study reviewed several county roads that were claimed to have been damaged by farm equipment. However, the study found that other heavy vehicles, such as trucks hauling gravel or
rock from quarries, might also have contributed to the damage on the roads. This study concluded, "it is difficult to link specific pavement damage to agriculture equipment and quantitatively estimate the reduction in pavement life with current available information." One of the recommendations from the study was to conduct a field study at the MnROAD test facility to specifically address pavement damage due to agricultural equipment.

Project Objectives

The main objectives of this pooled fund project are:

1. Determine the pavement response under various types of agricultural equipment (including the impacts of different tires and additional axles) through instrumented pavements at MnROAD.

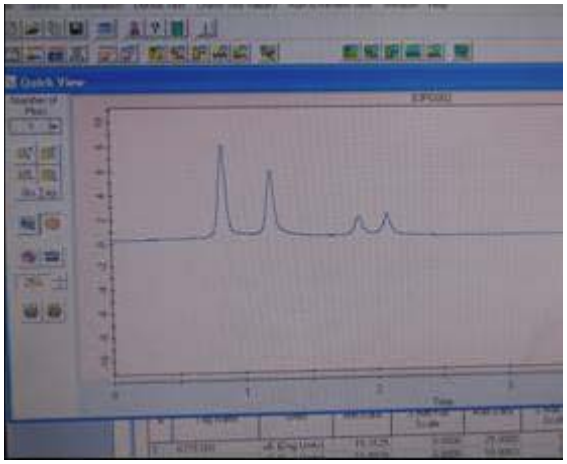
2. Compare this response to that under a typical 5-axle semi tractor-trailer and develop recommendations for determination of relative damage caused by farm equipment if any.

Participants

The following organizations are contributing to this Pooled Funded Project:

Minnesota Local Road Research Board (LRRB)
Minnesota Department of Transportation
Illinois Department of Transportation
Iowa Department of Transportation
Wisconsin Department of Transportation
Private Industry:

- Professional Nutrient Applicators Association of Wisconsin
- John Deere,
- Case IH,
- AgCo,
- Houle Farm Equipment
- Husky Farm Equipment
- Minnesota, Iowa, Ohio, Michigan, Manure Applicators Associations
- Michelin, Firestone/Bridgestone



Research Team

Project Manager
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Selected Testing Equipment

Vehicle Type	Vehicle Make/Model	Est. Gross Wt. (lbs.)	Size	No. of Axles	Tire Type
Straight Truck	Home Made	55,000-58,000	4400 gal	3	flotationl (24")
Straight Truck	Home Made	55,000-58,000	4400 gal	3	dual (22")
Straight Truck	Ag-chem 8204	56,000	1800 gal	2	flotationl (24")
Tanker	Husky/15000	49,260	4000	2	flotation
Tanker	HOULE/EL54-5000	73,600	6000	2	flotation
Tanker	Husky/23000	76,960	6000	2	flotation
Tanker	HOULE/EL48-6D 6100	89,500	7300	3	bias, flot.
Tanker	HOULE/EL48-8D 7400	109,500	8900	4	flotation
Tanker	HOULE/EL48-8D 7900	95000 + tanker weight	9500	4	flotation
Grain Cart		120,000-140,000	800-1000	3	flotation (50")
Grain Cart		120,000-140,000	bushels	1	flotation (50")
Terragator	AGCO Terra Gator 9205	49,600	5280 gal	3	flotations 66" X 43" & 73" X44"
Terragator	AGCO Terra Gator 3244	44,500	4744 gal	2	flotations 73" X44"
Terragator	AGCO Terra Gator 8203	29,440	Air Max 2000	2	flotations 66" X 43"
Terragator	AGCO Terra Gator 9203	33,430	2400 liq 60'/80'	2	flotations 73" X44"
Tractor	John Deere 8430			2	Front:380/80-R38; Rear:480/80-R50
Tractor	Massy Ferguson 8470			2	Front:480/70-R34; Rear:520/85-R46
Standard Semi Truck		80,000		5	Duals (22")
Overloaded Truck		102,000		5	Duals (22")
Materials Transfer Vehicle		75,500 (empty)	25 tons HMA	2	Flotation (25")

Current Status

- Construction of test sections completed Fall of 2007
- Testing completed for:
  - Spring of 2008
  - Fall 2008
  - Spring 2009

  Testing includes collection of axel weights, tire pressure, pavement strain and deflection.
- Quarterly reports on findings completed and are available
- The project ends in summer of 2010

For more information:

For further information on the Implements of Husbandry Pooled Fund Project, please contact:

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For more information on this and other projects and activities at MnROAD:

www.dot.state.mn.us/mnroad