TRANSPORTATION
AND
ECONOMIC DEVELOPMENT:
OUR CHOICE FOR THE FUTURE
Conference II

August 25, 1992
Sheraton Inn
Bismarck, North Dakota

Sponsored by the
Upper Great Plains Transportation Institute -
North Dakota State University
Fargo, North Dakota
(701) 237-7767
and the
Hubert H. Humphrey Institute of Public Affairs
Minneapolis, Minnesota
Contents

CONFERENCE II

Agenda

Biographical Sketches of Speakers

Public Finance

Trade and Commerce

Role of Technology in Transportation

The Public’s Capital

CONFERENCE I PROCEEDINGS

Program

Biographical Sketches of Speakers

Transcriptions from Conference Speakers

Summary of Focus Groups

Reports from Focus Groups

Listing of Focus Groups Members

Conference Evaluation Form Summary

Steering Committee Members
TRANSPORTATION AND ECONOMIC DEVELOPMENT: OUR CHOICE FOR THE FUTURE
Conference II
August 25, 1992

Preliminary Agenda

9:30 a.m. Registration

10:00 Welcome and Introductions
Gene Griffin, Director - Upper Great Plains Transportation Institute

10:15 "Rural Aviation and Economic Activity"
Gary Ness, Director - ND Aeronautics Commission

"Road and Bridge Decisions for the 90's"
Ray Zink, Chief Engineer - ND Department of Transportation

"Transportation's Role in Expanding North Dakota's Economy"
Bill Davis, Deputy Director / Marketing - Department of Economic Development & Finance

12:00 p.m. Luncheon / Keynote Speaker
Representative Byron Dorgan

1:30 Instructions for Focus Group Sessions

1:45 Focus Groups

3:15 Break

3:30 Reports from Focus Groups with questions and answers

4:00 Wrap Up and Quality Check

4:15 Reception following the conference
Biographical Sketches of Speakers

Gary Ness - Director -
ND Aeronautics Commission
Bismarck, North Dakota

Gary Ness has been the Director of the North Dakota Aeronautics Commission since 1986. The mission of the Aeronautics Commission is to promote, enhance and regulate aviation in the state.

Gary's previous experience is diverse. He is a graduate of North Dakota State College of Science and North Dakota State University. He served in the U.S. Navy as a naval aviator. After naval service Ness was employed by the Federal Land Bank in the Grand Forks area. He also served as Vice President of First Federal Savings and Loan of Grand Forks. Gary also worked as a sales manager for AGSCO, a regional agricultural chemical company headquartered in Grand Forks.

Ness holds a commercial multi-engine and instrument pilot certificate. He is the treasurer and serves on the executive committee of the National Association of State Aviation Officials (NASAO). Ness serves on the Board of International Northwest Aviation Council which is made up of eight states and four Canadian Provinces. He is a member of the "National Standing Committee on Aviation" for AASHTO representing Region IV. Ness is also a member "Joint Committee on Domestic Freight Policy" for AASHTO.

Ray Zink - Chief Engineer -
ND Department of Transportation,
Bismarck, North Dakota

Ray Zink is the Chief Engineer at the North Dakota Department of Transportation.

Ray grew up in Bordulac, North Dakota. He graduated from North Dakota State University in 1959 with an Engineering degree. He began working with the North Dakota Department of Transportation in 1959 in the Design Division. He became Assistant Maintenance Engineer in 1967 and Maintenance Engineer in 1974. In 1982, he became the Chief Engineer.
William (Bill) Davis - Deputy Director / Marketing - ND Department of Economic Development & Finance Bismarck, North Dakota

Bill Davis is the acting Deputy Director of Marketing and Technical Assistance within the North Dakota Department of Economic Development and Finance. Previously, Bill has been acting director of the agency and was director of the Industrial Development division within the Department. He initially came to the Department as special projects coordinator.

Mr. Davis has been an owner and principal in several small businesses specializing in consulting services for environmental compliance, business consulting and community development. He worked for Technical Planning Information of Bismarck for five years as Director of the Planning and Research Division. Bill started his career with North Central Planning in Devils Lake as a Human Resource planner. He has a B.A. Degree in Public Administration from St. Cloud State University. Bill is a Devils Lake native.

Currently, Bill is a member of the Governor’s Policy and Planning Office, President of the North Dakota Indian Arts Association, and a member of the Industrial Development Association.

Byron L. Dorgan: Keynote Speaker North Dakota Congressman - House of Representatives

Byron Dorgan is serving his sixth term as North Dakota’s lone voice in the U.S. House of Representatives. He is one of the most active members of the House Ways and Means Committee. As Chairman of the Select Committee on Hunger’s International Task Force he has pushed to put North Dakota’s impressive agricultural industry to work feeding the hungry around the world. Dorgan also serves in the House leadership as an At-large Whip in the Democratic Caucus.

Dorgan received his B.S. from the University of North Dakota. He earned his MBA from the University of Denver and subsequently worked for a Denver-based aerospace firm. At age 26 he became the youngest constitutional officer in North Dakota history when he was appointed by the Governor to serve as the State Tax Commissioner. He was elected to that statewide office by large margins in both 1972 and 1976. While in office, Dorgan was selected as one of 10 outstanding officials in the United States by Washington Monthly.

In 1980 Dorgan won an open seat in the U.S. House of Representatives with 58 percent of the vote. He has been re-elected to the U.S. House by overwhelming margins in five successive elections.
Public Finance

The passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in December 1991 create new opportunities for state and local governments, as well as creates significant new financing challenges. The act shifts responsibility for planning and setting transportation priorities from the federal government to states and regional bodies, while setting standards for certain areas such as safety at the federal level. The very title of the act predicts a new way of doing business in the area of transportation, with a new focus on surface transportation, intermodal planning and efficiency.

While intergovernmental cooperation in planning and setting transportation priorities is encouraged by the new act, such cooperation is frequently incidental rather than systematic. It is more common for states and local jurisdictions to compete with each other for limited funds than to cooperate in developing the best and most efficient transportation solutions.

While ISTEA authorizes increased funds for transportation infrastructure for the next six years, there is no guarantee that these funds will in fact be appropriated. With the federal deficit as large as it is, Congress and the President will be hard-pressed to fully fund the transportation authorization while cutting spending in other areas or increasing taxes. Even if all of the funding is appropriated, citizen and business demands for infrastructure improvements and maintenance go well beyond available funds.

What is the solution? States must begin a long-term process to redesign and restructure their systems of planning and setting transportation priorities. The types of shifts that need to occur can be grouped into four major areas:

**Current System**

- Modal autonomy in planning, priorities and funding
- Jurisdictional focus, dedicated funding, fixed formulas
- Emphasis on funding capital improvements, maintenance and operating costs
- Limited linkage between who benefits and who pays

**Alternative Model**

- Intermodal, customer oriented approach in setting funding priorities
- Regional, cooperative model with increased flexibility
- Emphasis on long-term costs and benefits of transportation improvements
- Greater use of pricing and benefit assessment

**Modal Autonomy vs. Intermodal Approach**

*Current system:* Until the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA), public funding of transportation systems in the U.S. was handled differently for each mode of transportation. The planning and setting of priorities with each mode relied on a separate federal funding stream, working within the framework of a separate federal authority (Federal Highway Administration, Federal Transit Administration, Federal Railroad Administration, etc.) As Figure 1 shows, Minnesota's transportation financing is representative of most states, with a heavy bias towards funding highways.
Even though most state departments of transportation have incorporated the other modes within their missions, highway funding and planning has tended to dominate their work. The 1956 Federal-Aid Highway Act and the Highway Revenue Act enhanced the emphasis on highway transportation by establishing the Federal Highway Trust Fund and by authorizing the completion of the Interstate system. The 1978 and 1980 deregulation of the airline and railway industries has further complicated intermodal transportation planning and funding decisions.

Table 1 indicates federal transportation infrastructure priorities.

**Alternative model:** While ISTEA encourages an intermodal approach to planning, prioritization and funding transportation systems, states have just begun to think about how their organizations and systems should change to become intermodal. If intermodal is to become more than a buzzword, it will require redefining planning systems to consider all modes in the planning process. An initial step may be to create an intermodal team, as the Minnesota Department of Transportation has done. However, eventually each of the components of the system for planning and setting priorities should be organized on an intermodal basis. This may mean examining and redefining processes that have been in place for many years. Moving towards a more integrated intermodal transportation system will require more public and private financing ventures.
<table>
<thead>
<tr>
<th>Priorities for Increased Annual Federal Infrastructure Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>(*) Star indicates priorities that are grossly underfunded.</td>
</tr>
<tr>
<td>1989 Federal Spending$^a$ (in billions of dollars)</td>
</tr>
<tr>
<td>Surface transportation total</td>
</tr>
<tr>
<td>Highways and bridges</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Mass transit</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Rail (passenger)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Airports and airways total</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Ports and waterways total</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

$^a$Federal spending totals include some noninfrastructure expenditures, such as for safety.

$^b$A 20 percent increase is hypothetical. However, for surface transportation, it approximates the impact of spending the current Highway Trust Fund balance over a 5-year period.

Jurisdictional Focus vs. Regional Cooperation

Current system. Over the years, the system of funding highways has had a strong jurisdictional focus. Transportation funding is dedicated by federal law and state constitutions. Each jurisdiction — state, county, city — receives an allocation of highway funds under fixed formulas. Most highways are included in the Federal-Aid System and are eligible for federal aid. The Federal-Aid System is divided into four divisions: the Interstate System, the Federal-Aid Primary System, the Federal Urban System and the Federal-Aid Secondary System. State systems also include trunk, county, municipal and town road and bridge accounts.

User charges comprise the largest source of tax revenue for highway financing. User fees include: motor-fuel taxes, registration fees, motor vehicle excise taxes, driver license fees, and weight-distance taxes. A comparison of user fees and total revenue is shown in Figure 2. Nationally, 60% of all highway revenues were generated by user taxes in 1989. The Minnesota Highway User Tax Distribution Fund derives funding from a twenty cent gasoline tax, vehicle registration fees, and motor vehicle sales taxes. Ninety-five percent of this fund is allocated to: the Trunk Highway Fund (62.0%), the County-State Aid Highway Fund (29.0%), and the Municipal-State Aid Street Fund (9.0%) (Figure 3). Other states use similar formulas. General funds, property taxes, and local bonds are also used to finance capital outlays, maintenance and operations of highways and roads (Figure 4).

![Figure 2](image)

User-taxes as Percentage of Total Current Revenues for Highways.
All Levels of Government, 1987

While constitutionally allocated trust funds may provide predictability and stability to the system, they can also limit expenditure decisions. Currently, there is little opportunity for a jurisdiction to consider the opportunity cost, or alternative uses of these funds. Also, since each jurisdiction has its own sources of money, there is no particular incentive to cooperate with other jurisdictions in transportation planning.

States also allocate their own funding for transportation and have mandates for state level planning. Yet there is little incentive for regional or cooperative transportation between states. The emerging competition for north/south trade corridors is generating some new cooperative efforts between states, but this is more the exception than the rule.

Alternative Model. States should consider placing greater authority for planning, setting priorities and making transportation funding decisions at regional level within and among states. The federal government should encourage long-term joint transportation planning between states. This should occur both on a multi-state regional basis and between each state and its neighbors. Federal funds should be allocated to pay for these multi-state planning efforts, and the federal government should consider giving higher priority to funding multi-state transportation plans over single-state priorities.

ISTEA may force the greater participation of Regional Development Commissions, Metropolitan Planning Organizations and provides the foundation for interstate cooperation in transportation planning.

Capital Improvements vs. Maintenance

Current system. The current system of transportation funding encourages capital improvements over maintenance and operating costs. By law federal funding is restricted to capital improvements; therefore, highway operations and maintenance is left largely to the states and local governments (Table 2 & Figure 5). In 1989, state and local governments financed over half of all highway capital improvements. Maintenance of deteriorating infrastructure has become an increasingly important issue for state DOTs. The question is whether the current system offers too much of an incentive to build new roads and not enough encouragement to take into account the long-term costs of supporting this infrastructure.
### Table 2

#### HIGHWAY MILEAGE AND FUNDING STATISTICS

<table>
<thead>
<tr>
<th>Road classification</th>
<th>Miles</th>
<th>Jurisdiction</th>
<th>Capital funding</th>
<th>Maintenance funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate System*</td>
<td>44,000</td>
<td>State</td>
<td>90% Federal 10% State</td>
<td>100% State</td>
</tr>
<tr>
<td>Federal-Aid Primary Systemb</td>
<td>260,000</td>
<td>State</td>
<td>75% Federal 25% State</td>
<td>100% State</td>
</tr>
<tr>
<td>(excluding Interstate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal-Aid Secondary Systemc</td>
<td>400,000</td>
<td>State</td>
<td>75% Federal 25% State</td>
<td>100% State</td>
</tr>
<tr>
<td>Federal-Aid Urban Systemd</td>
<td>125,000</td>
<td>State</td>
<td>75% Federal 25% State</td>
<td>100% State</td>
</tr>
<tr>
<td>Local roads*</td>
<td>2,751,000</td>
<td>Counties, municipalities, and townships</td>
<td>Not eligible for federal aid</td>
<td>Local and State</td>
</tr>
<tr>
<td>Federal roadsf</td>
<td>226,000</td>
<td>Federal</td>
<td>100% Federal</td>
<td>100% Federal</td>
</tr>
</tbody>
</table>

*Routes that connect principal metropolitan areas, serve the national defense, or connect with routes of continental importance in Mexico or Canada (Subsystem of the Federal-Aid Primary System).  
*bInterconnecting roads important to interstate, statewide, and regional travel.  
*cMajor rural collectors that assemble traffic and feed to the arterials.  
*dUrban arterial and collectors routes, excluding the urban extensions of the major primary arterials.  
*eResidential and local streets.  
*fRoads in national forests and parks, roads on military and Indian reservations.


### Figure 5

**Capital Spending Per Mile of Road by All Levels of Government, 1987, By Road Jurisdiction**

![Graph showing capital spending per mile of road by state, city, and rural areas for different states like Illinois, Wisconsin, Minnesota, Iowa, Kansas, etc.](image)

**Maintenance Spending Per Mile of Road by All Levels of Government, 1987, By Road Jurisdiction**

![Graph showing maintenance spending per mile of road by state, city, and rural areas for different states like Illinois, Wisconsin, Minnesota, Iowa, Kansas, etc.](image)

Alternative model. Each transportation decision should include an analysis of long-term benefits and costs, and these should be an integral part of the initial funding decision. While there may be short-term public gratification and political benefit in new capital investments, these must be balanced against the long-term costs of maintenance, operations and safety. Some Midwestern states will have to face difficult decisions between maintaining infrequently used rural roads and maintaining the entire transportation system. Efficient transportation investments are not always politically popular or feasible. Future funding decisions will be focused on balancing equity of access against economic efficiency as rural populations continue to migrate to metropolitan areas.

Who Benefits? Who Pays?

Current system. There is currently only a limited linkage between who benefits and who pays for transportation service. While user charges, motor fuel taxes and motor vehicle taxes and fees, are the primary source of funding for highways, there is only an indirect linkage between those who benefit and those who pay for highway improvements and costs. Tolls are a limited source of funds in some states, but are not common in the Upper Midwest. Local real estate taxes and assessments link local road benefits to the local community. In some cases, private property owners may share in costs where they derive benefits from highways. While the ISTEA encourages experiments in congestion pricing, this has not been tried very extensively in the U.S.

Alternative model. Increased use of benefit charges and pricing can contribute to a more efficient transportation system, assist in the process of setting priorities, and provide additional funding for transportation infrastructure investments. If a development or business benefits from a specific transportation improvement, a share of the cost should be assessed against that business. Congestion pricing should be considered as a solution to reducing peak hour congestion in the Twin Cities Metropolitan area, encouraging drivers to consider other modes, and help to fund the high cost of urban transportation improvements.
Trade and Commerce

Do Transportation Investments Pay Off in Economic Growth?

Most researchers agree that, in general, investments in infrastructure should mirror rates of economic growth. That is, infrastructure investments should follow rather than lead economic development. These researchers also prove that infrastructure supports economic activity and that continued decline in this type of investment will eventually erode our productivity, competitiveness and quality of life. Strategic investments in transportation infrastructure include those that make the system more efficient by reducing the costs of getting people and products to their destinations. This may mean building or improving roads in areas that connect with major trade routes, transport major export commodities, help to reduce congestion, or improve access between various modes of transportation.

In 1965, Niles Hansen, a University of Texas economist classified regions into three categories: congested, lagging and intermediate. This typology may help to show how investments in infrastructure can pay off. A congested community benefits from infrastructure investments by reducing the time wasted on choked highways -- this helps to accommodate the growth experienced by these faster growing areas. A lagging community is one in which employment and industry are declining, little benefit comes from increased infrastructure investments in such areas. Intermediate areas are those which lack specific infrastructure improvements but have a trained workforce and prospects of future economic growth.

The Basics of the Upper Midwest's Economy

The five states of the Upper Midwest, including Minnesota, Iowa, North Dakota, South Dakota and Montana, are centrally located just west of the St. Croix and Upper Mississippi rivers and south of the Canadian border with Manitoba, Saskatchewan and Alberta. This region shares a history of trade and commerce based on agricultural production and trade. This agricultural base led to the development of the Twin Cities of Minneapolis - St. Paul as a financial services center and distribution hub for much of the region's value-added agricultural and manufactured products.

In keeping with its agricultural and natural resource-based economy, the region is relatively sparsely populated. Between 1960 and 1985, the population of the Upper Midwest grew at a rate well below the national average (see CURA Trade Centers study). Within the Upper Midwest, there continues to be growth of urban centers and loss of population in rural communities.

### Upper Midwest Population

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>2,943,000</td>
<td>57%</td>
</tr>
<tr>
<td>Minnesota</td>
<td>4,324,000</td>
<td>35%</td>
</tr>
<tr>
<td>North Dakota</td>
<td>660,000</td>
<td>63%</td>
</tr>
<tr>
<td>South Dakota</td>
<td>715,000</td>
<td>72%</td>
</tr>
<tr>
<td>Montana</td>
<td>805,000</td>
<td>65%</td>
</tr>
<tr>
<td>U.S.</td>
<td>248,239,000</td>
<td>19%</td>
</tr>
</tbody>
</table>

Source: Almanac of 50 States
Agriculture is very important to the region. Iowa is second in the nation for agricultural exports, South Dakota leads the U.S. production of oats and rye and is second in sunflower seeds and flaxseed. Minnesota is ranked first in sugar beet production, third in soybeans and fifth in corn production. The region is also strong in numerous livestock products. The producers of these agricultural products continue to consolidate – during the past 30 years the number of farms and farmers has decreased by 37 percent.

Natural resource based activities such as mining, energy resources and tourism are also important to the region’s economy. During the past two decades there has been rapidly accelerating development of fossil fuels in the Western Dakotas and Montana and increasing tourism development in Montana and Minnesota.

Over the past several decades these states’ economies have experienced a great deal of change. For the states of Minnesota and Iowa this has meant a tremendous diversification and continued growth of the economic base. For the Dakotas, the past twenty years have led to loss of population and economic activity overall. Montana continues to reap benefits from its natural resources of minerals, forestry and wilderness (tourism) as well as a small but vital manufacturing sector. The service sector has grown over the past decade both nationally and in the region. At the same time, many manufacturing sectors have lost employment.

The most striking change in employment in the Upper Midwest has been the growth in service industries, particularly those servicing the business and the computer industry. This has been the case in high population density states like Minnesota as well as low-density states such as North Dakota.

**Upper Midwest**  
**Employment by Industry**  
**Percent Change 1979 - 1989**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Iowa</th>
<th>Minnesota</th>
<th>N. Dakota</th>
<th>S. Dakota</th>
<th>Montana</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>44.31</td>
<td>60.68</td>
<td>23.27</td>
<td>28.07</td>
<td>38.59</td>
<td>73.09</td>
</tr>
<tr>
<td>Mining</td>
<td>-29.92</td>
<td>-60.15</td>
<td>17.73</td>
<td>-23.12</td>
<td>-33.35</td>
<td>-25.09</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-11.92</td>
<td>1.60</td>
<td>3.64</td>
<td>17.66</td>
<td>-19.74</td>
<td>-9.27</td>
</tr>
<tr>
<td>Trans., Comm., Pub. Util.</td>
<td>8.88</td>
<td>14.67</td>
<td>13.80</td>
<td>3.60</td>
<td>7.06</td>
<td>17.68</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>-10.36</td>
<td>14.88</td>
<td>-11.89</td>
<td>-4.45</td>
<td>-11.42</td>
<td>18.65</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>8.24</td>
<td>19.18</td>
<td>5.18</td>
<td>7.56</td>
<td>-0.91</td>
<td>27.64</td>
</tr>
<tr>
<td>Fin., Ins. &amp; R. Est.</td>
<td>19.12</td>
<td>30.34</td>
<td>-77.24</td>
<td>39.84</td>
<td>-4.45</td>
<td>31.82</td>
</tr>
<tr>
<td>Services</td>
<td>39.75</td>
<td>51.97</td>
<td>43.92</td>
<td>41.95</td>
<td>31.66</td>
<td>62.98</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6.72</td>
<td>20.35</td>
<td>12.22</td>
<td>16.28</td>
<td>1.39</td>
<td>22.70</td>
</tr>
</tbody>
</table>

Source: U.S. Census, County Business Patterns
Trade: The Engine of Economic Growth

The goods producing activities of the region, including manufacturing, construction, farming, agricultural services, forestry, fisheries and mining, are a measure of the region's economic growth potential. These goods are exported outside the region and bring additional income to the area. According to the Bureau of Economic Analysis data on income from employment in these industries, only two states in the region, Minnesota and Iowa, exceed the national rates of goods producing income.

Foreign trade is a part of this export income. In the five states these exports are as follows:

<table>
<thead>
<tr>
<th>State</th>
<th>Tot. Value of For. Exports ($ millions)</th>
<th>Rank Among U.S. States</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>2,189</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Minnesota</td>
<td>5,091</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>North Dakota</td>
<td>360</td>
<td>45</td>
<td>47</td>
</tr>
<tr>
<td>South Dakota</td>
<td>205</td>
<td>49</td>
<td>45</td>
</tr>
<tr>
<td>Montana</td>
<td>229</td>
<td>48</td>
<td>44</td>
</tr>
</tbody>
</table>

The ability to produce and deliver goods to trading partners is an essential part of a healthy economy. In the Upper Midwest, goods produced are shipped to other regions of the U.S. and to foreign destinations. The following table shows the importance of foreign exports to the economy of these five states.

<table>
<thead>
<tr>
<th>State</th>
<th>Foreign Exports as Percent of Gross State Product, 1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>4.2</td>
</tr>
<tr>
<td>Minnesota</td>
<td>5.4</td>
</tr>
<tr>
<td>North Dakota</td>
<td>1.7</td>
</tr>
<tr>
<td>South Dakota</td>
<td>3.2</td>
</tr>
<tr>
<td>Montana</td>
<td>1.8</td>
</tr>
<tr>
<td>U.S. (as a pct. of GNP)</td>
<td>10.2</td>
</tr>
</tbody>
</table>

Source: Survey of Current Business

Increasing globalization of the world's economy, along with "freeing" up of trade restrictions among North American neighbors places the Upper Midwest in a unique position to capture a greater share of the increasing north-south trade with Canada and Mexico. According to one recent study, the Red River Trade Corridor between Upper Midwest and Manitoba is the fourth largest corridor along the Canadian border, accounting for nearly $8 billion in trade annually. These commodity flows include energy, wood and paper products, chemicals and agricultural products flowing south from Canada and industrial equipment, electronics, motor vehicles and parts, consumer goods and agricultural products flowing north. As this level of trade increases, it will require more attention to the connectivity between this region and other destinations throughout the U.S. on a north-south axis.
Getting Our Products to Market

Minnesota is a pole for much of the economic activity of the region. Minneapolis - St. Paul is one of 28 airline hubs nationally. Of these hubs, Minneapolis – St. Paul airport ranks 16th in aircraft departures and 12th in freight shipments per 10,000 residents. Several of the region’s intermodal (rail/truck, rail/barge) hubs are located in Minnesota (e.g. Twin Cities, Dilworth, International Falls, Duluth/Superior). According to University of Minnesota economist, Wilbur Maki, the Twin Cities serves as the core metropolitan area of the multi-state commodity-producing region and as a part of the global transportation - communications network.

The Upper Midwest’s trade and commerce depends heavily on its transportation infrastructure. The region has a number of well maintained interstate and highway thoroughfares which carry passenger vehicles within and through the region. In addition, to motor vehicles, passengers rely on the air services available at major commercial air hubs such as the MSP airport as well as other commercial and private aviation centers throughout the region. The vital service sector and headquarters functions of the Twin Cities rely heavily on the existence of the Minneapolis - St. Paul airport and its daily access to major markets throughout the world.

Passenger and Air Freight in Upper Midwest, 1989

<table>
<thead>
<tr>
<th>Passenger</th>
<th>Freight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enplanements</td>
</tr>
<tr>
<td>Iowa</td>
<td>1,042,003</td>
</tr>
<tr>
<td>Minnesota</td>
<td>8,871,085</td>
</tr>
<tr>
<td>North Dakota</td>
<td>500,561</td>
</tr>
<tr>
<td>South Dakota</td>
<td>350,015</td>
</tr>
<tr>
<td>Montana</td>
<td>678,614</td>
</tr>
</tbody>
</table>

Source: FAA Statistical Handbook

Annual aircraft operations are projected to increase dramatically, showing an increase of 75% from 2.1 million to 3.9 million over the next thirty years. This is due to an envisioned increase in the amount that each aircraft is used especially as aircraft are used to a greater extent for business purposes.

Goods produced in the region rely primarily on shipments by trucks along the extensive interstate and intrastate highway system of the region. The following table shows the modes by which the region shipped its manufactured freight in 1989. Trucking is clearly the dominant force in the region. This varies somewhat by commodity. Grains and coal shipments are carried by the region’s rail system and some barge traffic. Air cargo accounts for high value computers and scientific instruments as well as printed matter.
Inbound and Outbound Manufactured Freight, 1989
(millions of tons)

<table>
<thead>
<tr>
<th>State</th>
<th>Total</th>
<th>Truck</th>
<th>Rail</th>
<th>Air</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>94.2</td>
<td>74.0</td>
<td>17.0</td>
<td>.020</td>
<td>3.2</td>
</tr>
<tr>
<td>Minnesota</td>
<td>126.9</td>
<td>103.7</td>
<td>18.3</td>
<td>.076</td>
<td>4.8</td>
</tr>
<tr>
<td>North Dakota</td>
<td>14.8</td>
<td>11.3</td>
<td>3.5</td>
<td>.045</td>
<td>0.0</td>
</tr>
<tr>
<td>South Dakota</td>
<td>14.6</td>
<td>13.3</td>
<td>1.3</td>
<td>.001</td>
<td>0.0</td>
</tr>
<tr>
<td>Montana</td>
<td>35.7</td>
<td>30.1</td>
<td>5.6</td>
<td>.017</td>
<td>0.0</td>
</tr>
<tr>
<td>TOTAL Upper Midwest</td>
<td>286.2</td>
<td>232.4</td>
<td>45.7</td>
<td>.159</td>
<td>8.0</td>
</tr>
<tr>
<td>Percent of Total</td>
<td>100.0</td>
<td>81.2</td>
<td>16.0</td>
<td>0.0</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Source: American Trucking Associations Foundation/Reebie Associates

According to the ATA Foundation, 77 percent of the total freight moved throughout the Midwest is transported by midwestern trucking companies.

While water does not account for as large a share of total shipments as other modes, it is important to point out that the total shipments by barge through the Rock Island District of the Mississippi River grew nearly 90 percent from 1979 to 1989, and was dominated by grain and coal.

Miles of Public Roads and Streets

<table>
<thead>
<tr>
<th>State</th>
<th>Total</th>
<th>Urban</th>
<th>Rural</th>
<th>Federal Aid Primary Highway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>112,551</td>
<td>7,843</td>
<td>94,425</td>
<td>9,566</td>
</tr>
<tr>
<td>Minnesota</td>
<td>129,553</td>
<td>12,912</td>
<td>115,458</td>
<td>10,206</td>
</tr>
<tr>
<td>Montana</td>
<td>71,360</td>
<td>2,113</td>
<td>69,942</td>
<td>6,644</td>
</tr>
<tr>
<td>N. Dakota</td>
<td>86,384</td>
<td>1,600</td>
<td>84,579</td>
<td>6,109</td>
</tr>
<tr>
<td>S. Dakota</td>
<td>73,378</td>
<td>1,574</td>
<td>71,622</td>
<td>6,674</td>
</tr>
</tbody>
</table>

Source: FHWA

Levels of Public and Private Investment

Investment in infrastructure has slowed during the past several decades. Capital outlays for infrastructure are 1.6 percent of the gross national product today compared to 2.2 percent in 1963. Investments in infrastructure come from both public and private sectors. Public sector sources include federal, state, and local governments. During the past ten years, the burden of building and maintaining our transportation infrastructure has been shifted to the state and local level. These needed investments must now compete with an increasing array of other public goods in an environment of reduced taxing capacity.
The American Commission on Intergovernmental Relations (ACIR) produces a measure of tax capacity based on property values, sales tax and mineral production for each state as well as tax effort - the burden placed on the states' revenue base relative to the national average. The following summarizes these for the Upper Midwest region.

### State Fiscal Summary

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>$15,487</td>
<td>84</td>
<td>118</td>
<td>20</td>
</tr>
<tr>
<td>Minnesota</td>
<td>$17,657</td>
<td>103</td>
<td>117</td>
<td>20</td>
</tr>
<tr>
<td>North Dakota</td>
<td>$13,563</td>
<td>85</td>
<td>107</td>
<td>17</td>
</tr>
<tr>
<td>South Dakota</td>
<td>$13,685</td>
<td>78</td>
<td>95</td>
<td>18</td>
</tr>
<tr>
<td>Montana</td>
<td>$14,078</td>
<td>84</td>
<td>102</td>
<td>20</td>
</tr>
<tr>
<td>U.S.</td>
<td></td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Source: American Commission on Intergovernmental Relations.

The private sector invests in infrastructure mainly in plant and equipment. Private sector investments related to transportation include fleets of motor vehicles, material handling equipment, warehouses as well as computerized inventory and communications equipment. In an era of "just-in-time" delivery of parts and materials to U.S. manufacturers transportation is substituting for warehousing. This makes the speed and reliability of the transportation system even more crucial for the competitiveness of American manufacturers.

The following table shows the ratios of total public capital stock to total private capital for this region in two years, 1978 and 1988, derived by the Federal Reserve Bank of Boston from BEA data. This study (see Munnell, 1990) concluded that public capital investment has a statistically significant positive impact on private sector output. It also showed that although this public capital investment enhances productivity, public capital substitutes for private capital -- the more public investment available the less private investment is required. It also proved a significant positive impact between investment in public capital and employment growth.

### Ratio of Public Capital Stock to Private Capital Stock

<table>
<thead>
<tr>
<th>Year</th>
<th>Iowa</th>
<th>Minnesota</th>
<th>Montana</th>
<th>N. Dakota</th>
<th>S. Dakota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>1: 2.8</td>
<td>1: 2.0</td>
<td>1: 3.3</td>
<td>1: 3.8</td>
<td>1: 2.3</td>
</tr>
<tr>
<td>1988</td>
<td>1: 2.5</td>
<td>1: 2.2</td>
<td>1: 3.1</td>
<td>1: 4.2</td>
<td>1: 2.2</td>
</tr>
</tbody>
</table>

Source: Federal Reserve Bank of Boston
New Models for Cooperation in Infrastructure Development

Deregulation:

The Motor Carrier Act of 1980 relaxed the restrictions governing interstate movement of goods. This Act led to a dramatic increase in the number of road transport carriers and intermediaries. Between 1979 and 1985 the number nearly doubled. As a result, a hub and spoke network for less than truckload (LTL) emerged to take advantage of the economies of scale of consolidating shipments.

Most analysts believe that deregulation led to a relative fall in prices, and contrary to some fears service to rural areas has not deteriorated. The most significant impact of deregulation has been the greater competition between modes as trucks are now competitive with rail even on long hauls. While this competition has in many ways been beneficial, it has also made planning for an intermodal transportation system very difficult due to the entrenched interests of competing modes.

- Minnesota recently adopted a new law regulating the intrastate trucking operations. This law allows for greater competition in transporting of less than truckload (LTL) shipments.
- Border crossings with Canada managed jointly. Montana Governor, Stan Stephens recently led a trade delegation to Alberta, Canada that worked to create a jointly operated vehicle inspection station at the border at Coutts, Alberta. In addition the Montana/Alberta Advisory Committee has been given increased emphasis to help expand the trade, cultural and intergovernmental ties between Canada and Montana.

Intermodalism:

A recent University of Minnesota study of use of intermodal shipping found that Intermodal Railroad-Truck (IRT) is used by a great variety of industries. The most common characteristic of users of IRT was that their shipments tended to be low-volume per unit of size and had a distant destination. The benefits of IRT include reduced energy consumption, pollution, congestion, and road deterioration. Promoting greater use of IRT is limited by present regulatory structure.

- Siting of new intermodal truck/rail yards is difficult. The City of Minneapolis is planning to development such a new facility, working with industry to improve inner-city goods movement and reduce delays in through shipments.

Public-Private Finance

The Pennsylvania Partnership Act: provided for more formal partnership arrangements between the public and private sector, and permits municipalities to act jointly with each other and with the private sector to finance transportation projects. The act provides a process for pooling resources to take advantage of economies of scale. It also establishes transportation development districts which may raise revenues through: 1) imposing an assessment on business property or benefitting projects, 2) imposing any other taxes permitted by law, 3) issuing notes and bonds, and 4) accepting grants, gifts and donations. Finally, this act requires that the transportation development districts establish multi-year transportation improvement programs that identify priorities.
Interjurisdictional Cooperation

With the increasing potential for new markets brought forth by the trade agreement with Canada and the potential for a trade agreement with Mexico, the major goods shipment axis will shift from its traditional east-west orientation to a north-south one. (Larry Swanson of the University of Montana has analyzed the trade flows between U.S. and Canada.) The Red River Trade Corridor has organized a coalition of business institutions and governmental institutions including Minnesota, North Dakota, and Manitoba to promote trade within the corridor. A similar effort is being undertaken by several western states.

South Carolina’s State Development Board has initiated the use of GIS (Geographical Information Systems) to better coordinate infrastructure investments and other community and economic development activities. The GIS system allows policymakers to consider large geographical based data related to policy analysis and industrial site selection. GIS systems have the potential to connect transportation infrastructure investments with other infrastructure needs such as water and wastewater systems, and with broader economic development objectives. This GIS program has been a joint effort of several state agencies including the Highway Department, the Department of Health and Environmental Control, and the Water Resources commission.
Role of Technology in Transportation

The advent of new technologies in transportation has enhanced the economic growth of the Upper Midwest. New technologies will continue to be part of the development of the region's transportation system. A variety of areas can be used to highlight the changes technology will bring to this region. These apply to all modes of transportation. The following graphic represents possible changes in surface transportation. 

This paper looks at both current and future technology innovations now being considered by various transportation venues. The Upper Midwest and other regions of the country are also exploring such opportunities. The most advanced technology being tested in the region is Intelligent Vehicle Highway Systems (IVHS). This paper highlights its passenger and commercial vehicle applications.

Great gains have been achieved in recent years by using additional technology information systems for aviation traffic management. Today's advances in transportation technologies are centered around surface transportation. In each of the states of the region, research projects are being conducted by the state Departments of Transportation and by universities. In some cases, private enterprise such as Motorola, 3M and other companies are involved in these projects. The region must be ready to evaluate and test various modes of this technology during the next five years.
Throughout the region, agriculture serves as a key ingredient to economic prosperity. Transportation of agricultural products as well as other products is essential to the economic growth of the region. The use of new technologies, such as on-line systems between shippers and carriers, can keep costs competitive by creating faster and more efficient delivery systems.

In addition, new technologies may increase the productivity of transportation vendors and government regulators. Several research projects are testing more efficient monitoring of government regulatory requirements. In addition, training for future employees of transportation related industries might be aided by satellite based education systems.

The five state region will be able to serve as a model for regional cooperation in technology implementation.

**Current Technologies Being Implemented in the Five State Region**

**IVHS**

Minnesota is one of the nation’s leading research centers of Intelligent Vehicle - Highway Systems (IVHS). Minnesota Guidestar is the state’s IVHS program and is a joint effort between the Minnesota Department of Transportation and the University of Minnesota’s Center for Transportation Studies.

Minnesota Guidestar plans to reduce traffic congestion and improve safety. By decreasing delays, air quality will be improved and energy will be conserved.
Research is focused on three primary areas: 1) attempting to prevent congestion and predicting where and when it will occur 2) providing motorists with in-vehicle information on a variety of topics, including congestion, weather conditions and routing advice 3) developing fleet dispatching services for taxis, busses and emergency vehicles.

<table>
<thead>
<tr>
<th>Beneficiaries</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Public</strong></td>
<td>Travel</td>
</tr>
<tr>
<td>Commuters</td>
<td>Decreased travel time</td>
</tr>
<tr>
<td>Shoppers</td>
<td>Increased safety</td>
</tr>
<tr>
<td>Public transportation users</td>
<td>Increased comfort and convenience</td>
</tr>
<tr>
<td>Tourists</td>
<td>Increased security</td>
</tr>
<tr>
<td></td>
<td>Decreased cost</td>
</tr>
<tr>
<td><strong>Private Sector Operators</strong></td>
<td>Economic</td>
</tr>
<tr>
<td>Trucking companies</td>
<td>Increased productivity</td>
</tr>
<tr>
<td>Bus companies</td>
<td>Improved international</td>
</tr>
<tr>
<td>Taxis</td>
<td>competitiveness</td>
</tr>
<tr>
<td>Small package delivery</td>
<td>Product innovation</td>
</tr>
<tr>
<td>Emergency services</td>
<td>On-time delivery</td>
</tr>
<tr>
<td><strong>Industry</strong></td>
<td>Environmental</td>
</tr>
<tr>
<td>Automotive manufacturers</td>
<td>Decreased air pollution</td>
</tr>
<tr>
<td>Electronics manufacturers</td>
<td>Decreased noise pollution</td>
</tr>
<tr>
<td>Traffic systems suppliers</td>
<td>Increased fuel savings</td>
</tr>
<tr>
<td>Researchers</td>
<td>Information</td>
</tr>
<tr>
<td></td>
<td>Increased trip efficiency</td>
</tr>
<tr>
<td>State DOTs</td>
<td>More uniform and effective</td>
</tr>
<tr>
<td>Traffic departments</td>
<td>traffic enforcement</td>
</tr>
<tr>
<td>Transit agencies</td>
<td>Improved trip planning</td>
</tr>
</tbody>
</table>

IVHS Beneficiaries (Source: Mobility 2000)

IVHS-CVO

There is a great deal of interest in commercial applications of IVHS at the federal level. Currently, the Federal Highway Administration is funding research of regional strategies for IVHS-CVO. Several studies are being done across the country, investigating how states can cooperate with each other.

Researchers in Iowa and Montana are investigating applications of Intelligent Vehicle - Highway Systems (IVHS) in Commercial Vehicle Operations (CVO). The Iowa research is being conducted by the Midwest Transportation Center (MTC) and the Montana investigation is being done in cooperation with the Washington State Transportation Center (TRAC).

According to Mark Hallenback, Director of the Washington State Transportation Center, there is an eight state project in the Northwest, another eight state project in the Southeast, and a third project with three states in the Southwest.

The regional projects are designed to "encourage and assist regional states and industry in adopting advanced IVHS technologies which can increase the productivity and safety of motor carriers and efficiency of state regulatory programs."
There are two broad goals of the FHWA sponsored research:

- Free Flow of Interstate Truck Movement
- Electronic Commercial Driver/Vehicle Safety Inspections

The first goal hopes to create "transparent borders." Using electronic technologies to coordinate states' regulatory systems would allow commercial vehicles to travel from one state to another easily and smoothly. Compliance with registrations, licenses and permits would be verified electronically by a regulatory agency. Further, mileage could be reported to the states electronically."

Researchers at the MTC in Iowa are leaders of the IVHS-CVO applications field. They have identified five promising applications for IVHS-CVO:*

- Weigh-in-motion with automatic vehicle identification
- Pre-clearance for safety inspection
- "One-Stop-Shopping" for licenses, registrations, and permits
- Automated, apportioned fuel tax administration using instrumented state line crossings
- Automatic toll collection using electronic toll and traffic management systems

Researchers at MTC estimate complying with states' regulations and permit requirements cost $12,000 per tractor-trailer per year. This does not include the cost of taxes, tolls and fees associated with registration requirements. Assuming "that the Iowa's motor carriers surveyed are indicative of motor carriers throughout the country, a conservative estimate of the national cost of complying with administrative rule and regulation is approximately $6 billion per year."*

MTC says there is a need for a new paradigm for the successful application of IVHS-CVO application. More work "on institutional and policy issues is needed in terms of research, within the motor carrier community, and among policy-makers and there staffs."*

**Telecommunications and Distance Education**

North Dakota has several education programs reliant on telecommunications technology. The Upper Great Plains Transportation Institute is developing a two-way interactive satellite system. The system will link up four universities and six Departments of Transportation. The satellite system, expected to be operational by the end of September 1992, is designed to accomplish three objectives:

- Establish a graduate program in transportation at the four universities to be linked, North Dakota State University, University of Wyoming at Laramie, Utah State-Logan, Colorado State-Fort Collins.
- Stimulate technology transfer and research awareness between the universities and the DOT's.
- Create discussion between the DOT's in areas of policy and technical expertise.

The University of North Dakota-Grand Forks is developing a satellite based education program which will broadcast aviation instruction to universities across the United States. UND has received $4.5 million from the FAA to develop the system and it expects to receive additional FAA funding. The FAA hopes the service will provide more consistent aviation instruction.
The satellite education program will provide aviation instruction to ten universities by September 1992. Eventually, this service is expected to serve between forty and fifty universities.

UND has recently acquired a Cray supercomputer which will develop better models to predict weather conditions. The university will use the computer to research weather conditions as they relate to transportation challenges, such as de-icing of planes.

UND is also providing computer based instruction for students training to be pilots. Gone is the old manual based education. Students studying hydraulic systems are now able to see the operation of the systems in motion on their computer screens.

---

**Pave-Tech**

"Pave-Tech" is being used by the North Dakota Department of Transportation.14 "Pave-Tech" uses a mini-van equipped with cameras to inventory the condition of North Dakota state highways. This technology improves the state’s pavement management system, providing a more consistent inventory of state highway conditions.

Before "Pave-Tech," twenty-four ND-DOT workers spent three months investigating the conditions of state highways (equivalent of eight full-time workers).

Now, with the use of the $130,000 mini-van, three DOT workers do the work that the twenty-four did previously. Once the ND-DOT is finished cataloguing its roads and highways, it plans to lease out the mini-van to cities and counties.
Regional Technology Projects

Nine projects are being tested throughout the nation in conjunction with the Federal Highway Administration. Several of these projects have multi-city and multi-state parameters.

The following graph shows the location of these projects.

![Map of Regional Technology Projects](image)

Selected Operational Tests being Conducted with Federal Funding Participation

A brief synopsis of the work of these projects is as follows:15

**TRANSCOM:** A consortium of 14 transportation and public safety agencies in the New York and New Jersey area which are working to improve inter-agency responses to traffic incidents.

**SMART Corridor Project:** A joint demonstration project located along 12.3 miles of Santa Monica Freeway corridor in Los Angeles. The objective is to provide congestion relief through various alternatives.

**Guidestar Project:** A cooperative effort that will bring together a number of on-going operational traffic management and traveler information systems with a range of IVHS projects in Minnesota.

**Pathfinder Project:** A cooperative effort by Caltrans, FHWA and General Motors to provide in-vehicle navigation to improve traffic flow.

**TravTek:** TravTek represents a public/private partnership involving the City of Orlando, Florida, the Florida DOT, FHWA, General Motors, and the American Automobile Association (AAA) to
provide traffic congestion information and various guidance facilities to 100 test vehicles equipped with an in-vehicle TravTek device.

ADVANCE: An effort to evaluate performance of the first large-scale dynamic route guidance system in the nation in a joint project including the Illinois DOT, Motorola, Inc., the Illinois University Consortium and the FHWA.

DIRECT: Located in the Detroit, Michigan area, it will deploy and evaluate four alternative low cost methods of communicating advisory information to motorists.

HELP/Crescent: HELP (Heavy Vehicle Electronic License Plate Program) is a multi-state, multi-national research effort to design and test an integrated heavy vehicle monitoring system.

Advantage I-75: The project represents a partnership of public and private sector interests along the I-75 corridor to allow transponder equipped and documented trucks to travel any segment along the length of I-75 at mainline speeds with minimal interruption at weigh/inspection stations.

Possible Projects for Five State Region

The following is a list of possible cooperative efforts between the states within the region.

- Duplicate I-75 project possibly along I-94 and I-29.
- Expand GuideStar focus into five state region; broaden to include rural applications of IVHS.
- Expand current Iowa project for truck licensing and regulating into five state consortium.
- Provide linkages for radio or transponder information amongst properly equipped vehicles in five state region.
- Duplicate HELP/Crescent Project for heavy vehicle monitoring.

The possibilities for developing a five state consortium project are limited by the funds and the equipment available. However, as this information demonstrates, a need exists in the nation to determine how this work would be implemented into larger scale designs.
Endnotes

1. Leading work on this topic includes:
   
   Aschauer, David Alan. 1991 "The Third Deficit" GAO Journal pp. 4-8;
   
   Forkenbrock, David J., Thomas Pogue, Norman S. J. Foster and David J. Finnegar 1990 Road Investment to Foster Local Economic Development Iowa City: Public Policy Center;
   
   Munnell, Alicia H., Editor. 1990 Is There a Shortfall in Public Capital Investment? Boston: Federal Reserve Bank;
   
   
   


6. Sources for the Environment, Safety and Quality of Life section are as follows:

   
   Brandt, Steve. 1988. Light rail may be wrong cure/Study finds flaws in assumptions that led to push for system in Hennepin. Star Tribune. March 21: 1A.
   


7. All maps and graphics in this paper are from *An Overview of the IVHS Program Through FY 1992*, Federal Highway Administration, Washington, D.C.

8. IVHS Funding for Institutional Issues Development Memorandum, FHWA, 5/21/92.

10. MTC report.

11. MTC report.

12. Interview with Gene Griffin, Director of Upper Great Plains Transportation Institute, 5/20/92.

13. Interview with Scott Bergstrom, Director of Technology Based Instruction Research Laboratory, 5/21/92.


The new transportation bill marks the end of an era. Highways, such as these that define a commuter's life in Houston, will no longer dominate national or regional transportation policies.


The Once and Future Transportation Plan

For decades highways have been kings of the road; dominating transportation policy, taking charge of its funding. But not longer.

With the passage in 1991 of a major new surface transportation bill, Congress shifted policy away from a single-minded obsession with interstate highways and focused it on a variety of means of moving people and goods.

These changes, as expressed in the Intermodal Surface Transportation Efficiency Act, offer unique opportunities to state and local officials: It lets them decide for themselves the most suitable forms of future transportation for their regions—from new high-tech subways to low-tech car-pool lanes. “Our idea is to let states compete among themselves. Let them learn from each other’s mistakes; copy each other’s successes,” says U.S. Senator Daniel Patrick Moynihan, a principal architect of the transportation act. “Those who make wise decisions will prosper. Those who make poor decisions will pay.”

This edition of The Public’s Capital highlights three areas of the new transportation bill that pose significant opportunities and challenges to state and local governments:

- Devolution. Decision-making authority moves away from the federal government to the states, and in urban areas, from state agencies to metropolitan planning organizations. MPOs, rather than departments of transportation, will have a chance to call the shots, deciding which projects the region should invest...
Who Gets What: The Major Funding Provisions of ISTEA

National Highway System: $21 billion for construction and repair of Interstate highways and major state roads. States can transfer 50 percent of the money to the Surface Transportation Program. States can also spend highway money on non-NHS projects that will improve traffic flow on national highways. An additional $17 billion is earmarked for Interstate maintenance.

Surface Transportation Program: $23.9 billion for roads, transit, transportation enhancement and safety. Some of the money is allocated by formula to urban areas. An additional $14 billion from four other programs can either be transferred to the Surface Transportation Program or spent on projects eligible for the program.

Transit: $12.4 billion for new systems and equipment. Of that, 40 percent is for new starts, 40 percent for rail modernization and 20 percent for bus and other uses. About half the money is to be spent on 64 specifically authorized projects. In addition, $17.4 billion has been earmarked for transit operating assistance.

Congestion Mitigation and Air Quality Improvement Program: $6 billion for projects that will help areas struggling to achieve air quality goals.

Interstate Completion and Trade-in: $13.4 billion to complete the Interstate system and honor prior commitments for Interstate transfers to rapid transit projects.

New Technologies: $660 million for smart cars/smart highways research and development; $725 million for research and development leading to the production of a magnetic levitation train system.

Special Projects: $6.2 billion earmarked for 538 specific projects, such as replacement of a bridge in Portland, Maine, and improvement of an expressway in Chicago.

Bridge Repair and Replacement: $16.1 billion for continuation of existing bridge program. Up to 40 percent of a state's bridge funds may be transferred to the National Highway or Surface Transportation programs.

in. The challenge: Most of these regional planning councils have been around since the 1960s but they have little experience allocating resources or resolving high-stake disputes.

- Clean air. To help localities reduce traffic congestion while meeting air quality standards, the bill pushes investment in approaches that cut down on travel by persons driving alone. The challenge: The investments ISTEA is likely to underwrite—mass-transit systems, expansion of car-pool lanes—are well-received by the public but recent experience suggests that they have negligible effects on air quality and trivial effects on congestion. Alternative strategies that do seem to work—congestion tolls, parking charges at work sites—are, unfortunately, wildly unpopular with the folks at home.

- Innovative technology. ISTEA puts money into such politically acceptable and sophisticated technologies as Intelligent Vehicle and Highway Systems and high-speed magnetic levitation trains. Both these technologies hold out the promise of a technological fix that won't arouse environmental concerns or NIMBY passions. The challenge: There are formidable barriers to implementing IVHS and considerable evidence that high-speed trains are not feasible in major travel corridors.

For all its tilt toward the new, there is still plenty of business as usual. The bill directs funds to more than 500 specifically identified projects, which is inconsistent with the theme of local flexibility but helped assure the bill's passage.

These challenges underscore both the promise and the limits of the new bill. In 1956, when the Interstate highway system was first funded, few imagined the political turmoil that would be provoked as highways transformed patterns of urban and rural life. It remains to be seen if the new vision will be less disruptive or if it will produce new forms of turmoil as policy makers sort through the new guidelines for decisions and give life to the new decision-making structures.
DEVOLUTION

Ready or Not, Here Comes Regional Power

If there's one point of agreement on the new transportation bill, it's this: Putting regional planning councils in charge of decision making is the biggest gamble in the whole bill.

Congress is betting that these low-key advisory units—metropolitan planning organizations, by official moniker—can turn themselves into Type-A agents who can wield political clout as they coordinate policy, set priorities and make hard funding decisions. Without such a transformation, the high hopes for ISTEA as a force for change in urban transportation policies may not be realized.

Congressional sponsors of ISTEA latched on to MPOs as a way of changing transportation policy. They wanted less emphasis on building roads and more on custom-fitting alternative investments, such as mass transit or car-pool lanes, to regional transportation needs. There was widespread concern that state transportation departments had too ingrained a bias toward road building and had been relatively insensitive to the impact of highways on urban areas and environmental goals.

MPOs, on the other hand, tend to represent a variety of metropolitan interests. As such, they were perceived to be in a position to push states and localities toward investments that encompass a variety of solutions for regional traffic and air quality problems. "We don't know how this will play out," admits John Bosley, counsel to the National Association of Regional Councils, which represents MPOs and other regional groups. "But we think we've turned a corner and the old road gang has lost control."

The new act requires states to allocate a fixed percentage of available funds to urban areas (see sidebar on allocations, p. 66). MPOs for urban areas larger than 200,000 people (as well as MPOs in smaller areas that have not met air quality goals) are given the responsibility of deciding, in consultation with state DOTs, how to spend that money.

MPOs are not accustomed to exercising real power. Created in the 1960s and early '70s, MPOs have been advisers to local governments on transportation, urban renewal and land use activities. They prepared metro-area plans but those rarely had much impact on hard-nosed spending decisions.

Anxious not to offend any of their local government participants, MPOs produced long, unprioritized wish lists of projects. State DOTs were precluded from funding unlisted projects but they could, and routinely did, pick and choose from the list with broad discretion.

The new act dramatically changes these historic practices by requiring the MPOs to set the priorities. They will for the first time have to balance urban and suburban interests, choose among transit and road investments, and reconcile mobility with clean air goals. "The funding allocation power gives MPOs considerable clout," says Bruce McDowell, director of research for the U.S. Advisory Commission on Intergovernmental Relations. "Now they will have some chips when they come to the table. That has been their biggest problem until now."

While they may have new powers, the bigger concern is whether they'll know how to use them. McDowell notes that regional councils of government, which serve as MPOs in many parts of the country, "have proven themselves useful institutions for exchanging views. Discussing issues. [and] providing data and analysis...[However] most have not proven themselves as political policy makers, especially when the issues are controversial."

The ability of MPOs to grow into their new role is complicated by confusion over delineation of responsibility, especially in regard to state agencies. The bill contains language that requires consultation and cooperation between state DOTs and MPOs. This means that state DOTs are sure to be key actors: They have the technical expertise and they control the state funds needed to match federal grants. Some fear that state planners may attempt to subsume the MPO process. Others such as Ray Chamberlain, president of the American Association of State Highway and Transportation Officials, are worried that one result of legislative murkiness will be that "nobody is in charge."

Others expect astute local policy makers, who may have ignored MPOs in the past, to focus on making the regional organizations work. Bill Roberts, legislative director of the Environmental Defense Fund, which strongly backed the MPO provisions, figures that when the MPO wasn't that important, "a mayor might appoint his brother-in-law as his representative. Now that the MPO has power, you can be sure a mayor will make sure he has somebody good representing him on the MPO."

Larger jurisdictions will probably move to gain greater control over the MPOs, many of which are dominated by smaller jurisdictions in their metropolitan areas. In the Denver metropolitan area, for instance, the Council of Governments, which serves as the region's MPO, makes most of its decisions via a majority vote of all governments. There is a little-used provision in the organization's by-laws, however, that allows weighted voting. This could be invoked if a larger jurisdiction felt pushed to protect its interests.

There are also a number of structural problems that could make life miserable for MPOs. ISTEA calls for transportation plans to be coordinated across types of transportation, local governments and policy sectors, specifically those involved with air quality, land use and transportation. The law, however, doesn't adequately address the structural fragmentation that makes such coordination difficult. Large metropolitan areas are frequently divided into several MPOs. In addition, air quality and congestion management may be handled by a layer of agencies with non-overlapping jurisdictions. This patchwork structure reflects a distrust of regional governance typical of many local officials and residents.

GOVERNING April 1992 67
Finally, for all the hoopla surrounding their new role, MPOs will control only about $9 billion of the $150 billion authorized by ISTEA. As Lawrence Dahms, executive director of the San Francisco Bay Area MPO, notes, "We have to reconcile expectations about resources. The amount of money we are receiving in the Bay Area will not even pay for two interchanges in our current plan."

By most accounts, devolution of power will produce a variety of outcomes. In some areas, there will be substantial shifts in the types of projects that receive funding. In others, the outcome may be the status quo. In yet other areas, there could be institutional gridlock. What is clear is that MPOs, which have long decry their lack of power, are being given a chance to prove themselves in action. The test, notes Dahms, "will be street-level performance. We have to think in terms of outcome, not as we have in the past, just of process."

The Big Question: Can MPOs Do the Job?

Congress granted significant powers to metropolitan planning organizations. Can they fill the shoes Congress set out for them?

Yes. The good news is:

1. MPOs have a flexible outlook. Unlike state departments of transportation, which traditionally make investment decisions, MPOs do not have ties to a single transportation solution, such as highways.

2. MPOs are experienced. They've long had to coordinate the concerns of several jurisdictions, special interests and assorted government agencies at one time.

No. The bad news is:

1. MPOs rarely set priorities, made funding decisions, exercised real power.

2. MPOs don't have the technological expertise to develop the sophisticated models that can predict relationships between transportation improvements, congestion, air quality and land use.

3. MPOs don't have clear lines of responsibility. ISTEA leaves things murky on the relationship and divisions of responsibilities between MPOs and state agencies. With their greater experience, state agencies may be able to run roughshod over MPOs.

4. MPOs face structural barriers in coordinating policy. Large metropolitan areas, for instance, are often divided into several MPOs. And air quality and congestion management are often handled by other agencies whose jurisdictions don't overlap the MPO's.

CLEAN AIR

Transportation's New Priority

Cleaner air or faster commutes? That's been the policy question for more than two decades. And one that the new transportation bill resolves in favor of clean air.

It does so by making it significantly more difficult to build new highways in areas that fail to meet federal clean air goals. Instead, the act encourages states and localities to attack traffic problems through mass transit systems, special lanes for high-occupancy vehicles and other facilities designed to provide alternatives to solo automobile travel. The idea is to reduce pollutants from automobiles by cutting back on the number of miles cars travel.

This aspect of the transportation bill delighted environmentalists, many of whom fought hard for it. "We hit a lower-deck home run," says Bill Roberts, legislative director for the Environmental Defense Fund.

But that victory, however heroic, may be hollow: By targeting the attack on automobile mileage, the transportation bill may not be as effective in cleaning up the air as its sponsors and backers hope. In fact, the transportation investments encouraged by the bill and most likely to emerge in the coming years have little potential to reduce air pollution. At best, they may only keep it from getting worse.

This is not the first time a transportation bill has been linked to air quality. Since the mid-1970s, federal law has nominally mandated that transportation investments conform to clean air goals. But the federal commitment to enforcement was weak, and states found ways to get around the requirements. Some refused to include in their plans options aimed at reducing total vehicular miles traveled—VMTs, in transportation jargon: others drew up plans but neglected to fund them. In addition, transportation departments were able to include new road construction projects as part of their strategy for cleaning up the air. Their rationale was simple: Congestion is highly polluting; new roads relieve congestion. What they neglected to say is that additional road capacity induces more travel, which over time may nullify air pollution gains.

ISTEA gets tough with these past practices. Transportation agencies will now have to establish targets for reducing total automobile travel and demonstrate that these targets are being achieved. VMTs will have to be taken seriously. As the Environmental Defense Fund's Bill Roberts puts it, "Can the mandated targets be achieved without dealing with VMTs? I would say that it is virtually impossible."

ISTEA supports strategies for dealing with VMTs in three important ways: It allows a much larger share of transportation funding to be used for mass transit and other alternatives to road construction. It shifts the locus of decision making from state transportation departments to metropolitan planning organizations. (See previous story.) Where transit is likely to get a more sympathetic hearing. And it eliminates "phantom projects" by requiring that regional plans rank projects by priority and build them in that order.
A Primer on Pollutants, Congestion and The New Transportation Policy

The link between transportation and clean air is rooted in chemistry. About 50 percent of the chemicals that combine to form smog are emitted by motor vehicles, as is about 90 percent of the carbon monoxide in urban air.

Since the 1960s, policy makers have tackled this problem in two ways. First, they emphasized reduction of emissions through technical improvements in automobile engines and gasoline. Then they regulated emissions from new and existing stationary sources, such as factories, power plants and the like. These two strategies produced substantial reductions in emissions and a noticeable improvement in air quality. Moreover, they proved to be popular with politicians because their costs, while large, are not readily apparent to voters. Instead, they are hidden in the prices of products such as automobiles.

There is also a third line of attack: reduce air pollution by cutting back on automobile travel. But that approach has never been seriously pursued. There have been public subsidies for mass-transit systems, but the effects of those systems on automobile travel have been invisible. Regulatory actions, such as mandatory no-drive days or limits on employer-provided parking, and pricing policies, such as parking surcharges at work sites, have invariably floundered in the face of their unpopularity.

The result is that while automobiles are much cleaner than those of the early 1970s, the gains from emissions reductions per vehicle mile traveled have been significantly offset by increases in automobile travel. In the Los Angeles area, for example, where the population has increased by 50 percent in the last 20 years, auto emissions have been reduced by about 70 percent but total vehicle miles traveled has doubled. The net effect is that automobile-created pollution dropped about 35 percent. In areas where travel growth has been slower, pollution reductions have doubled, but the effect is less.

Even so, many areas have been unable to attain the nation’s ambitious air quality goals.

This approach, if implemented, represents an almost complete reversal of historic patterns in transportation decision making, contends Denver city councilman Ted Hackworth, chair of the National Association of Regional Council’s task force on the surface transportation bill. “The local political and development interests must understand that transportation must address the Clean Air Act first and development needs second.”

Will it work?

Until regulations implementing the new clean air and surface transportation laws are written, it is impossible to predict how states and metropolitan areas will respond to the federal policy direction. Recent experience in Los Angeles suggests, however, that many of the measures most likely to be implemented have only limited impacts on air quality.

Since the late 1980s, the Los Angeles area, the most polluted in the country, has undertaken an ambitious program to improve air quality. Its 1989 plan calls for quadrupling transit ridership, eliminating 3 million daily work trips through telecommuting and eliminating another 1.7 million daily work trips via ride sharing—all by the year 2010.

Achieving these goals requires substantial efforts, and they are being made. Ride sharing is encouraged through investments in special car-pool lanes and by regulations that require employers to develop transportation management plans that reduce the number of vehicles employees use to commute to work.

Martin Wachs, a professor at the University of California in Los Angeles, has been monitoring these efforts. He’s found that substantial increases in carpooling occur only when employees face negative incentives, such as parking charges. In Century City, a major mixed-use employment center, Wachs reports, 92 percent of those who receive free parking drive to work alone. By contrast, only 74 percent of those who have to pay for parking drive to work alone. “It is very difficult to get very large shifts from single-occupant commuting to ride sharing by employing only incentives for ride sharing,” he claims. “We must also pay attention to reducing the incentives for driving alone.”
Employees are not necessarily passive in the face of such regulations. Public employee unions in the Los Angeles area worked to get a rule adopted that prohibits the region's Air Quality Management District from adopting any regulations that violate collective bargaining agreements or place an undue impact on the poor. If free parking is considered a fringe benefit, its removal violates the first element. The use of parking charges to induce carpooling could easily qualify as a violation of the second.

In further efforts to lure commuters from their cars, the Los Angeles plan calls for spending more than $43 billion on mass transit. Yet almost every study of ridership shows that few mass transit riders are former car commuters and most new subway riders used to ride the bus.

Chang-Hee Christine Bae of the University of Southern California estimates that all of the mode shift strategies in the 1989 Los Angeles plan—empower ride sharing, elimination of parking subsidies, auto use restrictions, increased carpooling, transit improvements—will produce less than 2 percent of the total projected reductions for each of the two chemicals that are precursors to smog formation and about 3 percent of the plan’s projected reductions in carbon monoxide (see sidebar on pollutants, p. 70).

Bae adds that implementing all the plan’s travel reduction strategies—alternative work schedules, telecommuting, better land use planning—will produce 13 and 21 percent reductions in the two precursors to smog formation and a 31 percent reduction in carbon monoxide. “Even if they could be achieved,” Bae concludes, “the VMT-reduction measures in the Los Angeles plan make only a modest contribution to the total emissions reductions.”

There are several reasons why VMT-reduction strategies have limited effects on air quality. Most pollution from automobiles comes when cars are first started and when they cool down after being turned off. In an average 10-mile trip, roughly half the pollution is from this phenomenon. Thus, a shift from automobile to transit will have little impact if workers still drive to the transit station. Similarly, telecommuting can reduce the number of work trips made each week. There is some evidence, however, that workers are likely to respond by moving their residences further out into the country which could, in effect, then lengthen the remaining work trips.

Because the gains from behavior-changing measures are so limited, it may make more sense to reduce emissions via emerging technologies. Consider, for example, the work done by Professor Donald Stedman of the University of Denver. In collecting data on 300,000 cars under actual travel conditions, Stedman discovered that half the emissions came from less than 10 percent of the fleet. It makes more sense to concentrate on these vehicles, he suggests. One way to get the diehard offenders off the road is by using a mobile emissions monitoring device. Such devices could be deployed to haul in polluting cars the same way radar is used to catch speeders.

Such an effort, however, may be hindered by policies that focus on VMT as a surrogate measure of automobile pollution. Yet, despite evidence that a strategy of reducing VMTs produces minimal gains at relatively high costs, there has been little call to re-examine that approach.

One explanation is that VMT reductions would facilitate achievement of a number of other goals, most notably congestion relief, open space preservation, energy conservation, city revitalization and prevention of global climate change. Another comes from environmentalists who say that the nation’s goal ought to be to reduce all forms of air pollution regardless of cost. Since air quality goals outlined in the Clean Air Act cannot be fully attained through other means, even steps with small impacts must be undertaken.

But there has been little effort to question whether air quality goals are realistic. As Alan Altshuler, director of Harvard University’s Taubman Center for State and Local Government, noted in his 1979 book, The Urban Transportation System, those standards are designed to guarantee pollution levels “that can be tolerated by anyone, however ill or fragile, without ill effects.... By way of comparison, a safety standard that entailed zero levels of mortality and personal injury would be achieved only by a total ban on travel.”

While the rhetoric of the Clean Air and Surface Transportation acts suggests that stringent measures will be taken to achieve clean air goals, it is entirely conceivable that there will not be the political will to make hard decisions. Policy makers must discern whether the goals merely reiterate a society’s hopes or actually give voice to a national commitment.
INNOVATIVE TECHNOLOGY

High-Tech Highways Could Rule the Road

One are the days of building new highways. Today all efforts are on squeezing more out of what we have.

Asphalt and concrete will be replaced as the building blocks of future transportation systems. Computers, electronics and communications technologies known as Intelligent Vehicle and Highway Systems will come into their own.

This technology, its proponents believe, can do it all: reduce congestion, enhance safety, save fuel, help clean the air and provide a spur to emerging American industries.

Advocates also contend that investments in IVHS make sense on industrial policy grounds. While many of the technologies underlying IVHS were developed in the United States for use in aerospace and defense, European countries and Japan are widely perceived to be leaders in applying the technologies to everyday transportation needs. These countries have gained that edge through a public commitment of funds and by establishing public-private partnerships.

Others believe its impact will be minor. This disparity in views can be seen in estimates of IVHS reductions in travel time: These range from 2 percent to 50 percent.

Whether IVHS is a high-tech savior or just a technological mirage, remains to be seen. To find out what it can do, however, will require hefty financial commitments as well as unprecedented levels of cooperation among governmental agencies and between the public and private sectors.

The Intermodal Surface Transportation Efficiency Act gets the ball rolling by authorizing $660 million over six years to research, develop and test IVHS. The investment is warranted.

Fragmentation of authority among governmental jurisdictions may also be a problem. A recent IVHS demonstration project was delayed several years because of the difficulty of getting governments to work together.

IVHS implementation also requires unprecedented levels of cooperation between the public, which controls the roads, and the private sector, which owns the vehicles and some of the technologies. The full benefits of government investment in traffic management systems will not be realized without related private investment. Similarly, the risk to industry of investing in development of in-vehicle hardware is too great unless government invests in the infrastructure, or allows private investment, perhaps under a franchise arrangement.

The marketability of in-vehicle systems will be much greater if the same hardware can be used from one geographic area to the next and if different system components are compatible. These problems can best be resolved if a "systems architecture" is defined at the outset. Such an architecture defines the major components of a system, the function of each component and standards for component interface. It leaves plenty of room for multiple private industry providers of individual systems, healthy competition and technological advancement.

While the development of systems architecture and standards are needed, the process of getting there will be difficult. Much research, development and operational field testing is required. Choices of what to test, and how, will have positive impacts on some commercial developers, negative impacts on others. This will put pressure on the administrators of federal research and development dollars. They will also be pressured by state and local governments that prefer investments in proven technologies.

Cost may be a definitive barrier. The magnitude of the investment required to implement IVHS is daunting. Mobility
Governing Special Report

2000, an informal advisory group of public and private organizations, has called for government IVHS expenditures of $34 billion over 20 years. As the strategic plan is fleshed out, that number is likely to rise.

Other obstacles for IVHS include anti-trust considerations that make it difficult for private-sector groups to work together; liability issues, particularly with respect to automatic vehicle control systems; and privacy issues associated with automatic vehicle identification systems. Some believe these institutional obstacles are so severe that broad-scale implementation is unlikely over the next decade or two.

Moreover, like some other advances envisioned by ISTEa, IVHS may not solve the problems it is supposed to address. GAO warns that an automated highway system may provide more efficient vehicle travel, but in so doing might generate additional vehicle mileage because of its improved convenience. Induced travel growth could undo many of the benefits in travel time, safety, air quality and fuel consumption promised by system advocates.

There is another serious objection. One that revolves around using fancy high-tech gear when cheap, no-tech solutions could do the same job. Accusing the authors of the new transportation bill of riding a "high-tech white elephant," Brookings Institution economist Clifford Winston suggests that a lower-cost but politically more difficult solution to congestion and traffic problems is appropriate pricing of transportation infrastructure. Federal policy makers, he argues, are beginning to understand this in the case of airports where they are suggesting the use of congestion tolls; higher landing fees during peak periods. "The use of intelligent vehicle systems in air transportation (using radar and air traffic control communications) was not solving airborne congestion," he wrote recently, "adding that a similar realization will come with respect to road congestion."

IVHS advocates view congestion pricing as a political hot potato and would prefer not to justify system development in those terms. But as the Transportation Research Board notes, IVHS is an "enabling technology." It will allow policy makers, if they so choose, to move to a system of charging for the use of roads during congested time periods.

Perhaps it is no accident that Senator Moynihan's speeches supporting IVHS sounded the themes of productivity and pricing. Recalling the opening of the Triborough Bridge 54 years ago, Moynihan pointed out that men and women are still sitting in booths collecting tolls. "That is not productivity.... Twenty-five cents worth of electronics on a credit card would record that you had crossed the Triborough Bridge. If they had any sense they would charge you 50 cents at midnight and $2.50 at 6 a.m. and maybe a quarter at nine o'clock. Be up to date, learn productivity, think congestion pricing."

INNOVATIVE TECHNOLOGY

High-Speed Trains Are On Track but Off Course

Maglev transport system is electrical but untested, and public is wary

Magnetic levitation: The term hints at a high-tech mystery wrapped in a futuristic enigma. No wonder high-speed trains designed to run on the maglev principle have gained an inordinate amount of attention. It's an attention that, so far, exceeds the technology's potential to be a cost-effective means of transportation.

Congress signaled its belief in the train's potential by targeting $725 million of surface transportation act funds to the development of a prototype. Maglev, which has been tested but never used, is a system that uses magnetic forces to suspend a vehicle over a guideway while an electric motor provides the forward motion. Since there is no physical contact between guideway and vehicle speeds of 300 miles per hour or more are possible. Congress also allocated another $100 million to support more conventional high-speed rail technologies.

Advocates claim high-speed rail will attract riders from both gridlocked roads and crowded airports, thereby reducing congestion, improving air quality and eliminating the need for disruptive construction of either new roads or airports. Federal investment in maglev backers further claim, is justified by the fact that no one has yet to put a maglev train into service, though both Japanese and German firms are testing proposed systems. By contrast, the Japanese, French and Germans currently operate more-conventional high-speed trains capable of traveling almost 200 miles per hour. There is, however, increasing evidence that high-speed trains in general and magnetic-levitation systems in particular cannot generate enough revenues to be self-supporting. They may also be politically controversial.

A Transportation Research Board report, released during deliberations over the surface transportation bill, found that under the most likely scenarios of cost, high-speed trains—maglev and other technologies—would break even only if they carry some 6 million passengers a year. This level of ridership is almost impossible to achieve, the report concluded.

Because high-speed trains tend to be significantly more expensive than driving, most of the riders would be people who would otherwise use airlines to make their trips. In addition, because airlines are faster than trains for long trips, the trains would be competitive only in medium-length corridors of 200 to 500 miles. Air travel currently exceeds the required 0 million passenger volume in only one U.S. corridor—between Los Angeles and San Francisco. The TRB report predicts, moreover, that by the year 2010 air travel will exceed the required passenger volumes in only three other corridors: Boston/New York, Washington, D.C./New York and Los Angeles/Phoenix (see chart, p. 6). This means that high-speed trains will be economically viable only if they knock out their airline competition or receive large subsidies.

Experiences in Florida, California and Nevada support the TRB findings. There, efforts to build privately financed high-speed trains are floundering amid questions of financial feasibility. A proposed high-speed rail franchise is moving ahead in Texas. It too is contingent on receiving a large subsidy.

The TRB report estimates that a high-speed train system carrying 2 million
Markets for High-Speed Trains

A high-speed rail route is likely to need at least 6 million passengers a year to break even. The six largest airline markets serving cities less than 600 miles apart are the best bets for producing that ridership.

<table>
<thead>
<tr>
<th>Markets</th>
<th>Millions of passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles/San Francisco</td>
<td>6.25</td>
</tr>
<tr>
<td>Boston/New York</td>
<td>2.78</td>
</tr>
<tr>
<td>Washington/New York</td>
<td>2.76</td>
</tr>
<tr>
<td>Los Angeles/Phoenix</td>
<td>2.72</td>
</tr>
<tr>
<td>Dallas-Fort Worth/Houston</td>
<td>2.07</td>
</tr>
<tr>
<td>Chicago/Detroit</td>
<td>1.68</td>
</tr>
</tbody>
</table>

As a very costing factor, ridership can be as low as 5,000 a day. In 1989, the Texas system, for example, is Southwest Air, which currently provides extensive service. Despite these obstacles, proponents claim that the federal investment in new high-speed trains, particularly maglev, is justified. "We have always been on the edge of transportation innovation," says U.S. Senator Daniel Patrick Moynihan. "It is our intention that we should stay so and this bill embodies that purpose."
Water is becoming so expensive that reclaimed water can command high market prices. In Colorado, Aurora delivers reclaimed water to a golf club at 45 cents per 1,000 gallons—as cheap as other alternatives available to the club. In Arizona, stringent policies to cut groundwater overdrafts have encouraged communities to look for viable reclamation projects even without state funding. Tucson is completing a 10-year, $63 million project to deliver 35,000 acre-feet of reclaimed water. Gilbert, a small Arizona town, has been delivering wastewater for over a year—one of its projects is a waterskiing park that uses 200 acre-feet per year to fill two lakes. Irvine Ranch in California found that using reclaimed water for landscape irrigation and toilets in office developments is 33 percent cheaper than buying and treating additional water. It has built an extensive dual distribution system that includes 107 miles of pipelines for reclaimed water. Today, reclaimed water accounts for about 25 percent of all its water use.

One of the problems in recycling municipal wastewater is that customers do not always need water when municipalities produce it. But ingenuity in structuring contracts can overcome this problem without building expensive storage facilities. Tuolumne County Water District in Sonora, California, has contracted with 30 ranchers to take 1,300 acre feet of municipal wastewater during the April to October irrigation season. Ranchers receive the water at no cost but must take a specified amount of water at specific times. The water is delivered through sprinklers operated automatically by the district and the contract continues even if the land changes hands. Ranchers now select crops and planting times to take advantage of the reclaimed water.

Setting the Rules

Water suppliers investing in water reclamation projects must know their rights. Can they sell reclaimed water to other users? What are their liabilities concerning quality? How can they legally use reclaimed water? And what are the regulatory and legal requirements for a reclamation project? Uncertainty about these questions increases risk and makes projects less feasible. States can reduce the uncertainty by taking three steps.

First, define reclaimed water as a resource with clearly defined rights, including the right to sell. If states fail to establish effluent rights, they run into legal claims from downstream users who have come to depend on return flows of effluent for their own use. Several states, including Arizona and Nevada, are moving to establish legal frameworks governing effluent water.

Second, review health and environmental regulations. Many laws and regulations were created when new water sources were cheap. When treatment technologies were less developed and when water quality monitoring was less exact than it is today.

California, for example, carefully reviewed existing reclamation projects and found a noticeable lack of health incidents associated with the use of treated wastewater. It is, accordingly, revising a 10-year-old regulation to make it easier to use effluent.

Third, create a streamlined, accessible regulatory process. Effluent is widely used in Arizona because the state has established clear regulatory authority over the use of reclaimed water. Effluent reuse and recharge are solely regulated by the Arizona Department of Environmental Quality.

By contrast, consider the attempt by Pleasant Valley County Water District, in Camarillo, California, to buy reclaimed water from the nearby city of Thousand Oaks. Thousand Oaks has been discharging water into Conejo Creek since 1961. Permits for the sale are needed from the state Water Resources Control Board, the state Department of Fish and Game (concerned with impacts on wildlife), and the U.S. Corps of Engineers. Approvals are required under California’s Environmental Quality Act. Permission will not come easily. In its application to the Water Resources Control Board, Thousand Oaks is claiming appropriate rights to all the water it discharges from its treatment plant, but farmers and water districts have protested, claiming that they have been using the discharged water for years.

Psychic Drains

Financial and regulatory considerations are not the only factors delaying recycling projects. There is also public fear of health risks, based in part on the performance of some wastewater treatment plants. Overcoming these fears may require more demonstration projects where plant operation and water quality are carefully monitored. The Denver Water Department has been operating a demonstration plant for seven years; it has shown that wastewater can be treated so it equals or even exceeds the quality of other potable water sources. Despite the success of the pilot project, fears remain. State and local governments will have to work to overcome these fears by demonstrating the economic and environmental benefits of reclamation programs.

Reclaimed water isn’t the only answer for dry Western states. At best it can only meet a part of growing future demands. But it can do so at lower cost than many of the alternatives now under serious consideration. If states take the appropriate steps, they can ensure that reclaimed water at a reasonable cost will be an important part of future municipal water portfolios.

Roger Vance was an economist and the co-editor of the Water Strategist, a quarterly journal, from which this article is adapted.
RESEARCH REPORTS

False Dreams and Broken Promises:
The Wasteful Federal Investment in
Urban Mass Transit

Myths and Facts of the Nation's
Transit Policy

These two papers, issued by two
conservative think tanks, represent
unsuccessful efforts to change the course
of last fall’s debates over federal
transportation policy. The first paper, by
Illinois-based transportation consultants
Jean Love and Wendall Cox, argues that
transit subsidies have not achieved their
stated goals of increasing ridership,
alleviating congestion, reducing air
pollution, revitalizing cities or aiding the
poor. The second paper, written by Peter
Gordon, a professor of urban and
regional planning at the University of
Southern California, reiterates these
arguments and notes that demand for
transit actually has fallen as rising incomes
have allowed more people to pursue the
American dream of low-density living.
Love and Cox call for an end to federal
transit subsidies, elimination of barriers to
private service and competitive
contracting for subsidized services.
Gordon calls as well for congestion
pricing, emissions charges, full-cost
parking charges at work sites,
transportation vouchers for the poor,
deregulation and increased privatization.

Policy Analysis No. 162. The Cato
Institute. 224 Second St. S.E.,
Washington, D.C. 20003 Tel: 202-546-

Policy Insight No. 131. The Reason
Foundation. 3415 Sepulveda Blvd. Los
Angeles, CA 90034. Tel: 310-391-2245.

Liberalization Without Deregulation:
U.S. Telecommunications Policy
During the 1980s

During the last 20 years, the structure
of the U.S. telecommunications industry
has shifted from the public utility model
to one geared toward competition.
Although considerable regulation persists,
the growth of competition has produced
remarkable savings, calculates Robert
Crandall, a senior fellow at the Brookings
Institution. Some $3 billion may have
been gained from increased efficiency and
new technology, another $1 billion from
limited rate rationalization. Further
deregulation could produce additional
savings. Crandall argues, but political
pressures make it unlikely that policy
makers will embrace full deregulation in
the near future.

Contemporary Policy Issues. Vol. IX.
October 1991. Western Economic Assn.,
7400 Center Ave., Suite 109,
Huntington Beach, CA 92647-3039.

How Federal Spending for
Infrastructure and Other Public
Investments Affects the Economy

Carefully chosen federal investment in
physical infrastructure would yield
economic rates of return higher than
the average return on private capital.
concludes this report by the
Congressional Budget Office. The highest
economic benefits would result from
maintaining existing assets and from
expanding capacity in highly congested
facilities. Based on its review of the
evidence, however, the CBO believes that
recent studies have exaggerated the
importance of additional physical
infrastructure to economic performance.
The report also reviews the effects of
investment in human resources and
research and development activities.

Congressional Budget Office. Second
and D Sts. S.W., Washington, D.C.
20515. Tel: 202-226-2809.

Privatization of Municipal
Wastewater Treatment

Privatization of infrastructure is often
touted as a way to take advantage of
efficiencies in the private sector. This
comparison of costs of privately and
publicly operated wastewater treatment
facilities, however, found no statistically
significant difference between public and
private sector costs. Indeed, if results from
one particularly high-cost facility are
included, the private facilities, on average,
are more expensive than the public
systems. Author Randall Holcombe, of
Florida State University, contends this is
due to the fact that most privatization
contracts contain few incentives for

Public Budgeting and Finance. Fall
1991, Vol. 11, No. 3. Transaction
Periodicals Consortium. Dept. 8010,
Rutgers University, New Brunswick, NJ
08903.

Federal Options for Reducing Waste
Disposal

As more waste is generated, concern
about the health and safety implications
of disposal is rising. This report by the
Congressional Budget Office considers
alternative policies for reducing the
amount or toxicity of waste. CBO
suggests that the best theoretical
approach—a pricing system in which
households and businesses are charged
according to the amount and toxicity of
waste they produce—may not be feasible
in practice. Five other policies alternatives
also are evaluated: unit-based pricing, a
disposal tax and reuse subsidy, a virgin
material tax, an investment tax credit for
recycling, and a recycling credit system.
The criteria for evaluation include impact
on recycling, impact on volume or
toxicity of materials in the waste stream,
cost of administration, and whether it
encourages illegal dumping.

Congressional Budget Office. Second
and D Sts. S.W., Washington, D.C.
20515. Tel: 202-226-2809.

Public Sector Maintenance: The Case
of Local Mass Transit

Private transit operators tend to devote
significantly more resources to
maintenance than public sector operators,
contends Brian Cromwell, an economist
with the Federal Reserve Bank of
Cleveland. This may be due to federal
and state grants programs that encourage
investment in new equipment over
maintenance of existing equipment.
Alternatively, it may be that institutional
features of private ownership tend to be
more supportive of maintenance
activities.

National Tax Journal. Vol. XLIV.
No. 2. June 1991. National Tax
Association—Tax Institute of America.
5310 E. Main St., Columbus, OH
43213.
The Rising Tide of User Fees

Over the last 20 years localities have moved toward increased dependence on user fees for the goods and services they provide. Rapidly growing Sun Belt states rely on them more heavily than older Northeast states. Thirteen public functions eat up 80 percent of the fees raised.

Who uses them the most

What user fees support

Percentage of local budgets funded by user charges

- U.S.
- Middle Atlantic
- East North Central
- West North Central
- South Atlantic
- East South Central
- West South Central
- Mountain
- Pacific

Percentage of service funded by user charges

- Roads and parking
- Transit
- Air transportation
- Water transportation
- Water supply
- Electric power supply
- Gas supply
- Sewerage
- Solid waste management
- Parks and recreation 1962, 1972, 1982
- Natural resources
- Hospitals
- Housing and community development

SOURCES: U.S. Census Bureau publications compiled by Paul Downie; U.S. Census government finance data compiled by Dick Netter in papers presented at the Lincoln Institute of Land Policy; Reprint with permission of the Public Finance Quarterly (Jaei Publications Inc.).
NORTH DAKOTA'S
TRANSPORTATION NETWORK --
OUR CHOICE FOR THE FUTURE

Tuesday, April 14th, 1992 -- The Sheraton Inn, Bismarck, ND

New transportation legislation and new funding mechanisms will move us toward a more flexible and choice-oriented world. The conference outlined below will challenge participants to discover new ideas for North Dakota's growth and development by providing a quality transportation system in this new environment. Three speakers will give an overview of recent events and challenge the audience to engage in a thought-provoking and idea-generating session. Smaller focus groups will then be formed, and with the help of a facilitator, be asked to help shape the future of North Dakota's transportation network.

Conference Program

9:30 a.m.  Registration
10:00 a.m.  Introduction & Overview
            Barbara Rohde, Research Fellow, Humphrey Institute
            University of Minnesota
10:20 a.m.  Speaker #1
            Denver Tolliver, Upper Great Plains Transportation Institute
            North Dakota State University
11:00 a.m.  Speaker #2
            Kathy Ruffalo, U.S. Senate Environment and Public Works
            Committee professional staff
11:40 a.m.  Discussion/Q&A
12:00 p.m.  Lunch
12:45 p.m.  Keynote Speaker
            Les Lamm, President - Highway Users Federation for Safety &
            Mobility
1:45 p.m.  Instructions for Focus Group Sessions
2:00 p.m.  Focus Groups
3:15 p.m.  Break
3:30 p.m.  Reports from Focus Groups with Q&A
4:30 p.m.  Wrap Up and Quality Check
5:00 p.m.  Reception
Biographical Sketches of Speakers from Conference I

Barbara Rhode  
Research Fellow - Humphrey Institute  
University of Minnesota - Minneapolis

Barbara Rhode is a Research Fellow with the Humphrey Institute of Public Affairs at the University of Minnesota. Prior to her appointment with the Humphrey Institute, Barbara served on Representative Byron Dorgan’s staff for six years as chief of staff. She then became director of the state of Minnesota’s Washington office. Barbara graduated from the University of North Dakota.

Kathy Ruffalo  
Professional Staff Member -  
Senate and Environment Public Works Committee - Washington, D.C.

Kathy Ruffalo is a Professional Staff Member to the Senate and Environment Public Works Committee. She handles the surface transportation responsibilities. Prior to her work with the Senate and Environment Public Works Committee, Kathy was a legislative assistant to Senator Quentin Burdick where she handled agricultural issues. Kathy received her BS degree in Industrial Engineering from Northwestern University.

Les Lamm: Keynote Speaker  
President - Highway Users Federation  
Washington, D.C.

Les Lamm is the President of the Highway Users Federation. Prior to his appointment with the Highway Users Federation he held several administrative positions with the Federal Highway Administration. He also worked with the US Bureau of Roads. Les is currently President of the Intelligent Vehicle and Highway Society of America and is involved with many organizations promoting the U.S. highway system.
Denver Tolliver
Research Scientist - Upper Great Plains Transportation Institute
North Dakota State University - Fargo

Denver Tolliver is a Research Scientist at the Upper Great Plains Transportation Institute, North Dakota State University, where he has been employed since February of 1980. Denver’s primary research specialization are: freight transportation, railroad economics and costing, and multimodal planning. He is currently involved in the development of an interdisciplinary graduate transportation degree program at North Dakota State University, scheduled to begin in the spring of 1993.

Denver has previous experience with the ND Department of Transportation. He was a rail planner and developed North Dakota’s rail benefit-cost model and helped develop their first state rail plan. Denver also developed a branch line viability and cost procedure, and analyzed the impacts of restructuring the Milwaukee Road.

Denver holds a PhD from the Virginia Polytechnic Institute, he majored in Environmental Design & Planning and minored in Transportation.
North Dakota's Transportation Network:  
Our Choice for the Future  
Conference 1 - April 14, 1992  
Sheraton Inn, Bismarck, ND

Introduction & Overview:  Gene C. Griffin

My name is Gene Griffin. I'm with the Upper Great Plains Transportation Institute of North Dakota State University, and I would like to welcome you all here this morning to what I think is an important first step in trying to identify transportation's relationship to the economy and what some of the important transportation issues for the State of ND are, and that is what we're going to try to accomplish today.

Just a little bit of housekeeping, there's restrooms down the hall -- to my left I guess and coffee and water in the back. We also want to let you know that this program today is sponsored by the Humphrey Institute of the University of Minnesota and Barbara Rohde will tell you a bit more about that when she gets into her remarks.

But, if I could, I'd like to spend just a few minutes talking (and I know some of you don't think I can spend a few minutes talking) about the importance of transportation and the importance of this meeting today.

If you want to go back in our memories (well, some of our memories anyway), to the 1940s when we didn't live in a global economy and when transportation was not near as advanced as it is today. You think of an economic environment in which it was much more of a local economy that we focused on. And the reason for that is because transportation provides place and time utility. Without that the world that we know today would not exist. Why do you think we have a global economy today? Why do you think that it's bursting out all over? Do you think its because knowledge is expanding and doubling every two to three years? Well, that may be part of it. Do you think it's because we're looking at the elimination of some of the institutional and political barriers that we've had. Well that's part of it. But you take transportation out, good sound efficient freight transportation system -- people transportation system-- then were reduced back to those local economies where you eliminate transportation and you don't need monetary exchanges, you don't need a political system, you don't need systems of government because you simply have tribal form of life where the economic system is based on barter.

Transportation has changed all of that throughout the history of the world, and we are moving toward a better, more efficient transportation system and it is inextricably tied to the future success of the world as a whole, this nation and particularly the state of North Dakota. We sit in what some think is a very remote location of the United States of North America, but we're not remote if we have a good viable transportation system. That's very important to us, because we don't have the critical mass of resources and we don't have the critical mass of population in one location that many other states do. You don't have to look very far to the east -- you can go as far as Minneapolis to see that -- Denver to the South West, and to the West probably Spokane, certainly Seattle. We don't have that, probably never will, so transportation is extremely vital to us to provide the interconnectivity that we need to make our economic system function. Furthermore, its vitally important to our social well being. How do
we get to schools, to churches, to meetings? How do we socialize? That all requires a very good transportation system. So what we want to focus on today and in the succeeding two meetings is how do we maintain that transportation system for the benefit of the citizens of North Dakota and the region.

Our first speaker today is Barbara Rohde. How many people know where Pettibone is? I see you've got friends already, Barbara. Barbara is a native of Pettibone who migrated to the capital in the east. She served on Dorgan's staff for six years as chief of staff, she then became director of the state of Minnesota's Washington office. From there she joined the staff of the University of Minnesota at the Humphrey Institute last year where she presently works. She's a graduate of University of North Dakota, and this morning she will describe the project that led to this particular meeting and how it all fits into the larger role of the regional project and the role that North Dakota is going to play in that. So, with that would you please help me welcome Barbara Rohde.
North Dakota's Transportation Network:
Our Choice for the Future
Conference 1 - April 14, 1992
Sheraton Inn, Bismarck, ND

Presentation: An Overview of the Humphrey Institute Project, Barbara Rohde

Thank you. It's great to be home, and at six o'clock tonight I'm going to be heading for Pettibone so I'm really looking forward to it. I want to take just a few minutes and talk a little bit about how this program evolved and how the Humphrey Institute became involved with it. Last year as they were going over the new transportation act, some members of congress came to the Humphrey Institute and asked if they would do a study of how federal, state and local cooperation added toward good a federal program. They provided us with a grant last year, and we started working on it. When we began to work on it we decided that the best way to really get the information was not for a bunch of academics sitting down in Minneapolis to come up with this study but to work with people in each of the states and really bring it back to the grass roots level, because that is where the good information is coming from.

Before we go directly into this transportation part of the program, I'd like to talk just a little bit about the state and local policy program. I know that you all have a packet on it, but I'd like to encapsulate it quickly. This program started about two years ago under the grant from the Northwest Area Foundation with the Humphrey Institute. The Northwest Area Foundation is the foundation of Burlington Northern headquartered in St. Paul, and they provide about half of the states that we do the work for this area of the country and University of Washington does the work for all the states with the exception of Montana. The states that are comprised in the area are Montana, North Dakota, South Dakota, Iowa and Minnesota. We are doing work on three areas right now -- transportation is one of the major areas. We also are doing work in science and technology, telecommunications (and that's primarily geared toward the world areas of telecommunications) and public policy and economic development. We're also doing work in ethanol. I know there's a lot being done here, but I think its probably one of the larger efforts that been undertaken to work on regional issues. I maybe one of the minority in Washington that think this way, but I think regionalism is going to become the issue for the future, and I personally think that the Southern States are far ahead of us. For example, the Southern Growth Board and the Southern Energy companies there are already working in conjunction, so we're about 15 years behind. With that, I want to move on to talk to you about the transportation program and how what you're doing here today is so vital as we put together the whole package at the Humphrey Institute.

First of all I want to say that this is one study we do not want to be among the big books sent to congressional staff that go on a shelf somewhere and are never looked at. We want to make sure that this will be a study that has a lot of reality base to it. We are going to be making a presentation (probably late this year) to the appropriation committee that funded us on where we think money should be flowing in the future. This slide gives you kind of an overview of the project. You can see why this is a difficult project to undertake. We are in three different regions for the federal highway administration under this study. We try to look at this as positive rather than negative, because transportation issues are handled rather differently under each regional administrator. We're getting much different feedback from
Iowa than we have from Minnesota, and were expecting to have much different feedback from this area too. The purpose of this study is to help state and local leaders and policy makers understand regional economic problems. I would expand this to say federal law makers, because I think federal law makers are really grasping with what works, what doesn't work, what they can do, and what they can't do. We're hoping to be able to provide some information back to them on this. In trying to increase discussion in economic development issues of the region, what we generally find is that states know there own areas very well but are not as familiar with regional issues -- North Dakota doesn't know as much about South Dakota, Minnesota doesn't know as much about North Dakota -- so we were hoping to be able to pull this together a little bit under this study. We believe we can have new information, and that the changes will help to encourage the development of public policy in the region.

This slide illustrates the work plan. We're about five months into the plan right now. An eighteen month study was originally conceived, but because some of the people wanted the information back a little quicker than that, we intend to comprise it in a fourteen month study and intend to be slashing as we go along. We've done research analysis at the university, and this is one of the planning conferences that are being held around the area at this time. South Dakota held theirs yesterday, I believe, and Minnesota held theirs a couple weeks ago. From the information we receive here, we will be able to see the similarities and differences which might exist between the states, and then use that information as we go along to the next round.

I'm going to quickly describe kind of the time frame that we have. We started this whole project in December when we brought together what we thought were the transportation leaders from the area and place them on the steering committee. Gene Griffin sits on our steering committee for North Dakota, and he has been helping us here. The consultations began a little bit later than what we had hoped. We hoped we would be starting in February, but, because of some of the work that we had there, we weren't able to get them off the ground until April. We're hoping that between April and September we should be able to hold three conferences in each one of these states. From this conference, Gene and I, along with Sam Schuth, a graduate student at the Humphrey Institute and an assistant on this project, will be determining what we're doing right, what were doing wrong and plan another forum several months in the future which will focus on the specific areas that were highlighted here.

We are also providing funds to research agendas and other selected areas, so if there are issues that you feel need to be addressed further, please bring those up in your focus groups today. You are the kind of people we really need to hear from on it. We're hoping to pull this together between our academic partners in the states to the conferences like this, and probably by October prepare a final draft, put the final touches on it, and send it back to congress hopefully by December or January of next year when the new congress will be working.

Now again, I want to stress something that I don't think is shown in some of these charts. This area of the country has been known for the cooperation between local, state and federal governments and what can be achieved. What we would like is to be able to find more opportunities to bring these areas together.
I'll give you an example before I leave of what really happens when people think of this. I worked on a project in Minnesota of training traffic controllers at a building that's gone bankrupt by the Minneapolis public school system. A lot of the kids from Minnesota did not have the funds or the time to go to Oklahoma City to become air traffic controllers, but they could take projects at their own school (Community College in Wadena or where ever). Some of these people came to me and said can't we train some of these people up here, could we get just some of the funds up here -- they'll pay some and we'll pay some. Well, the project got started two years ago, and I just heard two weeks ago that they're closing down Oklahoma City for a year and bringing all their people up to Minneapolis. They want them to learn how the Minneapolis project works, because they think that's the way that they should keep training air traffic controllers in the future. This is just an example of what can happen when the people that really know what's going on in the field bring their thoughts and their efforts together.

We're looking forward to hearing from you today. That's the most you'll hear us speak all day today. Thank you very much. I'm so happy that you could all come and participate.
Moderator: Gene Griffin

Thank you very much Barbara. I just want to comment a little bit about the diversity of the crowd that I see here. A lot of times when we start talking about transportation we get a room full of people that are in government or at universities -- people that have some kind of professional affiliation with it. We often miss the providers of the transportation -- the carriers. We often miss the shippers and receivers and those people that actually depend on the transportation system. I see out here today, and from the list of attendants, that we have a very good representation today. I'm very pleased with that, and you are all to be commended for taking time to attend this today.

Our next speaker is Denver Tolliver. Denver is one of our staff members at the institute, and has been with the institute since 1980. Prior to that, he was with the North Dakota Highway dept (now the ND Dept. of Transportation) serving as a rail planner. Denver took a leave of absence to go out and get his PhD in Environmental Planning and Transportation at VPI, Virginia Polytechnic Institute, and it has served ND very well as he brought back a wealth of knowledge and ideas that have been transformed into a very viable research program that's having an impact, not only in the state of ND, but nation wide as well. Today, he will speak to us about transportation investment options and criteria. I like that word investment, because we need to start thinking about the five to six hundred million dollars that we have to invest in the next few years in our highway infrastructure. And he's also going to speak about transportation investments in agricultural economy and relate to that directly, and then to railroad investment issues -- all which effect us.

Please help me welcome Denver Tolliver.
North Dakota's Transportation Network:
*Our Choice for the Future*
Conferece 1 - April 14, 1992
*Sheraton Inn, Bismarck, ND*

Presentation:  
*The Impacts of Transportation Investment and Performance on Agricultural Economies, Denver Tolliver*

In my presentation today, I'd like to emphasize some of the relationships between transportation and the rural economy, and between transportation investment and economic development. There are many different ways in which transportation investment can affect the economies of rural states such as North Dakota. I would like to highlight a few of the effects that I feel are most important.

First of all, transportation investment creates personal mobility and accessibility for all citizens and residents, particularly for the work force. There is a hidden economic benefit in personal mobility. The physical mobility of the work force helps to match labor supply and demand at regional and local levels. But more importantly, personal accessibility and mobility affect the quality of the lives of people who live in rural areas. If they can't have personal mobility and accessibility, they're going to migrate elsewhere. The second major impact of transportation investment is on freight distribution, and that is what I'm going to focus on today.

Transportation investment can foster efficiency and effectiveness in freight transportation which is then felt throughout the entire economy. The basic impacts of transportation investment are a reduction in distribution costs and greater options for shippers. Because transportation affects personal accessibility and mobility in freight distribution, it also has an impact on the locational attractiveness of areas, particularly those trying to attract new industry and diversify the economic base. However, I think an important point that is sometimes missed in talking about attracting new industry is that freight transportation is critical to the maintenance and the enhancement of the existing economic base of rural areas. So, what I'm going to focus on today is transportation investment options to increase trade efficiency and effectiveness and to maintain and enhance the existing economic base. Since the economic base of the Upper Midwest is heavily focused on agriculture, I'm going to use agriculture to illustrate some of the concepts I'm talking about.

In general, I think there are four major areas or options where investment can be made in transportation that will foster economic development. The first major area is infrastructure, and this is what most people focus on when asked about transportation investment and rural economic development. Most people automatically think of roads, bridges, railroad tracks, and ports and terminals -- the physical infrastructure. Although infrastructure provides the physical capacity and is a necessary condition for economic growth and development, it isn't sufficient in and of itself to enhance economic growth. There are three other areas where I think either federal, state or local investment could be made that would enhance economic development. One area is in transportation operations.

Efficient operations result in greater utilization of the infrastructure and create the capacity to move more people and freight across a given network. For example, in metropolitan areas, investments in highway operations technology generally generate more benefits than
construction of new highways. Those benefits are primarily in the form of improved traffic management and traffic flow. In rural areas, we don't quite get the benefits that are realized in metropolitan areas, but there is still a lot to be said for improved transportation systems management options.

Many of the operating investments are centered around technology, and technology is the third big area that I would like to talk about -- both new technology and the adaptation of existing technology to transportation. Technology can be very exotic and high-scale, such as Intelligent Vehicle Highway Systems. Alternatively, technology can comprise traditional concepts that don't have the high-tech appeal but nevertheless generate a great amount of benefits. I'll illustrate some of these concepts as I go through the presentation.

The fourth big area, planning and management, is frequently overlooked. Investments in better databases, better analysis techniques, and better planning procedures can generate just as many benefits overall for economic development as building new roads and bridges. These four general areas have specific applications across the modes of transportation, and I'll just briefly discuss what those are.

With respect to highways, most of the emphasis today in terms of infrastructure is on the maintenance and rehabilitation of existing pavements, bridges and tunnels, instead of new construction. Consequently, there is a great deal of concern about how these investments can be optimized -- that is, create the most benefits for the most people. In terms of operating technology, smart highways and smart cars offer a great deal of benefit for both metropolitan and rural areas. However, rather than following a carte blanche approach, I think federal, state and local policy makers need to conduct a very in depth benefit/cost analysis and feasibility study to determine where these technologies could be applied in rural and non-metropolitan areas, and how they could generate the most benefits.

Although IVHS has captured most of the attention, I think there are other new technologies in highway transportation that could have some tremendous benefits, such as reassessing truck and trailer configurations. You might be familiar with a study that the Transportation Research Board recently finished that looked at alternative trailer configurations in terms of their axles and axle loadings and what the differences could mean in terms of efficiency and the cost per ton mile, as well as highway impacts. Their conclusion was that if we are not constrained by standard configurations, we can increase the efficiency of truck operations without incremental pavement damage. In fact, we can actually reduce pavement damage. There are also some interesting investment opportunities in the research and design of new tractors and promoting efficiencies in these new designs.

An important concept today is the focus on planning, forecasting and management technologies. Many benefits can be generated from better forecasting technologies, particularly concerning truck traffic; more frequent and better needs assessments and investment analysis; and project selection that tries to take a fixed budget and allocate it in such a way that it generates the most benefit for the most people. We are moving in that direction with some very nice pavement management databases and other databases at state
departments of transportation. However, there are opportunities for more improvements and advancements.

The options in terms of railroad investment are somewhat similar, yet quite different. Most of the investment in highways is from public agencies. On the contrary, most of the investment in railroads comes from private agencies. However, there is growing sentiment and growing support for public investment in railroad track and roadway. The Federal Railroad Administration recently conducted a study of local and regional railroads, and came to the conclusion that there was vast under-investment in track maintenance and capital expenditures, and that the industry really needed to catch up. The FRA was primarily approaching this from a safety perspective, but the conclusions have major impacts for freight distribution and efficiency, and subsequently for the local economy and economic development.

There isn't a similar study concerning large railroads, but if we just think about where the local and regional railroads bought most of their track, we can see that this trend actually started in the Class I railroad industry through deferred maintenance and capital expenditures on branch lines. Furthermore, this trend is probably continuing today. I'll give some examples later of what deferred maintenance can mean in terms of freight distribution impacts. Typically, it reduces the operating speed on branch lines, reduces the service frequency, and impacts both the operator and the shipper.

In addition to railroad infrastructure and operating investment, there is also a great deal of concern about equipment. Many of you following agricultural transportation issues have seen a great deal of controversy over equipment availability (freight cars and locomotives) and how they are allocated. In fact, a recent study by the USDA concluded that given existing replacement trends of covered hopper car fleets and projected demands through the year 2000, we could see a serious hopper car shortage by the end of the century. Some people say that it's already here, and indeed spot shortages have manifested themselves in this region during the last ten years.

There are a lot of related railroad issues that are appropriate for discussion in focus groups. Who should own the equipment? Who should finance it? How is it allocated? We have a model in the U.S. which says that car ownership lies with the private sector and that railroad owned freight cars get used first over shipper-owned freight cars. That's completely different from the Canadian system in which the Grain Transportation Agency of the government owns and allocates about 70% of grain covered hopper cars. I'm not saying that approach is appropriate, but these are issues that need to be discussed.

There is an opportunity for investing in planning, management, and technology in railroads, just as there is in highways. The absolute level of maintenance expenditures is one thing, but the related issue is how efficiently those maintenance dollars are spent. There are a lot of options in this area, particularly in databases. The Class I industry has developed a very detailed set of databases, but similar databases for regional railroads do not exist. To some
extent, the regional industry is not able to promote and analyze itself the way that it needs to do. So, I think there are some opportunities for improvements in this area.

Even though most of the focus in this part of the country is on railroads and highways, I think we'd be remiss if we didn't discuss waterway issues, as there are some critical issues looming on the horizon. The Upper Mississippi River system is a potential bottleneck to the transportation of grains and oilseeds, particularly from this part of the country to the Gulf for export. That system (and by that system I mean the locks and dams, primarily) is aging. It's an old system, and it needs some investment. Many of you are probably aware that periodically, due to low water, congestion, or other seasonal problems, there are bottlenecks at lock and dam 26 and other locks and dams on the system. The Army Corps of Engineers is mapping out a long term investment strategy nationwide, and in their initial analysis it appears that a great deal of money is already being allocated out to the Ohio River system and other eastern river systems -- not to the Upper Mississippi. From an investment standpoint, to support economic development in the Upper Midwest, I think waterway investment is something that the focus groups would want to discuss.

There are a lot of other areas related to transportation modes, such as airports and airways, that I'm not going to discuss, but I would like to point out one thing. We've traditionally focused on transportation investment as isolated investments in each mode. That's primarily because the money comes from different sources. What we've always done is take highway money and invest it in highways, take railroad money and invest it in railroads, waterway money and invest it in waterways. Once we begin by demarcating the funds in this manner, we are going to wind up sub-optimizing. As long as there was a lot of transportation money (or unlimited funds), then we didn't risk too much. But, now we're getting into an era of financial constraints and there is not enough money to go around. Thus, one of the things we need to start looking at is optimizing investment from a multi-modal perspective -- that is looking at all modes simultaneously.

There is a National Cooperative Highway Research Project currently underway to examine how state, federal, and local governments can better optimize their limited transportation dollars by looking at all modes when they make transportation investments. I'll just give you an example based on some work I've done lately in North Dakota and other states. In many instances we find that a limited amount of money invested to rehabilitate a railroad branch line actually generates more benefits than investing that money in the highway system, particularly when we consider the infrastructure and operating costs and the impacts on the regional economy over the long run. This generalization isn't always true, but it is in some cases. I think a multimodal orientation and perspective is what we need, more so than the traditional modal pattern of investment.

Those are some of the options. However, these options obviously need some type of criteria to guide investments, because there is a whole range of things that can be done. Historically, when public funds are invested we always look at the net benefits that are generated, and the projects that generate the most benefits warrant the most investment. However, we really haven't looked at the full picture, particularly when we've been investing in highways. The
types of benefits that we’ve traditionally looked at for highway investment are user benefits. That is, if we invest in highways we reduce vehicle operating cost, travel time and fuel consumption. These are very important benefits. However, there is more to the analysis. Highway investment also reduces truck operating cost. Similarly, when we invest in railroads we look at the benefits to the shippers or operators from reducing railway travel time, fuel consumption and vehicle costs. All of these factors directly impact users. We clearly need to look at user and operator costs in railroad analysis. However, we also need to look at impacts on distribution costs and how they affect the regional economy. If we don’t do that, we’re only getting part of the picture. So, I would suggest that we need some revised benefit cost criteria before we start seriously discussing long term investment criteria and projects.

I’ll illustrate some of these concepts briefly by focusing on how transportation investment affects the agricultural economy. There are four areas where investment affects the agricultural economy by affecting either operators or users. First of all, investment affects the performance of highways and railroads. By that, I mean the serviceability. In highways, serviceability essentially means the roughness of the pavement and the comfort of the ride. For railroads, the impact is somewhat similar in that the track structure supports a certain safe train speed. Lower investment or maintenance levels are going to result in lower speeds.

However, investment also affects the economic life of highways and railroads. In short, in addition to lower performance, under-investment reduces economic life. Transportation investments also affect the satisfaction of users and transportation service levels, particularly service frequency. Another thing we tend to overlook is that investment affects the coverage of the transportation system. The abandonment of rail lines or the abandonment of rural roads can increase the distance that someone has to travel to get from a supply point to a processing point. Some studies have recently been done in Iowa and other areas that examined increased circuity when some rural roads and rural bridges were eliminated.

To give you an idea of what a change in highway funding can mean for a regional economy, I’d like to introduce a couple of concepts. When we’re talking about impacts on the regional economy, what we’re usually looking at is how distribution costs affect farmer’s incomes through changes in net farm income or net producer income. Any time net farm income is reduced, there are two obvious effects. One is a reduction in personal income or household income, but more importantly there is a decrease in gross business volume because the producer has less to spend in the economy, purchasing fewer goods and supplies. North Dakota has a very good input/output model which quantifies all these relationships. Every dollar of lost income in the farm sector results in about 1.5 dollars of total lost household income and about 3 dollars in regional economic impacts when the effects on gross business volume are considered. In essence, one dollar translates into three.

Now, I’ll work through an example, based on some preliminary numbers. Suppose we lower the overall level of funding for the highway system in North Dakota and we drop the pavement serviceability rating from say a high-fair level where it is right now (of about 3.5), to a low-fair level or even poor level about 2.5. In other words we cause about a one point drop in pavement serviceability rating. This translates into an 8% increase in vehicle operating cost.
and approximately a 3.5% increase in travel time. If we look at all of the travel on North Dakota's rural and minor arterials and collectors, this translates into about 29 million dollars a year in lost travel time and opportunity cost if we value time at about $10 per hour, plus about 70 million dollars in vehicle operating cost. In other words, if we reduce the pavement serviceability rating from 3.5 to 2.5 we're looking at nearly 100 million dollars annually.

However, that's only part of the picture. Disinvestment has a very specific impact on agricultural business and particularly on farm truck operations. A one point drop in pavement serviceability rating from 3.5 to 2.5 will increase farm truck costs by about 7.5% or 8 cents per mile. Last year, elevators shipped out about 500 million bushels of grains from North Dakota. I'm not sure if that's a three year average, but I think it's close to it. Let's just say we take that number. What that winds up translating into is about four million dollars a year in increased vehicle operating cost if the pavement serviceability rating declines from 3.5 to 2.5. The 4 million, in turn, results in about 12 million dollars a year in gross business volume. In this calculation, I assumed an average farm truck trip of about 15 miles.

What typically happens is that the outbound movement from the elevators sometimes moves by truck all the way to markets. Frequently, it moves from satellite elevators to a subterminal elevator, so there is a further impact. If you assume, an average haul of about 15 miles for the outbound movement then you can double the impacts to 25 million dollars a year.

Again, that's only the portion of the picture that relates to truck operations and truck movements. There is an equally severe impact resulting from railroad deferred maintenance or disinvestment. When railroad capital investments are not made or deferred, train speed is reduced, service frequency is reduced and derailments increase. All of those factors increase operator cost. In a recent case study of the Red River Valley and Western done at the Transportation Institute, we found that we could reduce operator cost about 5 cents per hundred weight by rehabilitating rail lines on that system. The benefits vary with the rail line and with the carrier, but that's probably fairly representative of what we're going to find on North Dakota's rail line network if we rehabilitate the branch lines and light density system.

This savings sometimes translates into reduced railroad rates, or it goes back to the railroad operators. In the case of local and regional railroads that are headquartered in the state, this can have an impact on the local economy. The transportation sector has a different multiplier than the one I mentioned earlier, but let's just assume that we take the 5 cent figure and multiply it by the 500 million bushels that I talked about earlier, and assume that roughly half of it remains in the state. Again, this represents another 4 to 5 million dollar benefit annually. By the time we run this benefit through the economy we're talking about 12 million dollars and that's just railroad investment. Eliminating deferred maintenance doesn't necessarily show what happens when rail lines are abandoned. When rail lines are abandoned the impact is pronounced. According to some recent studies done in different parts of the country, when a rail line is abandoned, there's a net impact on the highway system of about 3 cents a ton mile. In addition, there's approximately a five cent/bushel transloading cost that is incurred. Those costs can be substantial and can mount very easily. In a study I did in Nebraska of the proposed abandonment of the C&NW northern main line, there were no alternative rail