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# HOW MUCH TRANSPORTATION INFRASTRUCTURE DOES RURAL AMERICA NEED?

by

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# HOW MUCH TRANSPORTATION INFRASTRUCTURE DOES RURAL AMERICA NEED?

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## ABSTRACT

Rural America has been the beneficiary of large investments in freight and passenger surface transportation infrastructure. Unfortunately, this infrastructure is becoming out-of-date due to the technological changes occurring in the transportation industry and related industries, and is showing the effects of time. Rural America needs further investments in the transportation infrastructure in order to move the large quantities of heavy products it produces long distances to market and because of the geographic dispersion of the rural population.

Parsimonious funding for the rehabilitation of the rural infrastructure means that future sources of funding will have to be found. Reduced state allocations to the local rural road system suggest that agriculture and other rural groups will face the dilemma of increased property taxes to fund the maintenance and reconstruction of the existing local rural road system or face a reduction in the miles of road. Agriculture must also be concerned about the deterioration of the aging inland waterway system, especially since federal funding of new construction must be matched by waterway user taxes. Moreover, the railroad industry still has 41 percent of its trackage still hauling only one percent of the total net ton miles. This suggests further rail abandonment as these tracks need rehabilitation.

Technological and structural change in agriculture and transportation have made some rural transportation infrastructure investments less than beneficial to agriculture and rural America. The 21st century will witness the emergence of an economic environment that will require agriculture and other rural interests to decide which transportation infrastructure investments to support and which investments they can, after all do without.

# HOW MUCH TRANSPORTATION INFRASTRUCTURE DOES RURAL AMERICA NEED?

## Development of Rural Transportation Infrastructure

Since the mid-1800's, rural America has been the recipient of large investments in freight and passenger surface transportation infrastructure. Most of the investments have been in railroads, roads, and waterways. We will not discuss rural air transportation requirements today, other than to note that air can be very important for the movement of people and priority freight and can not be ignored in the rural development context.

When discussing how much infrastructure is needed we must recognize

a. That the three primary modes of surface transportation both compete with and complement each other.

b. That technological change in either the transportation industry or in other industries can impact the amount and types of infrastructure required.

c. That modern communications have impacted the amount and type of transportation infrastructure required.

## Railroads

In the 1860s, a series of east-west railroads across the United States provided intercontinental freight and passenger service to much of the midwest. The completion of these trunk lines across the country set up intense competition among local communities to obtain a railroad. Communities not located on the recently built trunk lines needed an alternative to the horse and wagon. Many of these communities

made every effort to secure some type of rail service and in most cases, were successful in securing branch or feeder line rail service. This intense competition between communities for railroads and the enthusiasm of the railroad companies resulted in a substantial overbuilding of railroads.

Branch lines as well as trunk lines hauled passengers and freight including mail, packages, less than carload and carload shipments. The railroad station provided telegraph service which was the only method of rapid intercity communication. Many types of shipping and receiving facilities such as grain elevators, lumberyards and manufacturing plants were built along the tracks of these branch lines. Most of the facilities were expanded over the years and many are still in operation today.

By 1900, railroads had become the dominant mode of transporting both passenger and freight in rural areas and had a virtual monopoly on these services. However, the size of the railroad system has declined almost every year since 1916.

Deterioration of the Rural Rail Infrastructure

Railroad miles declined from a peak 254,251 miles in 1916 to 162,470 miles in 1990, a 36 percent reduction. Much of the reduction was in rural branch lines. A major reason for the decline in rural branch line miles was the development of the local rural roads which gave rural residents increased mobility and greatly reduced their reliance on railroads. Moreover, the branch lines were originally constructed to haul small boxcar loads of freight. The development of the jumbo covered hopper car required the upgrading of these branch lines to handle 100-ton hopper car loads compared to 50-70 ton-boxcar loads. These heavier loads, along with the

development of unit-grain-trains, required the accumulation of large quantities of grains at fewer elevator locations, which meant that many branch lines no longer served a useful economic purpose. Finally, the development of the nine-foot channel depths on the inland waterways and the construction of Interstate and arterial highways permitted longer distance trucking to low-cost barge transportation. Thus, most grain produced near the major navigable rivers move by truck to barge loading terminals. Today, there are few, if any, branch rail lines within 75 miles of the Mississippi, Illinois and Ohio Rivers.

Today, there are indications that future railroad abandonments are probable. According to Federal Railroad Administration studies in 1989, 41 percent of the existing railroad mileage carries only one percent of the railroad ton-miles. Most of this 41 percent consists of rural branch lines and short line railroads. These facts, coupled with the railroad's drive to become more competitive, translate into unprofitable railroad lines facing potential abandonment in the future.

Status of the Railroads Today

There was also a continued reduction in the number of railroad firms as a result of mergers and buyouts from the early 1900s up until railroads were deregulated in 1980. In fact, during the 1970s, some observers were predicting that only a handful of transcontinental railroads would survive, each with networks of more than 30,000 miles of track.

However, shortly after passage of the Staggers Rail Act of 1980 which deregulated the railroads, the exact opposite occurred with the spawning of numerous

"shortline" railroad companies that were established to operate abandoned track or lines that would likely be abandoned. Advantages of rural shortline railroads are:

1. Lower labor and operating costs due to flexibility in job assignments and payment of prevailing local wages rather than those established by national contracts.
2. Increased community interest in the success and health of a local venture as opposed to community indifference to large railroads with absentee ownership and management.
3. Rapid responses due to hands on local management, and increased flexibility in marketing and service to cooperate with, and better meet, the needs of local shippers.

Railroad Pricing

Prior to the mid 1970s, virtually all railroad rates were posted tariffs. A posted tariff was essentially a "take it or leave it" price. The rigid nature of these rates was due to a regulatory requirement mandating the railroads to file a 30-day minimum notice for a rate change. These rate changes would take up to 10-months if an Interstate Commerce Commission (ICC) investigation was initiated. This regulatory 30-day minimum notice was a governmental attempt to regulate an industry which was believed to have monopoly on grain and other commodity movements.

Truck and barge competitors, on the other hand, were free to change rates on a moments notice, enabling them to keep pace with changes in demand. Rate

flexibility enabled barges to cut deeply into the railroad's long distance export shipments, and allowed trucks to dominate short distance movements.

The Staggers Rail Act of 1980 was passed under the assumption that railroads no longer held a transportation monopoly. It enabled U.S. railroads to enter into contracts with shippers, to develop innovative pricing systems and allowed the ICC to completely deregulate whole classes of traffic such as perishable agricultural commodities. Contract pricing, and price responsive service tailored to meet the customers needs (for an added fee) rapidly occurred during the 1980s allowing the railroads to regain some of the traffic they had lost during the previous decades. One of the most innovative results of rate deregulation is the BN's COT program.

In 1987, the Burlington Northern Railroad (BN) developed a grain transportation pricing program called Certificates of Transportation (COTS). The COT program allows shippers to bid on a predetermined number of grain cars or unit trains in specified shipment corridors subject to a minimum bid. Winning bidders pay a nonrefundable partial prepayment for the COTs and are guaranteed delivery of the cars within a predetermined time frame. Failure to deliver the cars on time subjects the BN to a failure to perform penalty. The purchased COTs are negotiable so shippers can either use the cars or sell them to other shippers.

The COT program is the first phase in the development of an Integrated Network Management System (INMS). Eventually, with INMS, the BN would allow shippers to choose from a variety of service options based on their specific needs. The system would transform the BN into a scheduled carrier similar to the airline

industry. The BN's approach though is not without controversy. The National Grain and Feed Association (NGFA) filed a complaint about COTs before the ICC alleging that the COT program:

1. Violates the BN common carrier obligation and that a non-COT shipper should be given the same price and service agreement as a COT shipper.
2. Permits BN to exercise market power relative to car supply and effectively prohibits shippers from obtaining and reserving their own cars for use during car shortages thus forcing them to pay higher prices to obtain a guaranteed car supply through COTs.
3. Does not qualify for premium charges for special services.
4. Should be defined as a contract service so the maximum number of grain cars that could be allocated to COTs and contracts under the Staggers Act would be 40 percent of the BN fleet.

However, the ICC voted to dismiss the NGFA complaint about the COT program. Thus, all railroads are free to develop and implement car pricing programs that deviate from the century old "sticky" tariff system. Some of the issues that the NGFA raised such as car supply and car assignment deserve further discussion.

Rail Car Supply

Historically, agriculture has suffered through periodic rail car shortages followed by periods of car surpluses. During periods of increased grain shipments barge rates would rise sharply, causing grain shippers to look to alternative modes of grain

transport. The shift away form barge transport often meant shippers ordered large numbers of rail cars. However, railroad rate increases, which responded more to inflation than to changes in demand, typically lagged behind these large increases in rail car orders. Once an export boom subsided, barge rates would fall, causing rail car orders to decline. The grain export booms of the 1970s resulted in large and frequent rail car shortages followed by periods of rail car surpluses.

In the early 1980s, the rail industry experienced huge and continuous rail car surpluses. Often rail car owners had difficulty finding available track to park idle rail cars. Many of the companies owning or leasing rail cars went bankrupt and were taken over by companies which had little previous involvement in the rail car industry, like General Electric and Chrysler Corporation.

From economic theory, it can be shown that "sticky" prices with fluctuating demand will lead to exactly the kind of rail car shortages and surpluses that have plagued the railroad and grain industries for over a century. Furthermore, "sticky" prices accompanied by sharp increases and decreases in demand will discourage investment in rail cars. Since the early 1980s, investments in new covered hopper grain cars have all but dried up. Only two orders for a total of 3,000 new cars have been placed since 1981. The lack of rail car investment and the nation's current aging and shrinking rail car fleet has led a recent USDA report to predict a growing shortage of covered hopper rail cars throughout the 1990s and severe shortages in the 21st century.

Because of the seasonal aspects of grain movements, coupled with surges in export demand, it appears almost impossible to ever have to right number of grain cars. Thus, several questions arise regarding rail grain cars: Who should own and manage the rail grain car fleet? Should shippers have unlimited access to railroads for shipper-owned cars? Should shippers or railroad owned cars be used first in times of car surplus? Should there be a common carrier requirement that railroads provide part of their fleet to small shippers at a "tariff" price?

Changing Rural Technology and New Markets

Changes in transportation technology have changed the requirements for rail infrastructure and equipment. Unit trains increased car utilization and reduced the number of cars required. Covered hopper cars have increased the efficiency of loading and unloading bulk grain commodities and because they have larger capacities than boxcars, reduced the number of cars needed. However, these improvements have required investments in upgrading railroad track and grain handling facilities which has further contributed to the obsolescence of many branch lines and grain facilities.

There is a growing need for more specialized equipment to move specialty crops and higher value commodities into international trade. For instance, ocean going containers are used to export specialty crops such as certified seed and edible beans. Recently, six ocean shipping lines have used double stacked reefer trains to export chilled and flash frozen beef to Japan. This type of market is both price and

time sensitive and requires investments in both equipment and in handling facilities and rail terminals in rural areas.

Rural Roads

A major reason for the decline of the railroads was the development of the local rural road system. In the 1880s the development of the rural free delivery postal system, the lobbying of the League of American Wheelman (bicyclers), the lobbying of railroads who wanted to expand their markets and demands from farmers all contributed to a growing effort to get rural America "out of the mud." Consequently, many of the 2.2 million miles of local rural roads--those maintained and controlled by townships and countries--were first built in the late 1880s and early 1900s. The new dirt or gravel roads and bridges were designed for light horse and wagon loads. The road system was typically laid out in one-mile rectangular grids, a system dating back to the Ordinance of 1785 which established the one-mile survey grids to open the land for settlement. In fact, the one-mile grid road system was an integral part of the rural economic infrastructure and political system which is comprised of 6-mile square townships and 36-mile square counties. Theoretically, a rider on horseback could get from anywhere in the township to the "town" or service center in the middle of the township and return in half a day. Similarly, a horse drawn wagon could get from any place in the county to a centrally located county seat and return in one day.

After World War I, the discovery of large petroleum reserves in Texas and Oklahoma spurred the development of the automobile and truck industries in the 1920s and 1930s. Roads were surfaced and some bridges were replaced to

accommodate trucks with gross weights of six to seven tons. Over half of today's bridges were built before 1935, and even those constructed in the 1940s were designed for narrow, 15-ton loads. By 1950, most of the local roads had been improved with all-weather gravel or paved surfaces. Thus, the width, grades, base surface designs, and capacities of many local rural roads are based on the traffic needs of the 1940s and 1950s and their location is based on the economic and communication needs of the 1880s.

The Interstate highway system was designed and initiated in the 1950s. At the present time, there are over 33,000 miles of rural interstate highways in the United States. These interstate highways are supplemented with another 80,000 miles of "principal arterial" rural roads that serve travel of statewide or interstate significance. In addition, there are nearly 150,000 miles of rural minor arterial roads that provide access to principal arterial roads and link cities and larger towns. This extensive highway network has made trucking the largest carrier of intercity freight tonnage.

Status of Rural Roads Today

Just as technological improvements led to the abandonment of railroad branchlines, similar adjustments in size and quality are likely to be needed in the local rural road system during the early 21st century. The declining number of farms and rural population means that there are fewer households on local rural roads. Yet, the reduction in farm numbers and the increasing size of farms, farm trucks, and farm implements and the increasing dispersion of farm operations mean that heavier and wider loads will travel over these local roads. Several studies have indicated that a

more economically efficient rural road system would consist of a reduction in the number of miles of local roads, the downgrading of local roads that serve only farm fields, and the upgrading of roads that provide heavy truck and car service to markets and communities. One county engineer in southern Iowa recently proposed that the county only maintain a four-mile paved road grid. Roads within that public four-mile grid would be returned to private ownership or be abandoned. As would be expected, farm owners and operators tend to object strenuously to this type of change in the road system.

Recently a detailed study was made of the public expenditures on roads and the private costs of operating vehicles on those roads in a 580 square mile rural agricultural areas in Minnesota. The area has a typical square mile grid with a road almost every mile. Township and county roads, which are supported entirely by property taxes and other local revenues, accounted for 835 miles or 74 percent of the 1,135 total miles of road in the area. County state aid highways (CSAH), which are supported in part by state fuel taxes and vehicle fees, accounted for 238 miles or 21% of the roads in the study area. State and federal roads, which receive no local funding, accounted for 62 miles or 5.5% of the area's road mileage.

A breakdown of the mileage by jurisdiction by surface type is shown in Table 1. Over 20 percent of the total mileage is dirt surfaced township roads. The remainder of the township and county roads are gravel surfaced. The CSAH roads are more than half gravel surfaced while the state and federal roads are all hard surfaced, i.e., concrete or bituminous.

Table 2 shows the annual vehicle operating costs (VOC) in the study area. The variable operating costs include fuel, oil, tires, and maintenance expense. Driver costs are included in the VOC for trucks. The VOC varies by vehicle size and road surface. The study computed the VOC for 3 types of traffic. Local passenger traffic consisted of automobile trips from each rural residence or farm to up to four different communities or places in or near the study area as determined by interviews. The baseline traffic of 2.2 passenger trips per day from each farm or homestead was based on a 1983 survey of over 2,000 farms and residences in 3 areas of rural Iowa. Agricultural traffic consisted of the truck trips required to market crops and receive fertilizer. Product quantities were estimated by township from ASCS data and assigned pro rata to each section of the township. Overhead traffic consisted of trips that did not originate and end in the study area. Overhead traffic was computed from data from Minnesota Department of Transportation traffic counts on all state, federal and county roads. Table 3 breaks down the annual VOC by percent of local passenger traffic, local ag traffic and overhead traffic.

Total annual VOC in the area exceed $7.7 million. Fifty-four percent of the VOC occurs on the state and federal roads that make up only 5.5 percent of the mileage. However, over 80 percent of the VOC on the state and federal highways is due to overhead traffic passing through the study area. On the other hand, only 11 percent of the area's VOC occurred on the locally funded township and county roads that

TABLE 1

POLK COUNTY MINNESOTA STUDY AREA
BASELINE NETWORK ROAD MILES

| | Concrete | Bituminous | Gravel | Dirt | Total |
|---|---|---|---|---|---|
| Township/County | 0.0 | 0.6 | 603.9 | 230.1 | 834.6 |
| percent of total | 0.0 | 0.1 | 53.2 | 20.3 | 73.6 |
| CSAH | 28.2 | 75.6 | 134.9 | 0.0 | 238.7 |
| percent of total | 2.5 | 6.7 | 11.9 | 0.0 | 21.1 |
| State | 17.7 | 9.1 | 0.0 | 0.0 | 26.8 |
| percent of total | 1.6 | .8 | 0.0 | 0.0 | 2.4 |
| U.S. | 34.8 | 0.0 | 0.0 | 0.0 | 34.8 |
| percent of total | 3.0 | 0.0 | 0.0 | 0.0 | 3.0 |
| Total | 80.7 | 85.3 | 738.8 | 230.1 | 1134.9 |
| percent of total | 7.1 | 7.6 | 65.1 | 20.3 | 100.0 |

TABLE 2

POLK COUNTY MINNESOTA STUDY AREA
TOTAL BASELINE VEHICLE OPERATING COSTS
PASSENGER, AG AND OVERHEAD
IN 000s OF DOLLARS

| | Concrete | Bituminous | Gravel | Dirt | Total |
|---|---|---|---|---|---|
| Township/County | 0 | 0 | 808.2 | 37.0 | 845.2 |
| percent of total | 0 | 0 | 10.4 | .5 | 10.9 |
| CSAH | 330.7 | 1663.0 | 723.6 | 0 | 2717.3 |
| percent of total | 4.3 | 21.6 | 9.4 | 0 | 35.3 |
| State | 1234.4 | 586.3 | 0 | 0 | 1820.7 |
| percent of total | 16.0 | 7.6 | 0 | 0 | 23.6 |
| U.S. | 2328.9 | 0 | 0 | 0 | 2328.9 |
| percent of total | 30.2 | 0 | 0 | 0 | 30.2 |
| Total | 3894.0 | 2249.3 | 1531.8 | 37.0 | 7712.7 |
| percent of total | 50.5 | 29.2 | 19.8 | .5 | 100.0 |

TABLE 3

POLK COUNTY MINNESOTA STUDY AREA
BASELINE VEHICLE OPERATING COST BY TRAFFIC TYPE
PERCENT OF TOTAL

| | Concrete | Bituminous | Gravel | Dirt | Total |
|---|---|---|---|---|---|
| Township/County | | | | | |
| local | 0.0 | 0.0 | 3.67 | .32 | 3.99 |
| agriculture | 0.0 | 0.0 | 2.02 | .16 | 2.18 |
| overhead | 0.0 | 0.0 | 4.79 | 0.0 | 4.79 |
| TOTAL | 0.0 | 0.0 | 10.48 | .48 | 10.96 |
| CSAH | | | | | |
| local | 1.46 | 2.88 | 2.45 | 0.0 | 6.79 |
| agriculture | .76 | 3.14 | 1.14 | 0.0 | 5.04 |
| overhead | 2.07 | 15.54 | 5.79 | 0.0 | 23.40 |
| TOTAL | 4.29 | 21.56 | 9.38 | 0.0 | 35.23 |
| State | | | | | |
| local | 3.81 | .47 | 0.0 | 0.0 | 4.28 |
| agriculture | 1.61 | .06 | 0.0 | 0.0 | 1.67 |
| overhead | 10.59 | 7.07 | 0.0 | 0.0 | 17.66 |
| TOTAL | 16.01 | 7.60 | 0.0 | 0.0 | 23.61 |
| U.S. | | | | | |
| local | 3.58 | 0.0 | 0.0 | 0.0 | 3.58 |
| agriculture | .99 | 0.0 | 0.0 | 0.0 | .99 |
| overhead | 25.62 | 0.0 | 0.0 | 0.0 | 25.62 |
| TOTAL | 30.19 | 0.0 | 0.0 | 0.0 | 30.19 |
| Total by type | | | | | |
| local | 8.85 | 3.35 | 6.12 | .32 | 18.64 |
| agriculture | 3.36 | 3.20 | 3.16 | .16 | 9.88 |
| overhead | 38.28 | 22.61 | 10.58 | 0.0 | 71.47 |

make up 74 percent of the area's road mileage. Most of this VOC was due to local travel and ag related trips. The county state aid highways accounted for 35 percent of the total VOC (on just 21 percent of the road network). The CSAH road mileage accounted for 36 percent of the VOC due to local travel and 51 percent of the VOC due to ag traffic and a surprising 33 percent of the overhead VOC.

The study concluded that:

a. Some local rural roads (such as much of Polk Counties CSAH roads), are important for both local traffic and for regional overhead traffic and should clearly receive significant nonlocal funding.

b. Some rural road improvements such as hard surfacing of selected roads can be justified on the basis of the savings in vehicle operating and road maintenance costs or on the basis of those cost savings plus intangible benefits such as improved safety.

c. Some local roads (up to 40 percent in the study area) could have reduced maintenance or be abandoned with very little increase in transportation costs due to motorists having to drive further.

Motor Carrier Deregulation

The Motor Carrier Act of 1980 deregulated motor freight transportation. However, this Act has had little impact on agricultural and rural transportation partly because much agricultural traffic had never been regulated. The Act eased or eliminated most restrictions on entry and on routing requirements. It also encouraged agricultural backhauls. Consequently, most observers feel that truck service is now

more responsive to rural needs. On the other hand, the adequacy of rural intercity bus transportation has continued to decline even after deregulation. Rural intercity bus routes frequently have low passenger volume because of the convenience and relatively low cost of the private automobile and are uneconomic to run. Consequently, public rural intercity passenger transportation is frequently not available to those who would most depend on it, that is people without access to a car.

A secondary effect of the decline in intercity bus transportation has been its impact on small package service. The intercity buslines were a major supplier to rural communities of low cost, rapid delivery of small package freight.

Inland Waterways

The first commercial freight traffic on the Mississippi River was in the early 1800s. However, the growth of the railroads, combined with the difficulty of navigating an untamed river, caused the Mississippi to decline as a major freight carrier until more than a century later. During the 1930s, the federal government financed the construction of 28 locks and dams on the Mississippi River between Minneapolis, MN and St. Louis, MO. This series of locks and dams, combined with dredging, allowed the navigation of nine-foot draft barges and towboat all the way to New Orleans, LA. Locks and dams constructed on the Illinois, Ohio, Columbia and Arkansas Rivers allowed these rivers to also have a nine-foot channel and commercial barge navigation to New Orleans. The Missouri River was straightened so the water flow would deepen the channel. Locks and dams on the Columbia and Snake Rivers opened Washington, Oregon and Idaho to commercial barge traffic to the Pacific Ocean. In

the 1970s and 1980s, construction of locks and dams on the Tennessee and Tombigbee Rivers opened a 232-mile nine-foot channel, allowing barges to operate from the Appalachian coal fields to the Gulf of Mexico at Mobile Bay.

The inland waterways soon became very important to agriculture. In 1970, barges carried about 1.0 billion bushels of grain to export markets, principally to New Orleans. By 1987, barge grain traffic more than doubled to 2.2 billion bushels. Nearly half of all U.S. grain exports are hauled to export ports by barges, mostly to the New Orleans area. In addition, barges haul large quantities of fertilizer, chemicals, and processed grain products. Most of these commodities originate or terminate on the Mississippi, Illinois, Ohio and Columbia Rivers. Only a small percent of total barge traffic originates or terminates on the Missouri, Arkansas and Tennessee-Tombigbee Rivers.

In 1959 the St. Lawrence Seaway was completed at a cost of about $1 billion. This series of 7 locks on the St. Lawrence River and the 8 locks of the Welland Canal and the connecting 27-foot channels allow ocean going vessels to enter the Upper Great Lakes and pick up grain and other agricultural commodities as far west as Duluth, MN. It also allows specially built Canadian lakers to transport grain and commodities from the Upper Lakes to the Gulf of St. Lawrence for transhipping onto larger ocean ships.

The St. Lawrence Seaway has moved as much as 500 million bushels of U.S. export grain a year into international trade. U.S. grain shipments through the Seaway in 1990 and 1991 were about 140 and 120 million bushels. The Seaway also moves

specialty crops and higher valued agriculture products via break bulk vessels or containers.

Inland Waterways Today

A serious problem lies in the required upgrading and/or replacement of the 245 locks and dams on the nation's rivers and coastal waterways. The locks and dams on the Mississippi River system were constructed in the 1930s. Consequently, twenty-eight of the 33 locks on the Upper Mississippi are over 45 years old. Seven of the eight locks on the Illinois River are also that old. The Upper Mississippi River Lock and Dam 26 at Alton, Illinois was recently replaced at a cost of $1.1 billion. Locks and Dams 25 through 22 are projected to require large scale capacity increases by the year 2000. Other Upper Mississippi locks and dams are projected to require capacity increases by the year 2010.

One-half of all inland waterway construction costs must be financed by waterway user charge collections by the Inland Waterway Trust Fund. At the present time, the Trust Fund collects about $150 million per year from a fuel tax imposed on commercial navigation on the inland waterway system. The cost of seven lock and dam replacement projects authorized in 1986 is estimated to be almost $1.5 billion after inflation. None of the potential Upper Mississippi capacity constraints were included in the seven projects.

Thus, the limited resources available from the inland Waterway Trust Fund will severely restrict the options in improving the inland waterway system at least through 2025. Moreover, user fee collections represent only 8-9 percent of total Corps of

Engineers expenditures on the navigation related inland waterway system. There will undoubtedly be pressures to increase waterway user taxes to help fund the tremendous backlog of needed waterway investments and perhaps to partially fund navigation related maintenance costs of the heavy and lightly used rivers well into the 21st century. On the other hand, the inland waterway projects are multi-use projects. Many of the benefits of the river improvements are not navigation driven. Improved flood control, added recreational opportunities, increased and improved wildlife habitat, wetlands and fisheries are all results of river and channel maintenance and justify the use of general funds or specific nonnavigation user charges. In some areas, hydropower and irrigation also result from river management expenditures. Such uses may currently be inappropriately priced and a source of additional funds.

Funds are needed to maintain and reconstruct some of the locks and dams and to improve the infrastructure of the St. Lawrence Seaway. In 1985, the Seaway was closed because of the collapse of lock wall in the Welland Canal pointing out the need for a substantial rehabilitation of the Canal and Seaway. The operating costs of the Seaway have historically been paid by tolls. However, because of the stagnant or declining traffic volume, it is very doubtful if Seaway tolls can be raised enough to support both operating costs and the increased maintenance expenditures required by an aging Seaway.

Summary

The rural transportation infrastructure requires major upgrading. The inland waterway system, the St. Lawrence Seaway and the rural road system are in need of

major repairs and or rehabilitation. Railroad lines serving agriculture and rural areas are no longer in the crisis situation of the 1970's. However, railcar shortages are again occurring and capital investments in new technology and multimodal facilities are essential if rails are to play a major role in rural transportation.

Furthermore, as rural residents become increasingly mobile and travel longer distances for shopping and entertainment, they demand the upgrading of arterial roads to improved surfaces with bypasses around small towns or the four-lane highways with bypasses. Low traffic levels, projected continued population losses, and shifts of traffic to upgraded highways from newly formed short line railroads, seem to have little impact on the lobbying efforts to obtain federal funding for these road upgradings. Care must be taken that expenditures on the rural infrastructure are cost effective.

Economic development is the rationale for many rural transportation infrastructure projects. Unfortunately, the development created from these transportation projects is often economic activity that is transferred from other communities and other modes of transportation. This does not add to total output. Local congressmen have great difficulty opposing any project which lift the spirits of economically depressed constituents. They frequently become the most vocal boosters and often possess the "foresight" to become boosters even before feasibility studies are completed. Politicians, eager to serve all voters, sometimes even propose subsidizing competing modes that may be harmed by the project. Thus, projects that are of questionable economic value and often competitive with alternative modes are

proposed and funded. The most notable project funded on the basis of rural economic development was the construction of the nine-foot navigation channel on the Tennessee-Tombigbee River. Traffic on this river has been substantially lower than forecasted and prospects for significant growth are slim. The benefits from this project are almost certain to be less than the costs.

The rationale "If we build it, they will come" is too costly for rural America and it is better suited for mythical baseball fields in Iowa than for transportation investments. For the 21st century, a wiser approach is to invest in infrastructure projects that guarantee transportation and production cost reductions that are greater than the costs incurred by the project.

Conclusions

* Rural America has had the benefit of tremendous investments in railroad, road and waterway freight transportation infrastructure.
* Rural America needs large investments in transportation infrastructure because of its production of large quantities of heavy products that must be transported long distances to market and because of the geographic dispersion of the rural population.
* Technological and structural change in agriculture and transportation have made some rural transportation infrastructure investments less beneficial to agriculture and rural America. Other investments have yielded benefits that are less than the investment costs and were questionable investments from the beginning. Still others have been competitive with other rural transportation

infrastructure investments and effectively require subsidies to keep both modes operating.

* Agriculture must be concerned about future investments in the covered hopper railcar fleet and with the pricing and car assignment methods used in order to ensure adequate service in the future. Moreover, there will likely be further reductions in rural railroad mileage.

* Agriculture, rural interests, transportation policymakers and the general public must determine if the rules and philosophy of common carriage are still a viable concept in a deregulated, competitive environment. Agriculture and the larger society must ask what should be done (if anything) to provide rail cars, good service and favorable rates to small shippers or those with unusual or irregular shipping demands.

* Agriculture and rural interests must be concerned about adequate investments in new rail technology such as multistack refrigerated containers and adequate rail loading and handling facilities in rural areas.

* There has been a tendency by agriculture and other rural groups to resist any change, other than new additions, to the rural transportation infrastructure. For example, agriculture greatly resisted downsizing the branch rail line system, even though numerous studies indicated that upgrading most of these lines would have yielded benefit-cost ratios less than one. Indeed, there is still strong resistance to further reductions in the rail system in rural areas even for those lines that operate at financial losses.

* Reduced state allocations to the local rural road system suggest that agriculture and other rural groups will face the dilemma of increased property taxes to fund the maintenance of the existing local rural road system or face a reduction in the quality and number of miles in the local rural road system so that a core system of high quality paved local rural roads can be constructed.

* Rural interests must be concerned about investments in arterial roads that yield marginal returns by transferring economic activity from nearby communities and may place further pressures on remaining roads, branch rail lines, or the fledgling short line railroads that are attempting to operate in rural areas.

* Agriculture must be concerned about the future capacity of the aging inland waterway system, particularly since half of the new construction must be financed by waterway user taxes. There is a similar need for concern about the St. Lawrence Seaway system. Moreover, maintenance of the waterways which carry little freight at high costs will place further pressures on federal waterway funding and increase public pressures for higher waterway user taxes.

* Late in the 20th century, agriculture learned that it could indeed do without a substantial amount of so-called "essential" branch rail lines. There will undoubtedly be additional reductions in railroad mileage in rural America. The 21st century will witness the emergence of an economic environment that will require agriculture and other rural interest to decide which transportation infrastructure investments to support and which investments they can, after all,

do without. Undoubtedly, there is a substantial amount of rural transportation infrastructure in the latter category.

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