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# SURFACE AND MARITIME TRANSPORTATION

## Challenges and Strategies for Enhancing Mobility

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Mr. Chairman and Members of the Committee:

We appreciate the opportunity to testify on the challenges faced by the surface and maritime transportation systems in maintaining and improving mobility. Your hearing today focuses on important issues about the physical condition, performance, and future investment requirements of the nation's roadways and bridges.<sup>1</sup> Our remarks will focus on the performance of the transportation systems. More specifically, we will discuss the ultimate desired outcome of transportation infrastructure improvements—enhanced mobility—and the possible strategies for achieving that outcome.<sup>2</sup>

The scope of the U.S. surface and maritime transportation systems—which primarily includes roads, mass transit systems, railroads, and ports and waterways<sup>3</sup>—is vast. One of the major goals of these systems is to provide and enhance mobility. Mobility provides people with access to goods, services, recreation, and jobs; provides businesses with access to materials, markets, and people; and promotes the movement of personnel and material to meet national defense needs. However, the U.S. surface and maritime transportation systems have become congested and concerns have been raised about the burden they impose on the nation's quality of life through wasted energy, time, and money; increased pollution; and threats to public safety. Barriers to transportation accessibility for certain population groups and the level of financial resources available to address transportation problems are also major

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<sup>1</sup> We have not had an opportunity to review the Department of Transportation's *Conditions and Performance Report* that is expected to be released at today's hearing.

<sup>2</sup> In a July 2001 testimony before the former Subcommittee on Transportation and Infrastructure, Senate Committee on Environment and Public Works, we reviewed the infrastructure investment estimates of seven federal agencies and found that they focus mostly on the condition of the infrastructure rather than the desired outcomes (e.g., less traffic congestion) that can be expected from additional infrastructure investments. We cautioned against relying mainly on measures of need based primarily on the condition of existing infrastructure and instead suggested comparing the costs and benefits of alternative approaches for reaching outcomes, including noncapital alternatives (such as strategies to manage demand rather than build new infrastructure). See U.S. General Accounting Office, *U.S. Infrastructure: Funding Trends and Federal Agencies' Investment Estimates*, GAO-01-986T (Washington, D.C.: July 23, 2001).

<sup>3</sup> In this testimony, we define the surface transportation modes to include highways, mass transit systems, and railroads; and the maritime transportation modes to include ports, inland waterways, and the intermodal connections leading to them. Pipelines were not part of our review.

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concerns. Balancing the goal of improving mobility with other social goals, such as environmental preservation, will present challenges.

Our statement is based on a report that we are releasing today on surface and maritime transportation mobility.<sup>4</sup> We will discuss (1) key challenges in maintaining and improving mobility and (2) key strategies for addressing the challenges. Our report is primarily based on expert opinion drawn from two panels of surface and maritime transportation experts that we convened in April 2002. Our work also included a review of reports prepared by federal agencies, academics, and industry groups. Appendix I provides further information on our scope and methodology and appendix II contains a list of relevant GAO products.

In summary:

- With increasing passenger and freight travel, the surface and maritime transportation systems face a number of challenges in ensuring continued mobility. These challenges include:
  - **Preventing congestion from overwhelming the transportation system.** Increasing passenger and freight travel has already led to increasing levels of congestion at bottlenecks and peak travel times in some areas. For example, the amount of traffic experiencing congestion during peak travel periods doubled from 33 percent in 1982 to 66 percent in 2000 in 75 metropolitan areas studied by the Texas Transportation Institute.<sup>5</sup> Freight mobility is also affected by increasing congestion within specific heavily used corridors and at specific bottlenecks that tend to involve intermodal connections, such as border crossings, and road and rail connections at major seaports within metropolitan areas. Furthermore, congestion is increasing at aging and increasing unreliable locks on the inland waterways.
  - **Ensuring access to transportation for certain underserved populations (including some elderly, poor, and rural populations that have restricted mobility) and achieving a balance between**

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<sup>4</sup> U.S. General Accounting Office, *Surface and Maritime Transportation: Developing Strategies for Enhancing Mobility: A National Challenge*, GAO-02-775 (Washington, D.C.: Aug. 30, 2002).

<sup>5</sup> David Shrank and Tim Lomax, *2002 Urban Mobility Report* (College Station, Tex.: Texas Transportation Institute, June 2002).

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**enhancing mobility and giving due regard to environmental and other social goals.** Policies and patterns of development that encourage automobile dependence and favor provision of transit services with inflexible routes and schedules—such as subway or bus—may disadvantage some groups by limiting their access to needed services or jobs. The surface and maritime transportation systems also face the challenge of effectively addressing pollution problems caused by increased travel levels. Emissions from passenger and freight vehicles, shipping waste disposal practices, and excessive noise levels have contributed to the degradation of air quality, disruption of ecosystems, and other problems.

- There is no one solution for the mobility challenges facing the nation, and our expert panelists indicated that numerous approaches are needed to address these challenges. From these discussions, we believe that the wide range of approaches can be clustered into three key strategies that may help transportation decisionmakers at all levels of government address mobility challenges. These strategies include the following:
  - **Focus on the entire surface and maritime transportation system rather than on specific modes or types of travel to achieve desired mobility outcomes.** Transportation agencies at the federal, state, and local level might shift focus from their current emphasis on single modes to consider performance outcomes of all modes in addressing mobility challenges, and to recognize interactions across modes between passenger and freight traffic, and between public and private interests. This is important because addressing the mobility challenges outlined above can involve a scope beyond a local jurisdiction or a state line, and may require coordination across multiple modes, types of travel, or types of transportation providers and planners.
  - **Use a full range of techniques to achieve desired mobility outcomes.** Using various techniques—such as new construction, corrective and preventive maintenance, rehabilitation, operations and system management, and pricing—to address complex mobility challenges, may be more effective than placing emphasis on any one technique.
  - **Provide more options for financing mobility improvements and consider additional sources of revenue.** This strategy—which involves providing more flexibility in funding across modes, expanding financial support for alternative financing mechanisms (e.g., credit

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assistance to state and local governments), and considering various revenue-raising methods—may offer promise for addressing key mobility problems.

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## Background

The U.S. surface and maritime transportation systems facilitate mobility through an extensive network of infrastructure and operators, as well as through the vehicles and vessels that permit passengers and freight to move within the systems. The systems include 3.9 million miles of public roads, 121,000 miles of major private railroad networks, and 25,000 miles of commercially navigable waterways. They also include over 500 major urban public transit operators in addition to numerous private transit operators, and more than 300 ports on the coasts, Great Lakes, and inland waterways.

Maintaining transportation systems is critical to sustaining America's economic growth. Efficient mobility systems significantly affect economic development: cities could not exist and global trade could not occur without systems to transport people and goods. The pressures on the existing transportation system are mounting, however, as both passenger and freight travel are expected to increase over the next 10 years, according to Department of Transportation (DOT) projections. Passenger vehicle travel on public roads is expected to grow by 24.7 percent from 2000 to 2010. Passenger travel on transit systems is expected to increase by 17.2 percent over the same period. Amtrak has estimated that intercity passenger rail ridership will increase by 25.9 percent from 2001 to 2010. Preliminary estimates by DOT indicate that tons of freight moved on all surface and maritime modes—truck, rail, and water—are expected to increase by 43 percent from 1998 through 2010, with the largest increase expected to be in the truck sector. The key factors behind increases in passenger travel, and the modes travelers choose, are expected to be population growth, the aging of the population, and rising affluence. For freight movements, economic growth, increasing international trade, and the increasing value of cargo shipped may affect future travel levels and the modes used to move freight.

The relative roles of each sector involved in surface and maritime transportation activities—including the federal government, other levels of government, and the private sector—vary across modes. For public roads, the federal government owns few roads but has played a major role in

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funding the nation's highways. With the completion of the interstate highway system in the 1980s—and continuing with passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA)<sup>6</sup> and its successor legislation, the Transportation Equity Act for the 21st Century (TEA-21)<sup>7</sup>, in 1998—the federal government shifted its focus toward preserving and enhancing the capacity of the system. While the federal government's primary role has been to provide capital funding for the interstate system and other highway projects, state and local governments provide the bulk of the funding for public roads in the United States and are responsible for operating and maintaining all nonfederal roads, including the interstate system.

For transit systems—which include a variety of multiple-occupancy vehicle services designed to transport passengers on local and regional routes—the federal government provides financial assistance to state and local transit operators to develop new transit systems and improve, maintain, and operate existing systems. The largest portion of capital funding for transit comes from the federal government, while the primary source for operating funds comes from passenger fares.

The respective roles of the public and private sector and the revenue sources vary for passenger as compared with freight railroads. For passenger railroads, the Rail Passenger Service Act of 1970 created Amtrak to provide intercity passenger rail service because existing railroads found such service unprofitable. Since its founding, Amtrak has rebuilt rail equipment and benefited from significant public investment in track and stations, especially in the Northeast corridor, which runs between Boston and Washington, D.C. The role of the federal government in providing financial support to Amtrak is currently under review amid concerns about the corporation's financial viability and discussions about the future direction of federal policy toward intercity rail service. For freight railroads, the private sector owns, operates, and provides almost all of the financing for freight railroads. Currently, the federal government plays a relatively small role in financing freight railroad infrastructure by offering some credit assistance to state and local governments and railroads for capital improvements.

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<sup>6</sup> P.L. 102-240 (Dec. 18, 1991).

<sup>7</sup> P.L. 105-178 (June 9, 1998).

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The U.S. maritime transportation system primarily consists of waterways, ports, the intermodal connections (e.g., inland rail and roadways) that permit passengers and cargo to reach marine facilities, and the vessels and vehicles that move cargo and people within the system. The maritime infrastructure is owned and operated by an aggregation of state and local agencies and private companies, with some federal funding provided by the Corps of Engineers, the U.S. Coast Guard, and DOT's Maritime Administration.

Funding authorization for several key federal surface transportation programs will expire soon. For example, TEA-21's authorization of appropriations expires in fiscal year 2003 and the Amtrak Reform and Accountability Act of 1997<sup>8</sup> authorized federal appropriations for Amtrak through the end of fiscal year 2002. In addition, the federal funding processes and mechanisms for the maritime transportation system are currently under review by two interagency groups.<sup>9</sup>

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## Key Mobility Challenges Include Growing Congestion and Other Problems

There are several challenges to mobility. Three of the most significant are growing congestion, ensuring access to transportation for certain underserved populations, and addressing the transportation system's negative effects on the environment and communities.

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### Congestion

Ensuring continued mobility involves preventing congestion from overwhelming the transportation system. Congestion is growing at localized bottlenecks (places where the capacity of the transportation system is most limited) and at peak travel times on public roads, transit systems, freight rail lines, and at freight hubs such as ports and borders where freight is transferred from one mode to another. In particular:

- For local urban travel, a study by the Texas Transportation Institute<sup>10</sup> showed that the amount of traffic experiencing congestion during peak

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<sup>8</sup> P.L. 105-134 (Dec. 2, 1997).

<sup>9</sup> The two groups are the Interagency Committee on the Marine Transportation System and the Marine Transportation System National Advisory Council.

<sup>10</sup> Shrank and Lomax, *2002 Urban Mobility Report*.

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travel periods doubled from 33 percent in 1982 to 66 percent in 2000 in the 75 metropolitan areas studied. In addition, the average time per day that roads were congested increased over this period, from about 4.5 hours in 1982 to about 7 hours in 2000. Increased road congestion can also affect public bus and other transit systems that operate on roads. Some transit systems are also experiencing increasing rail congestion at peak travel times.<sup>11</sup> In addition, concerns have been raised about how intercity and tourist travel interacts with local traffic in metropolitan areas and in smaller towns and rural areas, and how this interaction will evolve in the future. According to a report sponsored by the World Business Council for Sustainable Development, *Mobility 2001*,<sup>12</sup> capacity problems for intercity travelers are severe in certain heavily traveled corridors, such as the Northeast corridor, which links Washington, D.C., New York, and Boston. In addition, the study said that intercity travel may constitute a substantial proportion of total traffic passing through smaller towns and rural areas.

- Congestion is expected to increase on major freight transportation networks at specific bottlenecks, particularly where intermodal connections occur, and at peak travel times. This expectation raises concerns about how interactions between freight and passenger travel and how increases in both types of travel will affect mobility in the future. Trucks contribute to congestion in metropolitan and other areas where they generally move on the same roads and highways as personal vehicles, particularly during peak periods of travel. In addition, high demand for freight, particularly freight moved on trucks, exists in metropolitan areas where overall congestion tends to be the worst.
- With international trade an increasing part of the economy and with larger containerships being built, some panelists indicated that more pressure will be placed on the already congested road and rail connections to major U.S. seaports and at the border crossings with Canada and Mexico.

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<sup>11</sup> For example, the Washington Metropolitan Area Transit Authority's studies on crowding found that, of the more than 200 peak morning rail trips observed over a recent 6-month period, on average, 23 percent were considered "uncomfortably crowded or crush loads." See U.S. General Accounting Office, *Mass Transit: Many Management Successes at WMATA, but Capital Planning Could Be Enhanced*, [GAO-01-744](#) (Washington, D.C.: July 2, 2001).

<sup>12</sup> Massachusetts Institute of Technology and Charles River Associates, Inc., *Mobility 2001: World Mobility at the End of the Twentieth Century and Its Sustainability* (World Business Council for Sustainable Development, Aug. 2001).



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According to a DOT report,<sup>13</sup> more than one-half of the ports responding to a 1997 survey of port access issues identified traffic impediments on local truck routes as the major infrastructure problem. This congestion has considerable implications for our economy given that 95 percent of our overseas trade tonnage moves by water, and the cargo moving through the U.S. marine transportation system contributes billions of dollars to the U.S. gross domestic product.<sup>14</sup>

- Railroads are beginning to experience more severe capacity constraints in heavily used corridors, such as the Northeast corridor, and within major metropolitan areas, especially where commuter and intercity passenger rail services share tracks with freight railroads. Capacity constraints at these bottlenecks are expected to worsen in the future.
- On the inland waterways, congestion is increasing at aging and increasingly unreliable locks. According to the Corps of Engineers, the number of hours that locks were unavailable due to lock failures increased in recent years, from about 35,000 hours in 1991 to 55,000 hours in 1999, occurring primarily on the upper Mississippi and Illinois rivers. Also according to the Corps of Engineers, with expected growth in freight travel, 15 of 26 locks that they studied are expected to exceed 80 percent of their capacity by 2020, as compared to 4 that had reached that level in 1999.

Some of the systemic factors that contribute to congestion include (1) barriers to building enough capacity to accommodate growing levels of travel; (2) challenges to effectively managing and operating transportation systems; and (3) barriers to effectively managing how, and the extent to which, transportation systems are used. First, there is insufficient capacity at bottlenecks and during peak travel times to accommodate traffic levels for a variety of reasons. For example, transportation infrastructure (which is generally provided by the public sector, except for freight railroads) takes a long time to plan and build, is often costly, and can conflict with other social goals such as environmental preservation and community maintenance. Furthermore, funding and planning rigidities in the public

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<sup>13</sup> *An Assessment of the U.S. Marine Transportation System* (Washington, D.C.: U.S. Department of Transportation, Sept. 1999).

<sup>14</sup> U.S. General Accounting Office, *Marine Transportation: Federal Financing and a Framework for Infrastructure Investments*, [GAO-02-1033](#) (Washington, D.C.: Sept. 9, 2002).

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institutions responsible for providing transportation infrastructure tend to promote one mode of transportation, rather than a combination of balanced transportation choices, making it more difficult to deal effectively with congestion. In addition, some bottlenecks occur where modes connect, and because funding is generally mode-specific, dealing with congestion at these intermodal connections is not easily addressed.

Second, many factors related to the management and operation of transportation systems can contribute to increasing congestion. Congestion on highways is in part due to poor management of traffic flows on the connectors between highways and poor management in clearing roads that are blocked due to accidents, inclement weather, or construction. For example, in the 75 metropolitan areas studied by the Texas Transportation Institute, 54 percent of annual vehicle delays in 2000 were due to incidents such as breakdowns or crashes. In addition, the Oak Ridge National Laboratory reported that, nationwide, significant delays are caused by work zones on highways; poorly timed traffic signals; and snow, ice, and fog.<sup>15</sup>

Third, some panelists said that congestion on transportation systems is also due in part to inefficient pricing of the infrastructure because users—whether they are drivers on a highway or barge operators moving through a lock—do not pay the full costs they impose on the system and on other users for their use of the system. If travelers and freight carriers had to pay a higher cost for using transportation systems during peak periods to reflect the full costs they impose, they might have an incentive to avoid or reschedule some trips and to load vehicles more fully, possibly resulting in less congestion.

Panelists also noted that the types of congestion problems that are expected to worsen involve interactions between long-distance and local traffic and between passengers and freight. Existing institutions may not have the capacity or the authority to address them. For example, some local bottlenecks may hinder traffic that has regional or national significance, such as national freight flows from major coastal ports, or can affect the economies and traffic in more than one state. Current state and local planning organizations may have difficulty considering all the

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<sup>15</sup> S.M. Chin, O. Franzese, D.L. Greene, H.L. Hwang, and R. Gibson, *Temporary Losses of Capacity Study and Impacts on Performance*, Report No. ORNL/TM-2002/3 (Oak Ridge, Tenn.: Oak Ridge National Laboratory, May 2002).

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costs and benefits related to national or international traffic flows that affect other jurisdictions as well as their own. Furthermore, in our recent survey of states, most states reported that the increasing volume of both car and truck traffic over the next decade would negatively affect the physical condition of pavement and bridges and the safety of their interstate highways.<sup>16</sup>

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## Other Mobility Challenges

Besides dealing with the challenge of congestion, ensuring mobility also involves ensuring access to transportation for certain underserved populations. Settlement patterns and dependence on automobiles limit access to transportation systems for some elderly people and low-income households, and in rural areas where populations are expected to expand.

The elderly have different mobility challenges than other populations because they are less likely to have drivers' licenses, have more serious health problems, and may require special services and facilities, according to the Department of Transportation's 1999 *Conditions and Performance* report.<sup>17</sup> People who cannot drive themselves tend to rely on family, other caregivers, or friends to drive them, or find alternative means of transportation. Many of the elderly also may have difficulty using public transportation due to physical ailments. As a result, according to the 1999 *Conditions and Performance* report and a 1998 report about mobility for older drivers,<sup>18</sup> they experience increased waiting times, uncertainty, and inconvenience, and they are required to do more advance trip planning. These factors can lead to fewer trips taken for necessary business and for recreation, as well as restrictions on times and places that healthcare can be obtained. As the population of elderly individuals increases over the next 10 years, issues pertaining to access are expected to become more prominent in society.

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<sup>16</sup> U.S. General Accounting Office, *Highway Infrastructure: Interstate Physical Conditions Have Improved, but Congestion and Other Pressures Continue*, [GAO-02-571](#) (Washington, D.C.: May 31, 2002).

<sup>17</sup> Federal Highway Administration and Federal Transit Administration, *1999 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance* (Washington, D.C.: U.S. Department of Transportation, 2000).

<sup>18</sup> Jon E. Burkhardt, Arlene M. Berger, Michael Creedon, and Adam T. McGavock, *Mobility and Independence: Changes and Challenges for Older Drivers* (July 1998). This report was developed under a cooperative agreement with the U.S. Department of Health and Human Services (DHHS), under the auspices of the Joint DHHS/DOT Coordinating Council on Access and Mobility.

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Lower income levels can also be a significant barrier to transportation access. The cost of purchasing, insuring, and maintaining a car is prohibitive to some households, and 26 percent of low-income households do not own a car, compared with 4 percent of other households, according to the 1999 *Conditions and Performance* report. Among all low-income households, about 8 percent of trips are made in cars that are owned by others as compared to 1 percent for other income groups. Furthermore, similar uncertainties and inconveniences apply to this group as to the elderly regarding relying on others for transportation. In addition, in case studies of access to jobs for low-income populations, Federal Transit Administration (FTA) researchers found that transportation barriers to job access included gaps in transit service, lack of knowledge of where transit services are provided, and high transportation costs resulting from multiple transfers and long distances traveled.<sup>19</sup>

Rural populations, which according to the 2000 Census grew by 10 percent over the last 10 years, also face access problems. Access to some form of transportation is necessary to connect rural populations to jobs and other amenities in city centers or, increasingly, in the suburbs. Trips by rural residents tend to be longer due to lower population densities and the relative isolation of small communities. Therefore, transportation can be a challenge to provide in rural areas, especially for persons without access to private automobiles. A report prepared for the FTA in 2001<sup>20</sup> found that 1 in 13 rural residents lives in a household without a personal vehicle. In addition, according to a report by the Coordinating Council on Access and Mobility,<sup>21</sup> while almost 60 percent of all nonmetropolitan counties had some public transportation services in 2000, many of these operations were small and offered services only to limited geographic areas during limited times.

Finally, transportation can also negatively affect the environment and communities by increasing the levels of air and water pollution. As a result of the negative consequences of transportation, tradeoffs must be made

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<sup>19</sup> Federal Transit Administration, *Access to Jobs: Planning Case Studies* (Washington, D.C: U.S. Department of Transportation, Sept. 2001).

<sup>20</sup> Community Transportation Association of America, *Status of Rural Public Transportation-2000* (April 2001).

<sup>21</sup> Coordinating Council on Access and Mobility, *Planning Guidelines for Coordinated State and Local Specialized Transportation Services* (Washington, D.C: U.S. Department of Transportation, Dec. 20, 2000).

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between facilitating increased mobility and giving due regard to environmental and other social goals. For example, transportation vehicles are major sources of local, urban, and regional air pollution because they depend on fossil fuels to operate. Emissions from vehicles include sulfur dioxide, lead, carbon monoxide, volatile organic compounds, particulate matter, and nitrous oxides. Vehicle emissions in congested areas can trigger respiratory and other illnesses, and runoff from impervious surfaces, such as highways, can carry pollutants into lakes, streams, and rivers, thus threatening aquatic environments.<sup>22</sup>

Freight transportation also has significant environmental effects. Trucks are significant contributors to air pollution. According to the American Trucking Association, trucks were responsible for 18.5 percent of nitrous oxide emissions and 27.5 percent of other particulate emissions from mobile sources in the United States. The *Mobility 2001* report states that freight trains also contribute to emissions of hydrocarbons, carbon monoxide, and nitrous oxide, although generally at levels considerably lower than trucks. In addition, while large shipping vessels are more energy efficient than trucks or trains, they are also major sources of nitrogen, sulfur dioxide, and diesel particulate emissions. According to the International Maritime Organization, ocean shipping is responsible for 22 percent of the wastes dumped into the sea on an annual basis.

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## Three Strategies for Addressing Mobility Challenges

The experts we consulted presented numerous approaches for addressing the types of challenges discussed throughout this statement, but they emphasized that no single strategy would be sufficient. From these discussions and our literature review, we have identified three key strategies that may help transportation decisionmakers at all levels of government address mobility challenges and the institutional barriers that contribute to them. The strategies include (1) focusing on systemwide outcomes, (2) using a full range of techniques, and (3) providing options for financing surface and maritime transportation.

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<sup>22</sup> See U.S. General Accounting Office, *Environmental Protection: Federal Incentives Could Help Promote Land Use That Protects Air and Water Quality*, [GAO-02-12](#) (Washington, D.C., Oct. 31, 2001).

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Focus on the Entire Surface and Maritime Transportation System Rather Than on Specific Modes or Types of Travel to Achieve Desired Mobility Outcomes.

Shifting the focus of government transportation agencies at the federal, state, and local levels to consider all modes and types of travel in addressing mobility challenges—as opposed to focusing on a specific mode or type of travel in planning and implementing mobility improvements—could help achieve enhanced mobility. Addressing the types of mobility challenges discussed earlier in this statement can require a scope beyond a local jurisdiction, state line, or one mode or type of travel. For example, congestion challenges often occur where modes connect or should connect—such as ports or freight hubs where freight is transferred from one mode to another, or airports that passengers need to access by car, bus, or rail. These connections require coordination of more than one mode of transportation and cooperation among multiple transportation providers and planners, such as port authorities, metropolitan planning organizations (MPO),<sup>23</sup> and private freight railroads. Therefore, a systemwide approach to transportation planning and funding, as opposed to focus on a single mode or type of travel, could improve focus on outcomes related to user or community needs. The experts we consulted provided a number of examples of alternative transportation planning and funding systems that might better focus on outcomes that users and communities desire, including the following:

- **Performance-oriented funding system.** The federal government would first define certain national interests of the transportation system—such as maintaining the entire interstate highway system or identifying freight corridors of importance to the national economy—then set national performance standards for those systems that states and localities must meet. Federal funds would be distributed to those entities that address national interests and meet the established standards. Any federal funds remaining after meeting the performance standards could then be used for whatever transportation purpose the state or locality deems most appropriate to achieve state or local mobility goals.
- **Federal financial reward-based system.** Federal support would reward those states or localities that apply federal money to gain efficiencies in their transportation systems, or tie transportation projects to land use and other local policies to achieve community and environmental goals, as well as mobility goals.

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<sup>23</sup> MPOs are organizations of city, county, state, and federal officials that provide a regional forum for transportation planning.

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- **System with different federal matching criteria for different types of expenditures that might reflect federal priorities.** For example, if infrastructure preservation became a higher national priority than building new capacity, matching requirements could be changed to a 50 percent federal share for building new physical capacity and an 80 percent federal share for preservation.
  - **System in which state and local governments pay for a larger share of transportation projects, which might provide them with incentives to invest in more cost-effective projects.** Reducing the federal match for projects in all modes may give states and localities more fiscal responsibility for projects they are planning. If cost savings resulted, these entities might have more funds available to address other mobility challenges. Making federal matching requirements equal for all modes may avoid creating incentives to pursue projects in one mode that might be less effective than projects in other modes.

In addition, we recently reported on the need to view various transportation modes, and freight movement in particular, from an integrated standpoint, particularly for the purposes of developing a federal investment strategy and considering alternative funding approaches.<sup>24</sup> We identified four key components of a systematic framework to guide transportation investment decisions including (1) establishing national goals for the system, (2) clearly defining the federal role relative to other stakeholders, (3) determining the funding tools and other approaches that will maximize the impact of any federal investment, and (4) ensuring that a process is in place for evaluating performance and accountability.

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## Use a Full Range of Techniques to Address Mobility Challenges

Using a range of techniques to address mobility challenges may help control congestion and improve access. This approach involves a strategic mix of construction, corrective and preventive maintenance, rehabilitation, operations and system management, and managing system use through pricing or other techniques. No one type of technique would be sufficient to address mobility challenges. Although these techniques are currently in use, the experts we consulted indicated that planners should more consistently consider a full range of techniques, as follows:

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<sup>24</sup> [GAO-02-1033](#).

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- **Build new infrastructure.** Building additional infrastructure is perhaps the most familiar technique for addressing congestion and improving access to surface and maritime transportation. Although there is a lot of unused capacity in the transportation system, certain bottlenecks and key corridors require new infrastructure.
  - **Increase infrastructure maintenance and rehabilitation.** An emphasis on enhancing capacity from existing infrastructure through increased corrective and preventive maintenance and rehabilitation is an important supplement to, and sometimes a substitute for, building new infrastructure. Maintaining and rehabilitating transportation systems can improve the speed and reliability of passenger and freight travel, thereby optimizing capital investments.
  - **Improve management and operations.** Better management and operation of existing surface and maritime transportation infrastructure is another technique for enhancing mobility because it may allow the existing transportation system to accommodate additional travel without having to add new infrastructure. For example, the Texas Transportation Institute reported that coordinating traffic signal timing with changing traffic conditions could improve flow on congested roadways. One panelist noted that shifting the focus of transportation planning from building capital facilities to an “operations mindset” will require a cultural shift in many transportation institutions, particularly in the public sector, so that the organizational structure, hierarchy, and rewards and incentives are all focused on improving transportation management and operations.<sup>25</sup>
  - **Increase investment in technology.** Increasing public sector investment in Intelligent Transportation System (ITS) technologies that are designed to enhance the safety, efficiency, and effectiveness of the transportation network, can serve as a way of increasing capacity and mobility without making major capital investments. ITS includes technologies that improve traffic flow by adjusting signals, facilitating traffic flow at toll plazas, alerting emergency management services to the locations of crashes, increasing the efficiency of transit fare payment systems, and other actions. Other technological improvements include increasing information available to users of the transportation system to

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<sup>25</sup> Joseph M. Sussman, “Transitions in the World of Transportation: A Systems View,” *Transportation Quarterly* 56 (2002): 21-22.



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help people avoid congested areas and to improve customer satisfaction with the system.

- **Use demand management techniques.** Another approach to reducing congestion without making major capital investments is to use demand management techniques to reduce the number of vehicles traveling at the most congested times and on the most congested routes. One type of demand management for travel on public roads is to make greater use of pricing incentives. In particular, some economists have proposed using congestion pricing that involves charging surcharges or tolls to drivers who choose to travel during peak periods when their use of the roads increases congestion. These surcharges might help reduce congestion by providing incentives for travelers to share rides, use transit, travel at less congested (generally off-peak) times and on less congested routes, or make other adjustments—and at the same time, generate more revenues that can be targeted to alleviating congestion in those specific corridors.

In addition to pricing incentives, other demand management techniques that encourage ride-sharing may be useful in reducing congestion. Ride-sharing can be encouraged by establishing carpool and vanpool staging areas, providing free or preferred parking for carpools and vanpools, subsidizing transit fares, and designating certain highway lanes as high occupancy vehicle (HOV) lanes that can only be used by vehicles with a specified number of people in them (i.e., two or more).

Demand management techniques on roads, particularly those involving pricing, often provoke strong political opposition. The panelists cited a number of concerns about pricing strategies including (1) the difficulty in instituting charges to use roads that previously had been available “free”, (2) the equity issues that arise from the potentially regressive nature of these charges (i.e., the surcharges constitute a larger portion of the earnings of lower income households and therefore impose a greater financial burden on them), and (3) the concern that restricting lanes or roads to people who pay to use them is elitist because that approach allows people who can afford to pay the tolls to avoid congestion that others must endure.

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## Provide Options for Financing Mobility Improvements and Consider Additional Sources of Revenue

More options for financing surface and maritime transportation projects and more sources of revenue may be needed to achieve desired mobility outcomes and address those segments of transportation systems that are most congested. Our panelists suggested three financing strategies:

- **Increase funding flexibility.** The current system of financing surface and maritime transportation projects limits options for addressing mobility challenges. For example, separate funding for each mode at the federal, state, and local level can make it difficult to consider possible efficient and effective ways for enhancing mobility. Providing more flexibility in funding across modes could help address this limitation.
- **Expand support for alternative financing mechanisms.** The public sector could also expand its financial support for alternative financing mechanisms to access new sources of capital and stimulate additional investment in surface and maritime transportation infrastructure. These mechanisms include both newly emerging and existing financing techniques such as providing credit assistance to state and local governments for capital projects and using tax policy to provide incentives to the private sector for investing in surface and maritime transportation infrastructure. These mechanisms currently provide a small portion of the total funding that is needed for capital investment and some of them could create future funding difficulties for state and local agencies because they involve greater borrowing from the private sector.<sup>26</sup>
- **Consider new revenue sources.** A possible future shortage of revenues may limit efforts to address mobility challenges, according to many of the panelists. For example, some panelists said that because of the increasing use of alternative fuels, revenues from the gas tax are expected to decrease, possibly limiting funds available to finance future transportation projects.

One method of raising revenue is for counties and other regional authorities to impose sales taxes for funding transportation projects. A number of counties have already passed such taxes and more are being considered nationwide. However, several panelists expressed concerns that this method might not be the best option for addressing mobility

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<sup>26</sup> See U.S. General Accounting Office, *Transportation Infrastructure: Alternative Financing Mechanisms for Surface Transportation*, [GAO-02-1126T](#) (Washington, D.C.: Sept. 25, 2002).

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challenges because (1) moving away from transportation user charges to sales taxes that are not directly tied to the use of transportation systems weakens the ties between transportation planning and finance and (2) counties and other taxing authorities may be able to bypass traditional state and metropolitan planning processes because sales taxes provide them with their own funding sources for transportation.

New or increased taxes or other fees imposed on the freight sector could also help fund mobility improvements, for example, by increasing taxes on freight trucking. The Joint Committee on Taxation estimated that raising the ceiling on the tax paid by heavy vehicles to \$1,900 could generate about \$100 million per year.<sup>27</sup> Another revenue raising method would be to dedicate more of the revenues from taxes on alternative fuels, such as gasohol, to the Highway Trust Fund rather than to Treasury's general fund, as currently happens. However, this would decrease the amount of funds available for other federal programs. Finally, pricing strategies, mentioned earlier in this statement as a technique to reduce congestion, are also possible additional sources of revenue for transportation purposes.

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In summary, the nation faces significant challenges in maintaining and enhancing mobility on its surface and maritime transportation systems, particularly with the growing congestion that accompanies increased passenger and freight travel. However, as the Congress considers reauthorizing surface transportation legislation—and weighs the structure, nature, and level of federal investment it will provide in future years to support surface and other transportation activities—it has an opportunity to consider new strategies for dealing with congestion and promoting enhanced mobility. While no single approach is sufficient, the key strategies that we have outlined today may help transportation decisionmakers at all levels of government address mobility challenges and the institutional barriers that contribute to them.

Mr. Chairman, this concludes my prepared statement. I would be pleased to respond to any questions you or other Members of the Committee may have at this time.

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<sup>27</sup>See U.S. General Accounting Office, *Highway Financing: Factors Affecting Highway Trust Fund Revenues*, [GAO-02-667T](#) (Washington, D.C., May 9, 2002).

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## Contacts and Acknowledgments

For further information on this testimony, please contact JayEtta Z. Hecker at (202) 512-2834 or [heckerj@gao.gov](mailto:heckerj@gao.gov). Individuals making key contributions to this testimony include Christine Bonham, Jay Cherlow, Colin Fallon, Rita Grieco, David Hooper, Jessica Lucas, Sara Ann Moessbauer, Jobenia Odum, Katherine Siggerud, and Andrew VonAh.

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# Appendix I: Scope and Methodology

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Our work covered major modes of surface and maritime transportation for passengers and freight, including public roads, public transit, railways, and ports and inland waterways. To identify mobility challenges and strategies for addressing those challenges, we primarily relied upon expert opinion, as well as a review of pertinent literature. In particular, we convened two panels of surface and maritime transportation experts to identify mobility issues and gather views about alternative strategies for addressing the issues and challenges to implementing those strategies. We contracted with the National Academy of Sciences (NAS) and its Transportation Research Board (TRB) to provide technical assistance in identifying and scheduling the two panels that were held on April 1 and 3, 2002. TRB officials selected a total of 22 panelists with input from us, including a cross-section of representatives from all surface and maritime modes and from various occupations involved in transportation planning. In keeping with NAS policy, the panelists were invited to provide their individual views and the panels were not designed to build consensus on any of the issues discussed. We analyzed the content of all of the comments made by the panelists to identify common themes about key mobility challenges and strategies for addressing those challenges. Where applicable, we also identified the opposing points of view about the strategies.

The names and affiliations of the panelists are as follows. We also note that two of the panelists served as moderators for the sessions, Dr. Joseph M. Sussman of the Massachusetts Institute of Technology and Dr. Damian J. Kulash of the Eno Foundation, Inc.

- Benjamin J. Allen is Interim Vice President for External Affairs and Distinguished Professor of Business at Iowa State University.
- Daniel Brand is Vice President of Charles River Associates, Inc., in Boston, Mass.
- Jon E. Burkhardt is the Senior Study Director at Westat, Inc., in Rockville, Md.
- Sarah C. Campbell is the President of TransManagement, Inc., in Washington, D.C.
- Christina S. Casgar is the Executive Director of the Foundation for Intermodal Research and Education in Greenbelt, Md.
- Anthony Downs is a Senior Fellow at the Brookings Institution.

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- Thomas R. Hickey served until recently as the General Manager of the Port Authority Transit Corporation in Lindenwold, N.J.
  - Ronald F. Kirby is the Director of Transportation Planning at the Metropolitan Washington Council of Governments.
  - Damian J. Kulash is the President and Chief Executive Officer of the Eno Transportation Foundation, Inc., in Washington, D.C.
  - Charles A. Lave is a Professor of Economics (Emeritus) at the University of California, Irvine where he served as Chair of the Economics Department.
  - Stephen Lockwood is Vice President of Parsons Corporation, an international firm that provides transportation planning, design, construction, engineering, and project management services.
  - Timothy J. Lomax is a Research Engineer at the Texas Transportation Institute at Texas A&M University.
  - James R. McCarville is the Executive Director of the Port of Pittsburgh Commission.
  - James W. McClellan is Senior Vice President for Strategic Planning at the Norfolk Southern Corporation in Norfolk, Va.
  - Michael D. Meyer is a Professor in the School of Civil and Environmental Engineering at the Georgia Institute of Technology and was the Chair of the school from 1995 to 2000.
  - William W. Millar is President of the American Public Transportation Association (APTA).
  - Alan E. Pisarski is an independent transportation consultant in Falls Church, Va., providing services to public and private sector clients in the United States and abroad in the areas of transport policy, travel behavior, and data analysis and development.
  - Craig E. Philip is President and Chief Executive Officer of the Ingram Barge Company in Nashville, Tenn.

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- Arlee T. Reno is a consultant with Cambridge Systematics in Washington, D.C.
  - Joseph M. Sussman is the JR East Professor in the Department of Civil and Environmental Engineering and the Engineering Systems Division at the Massachusetts Institute of Technology.
  - Louis S. Thompson is a Railways Advisor for the World Bank where he consults on all of the Bank's railway lending activities.
  - Martin Wachs is the Director of the Institute of Transportation Studies at the University of California, Berkeley and he holds faculty appointments in the departments of City and Regional Planning and Civil and Environmental Engineering at the university.

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# Appendix II: Related GAO Products

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*Transportation Infrastructure: Alternative Financing Mechanisms for Surface Transportation.* [GAO-02-1126T](#). Washington, D.C.: September 25, 2002.

*Highway Infrastructure: Preliminary Information on the Timely Completion of Highway Construction Projects.* [GAO-02-1067T](#). Washington, D.C.: September 19, 2002.

*Marine Transportation: Federal Financing and a Framework for Infrastructure Investments.* [GAO-02-1033](#). Washington, D.C.: September 9, 2002.

*Surface and Maritime Transportation: Developing Strategies for Enhancing Mobility: A National Challenge.* [GAO-02-775](#). Washington, D.C.: August 30, 2002.

*Highway Infrastructure: Interstate Physical Conditions Have Improved, but Congestion and Other Pressures Continue.* [GAO-02-571](#). Washington, D.C.: May 31, 2002.

*Highway Financing: Factors Affecting Highway Trust Fund Revenues.* [GAO-02-667T](#). Washington, D.C.: May 9, 2002.

*Transportation Infrastructure: Cost and Oversight Issues on Major Highway and Bridge Projects.* [GAO-02-702T](#). Washington, D.C.: May 1, 2002.

*Intercity Passenger Rail: Congress Faces Critical Decisions in Developing National Policy.* [GAO-02-522T](#). Washington, D.C.: April 11, 2002.

*Environmental Protection: Federal Incentives Could Help Promote Land Use That Protects Air and Water Quality.* [GAO-02-12](#). Washington, D.C.: October 31, 2001.

*Intercity Passenger Rail: The Congress Faces Critical Decisions About the Role of and Funding for Intercity Passenger Rail Systems.* [GAO-01-820T](#). Washington, D.C.: July 25, 2001.

*U.S. Infrastructure: Funding Trends and Federal Agencies' Investment Estimates.* [GAO-01-986T](#). Washington, D.C.: July 23, 2001.



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*Mass Transit: Many Management Successes at WMATA, but Capital Planning Could Be Enhanced.* [GAO-01-744](#). Washington, D.C.: July 3, 2001.

*Intercity Passenger Rail: Assessing the Benefits of Increased Federal Funding for Amtrak and High-Speed Passenger Rail Systems.* [GAO-01-480T](#). Washington, D.C.: March 21, 2001.

*Performance and Accountability: Challenges Facing the Department of Transportation.* [GAO-01-443T](#). Washington, D.C.: September 19, 2002.

*Highway Funding: Problems With Highway Trust Fund Information Can Affect State Highway Funds.* [RCED/AIMD-00-148](#). Washington, D.C.: June 29, 2000.

*Highway Infrastructure: FHWA's Model for Estimating Highway Needs Is Generally Reasonable, Despite Limitations.* [RCED-00-133](#). Washington, D.C.: June 5, 2000.

*Mass Transit: 'Mobility Improvements' Is One of Many Factors Used to Evaluate Mass Transit Projects.* [RCED-00-6R](#). Washington, D.C.: October 15, 1999.