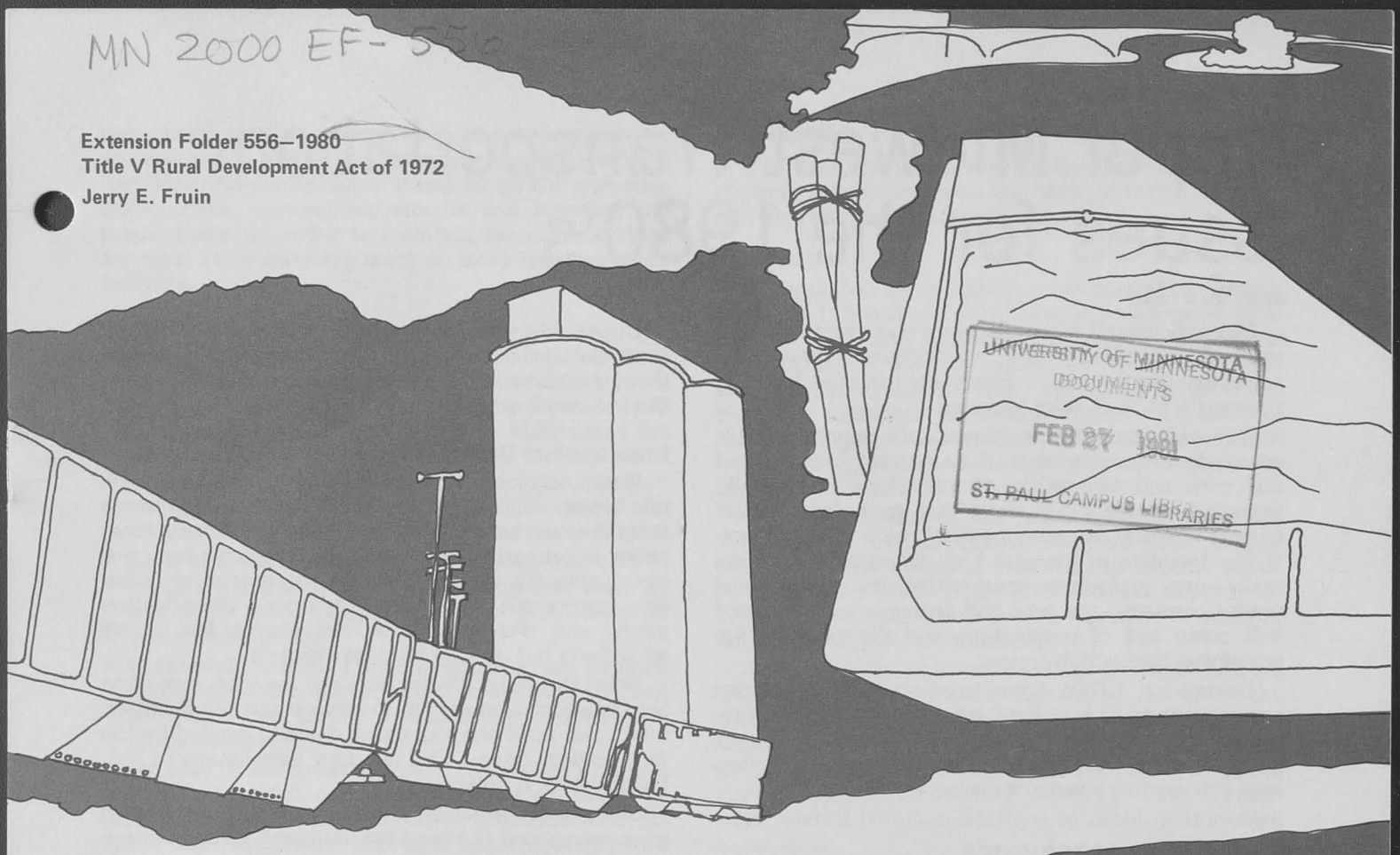
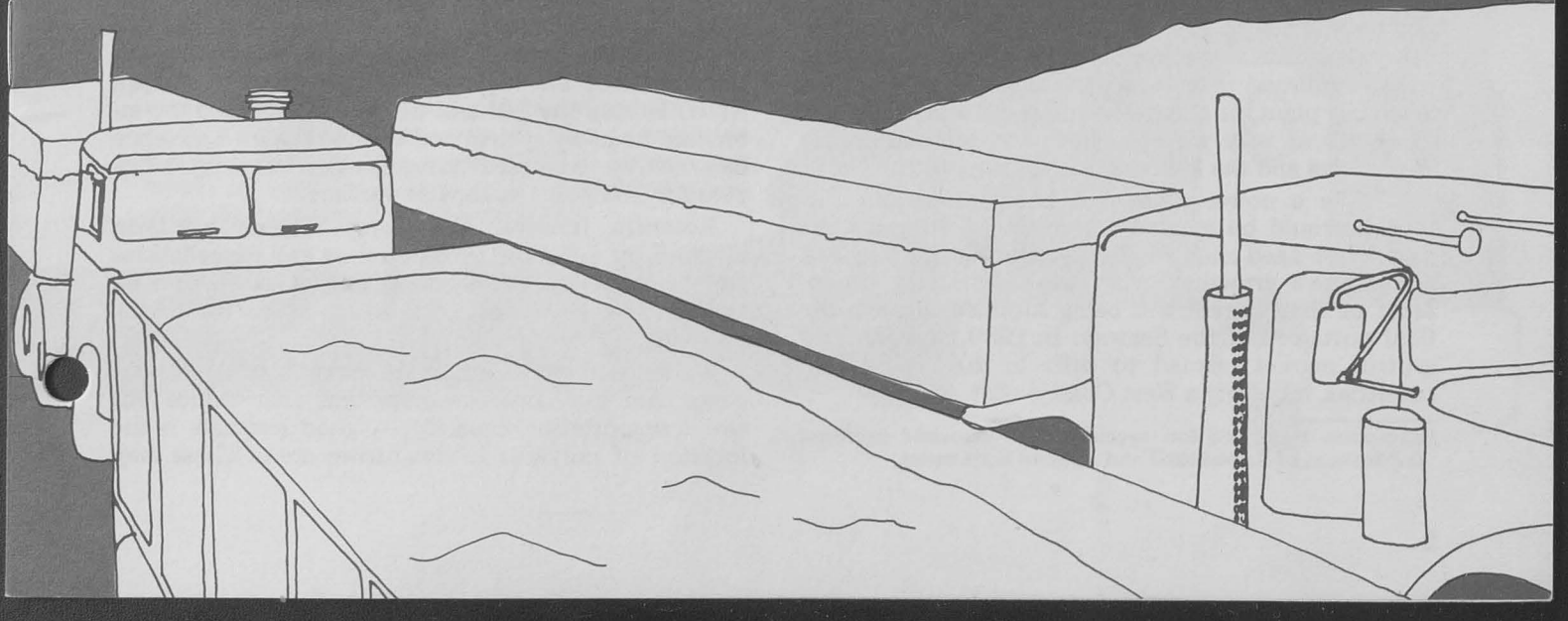
Extension Folder 556—1980
Title V Rural Development Act of 1972
Jerry E. Fruin





# Upper Midwest Transportation Issues for the 1980's

Agricultural Extension Service
University of Minnesota



# Upper Midwest Transportation Issues for the 1980's

Jerry E. Fruin*

Our agricultural technology and trade patterns have reached the point where an adequate agricultural transportation system is absolutely essential for farm prosperity in the Upper Midwest.

Our cash grain farms increasingly require reliable access to international markets. About one-third of our corn and two-thirds of our wheat is typically exported. If we can't move this grain into export channels—either because we don't have the transportation facilities or because high transportation costs make our grain non-competitive in international markets—returns per acre will decrease, marginal land will come out of production, and the value of the remaining land will decrease.

During the 1970s, transportation became a major contributor to the cost of production as agriculture depended more on off-farm inputs and as energy prices rose. Transportation's share of total production cost will continue to grow during the 1980s.

## THREE CHARACTERISTICS

### Location

Upper Midwest farm products are especially vulnerable to transportation short-falls. Because we are the farthest from the oceans and the deepwater ports, we are the last to prosper and the first to be hurt during swings in export demand. Consequently, we have to be ready to ship to where the markets are located. We must have alternative outlets. We must be able to ship to the Gulf of Mexico, through the St. Lawrence Seaway, and move by rail to the West Coast or even the East Coast.

Because of our location, the transportation system serving the Upper Midwest must be flexible. We must be able to respond efficiently to shifts in international demand for farm products. Some policy-makers, however, consider maintenance of two or three outlets for our products as redundant and wasteful. They tend to view vital transportation links in terms of a single road or railroad between a parts manufacturer and an assembly plant, or between a mine and a power plant. They ask us why we need both the railroad to the West Coast and the lock and dam system to the Gulf.

If, like a power plant, we knew where our customers would be located for the next 20 years, we might not need such flexibility. During the late 70s, agriculture's growth market was the Soviet Union. Most of that market was being supplied through the Gulf ports or out the Seaway. In 1980, however, our growth market seemed to shift to the Pacific Rim countries, requiring a West Coast outlet.

*Extension transportation specialist and associate professor, Department of Agricultural and Applied Economics.

Upper Midwest agriculture cannot let itself be short-changed in national transportation planning. Our transportation situation is different from that of the industrial economy.

### Infrastructure Deterioration

We must reverse the 1970s trend of moving from one transportation crisis to another, with each worse than the one before. The increasing severity of these crises is primarily due to the fact that we have not been replacing or repairing the transportation infrastructure—roads, railroads, railroad classification yards, and waterway improvements—as fast as we wear them out or they become obsolete.

Since the early 70s, we have not invested enough in the transportation system to replace existing facilities, much less meet the expanded demand created by the farm export boom. This is a new phenomena in U.S. transportation policy.

Since the formation of the republic, our leaders have recognized the need for improved transportation as a means to promote commerce and our economic well-being. Enormous resources, public and private, were devoted to development of the transportation infrastructure. In the early 1800s, Congress appropriated $6.8 million for the National Pike to run from Cumberland, Maryland, to St. Louis on what was then the western boundary of the United States. From 1820 to 1840 the states spent about $200 million on canal construction. This included the enormously successful Erie Canal which cost $7 million and provided the major impetus for settling the Old Midwest.

Next came the railroad building era, which generally spanned the period from the Civil War until the early 1900's. By the era's end, the average farm in the Corn belt was only 7 miles from a railstop—not a railroad, but a railstop.

During the 1920s and 30s we built rural roads and the old federal primary road system. In the 30s we built most of the locks and dams on the Mississippi River. During the 50s and 60s we constructed the interstate highway system and opened the St. Lawrence Seaway. We increased transportation capacity every year for 150 years, except in wartime.

Recently, however, this annual increase has been reversed by inflation, project delays and cancellations for environmental reasons, political pressures for mass transit, and indecision over what to do for failing railroads.

We must also be aware of technological obsolescence and locational developments that reduce our real transportation capacity. A good example is the location of railyards in downtown areas. These may

have been ideal locations when the railroads were constructed in the 1880s, but not now. Obsolete yard locations frequently force trains to go through congested cities, slowing movements and lowering rail productivity. In order to maintain the infrastructure we must start investing more in fixed transportation facilities.

### A System

Upper Midwest agricultural transportation is a *system* made up of many individual, but related, parts. These parts are generally controlled by separate entities whose goals may be in conflict. Minimizing the costs of one part of the system may increase costs elsewhere, and in fact it may increase total transportation costs. What's best for an individual might not be very good for the rest of the system. For example:

- **Long truck lines at terminal elevators.** The cost of waiting is put on the trucker or shipper. It could be solved by more dumps or storage. Then terminal costs would go up.
- **Overweight trucks.** Carrying an increased payload could result in lower unit costs to the shipper. Then the public has to pay a road damage bill that exceeds transport savings.

Because of the interrelation of the system's parts, a failure in one part may manifest itself elsewhere by delays, increased costs, or other problems. Our so-called rail equipment shortages are frequently not shortages, but symptoms of system breakdown that cause poor equipment utilization. If we were to get the same kind of turn-around in rail hopper cars that we did in 1972—about 18 trips per year—our recent car shortages would have been much less severe. Other parts of the system had the following problems:

- **Slow orders due to poor track.** In some parts of the rail system, the condition of the railbed limits train speeds to 10 or 15 miles per hour on routes where speeds of 30 to 40 miles per hour would have been possible with well-maintained tracks.
- **Shortage of locomotive power.** The cars are filled with grain, but occasionally there are no locomotives in working condition to pull them.
- **Poor turn-around at ports.** We embargo the ports of New Orleans or Houston when the backlog of loaded grain cars in the port area reaches 5,000. No more grain cars may be shipped to that port area until the cars are unloaded. Those 5,000 grain cars make up between 7 and 8 percent of our grain car fleet. Supplying more cars in the countryside would just mean that more $40,000 hopper cars would be used for storage on a siding somewhere, until the problems at ports are solved.

## THE ISSUES

The primary issues involve the financing of the physical infrastructure of the transportation modes—rail, highway, and waterway.

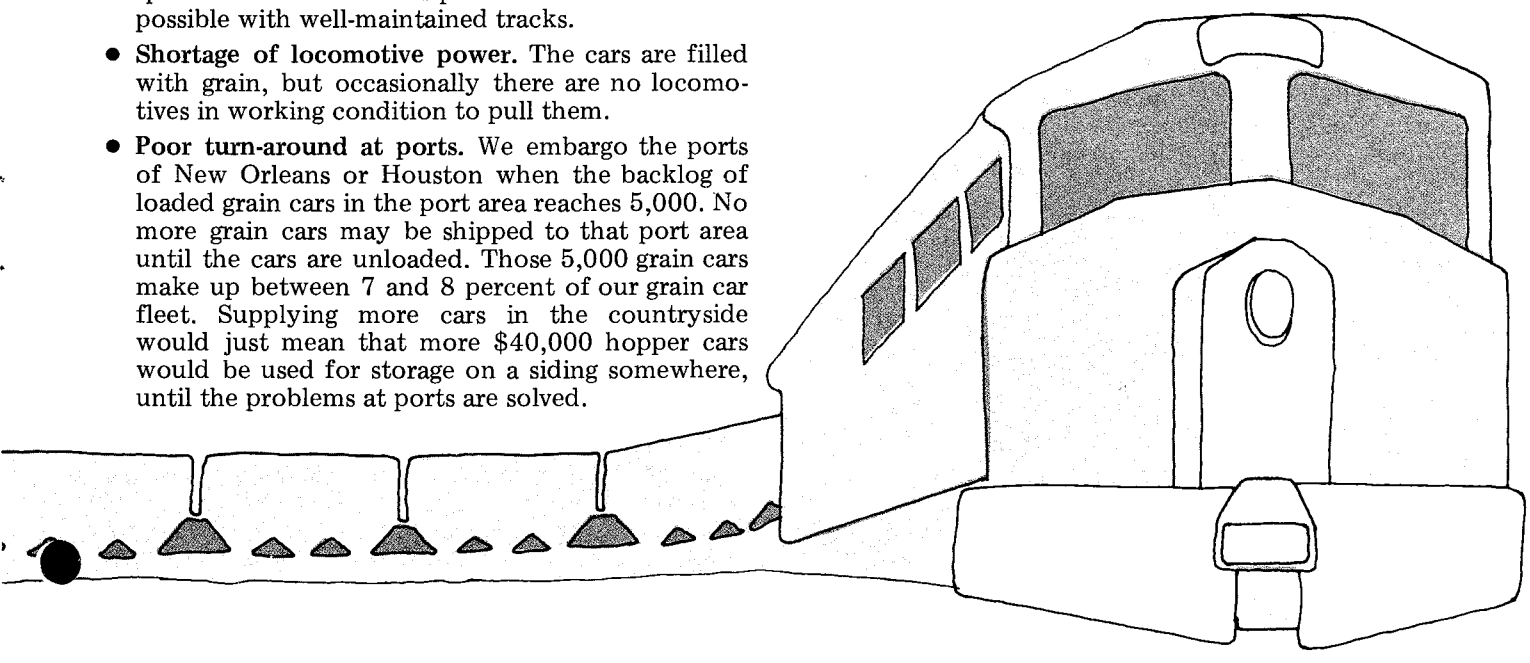
### Deregulation

Deregulation or reregulation are part of the financing issue, but will not solve overall problems on their own. Nor will they cause the disasters that opponents of deregulation are forecasting. On balance, agriculture probably benefits from deregulation. In some instances, increased rate-setting freedom for the railroads is likely to lead to improved and more reliable rail service, although costs are likely to increase for captive shippers.

Under conditions of less rate regulation, rates will be increased for rail captive shippers because they cannot use the threat of switching to another mode to hold down rates. Grain and fertilizer shippers located too far from water outlets would be considered rail captive shippers, for instance.

Another group which may experience disadvantages are the small shippers of commodities for which the railroads contract service. The negotiating power of large shippers might be such that their contract terms are much better than those given to small shippers. The Rural Transportation Advisory Task Force* made several recommendations to avoid or minimize

*The Rural Transportation Advisory Task Force was established by Congress to provide recommendations for determining essential agricultural transportation needs and for meeting those needs. It was made up of representatives from the agricultural, transportation, and academic communities. Its findings were published January, 1980, in its full report to Congress: Agricultural Transportation Services: Needs, Problems, Opportunities. The report is available from USDA's Office of Transportation.



this problem including the establishment of a minimum percentage of cars available for small shippers, regulated contracts for shippers unable to negotiate terms, and programs to assist small shippers in negotiating contracts. These devices, however, are unproven.

In general, trucking deregulation will improve the situation for both agricultural shippers and truckers. The agricultural exemption has been broadened slightly, backhauls will be easier to obtain for owner-operators, exempt and regulated comodities can be carried in the same vehicle, and a number of other owner-operator problems were addressed in the Motor Carrier Act of 1980.

### Rail Revitalization—Who will Pay?

Massive amounts of funds must be committed during the 80s to rebuild our railroad system. This rebuilding includes key lines and new or relocated yard and terminal facilities. Priority must be given to projects which will improve operations and lower costs. In other words, we should not rebuild every branchline. Nor should we maintain excess mainline mileage.

(Excess mileage includes not only low density branchlines, but also mainlines where several railroads serve the same routes and cities. There are four mainlines between Minneapolis and Chicago, for instance. We could allow the railroads to abandon every branchline they wanted to abandon, and those companies in financial difficulty would continue to have financial problems due to excess mileage.)

Funds to rebuild priority lines will probably have to be public funds. Most railroads do not generate enough cash flow to maintain the quality of roadbeds and service levels this country needs. Railroads cannot compete with trucks for much of the new industrial traffic regardless of their rate levels. Trucks have the advantage for many kinds of freight because the railroads have to pay for new facilities as they are constructed. They have to pay cash up front from loans or current earnings. Railroads generally serve the old center cities and warehouse districts, but new manufacturing plants are frequently constructed in the suburbs or the countryside.

For instance, a new plant goes in two miles from a highway. By the time it is completed a new highway is constructed, *financed by tax revenues*, on an existing right-of-way. Even if we assume that truck taxes will pay for the road, this is the same as an interest-free loan to the trucking firms. Truckers do not have to be concerned with acquiring a right-of-way, constructing the road, or making the bond payments during poor times. As a result, truckers get the shipments and the railroads are locked out of business that might have been profitable to them.

In most cases, deregulation and contract rates will not help generate the cash flow the railroads need to finance improvements. Where effective truck or water competition exists, rail rates cannot be raised. Rate-setting freedom will increase revenues only if the railroads can raise their rates *and* stay below the rates of competitive modes—an unlikely situation.

In general, the rails have been losing business because their rates are too high for the service they can provide. As a result, the only solution is increased public expenditure on railroad right-of-ways so that service can be improved and rail movements can become competitive.

### Water Improvement Needs

Water transportation in the Upper Midwest depends on three waterways—the Mississippi River and its major tributaries, the Great Lakes and the St. Lawrence Seaway, and the Columbia-Snake outlet to the Pacific Ocean (figure 1). Water transport costs about one-fourth to one-half as much as rail, and much less than truck transport. Waterway energy consumption per ton-mile is generally less than that of rail.

Waterway issues include whether or at what level user charges should be imposed on commercial navigation, whether or not specific expansion projects should be undertaken, and various environmental disputes.

Specifically, the construction or expedited construction of a new Lock and Dam 26 on the Mississippi River at Alton, Illinois, remains an issue. The current locking facility has been operating at or near its capacity since 1976. The average waiting time for a tow to be locked through the main chamber during the 9-month, April-December 1978 shipping season was over 18 hours. During November 1979, the average wait was 33 hours. Figure 1 shows its location below the confluence of the Upper Mississippi and the Illinois Rivers. This lock has the same dimensions as the other locks on each river. It handles about twice as much traffic, however, since the rivers carry about equal amounts of traffic.

In 1978 a total of 62 million tons of cargo passed through Lock and Dam 26. Of that total, 33 million tons were downbound grain, which is about 75 percent of all the grain shipped on the Mississippi River system. Current construction plans indicate it will be

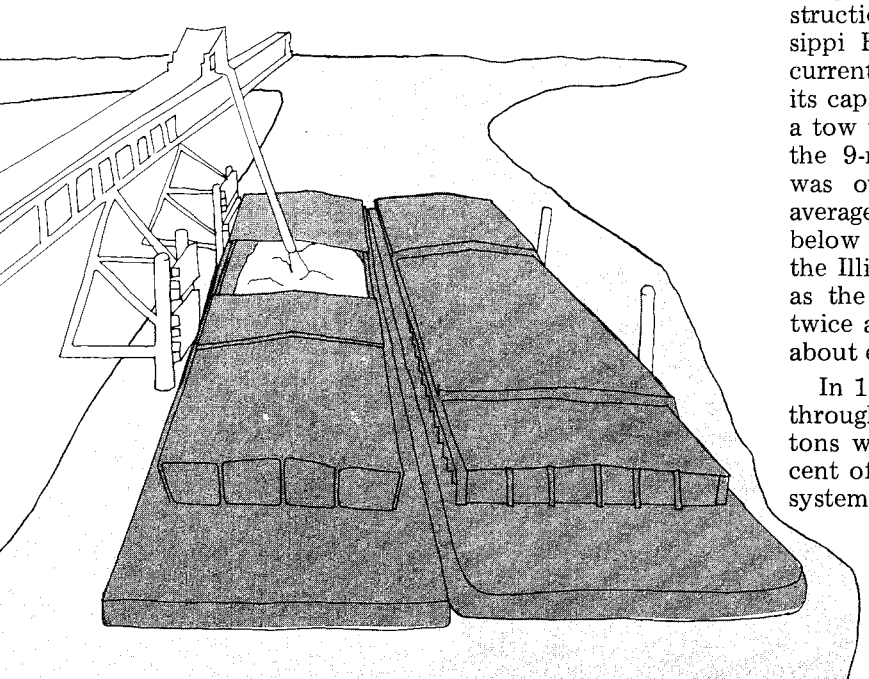
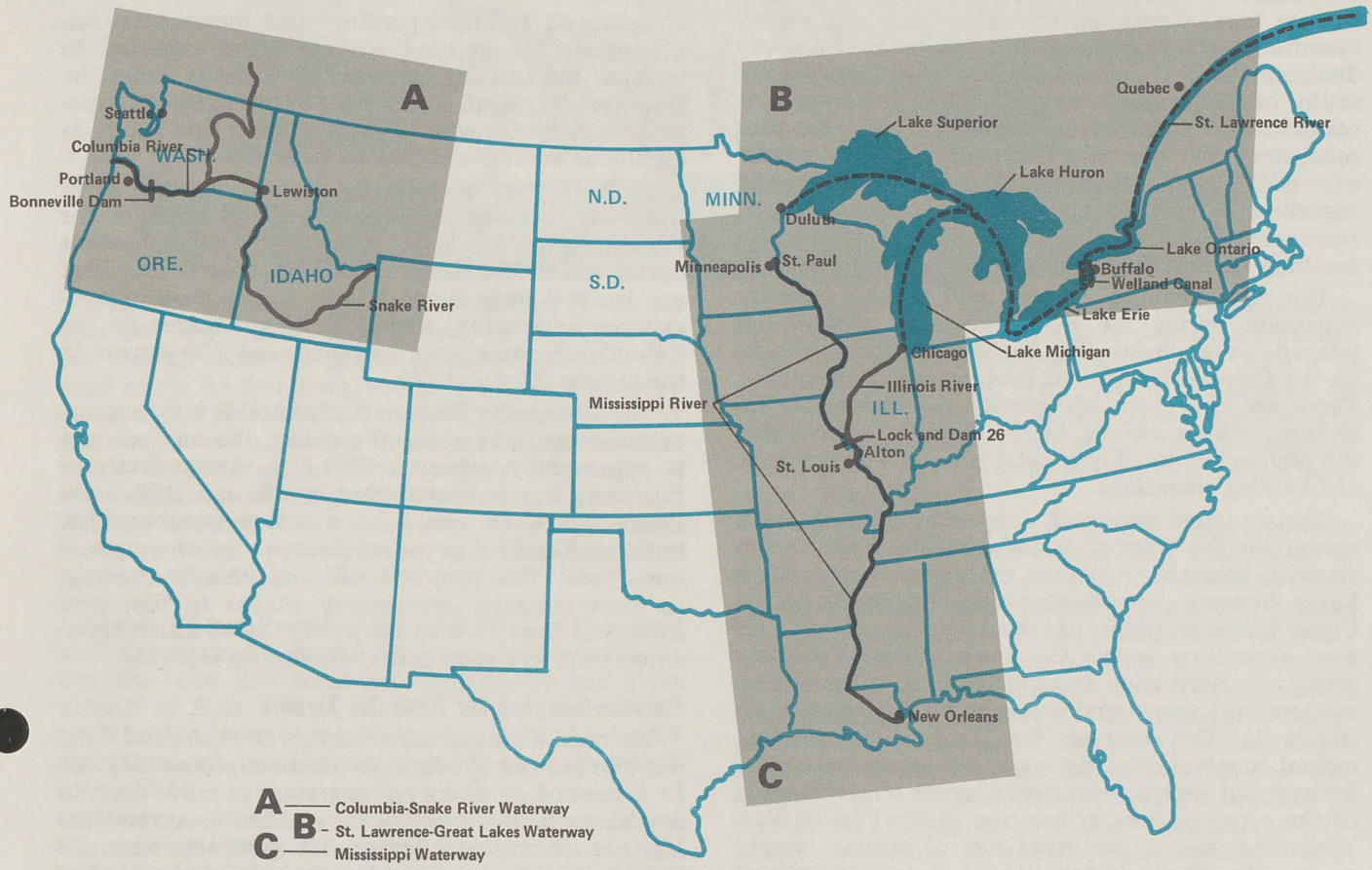


**Figure 1. Waterways serving Upper Midwest agriculture**




8 years before the new facility is completed and 10 years before its capacity will be significantly increased.

Barge shipments of grain from the northern areas through Upper Mississippi ports will likely increase in the next few years, even though the total tonnage through Lock and Dam 26 cannot increase. Increases from the northern part of the river will be possible because the expense of long waits at the lock will cause shippers in areas such as southern Iowa to use trucks and rails. The increased cost of rail over barge will generally be less if the distance is less. However, the resulting transportation costs will be higher for all shippers as the northern shippers bear the cost of long waits at Alton and southern shippers bear higher truck/rail costs.

Similarly, barge grain may be displaced from the Illinois River and trucked to Great Lakes ports. This will increase volume on the Great Lakes-St. Lawrence Seaway and cause that artery to reach capacity sooner than expected, raising costs to those who have traditionally exported through Duluth-Superior and other Great Lakes outlets.

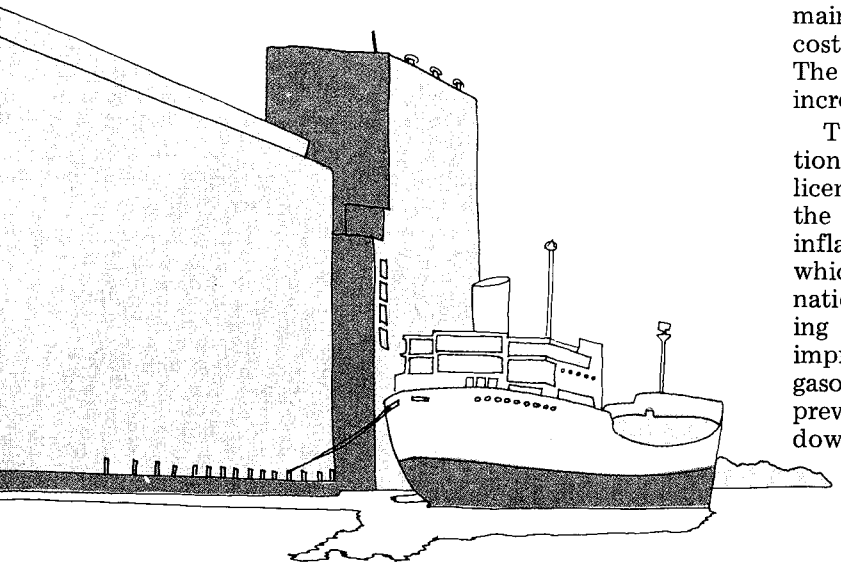
The construction of the new Lock and Dam 26 should be expedited. It was delayed primarily because of the debate on user charges for river traffic, and environmental concerns. Historically, all construction and maintenance by the Army Corps of Engineers on the river has been publicly funded. The barge industry, unlike rail and to some extent trucks, has not had to bear the cost of maintaining its way. This issue has been temporarily resolved with the imposition of a tax on fuel for commercial navigation. This tax started Oct. 1, 1980, at 4 cents per gallon and will increase in steps to 10 cents per gallon in 1985. A tax of this size increases costs somewhat, but will not have any major effect on the quantities of grain and fertilizer moved or on Upper Midwest agriculture in general. However, the railroads and others are continuing to push for what is called "full recovery" of public navigation expenditures. This would mean a fuel tax of over 60 cents per gallon. Such a fuel tax would cause major changes in grain and fertilizer flows, changes in our production patterns, and would deal a blow to farm income.

The environmental concerns were probably overstated by opponents of Lock and Dam 26 and heightened by poor public relations and conflicting statements from the Corps of Engineers. The serious environmental issues should be dealt with on a case-by-case basis. Dredging, for example, is not always harmful to the environment. In some locations the dredge material is uncontaminated sand. Immediately south of Minneapolis and St. Paul, however, it is contaminated with organic matter and other harmful substances. Yet, our rules frequently call for the same expensive on-land disposal of the dredge material regardless of specific circumstances. Environmental concerns and economic considerations must be more carefully balanced during the 80s.

The St. Lawrence Seaway will require capacity expansion during the 80s. Midwestern agricultural interests must ensure that the Seaway and the locks on the Great Lakes do not become overly congested. There are two types of capacity constraints on the Seaway: winter closing of the shipping season; and the physical limits of channel depth, lock dimensions, and locking operations.

The proposed two-week extension of the shipping season on the Seaway would provide a short-term capacity increase. A season extension on the Great Lakes, however, or even year-round navigation on the Upper Lakes, would be of little benefit to Upper Midwest agriculture unless the Seaway were also open longer. We need good transportation to international markets, not year-round access to Buffalo, New York (figure 1). The state of New York voices environmental concerns over any major improvements on the Seaway, but probably opposes a longer season because of the potential loss of business to the Port of New York. This real or perceived loss of business would occur primarily in industrial and consumer cargo if steamship lines were able to establish reliable year-round service to inland locations like Chicago. This would hurt well-established political constituencies such as the eastern longshoremen and overland transportation companies.

Capacity constraints due to physical dimensions will be even more difficult to solve. The channel depth of 27 feet is most limiting since newer ocean-going vessels usually have a loaded draft well in excess of 30 feet. Deepening the channel to 30 feet, however, would have serious environmental impact on water levels, shorelines, and ecological systems throughout the Great Lakes basin. This capacity-increasing alternative does not seem feasible in this century.



Improved facility operation and incremental improvements to existing structures are expected to increase the existing facilities' throughput. Since the Seaway is binational and most of the critical bottlenecks are in Canada, expansion may not occur as rapidly as we in the Midwest would like.

In the other direction, the Columbia-Snake River waterway has become a very important outlet for wheat (figure 1). This became especially apparent during the 1979 strike at Duluth-Superior when wheat was trucked from North Dakota to the head of navigation at Lewiston, Idaho. Total commerce on the Columbia-Snake system had increased 250 percent in the decade prior to 1979.

The Bonneville Dam on the Columbia is the closest to the ocean, but is also the oldest, the smallest, and is approaching capacity. The U.S. Army Corps of Engineers has indicated that by the late 1980s the Bonneville Lock could be a major transportation bottleneck and has proposed construction of a replacement lock. This proposal will undoubtedly generate an environmental controversy similar to that over Lock and Dam 26 with the possibility of added opposition from irrigation and hydroelectric interests.

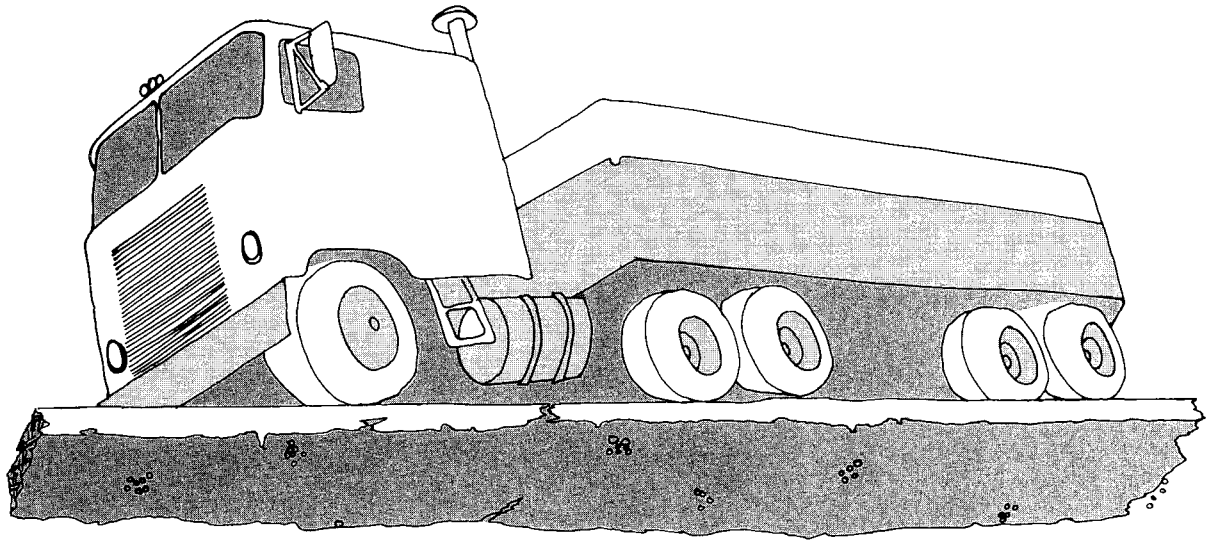
### Roads—Keeping Up With the Trucks

We need a strong infrastructure of roads and highways to get our products to locations where they can be processed or where rail or water can move them to export ports. However, we have a significant road and highway financing problem. We generally have not been building or rebuilding roads and highways as fast as we have been wearing them out.

There are three interrelated and costly problems pertaining to our roads and highways. The first is the financial crisis as it relates to almost all levels of highways from the interstate system to township roads. The second is the current status of our rural road system. The third is the relationship between heavier vehicles and increased highway wear.

**The financial situation.** Highway construction and maintenance have probably been as hurt by the hidden cost of inflation as any other part of our economy. The costs of road construction and maintenance have increased much faster than inflation since 1973.

The primary sources of funds for roads have traditionally been gasoline taxes, vehicle and operator licenses, and property tax revenues. Revenues from the gasoline tax and license fees do not increase with inflation. In fact, revenues from the gasoline tax, which historically accounted for 50 percent of our national highway and road spending, are now decreasing absolutely as a result of our national goals of improving gas mileage and reducing driving. Federal gasoline tax revenues were down 10 percent from the previous year early in 1980 and it appeared that the downward trend would continue.



Gasoline tax revenues are spent primarily on the interstate and primary road system. In 1972, the gas tax was 11 cents per gallon or about one-third the retail price. At that time, roughly, one-third of every dollar spent on gasoline went to construction and maintenance of highways. In early 1980, the tax rate was 13 cents per gallon, but only about 11 percent of every dollar spent on gasoline went to the road and highway system. The exemption of gasohol from federal and some state fuel taxes will only compound the revenue shortage.

**Status of rural roads.** Our rural road system was built during the 1920s and 30s when the average farm was less than 200 acres and farm trucks had gross weights of 6 or 7 tons. In fact, 70 percent of U.S. rural *bridges were constructed* by 1935. About 50 percent of all the U.S. rural *roads were improved* before 1950.

Rural transportation needs have changed considerably since the 1930s. Crop yields have ballooned, U.S. farm size has doubled, and our markets have shifted off the farm into national and international channels. Traffic characteristics have followed suit. Tandem-axel trucks with gross weights of 23 tons have become common on rural roads. A farm tractor and two wagons loaded with soybeans can weigh up to 28 tons. These vehicles are traveling over bridges built when 8 tons was considered a big load!

Obviously we must maintain an adequate rural road system to cope with these changes. However, in many parts of the Upper Midwest, we have too many rural roads to maintain efficiently. We no longer need roads that were plotted at one-mile intervals to serve 160-acre farms with horses.

If we were to lay out a road system today, we could put roads two miles apart and still have better access to towns and markets than we had 60 years ago. If the excess roads were eliminated, the number of intersections and grade crossings would be reduced and the remaining land could be farmed. The selection of roads to be abandoned will be a tough political process, but bridge replacement needs will probably play a key role in these decisions.

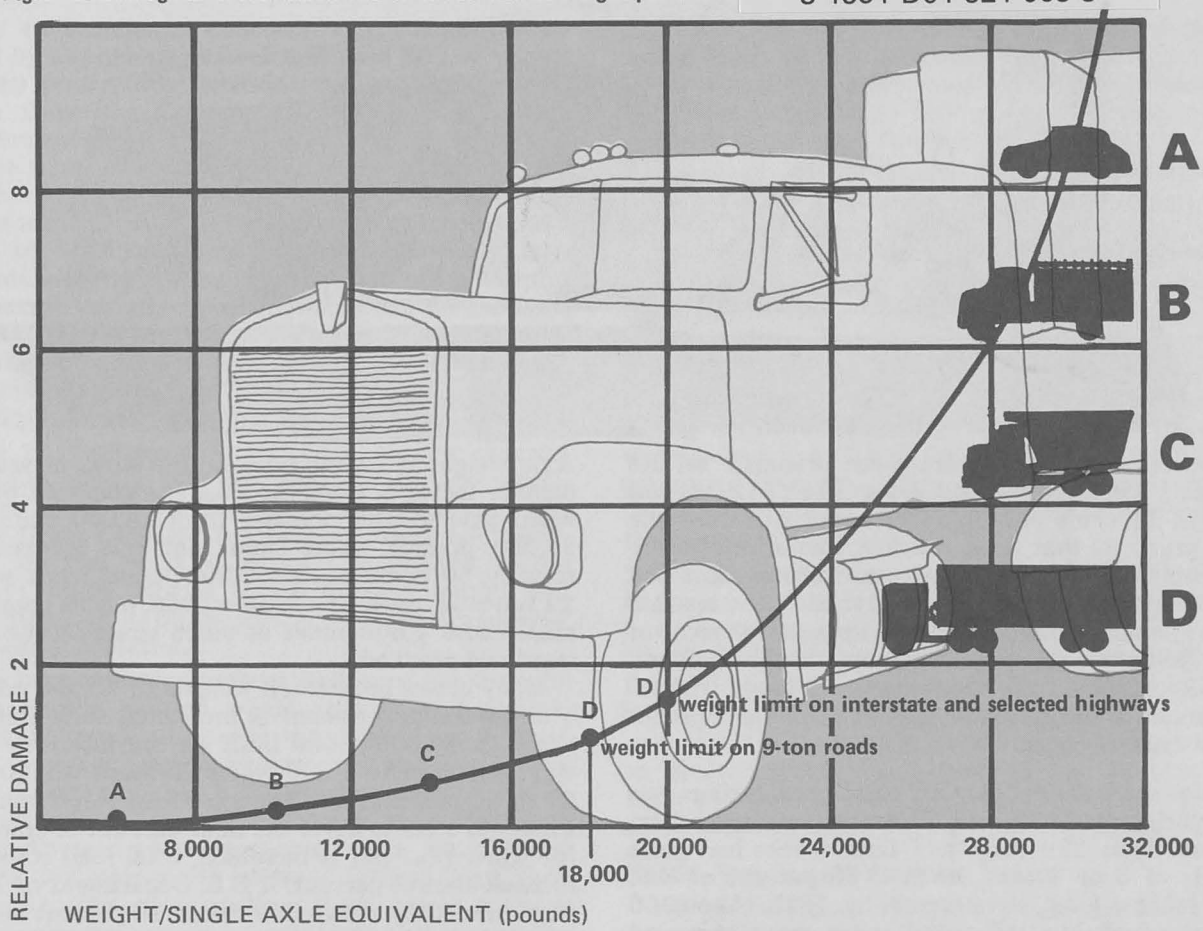
**Heavier vehicles.** The stress exerted on highway pavement increases as the fourth power of the axle load. Figure 2 illustrates this in terms of a single axle. Axle weight is on the bottom; the stress measure or damage factor is along the side. The graph shows that when axle weight increases from 18,000 pounds to 20,000 pounds, stress from that axle increases by roughly 50 percent. An 80,000-pound truck weighs 20 times as much as an automobile, but its combined axles cause 9,600 times as much stress on the pavement and roadbed.

Many states limit truck weights to 73,000 pounds. The federal government is pressuring such states to allow an 80,000-pound limit on the interstate highway system. The 7,000-pound increase would exert 25 to 40 percent more stress per load. After adjusting for fewer trips to move the same amount of commodity when the load is increased, total road stress will increase about 8 percent. A U.S. Department of Transportation study concluded that a 10 percent increase in maximum truck weight would decrease fuel consumption by 0.37 percent, but this might be offset by accelerated highway deterioration. If pavement deterioration continues to exceed repavement efforts at current rates, vehicle fuel efficiency in 1985 could decrease by 2.4 percent. Fuel consumption at 40 miles per hour over badly patched asphalt increases 34 percent over fuel consumption on high quality pavement. Poor road surface increases energy consumption *for all vehicles*, not just trucks.

Truck operating costs, especially labor cost per unit handled, should decline due to increasing productivity if truck weight limits are increased. However, this increase would not be free. The taxpayer would foot the bill for higher road maintenance costs.

One of the emerging issues of the 80s is whether large trucks "pay their way." License fees are much higher for trucks than cars, but trucks are responsible for most of the stress on our roads. It could be argued that from the 1920s through the 60s, the road system was being developed for general transportation. The system was going to be built whether or not trucks used it. Since the system was for everyone, commercial vehicles paid the "incremental costs" of their use. The public paid right-of-way, basic construction, and other basic costs, while an additional charge was levied on trucks corresponding to the increased pavement thickness and width they required. The validity of this system lessens as trucks get larger and autos get smaller. Now when highway improvements are

Figure 2. Damage level escalation due to added vehicle weight per axle*




*Source: Minnesota Department of Highways, *Axle Loads: Effects on Highway*, p. 2.

made, maximum truck size determines required right-of-way, grades, vertical and horizontal clearances, and structural considerations. The high clearances, wide turning radii, and easy grades of our best limited-access highways are designed for commercial traffic, not personal travel. We can expect that the highway financing problems of the 1980s will cause these issues to be much more widely debated than in the past.

Finally, most of the debate over higher truck weights has assumed that truckers generally load to their legal limit. If they load over the limit, the stress estimates would be much too low, as the steep curve on figure 2 indicates. A recent study by the Government Accounting Office showed that heavy commodities such as coal, steel, and grain were frequently loaded above the legal limit. When we consider how rapidly damage increases, it's obvious such loads are very destructive. And if some truckers run overweight consistently, it virtually becomes an economic necessity for other truckers to follow suit. The solution is a better and more vigorous system of weight law enforcement.

## SUMMARY

An adequate transportation system for Upper Midwest agriculture in the 1980s will require:

- A commitment by government and industry to rebuild our major rail routes to both the Gulf and the West Coast and to replace or consolidate obsolete yards and terminals in more advantageous locations;
- Expedited construction of Lock and Dam 26;
- Capacity-increasing improvements on the Great Lakes and St. Lawrence Seaway along with a season extension on the Seaway;
- An increase in expenditures for maintenance on state and federal highways along with vigorous enforcement of vehicle weights; and
- Some hard decisions about our rural road systems, since the costs of replacing obsolete rural bridges as well as the costs of road construction and maintenance means we will probably have to abandon some rural roads.

This research was funded by Cooperative Agreement Number 12-05-300-417 between the University of Minnesota Agricultural Extension Service and SEA, Extension, USDA; and by the Title V Rural Development Act of 1972.

editor . . . . . Kathy Frank Chesney
graphic designer . . . . . Rose Mauch

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Norman A. Brown, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108. The University of Minnesota, including the Agricultural Extension Service, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, creed, color, sex, national origin, or handicap. 15 cents