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SURFACE TRANSPORTATION

Moving Into the 21st Century

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Summary

The nation's federal surface transportation policy has become increasingly complex, changing from a narrow focus on completing the nation's Interstate highway system to a broader emphasis on maintaining our highways, supporting mass transit, protecting the environment, and encouraging innovative technologies. Surface transportation in the 21st century will differ from transportation today, and demographic changes will spark much of this change:

- The nation's population will increase by 60 million through 2020, resulting in 60 to 70 million more vehicles using the nation's surface transportation network.
- The rapid suburbanization of population and employment will continue. Since 1970, 86 percent of the U.S. population's total growth and the majority of all retail space is now located in suburban areas.
- The population will age. From 1995 to 2005, the number of Americans in their 50s will increase by 50 percent, presenting different travel patterns and needs.

These changes will move surface transportation in new directions that are likely to require new policies and approaches. According to a leading transportation expert, failing to respond to these new trends in the 21st century could send a negative ripple through the whole fabric of the American standard of living.

To understand these new challenges and assess the potential directions that surface transportation policy could take to address them, we sponsored a conference entitled "Moving Into the Future: Surface Transportation in the 21st Century" on January 26, 1999. The conference brought together transportation experts from the Congress, academia, state departments of transportation, local planning agencies, research institutes, investment banks, other private companies, and the federal government to discuss the future of surface transportation in the United States. These experts offered provocative thoughts on the wide-ranging challenges and issues facing current policymakers. Their remarks also provided an early look at surface transportation issues that the Congress might debate when authorizing legislation succeeding the Transportation Equity Act for the 21st Century (TEA-21). This report summarizes the future surface transportation issues based on the views transportation experts presented at our conference.

Challenges to Surface Transportation

According to our conference participants, the nation's surface transportation system faces significant demographic, lifestyle, and economic challenges and demands. In the future, busy passengers and businesses will increasingly press for improved transportation services that give them cost-effective means to move themselves and their goods rapidly and reliably through the transportation system. For busy Americans, the car will remain the dominant mode of travel and will continue to be viewed not as a problem but as the solution to their transportation needs. Our participants characterized Americans' views of cars as faster, safer, more comfortable and flexible, cheaper, and better able to link scattered departure and destination points than other forms of transportation. For the nation's businesses, moving freight quickly through the transportation system will be vital to their survival in a global market that poses unrelenting productivity demands. In addition, commuters, leisure travelers, just-in-time freight shippers, and older travelers all will have different trip patterns and travel needs, thereby placing more complex demands on the transportation system.

Conference participants had the following observations regarding the challenges that the traveling public and transportation policymakers will face in the 21st century.

- The surface transportation network is aging, and the existing infrastructure has not been adequately maintained. Traditional responses, such as constructing new highways, are being foreclosed by public and environmental pressures. In addition, state and local governments appear slow in directing more dollars to preserving the infrastructure. Without a significant change of direction, there will be a growing mismatch between the transportation system and travelers' needs.

- Highway congestion—particularly in very large urban areas—will be a continuing issue. Although average commuting times have not changed substantially for years, several participants noted that the public perceives congestion as worsening and producing adverse economic impacts. Population growth and more households with multiple vehicles are likely to outpace states' efforts to expand highway capacity. One conference participant concluded that congestion is not a problem that can be solved—it results from the public's travel and lifestyle choices. Families' desire for a wide range of housing and work choices—often in low-density areas—and the ability to combine several different purposes on a single trip will continue to generate considerable traffic congestion.

- Social and environmental concerns are becoming greater constraints on the system's expansion than money. People increasingly are concerned about how transportation investments affect their quality of life and expect results that improve both their mobility and their local community. The citizens who attend local planning meetings are looking for results from transportation investments that differ from those in the past (such as more bike paths or green space). However, reconciling transportation and environmental policies is increasingly difficult—often producing gridlock at state and local levels and delaying needed changes to the system.

- Future mass transit policy may have to acknowledge that only a few large urban areas contain the majority of transit users. For example, the 10 largest mass transit systems carry 60 percent of all the nation's transit riders; the other 5,000 operators carry 40 percent. Federal transit funding does not correlate with this ridership concentration; established transit markets where ridership could be increased do not receive proportional funding. Mass transit also will be called on to address the needs of low-income households that cannot afford cars as well as the needs of the disabled and elderly.

- Freight shippers are major transportation users and vital to the nation's economic competitiveness. Moving freight in and out of U.S. seaports will grow about 6 percent annually and double or triple in total volume by 2020. The current surface transportation network does not allow freight to move easily between highway, rail, air, and maritime transport. In addition, the public sector often does not understand the needs and problems of moving freight nationally or regionally. Freight and intermodal problems will thus require considerably more attention by transportation agencies in the future.

- With few exceptions, the public cannot obtain information about the quality and level of transportation services across states and regions. Currently, states handle and report on highway accidents and incidents in different ways that can have major impacts on travelers. The public needs additional performance information so that it can develop reasonable expectations about how public assets are expected to perform.

A New Paradigm for Surface Transportation

Our conference participants urged federal, state, and local policymakers and agencies that are responsible for surface transportation to adopt a new paradigm—one that focuses on the people who use the transportation system, including their needs and expectations. Unlike the 20th century

mission of constructing the transportation system that exists today, future transportation policies must shift transportation agencies' focus to managing the system for greater efficiency and delivering better services for the users. Such focus will require transportation policymakers and agencies to rethink their strategies for achieving transportation goals and to collaborate more extensively with the private sector to meet travelers' complex transportation needs. These challenges are especially important because transportation and the ability to move goods and people will be vital to our economic survival in a global market.

The conference participants provided several examples of how a focus on users would shape future transportation policies and services.

- Surface transportation policy must reflect Americans' heavy reliance on cars to meet their mobility needs. Rather than undertake complex, controversial programs to get people out of their cars, policies should concentrate on local experiments, such as greater ride sharing, new community designs, or enhanced emphases on urban mass transit or passenger rail. A participant observed that national mandates are unpopular and unproductive approaches for reducing problems associated with the automobile.

- By linking transportation policies and services to customers' needs and preferences, the primary mission of transportation agencies will change from building highways, bridges, and mass transit systems to moving people and goods. The measurement of performance success will also change. Instead of measuring the amount of additional capacity built, policymakers will focus on how transportation improves personal mobility, expedites shipping, and speeds the transfer of information.

- Developing new services based on customers' needs and input will be a substantial departure from the largely bureaucratic decision-making that characterizes transportation organizations today. In addition, collaboration among federal, state, and local transportation agencies will be important because no single transportation agency or level of government will be able to independently meet travelers' complex transportation needs in the future.

- Transportation managers will need to bring other public agencies into the policy and decision-making process. Transportation policy often involves other government entities—environmental, housing, education, and energy. However, these entities may not work together to meet common

objectives. For example, local agencies that provide water, sewer, and educational infrastructure are seldom involved in transportation decisions. As a result, infrastructure investments may not be coordinated and could often duplicate each other.

- Other nations are using public-private partnerships to put their transportation systems in a better position to meet global competition, according to a participant who surveyed international practices. In several nations where the private sector already delivers transportation services and maintains facilities, public-private roles are being reassessed to provide greater efficiency. These nations are experimenting with increased private-sector involvement in transportation services. They are using competition to make the transportation system more efficient and cost-effective, reducing regulations to encourage innovation, retaining transportation policy and management as a government role and using the private sector for maintenance and services, and seeking accountability through performance measures. In contrast, the United States has made modest moves to enhance the nation's global competitiveness by overcoming barriers that limit public-private partnerships. A participant characterized the public sector as superb at creating procedures and process but poor at deployment—the bottom line for private companies. Similarly, private companies are action oriented and do not understand or appreciate a funding process that requires 10 years to complete a surface transportation project.

- Freight stakeholders must become full partners in making transportation policy so that surface transportation investments are linked to freight needs. In 1994, business and industry spent $421 billion to move 3.5 trillion tons of freight over transportation networks totaling 2.3 million miles. Facilitating freight users' and suppliers' involvement in transportation policy will enhance the nation's ability to move freight seamlessly across different transportation systems. In addition, manufacturers and freight companies regard the Department of Transportation's (DOT) "stovepipe" organization as a major obstacle to working with the federal government, a participant reported. They find it difficult to discuss intermodal projects or emerging issues—such as how the new megaships will access U.S. ports—with a single DOT agency that is responsible only for highway or maritime issues.

- The conference participants stated that innovation is essential to the new transportation paradigm—its policy, management, operations, and services. Currently, ideas and innovation are generated at the state and

local levels. Although bellwether states are experimenting with funding, services, pricing, and relationship innovations, this is not well known at the federal level and virtually never mentioned in national discussions, a participant indicated. Another participant proposed that the federal government reward well-designed state and local innovation with seed money and other incentives.

- Federal policymakers need to renew their commitment to funding nationally important research. While TEA-21 substantially increased states' research funding, it considerably reduced funds for federal research, one participant stressed. While state research programs focus on short-term, practical problems, federal research must focus on long-term and high-risk research, intermodal problems, and transportation policies. For example, federal research to produce a "post-petroleum" vehicle propulsion system that would reduce pollution and energy consumption is increasingly important, a participant observed.

Our conference participants provided considerably more comments and suggestions for transforming surface transportation policies to a user focus. Appendixes I through X provide summaries of their remarks.

We would like to thank the staff of the National Academy of Sciences Transportation Research Board—particularly Robert Skinner and Dr. Suzanne Schneider—for their assistance in making our conference a success. Furthermore, we are extremely appreciative to Les Sterman, Director, East-West Gateway Coordinating Council, and Brian Taylor, Associate Director, Institute of Transportation Studies, University of California/Los Angeles, who served as expert discussion moderators for our morning and afternoon conference sessions. Should you require additional information on this report, please call me on (202) 512-2834. The conference was planned and this report was prepared under supervision of Phyllis F. Scheinberg, Associate Director, Transportation Issues. Other major contributors to this report are listed in Appendix XII.

John H. Anderson, Jr.
Director, Transportation Issues

Contents

Abbreviations

DOT	Department of Transportation
FHWA	Federal Highway Administration
GAO	General Accounting Office
I-95	Interstate Route 95
ISTEA	Intermodal Transportation Efficiency Act of 1991
ITS	Intelligent Transportation Systems
PennDOT	Pennsylvania Department of Transportation
TEA-21	Transportation Equity Act for the 21st Century
TIFIA	Transportation Infrastructure Finance and Innovation

Presentation by Peter "Jack" Basso, Assistant Secretary for Budget and Programs, U.S. Department of Transportation

"How we meet needs for transportation in the future is critical. It needs to be intermodal, it needs to be international, it needs to be inclusive, and it needs to be well financed."

"Even with record levels of investment at the federal and state level, we still fall short of the projected need. The consequences of failure are extremely clear. Reduced economic growth, loss of productivity gains, loss of jobs. And a negative ripple that passes through the whole fabric of the American standard of living."

I would like to divide my presentation into three segments. First, I would like to address the environmental factors that we're likely to face in the future of the nation. Second, I would like to discuss the needs, as we project them today, for at least the next 20 years for the future of transportation. Third, I would like to suggest some financing mechanisms that we might use to address those needs.

The Future Transportation Environment

As we come to the new millennium—enter the new century—we are faced with economic trends that are global in nature. In the United States, we also are enjoying an unparalleled economic expansion. Transportation and effective logistics are vital to our economic survival as we compete in the global market. Transportation today is about 11 percent of the Gross Domestic Product. Therefore, how we meet needs for transportation in the future is critical. It needs to be intermodal, it needs to be international, it needs to be inclusive, and it needs to be well financed. We also need to realize that the population of the United States will grow by 60 million people over the next 30 years, adding substantially to the stress on the transportation system. I would allow that Americans are really fed up with the congestion that currently exists. We cannot apply the approach that we used in the past—simply to build our way to transportation demand. We need to deal with more than system expansion. We need to deal with the efficiencies of the total system.

We are also faced with an aging population. That requires changes to our transportation system, so that we can remain mobile and be well served as a nation. Productivity demands are unrelenting, and we must meet those demands to remain competitive in a global market. In that vein, freight moving through our ports is expected to grow 6 percent annually, doubling or tripling in volume by 2020. One of the points I want to make here—the reason I'm touching on ports—is that there is "water surface," and there is "land surface." We tend to think of highways. Highways are a part of the total system, a key part. But there are other things we need to address from a federal level. These ports can either be choke points in the future

or they can be systems that flow smoothly. To flow smoothly, they need much more overall infrastructure.

Future Transportation Needs

To remain at the unprecedented level of economic growth and vitality we enjoy today, we must expand our transportation system's capacity to keep pace with that growth. We cannot do it by just building our way out. We must rely heavily on technology and efficiency in our systems in order to meet those needs. What are the needs? All forms of transportation are growing. Passenger miles on domestic flights have doubled since 1980. In the same period, vehicle miles of travel have increased 60 percent, and ton-miles of freight, 25 percent. With the economy expected to grow almost 30 percent by the year 2010, we expect these growth trends in transportation to actually increase exponentially. Against that growth are studies that show the need for total public investment in airports, air traffic infrastructure to be about $9 billion annually. The highway system will require an investment of $46 billion by all levels of government just to remain at current conditions and get the current performance out of the system. Our maritime, transit, and rail infrastructure will require even more billions.

Today, public investment in all transportation infrastructure totals a little over $60 billion a year. Even with record levels of investment at the federal and state levels, we still fall short of the projected need. The consequences of failure are extremely clear. Reduced economic growth, loss of productivity gains, loss of jobs, and a negative ripple that passes through the whole fabric of the American standard of living.

We need to begin by realizing that we do, in fact, need financing for the future. In order to meet those needs and be a player in the world market, the United States has to come to a new paradigm for transportation. That is, we must recognize that financial resources for public and private infrastructure cannot come from these sectors exclusively. In constructing the Interstate system, we had a unitary purpose. And while it cost a lot more than it was understood to cost at its conception, the accompanying growth of user fees provided the revenues that were necessary to make and get the job done. All of the need for transportation in the future cannot be simply carved out of the fuel and other transportation taxes. The needs are too great, and the range of needs too vast. They apply to all sectors of transportation. That was then, and this is now.

What Financing Mechanisms Will Address Our Transportation Needs?

So what are we going to do? We have already begun. So-called innovative financing techniques came in the mid-1990s in surface transportation. Steve Lockwood and others have talked about these techniques having become a permanent feature of the surface transportation programs. The Garvey bonds, as an example, are clearly catching on all around the country in various places. Robert Muller has talked about Garvey bonds and what they mean. Like him, I never thought you could sell air, but I conclude you can. I differ a little with him on state infrastructure banks—I think that they will ultimately play a significant niche role. What we have now is a lack of legislative authority to continue to capitalize those banks as probably the larger issue. Extensions, credit assistance, and expedited federal procedures have enabled over $12 billion worth of infrastructure projects to move forward. The new Transportation Finance Innovation Act—known as the Corbett Act, over here—will be coming on line this spring. I'm happy to announce that we actually have sprung the regulations loose from the Office of Management and Budget and will be coming out with those for comment within the next few days.

It's change that the federal agencies are primarily looking for and the source of change that we want to make come about. Contrasting with our focus on the Interstate system, federal agencies have to change direction. We have to be a patient investor. We have to be a junior investor, we have to be an enabler in the process, and we have to understand where they apply and in what markets. This is not a panacea for all needs, but it certainly fits substantial niches across the country. This is clearly our time. This is the time of public-private partnerships that will bring new capital to the table and allow mega projects, such as the Alameda Corridor, that are needed to be put in place to actually get off the ground and get built. In fact, I noted yesterday that the Alameda Corridor has been named the infrastructure-financing project of the year, which amazes me. When we first financed it, I thought I was going be named the infrastructure-financing fool of the year. But it didn't quite work out that way, which is good. It's also about a realization that we need new parties at the table. I share Brad Mallory's view that we really do need to work on readjusting and reporting those relationships. What this is really all about is being an "out of the box" thinker. It's a cliché—but it really is what it's about. It's about what economic power can really do.

So what do we need to do? The needs I've discussed and what we have done today expand upon and change the dynamics. Now we have to return to adopting that new paradigm and making it work. We have to ask ourselves three questions. Can we learn to give up the idea that public

infrastructure financing is the exclusive domain of public agencies? Can we learn to speak the language of the private financial community? Can we really continue to be players in a global market?

To the first question, I submit we don't really have a choice. We can either go the way of the dinosaur or we can adapt to a new financial environment—change is healthy. It's also clear that we can learn to speak a new language. Our innovative financing initiatives over the past 6 years have begun to translate public-private financing into a real world result. There are three major examples that come to mind: the Alameda Corridor, the San Joaquin Foothills Transportation Corridor, and the Eastern Foothills Corridor. I could go on and on with intermodal projects, but I think you get the idea.

In the case of the global market, we must make changes if we're to economically survive as a nation. We need to continue to take the steps that are necessary. These include establishing new partnerships, developing new legislation as appropriate and where it's appropriate, and not developing that which is not appropriate or necessary. They also include looking to how we can best make this world grow and prosper the way we want it to.

In closing, we need to recognize the environment that we are in and recognize that the players and their relationships are changing. Think outside the box. Be ready to grapple with change and embrace it and make it happen. Do not be afraid to find that things are different, and they may be for the better.

Last, but not least, with GAO being a major player in all of this, those of us who are in oversight roles or the national roles need to do two things. First, we need to be advocates for those changes that are changes for the good. Second, we need to be fair and substantial critics of the things that don't work.

Presentation by Anne P. Canby, Secretary, Delaware Department of Transportation

"The challenge is to bring together all the infrastructure decisionmakers and identify vehicles for doing that. It's insane to be putting the transportation investment in one place, and the water and sewer investments some place else because you're going to repeat both investments in the other location. And that still happens."

"One of the tools that we clearly need is technology and research—that's a critical federal role. It is absolutely critical for us to continue technology and research in terms of materials, systems, and the kind of analytic work that helps frame problems for those of us in the states."

I've had my job for about 6 years—for transportation Secretaries, somewhat of a long tenure. In our business, we deal with many different things. Delaware's transportation department is a bit unusual because we act, in essence, as a county transportation agency. This is because the three counties in our state have no transportation responsibility. So we deal with the Interstate Route 95s (I-95s) of the world but also the subdivision cul-de-sac. And you can guess where I spend most of my time—it's not on I-95. In addition, we operate all of the transit in the state. So we are among the more integrated—along with Maryland, New Jersey, and Connecticut—states in the aspect of jurisdiction. I will say that this doesn't make it a whole lot easier, except that occasionally, the Golden Rule does help out.

Changing Transportation Roles

As I thought about my talk with you, it was clear that transportation is changing very much. Our state transportation departments' roles are in some real transformation. Part of it is driven by some of the things that Tony Downs described. Part of it is driven by other realities, particularly in the Northeast, where we have aging infrastructures and mature systems that are forcing us to do rethinking. As Les Sterman commented about reaching out to our customers, this causes us to change as well.

Let me talk broadly about the roles in transportation because I think we have some challenges. As we heard from David Luberoff, one of the federal government's main roles is—"where's the money?" We've all just been through that, we know it all very well, and we look to the federal level for funds. But I think we also look to the government for a broader set of goals. At the state level, we certainly do chase the money—we've just submitted our Access to Jobs and our Livable Communities applications. So the federal programs can indeed lead us in some directions that we might not go on our own. I think there's a very important role there that needs to continue to be played.

The need versus equity issue probably isn't going to go away. Since we are the 49th largest state, as our Governor likes to remind everybody, the need versus equity issue is very important for us. One penny of our gas tax raises $4 million and everybody knows that doesn't get you too much today, and our gas tax is 23 cents above the norm for states. Money is always an issue as is the fact of our geographic location. Frankly, if you want to get from Washington to New York, you're going to go through Delaware—and you'd like to have that experience be a good one. We hope it's just gotten better with the introduction of Easy Pass.

At the federal level, there are other policies and goals that involve transportation. We've heard about some of them this morning—trade, welfare-to-work, energy, and a whole range of environmental issues. These all intersect with transportation in one way or another. So I think that at the federal level, there clearly needs to be influence in those areas for those of us in the transportation field.

I would say that more change is occurring at the state level of government. We've had a lot of conversations in the American Association of State Highway and Transportation Organizations about our role. With the selection of a new executive director, I think that you will see much more state movement to try to provide a bigger tent. We cannot do it all, but we are in a position to articulate some issues both at the state and regional levels. In Delaware, we have come together with the New Jersey Turnpike Authority, the Garden State Parkway, the Highway Authority, Atlantic City Expressway, and the Port Authority of New York and New Jersey on a single toll system. This is amazing to me. When I was in New Jersey, we hardly spoke to those independent authorities. The fact that we are now talking to each other and have become business partners is an indication of the changing direction that you're going to see states moving at the institutional level.

Intelligent Transportation Systems (ITSs) are another area of state change that relates to all of the Northeast's transportation agencies in managing our transportation systems and their operation. It is very much a change in terms of exchanging information. And it's not just highway information—it's also customer transit and train information. I think there will be a lot of change, and states are really leading in that arena.

The local governments have a range of responsibilities, and we deal with them differently in all of our states. In my state, we don't have any money. But there are entities that have road, transit, aviation, and port authority

that the states don't all participate in. We all have different structures in that arena, and I think that's where one of our challenges lies as we move ahead.

On the private side, the Northeast presents some interesting examples because of the sale of Conrail to Norfolk Southern and CSX. We have two railroads now taking over. States' discussions when that whole deal was put together were very much on an individual state basis, but the impact is clearly regional for us. My Governor and I made it very clear to both of those carriers that we wanted trucks off our roads and that they'd better be organizing in a way to make sure that that happened. We were talking about how you allocate limited capacity: is a truck that's hauling orange juice from Florida to New York better on I-95 or the railroad? We'd certainly like to see it on the railroad, although there are some people in my department who disagree with me because they see the toll revenues going down.

We need to be figuring out how to come together and make these trade-offs. For example, we never think about pipelines because we can't see them—they're out of sight, out of mind. They are very much a part of our transportation system, but one that the public sector has hardly thought about. Aviation, water, and truck issues all have significant private components—the same for all of us who own and operate automobiles. So there's a huge mix and Amtrak is somewhere in between public and private.

Transportation has a mix of ownership and operating responsibility—this makes for what I call the silos of the transportation network. We do not yet have a totally integrated system, which is why I think we've had so much conversation about intermodal transportation over the last years. But users are not thinking about all these pieces. They are just trying to get from some place cold to some place warm—if they're trying to go to Florida for a vacation. They don't care that there's 10 different people operating the different pieces of the transportation system that they're using; they just want to get there without a hassle.

It seems to me that those of us who are on the operating and the providing side have got to start figuring out what trips mean from the customer's standpoint. There are many different pieces to that. In the transit business, we don't think enough about our customers. One of my professors at the University of Delaware showed pictures of some bus stops. I'd be embarrassed to ask anybody to get on my service if the bus stops were the

front door to my service—the bus stops were pathetic, especially because the alternative was walking 20 feet and getting in your car. You might sit in traffic, but you'd be by yourself, you would have whatever radio station you wanted on, you could smoke a cigarette and nobody would scream at you or whatever it is you wanted to do. It's a whole different travel experience, and you probably don't have to go outside. When you ask somebody to change their travel experience, they must go outside, wait, sit with people they don't know, and go through an experience that's totally different. So thinking about the whole trip and the complications that our institutional structures pose make this a challenge for us.

We need to find ways to think about the user's travel experience. Is Delaware's the right way? I don't know. We're small and probably not the best example because you couldn't pull off our institutional structure in most other states, and it might not even make sense. But, we may be showing a way—without destroying our institutional structures—to bring together partnerships in new business ventures. We've joined Pennsylvania on a submission to the Federal Transit Administration on some new fare media. We've contracted with the Southeast Pennsylvania Transit Authority to operate commuter service along the Northeast (rail) Corridor. This means that travelers can park their car, get on the train or transit service, and pay using the same medium, making it easier for them. There are all kinds of arrangements that will break down the jurisdictional issues and lead us to some new places.

Metropolitan Planning Organizations also will be a place that will see some transformation. Although I don't think we're ever going to get anybody to give up their land-use authority, these organizations are the table around which these issues can be brought together. In most cases, land-use agencies are members of these organizations; if not, they should be. Transportation providers are also there. The people who provide other elements of infrastructure—water and sewer—are missing. Schools are another critical piece, but they don't tend to participate. The challenge is to bring together all the infrastructure decisionmakers and identify vehicles for doing that. It's insane to be putting the transportation investment in one place and the water and sewer investments some place else because you're going to repeat both investments in the other location. And that still happens. It's a challenge that we have to address.

Changing State Roles

In the transportation business, we are asset managers. Although we don't always know it, I think we're getting much wiser to that. State after state is

coming forward with a "preserve it first, fix it first" approach. We are recognizing that role, but it is clearly a balancing act because you're never going to have preservation at the exclusion of expansion. In Delaware, we are moving aggressively to restore and repair the assets that we use every day. About 5 years ago, a beam on I-95 cracked, and we had to take two lanes out of service for a short period of time. It was chaos—a nice warning. It gave us an opening to say that this is important—you absolutely have to take care of what you've already built.

Coupled with that is figuring out ways to utilize what we already have as efficiently and effectively as possible—hence, the ITS initiative that all states are involved in. In our statewide initiative, we just finished putting a new traffic signal system in our university town of Newark. One state legislator commented to me that the traffic works better today than it did 20 years ago. That could mean that our signal systems have been so lousy in timing for the last 20 years that we're making up for inadequacies of our own operation. Although there are some real benefits, we are just buying time—this is not going to fix the problem. But there are opportunities to make the traffic flow better and to give our customers better information. Kiosks and websites will allow you to pull up a map in your car; with the Global Positioning System, you'll know exactly where you are and you'll have someone telling you how to get there. That's going to be a nice thing to look forward to, and it will allow us to make better use of our whole system.

In Delaware, we are attempting to help our citizens understand their transportation choices. It's a long, involved process, but in a democracy it is the people who benefit by their own choices. By taking time up-front to help people understand, we're going to come up with projects that we can build and that help with some of our livability issues.

Let me touch on a couple of other issues. Environmental issues clearly are part of the transportation lexicon these days, and we need to deal with them. The Transportation Equity Act for the 21st Century (TEA-21) is giving us the incentives to do that, by streamlining. TEA-21 is not to get us away from addressing our environmental responsibilities—quite the opposite. It is finding better ways to do that.

Also, the lack of pricing mechanisms is somewhat unreal, both on the transit and the automobile sides. It is similar to health insurance: we have no idea how much it costs because the price is so well hidden. Tolls, which are an anathema, are one way to help people understand a little bit.

Other ideas don't seem to get off the ground—for example, paying for insurance at the pump. Finding ways to directly associate the cost of trips, whatever the trip may be, is very important as we move ahead. Tolls are not a very popular idea in Delaware, so we need some help to convince people that tolls are something that we should try. We're very good in the transportation business at rolling out problems. When you get into term-limited governorships, you begin to think—I've got 2 years, let whoever comes next worry about it. So you cobble together ways to avoid reality because people don't like to raise taxes.

It's very hard to get the total cost of transportation and other infrastructure issues together in one place. This is an area where we could use some help in understanding costs and helping our customers understand what we're doing to ourselves. One of the tools that we clearly need is technology and research—that's a critical federal role. It is absolutely critical for us to continue technology and research in terms of materials, systems, and the kind of analytic work that helps frame problems for those of us in the states.

Training is another area that needs attention—we absolutely have got to teach our people differently about the transportation system. I gave a presentation at the Transportation Research Board on pedestrianization. If we're ever going to have legitimate consideration of pedestrianization, the design standards have to be integrated into books that our people use so that it becomes second nature. It's not an amenity; it's part of what we do. Right now it's a separate chapter, but it's got to be an integrated book. As we improve a road, it's not just for automobiles. I've got kids walking up and down the side of roads with no sidewalks—that's a crime, and it shouldn't be that way. We need to be taught how to integrate pedestrian considerations.

There are institutional challenges to integrating the modes and enhance the roles of regional bodies—possibly, restructuring the trust funds that support the transportation investment. We now have modal trust funds, and in many, many states we have constitutional limitations on their use. Delaware is not one of those, we're very flexible, which is very good. Our future revenue sources are going to be severely threatened if current automobile research is successful at getting 60 miles to the gallon—and there is no reason to think that the research won't be successful. That's something for us to think about.

So, I think that there is very much a federal role. I also think the states are in many ways in the catbird seat and beginning to recognize the opportunities that we have and the need to make some changes. Clearly, there are going to be changes at all government levels, and the private sector also is going to change—fairly dramatically. So, there certainly is a lot out there. I hope I've given you at least a few thoughts and that we can get into a good discussion. Thank you.

Presentation by Anthony Downs, Senior Fellow, The Brookings Institution

"The most important thing to understand about traffic congestion is that it is a problem that cannot be solved. There is no remedy for traffic congestion."

My assignment was to orate on the future of ground transportation over the next few decades. I'm going to use the technique I call proof by assertion. I will describe my 10 conclusions.

Population Will Continue to Grow

The first point is that a crucial consideration for the future of ground transportation is the expected growth of the United States population over the next 20 years. From 1995 until 2020, the Census Bureau estimates that the population of the United States will go up by 60 million people—about 12 million every 5 years. Somehow, U.S. ground transportation systems must expand their capacity to cope with this large increase in persons, households, and goods. If we examine the ratio of increase in the number of automotive vehicles—cars, trucks, and buses—to the population from 1980 to 1995, there was a 1.29-increase in vehicles for every 1 human being added to the population. That ratio was a little lower from 1990 to 1995 than it was from 1980 to 1990. So somewhere between 60 and 77 million more automotive vehicles will be added to our roads by 2020. That is a rise of 30 to 38 percent over the number that was here in 1995. These data are based on car registrations, and registrations slightly exaggerate the number of actual vehicles, but not by all that much.

Thus, the sentiments of many existing residents who want to limit future growth in order to reduce congestion are total delusions. There is no way to limit growth at the regional level because no region can stop immigration from somewhere else. True, growth at the local community level can be limited by simply pushing it into two other places—peripheral sprawl and in-city overcrowded slums for low-income households, as in much of southern California.

Automobiles Will Remain Dominant

My second point is that privately owned automotive vehicles will remain the dominant form of ground transportation for the foreseeable future in

the United States. Attempts to cope with rising traffic congestion by shifting more people to public transit are not going to work. The automobile is, and will remain, a better form of movement for most people in spite of congestion. It's faster, safer, more comfortable, more flexible in timing and in linking scattered origins and destinations, and often cheaper, especially if you get free parking. It will not be possible to lure any significant portion of auto-driving persons into using public transit by improving the quality, quantity, or service frequency of public transit. One reason is that such a low percentage of all trips is now taken by public transit—only 3.5 percent of work trips in 1995 compared with 90.7 percent for private vehicles. Therefore, even if we could triple the percentage of total commuters using public transit—which is extremely unlikely—that would reduce the percentage of commuting by automotive vehicles by only 11.6 percent. That reduction would be offset by the increase in population, which is going to be much larger than 11.6 percent.

The only way to substantially increase the percentage of trips made on public transit would be to make the use of automotive vehicles far less convenient or far more costly—such as by quadrupling the cost of gasoline or placing heavy taxes on automobiles, as in such countries as Denmark and Singapore. But these steps will be so strongly opposed by a majority of Americans that there is absolutely zero chance that they will happen. Apologists for public transit say transit is necessary to cope with all this, and we need more subsidies for transit, because the automobile is so heavily subsidized. They should look at one number that I think is very impressive. Transit now gets 25 percent of the public spending on transportation in the United States at all levels and provides between 1 and 2 percent of the trips. That's a fairly impressive subsidy.

Commutes Are Not Worsening

Traffic congestion is widely perceived as a worsening problem across the nation, especially in fast-growth suburban areas. But the perception is worse than the reality. I do think congestion is getting worse in many parts of the country, particularly in very large metropolitan areas. But the average length of time spent commuting each day has not increased very much over the past 12 years, except in a few very large metropolitan areas. The average commuting time across the country was 18.2 minutes in 1983, 19.7 minutes in 1990, and 20.7 minutes in 1995. That's an increase on the average of only 2.5 minutes, or 13.7 percent in 12 years. The average distance traveled rose a little more, from 8.5 miles in 1983 to 10.6 miles in 1990 and 11.6 miles in 1995. That means that commuters are actually traveling faster than they were before, although it takes them a little longer

to get where they're going. But in most parts of the country where residents think they have very bad traffic congestion, they really don't. It may have gotten worse, but it's really not all that bad.

Congestion Cannot Be Eliminated

The most important thing to understand about traffic congestion is that it is a problem that cannot be solved. There is no remedy for traffic congestion because traffic congestion is essentially a balancing mechanism that enables people to pursue six objectives other than minimizing their commuting time. Two of these objectives are held by employers and the other four by households.

The first objective that employers seek is having most firms use similar work periods during the day. Then when you call up somebody at another firm, that other person is at work. Therefore, almost everybody has to go to work and come home from work at about the same time. There are some staggered working hours, but they don't really have much effect, because they aren't staggered all that much. Second, the owners of businesses want to operate mainly in low-density work places, which means they are widely scattered across each metropolitan area. Those are the key objectives that employers want.

The first objective that households want is to have a wide range of choices of where to work and where to live in different types of communities, especially if they have more than one earner in the household. Second, they want to be able to combine several different purposes on each individual trip to be efficient. Third, they want to live in a relatively low-density community. And fourth, most households want to separate their own family dwellings spatially, and, particularly, regarding public schools, from other families with much lower incomes and social status and often from people who are in different racial groups.

It is not possible to pursue all these objectives effectively without generating a lot of traffic congestion. In reality, traffic congestion is the balancing force in rationing road space that emerges from pursuit of those objectives. Yet most Americans do not want to give up any of these objectives enough to change their behavior. They would rather endure a certain amount of traffic congestion than change these objectives. It's true that the more traffic congestion they encounter, the unhappier they are. So, the amount of traffic congestion they are encountering is bad enough to make them complain, but not bad enough to make them change their behavior. If congestion becomes unacceptable, they can move closer to

where they work or work closer to where they live, which many of them in fact do. But this means there is no such thing as a solution to the traffic congestion problem. Traffic congestion is not a disease that can be cured. It is an inherent connection in the quality of life that embodies those objectives that I described.

Letting Existing Roads Deteriorate Is Not Sustainable

In the recent past, peripheral low-density growth in most metropolitan areas has been accommodated by financing enough new streets and roads to cause only moderate increases in traffic congestion at the periphery. However, the maintenance of previously existing streets and roads has not been kept up adequately. This arrangement is not sustainable because too many older streets and roads will deteriorate into very bad condition. It is a fact of life that many of us getting on in years do not want to recognize, but older things do deteriorate as time goes on.

Thus, we are allowing our existing infrastructure to deteriorate in order to add more on the periphery to accommodate new growth. This means we can't accommodate projected future peripheral growth without either

- underinvesting in maintaining existing systems to a dangerous degree,
- failing to service the new growth adequately with new streets and roads,
- increasing the densities of the new growth so we don't have to build so many roads to service, or
- hugely increasing the share of national production we devote to building and maintaining streets and roads and other transportation.

The first two alternatives are at least theoretically unacceptable. However, in fact, places like Florida are engaging in both of those as a means of accommodating their rapid growth. Hugely increasing the allocation of resources to streets and roads seems unlikely in light of competing budget pressures and the present diversion of so many public resources to transit, even though it provides a very low percentage of all trips and travel miles. So this leaves increasing density in new growth areas as a theoretical way to accommodate future transportation needs.

Forms of Ground Transportation Will Not Change

But changing the land-use patterns embodied in future metropolitan growth and development will not substantially alter the basic forms of ground transportation now in use. After all, 85 percent of the developed portions of the country that will exist in 2020 already exist now. Even if radical changes in the form of the to-be-added 15 percent could be

achieved, which I don't think is the case, that would not substantially change the patterns already in place today. They will necessarily dominate the overall picture of transportation in 2020.

Increasing New-Growth Densities May Help Address Future Infrastructure Needs

Raising average densities in new growth areas and emphasizing in-fill development to a maximum degree might somewhat reduce the cost of accommodating future population growth with adequate infrastructures. New growth suburban densities might have to rise from about 2,500 persons per square mile, which is the density of the city of Phoenix, to about 7,500 persons per square mile, which is the density of the city of Los Angeles, to make any difference. But this will not reduce traffic congestion much, because higher densities generate more local congestion, since almost as many vehicles are concentrated in a smaller space.

Local Governments Not Equipped to Handle Higher Densities

Even if it were desirable to use higher-density land use for new growth, existing governance arrangements in most metropolitan areas are not capable of managing regional growth to achieve any rational policy of any kind whatsoever, particularly higher densities in new growth areas. In fact, existing governance structures tend to lower densities in those areas to protect the environments of affluent households who live there. This is explained and discussed at length in one of my books called New Visions for Metropolitan America,[1] which was published by Brookings in 1994.

It is not politically likely that we can develop some type of regional planning and authority over land use and transportation over local governments. Doing so, however, is the only way to achieve consistently higher densities in new growth areas, something like what Portland, Oregon—and almost no place else—has done. Most states will not do this because large majorities of citizens refuse to reduce the authority of local governments or to accept even moderate-density multifamily housing nearby in any significant quantity.

Congestion Is Here to Stay

Traffic congestion is not going to decline in the future. In fact, it will probably increase as the total population rises and real incomes rise enough to enable more people to afford private vehicles. This is not a problem confined to the United States. In fact, traffic congestion is much worse in many parts of the world. It is a worldwide phenomenon of rising

[1]Anthony Downs, New Visions for Metropolitan America (Washington, D.C.: The Brookings Institution and Lincoln Institute of Land Policy, 1994).

real income and the desire to use private transportation. There is no such thing as a solution to the traffic congestion problem because it's not really a problem. It is the result of our pursuit of other objectives, which we do not want to give up. True, some improvements can be made, but they will only be marginal. They will likely be swamped by rising metropolitan populations and the use of multiple vehicles by more households.

As I say in the final paragraph of my book, Stuck in Traffic,[2] congestion is here to stay. So you'd better learn to like it. Get yourself an air-conditioned car with a stereo radio, a tape deck, a portable computer, a television set, a microwave and commute with somebody you're really attracted to. Regard commuting as part of your leisure time. You might as well learn to enjoy it.

[2]Anthony Downs, Stuck in Traffic (Washington, D.C.: The Brookings Institution, 1992).

Presentation by James A. Dunn, Jr., Professor of Political Science and Public Administration, Rutgers University/Camden

"Certainly there are true problems associated with the automobile. But for most Americans, it's a solution."

One of the themes in my recent book—Driving Forces: The Automobile, Its Enemies, and the Politics of Mobility[3]—is the difference in perception about the automobile and what it means in our society. What I try to do in Driving Forces is to explore the great gulf in perceptions and policy prescriptions between the mass of Americans, for whom the automobile is the solution to their transportation needs, and a group that is growing in importance in the transportation policy community that I call the "antiauto vanguard," for whom the automobile is a problem—a big problem. They truly see themselves as a vanguard of people who know where the masses need to go and see themselves as leading the masses in the right direction, in spite of the masses' false consciousness. They are increasingly organized and self-conscious about their role of saving the masses from themselves. They have a whole agenda of policy prescriptions that are not designed to address the problems of the automobile but to address the problem of the automobile itself. Basically, they say that we need to somehow get rid of automobility as we understand it today—not to get rid of all automobiles but to get people out of their cars, to require drastic reductions in the amount of vehicle miles traveled that the automobile produces. They want to get people using more collective means of transportation, rather than individual means of transportation. Certainly there are true problems associated with the automobile. But for most Americans, it's a solution.

In the book, I look in some detail at the kinds of policy proposals that they have put forth. I conclude that essentially, it's not going to work; they're promising much more than they can deliver. As people like Anne Canby know, it's hard to get people out of their cars and onto buses or trains. It's hard to get people to form car pools and share rides. And given the kinds of policy incentives and disincentives that are within the mainstream of American politics, it's very, very difficult. And with that kind of parameter, it's going to be a great disappointment to the vanguard that they're not going to achieve their goals, even though they feel this so urgently.

But then, you say, why even bother looking at their prescriptions in detail and debunking them because they're just not going to happen. And here I have to refer to Anthony Downs and his concept of the "issue-attention cycle." There are times when "a window of opportunity" opens up in a

[3]James A. Dunn, Jr., Driving Forces: The Automobile, Its Enemies, and the Politics of Mobility (Washington, D.C.: The Brookings Institution Press, 1998).

particular area. People then start searching and grabbing off the shelf ideas that have been hanging around for years, and trying them out: "Hey, we've got a problem—all of a sudden, let's go get some policies, hook them up to these problems and see if they'll solve the problems." You can look down the road in a few years and see that it's quite likely that there will be this kind of a window of opportunity opening up in the policy-making process toward the automobile and its problems.

What I'm saying is that now is the time to start examining the policy proposals that are being put forth by the antiauto vanguard. They are calling for dollar-a-gallon gas tax increases, bans on new highway building, massive spending on new rail transit systems, and federally mandated ride sharing. We need to look at them very, very carefully, to make sure we don't make some rather expensive and unpopular mistakes when the issue-attention cycle brings the automobile to the fore again.

Obviously, I have a lot of colleagues and friends who are card-carrying vanguard types, and I'm not very popular with them right now. But for 30 years they have been criticizing the establishment—criticizing the automobile. And turnabout is fair play. If they have an agenda, then they have to be ready to take some criticism in return. They'll say then, "well, you're just defending the automobile and the status quo." No, nobody in academia certainly gets very far by just saying "keep the status quo."

The Paradigm of the Automobile Plus: It's Better to Experiment Than Mandate

I have my own paradigm, which I call the "automobile plus." My suggestion is you start with the automobile and you go on from there. You don't try and attack the automobile head on. You don't try to get people out of their cars when they don't want to get out of their cars. You look at reality and you improve around the edges with incrementalism. I don't really object to a lot of innovative ideas and new thinking, as long as they are carefully vetted.

So it's the automobile plus: well thought-out initiatives in urban transit or inter-city passenger rail, democratically chosen "new urbanist"community designs, and car pools that people want—not ones that are imposed by outside regulations, particularly federal regulations.

The role for the federal government should be in the nature of promoting experiments and letting States and local communities see what works. Federal support for limited local experiments should also have a built-in evaluation component so we can see whether an experiment is working

and if so, why, and if not, why not. Then the federal government can disseminate this information. I suggest that it's better to experiment than to mandate—to experiment with well-thought-out, well-designed local-ride sharing programs, rather than to mandate nationwide programs that are bound to be unpopular and probably unsuccessful.

Now Is the Time to Consider Potential Solutions to the Problems

But the biggest part of "automobile plus" is not so much with people's individual behavior but rather with the technology of the automobile itself. Part of the problem with the automobile is pollution and energy consumption—energy dependence. Rather than trying to come up with various kinds of complex and controversial programs to get people out of their cars, let's make the cars better. Americans are pretty good at solving technology problems. Let's move toward what I call the "post-petroleum propulsion system" for automobiles. We're not going to do that overnight. We're not going to be able to do that without some controversy. But it's time now to start thinking about deploying incentives and perhaps, mandates—not against the citizen voter but aimed at the auto manufacturers who are producing a product that the citizen voter is, I think, going to continue to demand far into the foreseeable future, unless a better product comes along. We need not necessarily expect the return of Ralph Nader in all his adversarial glory. I think both Washington and Detroit have learned that adversarial confrontation is not necessarily the way to go. We need to be thinking about new and innovative ways of moving toward new automobile propulsion systems, so we get cleaner, more fuel-efficient automobiles, not trying to get people out of their automobiles.

Anne Canby mentioned vicious cycles in automobile dependence. If in fact we move toward a 60-mile-per-gallon car or even toward a zero emission vehicle that's not based on propulsion technology with petroleum fuel, we may create a kind of a "virtuous cycle." That is to say, as cars need to burn less and less petroleum, it would be possible to increase the rate of taxation on petroleum. People would be paying roughly the same amount of taxes because they'd be burning less petroleum. As that creates incentives for auto manufacturers to have even more fuel-efficient vehicles or vehicles for which the fuel is not petroleum, that then creates opportunities for new financing mechanisms for roads and streets that are based perhaps on electronic-toll-collection technology. This puts a tool in the hands of traffic and transportation planners, who then can begin to address some of the peak-hour congestion problems. It's a virtuous cycle, not a vicious cycle.

To conclude, the way to the future is exploring innovations that build on the automobile—that make the automobile better for the environment but also better for the individual because the individual is not going to want to give up the automobile. I suggest that the vanguard types who want to roll back automobility haven't thought through the consequences for the democracy and personal empowerment of their extreme antiauto stance.

Presentation by Stephen C. Lockwood, Vice President, Parsons Brinckerhoff

"The tax-funded public monopoly was appropriate for the mid-20th century mission of building basic infrastructure. But providing a variety of non-standard services to a range of customers who have varying needs is not compatible with tax based funding and bureaucratic decision-making. Highway finance must evolve in new directions based on more direct customer input, an increased role for private enterprise in service provision, and the addition of markets and prices, technology and capital."

"Certain important segments of the highway-using community appear ready to pay more for better service; for example, just in time freight shipments, time-short commuters, and business travelers may be prepared to spend more for "guaranteed speed limit" trips.... But, for the most part, premium service can't be purchased anywhere at any price. And that is a curious phenomenon in a free enterprise economy."

I'm going to discuss moving toward a financial system that supports improved services by focusing on the financial implications of some institutional issues that have been raised during the conference. My particular perspective is the relationship between finance and transportation service and how the two interact.

A Financing System Linked to User Needs

In a mixed economy like ours, the financial mechanisms supporting infrastructural services for surface transportation have to perform two functions. One is raising capital—generating funds. But an effective financing system should do more than simply raise revenues. It should also incentivize service providers and their customers/users to evolve a transportation system that meets contemporary needs. My central thesis is that the existing system of transportation finance does the former job quite well but tends to inhibit evolution toward a more performance-based customer-driven, service-oriented approach to transportation infrastructural services.

The Changing Mission of Surface Transportation Institutions

The basic mission of highway owners (states and local governments) is changing. We have a largely mature network and significant constraints to significant additions (funding, environmental and community considerations, etc.). At the same time, we are faced with increasing congestion and customer demand for improved service levels. As a result, today's surface transportation mission increasingly is to provide the best possible service through the most efficient use of the available capacity.

Exploiting the existing infrastructure more effectively requires actively managing the facilities and networks in response to demand variations so

that service levels are maintained and travelers are supplied with maximum information to make travel decisions with full knowledge of the transportation systems' conditions. Such an aggressive approach to management and operations has been conceived within the transportation profession around both new technology and new institutional concepts. ITS represents a systematic approach to managing transportation facilities and services in real time both for maximum efficiency and to provide services appropriate to congested systems. To improve reliability and offer knowledge of existing conditions, ITS builds on the applications of advanced technology in sensing, communications, computation, controls, and information dissemination. First-generation communication and control systems are new being deployed for advanced traffic operations, and a range of new information dissemination approaches is being developed to provide travelers with a new level of information about conditions and options. Capitalizing on the promise of these systems will require not only new concepts and technology but also additional capital and new operating arrangements.

At the same time, new institutional concepts are emerging that capitalize more directly on the private sector to access technology, capital, and innovation. New public-private partnership arrangements include those that can provide capital for private toll roads; introduce new technology, such as improved construction material and techniques, and new services, such as the premium toll roads; and advanced traveler information.

These new technical and institutional approaches share in common that they are service-oriented, performance based, and focused on real time, active exploitation of the existing infrastructure. In addition, they address the needs of special market segments and introduce service and technology innovations. Fundamentally, they are driven by an increased focus on performance and markets.

The Current System and Its Constraints

The existing financial framework was designed for an earlier era of basic infrastructure construction. Monopoly ownership and legislatively determined tax-based funding with bureaucratic decision-making are not well suited to capitalize on private enterprise nor tuned to expressions of customer demand. I'm not going to describe the key characteristics of our current financing system—they are well known to this audience. I would point out that with a substantial preservation backlog burden, the sector is chronically underfunded and is ill equipped to embark on the development of a new generation of transportation system improvements. You may not

be aware that, as a nation, we spend less than 3 cents per vehicle mile on infrastructure—out of an average of 40 cents for full operating cost (less than the operating cost of car air-conditioning). With these institutional and financial constraints, there is very little focus on what a first-class road operation might actually require.

The Challenge of Evolving the Financing System

The emerging context for transportation and the need for a greater focus on management, operations, and the installation of new technology suggest a need for evolution to a new financial mix. There are two principal challenges. First, there is the 20th-century legacy financial agenda, namely making the existing financing system more efficient than it is today and sustaining the revenues that are part of that system. There's also another agenda, which I think of as the 21st-century challenge: evolving new mechanisms that contribute to the effectiveness of the transportation service itself.

The first challenge tends to dominate discussions of innovation in transportation finance. I'm going to conveniently ignore a lot of very thorny issues, including the revenue erosion due to inflation and vehicle efficiency as well as tax evasion and diversion. Nor will I discuss several exciting innovations to maximize the leverage of the existing revenue stream, such as commingling private investment, innovative finance, public-private partnerships, et cetera. I'm going to concentrate on the second challenge—effectiveness. This is based on the thesis that a competitive high-tech service economy has different needs from its transportation infrastructure from those for which the inherited financial arrangements were intended—and that this inheritance must be modified if it is to support significant improvements to transportation service in a new era.

Needed modifications to the existing financial/institutional arrangements would include approaches that would generate new revenue sources, new project and service sponsors, and new mechanisms that will encourage more customer-specific and customer-responsive service innovation. Three examples illustrate some of the relationships between customers, services, costs, prices, and revenues that need to be addressed.

Congestion continues to grow, which, in most sectors, is a clear signal that service improvements are needed. Yet, the necessary capital facility preservation preoccupation of our state departments of transportation, together with inherited conventions and the lack of customers' voice,

limits incentives to shift to very intensive congestion management and enhanced operations orientation for state and local transportation agencies. There is simply not enough money, not enough resources, and not enough attention to have this entire agenda under the current system.

The increasing prevalence of incidents, breakdowns, and crashes now cause about 50 percent of the delay we experience in metropolitan areas. There is no way for the inconvenienced traveler "market" to express its demand (through willingness to pay) that priority be given to the kind of investment in operations in technology and systems that can more effectively minimize that kind of a problem.

Certain important segments of the highway-using community appear ready to pay more for better service; for example, just-in-time freight shipments, time-short commuters and business travelers may be prepared to spend more for "guaranteed speed limit" trips. This seems to be the lesson learned in the so-called High Occupancy Toll lanes in California where users are paying up to 40 cents a mile to bypass peak period congestion. Reliability is as important as time savings in the kind of economy that we have today. But for the most part, premium service can't be purchased anywhere at any price. And that is a curious phenomenon in a free enterprise economy.

What Changes Are Needed?

We are at a point in the evolution of our surface transportation systems where we need to shift from a financial system that is oriented to construction to one that fosters effective, customer-responsive, innovative service. This must include financial arrangements/mechanisms that will detect, support, and promote customer-related service improvements. This is not a new issue for a private enterprise economy. Other networked infrastructure sectors (power, telecommunication, and water) exhibit dramatic changes in organization and financing that are fostering substantial improvements in service quality. These sectors are increasingly deregulated, competitive, and investor owned. They have private-sector style management that focuses on customer service (as well as constructing and maintaining physical plant) and offering priced services with premium options. Dramatic changes in organization and finance have brought with them substantial improvements in service quality.

The United States is the international model on institutional/financial structure for progressive public infrastructural services. Yet, the transport sector remains uniquely on the static fringe of the spectrum with regard to

the provision of public infrastructural services. Perhaps the 21st -century agenda for surface transportation finance needs to focus on introducing elements of the financial mechanisms that characterize the norm in other networked services. The same types of transition may be necessary

- from a revenue-constrained priority on the preservation of basic infrastructure to increased resources focused on real-time service,
- from public monopoly ownership and operations to an increased role of the private sector through outsourcing public-private partnerships franchises,
- from "one size fits all" services and facilities to market-related price-based premium and discount options,
- from arms-length relationships with customers/users to market-related relationship through prices,
- from tax dependency to a new mix—with commercialized self-supporting service components, and
- from public agency bureaucracy to an enterprise-style management of transportation agencies with performance incentives.

It is obvious that major institutional changes would be involved: political, professional, and even cultural. Therefore, any change must be evolutionary and politically practical: a transitional approach incrementally adding enterprise features where and as appropriate, and retaining existing systems appropriate to the components of networks.

Changes Taking Place Today

Some of these changes are already visible. The American Association of State Highway and Transportation Officials recently completed a survey of the 50 state departments of transportation, called "The Changing State DOT." This report describes a wide range of innovations that are going on in many state departments. Some of the innovations are financial—such as increased reliance on nonfederal funds, leveraging and commingling State Infrastructure Banks, increased tolling, private finance, and so on. There is also some experimentation with new services for different markets. I'm sure you all know about providing single-occupant vehicles the opportunity to pay a premium for the space left over in high-occupancy vehicle facilities. There are a few experiments with pricing, and a few state departments are beginning to think in an asset-management perspective—focusing not only on the capital assets but also on operating the assets they have to maximum customer-related effectiveness. And there are a variety of experiments with new institutional

relationships—vertically and horizontally—between the public and private sector and among levels of government.

But these changes are not widely known or discussed. There's very little dialogue among states and local governments on these issues. At the national level, the discussion of these issues is virtually invisible–no think tank white papers of professional conferences. The consciousness level is low and inertia–as we have remarked in several contexts today–is high. Yet, there is an opportunity to begin to connect some of these innovations that are going on to give them visibility and to give the pioneers and champions some cover, some support, and some incentives. The changes taking place need to be focused and consolidated with debate and encouragement.

These developments suggest some elements in a tentative agenda that links institutional to finance and supports progress in service terms. Some of these elements include the following:

- Continued programmatic devolution to state and local levels (some suggest partial tax devolution as well).
- An increased focus on system performance in customers' terms—including support for real-time active systems operations.
- Additional incentives to state and local governments to form public-private partnerships in the development of technology and the delivery of service.
- Shifting to direct charges to finance service upgrades (tolling interstate highways).
- Incentives for increased commercialization of premium and special services and enterprise-style approaches.
- Credit support for private investment (including securitization of debt).

Bring the Future Forward Faster

As the role of highway finance moves beyond simply constructing and preserving capital facilities, key financial arrangement issues move beyond "how much" the legislatures–federal and state—will grant. The tax-funded public monopoly was appropriate for the mid-20th century mission of building the basic infrastructure. But providing a variety of nonstandard services to a range of customers who have varying needs is not compatible with tax-based funding and bureaucratic decision-making. Highway finance must evolve in new directions on the basis of more direct customer input, more private enterprise in service provision, and adding markets and prices, technology, and capital. Other infrastructure sectors

have evolved ways that incorporate such free enterprise arrangements. We must find a parallel path suitable to surface transportation.

Presentation by Mr. David Luberoff, Associate Director, Taubman Center for State and Local Government, Kennedy School of Government, Harvard University

"Transportation policy centers on four challenging issues—mobility, environment and community enhancement, and benefiting the economy."

"Although we've made some historic decisions about what's a public responsibility and what is a private responsibility, those lines are not fixed; they move. One of the great underlying debates of U.S. economic and political history has been the question of what is a federal responsibility, what is a state responsibility, and what is a local responsibility.... We need to remember that the policies have changed dramatically over the years at varying points in time."

The purpose of this conference is to think broadly about new directions in transportation policy for the 21st century. I'd like to begin this conference by providing a framework for the conversations and discussions that will follow. Whenever we think about transportation policy, we should think about the following three questions:

- What are the problems we're trying to solve?
- What norms govern the choices that we can make?
- Which solutions are political decisionmakers, particularly elected officials, most likely to support?

What Are the Transportation Problems We're Trying to Solve?

Meeting the Challenge of Mobility

Transportation policy centers on three challenging issues—mobility, environment and community enhancement, and benefiting the economy. In thinking about these issues, we should remember three trends.

- As Tim Lomax and his colleagues have shown,[4] there is growing congestion in urban areas and an astonishing rate of congestion growth in smaller areas. The congestion is getting worse in big cities, such as Los Angeles and New York, but it's also getting worse in small cities, such as Buffalo and Las Vegas. Congestion also is getting much worse in suburban areas as they become major commercial centers.

[4]Tim Lomax and David Schrank, Urban Roadway Congestion Annual Report—1998 (College Station, Tex.: Texas Transportation Institute, The Texas A&M University System, 1998).

- As Alan Pisarski has shown,[5] transit's market share has been declining, particularly as the nature of those who drive changes and because of the introduction of women into the workforce in the 1980s, the growth of link trips, and the increased decentralization of businesses and residences.

- Many key transportation facilities are nearing the end of their useful life, and we're faced with the challenge of rebuilding facilities that are already badly congested. Fixing a central artery for a major city, such as the Gowanis Expressway in New York City, generally requires closing it for awhile, but that wreaks complete havoc on the city's transportation system.

  To meet this challenge of mobility, we should recall that the average length of commuting times has not changed substantially for decades. People somehow make adjustments between work and home to accommodate the time consumed by their commutes. While some people commute 3 hours a day in order to live in far-off rural areas, the average commuting time, according to all the surveys, has not changed dramatically.

  It will be very interesting to look at the next census to see if this changes. If decentralization continues, the length of commutes will probably stay about the same. However, if travel times use up all the excess capacity that was built through the 1960s and 1970s, commuting times might get much longer. If that happens, the political pressure to deal with congestion will rise significantly.

Enhancing and Preserving the Local Community and Environment

The second major policy issue is environmental and community enhancement and preservation. To what extent can we allow transportation to disrupt neighborhoods and natural environments? Is it okay for a highway to go through a local park? Should we think about the relationship between transportation policy and the reality or threat of global warming? If we conclude that such disruption is necessary, decisionmakers need to determine to what extent mitigation (e.g., design modifications) help make it politically, environmentally, and morally acceptable. Are there some forms of transportation projects that actually enhance and protect communities and natural environments instead of destroying or harming the environment? To what extent should we encourage them?

[5]Alan Pisarski. Commuting In America II : The Second National Report on Commuting Patterns and Trends. (Lansdowne, Va: Eno Foundation for Transportation, 1996).

Benefiting the Economy

Decisions on transportation policy need to consider their economic impacts, which I group into three types according to their different political dynamics. The first impact is the direct economic benefits that public works projects provide for the people and the companies that build them as well as the companies that supply them. Public choice theory suggests that such groups may, in fact, dominate the transportation policy-making process. The second is the regional impacts of highways and transit systems, particularly on real estate values. Urban political theory suggests that local decision-makers tend to give this issue great weight. The third is the long-standing debate about transportation's impact on the national economy. About 10 years ago, David Aschauer asserted the thesis that investment in transportation generally benefits the national economy.[6] Many economists—including Edward Gramlich, Henry Aaron, and, most recently, the Congressional Budget Office—have criticized such assertions,[7] and the conventional wisdom now seems to be that well-designed projects can have positive economic impacts while the impacts of general highway on the economy are either mildly positive or have no discernable impact at all.

What Norms Govern the Choices That We Can Make?

My second thematic question has three major components. The first is a very fundamental political question about whose responsibility it is to make transportation decisions.

Who Is Responsible?

Although we've made some historic decisions about what's a public responsibility and what is a private responsibility, those lines are not fixed; they move. One of the great underlying debates of U.S. economic and political history has been the question of what is a federal responsibility, what is a state responsibility, and what is a local responsibility. Although we have a surface transportation system that dates back to some 40 years—in some respect an anomaly in American history—we need to remember that the policies have changed dramatically over the years at varying points in time.

[6]David Aschauer, "Is Public Expenditure Productive?" Journal of Monetary Economics, Vol. 23 (1989) pp. 177-200.

[7]See Henry Aaron, "Discussion of Why Is Infrastructure Important," in A. Munnell, ed., Is There a Shortfall in Public Capital Investment? (Boston, Mass.: Federal Reserve Bank of Boston, 1990), pp. 51-63; Edward Gramlich, "Infrastructure Investment: A Review Essay," Journal of Economic Literature,Vol. 23, No. 3 (Sept. 1994), pp. 1176-1196; and The Economic Effects of Federal Spending on Infrastructure and Other Investments, Congressional Budget Office (Washington, D.C.: Government Printing Office, June 1998).

To What Extent Should Transportation Policy Explicitly Seek to Shape Behavior?

The second question of political norms is to what extent should policy explicitly seek to shape behavior. Is it an explicit goal, for example, to encourage the use of transit? Is it an explicit goal to discourage the use of the automobile through mechanisms such as pricing? This question about the use of incentives and disincentives is very important. The underlying politics change depending on whether you're merely trying to encourage somebody to do something or you're actually making their life miserable if they do something that you don't want them to do.

How Do We Balance Societal Versus Individual Needs?

The question of how to balance societal versus individual needs is the old question, "Can we make omelets without breaking eggs?" While policymakers were able to balance the competing needs of society and individuals through the 1950s and 1960s, through the 1970s and the 1980s, this challenge became increasingly difficult. I actually think that this is an area that may be in flux. I see some interesting trends that say that we may be interested in making some more omelets, albeit trying to make the egg whole again.

What Options/Choices Do Policy Makers Have?

There are eight general approaches to addressing transportation problems that policymakers have before them. The first three reflect historical patterns of action over the last 20 or 30 years. The fourth reflects the current regime, and the last three are the most interesting or important alternative courses of action.

Diminishing the Federal Role

The first is that we can imagine a world in which the federal role greatly diminishes. It is important to recall that as late as 1956, the federal share of transit spending was virtually nothing, and the federal share of highway spending was only about 12 percent of total spending. At the height of the interstate movement in the 1960s and 1970s, this percentage peaked in the high 20s. Then, with the passage of the Intermodal Transportation Efficiency Act of 1991 (ISTEA), it started to slowly decline around 1991 or 1992. Those percentages are creeping back up as the federal share of transportation spending increases.

Moreover, total spending on transportation in constant dollars (that is, dollars adjusted for inflation) has been increasing since the early 1980s—which means that until ISTEA, the bulk of the increase in spending was at the state and local level. My point here is that you can imagine a world in which the federal government decided that it should not have a significant role in surface transportation but highway spending did not fall

significantly because highways are critical to local and regional economies.

A New Federal Role

In contrast, imagine if the federal government were to decide to return to the heyday of the highway policies from around the 1950s and 1960s. There was a clear delineation of a federal role—there was a policy decision that we wanted a national system of Interstate highways to link major urban areas and to alleviate traffic problems in cities (as well as sometimes also providing money for slum clearance and downtown revitalization plans). Two features of the Interstate era are particularly significant. The first is that very little account was taken of the disruption caused by highways. The second, and perhaps most important, is that the Interstate system was an entitlement program. If a road was eligible for Interstate funding, the federal government was going to pay 90 percent of the cost, regardless of the total cost. At first, the national highway program had rigidly defined standards about what was and was not eligible. However, as the program emerged and the political process worked in the way that the political processes work, the definition of what became eligible for federal highway expenditures expanded, and expanded, and expanded. Eventually, projects that happened to have a transportation component evolved, such as the Central Artery in Boston or the Westway in New York, which were actually projects about park land and urban revitalization that happened to have a transportation component.

Entitlement Plus

The third general policy area is related to the second. I might call this "Entitlement Plus." In the 1970s, the federal government began to give regions some flexibility in deciding whether or not they wanted to build a highway or trade some of the funds to improve mass transit. Although the local government had some choice, the funding mechanism essentially remained an entitlement program. And that, as you can imagine, encouraged a certain form of decision-making.

Block Grants

That brings me to what the world looks like right now in ISTEA and TEA-21. Both ISTEA and TEA-21 made an important shift away from categorical grants toward more state flexibility. Essentially, the national highway program is turning into a block-grant-funded program. There's more than a modicum of formula tweaking, and there's always some pot of money that generally is distributed to Members of Congress, usually on the basis of their position on the authorizing committee and their general influence over transportation legislation in Congress. What is critical is that the national highway program has evolved from an entitlement program to a block grant because we're giving the states a fixed pot of money and telling them

to distribute it among the projects on their list. This approach radically changes the nature of the transportation planning process because it forces the states to make important tradeoffs.

Discouraging Automobile Use

The fifth policy refers to the varying proposals put forward by what one might broadly call the environmentalist community. In his important new book,[8] James Dunn calls this the vanguard strategy, and it has two components. One is a fairly heavy investment in transit and other forms of nonhighway transportation. The other is significant restrictions on the investment in new capacity and possibly even disincentives on automobile use and stringent controls on land use. The policy implies that the car is a major problem for society and the land use patterns that it engenders—and we have to stop it. Depending on the year or month, the reason we have to do that is, global warming, suburban sprawl, wildlife habitat protection and urban revitalization. This has captured both an investment strategy and a strategy that says we may need to constrain people's ability to use their automobile. This is an important point, which I will come back to in a moment.

Greater Use of Information Technology

The sixth idea concerns the greater use information technology to improve our nation's transportation system. Some people believe that various forms of information technology—from its simplest traveler information systems to its most imaginative and far-reaching electronic highways—can expand the system's effective capacity. There is, however, some interesting controversy about whether or not expanding capacity will encourage or discourage sprawl.

Rationalist Strategies

Next, there is the rationalist strategy, which is the economists' continued fascination with road-pricing schemes and their continued antitransit, particularly federally subsidized rail transit, position in favor of market mechanisms. In his new book, Clifford Winston,[9] one of the most astute writers in this field, estimates that a policy of efficient pricing and services could generate $10 billion in annual net benefits over current practices. Winston—and his coauthor, Chad Shirley —believe that if transportation's inefficiencies are recognized, we could construct a political dynamic that would address the inefficiencies.

[8]James A. Dunn, Jr., Driving Forces: The Automobile, Its Enemies, and the Politics of Mobility (Washington, D.C. : Brookings Institution Press, 1998).

[9]Clifford Winston and Chad Shirley, Alternate Route : Toward Efficient Urban Transportation (Washington, D.C. : Brookings Institution Press, 1998).

Marketization

Related to this idea of rationalization is the question of whether or not we should be looking at more marketization of the transportation system. This decision turns on the question of whether or not you believe that state departments of transportation are monopolies—are they capable of engaging in the market-based schemes and undergoing the innovations that we expect in markets? This situation is analogous to the deregulation of most forms of infrastructure in the United States, such as telecommunication, electricity, aviation, and trucking. I commend the Pennsylvania Department of Transportation for attempting to become a more customer-oriented agency and I imagine that Brad Mallory will tell you some of the things that they are doing. The intellectual critique, however, is that this scenario is unlikely without some form of competition.

How Will Policy Options Affect the Future?

I've given you a framework of the major transportation policies and three major issues that we're concerned about—mobility, community and environmental protection and economic impacts—and discussed the norms that govern our choices—whether or not we should encourage or discourage behavior, whether or not we allow disruption, and who we think ought to be responsible for making the decisions. Now I'd like to share with you my thoughts on how different policy options might play out over the next 5 to 10 years.

I don't think we'll see a major diminishment of the federal role. Why? As George Peterson has written about over the years, people generally support more spending on transportation.[10] So for politicians, supporting a major federal transportation program is something that their constituents favor. In addition, the groups with a large economic stake in the current funding structure —primarily road builders and those who build transit systems, but also governors and officials from state departments of transportation—are going to lobby assiduously against any effort to reduce federal highway and mass transit spending. In contrast, no one is lobbying that hard on the other side, except for a couple of states that may be particularly upset by current formulas.

Second, I don't see any return to any entitlement program, such as the Interstate system. Such programs only emerge with the development of fundamentally new technology—such as those that Bob Skinner touched on briefly—even then, generally only after the general policy approach has

[10]George Peterson, "Is Public Infrastructure Undersupplied?" in A. Munnell, ed., Is There A Shortfall In Public Capital Investment? (Boston, Mass.: Federal Reserve Bank of Boston, 1990), pp. 113-130.

been tested at the local and regional levels. The Interstate program, for example, built on state and local experimentation with limited-access roads. In addition, it took almost 20 years for the idea of a national system of such roads to move from a general idea to something the federal government would actively support.

Since we're not going to diminish the federal role or have an entitlement program, we are going to have a large program of block grants. With block grants, the spread between the donor and donee states generally narrows. With some variations, we're basically going to see the states get back roughly what they put into the system. This trend toward narrowing the spread of grants is going to be interesting for transit policy over the next 10 to 15 years because the bulk of federal transit money historically has gone to the relatively small number of locales with transit systems that carry significant numbers of people. In the most recent debates over TEA-21, the states that had been getting very little in transit funds compared with the amount they had been paying in gas taxes grumbled about that. Transit advocates were basically able to rebuff the attacks partly by making alliances with environmentalists and partly because the Chair of the Senate Committee that oversees transit came from New York. However, as we in Massachusetts know all too well, if generous federal funding for a program relies on having one politician in a particularly powerful position, that system is probably unsustainable over a long period of time.

In addition, despite GAO's criticisms, some form of pork barrel politics will continue. I don't mean that pejoratively; I mean that descriptively. As long as there's going to be a federal program, we should not be shocked or surprised by this because Members of Congress are supposed to bring something back to their districts; it's how they demonstrate their success. Moreover, as others understand that surface transportation programs have money, they are going to try and make other endeavors eligible for transportation money—through programs such as the ISTEA and TEA-21's transportation enhancement programs, which are basically ways of tapping the highway and transit programs to fund things such as bicycle paths, parks, and historic preservation.

Policy Impacts on Behavior

The likelihood of serious constraints on behavior as advocated by the environmental community seems quite slim. As a country, we generally don't respond well to serious constraints. I say this in full awareness of the most recent suburban antisprawl programs. If you look closely at the most successful of these efforts they either involve the purchase of open space or efforts to limit the provision of infrastructure in rural areas. In contrast,

recent efforts to constrain behavior, such as using the automobile, are either on the ropes or have died. For example, the transportation demand command measures in ISTEA, which would have required some employers to discourage single-occupant commuting, were repealed. Thus, it seems likely that transportation programs will continue to support environmental agendas with such measures as preserving open space and greater investment in mass transit (even though most of the data suggest that the new transit lines are accomplishing neither their mobility nor their air-quality goals) but are not likely to try to constrain driving.

While highway capacity will continue to expand at a modest rate, we'll never see a building boom as great as the 1950s and 1960s. In most growing urban areas, there is some pressure—sometimes coming from congestion and sometimes coming from land development forces—to do new construction. People are also trying to develop a strategy for getting around the reconstruction question. The strategy for doing so has been less disruptive but more expensive highway construction strategies plus expensive mitigation.

To date, information technology has been driven much more by its producers than its consumers. Most significantly, in the wake of the 1990s Defense cutbacks, many industries were essentially looking to adapt their products for new customers. Many of them, therefore, became part of the surface transportation coalition to get access to some of the federal funds. To date, however, it's not clear that such efforts have produced noticeable changes for drivers.

A couple of questions remain on the table. Why are we still investing in mass transit despite 20 years of data showing that rail transit generally does not have significant impacts on either mobility or air quality? Locally, such projects are often driven by land use considerations. Certain property owners will organize at the local level because they perceive that proximity to mass transit will increase the value of their holdings. Producers of transit want funding to build more transit lines. At some point, however, the rest of the country either says to the few areas that are getting the bulk of transit money, "That's enough" or "We want to build transit lines too." It looks like it's the latter.

I'm not sanguine about the future of marketization because I don't see who's pushing it. In contrast, such industries as telecommunication, electricity, and airlines had active groups of producers and consumers who said that these markets were so inefficient that they could provide

those services at much lower costs. In the early 1980s, alternative forms of long-distance service began, particularly for businesses. If you recall, in the airline industry, those great anomalies of places not subject to airline deregulation because they were in-state flights were beginning to demonstrate that the system might be flawed.

Nor can I figure out how you get to Cliff Winston's large-scale prescriptions for change. However, there are four areas where market pressures could produce change over the next few years. One is urban transit, which is notoriously inefficient. In places like New York, some private-sector and often-illegal minivan programs are providing services at a profit, and perhaps they are going to slowly undermine the local transit monopoly. In response, the pressure to redo some of the transit laws, particularly the labor provisions, might increase. The current urban transit system seems somehow untenable. I'm not antitransit, but I'm trying to sort of predict its future, which seems an unsustainable trend.

My second prediction concerns freight movement between ports. The Jones Act prohibits the passage of freight between U.S. ports unless it's on U.S.-flag and U.S.-built vessels. However, the freight industry is changing with the emergence of mega-ports just outside the United States in the Bahamas, in Halifax (Nova Scotia), and in Vancouver (British Columbia). These ports could lead to circumventing the Jones Act by barging cargo to a variety of feeder ports up and down either the West Coast or the East Coast.

Why is this a surface transportation issue? The increased use of barges might affect surface transportation by taking freight off of highways. The numbers are potentially significant because there are enormous efficiencies that could be achieved. In its Conrail merger, CSX estimated that the merger alone would allow it to take about a million trucks off the East Coast highways each year. There are enormous efficiencies to be gained here. Again, if the major U.S. ports begin to see a significant slippage of business because someone has found a notch or a hole in the system (like the airlines), there will be increased pressure to address the issue.

The third area where marketization might increase is in private toll roads, which are often tied to congestion pricing in fast-growing areas. California's S.R. 91 and a new road in New Mexico are interesting examples. As state highway departments have to focus on the core business of maintaining what they've got, they may be attracted to such

projects as a way to provide new capacity without having to seek additional funds. However, while such projects are interesting, they will make up only a small portion of total highway spending.

The last is some basic maintenance functions, which pass what Indianapolis Mayor Steve Goldsmith calls the "Yellow Pages test." If five entries in the Yellow Pages are doing what some state employees are doing, you ought to at least put that service out to bid and let the public employees compete against the private employees. In Indianapolis, public employees have actually won many of those contracts because they often know the business better than anyone else does. I can foresee more of this, particularly if and when budget pressures get too great. In general, the academic analysis of transportation policy has underestimated the importance of producers and consumers as compared with water policy or regulatory policy.

Thus, as you listen to the remarks that follow, think not only about whether the policies are efficient but also whether they can be crafted so they are within the norms of American politics. It's our challenge to craft policies that somehow meet these twin tests.

Presentation by Bradley L. Mallory, Secretary, Pennsylvania Department of Transportation

"What we do need to do, however, is to radically change the set of relationships that transportation agencies have with their customers and virtually everyone else."

"Once you get those sets of relationships right, the financing mechanisms and other mechanisms will follow."

I tinker at the margin of a large state transportation department which some of its detractors would still call a highway department. We had one great good fortune—that was to go financially and morally bankrupt in the mid-1970s. I say that's the best thing that can happen to a public agency because then you get to start over again. You generate the political will to set in motion a set of changes and events that can ultimately result in real positive change. I think I can say with accuracy that many people refer to our department today in bellwether terms from time to time, almost to the exclusion of other state transportation departments. I must tell you, I find that to be inaccurate. I find the general level of play among the state transportation departments to be quite high. I would commend it to many of you within the (Washington, D.C.) Beltway as an example, frankly, of what can be done. It is a little understood secret, to use one of Steve Lockwood's terms. I think there are some good reasons for that. One of the main reasons is that most state transportation departments have lived with a checkbook just like you have, and just like most businesses do. Most people in government don't live with a checkbook. They have a budget, but it's not really theirs. If they save a dollar, the state budget secretary or the legislature takes it back and spends it on something they wanted to spend it on. Because of the existence of trust funds and historical practice, state departments of transportation traditionally, if they saved a dollar, got to put it somewhere else. So typically, I find them to be relatively responsive in governmental terms to what the customer is talking about because they've got a checkbook. I think this is little understood—very little understood, in most quarters. But I think it's vitally important.

Finance Is Not the Answer

When I first saw that I was going to be on this panel, I sort of recoiled and I said, "Oh, my God, they put me on the wrong panel. I should have been on the relationship panel." Finance isn't the issue. Then it dawned on me that I am on the right panel because I ought to stand up and say that. Finance is not the issue, in my judgment. That's easy to say right now. Two years ago, we got a $400 million state revenue increase. Reflect on that for a moment. Our Governor raised the state gasoline tax 3.5 cents and increased our state registration fees by 50 percent. Two years later, he got

56 percent of the vote. His opponent didn't even show. The political consequences of investment in infrastructure are almost always positive, not negative. It's relatively easy for me to sit here with an additional $400 million of state revenue in one pocket and thanks, to Chairman Shuster and Mr. Oberstar, $400 million a year in additional federal revenue in the other pocket and talk about finance not being the issue. I concede that point. However, I believe that even when the eventual downturn comes, finance will still not be the issue. The reason I believe that is because our real problems are not capable of being solved by vast infusions of additional capital. We've heard a great deal about them today.

We have talked a great deal about traffic congestion. I would offer an observation to you and that is that it is perfectly acceptable and polite to talk about traffic congestion on an elevator. What things can you talk about on the elevator? The weather and traffic congestion. They are the only two safe subjects. Why? Because no one is responsible for them. You stand little chance of offending anyone. People widely perceive traffic congestion essentially to be an act of God and somewhat inevitable. I think that Mr. Downs' comments were right on the money. It is essentially the price of not walking. It is largely inevitable, and I know of no one who has proposed anything remotely approaching much of a solution to it. I'm tinkering at the margins of it, as many are. ITSs offer some relief. They principally offer the relief of giving the person sitting there enough knowledge so that they won't be furious. That's the principal benefit. That is a significant benefit. There is the potential, of course, to provide people with alternative information or give them the information necessary to choose an alternative. But that is no small benefit. And, yes, we can increase throughput.

I think we all accept the notion that we cannot build ourselves out of traffic congestion. The reason we cannot build ourselves out of congestion is not due to money—not at all due to money. It's due to the social and environmental constraints. There is no place to put those roads, for the most part. People would not put up with what we would have to do if we tried to build those roads. We would not build the Interstate system today. I think we all know that. We will not build our way out of congestion. So we do not need a great deal of money to do that.

Improving Relationships Is the Answer

What we do need to do, however, is to radically change the set of relationships that transportation agencies have with their customers and virtually everyone else. Much is said about the differences between the

public and private sectors. I think most of it is overstated. I've been in both. The truth of the matter is, the public sector is actually quite a bit better at some things than the private sector is; of course, the opposite being true as well. They're each good at different things. One of the things, however, that the private sector is exceedingly good at is managing the set of relationships—all the relationships—between supplier, customers, and contractors. They set up these seamless webs, if you will, of customer, organization, contractor, suppliers. They're very good at it. We have none of that in the government. In fact, we have a vast body of law and regulation that's been created to prevent it from happening. If one of my employees set up a seamless web with a supplier, he'd go to jail—seriously. We need to find ways to get those relationships right. Steve Lockwood was touching on that a bit. We need to find ways to enhance this set of relationships to remove the obstacles—legal, and even more importantly, perceived obstacles between people cooperating with each other in new and unusual ways. Once you get those sets of relationships right, the financing mechanisms and other mechanisms will follow because the market that you set in motion will demand that they be generated. To try to do that in the abstract is impossible.

We've heard several times here today people talking about the inefficiency in the system. Quite frankly, the inefficiency in the system is its salvation. The redundancy in the system is the salvation. That's why the system can respond so well to unanticipated events. That's why the nation's inventories moved from its warehouses to its roads and rails in a very short period of time and no one noticed. It happened rather seamlessly. That's why we've been able to respond as we have because of that built-in redundancy. Yes, it's messy. It's not pretty. It's not intellectually satisfying in any way, shape or form. But it makes a great deal of sense in a very real, messy world, where you've got to be able to respond.

The critics of demonstration projects view them as inefficient. I don't think that anyone has more demonstration projects than Pennsylvania. The cynic among you may say that I'm about to say this because of Chairman Shuster. That's a very good reason to say it. But I'll say it for a second reason: it's the truth—demonstration projects are not a problem. They're not even a little problem. First of all, most of them are in line with the long-term needs and wants of the people. Our Congressmen are rational human beings, who are elected by their constituents for a purpose. And they express themselves well and accurately. They have directed some of our programs in certain directions. But the truth of the matter is that in Pennsylvania, the vast amount of our resources is spent on the

preservation of our existing system. The split between maintenance and new construction I find is almost always incorrectly stated because people, I think, misunderstand the difference between new construction and reconstruction—heavy maintenance, if you will.

A Modest, Incremental Approach Is the Answer

Our program is almost exclusively maintenance oriented, as it should be. There isn't a need to build a great deal of highway capacity, and we couldn't anyway, as I've already described. What we need to do is move beyond—we need to secure that maintenance philosophy and then move on to Steve Lockwood's point of an operational concern. That's where the interaction with the customer will generate a new set of relationships. When we get those relationships right, the rest will follow.

This may sound relatively modest to you. I don't know how many of you heard Frank Francois' speech at the Transportation Research Board awards luncheon. He gave 10 predictions. I won't go into them now, but I think many people from outside the community would have sat there and thought to themselves—that's sort of modest forecasting. There's nothing too exciting there or earthshattering or new. And that's exactly right, there wasn't. He was, to my way of thinking, entirely correct. It is a modest incremental evolutionary approach, and I think that's what's required here. I don't think we need to do massive surgery on the system we have. I think it's going to produce reasonably good results. I think the environmental issues are a thorny problem for us. I particularly enjoyed Mr. Dunn's presentation this morning because I think he has hit on a very important point. This isn't about bad cars. If cars are bad, we're bad because they're part and parcel of what we are all about in this country. We may not like that. Apparently some people don't like it. But it is reality.

We've got to find ways to get that set of relationships right with the environmental community so that we gain their trust and respect, so that we can continue to provide our customers—our people—what they want. What they want is to be able to get around. I think we have enough money to do the job right if we're very, very smart. I don't think that we have the relationships right yet. I don't think that we're quite clever enough about how we marshal our arguments—marshal our assets and then apply them.

That's why I make the proof by assertion that finance is not the issue. In fact, what we need to be about is enhancing the set of relationships. I would encourage those of you working on the Washington scene at every turn to take the path that provides more flexibility. When the Governors

come and say they want more flexibility, people's eyes glaze over—just give us the money and run. I know that's what you think. In part they mean that too—of course they do. But on their better days, what they mean is, "Give us more tools and options." We live in a very messy world where circumstances change four times a day. The more tools and options we have, the more redundancy within the system—and yes, even some inefficiencies—the better off we're going to be, once that new thing comes flying out of the blue at us. We'll be able to scramble, pick one tool up, find it's got a whole new application, and use it to solve the problem.

Presentation by Robert H. Muller, Managing Director, J.P. Morgan Securities

"With all the talk about innovations in finance, not much as changed in the last 10 or 15 years. We are still financing transportation in about the same way we did in the past—at least at the state and local level—for state highways."

About 3 years ago, I published a study on the accuracy of toll-road feasibility studies, which has permanently endeared me to feasibility consultants. The conclusion of my study was that, on average, about one of four toll-road deals will probably default if the accuracy of the studies do not improve—most studies are done to about a 50-percent rate of accuracy. The problem is that you don't have a bell-shaped curve with regard to accuracy—you have a curve that has almost no upside. There is very, very little upside if you do a toll road, but a lot of downside. The question is, how much downside?

Transportation Financing Is Little Changed

The flip side of what Steve Lockwood said about user charges is interesting—with all the talk about innovations in finance, not much has changed in the last 10 or 15 years. We are still financing transportation in about the same way we did in the past—at least at the state and local level—for state highways. Taxes and bonds are only 7 percent of all the money, and user charges are the rest. We are still in that world, and I don't think that it's going to change for the foreseeable future.

The only part of the whole transportation world where there is private funding is in railroads. I noticed in conversations at this conference that a lot of people are asking, "What's going on in freight railroads?" I think the reason that we do not know is because we have nothing to do with it—the equity analysts follow the railroads. We almost never talk about that piece of the equation, but that may change as time goes on.

Maintenance Funding Is Lagging

We currently have $70 billion of outstanding debt at the state and local levels for highway purposes, of which, about one third is supported by tolls. Virtually all the increase in toll bonds sold by local governments have come in the 1990s—this is where we've seen innovations on the financing side. In addition, we have had a lot of financing. In the last 2 years, on the basis of taxes and debt sold, there has been a big increase in state and local government dollars going into highway construction. Have the methods that we've used so far worked? I think we have to give a pretty good grade—at least a "B." Capital outlays on a real basis have gone up

dramatically in every year except from 1992 to 1996. The converse is that we have not done a very good job on maintenance. Maintenance outlays are virtually flat on a real basis. My answer is that maintenance is an awfully unsexy business. If you can figure out a way to get all the financing types to work on maintenance, that may solve some of the problem. With an aging highway system—like an aging house—maintenance should have been going up on a real basis over the last 15 years. So—pretty good grades on financing the sexy part of it—new roads and added capacity—and not so good grades on maintenance.

Flexibility and Innovation in Financing

There has been real change in financing flexibility in the last couple of years. State and local governments are permitting innovation, and Congress has finally allowed some new uses of federal money. The San Joaquin Foothills Transportation Corridor and the Eastern Foothills Corridor are examples. I know the Eastern Foothills Corridor intimately because we were senior managers of that financing in 1995. I'm pleased to say that as it has opened over the last 2 months, its forecast has proven reasonably accurate. There was a federal line of credit on both projects—only $120 million, accessible to $12 million a year. They used the federal line of credit actively to restructure the bonds in 1997. Although San Joaquin's forecast was well short of projections, it would not have gotten bond insurance that enabled it to avoid even more significant shortfalls in forecast without the federal line of credit. One of the things that has not come up today is taking advantage of new transportation construction—taking some of that gain from development and using it to build roads and transit.

Zero coupon bonds are a wild innovation, compared to the way toll roads were financed in the 1950s. At that time, you did them, you restructured them, and you restructured them again. Thanks to Congress, you cannot restructure taxes and debt very often because you can only advance or fund one time. Unless you want to go into bankruptcy, that means you've got one opportunity. Zero coupon bonds magnificently allow toll-road increases in usage to match up with the maturity of the debt. The disadvantage is it leads to an extraordinary amount of debt on the future value basis.

Allowing the states to pay maintenance expenses really was a significant innovation. We don't really think about that as innovative, but it was—it was a partnership with the state. I-470 uses zero coupon bonds—local license fees mixed with toll usage. Dallas North Tollway, heavily touting

how much money was put in at the state level, had bond insurance at the beginning because it had not established a basic draw. In the last year, the Connector 2000 project in South Carolina came out with a public-private venture that effectively provides that a private firm will be responsible for future operations. It is, probably, in many people's mind, the weakest of the projects. The state accepts subordinated payment for a period of time for maintenance. We have not built a lot of miles with this innovation, but we have issued a lot of debt.

The final development is the Garvey bond that comes directly from TEA-21. Garvey bonds are the sexy products in the tax-exempt market right now, and I've been talking to some state departments of transportation about them. For the first time, the marketplace has shown the willingness to have long-term debt secured by an appropriation process that is shorter than the maturity of the bond. Ten years ago, if you told me that you could sell grant anticipation notes, I would not have accepted it. If you told me you could sell a grant anticipation bond, I would have said you were crazy. Well, Massachusetts did that to finance the Boston Central Artery. I expect to see many states using these bonds as a way to jump-start all the new money that's coming out.

Potential Advantages of the Existing Regime

Many people do not realize how unique the U.S. financing market has been for public infrastructure. The previous European model was strictly a government-financed model at the sovereign level. There was some subsovereign involvement, but it was basically a sovereign financing model. Europeans went directly through the quasi-public model that we have in the United States to a private model. It is being developed around airport funding, but we've seen it certainly on the highway side as well.

In the United States, an obstacle to innovation is that we have created a favored market for financing infrastructure through the existence of tax-exempt bonds. We have a revenue bond concept. It effectively is a model not dependent on national government largesse, but with some degree of market discipline—a kind of a quasi-corporate financing model. Tax-exempt bonds themselves provide specific benefits. They are the lowest cost of capital, without question. They also give access to an investor base and do not have to compete against equity financing or Internet stocks. Tax-exempt bonds are investor based and focus only on government finance, with the small exception of the nonprofit sector. Tax-exempt debt also has structuring advantages such as the selling of zero coupon bonds, one of the innovations in the San Joaquin project.

However, talk to a taxable trading desk about selling zero coupon bonds, and their eyes glaze over. This is because you have to pay taxes every year on the accretion. With tax-exempt financing, you get no accretion. There are all sorts of advantages in terms of how the market works. Finally, I think government has the time and money to tolerate long development periods for new assets. When Steve Lockwood and I first met each other about 4 1/2 years ago, we worked on S.R. 125 for about a year and realized that it was going to take a long time to get finished, so we dropped out of the process. I don't know if they now have the second, third, or fourth banker involved in it, but only government has patience for that long-term time frame.

What Are the Limitations?

The federal grant system is still the easiest method of financing, even though there are strings attached. It is money and there's nothing I'm going to tell you that beats having dollars from the federal government. Governments are neither risk-takers nor innovators at heart—that really is not the focus of government. As we know in the municipal market, the goal of financing these days seems to be creating a commoditized product so bond insurers can slap on insurance. The creation of commoditization doesn't necessarily create innovation. There are certainly some reasons to question whether we will have enough innovation. The municipal bond business itself is also very isolated. It's amazing how isolated those of us are in the tax-exempt business from the rest of our firms. The truth of the matter is that we are not necessarily attached to the best ideas, and that will become an issue over time. Tax-exempt bonds also have a very limited investor base, courtesy of the Congress. The only people who buy municipal bonds are individuals with mutual funds, although there is limited insurance company purchasing. But infrastructure financing in the United States is almost fully financed by private individuals. I'm not sure that's a good long-term situation.

Finally, state infrastructure banks seem to be going nowhere. So that innovation hasn't done very well. Also, people hate tolls. I keep trying to come up with a way to do innovation that does not involve tolls, but they have to come into play in some way. The fight, as I see it, is going to be between the increasing use of tolls and new technology that is phenomenally different. As people begin to forget the current system of finance, tolls are likely to be more acceptable. That will bring great change.

Where Global Finance Is Heading

In discussing where global finance may be heading, I do not want to defend tax-exempt bonds because it's an endless argument in Washington. Tax-exempt bonds continue to have a very real place in the process because of their positive factors. There are many reasons to believe that the value of tax exemption outweighs any question of inefficiency in market allocations.

A more viable model requires the use of tolls for several reasons. First, stand-alone project finance is not the best way for us to finance capacity. There seems little question that existing state toll-road authorities will have to step up to the plate and be willing to use their existing capacity. It is a lot cheaper to finance off of an existing revenue base than it is with new projects. You get higher ratings, much lower financing costs, and you don't have to buy bonds.

What if we didn't have tax-exempt bonds? What if Congress finally decided that tax-exempt bonds are gone? We would have very rapid innovation in financing highways in this country. Tax-exempts are really a crutch in many ways because they're so easy to use. One of two things may happen. States will continue to issue taxable securities at interest rates that will be 30 or 40 percent higher than tax-exempt debt. That necessarily reduces impact. Coverage numbers go down and the amount of roads that you can build under that model goes down. Basically, the elimination of tax-exempt financing will require state and local governments to raise taxes to finance higher cost debt. The alternative, if you have tolls, is a private-sector version of financing and a sure revenue stream that will allow private companies to come into this business and begin a lot more financing. Equity is not cheap. A lot of people think that private company financing is a much cheaper way of doing the tax-exempt model. That is not true. It's an alternative model. It is a model that by its nature provides more innovation, more creativity, and perhaps more efficiency. But it isn't absolutely a better model than what we have today.

Privatization

I did an exercise of turning some of our state toll-road authorities into private companies and creating initial public offerings for these companies. Right now, state and local governments are as flush as can be. If we get into a recessionary environment, my guess is that they are going to feel really pressed for money, and change will come in that environment. When they seek more private involvement, the question will be making better use of the assets to meet needs. States might consider their turnpikes as a source of money. For example, the Massachusetts

Turnpike in 1996 would have fetched, under my model, about $200 million to $250 million. Its outstanding net debt was $390 million—before the Boston Central Artery. Using some standard ratios from other types of privatization, I found that there was not enough money at the existing toll level to pay off their taxes and debt. That implies a large subsidy and certain policy issues. The New Jersey Turnpike was even more interesting. I came up with about $1 billion off the turnpike against $2.1 billion of debt. The answer is that you would not have been able to sell the New Jersey Turnpike. By contrast, when I did the same exercise for airports, the very interesting result was that you can clearly sell airports in the United States. Aside from the federal grant issue, they generate a substantial positive net benefit for the community that owns the airport. I think that's the reason why we're seeing some European airports becoming viable private companies. The bottom line is that a corporate financing model for highway finance will require very dramatic changes in the willingness of consumers to pay for services.

As Steve Lockwood said, there are niche opportunities for the private sector to pick off pieces of this market. But, for the foreseeable future, I see little likelihood of a major alternative model to the way we finance highways today. We should continue the innovations that we have talked about during the conference. We should continue to defend taxes and debt because of the advantages that they provide, and where possible, privatize a lot of the services.

Presentation by James L. Oberstar, Ranking Democratic Member, Committee on Transportation and Infrastructure, House of Representatives

"We can't solve problems by using the same kind of thinking that we used when we created the problems in the first place." (Albert Einstein)

Those who have heard me either in Committee or in forums like this know that I love history and like to reach back into history. It's important to know, as Lincoln said, where we have been so that we may better understand whither we are tending. If we had had a conference like this at the turn of the last century, it would have been when the first prototype automobile by Henry Ford was just being built. It was only 5 years old.

The beginnings of transportation as we know it today were stimulated by a group of bicyclists, which is one of my passions. A group of cyclists in 1894 petitioned the U.S. House of Representatives for an appropriation of $10,000 for the then-predecessor of the Bureau of Public Roads—the Office of Road Inquiry, a small agency in the Department of Agriculture—to study the possibility of developing a system of paved surfaces, to get those new-fangled horseless carriages off the routes that the bicyclists were using. Because those predecessors of automobiles were causing ruts in the pathways, they were causing, consequentially, bicyclists to take what they then called "face plants." The bike would hit the ruts, they'd go over the handlebars, and go smack face first into the mud. Congress accommodated the request and appropriated $10,000; the study was undertaken. A few years later, the Bureau of Public Roads was established, elevating the Office of Road Inquiry to a higher level in the Department of Agriculture. That began what we know today as the Federal Highway System.

The study built on an initiative by the Office of Road Inquiry, which developed what we call today a map of paved surfaces; those that were gravel crust and those that had macadam. It found that only 7 percent of the 2.1 million miles of roadway had any kind of surface at all. Usually, they were just formed by a cow who had trampled down the grass, and that became a roadway. Those that were more sophisticated used some kind of compression means to pack down the surface—a very few had macadam surface—7 percent of the 2.1 million miles.

That conference, had we convened it then, would have been 4 years prior to the first transcontinental road trip. You can imagine a group like this gathering around and thinking about what surfaced roadways might look like—questioning the need for them. Simon Newcomb, a noted American astronomer of the time, confidently predicted that, of course, it is folly to think that man can fly long distances in heavier-than-air craft. In 1893, a

prominent newspaper editorialized that the horseless carriage movement will of course come to naught. A decade plus later, the 1 millionth Ford rolled off the assembly lines. This leads me to conclude that futurists are often wrong, often make judgments based on inaccurate, incomplete, or insufficient information, and probably ought not to be dabbling in the future. But if we don't, we'll never get there.

Twenty years after that first transcontinental trip, a young U.S. Army officer fresh out of West Point by the name of Eisenhower accompanied and led a convoy across the United States. He noted the shortcomings of this network of gravel, stone, and mud surfaces. He wondered how the United States could defend itself adequately if called upon in a time of emergency. He didn't forget that experience. Later, as President, he asked the Congress to reawaken a study done in 1944 by Congress or commissioned by Congress in 1944, just as World War II was coming to an end. He directed a study of a 44,000-mile interconnected network of highways across the United States. Eisenhower, remembering his own trip, asked the Congress to develop what became known as the National System of Interstate and Defense Highways, which he signed into law in June 1956. It also included an innovative financing scheme.

My predecessor in Congress, John Blatnik, was one of the five co-authors of the Interstate Highway System and the Highway Trust Fund. They thought they had accomplished a work for all time. Of course, nothing needed to be done except to watch over the development of a 42,500-mile network of highways that theoretically crossed the United States from coast to coast and border to border without a traffic light. Well, that was before population growth. That was before transportation began driving the development of everything in our economy, expanding growth and exploding population. It is a far cry today from 1956, when that legislation was enacted, with over 565 million vehicles traveling the nation's roadways and a trillion passenger miles every year. It's the most extraordinary development. But not so extraordinary when you come to think that Americans own three-fourths of all the trucks and half of all the cars in the entire world. They need some place for them to drive.

But it certainly wouldn't have been envisioned in the imaginary conference that I mentioned at the turn of the last century. So let's hope that here at the turn of this century we do a little bit better in thinking ahead to where we need to go. Oliver Wendell Holmes observed, "I find the great thing in this world is not so much where we stand, as in which direction we are

moving." We must sail sometimes with the wind and sometimes against it. But sail we must, not drift, and not lie at anchor.

That certainly should be the challenge of this conference. Where will America sail in the 21st century? What will be the legacy of the post-Interstate era? That was the question I began asking as Chair of the Oversight Subcommittee in the 1980s, what will the post-Interstate era look like. Where are we headed? In the course of the hearings that I conducted, we had a number of tantalizing thoughts. Demographics were changing. Predictions in 1986 and 1987 were that by the end of this decade, which we are approaching, half of all drivers would be 50 years of age and older. Well, that suggests some new ideas about road surface, markings, reflective surfaces, driving habits, and driving conditions. It also suggests some new ideas about the kind of driving that people would do—more leisure miles driven and more people taking vacations (maybe longer duration), using the Interstate to get to the point of their vacation travel, and then using the non-Interstate roadways of this country for the balance of their travel.

Something that emerged along with those hearings was a demand for a change in the quality of peoples' driving experience. Drivers want more than the neat, separated grade-crossing controlled Interstate highway system—something that shows more of America's scenic, cultural, and historic treasures. Out of that arose my idea for a Scenic Byways Program, which I crafted and with the help of numerous groups, tourism and environmental organizations, put together and made it part of ISTEA in 1991. Millions of miles are driven on the scenic byways of this country. We have 14 national scenic byways, 11 all-American roads and hundreds of state-designated scenic byways. In addition, these roads are a powerful driving force behind America's $92 billion in-bound international travel and tourism, with a $22 billion positive balance-of-payments benefit to the United States.

The other ideas that emerged were that people wanted something more than just more road surface—a better quality of life in their communities. They wanted an enhancing rural and urban life, and out of that came what we know today as the Enhancements (contained in ISTEA and TEA-21). In the 20 years prior to ISTEA, only $40 million had been spent on bicycle provisions and converting railroad grade beds to bicycling paths and pedestrian walkways. Providing (in ISTEA) a 10-percent set-aside of enhancements program for bicycling facilities, converting railroad grade beds to bicycling paths, and mandating the establishment of a bicycling

coordinator in every state Department of Transportation led to the development of a state bicycling road plan. A billion dollars has been spent in the lifetime of ISTEA compared with $40 million in the previous 20 years. Three thousand two hundred forty bicycling projects are all across America—10 million more Americans bicycling than 7 years earlier because of a massive change in our lifestyle—a more aerobic lifestyle—people are going to be living longer and healthier.

That was the framework for ISTEA. Add to it congestion mitigation and air quality improvement provisions that said we should use some of our Highway Trust Fund dollars to improve the quality of air and quality of our driving experience in America's urban centers. To reduce congestion or to mitigate choke points in urban areas, states and localities have used that flexibility to transfer $4 billion from highway construction to transit projects. These innovations led to real changes in the way we think about transportation in America—something more than just pouring more asphalt and concrete.

But we really broke through some preconceived notions about our federal highway program with ISTEA. We carried that forward in TEA-21, the Transportation Equity Act for the 21st Century. The most important initiative in TEA-21 was to take the trust fund off budget and reestablish it as it was originally conceived in 1956 and as it operated until 1968. It's off budget within the budget, but it's guaranteed spending that increases as revenues increase and, of course, would decrease if revenues dropped, but not below a certain threshold. The trust fund is indeed secure. Spending is guaranteed—it cannot be withheld by the Appropriations Committee. In addition, there's a 40-percent overall increase in outlays for the states; guaranteeing that 90.5 percent of every state's gas tax dollar be returned to the state.

In addition, we agreed on an 80-20 split of the Highway Trust Fund; 80 percent for highways and 20 percent for transit. I won't walk you back through the age-old controversy. But I can remember as a Hill staffer in the 1960s, when the idea was first surfaced of using Highway Trust Fund dollars for transit projects, the hew and cry and screams of, "This is our money and you can't use it for transit." People would rather choke in traffic, sit behind the wheel of their car, and breathe in those exhaust fumes from the guys ahead of them than get their fellow motorists off the road into mass transit.

We've changed that, $173 billion for highway and $41 billion for transit. If you had looked at the program in 1963, when I first started my work as a Legislative Assistant on the Hill, you would have said, "No way, never." But it's there. It's also guaranteed spending. In addition to that, we've included provisions in TEA-21 to designate funding for rebuilding existing transit systems and expanding and constructing new ones. We also provide funds for magnetic levitation (MAGLEV) and other high-speed rail development, loans and guarantee programs for freight rail rehabilitation, and reconstruction and improvement.

We also provided funds for a rather innovative idea—to coordinate land use and transportation planning. Planning has all too often been a bad word, an evil term. I remember up along the North Shore of Lake Superior in my district going to a town meeting when the Coastal Zone Management program was being planned. One after another suspicious citizen got up and said they're going to do it again; they're going to take our land away from us; they're going to plan it out of our hands. I told them that this is your opportunity. Either you make the plans—either you take this money and you design how the future is going to look along the North Shore—or it will just happen without your input at all. Developers will come and you'll be screaming at me 20 years from now saying, "Why didn't you stop this?"

The county boards and local governments voted against coastal zone management. Five years later, they asked me to come back. They wanted to know how to get some of that money and take charge of their destiny. After a time, planning—the reasonableness of it—settles in with people. When they understand that it's a grass roots initiative, they take hold and do it well, with substantial amounts of funding, in this case, $120 million to coordinate land use and transportation planning. When dedicated to the simple purpose that transportation does not have to destroy the environment, it does not have to destroy quality of life, and citizens can be entrusted with the decision-making that affects their own life. We're going to give that to them.

TEA-21 addresses safety. The $540 million incentive program is for states that enact a 0.08 blood alcohol standard for drunk driving, punishment of repeat offenders and for open alcohol containers, and the enhancement of the national driver register, which tracks dangerous drivers—those who lost their license in one state and try to get a license in another state. This is an initiative that former Republican leader John Rhodes and I crafted.

We catch something like 500,000 of those drivers and get them off the roads every year.

Those are all good initiatives. But it's still not enough. Einstein said that we can't solve problems by using the same kind of thinking that we used when we created those problems in the first place. Some of our old thinking about highway programs got us there. In ISTEA, and continued and enhanced in TEA-21, are three tools that help us avoid the kinds of thinking that got us into the problems that we confront in our current transportation system: the use of advanced technology, smart growth concepts, and innovative financing.

Advanced Technology

I have taken the train a grande vitesse (TGV) from Paris to Lyons in 2 hours and 1 minute. In 20 years time, they had cut the travel time in half. There were 3 million air passengers between those two cities and 500,000 rail passengers. Today, there are 500,000 air passengers and 5 million TGV passengers at 178 miles an hour between those two cities. The five segments of the TGV are running profitably and are paying for the rest of the rail system. I've been to Tours in the southeastern part of the Loire Valley where business people commute daily 220 miles to Paris in an hour and 15 minutes at 180 to 190 miles an hour. The Inter City Express (ICE) in Germany is achieving speeds of 180 miles an hour. The MAGLEV that Germany is developing between Hamburg and Berlin at a $1 billion cost will move 15 million people a year at speeds of 300 miles an hour. I rode the Shinkansen in Japan from Tokyo to Osaka at 180 miles an hour. They expect to have high-speed MAGLEV operating in Japan in the next five years.

Meanwhile, our highest speed on our passenger rail in the United States is 110 miles an hour. Most of the time it's much less than that. We have similar corridors, Minneapolis-St. Paul-Chicago, where high-speed rail would be vastly superior to air travel between those two cities. There's also enough population density to make it attractive. Why do we have high-speed rail in Europe, Germany, France? England is improving its speed, and the Italians have done the same. Spain has taken the TGV with a few adaptations. The Japanese are doing it. China is moving in that direction. But we—the leaders in transportation in the world—don't. Why? Because we're not thinking right.

We will have high-speed rail here in the East Coast with the electrification of the Northeast Coast Corridor. You'll be able to travel using the new

[Acela] high-speed trainsets up to 150 to 166 miles an hour. That's high speed for us. But it's because we are still thinking about transportation with the same mind set that got us into these problems in the first place. We have to get beyond that way of thinking.

TEA-21 provides some funding for us to take advantage of the MAGLEV, TGV, and other high-speed rail technologies and develop high-speed rail corridors, which we designate in the act as 10-10 corridors and specifically authorize out of appropriated funds—but not out of trust fund moneys—$1 billion for the development of the MAGLEV idea over the next 5 years. Thanks to Senator John Chafee's vision and determination, we have the innovative finance program of TEA-21 available to finance the high-speed rail, including MAGLEV developments, over the next few years.

Unfortunately, high-speed rail took a little setback just about a week or 10 days ago when the new Governor of Florida decided to cancel the state's participation in the FOX Overland TGV Corridor between Orlando and Miami. I don't have a complete statement of the Governor's decision. But I have worked with the FOX promoters, we have put authorization in TEA-21 to enhance that initiative. I think it made perfectly good sense. It was a good investment for the state and its future. The failure to proceed with it will just mean more cars, more drain on the resources and more congestion. In a real sense, high-speed rail is a "Field of Dreams" idea. If we don't build it, they won't come.

The other initiative that I mentioned is Intelligent Transportation Systems. We invested a lot of money in ISTEA and continued those investments in TEA-21 to the tune of about $2.5 billion over the next 6 years in intelligent transportation system concepts. If all the funds are used wisely, I think we'll approach the no-hands, no-feet idea of ITS driving with the automated highway in which cars literally can drive themselves. In fact, I-15 in San Diego, an 8-mile segment, is a no-hands, no-feet driving demonstration project. If we carry this concept through, we'll enable highway managers to double or triple the capacity of highways by increasing speeds and shortening distances between vehicles with greater control mechanisms. We've got to test them out. That's what this is all about.

Smart Growth Concepts

What we need is smart growth, not unbridled growth. We need to look very carefully at the idea of induced travel. There was a very thoughtful piece in The Washington Post just a few weeks ago about the I-270 corridor. Those of you who are from the Washington, D.C., area and have

driven up Rockville Pike and beyond, going up toward Frederick, Maryland, know what that's all about. That was a nice four-lane road a few years ago. Traffic grew and eventually congestion grew along with it. So the highway folks said, "well, let's do what we do best—add more lanes." So they got 12 lanes. You know what happens when they have all those lanes? Someone says, "well, I don't have to car pool any more. I can drive my own car. I don't have to use that HOV lane now, I don't have to be stuck with my neighbor and listen to his silly conversation. I can drive myself."

So now you have congestion. It's a big story every morning, you look to see what's happening on I-270, because more lanes beget more travel, which begets more growth. One-and-a-half-million drivers a day are stuck in traffic somewhere in America. The Los Angeles Chamber of Commerce did a study a few years ago that showed that the cost of congestion is $3.5 billion a year to drivers stuck in traffic in Los Angeles. It costs $40 million each year to the United Parcel Service and Federal Express just to have delays. That's a look at business news. If you like spending time in traffic with yourself only, then support the continued plan that we have of adding lanes and opposing HOV lanes and schemes to get some cars off the roadway and make travel more expeditious, more convenient, and affordable.

The President has, as part of his State of the Union message, announced an initiative for sustainable cities, or livable cities, which includes a $6 billion increase in funding for public transit. It also includes $2.2 billion for community-based programs with innovative transportation strategies and regional transportation strategies to improve existing roads and transit and invite ideas for alternative transportation. I think that's a good idea. I want to see the specific legislation they send forth. It's in the right direction. This is the kind of thinking that we need to embrace.

Innovative Financing

Coming to the third point that we dealt with in ISTEA—finance—the Highway Trust Fund has spent $372 billion building our Interstate highway system and its accompaniments. That's a lot of money. It built the greatest road system in the world. But it's not enough. There isn't enough money to address all the roadway needs in this country, even with the 40-percent increase that we provided—even with the guaranteed spending. What that—the guarantee—will do is assure from year to year that highway planners, highway engineers, and design people can count on the money they need for the projects they've designed.

I was in California last summer for the meeting of the Mineta Institute for Intelligent Transportation Systems. The Director of CalTrans talked about the impact of TEA-21 on his department. The increase in funding is so great they're going to hire 2,000 engineers to carry out the planning, design, and engineering of the new roadways they're going to build and existing ones they're going to improve. When it came my turn, I said I would have felt a whole lot better about the future of transportation if you had added 200 planners to design strategies for dealing with the growth of transportation in California, instead of just plowing ahead to build. You have to have some thought going into this as well.

A good example of what is needed is additional funding for sources or using the available Highway Trust Fund dollars to leverage other investments to make those improvements in traditional as well as alternative transportation concepts. The Transportation Infrastructure Finance and Innovation (TIFIA) provision of TEA-21, also an idea of Senator Chafee's, to whom I give great credit for this initiative, is authorized at $530 million to cover the risk of loans, loan guarantees, and credit enhancements up to an additional $10.5 billion over the amount guaranteed in TEA-21. TIFIA will make it possible to finance projects of national or regional importance. Projects costing more than $100 million are beyond the means of a state to finance from its highway apportionment. With the TIFIA money, a state could use these leveraging dollars to fund transit, passenger rail, and even freight rail projects.

The Alameda Corridor in California is really the forerunner and guide for this idea. The Corridor provides access to the ports of Los Angeles and Long Beach. Why is that important? One-fourth of all of our imports and exports by water go through those two ports. So before you can move goods by truck or by rail, before you can get them on the boat, you have to move them by truck or by rail to that port and get them on board to move by water some place. The tangle of local rail lines and highways and grade crossings created gridlock that made it impossible to move at a competitive basis. DOT provided $59 million to finance a loan for the additional $400 million that California needed to complete a $2.4 billion project. Their allocations out of the Highway Trust Fund were nowhere near the amount that they could foresee to complete this project. With the project financing that makes a $2.5 billion initiative possible to untangle those rail lines and improve the truck and rail access, trade is expected to jump from $116 billion to $253 billion over the next 10 years, creating an additional 700,000 jobs locally. Those are the kinds of initiatives that we

can undertake with TIFIA and with State Infrastructure Banks, four of which are authorized in TEA-21.

A new initiative, one I particularly championed and advocated vigorously, is the railroad loan and guarantee program for the short-line railroads of this country—those that have picked up the slack from the abandonments and consolidations of our nation's freight rails into four national rail lines. With the funds from the Title V program, as we call it, we will be able to leverage some $3.5 billion of railroad infrastructure improvement for the nation's short-line rails and revitalize small towns and small communities.

Those are the kinds of initiatives that I think we need to undertake. Those are the three principal areas of innovation of TEA-21. We should have had a lot more in the way of innovation and new ideas and out-of-the box thinking in TEA-21. What we did, I think, was about as good as you can expect of the legislative process in the short run.

If conferences of this nature can stimulate new ideas and new thinking, that's good—we have a mid-term correction coming up in a couple of years, and we need to assess where we are with TEA-21 and make some adjustments. That's the place for new ideas. It may not necessarily require new financing but new ways to leverage dollars, like those that I suggested. Help us to move our transportation agenda forward.

There were a few cartographers in the Office of Road Inquiry at the turn of the century who developed a set of maps that laid the foundation for what became the Interstate system. What we need today are innovative mapmakers on the threshold of the 21st century to help us chart the map to take transportation forward from here.

Presentation by C. Michael Walton, Chairman, Department of Civil Engineering, University of Texas/Austin

"A major attribute of international reform initiatives has been to redefine the role of government by separating policy and management responsibilities from program and service delivery."

My remarks will center on the trends of international institutional reform in delivering transportation programs and services and the implications for domestic policy and delivery. I recently led a committee that visited New Zealand, Australia, Sweden, and the United Kingdom—countries identified as having innovative programs for transportation agency reforms—to investigate how other countries are coping with budget constraints and using new tools to manage their transportation programs.

International Trends in Institutional Reform

Many transportation agencies in countries throughout the world, including the United States, are feeling the pressures of privatization in wake of current government restructuring and downsizing. In short, transportation agencies are being required to do more with fewer resources. This trend is part of a larger redefinition of government and business functions and is by no means confined to the transportation sector. A number of countries have already implemented the comprehensive restructuring of their transportation departments, and their experiences present useful input to the formation of similar issues in the United States.

The road-sector reforms reviewed in several countries are part of an effort to make government more responsive; to treat the public more as a customer. It is taken as a given that making the distribution of resources and contracts more competitive will improve the efficiency and cost-effectiveness of providers, transportation authorities, and the transportation network itself. Regulation methods are being redefined in relation to the private sector—generally becoming more "light-handed" and results-oriented, to allow for innovative approaches—although there has been concern that privatization will require more careful monitoring. There is a move toward greater accountability of government agencies and to the use of more objective, careful, and inclusive real-cost accounting as a means of allocating scarcer resources through the use of cost-benefit ratios and performance measures. A concern of note is the issue of public trust.

Redefined Public and Private Roles

The transportation reforms in the countries surveyed were found to be part of an overall reevaluation of the appropriate nature and extent of government activity in response to a government mandate or some degree of financial crisis. In the reorganization of government, there has been a greater distinction drawn between policy formation and management and the delivery of services and facilities. The decision that has been made, to a greater or lesser extent, is that service delivery is best provided by the private sector, partly in response to the process of governmental reforms and demands for greater cost-effectiveness. In all of the countries reviewed, reform began with reevaluating and clarifying their transportation agencies' core functions and responsibilities and roles within the organization and identifying those functions best transferred to the private sector. As an alternative to total outsourcing, public policy in some countries allows—if not requires— providers to operate as profit centers or publicly owned enterprises, which compete directly with private companies, collect a profit, and pay taxes. Sweden has adopted this approach, at least in principle, as a means to maintain quality standards and prevent the very few major private roadworks contractors from behaving as an oligopoly. One of the most important and successful changes in structure adopted by all the countries surveyed was an explicit separation of buying and selling roles within the agency, forcing project decisions to be made more carefully and reducing conflicts of interest.

There is also an effort to transfer some of the public risk in transportation infrastructure development to the private sector, as evidenced in several trends: a variety of turnkey programs are being used successfully in the United Kingdom and Australia, variously referred to as design-build-finance-operate (DBFO), build-operate-transfer, build-own-operate-transfer, and design-construct-maintain according to their specified contractual obligations. So far, the United Kingdom particularly has seen significant cost savings with its first eight DBFO contracts in comparison with its standard system, which routinely ran over budget. In principle, these contracts are deliberately made rather long-term (up to 30 years of operations) and comprehensive in scope to apply the same incentives and responsibilities to the private company that a public authority would have to operate under.

All countries are also beginning to outsource maintenance work under similar contracts (3-5 years) that are more "performance-based" than "specification-based." The United Kingdom also uses "lane rental contract" clauses to keep as many lanes open as possible during maintenance and construction activities. Other than through the DBFO

projects, the idea of transferring design activities to the private sector is treated very cautiously out of concern for maintaining consistent safety and quality standards and because there may not be enough highway design work in the smaller countries to support more than a limited number of private companies; however, most do express interest in having foreign firms compete in this area as well. With the transfer of responsibility for service delivery to the private sector comes a certain degree of authority as well.

Transportation Initiatives and Links to Economic Viability

Transportation departments in the countries surveyed were under great pressure for financial accountability. Tolls, except for bridges, were generally disliked, although they were being reconsidered and there was some warmth toward electronically assessed tolls, which might also be used to distribute traffic by encouraging the use of alternate routes. It was observed that only New Zealand had dedicated funding sources comprising of user fees for transportation (although Australia's transportation funding at the federal level is intended to correspond to income from fuel taxes and registration fees, strictly speaking, the moneys come from general revenue) and, instead, must compete for funding with other government agencies during each budgeting period. While fees from highway users are collected in all countries, the fees typically accrue to the account of the general fund for allocation during the normal budget cycle. Even in New Zealand, highway user fees are used for nonhighway or transport-related purposes. Generally, there seemed to be only little, though growing, acknowledgment of the importance of transportation infrastructure to economic growth, especially by national governments (other than Australia, which considered it instrumental and invested heavily in its highway system through the 1980s). Sweden explicitly considers transportation investment as an important means to equalize regional development. Wales, which recently decided to double its transportation investment, saw greatly increased economic growth compared with the rest of the United Kingdom.

Cost-benefit analysis has been one of the major ways in which this business-like approach has been expressed. Such analysis systems are increasingly being used to prioritize projects and allocate resources more objectively. The costs included in this analysis vary, however: some include costs related to noise, environmental degradation, aesthetics, and delays, and some do not. Some include a comparison with the costs of a do-nothing option. Mostly all include items related to safety. There is interest in making these analyses very generic to facilitate a comparison

between regions and internationally. These analyses are very much works-in-progress but are being pursued enthusiastically.

This new businesslike approach has allowed the public sector to level the playing field with the private sector in certain circumstances. In some cases, the public sector has been allowed to compete with private-sector firms, most notably in Sweden and Australia, and the public sector has been able to hold its own and gain a number of contracts on its own merits. In both of these countries, the public-sector firms must allow for certain rates of profit and pay taxes in a manner that makes them operate with many of the same constraints as their private-sector competitors. Although there have been discussions about the lack of equality between private- and public-sector firms in Australia, VicRoads has let its in-house teams compete and has seen them compete well. The experiences of each country suggests that there have been mixed results to date; however, most officials agreed that overall direction has yielded short-term benefits. Some agencies have set goals for their units in competing with the private sector, which has proven to be both successful and viable.

One concern was retaining core competencies within the transportation agencies, many of which had been drastically downsized. All placed a high priority on retaining their experts for a variety of reasons, including contract writing (especially important to be done carefully when contract arrangements and types are changing) or a sense that privatizing necessitates more careful monitoring. There is concern for the training of future transportation professionals. Research efforts have generally suffered under privatization, except in Sweden, where transportation research is supported by the SNRA, which also collects statistics related to road use, and through grants distributed by the KFB (Communications Research Board).

The major component to operating in a businesslike atmosphere is the effect of competition. It is a common perception in all the countries surveyed that making the provision of service subject to competitive tendering is the most significant means to increase efficiency and encourage innovation. It therefore is important that there be enough firms to provide sufficient competition to offset tendencies toward oligopoly, which is a significant concern for some of the smaller countries.

Since this current businesslike state is evolving, it is impossible to foresee what it will lead to in the future. However, some trends have begun to emerge. The overreliance of a cost-benefit analysis can lead to encourage

short-term or suboptimal decisions unless some mechanism is in place to allow for long-term implications to be more readily factored into the process. With the changing roles of the public units, the training of personnel has become a concern. In general, the public agencies have been a source of human capital for the private firms. In addition, they have traditionally provided formal instruction and training coupled with on-the-job experience. The reform and its impact on the traditional public agency has altered this process both in the quantity of technically and professionally qualified people with skills desired by the expanding private companies but in the training activities. The result has been that the private companies have recognized their mandate to include training in their annual budget process. Similar trends are occurring in research where the private sector recognizes that it must include research and development in its activities as the public agencies scale down their involvement. With the shift of emphasis from the public to private sector, the public sector has dropped its lead role in both of these areas. It is now up to the private sector to fill the void left by the public sector and increase their emphasis in these two crucial areas.

Because of the increasing influence of the private sector, a check is needed to ensure that the job that they are doing is meeting requisite quality and is as efficient as possible. The governments of the selected countries reviewed are moving toward a system of performance measures that would allow them to oversee the areas of the road system, which they view as being important, while using the fewest number of employees. The performance-based approach is intended to ensure receiving the quality of work for which they had contracted. These countries still find themselves in the developmental stages of creating such a performance-based system and also an accurate transportation database. It is believed that such a system will allow internal comparisons to be made, thus ensuring a quality return on public investment.

Implications of International Transportation Trends

All of the countries surveyed were and are in significant transitional periods, all to varying degrees moving toward lighter regulation and adoption of the business strategies of the private sector. Change in all agencies was initiated either by crisis or government mandate, as part of a policy of some branch/authority in the national government, rather than internally from the transport authority itself. While their experiences offer some valuable lessons, it is important to remember that these reforms would be considered works in progress; their long-term implications have not yet played out. The implication of these international trends on

domestic policies governing the delivery of transportation programs and services is intriguing. Several key observations are summarized for discussion purposes.

In considering the implications of these valuable experiences for our situation, it is useful to keep several factors in mind. Essentially, it was a top-down reform, and these governments are going through major change. To a certain extent, they started at a position that was much different from ours and have gone now beyond us in many cases. One example would be in the selling off assets that have traditionally been in the public domain. In their case, railroads are one of those assets—unlike the United States—as are airlines, ports, harbors, and airports. In the rail industry, the infrastructure was separated from the operating authority, with separate companies for each. We, of course, are not in that position.

A major attribute of international reform initiatives has been to redefine the role of government by separating policy and management responsibilities from program and service delivery. Public trust is a concern, and the funding constraints associated with each. By saying it's a business approach to delivering transportation, we're saying that we're bringing competition into the fore. The long-term implications are not clear. But the short-term benefits are widely touted—in many cases, a 15 to 30 percent increase in efficiency or maintenance expenditures as well as in new construction.

In all cases, there has been a decrease in the size of government. The focus has been on maintaining core competencies in critical areas—that's part of defining the government role. There has been increased competition across the board. Public units are competing among themselves and with private units domestically and internationally. Some public units are encouraged to compete internationally as well as domestically.

There has been general dissatisfaction with some aspects of services provided by the private sector—for example, in the design of a transportation facility. As a result, these countries have adopted quality assurance standards. The use of benefit cost analysis and performance measures is evolving in a variety of ways.

I think the lessons learned from these international experiences will reveal some significant opportunities to help us meet the transportation challenges of the 21st century.

Profile of Speakers

Peter "Jack" Basso, Assistant Secretary for Budget and Programs at the U.S. Department of Transportation. Mr. Basso joined the Office of the Secretary in 1995, when he was named the Deputy Assistant Secretary for Budgets and Programs. Previously, he held several financial and administrative positions within the Federal Highway Administration, an agency within DOT. From 1990 to 1995, for example, he was the Director of Fiscal Services for FHWA. He has served as a member or chairman of numerous councils and committees, including the President's Council on Management Improvement and the Small Agency Council. He also served as Deputy Chair for Management at the National Endowment for the Arts and as Assistant Director for General Management at the Office of Management and Budget.

Anne P. Canby, Delaware's Secretary of Transportation, has over 20 years' experience in transportation administration, strategic planning, finance, budgeting, and management. Appointed as Secretary in March 1993, she has focused on applying an integrated multimodal approach in constructing and preserving Delaware's developing transportation network. Prior to her appointment, she was a partner in the transportation consulting firm of Canby, Cameron and Company and the Principal of Canby Associates. She also served as Treasurer-Controller for the Massachusetts Bay Transportation Authority, as a Commissioner of the New Jersey Department of Transportation, and as Chair of the New Jersey Transit Board of Directors.

Anthony Downs, Senior Fellow at The Brookings Institution (a private, nonprofit research organization specializing in public policy studies) in Washington, D.C. He previously chaired the Real Estate Research Corporation, a nationwide consulting firm advising clients on real estate investment, housing policies, and urban affairs. He has served as a consultant to many of the nation's largest corporations; major developers; local, state and federal government agencies (including the Department of Housing and Urban Development and the White House); and private foundations. He is the author or coauthor of numerous articles and books, including Stuck in Traffic, New Visions for Metropolitan America, Political Theory and Public Choice, and Urban Affairs and Urban Policy. Dr. Downs is a frequent speaker on real estate economics, housing, urban policies, and other topics.

James A. Dunn, Jr., Professor of Political Science and Public Administration at Rutgers University/Camden. He was an Alexander von Humboldt Research Fellow in European transportation policy at the

University of Bonn and a National Endowment for the Humanities scholar in modern French politics and transportation policy at the Institute of Political Studies in Paris. Dr. Dunn has written articles on a range of topics, including the outlook for high-speed rail in North America. He is the author of Miles to Go: European and American Transportation Policies and Driving Forces: The Automobile, Its Enemies, and the Politics of Mobility. In 1987, he received the Rutgers Presidential Award for Distinguished Public Service for serving as Chair of the South Jersey Transit Advisory Committee.

Stephen C. Lockwood, Vice President of Parsons Brinckerhoff, the nation's largest transportation planning and design firm. He manages its special Finance and Economics group and serves as Senior Technical Advisor on projects involving Intelligent Transportation Systems planning, public private partnerships, and multimodal applications. He previously served for 3 years as FHWA's Associate Administrator for Policy, overseeing policy development and new legislation, as well as strategic studies and international programs. In addition, he directed the Transportation 2020 Alternatives Group, a coalition of state and local government interest groups dedicated to reshaping national transportation policy for the 21st century, and served as vice president of a major national and international consulting firm. Mr. Lockwood chairs the ITS -America Task Force on Regional Deployment and is Vice Chair of the American Road and Transportation Builders Association, Public-Private Ventures Division.

David Luberoff, Associate Director of the Alfred Taubman Center for State and Local Government at Harvard University's Kennedy School of Government. His research and writing focus on the political economy of infrastructure and land-use policies. He is currently coauthoring a book on the politics of large-scale urban infrastructure projects, which will draw heavily on a 1996 political history of Boston's Central Artery/Third Harbor Tunnel project. He is also a columnist on infrastructure issues for Governing magazine and was co-editor of The Public's Capital, a quarterly forum on infrastructure issues. Before joining the Taubman Center, he was the editor of the Boston Redevelopment Authority's 1987 Midtown Cultural District Plan and served as editor-in-chief of The Tab, greater Boston's largest group of weekly newspapers.

Bradley L. Mallory has been Pennsylvania's Secretary of Transportation since March 1995. Under his leadership, the Pennsylvania Department of Transportation has redirected $170 million from overhead to road work and achieved a $550-million-per-year revenue enhancement for highways

and mass transit. Mr. Mallory previously served as counsel to the law firm of Dechert Price and Rhoads. From 1977 to 1989, he served in a variety of management positions at PennDOT, spending 3 years as Director of Strategic Planning and 3 years as the first Deputy Secretary for Aviation, Rail Freight, and Ports and Waterways.

Robert H. Muller, currently the Managing Director of Municipal Bond Research at J.P. Morgan Securities, has been active in municipal and health care research for more than 25 years. Before joining Morgan in 1981, he worked for Standard and Poor's Corporation and E.F. Hutton and Company. The past three Institutional Investor surveys ranked him as the top transportation analyst in municipal bonds, and prior surveys identified him as the top generalist analyst. He is a member of the Society of Municipal Analysts and has served on the Blue Ribbon Committee on Secondary Market Disclosure of the National Association of State Auditors, Controllers, and Treasurers and on the board of the Government Accounting Standards Advisory Council. He is also a board member and past treasurer of the National Civic League, has been a juror for the All American Cities award program, and has spoken widely before both investor and issuer groups.

Representative James L. Oberstar, an 11-term Member of Congress, serves as the Senior Democrat of the House Committee on Transportation and Infrastructure. From 1989 to 1994, he served as the Chairman of the Aviation Subcommittee. As such, he has been a principal author of much of America's transportation legislation during the past two decades, including the Aging Aircraft Safety Act of 1991, the landmark Intermodal Surface Transportation Efficiency Act of 1991, and, most recently, the Transportation Equity Act for the 21st Century, which provides a 40-percent increase in funding for federal transportation programs. Representative Oberstar has taken a leading role on such issues as rail safety, improving railroad infrastructure, developing high-speed intercity rail, expanding mass transit, protecting environmental statutes, expanding facilities for bicycle and pedestrian travel, and aviation safety. He has held a number of memberships including membership in the Great Lakes Task Force; Renewable Energy Caucus; House Trails Caucus; and Forestry 2000. He has also received a number of awards, including the James L. Oberstar Award, from the League of American Bicyclists, and the Award for Excellence, from the National Association of State Aviation Officials.

Les Sterman, Executive Director of the East-West Gateway Coordinating Council since 1983, a position he assumed after working for 5 years as the

organization's Director of Transportation Planning. Responsible for some of the Council's largest and most visible projects, he conceived and planned the MetroLink light-rail system. He has spoken on metropolitan transportation, urban development, and environmental issues at the state and national levels, testifying before several congressional committees and national conferences on these topics. Before assuming his current position, he worked as a transportation planning consultant and civil engineer. He is currently President, Missouri Association of Councils of Government, and Co-Chair and Founding Member, National Association of Metropolitan Planning Organizations, as well as a member of several governing boards of transportation-related organizations.

Brian Taylor, Associate Director of the Institute of Transportation Studies, University of California/Los Angeles (UCLA), and Associate Professor of Urban Planning at UCLA's School of Public Policy and Social Research. He teaches courses in transportation policy and planning, and urban policy planning. His current research is on the politics of transportation finance and planning, including the history of highway finance and the effect of public transit subsidy programs on system performance and social equity. Professor Taylor has also examined the relationships between transportation and urban form, including the effects of suburbanization on access to employment and the evolving commuting patterns of women, minority, disabled, and low-income workers. He was previously an Assistant Professor in the Department of City and Regional Planning at the University of North Carolina/Chapel Hill and a transportation analyst for the San Francisco Bay Area Metropolitan Transportation Commission.

C. Michael Walton, Professor of Civil Engineering, holds the Ernest H. Cockrell Centennial Chair in Engineering at the University of Texas/Austin. He has a joint academic appointment at the Lyndon B. Johnson School of Public Affairs. He formerly served as Transportation Economist, Office of the Secretary, DOT, and Transportation Planning Engineer, North Carolina State Highway Commission. A member of the National Academy of Engineering, Dr. Walton has served on or chaired a number of national study panels, some mandated by the Congress and others by the National Research Council. He is a founding member of the Intelligent Transportation Society of America and currently chairs its Coordinating Council. He is a Fellow of the American Society of Civil Engineers and of the Institute of Transportation Engineers. He also holds many other positions within the transportation profession's technical societies and industrial boards. Dr. Walton has received numerous awards,

contributed to more than 200 publications, and delivered several hundred technical presentations.

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