
October 2001

PHYSICAL INFRASTRUCTURE

Crosscutting Issues Planning Conference Report



Report Documentation Page		
Report Date 00OCT2001	Report Type N/A	Dates Covered (from... to) -
Title and Subtitle PHYSICAL INFRASTRUCTURE: Crosscutting Issues Planning Conference Report	Contract Number	
	Grant Number	
	Program Element Number	
Author(s)	Project Number	
	Task Number	
	Work Unit Number	
Performing Organization Name(s) and Address(es) U.S. General Accounting Office P.O. Box 37050 Washington, D.C. 20013	Performing Organization Report Number GAO-02-139	
Sponsoring/Monitoring Agency Name(s) and Address(es)	Sponsor/Monitor's Acronym(s)	
	Sponsor/Monitor's Report Number(s)	
Distribution/Availability Statement Approved for public release, distribution unlimited		
Supplementary Notes		
Abstract The nations physical infrastructure consists of a broad array of systems and facilities that house and transport people and goods and provide services. Among other things, this infrastructure includes transportation networks, including roads, airports, rail, and mass transit; housing; federal buildings and facilities; and postal and telecommunications services. These systems and facilities do not exist in isolation: decisions about where to build or expand roads affect decisions about housing and vice versa, and, in turn, these decisions affect the need for and location of public facilities and communications and energy services. Historically, the federal government has supported the construction of much of this infrastructure and helped to ensure the safety of services it provides. It builds, owns, operates, and maintains federal infrastructure such as federal buildings, dams, and waterways; financially assists state and local governments to build, own, operate, and maintain facilities such as roads, transit systems, and airports; and regulates public works. State and local governments and the private sector also play significant roles in planning, developing, and maintaining this infrastructure.		
Subject Terms		
Report Classification unclassified	Classification of this page unclassified	

Classification of Abstract unclassified	Limitation of Abstract SAR
Number of Pages 140	

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Abbreviations

ATC	air traffic control
CALTRANS	California Department of Transportation
CHAS	comprehensive housing affordability strategy
CIMIS	California Irrigation Management Information System
CLEC	competitive local exchange carrier
CSU	California State University
DOD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
DSL	digital subscriber line
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDA	Food and Drug Administration
FTA	Federal Transit Administration
FTE	full-time equivalent
GO bonds	General Obligation bonds
GPRA	Government Performance and Results Act
GSA	General Services Administration
HUD	Department of Housing and Urban Development
ILEC	incumbent local exchange carrier
IRS	Internal Revenue Service
ISTEA	Intermodal Surface Transportation Efficiency Act
IT	Information Technology
JV	joint venture
MVPD	multichannel video program distributor
NAFTA	North American Free Trade Agreement
NASA	National Aeronautics and Space Administration
NEC	National Economic Council
OMB	Office of Management and Budget
SMARTRAQ	Strategies for Metro Atlanta's Regional Transportation and Air Quality
ULI	Urban Land Institute
UPU	Universal Postal Union
USPS	United States Postal Service
VA	Department of Veterans Affairs

Preface

The nation's physical infrastructure consists of a broad array of systems and facilities that house and transport people and goods and provide services. Among other things, this infrastructure includes transportation networks, including roads, airports, rail, and mass transit; housing; federal buildings and facilities; and postal and telecommunications services. These systems and facilities do not exist in isolation: decisions about where to build or expand roads affect decisions about housing and vice versa, and, in turn, these decisions affect the need for and location of public facilities and communications and energy services. Historically, the federal government has supported the construction of much of this infrastructure and helped to ensure the safety of services it provides. It builds, owns, operates, and maintains federal infrastructure such as federal buildings, dams, and waterways; financially assists state and local governments to build, own, operate, and maintain facilities such as roads, transit systems, and airports; and regulates public works. State and local governments and the private sector also play significant roles in planning, developing, and maintaining this infrastructure.

As we move into the 21st century, the following trends are likely to influence the nation's needs for interconnected infrastructure systems and services.

- The population will increase. From 2001 to 2020, the total population of the United States is expected to increase by close to 50 million people, or about 17 percent.
- The population will age. From 2001 to 2020, the number of Americans aged 55 and over is expected to increase by about 60 percent.
- The suburbanization of population and employment will continue.

These trends hold wide-ranging and varied implications for the nation's physical infrastructure. The steps that the nation takes to accommodate these trends as it plans for and institutes infrastructure-related policy and investments in the coming years will have a direct affect on America's economy and quality of life.

Interrelationships among the nation's infrastructure systems often have not been fully considered during the planning and building of infrastructure. To better understand these connections, we sponsored a conference on June 14, 2001, to consider a number of infrastructure-related issues from a crosscutting perspective. The conference brought together scholars, practitioners, and policy experts with a wide range of expertise in physical infrastructure issues. We grouped the discussion into four panels, which

we organized around the broad themes of infrastructure needs, sustainable development, federal facilities, and the promotion of efficiency and access to infrastructure services. Sixteen panelists offered provocative thoughts on the nation's infrastructure challenges and opportunities. Their thoughts are summarized below. The introductions by panel moderators and the full remarks of the panelists are contained in appendixes I through XX. The views presented here are those of the panelists and do not necessarily represent our views. We plan to consider this information in formulating plans for our future work.

This conference predated the events of September 11, 2001, which have fundamentally altered the nation's consideration of physical infrastructure issues. Therefore, this conference did not address the relationship of infrastructure policy to national security or the issue of protecting the nation's infrastructure from violence.

Challenges Facing the Nation's Physical Infrastructure

Conference participants identified many challenges facing the nation's physical infrastructure. Although these concerns varied depending on the participant's background, perspective, and area of expertise, the following common themes emerged:

- The demand for infrastructure services is increasing. In 2000, GAO reported that, for all communities, the need to build and repair infrastructure tops the list of growth-related challenges.¹ One conference speaker asserted that, as the population increases, especially if the economy continues to expand, there will likely be more demand for infrastructure services. For example, this speaker predicted that a rise in population and vehicle ownership would lead to increased traffic congestion. To address this congestion, new and expanded transportation networks and technologies may be needed. According to this speaker, rising incomes will increase demand for air travel. This demand will likely cause increased airport congestion and may strain an already troubled air traffic control system. At the same time, this speaker predicted that increasing numbers of low-income households will live in cities and older suburbs. This trend could lead to increasing demand for affordable housing and employment access options.

¹ *Community Development: Local Growth Issues—Federal Opportunities and Challenges* (GAO/RCED-00-178, Sept. 6, 2000).

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- There are insufficient resources to support an aging infrastructure network. According to conference speakers, investment in maintenance of our aging national infrastructure has not kept pace with demands. Infrastructure systems underpin our national economy and require regular maintenance and replacement as they wear or complete their useful lives. One speaker explained that, on the state level, inflation, taxpayer revolt, and the emergence of competing needs have left California's infrastructure investment lagging far behind demand. Another speaker highlighted the fact that the General Services Administration, which controls approximately 300 million square feet of federal office space (41 percent of the federal inventory), has a multibillion dollar backlog in capital maintenance expenditures for its building inventory. This speaker also maintained that the lack of quality federal workspace affects the recruitment and retention of workers, which can exacerbate the workforce planning challenge faced by federal agencies.
 - The impact of past federal policy concerning the nation's infrastructure should be reevaluated. A conference panelist suggested that such an evaluation should consider the design, condition, and needs of our public and private infrastructure network. In addition, speakers raised questions about the implications of federal policy in several areas, including (1) whether government funding is meeting the maintenance needs of federal properties, (2) whether federal regulations are creating barriers to innovation and economic expansion, and (3) how federal infrastructure policy and investments might be used to support state and local quality growth initiatives designed to avoid the negative consequences of urban sprawl development. One speaker stressed the need for effective intergovernmental cooperation between federal, state, and local policymakers to address the dual challenge of managing growth while maintaining the quality of life in communities nationwide.

Approaches for Addressing Infrastructure Challenges

Conference participants generally agreed that meeting the challenges facing the nation's infrastructure will require concerted efforts on the part of the public and private sectors. Again, the approaches that panelists recommended varied with each panelist's perspective and area of expertise. At the same time, many of the suggested approaches had broad similarities and interrelationships.

Conference participants provided numerous examples of approaches for addressing the nation's infrastructure challenges, including the following themes:

- Plan and use existing infrastructure more efficiently. One panelist noted that providing incentives for development in areas already served by infrastructure systems could increase the efficiency of infrastructure use. Another panelist indicated that taking advantage of available information on demand for services could help planners more effectively meet growing demand. Concerning incentives, one speaker suggested that providing tax credits for housing development in areas with adequate transportation services could help meet the need for affordable housing while taking advantage of existing transportation networks. Another approach mentioned to address demand and environmental concerns was brownfield development² in cities and, occasionally, in rural areas. Both housing tax credits and brownfield development were highlighted by panelists as ways to efficiently use existing infrastructure. In addition, the use of information technology could facilitate efficient infrastructure investment and avoid oversupply. For example, a conference speaker indicated that policymakers can project future demand through the analysis of infrastructure use rates and thereby efficiently plan the level of new investments. Another speaker demonstrated decisionmaking software that policymakers can use for investment priority-setting and aligning investments with strategic goals. Furthermore, pricing strategies known as demand management can promote the efficient use of existing infrastructure, as discussed below.
- Incorporate performance management in infrastructure decisionmaking. According to *Fragile Foundations*, a report written by a conference panelist, performance measures are necessary for gauging infrastructure needs more precisely, maintaining and expanding service capacity more effectively and efficiently, and supporting a growing and prospering economy.³ This speaker emphasized that federal infrastructure investment and regulations can be monitored and

² Brownfield development seeks to use abandoned and contaminated industrial sites for redevelopment following the cleanup of toxic waste.

³ National Council on Public Works Improvement, *Fragile Foundations: A Report on America's Public Works, Final Report to the President and Congress* (Washington, D.C.: U.S. Government Printing Office, Feb. 1988).

assessed using the performance measurement requirements under the Government Performance and Results Act (GPRA) of 1993. According to this speaker, infrastructure performance is fairly measurable, and GPRA provides the federal government with the framework for measuring results. Examples of measurable outcomes of federal programs include congestion time and accident rates for highway investments and average delays and elderly/handicapped access for mass transit investments.

- Integrate regional planning and intergovernmental cooperation in infrastructure development. Conference speakers indicated that if the federal, state, and local roles in state and local infrastructure development were altered by requiring more regional planning, federal assistance might be put to better use. According to one panelist, regional planning such as that embodied in the Intermodal Surface Transportation Efficiency Act of 1991 and the Transportation Equity Act for the 21st Century (TEA 21) of 1998 provides substantial benefits through intergovernmental cooperation. For example, TEA 21 requires metropolitan area planning and intergovernmental cooperation on transportation investments. Such planning considers projects and strategies to enhance economic vitality, increase safety and security for transportation system users, protect the environment, and promote energy conservation and quality of life improvements. One speaker suggested that regional planning and intergovernmental cooperation could improve the delivery of housing assistance. Receipt of federal housing assistance under federal formula grant programs requires jurisdictions to prepare consolidated plans, including comprehensive housing affordability strategies—that is, plans for meeting low-income family housing needs. The speaker suggested that these plans could be made regional in scope and merged with metropolitan transportation planning to better meet housing needs by taking advantage of regionwide housing opportunities.
- Encourage alternative approaches to infrastructure development and maintenance. Because there has been insufficient funding to address the backlog of federal property maintenance and renovation needs, one speaker suggested regulations to promote private-sector-like approaches for property maintenance and renovation. For example, this speaker suggested that federal agencies could be permitted to keep and reinvest the proceeds from sales of federal property. Agencies could also be allowed to enter into lease-with-option-to-buy arrangements if the Office of Management and Budget would waive or

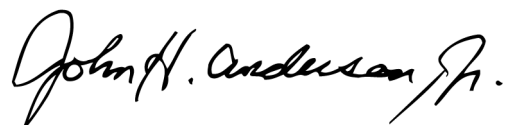
revise budget-scoring rules that prohibit such arrangements. A different approach mentioned in terms of federal property was allowing federal agencies to tap some of their billions of dollars in equity by entering into public-private partnerships, in which developers would finance the renovation of federal property in return for a percentage of the cash flow from the partnership. Another speaker offered a planning-oriented proposal to help state governments address deferred maintenance issues. For example, this speaker said that life-cycle costing could be promoted by requiring preparation of maintenance plans in conjunction with capital outlay plans.

- Encourage market-based decisionmaking in provision of infrastructure services. Several conference presenters agreed that the historic federal role in regulating some infrastructure services has been too intrusive and that encouraging competition through deregulation provides incentives that foster economic efficiency and innovation. One speaker illustrated the concept by describing the introduction of competition into the telecommunications industry, which lowered prices and significantly increased both investment and the number of wireless subscribers. Another speaker pointed out that deregulation can lower costs for consumers, as evidenced by lower prices in many airline markets since deregulation. A third speaker suggested that time of day (i.e., congestion) pricing or auctioning of runway takeoff and landing slots would help to reduce air traffic congestion and flight delays by providing incentives for more efficient use of airport capacity.⁴ Similarly, a fourth speaker suggested using time of day pricing for access to bridges and tunnels.

The full text of speakers' remarks, each of which represents the speaker's positions alone, is contained in report appendixes. If you would like additional information on this study, please call me on (202) 512-2834. The June 2001 conference was planned and this report was prepared under the direction of Peter Guerrero, Director, Physical Infrastructure. Other major

⁴ These points are detailed in "Ending Runway Gridlock" by Dorothy Robyn in *Blueprint: Ideas for a New Century*, September/October 2001.

contributors to this report were William Sparling, Teresa Spisak, and Alwynne Wilbur.

A handwritten signature in black ink, reading "John H. Anderson, Jr." with a stylized flourish at the end.

John H. Anderson, Jr.
Managing Director, Physical Infrastructure

Introduction to Panel 1 by Paul Posner, Managing Director, Federal Budget and Intergovernmental Relations

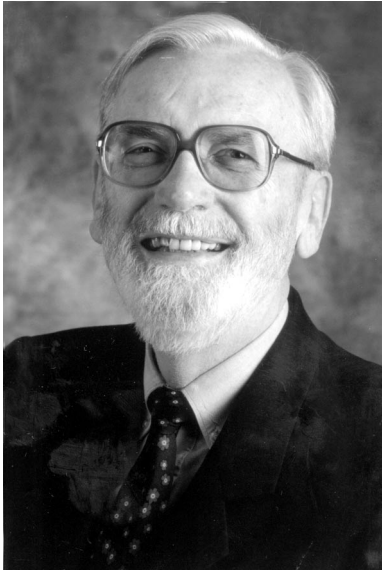
Panel 1: What is the state of the nation's physical infrastructure; what factors will influence future infrastructure needs; and how can these needs best be met?

We might dub this panel our foresight panel. A lot of us think of the General Accounting Office as being in the business of oversight—that is, overseeing how agencies are implementing laws that the Congress has already passed. But another important role for us is foresight, helping the Congress and the public understand how emerging forces in a rapidly changing society are going to affect the federal role in a lot of different areas, what choices are presented to us, and how we can inform those choices with good systematic analysis. In some sense, we have had the luxury in the past 3 years of having risen out of a preoccupation with deficits to enjoy surpluses, at least for a period. Surpluses can prompt us to think about how we can position the government to address emerging issues over the long term, and infrastructure is certainly among the largest of these issues. We also know that surpluses will soon be overtaken by a demographic tidal wave we're all a part of, which makes it important that our choices today are effective and fiscally sustainable.

Today's panel will guide us through some of these choices and help us to better understand the big picture. What are the implications of energy, demographic, economic, technological, land use, and intergovernmental trends for infrastructure in general and for the federal role in particular? How do these trends interact with our values, views of government, and financing issues to shape our choices?

The remarks of panel 1's four speakers are contained in appendixes II through V.

Presentation by Joseph Coates, President, Joseph F. Coates Consulting Futurist Inc.



Joseph Coates is president of Coates and Jarret, a futurist research firm. Since 1979, the firm has consulted with 45 Fortune 500 companies, numerous smaller companies, trade and professional organizations, and all levels of governments. He is the former head of exploratory research at the Office of Technology Assessment and program manager of the National Science Foundation's Research Applied to National Needs program. Mr. Coates has authored over 300 articles, papers, and chapters and is co-author of *2025: Scenarios of U.S. Global Society Reshaped by Science and Technology*. He holds degrees from Brooklyn Polytechnic Institute, Pennsylvania State University, and the University of Pennsylvania and an honorary doctorate from Claremont Graduate School.

Looking to the Future Requires Challenging Assumptions

Thank you. It's a great pleasure to be here. I've always admired the work of GAO. Some people think it has a heavy hand, but weight is necessary if you are to see whether the law and expectations are being met. I'm going to talk about some of the things shaping the future of the infrastructure. But before doing that, let me answer a question that should be on your minds. Why bother? Bright, intelligent, well-informed people could very well feel that they're smart enough to be ready to engage the future as it unfolds. The problem with that reasoning is that it doesn't work. There is an infinite history of failure of that strategy.

The point of looking into the future is not to tell you what will happen or what may, might, or could happen. That's at best an instrumentality. The primary purpose in looking to the future is to help you to understand what your assumptions are about the future. Remember, the higher you go in the organizational pyramid, the more socially and culturally isolated you are, and the less likely it is that anyone will seriously challenge you. You're going to persevere in the mind-set that brought you successfully to the top. In other words, you are going to be continually looking backward and attempting to reproduce your historic experience.

The purpose of looking into the future is to help jar you into becoming acutely aware of your assumptions. I'm seeking disagreement, not

agreement. I'm hoping to evoke from you, "That couldn't be. No way. What a nutty idea," because if you think twice about that, you'll realize that you can't attack a concept about the future without revealing some of your own assumptions. It's those assumptions that are worth thinking about.

Demographic Trends Will Affect the Nation's Future Infrastructure Needs

Let me pick a few themes here. You will recognize that current and historic practices have led to rigidity; to narrow interests influencing infrastructure; to indifference to future outcomes; and to a generally chaotic, limited, and partial planning for the future of infrastructure. That's GAO's problem to overcome if it is going to be more successful than it's been in the past in influencing the future. Let me suggest some of the things affecting the future of transportation and information. The first thing to consider is that population growth is clearly in our future. We're the only rapidly growing advanced nation. That's fundamentally good news for the economy. It means more clients, more prosperity. It also means more voters. At the same time, it means new distributions of population and new interest groups. All these changes have to be integrated into transportation and information technology infrastructure planning because infrastructure has a minimum lifetime of 50 or 60 years. If you're only looking out with a decade's perspective, you're going to miss the boat. That's the only form of transportation I'll mention.

The second thing to consider is that information technology is now highly active in business-to-consumer and business-to-business trading, bargaining, buying, and selling. The consequence of that has to be a large increase in the movement of goods in relatively small packages around the country—in other words, an explosion in logistics. Those logistics are largely going to move through the transportation networks.

The third thing to consider is the growth of tourism and travel. This will rise if we make a reasonable assumption of 1-1/2- or 2-percent annual growth in the Gross Domestic Product. You may be more optimistic about that. I don't want to be extreme. If this growth occurs, over decades, more people will have more discretionary money. More discretionary money all around the world means the same thing. It means more mechanized, motorized transportation—particularly outside of the United States, as we already have a lot of it. Second, it means more meat in the diet. Third, it means more travel. Global and domestic prosperity imply these three increases.

We have a consistent history of federal and local government neglect of infrastructure. Why do American highways fall apart in 5 years, yet the ones in Germany last forever? It's a simple matter of the failure to do two things that are right down GAO's alley. One is to enforce the conditions for the construction of highways, and the second, which is not part of the federal package but can be mandated, is to be sure that local ordinances are enforced. You could, before they patched it up a few years ago, go down the Washington-Baltimore Parkway and feel exactly where the trucks' turnoffs were, because at those points the road ceased to be a shambles and you had fairly smooth travel. That situation shows absolute administrative and technological incompetence. That's the story of transportation infrastructure across the United States.

Deregulation is another source of problems. I can't think of a single example of deregulation leading to an overall net public gain. Try to fly somewhere and the airlines will say, "Technical problem. Had to cancel the flight." They are only canceling because they have an under-filled aircraft. What are they doing? They lie to you. They cheat. They mislead you. And what is GAO doing about it? Nothing. There is no significant independent government analysis of the abuse of consumers by the airlines.

I'm thinking of writing an article entitled "Hallelujah! Let's Welcome Back Regulation." Look at what deregulation has done to whatever your favorite sector is. Look at our local telephone company, Verizon. It's probably the most disgraceful telecommunications organization in the United States. Where is government looking at the lousy service that is routine in telecommunications? Telephone companies used to have information services. They used to have telephone books. In the last 2 weeks, I've called for information at Verizon three times. Twice, they didn't have the number, and they'd never heard of what I was looking for. Decay, rot, and bad service are coming out of deregulation, and we the people and our representatives in the Congress need to know why. The Congress can't correct the problem unless it knows it exists and why. The primary reason those things happen is that there's a failure to treat law and regulation as social technologies. We know how to deal with physical technology in terms of anticipating future consequences, but the Congress has been extremely reluctant to acknowledge that legislation is social technology, and its side effects and consequences can be simulated, worked out, and anticipated. A couple of exercises along this line by GAO could be a great eye-opener for the Congress.

Priorities are set by interest groups in the United States, and, consequently, present practices are not linked to what could be. Present practices are limited by what those special interest groups want or will tolerate. It doesn't make any difference whether they are liberal or conservative. It doesn't make any difference whether they are concerned with the environment or higher sales of energy. The narrow interest groups dominate what goes on on Capitol Hill. GAO has the opportunity to be an alternative, leveling, even-handed voice, the voice that gives pros and cons on the concepts in the legislative mill.

Changing Land-use Patterns Affect Transportation Needs

Land-use patterns are promoting the polycentric city. Twenty-five years ago, you could map Calcutta onto Chicago or Chicago onto Calcutta. That's how universal the internal logic of city structure was. Not today. Today, what you have is exemplified by what's going on here in Washington, with four or five centers of business, even such things as Tyson's Corner, which I believe was a car dealership that grew into a business center. You have Rosslyn. You have Columbia. You have Alexandria and Arlington. You have places growing up that have all of the functions of the central business district, except the cultural and governmental functions.

Effectively, that means that all of the traditional infrastructure, which was built in and out of the central business district, now has to be restructured into a more spaghetti-like pattern. Another factor to consider, which doesn't seem to enter into planning as much as it should, are the trade-offs between airplanes and car or rail. Some recent research shows that people prefer to drive up to about 325 miles. What does that mean for strategies for light rail, new forms of transportation, short-hop aircraft, and so on? One needs to understand why people have their preferences and how to deal with them. In general, one needs to expand the context for thinking about infrastructure.

I learned just the other day that there's a plan under way to build a new airport for Philadelphia. The land is available. It just happens to be 40 miles away from anyplace anyone wants to be. Is there not some alternative to that kind of madness? Look what's happened in Denver. The Denver airport is an absolutely beautiful-horrible place to go. Nobody and nothing is out there, and, yet, somebody figured it would be a good thing to move an airport that was 15 minutes from downtown Denver to someplace that happens to be a fair fraction of a day's work in travel. When is systemic thinking going to occur in the design and building of the infrastructure? Promoting systems thinking should be GAO's mission.

GAO Should Examine Broad Infrastructure Issues

GAO needs to look back at maybe five previous examples of infrastructure that had overruns and examine in detail why those overruns existed—not in terms of what the Congress voted on, but in terms of what the Congress knew before it voted or what it could have known before it voted. Then GAO needs to transfer that lesson back into future consequence analysis and feedback. I'm not suggesting this is an easy thing to do, but unless we do it, every bit of the infrastructure in the United States will have shocking overruns during the next decade or two. We're talking about overruns that will have 12 or 13 digits, that may run to a trillion dollars. This situation provides a fantastic opportunity for GAO to do good.

Public policy in the Congress is focusing on the short run, the local, and the pork barrel. Pork barrel has to become a clear, positive, overt element in GAO's evaluation and planning. Denial doesn't do good for anyone. You folks have to learn how to cope in a positive way with pork barrel. It doesn't have to be everybody's pork, every time. It only has to be fairly distributed and for the common good.

Let me make one last point. The most critical thing that information technology is doing is making it practical, and now mandatory, to deal with the total system that one is concerned with. One can no longer say, oh, yes, we know all about the system and then ignore most of the factors influencing it. Information technology makes it practical and necessary to consider all of the components of whatever infrastructure system you're concerned with. I hope that GAO will lead the way by both precept and practice in doing that as it explores for itself and others the infrastructure's purpose.

Thank you.

Presentation by Anthony Downs, Senior Fellow, The Brookings Institution



Anthony Downs is a senior fellow at The Brookings Institution, where he has been since 1977. Before that, he spent 18 years as a member and chairman of Real Estate Research Corporation, a nationwide consulting firm advising public and private clients on real estate investment, housing policies, and urban affairs. Dr. Downs has been an advisor to several secretaries of the Department of Housing and Urban Development and has authored 20 books and over 460 articles. His recent books discuss such issues as traffic congestion, rent control, and metropolitan governance. He holds a Ph.D. in economics from Stanford University.

Demographic Trends Will Affect Transportation Demands

My task today is to present information on forthcoming population changes in the United States that will influence how transportation functions in the first part of the 21st century and then to show the implications of those population changes for transportation. Let me begin with the likely population changes within the next 25 years. The most important change is that the nation's total population will rise by at least 48 million people between now and the year 2020 and by as much as 64 million by 2025. These estimates are based upon the Census Bureau's projections before the Bureau did the 2000 count, in which it found 6 million more people than it thought were in existence, so if anything, these projections are all low.

Americans have been adding more than one additional private motor vehicle per human being added to the population since 1980. This means that the number of private vehicles on American roads will rise immensely in the future, by at least 48 million by 2020. The second trend is that the elderly population will grow faster than any other group. Again on the basis of data projected before the 2000 census results, the population of those who are 55 and over will rise by 73 percent between 2000 and 2025. People over 55 make up 21 percent of the total population today but will be 25 percent by 2010 and 30 percent by 2025. In fact, by 2025, there will be 9.5 million more people 75 years and older. This means that older drivers with limited capabilities may become as big a problem on roads as drunken

drivers are today. Moreover, older drivers will have the political clout to change the rules to allow them to stay on the roads longer, since no one wants to stop driving.

In contrast, the population of young people under the age of 18 will grow by only 2 million, or 3 percent, between now and 2010, but it will rise by 10 million from 2010 to 2025. That means a lower fraction of all households will have children than at present, which will mean less public support for education but perhaps more public support for public transit.

Future ethnic changes in our population will be dramatic. The non-Hispanic white population of the nation, the traditional majority, is now 70 percent of our total population but will decline steadily to 60 percent by the year 2025. This majority group will grow only by 6 percent between now and 25 years from now, compared with a 23-percent growth for the entire population, a 30-percent growth for African-Americans, and an 88-percent growth for Hispanics. Hispanics, or Latinos, will rise from 13 percent of the total population today to 20 percent in 2025.

Looking at the increase in the population from now to 2025, only 19 percent will consist of non-Hispanic whites, 50 percent will consist of Hispanics, 15 percent of African-Americans, and 16 percent of other groups. This means that 81 percent of our future population growth will be among groups we now consider minorities. Because minorities have lower incomes and lower vehicle ownership than whites, this could mean a slower increase in vehicle ownership on the one hand and more patrons for public transit on the other, especially in big cities. But it certainly means that minorities are going to become much more important in every aspect of our life.

Because minorities have higher birth rates than whites, they will become even more dominant among younger ages. Today, non-Hispanic whites are 62½ percent of all children under 18, but that number will decline absolutely by 2.8 million by 2025. In contrast, the number of Hispanic children under 18 will rise by 9.4 million. As a result, the share of minorities among all children under 18 will rise from 37.5 percent today to 49.4 percent in 2025. That means that half of all children in our schools will be minorities, mainly Hispanics and African-Americans, especially in big cities, where they dominate the public schools.

Another trend is that the real income level of the majority will rise enough to generate rapidly increasing demand for faster travel. People tend to spend about the same percentage of their income for transportation. When

incomes rise, people move to faster modes. They start by walking, and then they go to bicycles, and then to buses, and then to motorcycles and motorbikes, and then to cars, and then to airplanes, because airplanes are the only way they can get the speed up. The demand for air travel will escalate dramatically. If the number of passengers carried by American airlines were to escalate in the future at the same compound annual growth rate that it did in the 1990s, then the number would increase by 51 percent by 2010 and by 114 percent by 2020. The demands for air travel will escalate dramatically, as will demands for car travel and car use in the developing countries, where people will be moving from buses and bicycles to automobiles.

Another population trend is that in the United States, most future population growth will occur in the South and the West. The metropolitan areas in those regions have been built mostly during the automobile era. They have much lower central city densities but higher suburban densities than older cities in the Midwest and East. On the other hand, environmental resistance to growth is strongest in the west. One of the reasons the South and West have lower densities is that it takes a long time to build up high-enough densities to support transit. In fact, anything of value takes a long time to build up.

**Population Growth Will
Expand Suburban Areas,
but the Poor Will Continue
to Live in Older Core Areas**

Most population growth will continue to occur through peripheral expansion of suburban areas, that is sprawl, rather than through rising density in central areas, even if the population in some central cities rises as happened in the 1990s. Although future infrastructure costs could be reduced somewhat by having more compact growth replace sprawl, the cost savings will not be considered worth the losses of benefits by those who now gain from sprawl.

I just participated in a large-scale study called *The Cost of Sprawl 2000*, managed by Bob Rochelle of Rutgers. He and I were the principal authors of it. We produced a 600-page volume estimating the costs of accommodating all future population growth in the country between now and 2025 under two scenarios. One scenario is continued sprawl, and the other is a more compact form of development. The study estimates that the cost of sprawl would be at least \$250 billion more over that period than the cost of more compact development. But \$250 billion is only \$10 billion a year over a 25-year period, and that is not a very large amount of money compared with the total cost going into development or the size of our gross national product. Furthermore, a lot of people believe that sprawl

produces benefits for them. For example, typically, housing prices are lower if you go farther out. So I think most of the future development will continue to be in the form of sprawl. There will be a lot of peripheral growth of somewhat higher density than in the past, and many more poor people will live in the suburbs.

Population growth will occur in relatively new communities, which means in newly built dwellings. Because in America we require all newly built dwellings to meet very high-quality standards, which are expensive, a lot of people will not have enough income to live in these newly built dwellings and, therefore, will not be able to live in new-growth areas. At least a sixth of the population added will be in that category. This means that there will be more overcrowding in older core areas and older suburbs through the more intensive use of existing older dwellings. America will continue to house many of its poorer citizens in slums, as it has done right from the beginning of the nation and particularly during periods of high immigration, such as the period we are in now.

Travel Will Continue to Be Dominated by Automotive Vehicles

What are the implications of these trends for future transportation activities? The first and most important is that ground travel will continue to be dominated by private automotive vehicles. Public transit use will grow absolutely because of more low-income households living in cities and more minorities without cars. But auto transportation will grow even faster. Public transit today is such a small share of total movement that even rapid percentage increases in it will not displace much private vehicle movement or alter the dominance of cars and trucks. Advocates of public transit recently have pointed out that public transit use went up something like 4 percent in the last year, and they say this is a great triumph, that it was a bigger percentage increase in public transit use than in automobile use. In percentage terms, that's true, but the absolute amount of increase in automobile use is about 20 times larger than the increase in public transit use.

Outside of New York City, only 2.2 percent of all American commuters commute by public transit. Public transit mileage is less than 2 percent of all ground passenger travel mileage. For most Americans, cars are faster, more private, more comfortable, and more flexible than public transit. The average commuting time in America for somebody driving in a car is 22 minutes. For somebody taking a bus it's 36 minutes. For somebody on fixed rail it's 45 minutes. So you can't get American drivers out of their cars and into public transit by making public transit more attractive. You can

only do it by making driving less attractive, and that means raising the cost of it through such things as high gasoline taxes, which we refuse to adopt, or other methods.

Public transit will need to become more flexible to better serve low-density areas. That should mean more deregulation to end the dominance of transit by high cost, monopolistic public authorities controlled by unions and administrators. Smaller scale vehicles and firms that can serve lower density areas should be encouraged. I do not share the opinion of Mr. Coates that deregulation is a total failure. I think it has drastically reduced the cost of air travel for people who want to travel, but it doesn't make travel more convenient.

Roadway Traffic Congestion Will Continue to Get Worse

Another result of future trends is that roadway traffic congestion will inevitably get worse because of the rising use of vehicles by additional people. I happen to know a lot about the subject because I wrote a book entitled *Stuck in Traffic*, which is published by the Brookings Institution. I believe that rising traffic congestion is an inescapable part of living in modern metropolitan areas everywhere in the world. Traffic congestion is essentially a balancing mechanism that enables people to pursue certain key goals besides minimizing commuting or driving time. Thus, it is a mark of rising prosperity. There is no solution to increasing traffic congestion. We can only cause it to rise more slowly. We can't stop it from rising.

Congestion will encourage more decentralization of workplaces to get jobs nearer to where people live. It will also encourage more telecommuting. But tension with poorer workers will rise, since they will be unable to live in the new suburbs near the new jobs because they can't afford to live in brand new housing. In some cities, trucks will be prohibited from entering certain areas during peak hours, as now occurs in Bangkok. Some areas may construct separate roadways for trucks only, as is being considered in some American cities. Congestion in the largest metropolitan areas, those with strong downtowns, will encourage more people to live near the downtowns to be nearer to their central-area jobs. But this will be a relatively small offset to the total increase in population in most dynamic metropolitan areas.

Hot lanes, or so-called high occupancy toll lanes, to which sole drivers can buy access during peak hours, may become much more common because they create at least one lane in which people can move fast during periods of congestion if they're willing to pay for it. Hot lanes do not solve the

congestion problem because all of the other lanes remain just as congested as before. They just let some people move fast while most remain stuck in traffic.

Air Traffic Congestion Will Also Get Worse

Another form of congestion will concern air travel. Congestion at airports will become a serious bottleneck limiting the growth of air travel. Yesterday, it took me 6 hours to go from Chicago to Washington because of delays caused by weather. We taxied out on the runway, and after we got out there, the pilot announced that he had known for an hour that there was an air stop in Washington, but the airline had made him taxi out and put us there in the heat because they needed the gate for somebody else. There is already severe congestion in bad weather at major American airports. Major airports will be unable to handle demands for air travel at peak periods, or even at all. Bitter conflicts with environmentalists and local residents concerning the addition of new runways or the building of new airports will become widespread. In San Francisco, for example, although there are 264 square miles of water in the San Francisco Bay and the bay is 19 miles wide at the San Francisco Airport, the environmentalists do not want to allow a 1-mile addition onto the airport for a new runway because they say it will ruin the bay and cause more noise pollution in the area.

How you feel about this kind of situation where the airlines are frozen because of local resistance depends on who you are. If you're somebody who lives underneath the runway and doesn't want to hear the noise, you like it. If you're somebody who wants to travel more, as I do, you don't like it.

I think the most sensible solution, more runways at existing major airports, should dominate over the construction of new airports. I think that at O'Hare, at Logan, at all of the other major airports in the country that have a tremendous amount of transfer traffic, it makes sense to build more runways. It does not make sense to build another airport 40 miles away.

Limitations on air travel will create some pressure for more fast trains, but these trains will be tremendously costly. There's an article in the latest issue of the *Economist* that talks about how the new fast trains in France are so wonderful but cost taxpayers an enormous amount of money. So I don't think fast trains will take over much travel at all. Problems connected with transportation will create more pressure for some type of regional governance and planning arrangements over land use as well as over

transportation itself. This is already evident. But actual adoption of regional governance will only occur in areas that believe they are in some type of growth crisis, as has already occurred in Atlanta, Florida, and New Jersey.

**U.S. Citizens Will Continue
to Make Choices That
Reflect Their Priorities**

My last point is that if there's a saving grace for our future transportation system, it will be the adaptability of U.S. travelers, households, and firms. They will modify their behavior in locations to optimize those goals they cherish most by sacrificing others such as the saving of time, which they are now sacrificing to attain goals like a wide range of choices of where to live and work, the ability to make more than one stop on a trip, etc. Consequently, we will still be able to achieve quite high and efficient mobility in spite of all the problems caused by more people and vehicles.

Thank you.

Presentation by Bruce McDowell, Fellow, National Academy of Public Administration

Bruce McDowell is a fellow of the National Academy of Public Administration, president of Intergovernmental Management Associates, and a certified professional planner. For 12 years, he was a local and metro area planner in Washington, D.C. His federal experience includes 24 years with the Advisory Commission on Intergovernmental Relations and 2 years as director of governmental studies for the National Council on Public Works Improvement (a congressional commission). He has worked extensively with metropolitan planning organizations, which have been mandated by the Congress to coordinate regional transportation planning. Dr. McDowell holds a masters degree in Urban Planning from Georgia Institute of Technology and a doctorate in Public Administration from American University.

Five Recommendations for GAO Regarding Infrastructure

I'd like to get right to the point with the five things GAO should do. First, GAO should put out a regular report card on infrastructure. I spent 2 very intensive years working on the National Council on Public Works Improvement staff. In 1988, this panel on the status of the nation's physical infrastructure came out with a report card. We gave the nation a C+ grade for highways, a C- for mass transit, a B- for aviation, a B for water resources, and a B- for water supply. Wastewater got a C grade, solid waste a C-, and hazardous waste a D. I haven't reassessed these grades myself since 1988, but the American Society of Civil Engineers has updated it twice, most recently, I think, this spring. The grades are going down. The bottom line is that somebody has got to be out there keeping track of this in a credible fashion. Who better than GAO?

GAO is the last government think tank in this town that remains standing. Everybody else has been abolished. Thinking has gone out of style, so I hope you do some of it, and I applaud the big picture part of your agenda. I hope the 10-percent big picture thinking you can do on top of the 90-percent little stuff can make a difference.

We put out a pretty good report in 1988. The Congress asked for it. We gave it to the Reagan administration as they were leaving town, and I'm sure it was shelved immediately. On the theory that it had been shelved, I pulled a copy off the shelf, and I now present it to you as the agenda for this team. It's a big picture version of your topic. We looked at nine categories of public works, and I think you could do a lot worse than following this approach and bringing it up to date. The council self-destructed as soon as it turned in its report. The report was on time and it was under budget, and we were very proud of that and proud to go out of business. Following that

report, however, the Corps of Engineers got an appropriation from the Congress for a 3-year follow-up on the report. I went back to my former agency, the Advisory Commission on Intergovernmental Relations, and the Corps contracted with us to do some of the follow-up studies.

The major victory we got out of the follow-up studies was Executive Order 12893 in 1994, called Principles for Federal Infrastructure Investments. That has been picked up by the Office of Management and Budget (OMB) and made into a new Part III of the Budget Circular A-11. The original annual budget guidance is just Part I now. Part II is the Government Performance and Results Act (GPRA). The new Part III on investment analysis includes a very timid approach toward capital budgeting for the federal government, something that GAO has supported for a long time. So my number two charge to GAO is to keep track of that executive order. I think there's some real leverage there for the infrastructure community. It would be too bad to let it go off into a black hole.

The third thing that GAO should do is to apply GPRA to infrastructure programs. GPRA is the best thing around. It was embraced by the National Performance Review very shortly after it was enacted. Agencies didn't get the idea that it applied to them until 1997, which was the deadline to present their first strategic plans to the Congress. You should have seen the scramble in August, when the drafts were due to OMB, which was the first time most agencies ever thought of this act and the fact that it might apply to them. They all assumed it would go away. The Congress got interested. They did a report card on the agencies. They put it on the *Federal Page*. There were only two or three agencies that got better than a D. Most of them failed. But the fact that a couple of them didn't fail showed that it could be done, and every year as the new ones are submitted to the Congress there's kind of a rack up. They don't do the report card anymore, because they got such heat. But if they hadn't gotten that heat, the federal agencies still wouldn't be looking at it.

I think people now have the idea you've got to do GPRA, and I hope you'll apply it for all it's worth in the infrastructure area. The interesting thing about GPRA is that it gives government a bottom line. Everybody says that government doesn't have a bottom line, and therefore, you can't manage it. In fact, the bottom line for government is performance for the people. The infrastructure team is lucky because you look at things that are pretty measurable compared with an awful lot of other federal programs. If you can't apply GPRA, it won't work. So go out there, tell the agencies they do have bottom lines. They can manage those bottom lines. Their bottom line

is not profit; it is benefits for the American people. Those benefits can be measured, and agencies are making considerable progress in doing that. Our 1988 report made an awful lot of the idea of performance. We measured performance. We ranked performance to the extent that statistics were available, and that's what needs to be continued. If there's no bottom-line tracking of performance, you're not going to get there on the goals. There's an old saying in management: what gets measured gets done. Performance measurement is the key to moving ahead.

My fourth charge to GAO is to reevaluate the federal role in infrastructure. I had developed five illustrations of areas where you could do that. But to save time, let me just give you one, and then just name the other four so you can fill in the illustrations from your own reading of the daily newspaper. The first one is the Interstate Highway Program. Around 1990, the Department of Transportation declared it to be completed, and said that from then on the job was maintenance. Well, what was the basic principle behind the interstate highway system design in the 1950s? It was very simple: connect every metropolitan area in the country. But then, the 1980 census created 80 new metropolitan areas, and the 1990 census created about 30 more. And it's expected that the 2000 census will create another 30. Is the system designed to serve those 140 new metropolitan areas? Somebody ought to see if the design principle behind the interstate highway system is still alive or not. I think it might be eye-opening. Joe Coates made the point that among the first-tier countries, we're the only one still growing rapidly. The country is not complete, so how can the interstate highway system be complete?

My second illustration was going to be the North American Free Trade agreement (NAFTA), and I won't try to spell that out too much. But it fits in very closely to the design of the interstate system. NAFTA creates a lot more north-south traffic. If you look at the design of the interstate highway system, it's mostly east-west to connect the coasts. We connected things in our own country. We weren't concerned about connecting Mexico to Canada. There wasn't a unified market at that time. Well, we're now busily trying to retrofit without saying that we are doing anything because, of course, the system is complete. The border crossings don't work. They are overloaded, and we've got to redesign them.

You can go to the other topics I was going to illustrate—rail mergers, air traffic congestion, and the nation's electric power grid—and imagine for yourself out of the daily newspaper the need to reevaluate the federal role in all of them. It's not enough to say we did our job and that we can now

walk away from infrastructure. The fallacy of highly developed countries is that they forget the basic rule in the underdeveloped countries, which is infrastructure, infrastructure, infrastructure. You go absolutely nowhere without infrastructure. We get fat and happy in this highly developed nation. We say we've got the infrastructure we need, and we begin to ignore it. I agree very much that deferred maintenance is one of the top issues around.

We got started on the issue of deferred maintenance at the National Council on Public Works Improvement because a book came out from the National Governors' Association that was entitled *America in Ruins*. The Congress said, "Is that true? I guess we'll have a commission." Well, the commission titled its report *Fragile Foundations*. We weren't quite willing to say America was in ruins. It didn't resonate. Everything was still working in 1988. I don't know if it is today. We got some gloomy comments about that this morning, and I think I would echo some of them. We are not paying enough attention to the existing system or what kind of upgrades it needs. We've lulled ourselves into complacency, I think, because we have a pretty good system. But we will wake up one day after America has fallen in ruins if you all don't measure performance all along the way and give some warning signs.

That leaves me with my last point, which is to push the crosscutting goals and measures that are called for in GPRA. Nobody else in this town will do that. GAO is perfectly placed. OMB has walked away from it. The individual agencies have walked away from it. Anybody who has actually tried to do it has walked away from it in frustration. Let me make one practical suggestion. Take a look at local government. Every state in the nation has enacted a law called the Interlocal Cooperation Act. They're not all the same, but every state has one. It says to local governments that anything you can do by yourself, you can do jointly. Some of the states even allow you to do it jointly with local governments that are in another state. And some of them are even so liberal as to say if they can do it and you can't, you can do it with them.

The point of this is to compare the Interlocal Cooperation Act with the Joint Funding Simplification Act of 1974. If you look at the history of that act, it said you can do everything jointly and we're going to simplify that for you. But then when you looked at all the simplifications, it was more complicated than anything you had ever imagined within your own agency, which is going a long way. It didn't work. It was enacted for a 5-year period, and it was used for the first 1 or 2 years. But it was found to be too hard to

do. It was extended for another 5-year period, and then mercifully allowed to lapse. It was a great idea, but its implementation was terribly flawed. The interlocal cooperation that the states have enacted essentially says you can put the money into a pot and then you can administer it and account for it as a single pot.

We've got a perfect precedent in the federal government, the Single Audit Act. We certainly don't have to go back and audit something five times just because five agencies put the money in. However, for your own accounting systems, you have to deconstruct the whole project at the end of the year, divide it back up, and stick it into your old original appropriations pots. That's a horrendous hurdle. That's basically why the Joint Funding Simplification Act failed. If you're putting it into the joint pot for a legitimate purpose, you should not be required to have to break it back out again. If it's a legitimate joint purpose, it ought to be audited and financially reported on its own base. I think we need an interagency cooperation act that says just do it. Put out some memorandums of understanding and some models and get a single audit at the end, and everybody should be happy.

The Bottom Line Is Performance for the American People

It's going to take a different kind of federal manager, I think, to work on some of these partnerships. The federal role is very different than it used to be. There are not that many things that the feds do by themselves anymore. Federal managers actually have to become managers of community-based programs, which entails a lot of consultation and a whole new way of operating. Instead of micromanaging by going out and getting compliance with what the Congress passed in its acts, you need to go out and be part of the community, part of the partnership, willing to collaborate, and willing to live by the results of the collaboration. I have a handout for you called "Principles of Consultation." I also have a handout for you called "Principles for Federal Managers of Community-Based Programs." The idea is not to just follow the book and make sure that everyone complies. Instead, the idea is to get in there together and make the program work. Get some bottom-line performance for the American people. It's a whole different approach.

Thanks very much.

Presentation by Jan Whittington, Independent Planning Consultant



Jan Whittington is a planning consultant from San Francisco, California. Her most recent publication, *Building California's Future: Current Conditions in Infrastructure Planning, Budgeting and Financing*, was co-authored with Michael Neuman. Her next publication, to be published later this year, is entitled *Making Room for the Future: Rebuilding California's Infrastructure*, and is co-authored with David Dowall, an internationally recognized professor at the University of California at Berkeley. As a senior planner for Bechtel Corporation for 10 years, she studied and developed large-scale infrastructure developments—from new towns to high-speed rail and intermodal port systems—across Asia and the Americas. Ms. Whittington holds a masters degree from California State Polytechnic University and is currently pursuing a doctorate in City and Regional Planning from the University of California at Berkeley.

California and the Federal Government Face Similar Challenges in Managing Infrastructure

The topic of this panel holds considerable bearing on how states manage their infrastructure, and let me just say that the apple doesn't fall far from the tree. On behalf of the Public Policy Institute of California, a private, nonprofit organization dedicated to public policy research, Professor David Dowall and I have spent the past 2 years studying California's management of infrastructure. If you're interested in our work, our past studies are available at www.ppic.org.

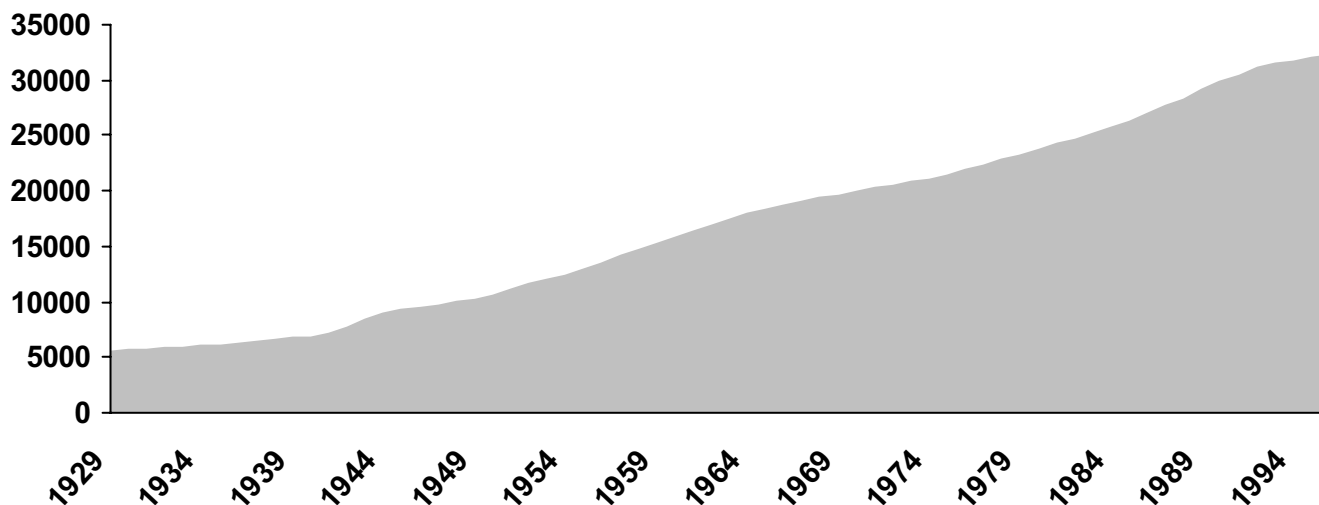
California's Investment in Infrastructure Has Lagged Behind Demand

Today, I bring you some highlights from our upcoming publication, *Making Room for the Future*. In the post-World War II period, California invested a great deal to accommodate population growth, and these public sector investments in education, transportation, and water could be called the crown jewels of the state. From the 1970s to the mid-1990s, inflation, taxpayer revolt, and the emergence of competing needs left state investment lagging far behind demand. By 1999, the California Department of Finance estimated the state's 10-year infrastructure needs at more than \$80 billion. And while higher levels of debt are anticipated—financing covers the majority of these needs—a sizable gap remains.

I'll see if I can show you how the gap was created. Population growth and infrastructure demand go hand in hand. California seems to have

consistently experienced record growth, much of this through immigration (see fig. 1).

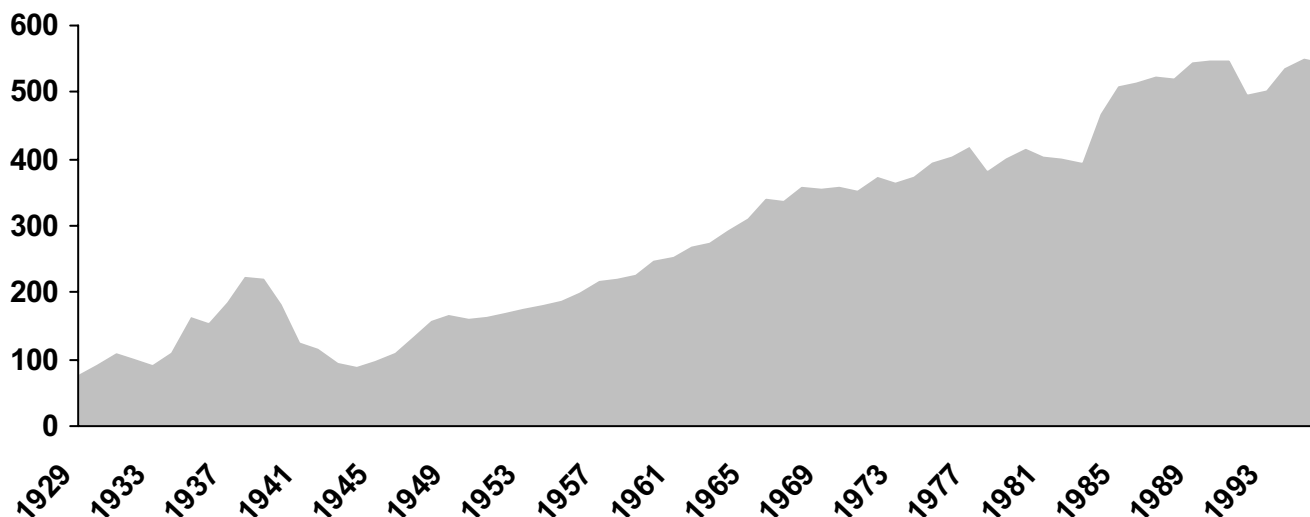
Figure 1: Persistent Population Growth: California's Population 1930-1996 (in thousands)



California's Operations and Local Assistance Spending Have Risen, While Capital Outlay Spending Has Fallen

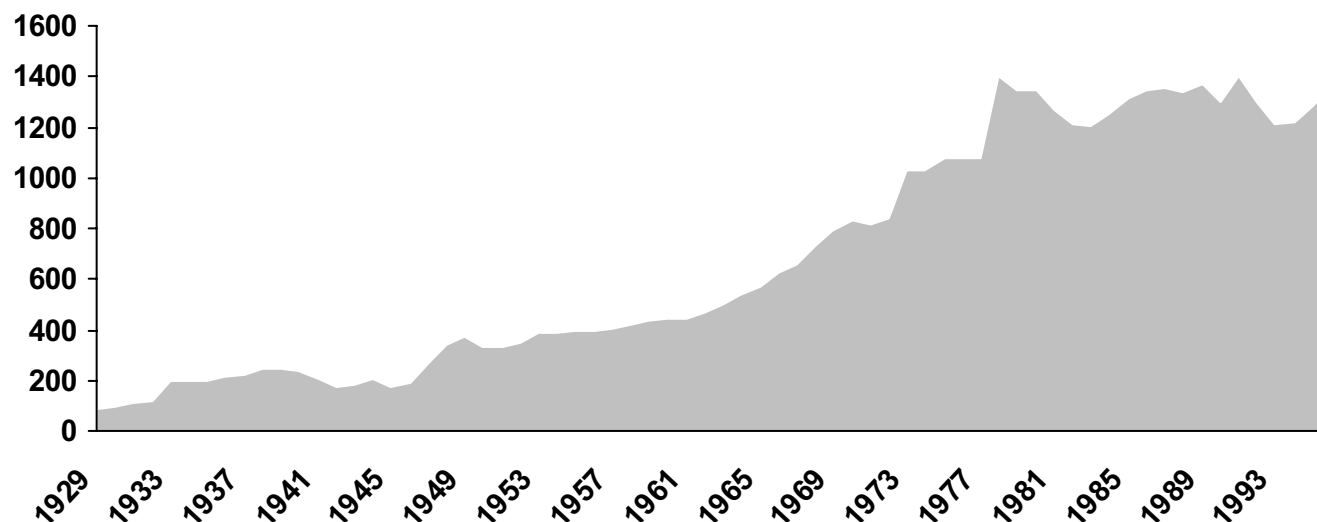
Already at 38 million, the state's population will climb to 50 million sometime around 2020. How has California been accommodating this growth? This graph (see fig. 2) shows California state operations' spending.

Figure 2: Demand Rises for Operations: Real State Operations Expenditures 1930-1996 (per capita in 1996 dollars)



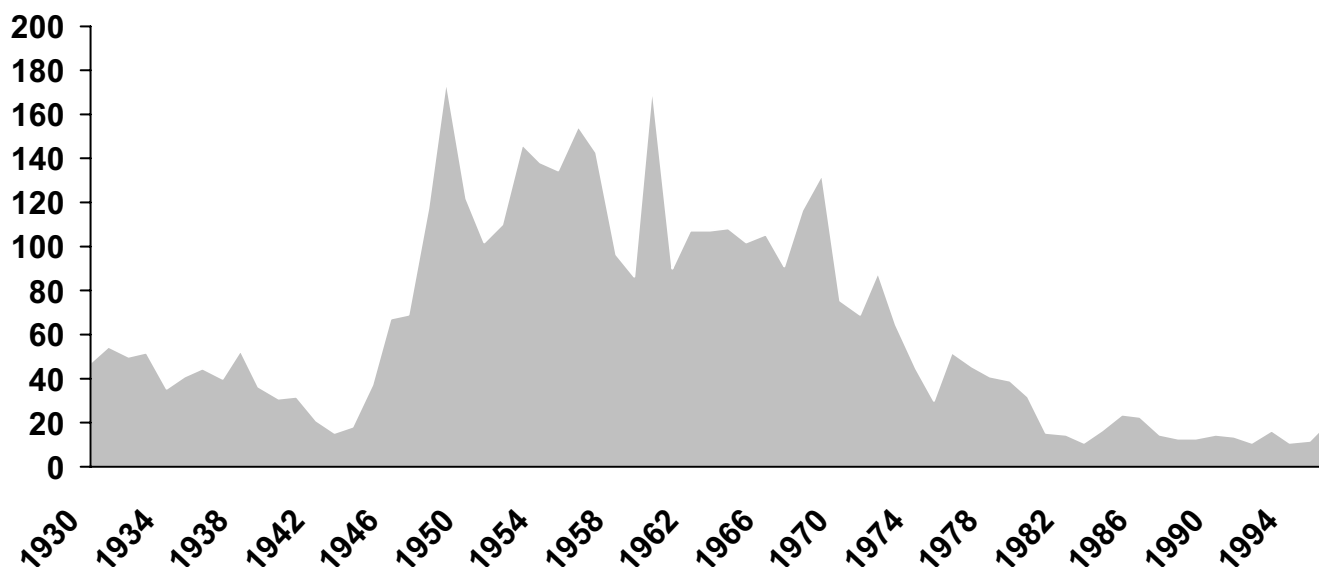
Demand for increased spending for a growing state bureaucracy makes sense, but what we show here is operations spending per capita. Clearly, state staffing and the cost of staffing have outpaced population growth. In 1960, the state consisted of about 22 departments, and today it has 64 departments and 8 agencies. California's expenditures for operations have doubled. Evidently, California has also been spending for local assistance like it's going out of style. This figure (see fig. 3) shows local assistance per capita.

Figure 3: Local Needs Plateau: Real State-Provided Local Assistance 1930-1996 (per capita in 1996 dollars)



You'll notice how local assistance spikes in 1978. It's about a 30-percent boost from Proposition 13. This proposition had the effect of strangling cities' and counties' ability to pay for infrastructure services, especially K-through-12 education. Since Proposition 13, you can see we've reached a plateau in local assistance. There's plenty of pork in here too. Now, the next figure shows that capital outlay spending per capita has trailed off (see fig. 4).

Figure 4: Capital Outlay Trails Off: Real State Capital Outlays 1930-1996 (per capita in 1996 dollars)

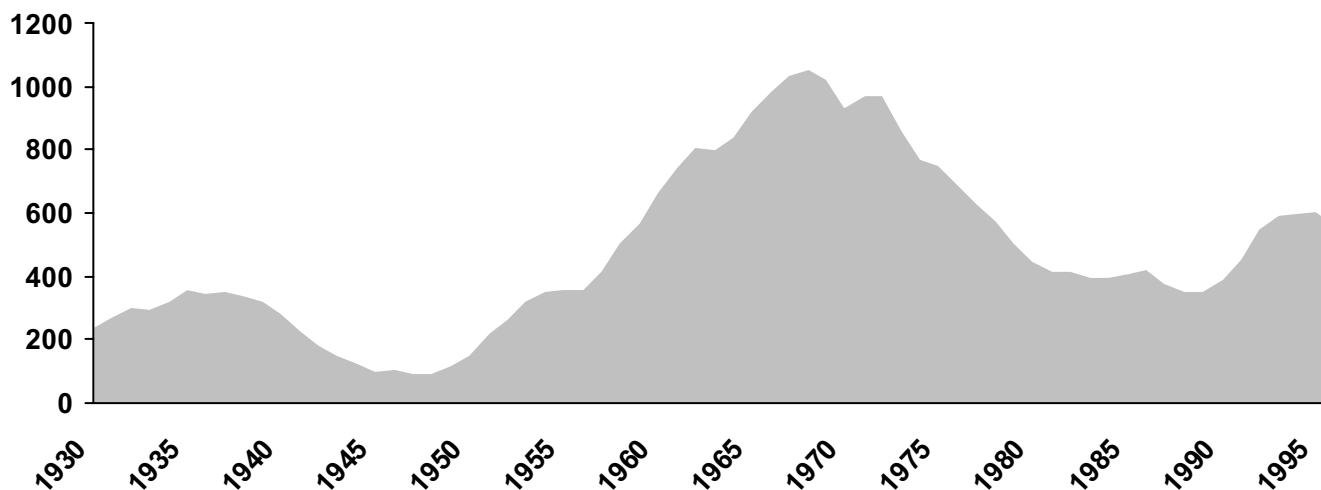


This is our smoking gun. Capital outlay spending has trailed off the map. You can clearly see the post-World War II development boom. You can see that spending kept pace with the population growth of the '50s and '60s. But for the better part of the last 20 years, we've been spending less than \$20 per capita on state infrastructure.

Financing Has Not Picked Up the Slack in Capital Outlay Spending

Some of you might be saying that the basic system has been built, and now California is putting it to full use. However, even if these systems of infrastructure were designed with excess capacity in the '50s and '60s, we should all be clued in to the fact that they are reaching the end of their 20 to 40-year designed lives. Some of you are definitely thinking that California must be using long-term financing instead of pay-as-you-go financing. But the General Obligation (GO) bonds haven't picked up the slack (see fig. 5). California has experienced some increase in bond spending, but it has not kept pace with population growth.

Figure 5: GO Bonds Don't Pick Up Slack: Real GO Bond Debt 1930-1996 (per capita in 1996 dollars)



Today's debt is climbing toward about \$700 per capita, but this still doesn't compare with the levels of the 1960s. In addition, nearly half of today's debt is being spent on K-through-12 education. I hear more echoes of Proposition 13 here. In addition, California's bond ratings are being strained by the energy crisis.

Something had to give. We have growing population, growing demand for services, and limited resources. Bonded indebtedness has limits, too. Among other things, the political will required to bring bonds to a vote seems to be dissuading the state from a continuous balanced approach to bond spending for capital outlay. Capital outlay has been squeezed out. If the state isn't spending commensurate with population growth, then the gap is growing.

California Needs a Renewed Commitment to Infrastructure Investment

We need a renewed commitment to infrastructure investment. The state needs to increase funding, but money alone won't do it. Even with all of the funds the state can muster, I don't think California can build its way out of the gap. Limited funds need to be invested strategically within and between sectors, and state dollars need to become more effective.

I'm going to talk about managing demand, aligning tasks with costs and benefits, enhanced project delivery, and maintaining investments. As with all policy options for infrastructure management, the devil is in the details.

So where possible, I'm bringing you detailed examples. This might seem a little far from Washington, D.C., and some of these details are at the county or city level, but I'll hope you'll bear with me.

Demand Management Can Help California Better Meet Its Needs

The best way to understand demand management is in contrast to a supply orientation. Supply focuses on what to build and how to build it, taking into account factors such as engineering costs and construction-cost estimates. In its most egregious form, a supplier orientation says, "if you build it, they will come." This perspective assumes inexhaustible resources. Demand management focuses on the consumer, on the market for the goods. It gives voice to clients or users. It's more planning and information intensive and assumes that resources are scarce. It looks toward service reliability, access, and accountability through regulation.

I have some examples here. Regarding urban water demand management, Marin County has an integrated resource management plan that was put in place in 1992 with a 10-year goal to reduce water consumption by 22 to 32 percent over 1987 levels. The plan includes conservation policies for residential users such as low-flow toilets, faucets, and landscaping. Commercial users are required to meet a water budget, and if they can't, they must buy rights to water from other commercial users. At the same time, the users face an increasing block tariff. Water use is down 16 percent, from 170 to 143 gallons per day. Regarding agricultural water demand management, water costs for crops as a percentage of total costs vary. It's about 5 percent for grapes, 12 percent for cotton, and 36 percent for pasture. The use of drip irrigation is increasing from about 2.2 percent in 1979 to about 13 percent in 1994. Underwater Ranch in Ventura grows peppers. It switched to drip irrigation and cut its water use by 25 percent. As it turns out, over-irrigation had fostered the growth of a fungus that actually decreased yield, so when the ranch switched to drip irrigation, its yield increased by 50 percent. And who knows what other crops this could occur with.

The Department of Water Resources in California operates the California Irrigation Management Information System (CIMIS). CIMIS consists of 100 computerized weather stations across the state. CIMIS costs \$850,000 a year to manage, and it generates benefits of \$30 million in avoided water costs. Incentives for conservation are critical for reducing water use. As soon as you shift to increasing block tariffs, this will result in changing cropping patterns that reduce water.

Now, I'd like to turn to higher education. Table 1 shows our estimate of the increase in full-time equivalent (FTE) capacity that would be generated at the University of California and California State University (CSU) if we were to switch to year-round education. The University of California would gain 31,000 FTEs; CSU would gain 36,000. As shown in the bottom right-hand corner of the table, the avoided costs would total \$3.3 billion.

Table 1: Higher Education Demand Management: Capital Cost Savings From Year-round Operation

System	Increased capacity (full-time equivalent)	Assignable square feet (full-time equivalent)	Cost (assignable square feet)	Total savings (in billions)
UC	30,846	140	525	2.27
CSU	35,883	75	384	1.03
Total	66,729	105	471	3.30

The esteemed Anthony Downs introduced the concept of triple convergence in his 1992 book, *Stopped in Traffic*. Triple convergence means that any new supply in the form of roads will quickly be overwhelmed with traffic for three reasons: travelers shift routes, travelers shift times, and travelers shift modes. Supply creates its own demand. People choose the path of least resistance. Downs mentioned a number of demand management tools: intelligent transportation systems, monitoring traffic, removing accidents, and using high-occupancy vehicle lanes or high-occupancy toll lanes. I-5 in Washington State was able to implement a range of demand management measures and reduce its vehicle miles traveled by 6 percent. This eliminated 80-million vehicle miles traveled per year.

Telecommuting is another way to reduce trips, but it's hard to monitor. Priced parking can encourage shifts to high-occupancy vehicles or transit. Congestion pricing can be effective. The New York-New Jersey Port Authority, I believe, has just implemented congestion pricing on tunnels and bridges entering New York. Transit-oriented development also is slowly under way. In San Diego, California, the Association of Governments has, for a regional organization, considerably consolidated power and is implementing higher densities near transit modes, but this is an exception.

Tariffs Should Be Aligned With Costs and Benefits

Now I'd like to talk a little about aligning tariffs with costs and benefits. Given California's apparent lack of will to spend tax dollars on capital infrastructure, it seems appropriate to revisit the role of prices. Conventional wisdom suggests that government should foster the consumption of merit goods by supplying them without fees. But what are we to do with a state that cannot cover the full cost of supply when resources become scarce? Infrastructure pricing could be used to redistribute income, but in most cases it shouldn't. Instead, we should be using income transfers. If this is impossible, we should structure tariffs to ensure access but charge marginal costs to middle and upper income consumers. In this day and age, government needs to generate revenues to cover the costs of services and to provide signals to producers and consumers that encourage efficient production and discourage over-consumption. Tariffs should match costs.

I have some principles for pricing infrastructure services: make effective use of increasing block tariffs to encourage water conservation, and introduce road pricing to reflect congestion and social costs. Cost recovery has its limits, and tariffs are usually regressive. Again, prices can be offset with income transfers and special programs such as lifeline services. Pricing of higher education should promote access, but tariffs should be structured to place more emphasis on means testing. These revenue streams would cover bonds and operational costs, and it's equally important to cover life-cycle maintenance costs, a task that requires considerable upfront planning.

Project Delivery Could Be Enhanced

I have a number of potent examples of enhancing project delivery in California. The first is in planning and project execution. Santa Clara County had about 50 miles of highway construction or expansion to do in the early 1980s. The county went to the California Department of Transportation (CALTRANS) and said, "Can you help us out? We're going to put in a half-cent sales tax measure over the next ten years. We need to complete the project within the next ten years to be able to benefit from this revenue stream." CALTRANS said it would take about 14 to 23 years to complete the project. These projects were actually completed in 7 years, but that's because Santa Clara County used Bechtel Civil Company to manage the project, and they coordinated the project with private contractors and CALTRANS. The county saved \$116 million through value engineering and time savings.

Concerning better information and asset use, in the planning state, the more we know about how well our assets are being used, the more we can reduce the estimates of infrastructure needs and the scope of new development. For example, classrooms are typically underused at the University of California. The average use level is only 67 percent of capacity. If all University of California campuses increased their use to meet our standard of full use, we would generate an additional 800,000 station hours of capacity. This would avoid capital costs of \$280 million.

Partnerships Are Another Good Option

Cooperation and sharing can also work. Last month, the City of San Jose and San Jose State University broke ground on the biggest library construction project west of the Mississippi. The university wouldn't have had the funds to develop a new library on its own. The city built the library but used university land to do it. I think the Santa Clara County experience is also a good example of a public-private partnership.

Introducing competition creates strong incentives for cost-effectiveness, but it is difficult to make competition last. First mover advantages, such as information asymmetries, can lead to hold up and monopoly positions. For example, San Diego has a Metropolitan Transportation Board that reviews contracts to provide bus service in the regions' transportation corridors. They award contracts for 3- to 5-year periods. The committee that reviews and awards the contracts includes the unions, the public and private bus operators, and citizen representatives. About 37 percent of revenue passenger miles are contracted out to private operators and the remaining 63 percent go to public bus operators. The region's bus fair box ratio is about 50 percent, which is well above the national norm. Their continual monitoring of contracts and regular schedule of placing routes up for bids allows for more sustained competition.

Life-cycle Costing Is Needed to Address Deferred Maintenance

Deferred maintenance is the sleeping giant. Maintenance requires planning, and maintenance and capital outlay decisions belong together. Each 5-year capital outlay plan should have a twin in maintenance. We had a hard time finding any evidence of life-cycle costing, which is really the basis for conducting maintenance. Asset reporting was dismal. Nobody likes to bother with record keeping.

In closing, I'll say that California's situation is probably familiar to other states as well. Spending has plummeted. The transition to long-term financing has been less than smooth, and growth continues. The states' institutions are filled with routines that are easy to design and hard to change. Moving to demand management or pricing, to more efficient service delivery, or to continuous maintenance involves painstaking efforts mired in details that are actually critical for success.

I hope these projects offer some insight.

Introduction to Panel 2 by Steve Cohen, Assistant Director, Physical Infrastructure

Panel 2: How can all levels of government and the private sector help plan for the infrastructure needs of sustainable communities?

I'd like to welcome you to our second panel of the day. This panel will continue the discussion about how we as a nation will meet our infrastructure needs, but it will do so in the context of the immense challenges of growth and development that we face in the years ahead. Over the next 50 years, the population of the United States is projected to increase by 50 percent. That's over 100 million more people for whom we're going to have to provide housing, jobs, schools, water, and roads and other transportation systems. In places like California, Texas, Florida, and the Southwest, there will be growth in the 50-percent range over the next 25 or 30 years. California, during this period, will add to its population the equivalent of the current population of the state of New York.

To understand the challenges we face, we need only to look at how we faced the challenges of accommodating growth in the recent past. The last time our nation's population increased 50 percent, the amount of driving we did as measured by vehicles miles traveled increased by about 300 percent. Fueled by economic prosperity, our growth was characterized by rapid expansion of our metropolitan areas. With that prosperity came not only traffic congestion, but the consumption of land, open space, and natural resources to support development; declining air quality; and the decline of our cities and older communities. It seems that almost overnight the people of Atlanta woke up to find that their metropolitan area was 100-miles wide. The people of Denver woke up to find that the mountains and open spaces they cherished were dotted with townhouses and subdevelopments. And the people of metropolitan Washington, D.C., found themselves spending the equivalent of 2 workweeks a year sitting in traffic.

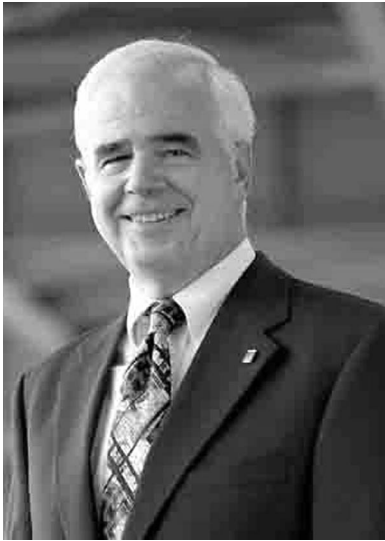
Looking at the record of the past and the challenges of the future, many communities and observers have concluded that the way we have been growing is simply not sustainable. The question facing many communities is how do we accommodate the growth that we know is coming in a way that is sustainable over the long haul. For example, how do we grow and improve our road systems while at the same time providing our people with alternatives to the automobile, such as transit, walking, and bicycling? How do we target growth and development to places that already have needed infrastructure, make better use of what we have, and avoid the need for billions of dollars in new spending? How do we provide the economic development our people demand while at the same time

preserving open spaces and minimizing the damage to our natural environment? And how do we do all this and still provide jobs and affordable housing to millions of Americans? This is the challenge of building sustainable communities, a challenge that is integral to the discussion of infrastructure.

This panel will address how all levels of government and the private sector can meet the challenge of building sustainable communities. In particular, it will examine how to integrate the multiple players at the local, regional, and state government levels as well as in the business and other private-sector communities. It will also address how to integrate the range of crosscutting concerns in environmental policy, transportation policy, and housing policy.

The remarks of panel 2's four speakers are contained in appendixes VII through X.

Presentation by Robert Dunphy, Senior Resident Fellow, Transportation, Urban Land Institute



Robert Dunphy is senior resident fellow (transportation) in the policy and practice department of the Urban Land Institute (ULI). He chairs the transportation and land development committee of the Transportation Research Board and is a member of the Institution on Transportation Engineers, for which he is writing a chapter of the new *Transportation Planning Handbook*. The research for his latest book, *Moving Beyond Gridlock: Traffic and Development*, included case studies of three large regions recognized for implementing smart growth policies. He also wrote *Transportation and Growth: Myths & Facts*, which addresses some of the most controversial aspects of growth in the context of traffic congestion and transportation options. Mr. Dunphy frequently speaks on growth and transportation issues at national and regional meetings. He holds an M.S. in Civil Engineering from Texas A&M and is a member of Lambda Alpha International, an honorary land economics society.

Infrastructure Policy Affects Land Use

I'm going to simplify the charge of this conference by talking about transportation as a primary aspect of infrastructure. Transportation is a true crosscutting issue relating to a whole variety of different kinds of travel for people and goods, and it's delivered by a whole variety of different units of government as well as the private sector. It also links to the issue of land use. It becomes part of the broader dialogue on growth, no growth, smart growth, or sustainable development.

There are conflicting views. The National Survey on Growth and Development commissioned by Smart Growth America asked people what they thought about different strategies. The survey found that 78 percent of respondents supported giving priority to improving services in existing communities rather than encouraging new housing and commercial development in the countryside, sort of obvious good management. Fifty-four percent said traffic in the area was getting worse, but when asked what to do about it, the primary response was to improve public transportation. About half gave that primary response, twice as many as said to improve the roads. Similar results were found in an Atlanta poll.

People seem to favor improving transit over improving roads despite the fact that few of them actually use public transportation. A survey conducted by the Alliance for Clean Air asked people what the most responsible means of commuting was for them. People's response was,

“Well, it’s driving my own car.” Clearly, in this survey, when given an opportunity to vote for the environment and good government, the respondents recognized that it was all about them. These studies confirm the linkage between growth and traffic in people’s minds. There is wide support for doing something to improve the traffic. There may or may not be support for greater management of growth.

We know that when it comes to development, the two things people hate most are sprawl and density. And the disconnect between Americans’ apparent support for improving alternatives to driving and the reluctance to use them is illustrated by a presumably humorous article in *The Onion* last year, which reported that a study by the American Public Transportation Administration revealed that 98 percent of Americans support the use of mass transit by others.

Developing a Regional Vision Is Critical to Effective Transportation Planning

Should federal policies support sprawl or smart growth? Again, that sounds like an easy question. My take is it probably depends. Decisions on growth are jealously guarded local government responsibilities that collectively have a great impact on transportation investments of state and local governments. The survey cited earlier found that while most voters feel there needs to be more management of growth, particularly because of the transportation impacts, there is little support for federal or state intervention. So again, we have one of these contradictory findings.

Developing a regional vision of where the next million people will be or, in the case of Los Angeles, where the next 6 million people will be, requires collaboration among local governments and the private sector throughout a region as well as supporting state and federal policies. Such visions vary according to local priorities regarding the economy, quality of life issues, and the environment.

As critical as this vision is in determining the need for regional investments in infrastructure, economic development, and housing, its importance is not universally understood. In many cases, we have been driven by transportation planners’ decisions and visions. There is a federally established process for developing consistent transportation and growth strategies, but it is rarely invoked. One of the few examples was Atlanta, where a finding that the city’s plans were not in conformance with clean air requirements created a crisis that led to a business-driven fix, at least for now. And while the term “smart growth” is hot in some places, it is by no means mainstream. You can talk about smart growth in Atlanta, but you

can't talk about it in Charlotte. You can talk smart growth in Austin, but not in Dallas.

It seems to me that there are three levels of community consciousness that can spark successful regional strategies for dealing with travel and growth. The first level is, "We have a traffic problem and we need traffic solutions." This is characteristic of growing business communities, such as Houston and Atlanta, because of the critical nature of transportation and mobility to businesses in these communities. In fact, both Houston and Atlanta faced a crisis in transportation, and in both cases the business community led the regional solution.

The next level up is, "We have a traffic problem and we need traffic and land-use solutions." This—smart growth—seems especially oriented toward destination communities, such as Phoenix or San Diego, that have an important stake in preserving the quality of life of the place that drew people there as well as in mobility. In these places, there appears to be support for light smart growth, which approaches growth management gingerly, but at least is a start. I think San Diego is a rare example of a metropolitan planning organization that was given authority to coordinate regional facility plans mandated by a voter initiative. This type of delegation of local authority is rarely done at the regional level. I believe there's a large potential for such light smart growth with better planning and community involvement.

The last level is the attitude, "We have a traffic problem, and we need traffic and land-use solutions as well as a change in lifestyles." Livable communities, such as Toronto, Portland, and Seattle, seem to be candidates for this kind of deep smart growth, possibly including pricing and management of parking.

This review of approaches to linking transportation and land development illustrates the wide range of experience in different metropolitan areas as well as the degree of comfort or discomfort people have with making significant changes in current trends. Developing a regional vision is a first step in transportation planning, but it's often been dismissed as a necessary preliminary step to the real work of calculating transportation plans. Rather than have the forecast generated by a university or a consultant, as sometimes happens, this visioning exercise should be recognized as the origin and most critical determinant of transportation plans. As Paul said, the question is where are we going to grow, and there are a number of

examples, most recently in Salt Lake and in the Twin Cities, of broad community deliberations of this question.

One interesting example of the federal government dealing with land-use issues is the Transportation and Community and System Preservation Pilot Program. It's a mouthful. It started under the transportation appropriations of fiscal year 1999, and the most recent round awarded 80 grants for a total of \$47 million. I understand that the way they came up with this horrendous title is they started to call it transportation and land use, but that was entirely too controversial on the Hill. So they went back and did a search and replace in the legislation and came out with something completely unpronounceable. This model, by the way, has been followed by other similar programs. In Atlanta, the regional agency has a livable centers program. There's one in the Bay Area in San Francisco, and another in Minneapolis.

Housing and Transportation Strategies Affect Each Other and Land Use

The cost of affordable housing is an issue that I think we often don't appreciate for its linkage to transportation. A significant component of the traffic growth in recent years is the growing distance between homes and jobs, which reflects consumers' need to spend more time on the road in return for affordable housing. A ULI study in Portland, Oregon, found that for the same size home, new home buyers could save about \$2 a day in mortgage costs for every mile they moved further out, adding additional congestion to the roads and emissions to the environment. Even a generous estimate of the cost of driving is maybe 50 cents a mile. So out and back, that's an extra dollar against a \$2-a-day reduction in mortgage costs. And most people at that stage don't even consider fully allocated costs. They're probably thinking about the cost of gas.

There is an experimental Location Efficient Mortgage Program being implemented by Fannie Mae to help redress this balance. Most housing is provided by the private sector, so it's important to understand the strategies to incentivize housing in locations that are efficient in terms of transportation demand and supply. It may be necessary to offer carrots to private developers and localities for developing affordable or mixed income housing in smart growth areas that include adequate transportation. This approach is being used in Maryland now, in New Jersey, and in a number of other places. Federal carrots for mixed income affordable housing could include allowing investors to take losses as they did in the olden days, increasing tax credit amounts to offset higher land

costs, home ownership tax credits, and higher tax credits for residential mixed income in these areas.

The Millennial Housing Commission is currently examining the range of housing recommendations under a congressional charge. The transportation program that most directly addresses smart growth goals and urban revitalization is the federal transit program. But one of the challenges is that transit works best in places that are generally not growing and worst in places experiencing most of the growth, typically auto-dependent communities in the Sunbelt. Encouraging development within the existing transit service area is clearly important to its success, but many of the investments in new transit lines are being undermined by the lack of local consistency in decisions to reinforce the transit investment. The Federal Transit Administration (FTA) has implemented criteria to encourage new start transit communities to make land use changes to support transit. And, of course, the growing smart growth movement would reinforce that.

FTA has also changed its rules to encourage joint development, by allowing transit agencies to keep their revenues from sales or leases of real estate, which removes one of the major disincentives for a public agency to get involved in such a high-profile venture. One of the organizations involved in this rule change was Trimet in Portland, which estimated that with the capital cost of new rail lines, generating new riders by developing an adjacent site would be 10 to 23 times more cost-effective, even if the land were given to a developer. With the cost of new transit investments running as high as \$50,000 per regular daily rider, there's a strong financial return from supporting development nearby as well as the potential for supporting smart growth goals and increasing the livability of the community.

This strategy of investing in places where travel demand is low and available sources are high works well on the highway side as well, such as in some of the places that Larry Frank talked about in Atlanta. Because these sites often have other challenges, including neighborhood opposition, the existence of a regional vision and strong reinforcing policies is essential. Finally, the provision in the financing of parking facilities is especially essential in in-fill locations. Since parking is needed to bring development into the types of locations that offer many choices, it might be considered as a potential public expense. Robert Silverman, a developer in Atlanta, spoke at a ULI in-fill development forum and pointed out that since federal and state funds were used for highways and transit, they should be

available for parking, also. The federally mandated transportation process requires that all federal transportation investments be consistent with regional plans. A broader view would align other public policies as well, including state investments and other areas of development, such as housing, education, and recreation. I think Governor Glendening is doing this in Maryland and is encouraging others through that. The principles of ISTEA, the Intermodal Surface Transportation Efficiency Act, were such good models that Congressman Blumenauer has suggested that there should be a water ISTEA built on similar principles of broad regional approaches.

A broader view of transportation decisions recognizes that they are part of a broad focus on community and livability. This heightened concern of citizens about the built environment was mentioned at the beginning of the last presidential campaign but was never really pursued. But it continues to be an important issue. Even if there is not voter support in having the federal government involved in local growth issues, there needs to be a national dialogue, and the federal government needs to be involved. With its involvement in so many aspects of urban life, federal actions can have a marked effect, as we've seen with the Interstate Highway Act, the Federal Housing Administration, and the Veterans Administration loans that have changed the landscape of America since the second World War. As the Millennial Housing Commission begins its activities, a parallel effort among the U.S. Department of Transportation, the Environmental Protection Agency, and the Department of Housing and Urban Development, as a minimum, with an array of state and local official, civic and business leaders, would be a timely program.

Thank you.

Presentation by Lawrence Frank, Assistant Professor, Georgia Institute of Technology

Lawrence Frank is a faculty member of the City Planning Program at the Georgia Institute of Technology and a registered landscape architect. He holds a M.S. in Civil Engineering Transportation Planning and a Ph.D. in Urban Design and Planning from the University of Washington. Specializing in the interaction between land use, transportation, air quality, and health, he has published several papers on the effects of local land use and regional transportation decisions on regional development patterns, air quality, and traffic congestion. Dr. Frank received a multiyear award from numerous state and federal sources to conduct a study (known as SMARTRAQ) to assess the role of land use and transportation in improving air quality and public health in the Atlanta Metropolitan Region. This study will be pioneering in that it will assess how development decisions and transportation investments affect travel choice and the level of physical activity as a predictor of overall public health.

The Built Environment Affects Our Behavior and Our Health

Good morning. I was glad to see you chose Crosscutting Issues as the name of this conference because I think we've done a really good job in our educational system and in our culture of separating roles and responsibilities among disciplines to the point that it is as if we had blinders on. And I think that is responsible for a lot of the problems that we're now facing. Obviously, it is efficient for a transportation engineer to know exactly what makes a highway move the most number of people in a car, but that knowledge in isolation has led to a lot of costs, in terms of pedestrian movement, fatalities, the ability to walk, etc.

All of these issues are intertwined. The gist of my talk will be looking at city planning and health—that is, how the built environment affects our behavior and our health. Transportation, infrastructure, all of these things are intertwined. City planning grew out of health concerns, but it grew way out of health concerns and diverged to the point that I will argue that our current use of the Zoning Enabling Act to separate uses through zoning has made things so separate that, in fact, it's counter to the original impetus upon which this act was originally predicated. I haven't written that book yet.

Atlanta Was Forced to Rethink Planning and Development Issues

To start off, I had to give talks on a project called SMARTRAQ or Smart Growth. I'd moved from Seattle to Georgia. I'd felt really safe talking about the project in Seattle, but when I moved to Georgia, I found that growth management was considered a very scary thing. Then, in 1997, Atlanta faced a freeze on federal transportation funds—I think it was the first

example in the nation, and I was happy to be there to see it—where the federal laws came in and gave a lesson to a region on how it needs to rethink the way it's growing, developing, and planning for its future infrastructure.

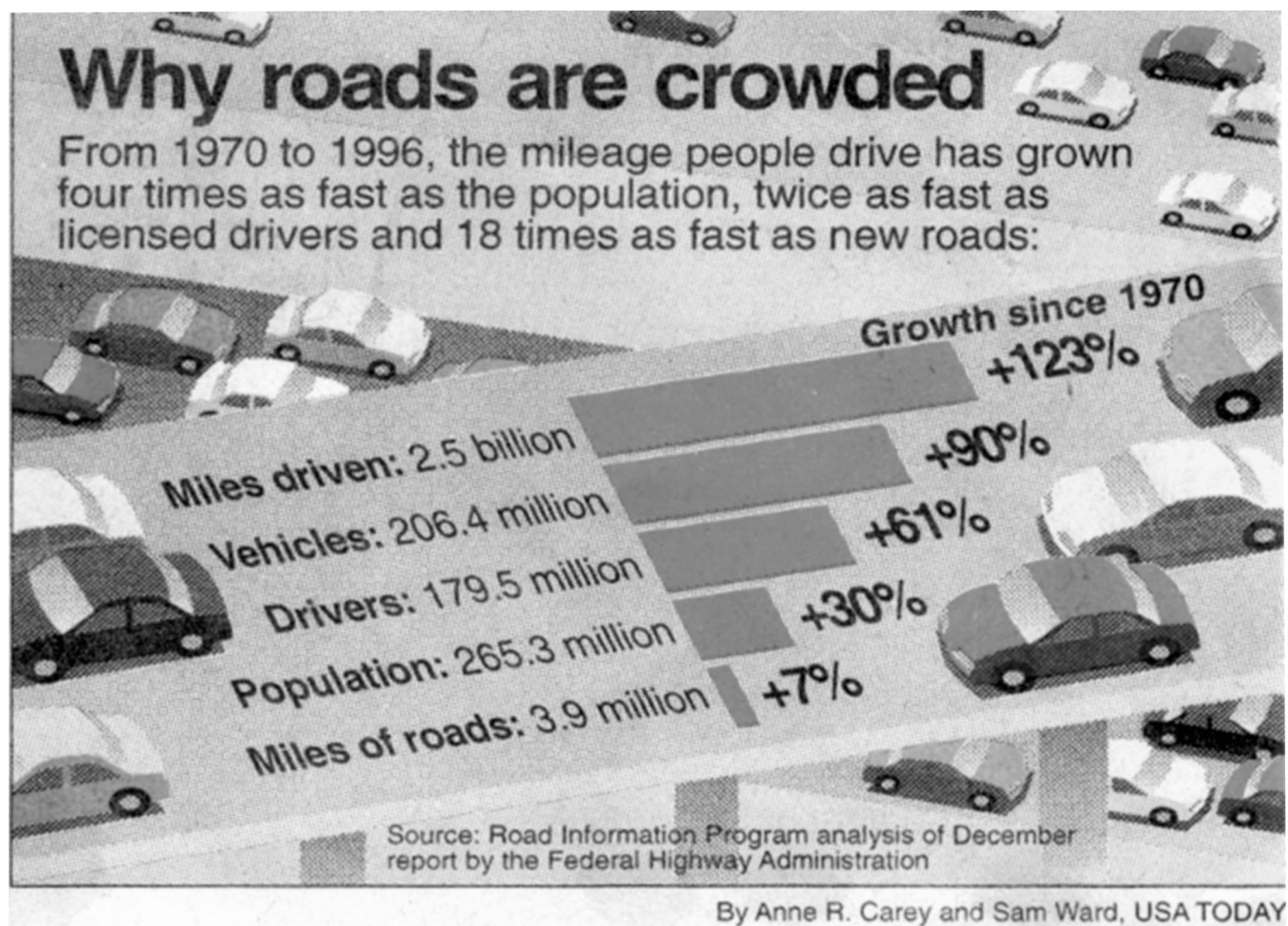
Our regional transportation plan in Atlanta has changed a lot. The approach to planning for future infrastructure has changed. I'm happy to report that. On the other hand, I don't think that the implementation of that plan has changed very much. The realities are still there, and I guess that says how far we really have to go. But to a group of elected officials in Atlanta, this quote seems to be very effective: "Change is inevitable. In a progressive country change is constant." (Benjamin Disraeli, Edinburgh, Oct. 29, 1861) If we're going to be progressive, we need to recognize that change is fundamental. Underneath all that is the way the expectations of the general public seem to be manifested. Behind the financial and elected officials' barriers are really the public's expectations. We have words like "NIMBYism, LULU, and NOPE—Not On Planet Earth."

Rising Car-use Affects Air Quality and Health

People are most upset by time use, and that's manifested through their frustration over congestion. But air quality, we know, is also affected by traffic, as is physical activity and health. The linkage between physical activity and health is new. Our thought process is that if we can't walk to places, we won't be as physically active. And maybe that's related to why we are getting a little bit heavier every year, according to statistics that are now documented by the Centers for Disease Control, which funds some of this work.

Now, this graphic (see fig. 6) is a 26-year window created by Ann R. Carey and Sam Ward for *U.S.A. Today*.

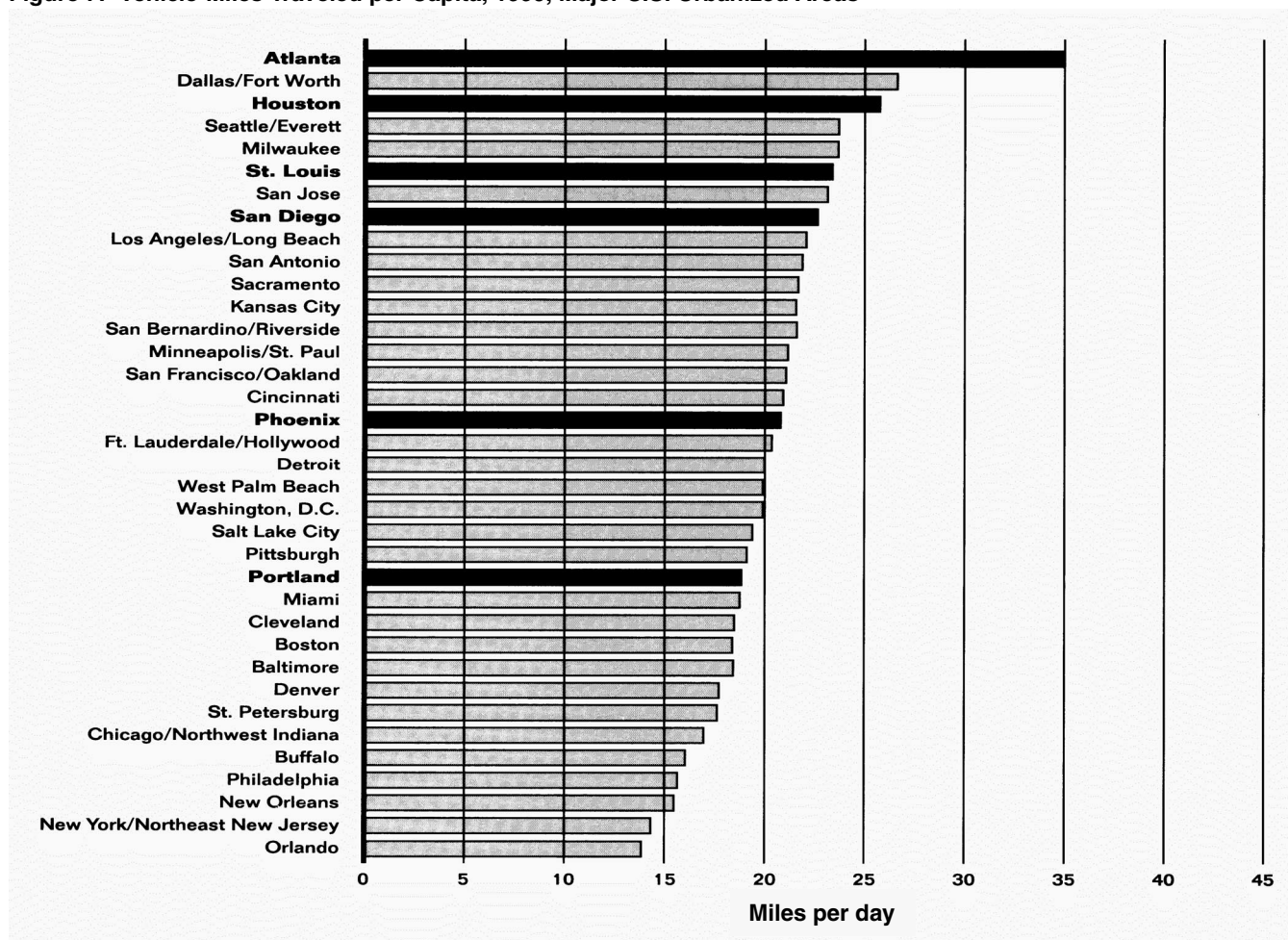
Figure 6: Why Roads Are Crowded



Population growth from 1970 to 1996 grew 30 percent, while doubling that were drivers, tripling that were vehicles, and quadrupling that were miles driven. Vehicle ownership is flattening out in our country, but what about in the rest of the world that's not?

Bob Dunphy put this next graphic together (see fig. 7) in his book, *Moving Beyond Gridlock*. It shows where Atlanta was in 1990 in terms of vehicle miles of travel per capita. We thought we were so far out in the lead that nobody would ever catch up, but in 1995, Houston passed us.

Figure 7: Vehicle-Miles Traveled per Capita, 1990, Major U.S. Urbanized Areas



Source: 1990 Highway Statistics (Federal Highway Administration).

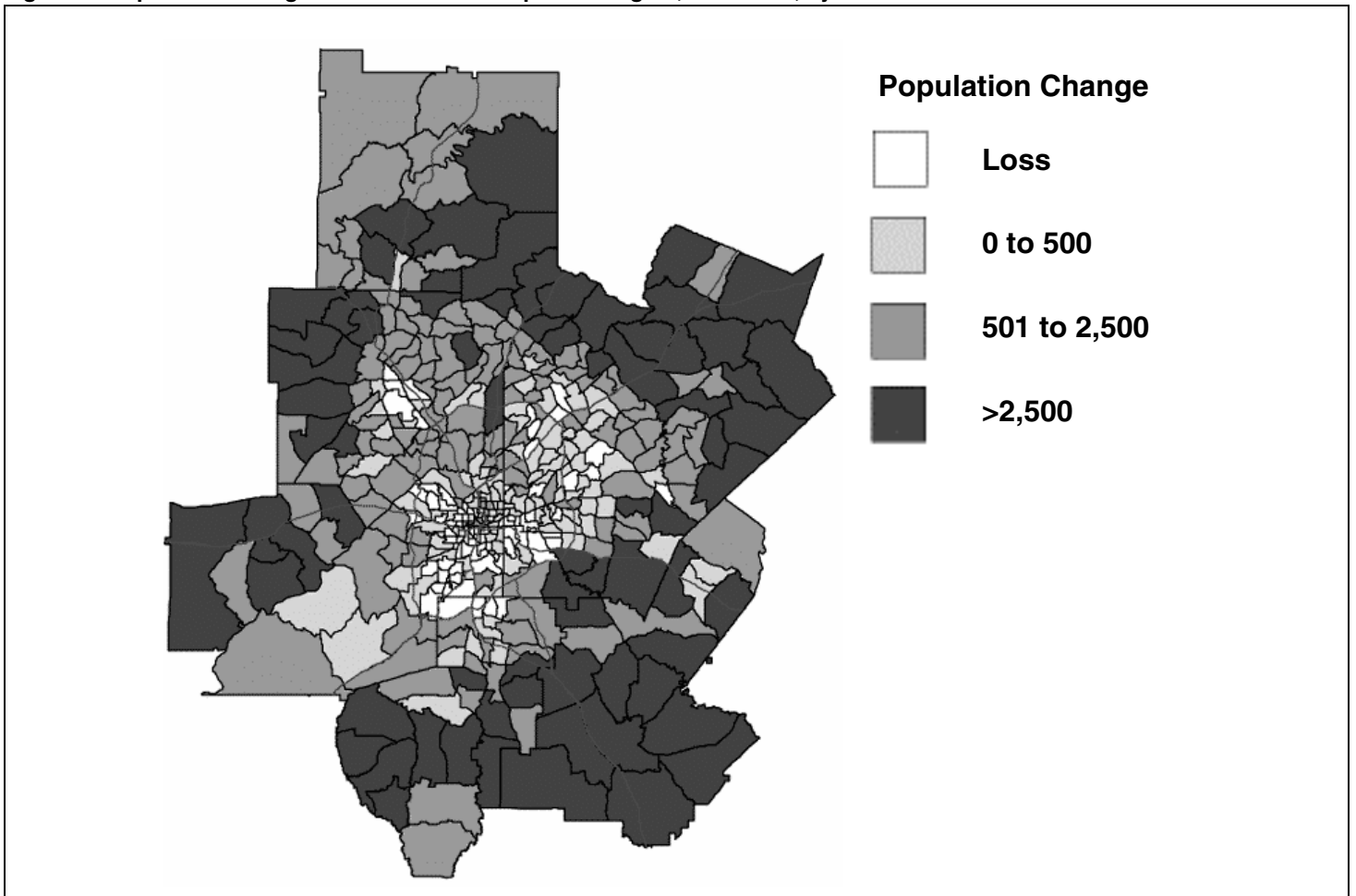
Source: Robert T. Dunphy, *Moving Beyond Gridlock*, Urban Land Institute, 1997.

Thirty-five miles of travel per capita per day translates into a graphic not to scale. But if you think about how far we actually travel in 1 day in a region, we travel the distance to the sun. If you multiply 35 miles by 3 or 4 million people now in Atlanta, we actually are now on our way back home for a return trip every day. That is astronomical, literally and figuratively.

Do we really need to drive that much? One of the themes in the last panel was monitoring and tracking performance. In this arena, there are tangible

ways we can do that. This graphic (see fig. 8) shows the last 10 years in Atlanta.

Figure 8: Population Change in the Atlanta Metropolitan Region, 1990-1999, by Census Tract

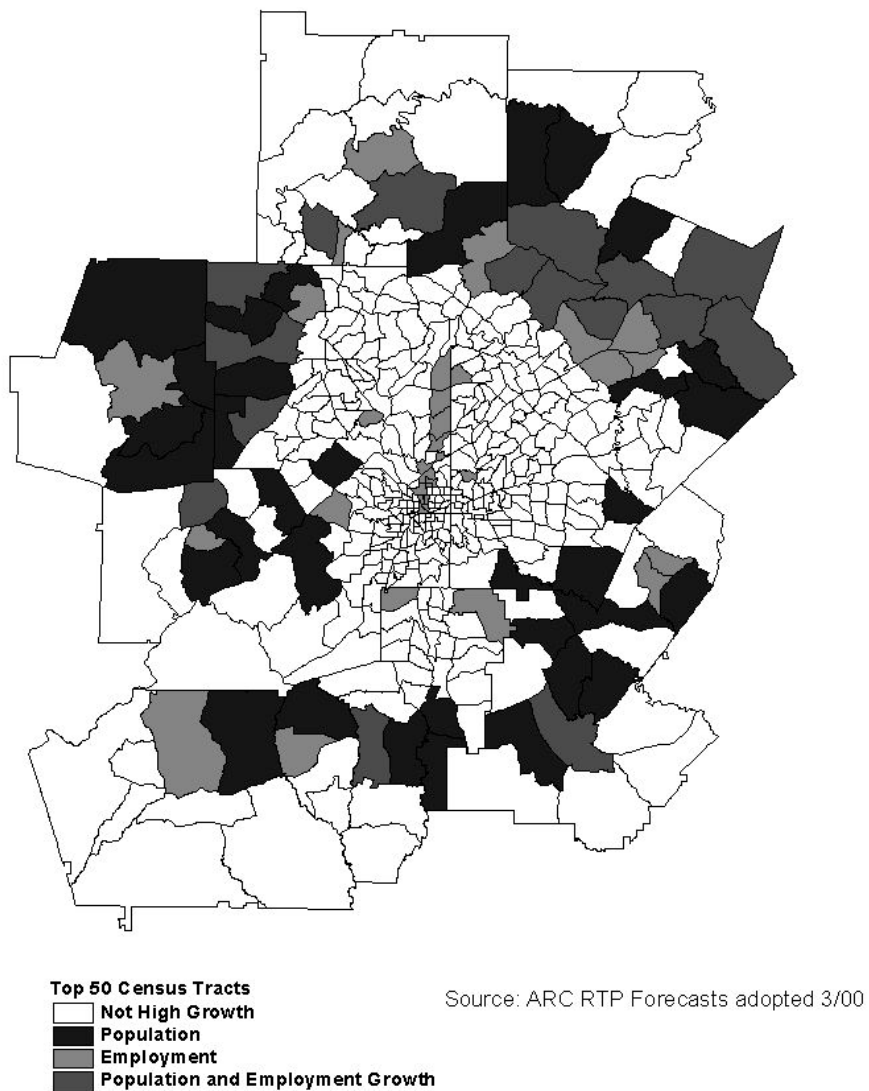


Source: Atlanta Regional Commission.

Where did the growth go? You can see that the population changed. The dark areas are where most of the growth went and the lighter areas are where the population did not grow, or even shrank. The next graphic (see fig. 9) explains why Atlanta might be driving so much. It's pretty clear that we're exploding out. As Paul said, we're 80 miles east-west, and 120 to 130

miles north-south. An incredibly rapid rate of expansion occurred over the last 10 years, as the graphic shows.

Figure 9: High Growth Areas in Atlanta, 1995-2025



Transportation Approaches Affect Development

Many factors are contributing to Atlanta's growth. But I believe regional and federal approaches to transportation and infrastructure investment are number one. The provision of freeway access to outlying areas in Atlanta has been amazing, and for the last 20 years, they've been trying to put in an outer perimeter beltway. That doesn't seem to be a way to go if you want to contain and reduce outward growth. It's safe to say that maybe that's not a good idea. Provision of freeway access is obviously going to contribute to growth, and then there's the issue of the induced demand that would come from that.

Georgia 400 was built in the late 1980s or early 1990s. The population of Alpharetta, which is a city to the north, exploded right where the darker colors are in figure 9. I hypothesize that Alpharetta probably wouldn't have grown as fast at the region's edge without the provision of Interstate Georgia 400. Lack of accounting for environmental and social costs is really also at the core of that decision. When we make our transportation infrastructure decisions, we're not doing a good job of including in the cost-benefit scenario things such as health, secondary impacts of land development, consumption of raw lands, and so on.

Auto-dominant modeling regimes. That is a very technical term, but the fact is that when we collect travel data, which is what the SMARTRAQ Project is about, we don't do a good job of collecting data on travel patterns other than vehicular-based travel. Most MPOs in the nation tell people when they fill out their surveys not to worry about the short trips. In fact, they throw out the short trips, which are what we want to know about to understand where transit might work. So we're working on using GPS devices and Palm Pilots so that in a travel survey, we can track with technology exactly what the actual behavior of people is instead of relying on self-reporting. To date, all of the data we have on travel are self-reported, and we don't really know what people do. I just did my own travel survey. I happened to have been recruited, and I have to say it's difficult to remember every single thing you do throughout a day. So this may help.

This auto-dominant modeling regime is very important because we don't have data to understand the relationships, nor have we been collecting data across a wide range of urban forums. Another thing we're trying to address is that when we do household travel surveys, typically, we capture households located in the lower density environments. That's mostly what we have now. And we don't know enough about higher density

environments or how people who live in these environments relate to the environment or travel.

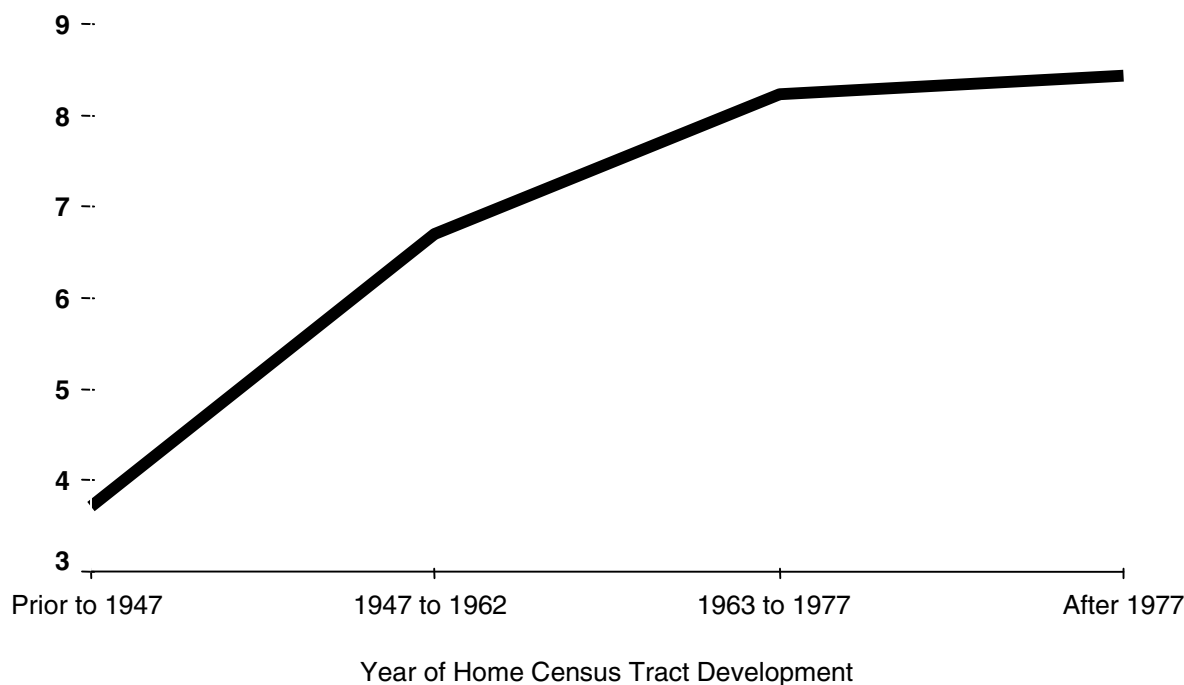
Lack of geographic barriers in Atlanta. Obviously that's a foregone conclusion. Limited economic value of land for agricultural use is another one. I want to convert it if I can make money on it another way. Ethnic and cultural diversity is also very much a catalyst for outward growth. Competition for tax base occurs in Atlanta, which has several small governmental units. Atlanta has everything going for it to make it want to sprawl. The state constitution mandates home rule for urban land use.

Having learned our lesson with the Clean Air Act, how are we projecting growth to go in the future? Well, in this graphic (see fig. 9), you can see that the outlying areas, again, are the ones with the color hits. Most of the growth continues to go to the outlying areas, requiring more infrastructure investment to serve that growth, because the levels of service are projected to be so low on those freeways that we've just recently built or are planning to build that we better get out there and add some more lanes.

**Correlation Between
Housing Age and Distance
to Recreate May Help
Explain Why People
Recreate Less**

Moving into the physical activity and health discussion, we did a simple little cross-tabulation. We compared travel data in Seattle in 1996 with the year in which the houses of the people in the survey were built. Then we looked at how far people drove to recreate (see fig. 10).

Figure 10: Average Distance Traveled to Recreate
Mean DISTANCE (miles)

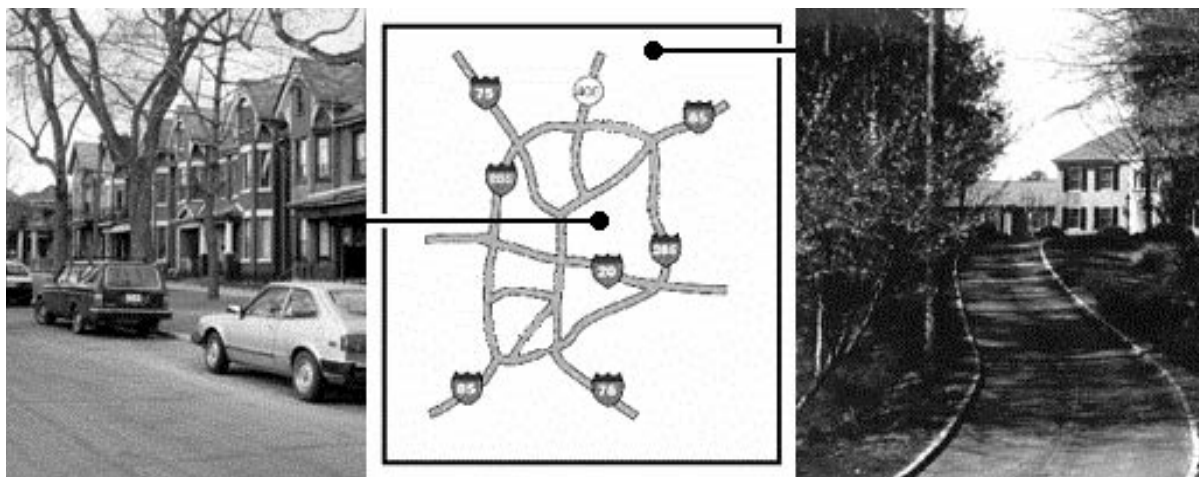


Source: 1996 Puget Sound Transportation Panel

It's amazing. Survey respondents averaged around 3.7 miles to recreate if their house—their neighborhood—was built before 1947. Before World War II is what we typically talk about in the literature. And you can see, as you live in a newer and newer community, you drive almost three times as much just to recreate. In terms of cost, that suggests that you may be less likely to recreate. Recreation is not as easy to get to.

When we try to communicate this, we say let's compare a couple of families: one in town in Atlanta—I borrowed this picture from Toronto, because Atlanta didn't have a picture that looked like that—and one in an outlying area (see fig. 11).

Figure 11: Comparing Two Families



Profile of Family A (Urban)

8 units per acre
Parking is limited
services nearby
family of four
annual income \$50,000
one vehicle
four vehicle trips/day
46 miles of travel

DENSITY

PARKING

MIXED USE

HOUSEHOLD SIZE

INCOME

VEHICLES

TRIPS

MILES OF TRAVEL

Profile of Family B (Ex-urban)

1 unit per acre
parking on site
no services within walking distance
family of six
annual income \$90,000
three vehicles
eleven vehicle trips /day
101 miles of travel

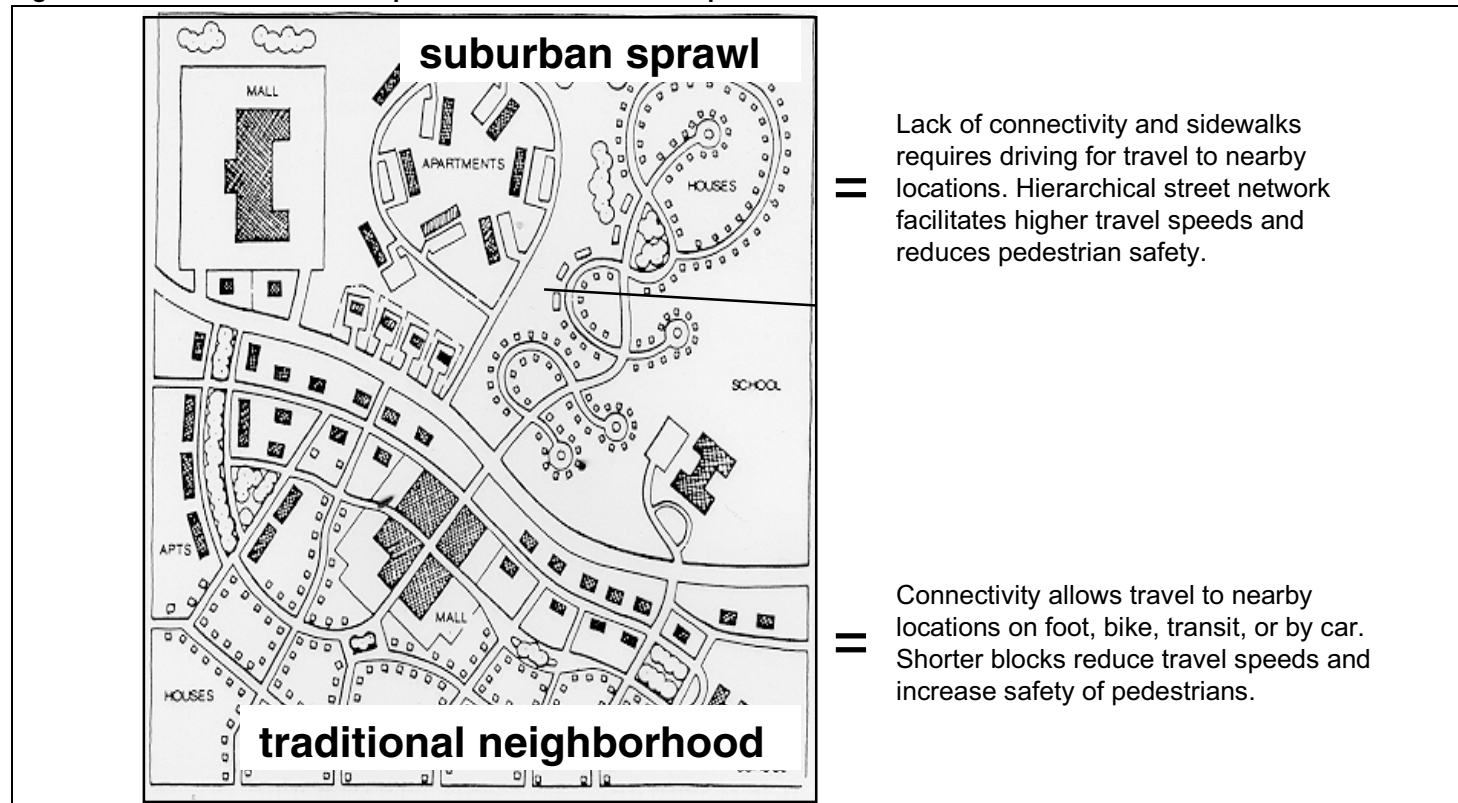
We talk about things we can compare, like density. These are measurable things that can be performance-based. We can also track with geographic information systems as we're doing now these phenomenon of urban form, land use, transportation, travel choice, vehicle emissions per household, and physical activity levels, too. And we can correlate all of that if we think crosscutting in our research design will help us to make

policy recommendations based on what people really do and how healthy people are who live in different environments. In terms of the two families, we could make the assertion that the one in the outlying area takes more trips in this environment and that they actually travel more. And these are data based on Atlanta from 1991. Well, that's true, but they also have more people, they have more money, and they have more vehicles. So we need to be thinking about the controls and how we compare the two.

Neighborhood Design Affects Transportation Choices

Frank Spielberg drew this next graphic a long time ago (see fig. 12). I've used it constantly. The suburban sprawl versus the traditional neighborhood.

Figure 12: Neo-traditional Development vs. Suburban Development



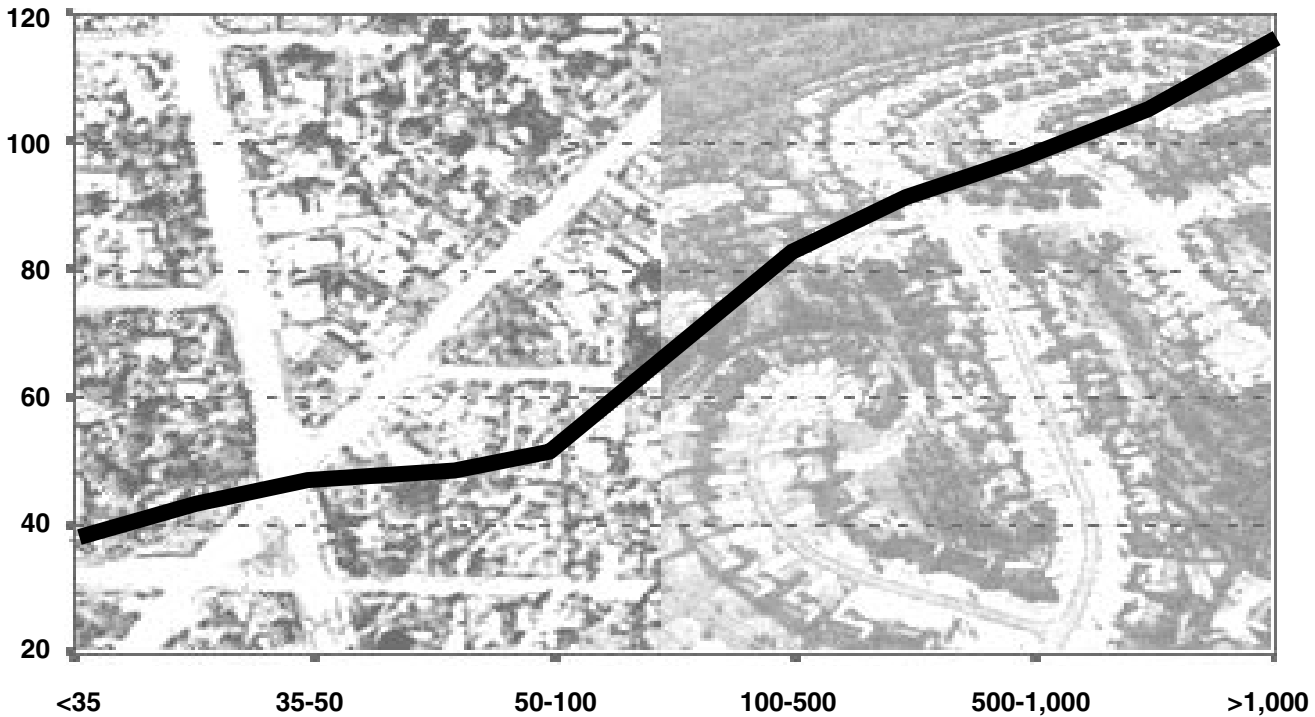
Source: Frank Spielberg.

The traditional neighborhood is interconnected. If we measure neighborhoods based on the connectivity of the street network alone, meaning the numbers of intersections per the same unit of area, you're going to say there are obviously more intersections and more blocks in the traditional neighborhood. You have choices of ways to get through the neighborhood. Here in the suburban development, if kids want to go to school to play basketball, how are they going to get there? Well, they've got to go all of the way back out. We've indoctrinated an irrational approach to land development to make people have to travel far distances for what are actually very short distances as the crow flies. I think that's an opportunity for us to resurrect, based on microeconomic modeling, what could be a cost that's less for walking than for driving. Keep them driving around, but let's really focus on the pedestrian linkages so that the walker has a short distance where the driver still retains the longer distance for travel.

I'll conclude by showing you what the data actually say with vehicle miles of travel in these two communities. Vehicle miles of travel increase threefold as connectivity goes down in Atlanta (see fig. 13).

Figure 13: Household Vehicle Miles of Travel, by Mean Block Area

Mean Vehicle Miles of Travel

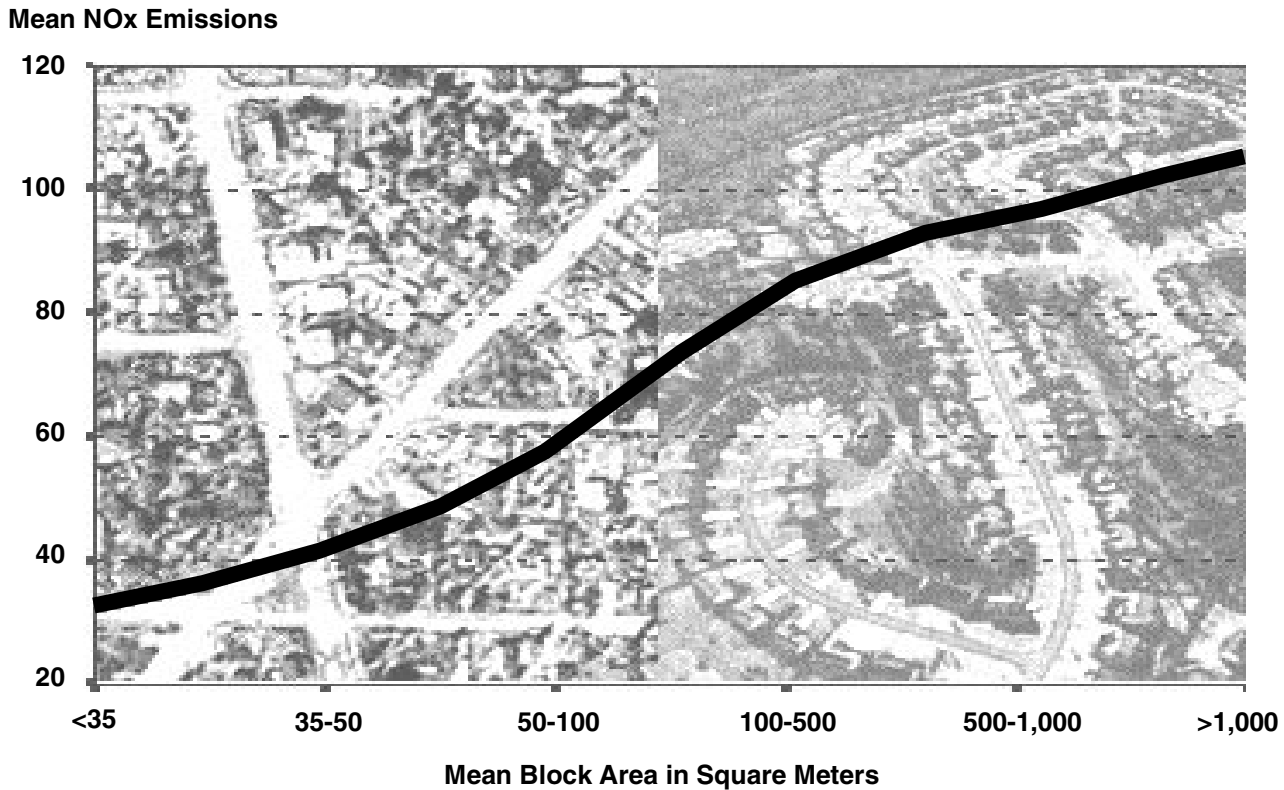


Mean Block Area in Square Meters

Source: Atlanta Data – The Turner Foundation.

When we modeled the air quality effects, we found the very same thing for NO_x, which is our precursor to ozone formation (see fig. 14).

Figure 14: Household NOx Emissions, by Mean Block Area



Source: Atlanta data – The Turner Foundation.

Descriptively, we know these things matter. We're going to work hard to try to link public health into this.

I thank you very much for your time.

Presentation by David Rusk, Urban Policy Consultant, Former Mayor of Albuquerque, New Mexico



David Rusk is an independent consultant on urban and suburban policy as well as an author and public speaker. A former federal official, New Mexico legislator (1975-77), and mayor of Albuquerque (1977-81), he has spoken and consulted in over 90 U.S. communities. He has authored *Cities Without Suburbs* and *Inside Game/Outside Game* and spoken on “Fair Growth: Connecting Sprawl, Smart Growth, and Social Equity.” Since 1993, Mr. Rusk has lectured abroad on urban problems in Berlin, Stuttgart, and Frankfurt, Germany, as well as in Toronto and Victoria, Canada; served as an advisor to the government of South Africa on metropolitan governance; and was a visiting professor at the University of Amsterdam and Delft Technical University. Mr. Rusk attended the University of California at Berkeley and graduated Phi Beta Kappa as the outstanding undergraduate student in economics in 1962.

The Primary Factors Shaping Development Have Been Sprawl and Race

Don Hutchison, executive director of the Greater Baltimore Committee and a former county executive in Baltimore County, once stated, “If regionalism isn’t dealing with land use, fiscal disparities, housing, and education, then regionalism isn’t dealing with the issues that really count.” I think I could reduce that list of four to one very basic question, which relates to the framework of this conference on crosscutting issues and physical infrastructure. And that is, “What gets built where for whose benefit?”

I have spoken and consulted in over a hundred metropolitan areas in this country as well as abroad. I’ve analyzed trends in all 300-plus metropolitan areas, largely through census data. I have found that although each metropolitan area has distinctive characteristics, there are common factors. The primary factors that have shaped the development patterns of metropolitan areas have been sprawl and race. The two are interconnected. They are linked most clearly through the phenomenon of the concentration of poverty. High-poverty neighborhoods generate “push” factors, such as high-crime rates; poorly performing local schools; declining property values; and, very often, high-tax rates and poor local services. These negative conditions push middle class families out of such neighborhoods and into newer communities.

There are also “pull” factors at work in the newer communities, which are the reverse of those on my previous list: safer neighborhoods, better schools (at least they are perceived to be better), rising property values, and often lower tax rates and better quality services. These positive features aren’t due to the superior virtue of suburban officials. They reflect the fact that these communities are low-poverty communities. They are low-poverty communities because they were designed that way by a combination of federal, state, and local policies and the impact of these policies on local housing markets.

This, as I’ve hinted, is not a race-neutral question. In 1990, there were almost as many people in metropolitan America who were poor and white (about 11 million) as there were those who were poor and black and poor and Hispanic combined (7 million and 5 million). Yet, poor whites almost never lived in poverty-impacted neighborhoods. Only 25 percent of poor whites lived in neighborhoods with 20-percent or higher poverty rates. In contrast, half of all poor Hispanics and three-quarters of all poor blacks lived in poverty-impacted neighborhoods. Across urban America, you almost never find examples of what you might call white slums. Most high-poverty neighborhoods are black ghettos and Hispanic barrios.

Economic Segregation Affects Educational Outcomes

Economically isolated communities, thus, are racially and ethnically isolated communities. On the one hand, Census 2000 confirms that racial and ethnic segregation is declining across most metropolitan areas (except where there has been a large influx of Hispanic immigrants), and it is generally declining twice as fast in the South and the West as in the Northeast and the Midwest. On the other hand, we also know that while racial segregation has been going down, at least through 1990, economic segregation was rising in 70 percent of American metropolitan areas. In studies that I’ve done of trends in school enrollment in a dozen metropolitan areas, it appears that, even after the highly prosperous 1990s, central city school districts almost always had a higher proportion of children who qualified for free and reduced price lunches in 2000 than they did back in 1990. In fact, using school enrollment as something of a proxy for overall population economic trends, I would hazard a guess that next spring we will find from Census 2000 that the level of economic segregation has continued to rise over the past decade.

High-poverty ghettos and barrios are not so much the result of factors inside such communities as they are a reflection of the “rules of the game” that have been operating over the decades outside of those communities.

What gets built where for whom, in effect, also means who lives where? What kinds of different racial and ethnic and income groups live in different kinds of communities? And that cuts across all four of my issues: land use, fiscal disparity, housing, and education. “Public policy dictates where development occurs,” says the National Association of Home Builders. Fiscal disparities are based on property values, and, typically, 50 percent of the communities’ assessed valuation is in residential property. Property values are related to the nature of the housing stock and its occupants.

As for education, one of the most significant and constant findings of educational research for the last 35 years (ever since James Coleman’s monumental *Equality of Educational Opportunity* study back in 1966) is the relationship between family income, parental educational achievement, and the educational outcomes for children. First and foremost is the significance of those factors in the child’s family itself, and second is the income and educational attainment of the parents of a child’s classmates. These have been found as the dominant factors affecting educational outcomes over and over again.

I typically do such studies myself when I am speaking in a local community. A single fact—the percentage of children that qualify for free and reduced price lunch in each local school—typically explains from 65 to 80 percent of the variation in standardized test scores from school to school. I am currently collaborating with the Urban Institute on a survey of trends in racial and economic segregation in all of the nation’s elementary schools from 1990 through 2000. We’ll have those results in about 6 weeks. As GAO looks at the question of academic performance—and the Congress has the President’s proposals regarding testing and accountability before it right now—one needn’t wait for several years for the results of new, nationwide testing programs. We can anticipate what the results will be right now. In 6 weeks, I can give GAO a list of what are going to be, let’s say, the lowest 10-percent academically performing schools in the future, simply based upon who the kids are.

I was just up in Buffalo, New York, where I did such a study of all 140 public elementary schools in Erie County. The percentage of children on free and reduced price lunch explained 87 percent of the variation in test scores in their fourth grade English language skills tests, with a standard error of 6 points. So, in effect, just tell me the percentage of kids on free and reduced price lunch in one of that region’s elementary schools, and I will tell you, plus or minus six points, what the reading test scores were in that school

with 95-percent accuracy. On the other hand, the correlation between test scores and the amount of money being spent per child or pupil-teacher ratios in the school is zero. The correlation is usually zero wherever you do it.

The social science research is very clear on the overwhelming linkage between family background and academic performance. There has also probably been no finding of social science that has been so persistently, and I might say even deliberately, ignored by many educators and by virtually all politicians. In effect, where you live determines what your educational opportunity will be. We may, as a nation, subscribe to a goal of egalitarianism, but we apportion educational opportunity by where you live. What's important is not how much money is being spent, but rather who your classmates are.

That's the bad news. The good news is that there's also a large body of research that shows that poor children, if they are attending middle class schools (and preferably living in middle class neighborhoods to boot) substantially improve their academic performance. My own research shows that for every percent that the free lunch rate of a school goes down, an individual poor child's test scores go up two-tenths to three-tenths of a point. That means that for a given poor child, the difference between living in a poor neighborhood and going to a school where 80 percent of the kids are on free lunch and living in a middle class neighborhood and going to a school where 20 percent of the kids are on free lunch is a 15-percent improvement in that child's test scores. And you won't find anything in all of the business-supported and state-legislature-initiated educational reform movements that has that kind of impact. *Housing policy is school policy.* Housing policy is also basically fiscal policy. And housing policy certainly affects the consumption of land.

Federal Policies Could Support Diversity Through Regional Planning

What gets built where for whom? The question sounds like a land use issue, which constitutionally lies outside of federal responsibility. But you all know that federal policies have a huge impact in setting the rules of the game.

Our two previous speakers focused much of their remarks on transportation issues, for example. From 1956 onward, our national government, adjusting all figures to current dollars, has spent eight times as much money to build highways as it has to support urban mass transit. Fundamentally, the decisions to build or expand highways or put in new

bridges are not transportation decisions. They are land development decisions. Unfortunately, such land development decisions are driven by transportation planners, not by some overarching vision of how a community would like to develop.

Similarly, in looking at the impact of housing policy, first the Home Owners' Loan Corporation back in the Hoover days and then the New Deal's Federal Housing Administration "red-lined" black neighborhoods, denying federal mortgage guarantees. This policy greatly increased housing segregation and substantially created loan-starved, high-poverty ghettos. Our tax policy provides 11 times as much in tax incentives and subsidies for home ownership as it does for landlords and their renters.

Most of my work targets reforming the rules of the game at the state and local levels. These include regional land use and transportation planning, or regional growth management, and regional mixed-income housing, where every new development must have a modest proportion of housing for low- and moderate-income families. There are communities that do this. Nobody does this better than a county a few miles from here, Montgomery County, Maryland. And least important, but still useful, is regional tax base sharing.

But let's talk about federal reforms for a minute. I've got some suggestions for you. First, it seems to me that the federal government needs to get serious about the notion that our metropolitan areas are the real social and economic centers of our national activity. We need to take all of these functional federal "silos" and somehow bring them together into a common regional framework or regional plan. The Intermodal Surface Transportation Efficiency Act and the Transportation Equity Act for the 21st Century were major steps in that direction. But as I say, the traffic engineers are still driving the land use philosophy. The Department of Housing and Urban Development (HUD) has its comprehensive housing affordability strategies (CHAS). The CHAS are not metropolitan in scope. They are strictly jurisdictional. Let's take all of HUD's categorical programs and at least try to look at them in a comprehensive, regional context, integrated with transportation planning.

Secondly, I think beyond this idea that regions are the vital policy unit, we really ought to see a commitment by the federal government to the concept that not only racial diversity but also economic diversity is desirable. There are a number of policies that would help promote that. For example, the Community Reinvestment Act and the congressional instructions to the

government-sponsored enterprises (Fannie Mae and Freddie Mac) have certainly opened up a great deal of private-sector credit, mortgage financing, etc., for central cities. But sometimes that has had the effect of building more low-income housing where there's already too much. There ought to be mechanisms that reward mixed-income housing when it is built in newer communities, and, above all, when it is tied to some sort of a metropolitan eligibility list for low-income and very modest-income families.

The real issue of livable communities is twofold. Generally, livable communities, or sustainable communities, are talked about in terms of the concept of our stewardship toward nature, but we also have the greater challenge of our stewardship to our fellow man. The ultimate question about livable communities is: are we going to live together?

Thank you.

Presentation by Paul Souza, Senior Policy Analyst, National Governors Association

Paul Souza is a senior policy analyst in the Natural Resources Policy Studies Division of the Center for Best Practices, which is a part of the National Governors Association. Before that, he was the national coordinator of the U.S. Fish and Wildlife Service's Coastal Barriers Program, where he worked in programs that restore habitat on private and public lands through cooperative approaches. Earlier in his career, he worked for the Florida Center for Public Management, the National Audubon Society, and American Rivers, where he considered issues such as the impacts of growth on the environment, Everglades restoration, and hydropower dam relicensing. He earned his M.S. in Urban and Regional Planning at Florida State University.

Intergovernmental Coordination Is Important in Planning for Growth

Thank you for having me here today. Infrastructure is critically related to growth. It's very much the chicken-and-egg scenario. Infrastructure follows new development on the urban fringe, and development follows infrastructure. Any real discussion about growth and quality of life issues must address the critical role of infrastructure.

This year we've been doing quite a bit of work on the issue of growth and quality of life. Governor Glendening from Maryland is chair of the National Governors Association, and we've been working closely with states to try to come up with policies that different states can use, based on their particular characteristics, to address growth issues. I can tell you that one of the things we've found is that one size does not fit all. There are dramatically different political dynamics, population sizes, and other pressures in states across the country, and an attempt to pick up a program that's successful in one state and put it somewhere else doesn't necessarily work. You have to have an open and public process when you bring people to the table. There is no shortcut for this process. We must fashion solutions that work and build public support for them.

In the last 3 years, we've seen this issue of sprawl move to the forefront of debate among states, and we've noticed that a lot of the debate has focused on the negative impact of sprawl. People have looked at traffic congestion and raised their arms in disgust. They want alternatives. They want more lanes. They want this traffic problem to be ameliorated. We have also seen open-space conservation move to the forefront of the debate. People see the farmland of their youth, the open spaces that were around for so long, being transformed into single-use types of development.

What we're looking toward in the future is moving past this effects debate, which has polarized the discussion of growth. Growth is coming; every state in the country wants it. The real question is how will it be facilitated on the landscape. And rather than getting in camps for no-growth and camps for pro-growth, what we want to do is find the balance. We want to find the ways to work within and between governments. Intragovernmental coordination is one of the biggest challenges ahead for quality growth initiatives. Health, education, agriculture, transportation—all of these agencies play a role in growth on some level, and coordinating internally is absolutely fundamental. Intergovernmental coordination is also essential. The federal role in growth is real. The federal relationship to the state and local governments is real. Throw regional layers on top of that, and you've got additional bodies that you must deal with. There is also the private sector.

What Is a Sustainable Community?

How do we guide development patterns? How do we work with the private sector to help fashion growth that is consistent with our objective to grow yet retains the characteristics of places that brought us to those places in the first place? When I heard that the name of this panel was Planning for the Infrastructure Needs of Sustainable Communities, the first thing that struck me was that it would be wise to define a sustainable community. The National Governors Association has chosen to use the term "new community design." There are a lot of terms out there for what many people would call sustainable development. New urbanism is one of the terms that's thrown out there a lot. Traditional neighborhood design is another. We have found that some projects that fall into this nomenclature are not necessarily ones that we would recommend to be replicated.

The fundamental characteristic of new community design is mixed use. That means that jobs, office space, retail space, parks, and schools are all intermixed within walkable neighborhoods. What we've seen over the last 50 years is the tendency to isolate land uses, to have housing subdivisions, commercial centers, and parks all at distances from one another that mandate automobile use. The idea with sustainable communities, with new community designs, is to intermix these uses.

Another key point for new community design is to target communities as urban in-fill locations, to insert mixed-use communities into existing suburbs that are often single-use, and to target them in open spaces where there is a clear decision made to foster growth in the future. We know growth is coming. In-fill sites won't go the whole way. Growth is going to

continue, but where shall we put it? This is the fundamental question. New community designs attempt to efficiently use infrastructure by targeting these designs to places where infrastructure already exists. These places are also typically more compact than single-use areas, such as housing subdivisions. A lot of the literature suggests that these compact developments are less costly per dwelling unit in terms of providing infrastructure; and cost is a critical issue for local and state governments and the federal government. These developments also attempt to make efficient use of water and energy. Given what we've seen in California recently, it's clear that energy conservation is fundamentally important.

I'd like to talk about one of these new community designs occurring in Chattanooga, Tennessee. It is a suburban revitalization project on what is called a gray field, or an old single-use commercial mall built in the '60s that, for all practical purposes, has lost its financial livelihood. It was no longer contributing to the financial status of the area. Recognizing this, the mayor of Chattanooga and a bunch of stakeholders had an idea—let's try to insert a mixed-use community into a suburb to bring a walkable neighborhood into a place that, for the most part, has been dependent on automobiles, just simply because of its design. There was an open public process; 300 people came to one of the meetings to build support for the idea and develop an idea that would work for a group. A plan was put together. It was adopted by the city in 1998, and construction is under way. The early signs suggest that this is going to be a success. Commercial leasing has skyrocketed very early on. So this is the type of idea new community designs aim for, to use the infrastructure in place to help reinsert mixed-use communities with transportation options, including walkability, into places that historically have not had them.

All Levels of Government and the Private Sector Can Work Together to Support Alternative Community Designs

Currently, there are tremendous barriers to the entry of the principles of new community design into the marketplace. For the most part, local zoning regulations and building codes prescribe sprawl, single-use developments, housing subdivisions, and commercial strip malls. When a developer wants to come in and build a new community design, he or she must obtain a pocketful of variances to get it done, which incurs time and costs and, therefore, discourages the use of these designs. We are finding that some communities across the country, probably well over a hundred, have adopted parallel codes for these new community designs. We're not talking about getting rid of the old codes altogether, because there is a significant market out there for single-use developments. A lot of people want a housing subdivision. They want their large lot. That's just a reality.

But by providing the alternative, by leveling the regulatory playing field, we let the market sort out the success of these designs.

The market research that we've found in talking with practitioners in this field suggests that about 30 percent of people, when given the choice, would choose new community designs. However, housing starts of this type are less than 1 percent per year. And, again, this disconnect is because of these institutional barriers. There are also some barriers in the financing realm and also impact fees, which many would argue encourage development on the urban fringe by not charging the full cost of providing infrastructure to those places.

How can all levels of government and the private sector work together to plan for infrastructure needs? This is the \$10,000 question and why all of you are interested in this. There are a number of things that both government and the private sector can do. One is to level the regulatory playing field for these new community designs. I'd like to talk about a few of these things and highlight the federal component, the state component, the local government component, and the private-sector component. Some of these approaches might be led by one of these particular components. But it's important to recognize that, because of the comprehensive interdisciplinary approach that we're dealing with here in considering land use, different agencies, levels of government, and private-sector folks must work together toward a common vision, and that's developing in-fill areas, that's reusing suburban areas and guiding growth to places where we want it to be in the future.

One such way of doing this that I believe holds a lot of promise is using the power of the purse. Maryland has developed priority funding areas. The state has worked with local governments to designate places where growth will go in the future. Infrastructure dollars are then funneled to those places. These areas include existing urban areas, older towns, suburbs, and green spaces where people have made a choice to direct future growth. All proposals go through Maryland's process, and they are reviewed to see if they are consistent with this priority funding area scheme. If they are, they can move forward. If they're not, they don't.

Federal funding could follow a similar course of action, working closely with states to ensure that federal investments reflect the goals of individual states. Again, a fundamental component of this idea is to make sure that we use the infrastructure in place, that we essentially build upon our previous investments for infrastructure. There are a number of states—and the

federal government is taking some steps in this regard, also—that are trying to locate agency buildings downtown, in places where growth is found already. This does a fundamental good by not contributing to the further spreading out and automobile dependency of other approaches. Putting government agencies close to where the constituency is can be part of the solution.

Brown fields are another concept that we’re seeing a lot of work in—these are older sites that were formerly used for some industrial purpose. A lot of brown fields across the country are in prime locations downtown, and even in rural areas in some cases. But because of regulatory barriers, it’s been very difficult to redevelop these areas. States and the federal government have taken some good steps in trying to move past these barriers, but clearly a lot more needs to be done. Reinvest in these brown fields. I believe legislation is being considered this year in the Congress to address this issue and create mixed-use centers here to make them part of communities and part of the solution to where we direct growth.

By virtue of their planning, new community designs are walkable, which provides a transportation choice that, in a lot of cases, is not available today. You can walk to the corner store instead of having to drive, which studies have shown decreases vehicle miles traveled. You can walk to your job. Furthermore, these places are typically more dense than existing residential subdivisions. “Density” is a bad word, I can tell you. When you say “density,” people’s eyes roll back and a lot of people turn off at the get-go. It’s a real hurdle that I think we’ll have to get past. But what we’ve seen in visualization exercises where people actually see these places and then compare them with what a lot of people would call sprawl is that people actually choose the former. Again, market research suggests that 30 percent of the public today would choose them if they were available. So in that regard, I think, through open processes, by showing people what these are, by showing the quality designs, we can get past that initial density fear that people have.

Somebody before mentioned transit-oriented development, and that is one way to facilitate this. Higher densities make the likelihood of transit viability more real. When high-quality transit is around, a lot of people choose it. Clearly it’s a minor means of transportation for how people move to and from work and other needs today. But where you find high-quality systems, in Portland, in San Diego, in other cities, people use them. They must be comparable in cost and in time, and new community designs,

with higher densities and development focused closer to transit centers, can help facilitate the viability of transit.

Now, in closing, I guess I would just like to say that growth on the landscape is one of these issues that we have to work on together. The federal government has a dramatic role with funding. A number of agencies affect growth. State and local governments and the private sector all have tremendous roles. There is no shortcut for building solutions that work in individual places. The challenge in government will be to coordinate different government programs to make sure that everybody is singing off the same sheet of music in attempting to try to focus development where people want it to go. Anytime you're dealing with land use, you're going to have a lot of folks that resist this, but we need to move the debate past where it has been—that is, people fighting one another between the no-growth camp and the other extreme. The issue has been totally polarized, and the truth of the matter is we're growing—the question is really where and how, and to answer these questions requires a lot of work and a lot of hand-holding and a lot of processes to develop solutions that work in individual places.

Thanks.

Introduction to Panel 3 by Bernie Unger, Director, Physical Infrastructure

Panel 3: How are federal facilities' infrastructure needs changing and how can federal agencies better manage the assets they own?

Welcome to our third panel. When we think about infrastructure, we naturally think about highways and bridges, rail, airports, water treatment facilities, and schools. I don't believe we always think about federal facilities. Yet federal facilities have a fairly large impact. There are close to 500,000 federal facilities belonging to a large number of different agencies across the federal government. Some are overseas. Not only does the federal government own property, but it leases property as well. The location and quality of federal facilities has ramifications not only for federal operations but also for the communities where the facilities are located. There are impacts on transportation and other infrastructure networks. Furthermore, the challenges facing federal facilities are similar to the challenges facing other types of infrastructure in the nation. For example, deferred maintenance is a huge issue not only for infrastructure like roads and bridges but for federal facilities as well, which have billions of dollars in needed repairs and alterations that remain undone. The operational costs facing agencies that have large inventories of federal buildings is another big issue, particularly regarding energy costs.

In addressing the challenges facing federal facilities, there are a lot of innovative ideas floating around, but there are also a lot of obstacles to overcome. We're very fortunate this afternoon to have a high-powered group of panelists with a lot of insight into the infrastructure issues related to federal facilities.

The remarks of panel 3's four speakers are contained in appendixes XII through XV.

Presentation by David Bibb, Deputy Associate Administrator for Real Property, Office of Governmentwide Policy, GSA



David Bibb heads the real estate section of the General Services Administration's Office of Governmentwide Policy. Mr. Bibb and his staff help ensure that governmentwide real property policies allow and encourage agencies to develop and use the best, most cost-effective management practices. They are transforming the traditional policy development model to emphasize collaborative policy development across government. Mr. Bibb's office has done a wide range of work on best practices, including work on environmentally conscious (green) buildings and innovative workplace strategies such as telecommuting.

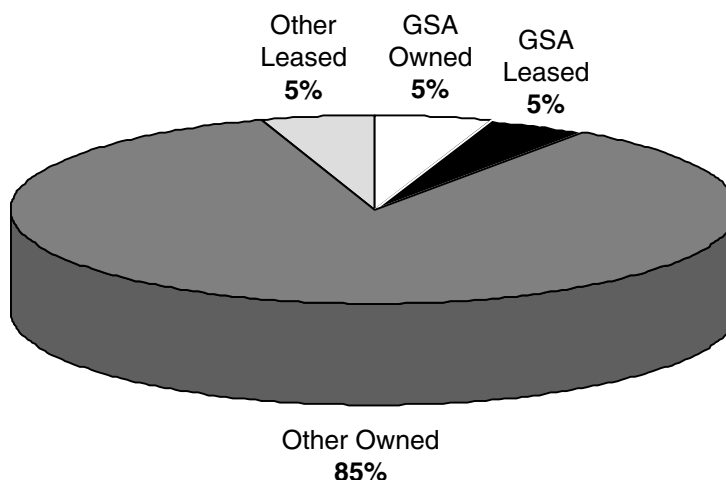
The Purpose of the Office of Governmentwide Policy Is to Bring a Crosscutting Perspective to the Federal Building Inventory

It's good to be here today. I don't know if it's old age or what, but increasingly, I find that when GAO comes knocking, I'm glad to see you. The more we work together and look at issues, the more I think we're in many ways on the same page in understanding what the issues are, and even on some of the solutions.

I am not from the Public Buildings Service, which is the part of the General Services Administration (GSA) that runs the GSA building inventory. I used to be there, but I'm now in an office called Governmentwide Policy, which was created about 5 years ago for a couple of purposes. One was to separate operations from policy within GSA. The second reason is that we are in a lot of ways a creature of the National Performance Review and the idea that somebody ought to be bringing a crosscutting perspective to this huge federal inventory that's much more than just GSA. We try to do that. For example, I chair a Federal Real Property Council, which includes senior executives from every agency that owns and operates a real property inventory. We get together in a consensus-building way to look at issues and try to solve them. In a lot of ways, we are a think tank. I have about 40 people. We do a lot of good stuff. If you haven't seen it, check out our Web site, www.GSA.gov/realpropertypolicy.

Just to give you some idea of the magnitude of this big federal inventory, GSA's inventory alone, the Public Building Service, includes over 300 million square feet of property. When I talk about that with the private sector, jaws drop. They can't imagine an inventory that big. But GSA's inventory is only one-tenth of the federal inventory, which is over 3 billion square feet, about the size of the planet Pluto as far as I can tell. It's a lot of space (see fig. 15).

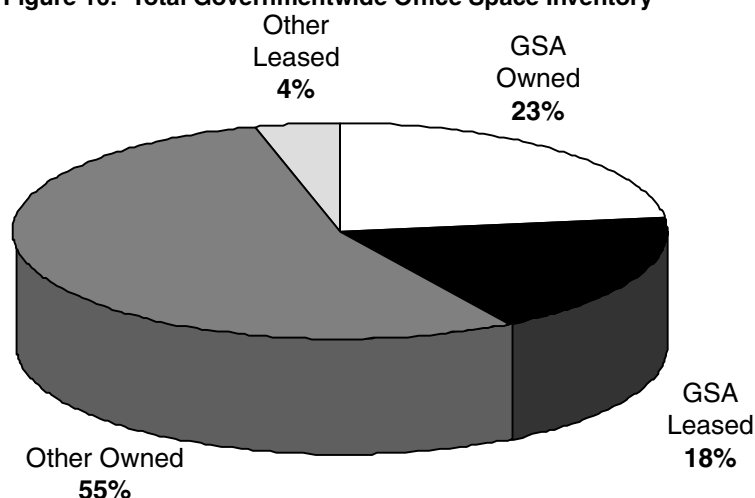
Figure 15: Total Governmentwide Space Inventory



The Governmentwide space inventory is approximately 3 billion square feet, of which GSA directly controls 10 percent, or approximately 312 million square feet of space.

Just in terms of office space, GSA houses 1 million people. But when you add up the office space in all the other agencies' facilities, whether it be an Environmental Protection Agency facility or a Department of Defense (DOD) base, or whatever, there's over 700 million square feet, and GSA has only about 41 percent of it (see fig. 16). So when we're talking office-space issues, there are a lot of issues way beyond the GSA inventory.

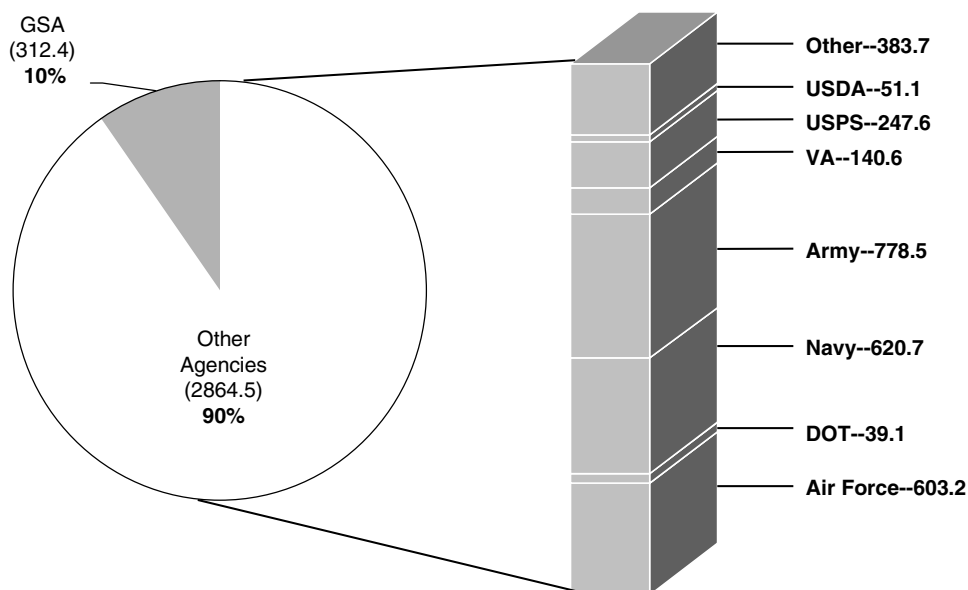
Figure 16: Total Governmentwide Office Space Inventory



The Governmentwide total for office space is 728 million square feet, of which GSA directly controls 41 percent, or approximately 300.6 million square feet of space.

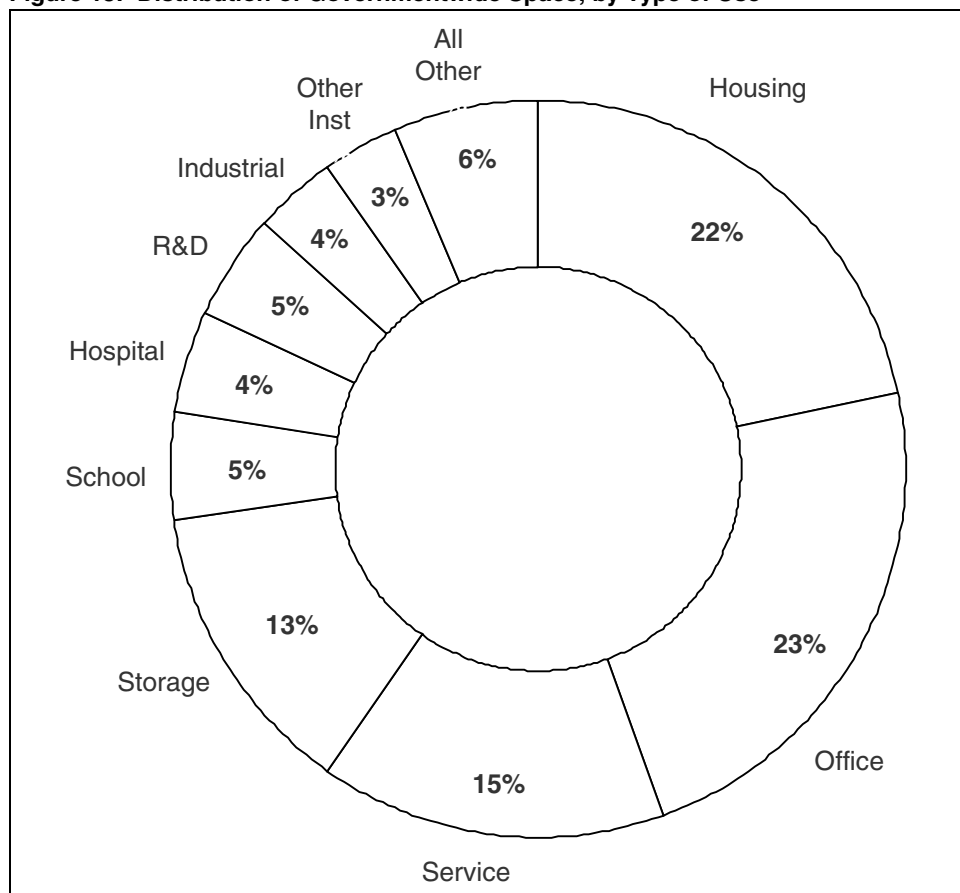
This next graphic (see fig. 17) gives a crosscut by agency. Again, you see that GSA has 10 percent of the governmentwide real estate holdings. Everybody else together has the other 90 percent. There are obviously a lot of big DOD users, but our colleagues from the Veterans' Administration (VA)—this number may be dated, but it's coming up on 150 million square feet. That's a lot of space in and of itself. The State Department has embassies all over the world, millions of square feet, I suppose, when you add them up. And those are just pieces of the inventory.

Figure 17: Federal Agencies' Real Estate Holdings, in Thousands of Square Feet



Think of the diversity of the federal government. Office space makes up just 23 percent of the total government space; housing, 22 percent; storage, 13 percent; schools, 5 percent; hospitals, 4 percent; and so on (see fig. 18). There are all kinds of federal real property.

Figure 18: Distribution of Governmentwide Space, by Type of Use



Inadequately Maintained Federal Building Inventory Affects Productivity and Recruitment Efforts

So what's the state of that inventory? In our Federal Real Property Council, a lot of themes come across. One of them is that there are a lot of functionally obsolete buildings. GSA itself has so many buildings that are 50 years old and older you can hardly count them. They make up a large proportion of the inventory. Many of the older buildings are not configured to support the technology that we're all working with now. There's also some physical deterioration. Most agencies are keeping the roofs from leaking, but not all. There are examples of leaking roofs, including some in the GSA inventory. Environmental sustainability can't be achieved in the facilities we have. Bernie Ungar mentioned that when GAO looked at our own GSA internal inventory, it found a \$4 billion backlog in capital maintenance expenditures. It could be \$5 billion, it could be \$6 billion, it

could be \$3.5 billion. It's big. It's four or five times our annual appropriation, or the money the Congress gives us out of the rents we collect to deal with the problem, and it's growing.

This is not a problem unique to GSA. It's a problem across the federal government. We had a public-private partnership forum a couple of weeks ago. DOD talked about their military base housing privatization effort and said that if they had relied on direct appropriation to do that, it would have taken 40 years to revamp their housing. It's a problem for everybody. In 1998, the National Research Council affirmed what we and GAO have been saying, that agencies should be putting a certain percentage of the value of their properties back into renovation every year, something like 2 to 4 percent of the replacement value of those properties. The bottom line is that nobody is coming close to doing that right now.

Can we take care of this problem on the demand side? Why don't we just get rid of a lot of the space, and then we won't have as much to fix up, and our dollars will go further. That's one possibility. Is telework going to mean that everybody moves out of the federal buildings and decreases demand so we can give up a lot of our buildings? So far, experience says no. People aren't giving up a lot of space, with the exception of those agencies that have a lot of their people on the road all of the time. So far, things like teleworking are resulting in quality of life improvements for the employees, but not a lot of sharing of desks and reduction of space. Maybe we will have some of that as time goes by and more people telework. However, the inventory is so huge and the problems are so large that even if we have a substantial reduction on the demand side, so much work needs to be done with what would be left that it would still exceed anybody's projection of available dollars.

What happens if we stay with the status quo, which in my opinion is inadequate funding for everybody year after year. Obviously, when you defer action, it costs more in the long run. Costs include disruptions in the workplace and compromised productivity. There's enough information to know that work space impacts productivity and the well-being of people in the space. When you're spending 90 percent of your agency costs on people costs, and you're putting them in a facility that doesn't help people get the job done, if you multiply that by a 1- or 2-percent productivity change, you'll see that the facilities are important. They are often neglected in the agency's strategic plans, by the Congress, etc. My thesis, and I think the research bears it out, is that facilities have a huge impact on the ability of the occupants to get the job done.

Another issue is apathy among employees. I won't say federal employees are apathetic; they're not. But a poor environment can certainly hurt morale. Attraction and retention are also affected. Your own Comptroller General brought up that issue. How can you attract the top college graduate if you say, "Come work for us. We don't pay quite as well, but the prestige of being a federal employee is incalculable." As you know, they don't believe that. And then we say, "On top of that, you get to work in a dump." That's not a good combination. We think good facilities play in to attraction and retention.

Reform Efforts Are Under Way to Permit Alternative Financing Approaches

As for energy reduction, I know Beth is going to talk about that, but it's tough to meet the goals with the facilities we have. There are some tools to deal with that, but the state of our facilities makes it tough. Moving on to budget constraints, under most budget rules, up-front funding is required for whatever you do. I understand when you talk about funding for capital projects and you talk about various approaches that you get into much bigger issues than just real estate. I've had to defend that notion a hundred times on the Hill. They say, "Why did you make that lease with no purchase option?" I have to say, "Because we can't under the current scoring rules." It's hard to grasp, but there is a bigger issue of balancing the budget and off-budget borrowing, and we understand that. But as a result, agencies have very little ability to leverage the equity in their assets, and one solution that could help us would be to allow us to tap some of that equity. There are billions of dollars in that equity that many agencies have no way of getting to right now.

We are a member of an international organization called the Workplace Network, which includes representatives from most of the Western European governments, as well as Australia and Japan, who do the same types of things that we in the "government do. We laid out a case study for a typical GSA project. We said, "How would you deal with this?" They looked at it, and they came up with scheme after scheme, most involving some kind of creative financing that they have the authority to use. And on every one of them, we had to say, "We can't do that. Our laws don't allow it." We had no solution when the day was over.

Recently, there have been some developing efforts in various arenas to grapple with these issues. Last year, as many of you may know, growing out of the Federal Real Property Council, we introduced major property reform legislation, and it went to the Hill last spring and was introduced by Senators Thompson and Leiberman. We found a good combination to

introduce the bill. We had hearings on the House side. The legislation would do a number of things to introduce incentives. I think we can have much better property management if we have some reason to manage property well, and a piece of that is incentives. So we put in the legislation incentives such as being able to keep the money if you sell a piece of property, which most agencies can't do now; expanding out-lease authority; and better subleasing and sale and exchange possibilities. I call these provisions the "wheel and deal" part of the bill.

The bill also included some other provisions. For example, it would charge GSA by law with putting together a worldwide inventory of property, which is done by goodwill now, and the goodwill doesn't go so far in some areas. It would also establish governmentwide asset management principles, requiring each agency to have a real property officer to put some focus on this huge investment we have and installing a requirement for each agency to do real property planning. That bill went up late and probably had little chance of getting passed last session. But the story is not over yet. We have some very encouraging signs from the Hill. I can't speak for the administration because I don't know where the administration will be on this issue, but personally, I'm encouraged because a number of staffers have indicated that their bosses are willing to reintroduce the bill. Also last year, Congressman Pete Sessions of Texas introduced a public-private partnership bill fairly late in the session, which didn't get passed. We know firsthand that he is interested in reintroducing that bill. So we may have something in play. The staff seem very interested.

In the meantime, a number of agencies have gotten their own authorities. VA has enhanced-use leasing. DOD has the opportunity to use the private sector to revamp their housing, and then pay for it over time by giving the individual service men and women a monthly housing allowance that they may use to pay rent to the private sector for the renovated housing. So agencies have been successful in getting some authorities on an individual basis for the pure reason that they have this inventory of work to do and no real way to get the cash to do it. I had hoped that with our huge national budget surpluses, we could do something on the "cash-on-the-barrel" side, which is option one. However, realistically, since we had a tax cut bill, none of us think there's going to be a huge increase in cash flowing into the capital infrastructure area. It's just too easy to defer, and you all know it happens over and over again.

So what are other options GAO could look at? First, I would certainly like to see more money in the system. Second, reform the property act in some of the ways I have talked about. Another area in need of analysis is changing the budget scorekeeping rules, which I haven't talked about in this session. But many of you know that from a purely real estate standpoint, there are situations where we could have made a lease and could have negotiated an option to own the building for a dollar at the end of the term. But, because that would have scored as a capital lease or lease purchase, and we would have had to put all of the money for the total of the rental payments over the term of the lease in that year's budget up-front, we couldn't make the deal. I fully recognize that this is a big picture issue, having to do with balanced budgets and the budget enforcement act and so on. There would be a tough road to go to tackle scorekeeping, but I think we've got to take a look at it again, and I hope GAO will do that.

These are options for you to consider. They offer many challenges for us and for you. Maybe together we can solve some of them.

Thanks.

Presentation by Beth Shearer, Director, Federal Energy Management Program, Department of Energy



As the director of the Federal Energy Management Program, Beth Shearer works with federal agencies across the country, helping them reduce energy and water consumption, manage their utility costs, and increase the use of renewable power and technologies. Formerly, at the General Services Administration, Ms. Shearer was the director of the Energy Center of Expertise as well as the director of the Information Management Institute at the Administration's Training Center, where she developed the first comprehensive federal curriculum for the acquisition and use of microcomputers and software.

The Federal Energy Management Program Helps Agencies Improve Energy Efficiency

David Bibb gave you the big picture. I'm going to go into a smaller picture—energy use in federal facilities. The Federal Energy Management Program is a part of the Office of Energy Efficiency and Renewable Energy at the Department of Energy (DOE). We help federal agencies that operate and maintain buildings reduce their costs and environmental impact through energy efficiency, renewable technologies, and managing utility costs. At lunch today, I was asked if this area of utility management was a fairly new kind of responsibility for federal agencies and for the Federal Energy Management Program. The answer is yes, especially in light of what's happening in California. There's been a lot of activity with agencies' management of utilities in terms of how they can cut their loads. Energy management in federal facilities is also increasing in importance because, as we manage our load, we can also manage our costs.

I wanted to give you an idea of the context of energy use in the federal government. We spend almost \$8 billion a year on energy in the federal government: in our facilities; for our trucks, airplanes, and cars; and for process kinds of operations. For example, we consider the Bureau of Engraving and Printing's money printing a process-type energy. The largest energy user in the federal government is the Department of Defense (DOD), which uses 70 to 75 percent of the energy used by the federal government. The next largest users are the U.S. Postal Service (USPS), the

Veterans Administration (VA), DOE, and the General Services Administration (GSA). Those are our five largest users.

The Federal Energy Management Program was actually incorporated in 1973 in the Department of the Interior, and over the years it has continued to be the focus of both legislative and executive attention to federal energy management. Most recently, with Executive Order 13123, which was passed in the Clinton administration and is still operative in the current Bush administration, we've increased the scope of federal energy management.

What are we asking federal agencies to do? We're asking them to reduce their energy consumption. In the executive order that I mentioned earlier, we're asking federal agencies to reduce their energy use by 30 to 35 percent by 2010. We're asking agencies to increase the use of renewable energy. We're saying that by 2005, agencies should be buying 2.5 percent of their electricity from renewable sources. While 2.5 percent doesn't seem like a lot, in fact, it is very much of a stretch goal for agencies. Currently, federal agencies get less than one-half of 1 percent of their electricity from renewable resources. We're also asking agencies to implement best practices for water conservation and to reduce greenhouse gases by 30 percent by 2010. So, in essence, the executive order tripled the kind of work that we're doing in federal agencies. While before we were just concerned with reducing energy consumption, we're now also looking at water renewables and greenhouse gas emissions.

How are we doing? In terms of energy consumption, federal agencies are doing pretty well. At the end of 2000, we were using 22.7 percent less energy per gross square foot than we did in 1985, which is our base year. That represents a savings of over \$2 billion in what we would have spent for energy use if we hadn't cut consumption. Some of these energy savings are from emission-related changes and DOD base closures. But about half of them are from energy conservation projects that agencies have implemented over the last 15 years.

**Sustainable Design
Principles Enable Agencies
to Improve Energy
Efficiency**

In terms of infrastructure, how do agencies do this? When agencies build new buildings, they can reduce their energy use and their impact on the environment by building them in an energy-efficient, sustainable manner. We spend most of our time in federal agencies reducing energy through building retrofits, such as replacing aged equipment and improving infrastructure. We have reduced our energy by buying energy-efficient

equipment, through good maintenance and operations procedures, and utility and load management. My program, the Federal Energy Management Program, assists federal agencies in their energy management programs through activities, such as alternative financing, technical assistance, outreach, coordination, and policy development.

Brad had asked me to talk about sustainable development in our federal buildings. In the executive order, there was a requirement for us to develop sustainable design principles. We had an interagency working group whose primary participants were from DOD, GSA, DOE, and the Environmental Protection Agency. The working group developed sustainable design principles, which we incorporated in a document called the *Whole Building Design Guide*. If you haven't taken a look at it, I really recommend it. It has a wealth of information on sustainable design principles. We will also be reconstituting this working group to get these sustainable principles as part of our standard operating procedures in federal agencies. I've been talking with a number of federal agencies, and I understand that GAO's Comptroller General has a human capital group that is interested in how sustainability and space affects people's productivity. That's something that we will be looking at this year.

What are the sustainable design principles that this interagency group put together? The first one is to think about these issues when you are siting a building. Can you rehabilitate or reuse a building? Is the site close to public transportation? If you've got a south-facing exposure, how are you using that in the design of the building? A big part, and the part that I am most concerned about, is how do you minimize energy consumption in your building? What kinds of passive solar design can you use? What kinds of conservation principles can you put into effect? How can you get away from using fossil fuels? How can you use renewable technologies?

The next principle, to protect and conserve water, includes things, such as if you've got runoff from your building, can you use it for your landscaping? Is there some way you can use the gray water that may come out of your sinks? Use environmentally preferable products. There is a whole executive order on environmentally preferable products that many of you may be familiar with. But, in addition, this includes energy star products and product recommendations for energy efficiency. It also includes things like using recycled glass for tile in your bathrooms, recycled carpeting, paints that don't have a lot of off-gassing, and all of those kinds of things.

Next, to enhance indoor environmental quality, think about things, such as whether you have daylighting in your building. What kind of ventilation do you have? Then, optimize operational and maintenance practices. David mentioned that we can save lots of money through good operations and maintenance. Operations and maintenance also affect your indoor air quality and productivity.

I think that the real issue of these principles is that as you are designing buildings, if you want to design them in a sustainable way, you really have to think about the whole building. You have to think about how the parts interact and design a thoughtful building. What we're starting to talk about now in the energy arena is zero energy buildings, where you might actually be able to produce all of your energy needs and sell some to the grid. Designers are talking about things like having wastewater treatment as part of the building, where you might have an aquifer in the building itself treating the waste water. So it's a fairly exciting area and one with some very far-reaching kinds of thoughts.

Regarding sustainable principles, we are doing a lot of research and development on and encouraging agencies to use renewable energy technologies, such as photovoltaic power, wind power, hydropower, and geothermal power. There's a whole host of renewable energy technologies that are starting to become cost-effective. Wind power today is sometimes cheaper than fossil fuel power. It depends on where you site it. We're encouraging agencies to use renewable energy technologies. We are also looking at distributed energy power technologies. These are technologies that you can use in your building or in your house to produce electricity on-site.

Renewable and Distributed Power Offer Solutions for Federal Buildings' Needs

Let me show you some examples of how renewable and distributed power technologies are being used. Four Times Square, New York City, is a commercial spec building. The top floors are all photovoltaic panels that use the sun to produce electricity. They've got fuel cells in there. The whole building has been designed as a very sustainable building, in terms of the way it uses waste and the way it produces power. It's an exciting building, and if you can do it in Times Square, in New York City, you ought to be able to do it anywhere.

Another example is the Tucson-Civano community. All kinds of sustainable design principles were used in these buildings. The developer guarantees to homeowners who buy these buildings that they will spend no more than

94 cents a day for their electricity, even in the height of the summer when they are using air conditioning. There are some very interesting things you can do using renewables and distributed technologies.

We have a special program for sustainability with the National Park Service—the Green Energy Parks. For example, we are using photovoltaics to produce solar hot water heating for particular rest areas. In Pearl Harbor, Hawaii, DOD-Navy has put solar hot water heaters on housing throughout naval bases in Moanalua. These are pretty exciting buildings. They are actually low-income housing for some navy personnel. They are producing all of their hot water, and, in some cases, they've got solar pipes in the bathrooms, so they have daylighting and so forth. They are very low energy-using buildings, and they have improved the quality of life considerably for navy personnel.

Finally, I'd like to talk about some lessons that I have learned over the last couple of years. I'm a passionate advocate for energy efficiency and sustainable design, but I can't sell energy efficiency. I can't sell sustainable design. I can sell cost-effectiveness, and I can sell solutions. So I just wanted to give you some examples of solutions that we have found using renewable technology—and here I'm using solar technology for the example. As we're trying to improve our infrastructure, we've got to look for the hooks that will sell.

What are some things that sell? The National Oceanic and Atmospheric Administration uses solar panels to power their buoys. We can use solar panels for communications. We've used a number of these solar panels for communications throughout the government. You can sell solar as a solution for energy needs in highways. Many of you may have seen these solar panels that tell you how fast you are going and if you are speeding. You've probably seen lots of solar panels for lights on the highways. Solar for disaster relief actually has gotten to be a very big niche market. We find that, in disaster areas, we can take in some solar panels with portable generators and produce power. After Hurricane Andrew, for example, we had some solar lights in neighborhoods. The only things standing in some neighborhoods were these solar lights, and people would gather underneath them. So disaster relief is an area for which renewables can be a solution.

Thank you.

Presentation by James Sullivan, Director of Capital Budgeting, Department of Veterans Affairs

James Sullivan is the director of capital budgeting at the Department of Veterans Affairs. Under his leadership, the capital investment planning process has evolved from a vertical stovepipe process with minimal crosscutting proposals to one that is horizontally integrated between the administrations and staff offices and encourages projects that cut across departmental lines. Recently, the Department received a best practices award from the Office of Management and Budget for its decision-support software program that evaluates and ranks projects on the basis of agency goals and financial measures.

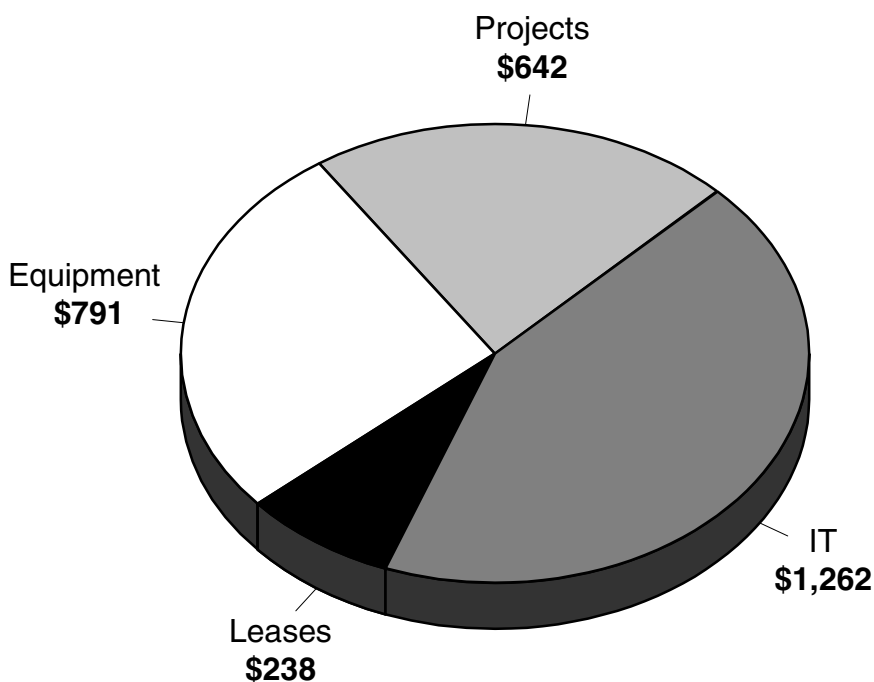
VA Has a Large, Varied Buildings Inventory

Good afternoon. I'd like to thank you for the opportunity to make this presentation today. I want to give you an idea of the Department of Veterans Affairs (VA) infrastructure as well as some of the issues that VA faces regarding infrastructure. In addition, we have a process that we've developed to prioritize different types of assets against each other and link them to our strategic goals and other priorities of the Department of Veterans Affairs. I would like to describe this process and then give you a demo of the prioritization decision model that we use to select assets. When we talk about assets, we include the bricks and mortar we've talked about here, but also information technology (IT) equipment, leasehold interests, and sharing agreements.

In terms of inventory, we have hospitals, clinics, cemeteries, office buildings, fire departments, golf courses, and IT and medical equipment. We also have what we call our categories of investment. These categories include energy saving performance contracts, which are agreements to share energy cost dollar savings with private firms that provide energy conservation retrofits; enhanced sharing, which is special authority to buy and sell services in real property for our medical system that can be used in the appropriate forum; and enhanced-use leases, which are similar to an equity partnership except that we set up a trust for the benefit of the government that we use as the vehicle for the development. In many areas, where the market is right for it, as Steve Weiner discussed, you can make these deals work. But we found that there are places where the market doesn't make it work, but where we have a demonstrated need to have a building such as a clinic. Two years ago, a couple of committees on the Hill established that in these cases, we can use appropriated dollars in conjunction with the private-sector field to make it work. Other categories include IT, infrastructure, and leases. We have direct delegated leasing authority from medical plus the traditional General Services Administration (GSA) leasing and space assignments.

Our portfolio of assets is about \$3 billion (see fig. 19). It includes infrastructure projects at about \$650 million; equipment, which comes to about \$800 million; leases, which total a little over \$200 million; and IT, which totals about \$1.3 billion.

Figure 19: Fiscal Year 2002 Capital Budget (in millions)



VA Has Developed a Planning Tool to Assist in Prioritizing Proposals for Capital Investments

In our capital planning process, we focus on three phases. The first, a functional development phase, includes the users, who are the people closest to the products, and the service delivery items that they need. The users develop and rank their proposals for what they would like. Then we have crosscutting councils or boards that perform a technical review process to make sure that, for example, our IT proposals adhere to our IT business architecture and our IT technical architecture. Then we have what we call a strategic review phase, where senior management uses the decisionmaking tool I'll describe later to rate and score investments and rank them against each other and our strategic goals.

We then have our confirmation or tracking phase. As many of you know, these investments have a long lead time. We want to make sure that if 22 months ago we submitted a proposal for building a clinic in Oshkosh, 3 years later, just before we're going to award the contract, we still need it—or, probably more appropriately, we still need the size and type that we originally thought we would. The last phase is our tracking phase, in which we track performance, costs, and schedule. This is probably the one we're working on the hardest. With our portfolio, it is very difficult to track costs for all of these proposals.

The Capital Investment Board is key to our capital planning process. The membership of our board is made up of fairly high leadership in the department, including the deputy secretary chairs; deputy undersecretaries for each of our administrations; plus legal, congressional, and technical assistant secretaries. One of the prime goals of the VA Capital Investment Board is to ensure that we have a one-VA perspective. Just as GSA is trying to show a one-government perspective, we try to make sure that proposals for our medical system, which is fairly extensive, and our benefits department, which does GI Bill benefits, burial benefits, education benefits, and so forth, are looked at in terms of their overall effect.

If we are putting in a new 1-800 telephone system, we want to make sure that we have one system for everyone or at least one that can be linked or modulized with others. In 1999, when we started this process, each administration came forward with its own 1-800 system. As part of this board, they came together, and now they have a modulized system where they can add modules as each administration is ready to do so.

Generally, the board's decisions are used to support our strategic planning and budgeting and goals as well as the basis for submission in our annual budget to the Office of Management and Budget (OMB). This next graphic shows the monetary thresholds for what our board looks at (see table 2).

Appendix XIV
Presentation by James Sullivan, Director of
Capital Budgeting, Department of Veterans
Affairs

Table 2: Capital Investment Proposal Thresholds

Investment categories	VHA	VBA	NCA	Staff offices
Infrastructure ^a	\$4M	\$4M	\$4M	\$1M
Medical equipment	\$1M	N/A	N/A	N/A
Non-Medical equipment	\$500,000/piece	\$500,00/piece	\$500,000/piece	\$500,000/piece
Information technology:				
Total acquisition cost	\$10M	\$2M	\$1M	\$1M
Life cycle cost	\$30M	\$6M	\$3M	\$3M
Leases/GSA space assignments	\$600,000	\$600,000	\$600,000	\$600,000
Enhanced-use leases ^b	\$4M	\$4M	\$4M	\$4M
Enhanced sharing agreements	See note c	N/A	N/A	N/A
Energy savings performance contracts (per task order)	\$4M/facility \$10M/multiple facilities	\$4M/facility \$10M/multiple facilities	\$4M/facility \$10M/multiple facilities	\$4M/facility \$10M/multiple facilities

^aIncludes the construction and medical care (NRM) appropriations.

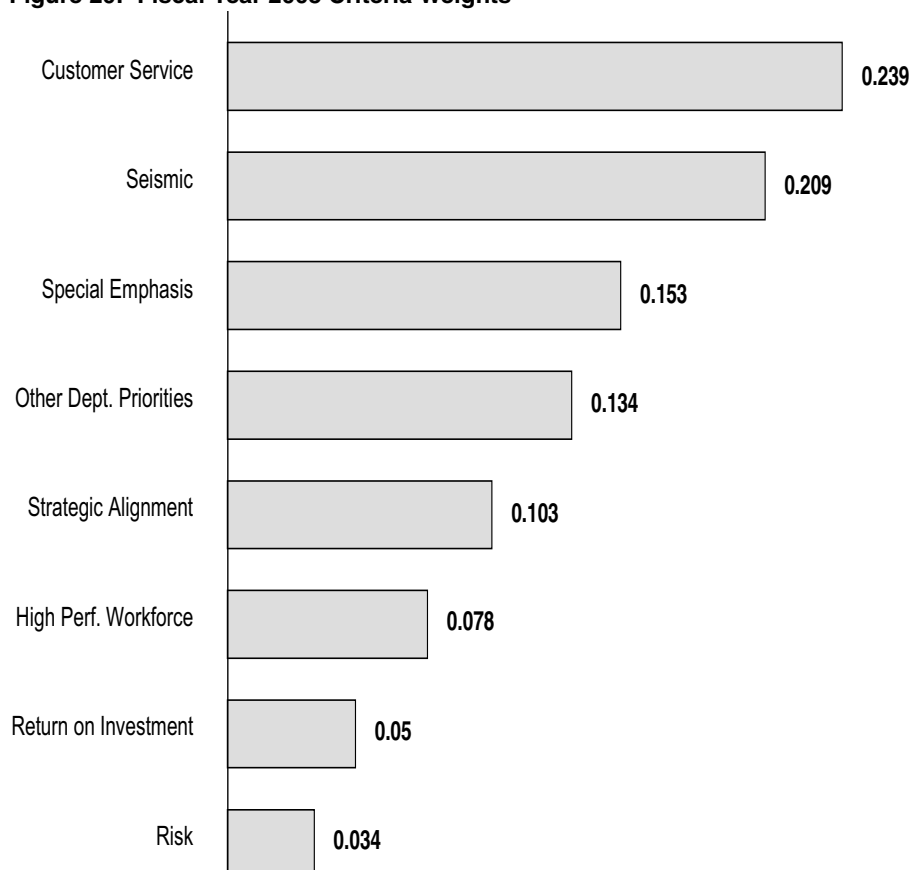
^bWhere VA receives consideration with a present value exceeding \$4M.

^cEnhanced sharing agreements for space will use the definition under note b. For all other categories, existing VHA thresholds apply.

The thresholds vary by administration: VHA is health, VBA is benefits, NCA is cemeteries, and then there's general staff office support. On the left side of table 2, you'll see the type of things that we review, including infrastructure, which includes our construction programs; medical equipment, since we have a lot of high-tech, high-cost items; and IT, for which we use both an acquisition cost and life-cycle trigger.

This next graphic (see fig. 20) shows the criteria weights we're using for 2003.

Figure 20: Fiscal Year 2003 Criteria Weights



We actually sit our board down together with the top political leadership in the department and use this tool to weight each one of those criterion against the others. The board has to decide what is most important to them. As you can see here, customer service is rated the highest, and risk is weighted the lowest. When we started this original process, we added risk, I believe, at GAO's request. We added return on investment at OMB's request.

This next graphic (see table 3) gives you the idea of how we can change over time. Each year, we not only decide whether to use the same criteria, but we also set the weights. For example, customer service was weighted quite high the first year we did this, but since then it's fluctuated and settled down to about a quarter of our weight in alternatives. We've added seismic.

We've also added special emphasis, which is a congressionally mandated criterion we're supposed to use in all of our investments now.

Table 3: Comparison of Weights, 2000-2003

Criteria	2000	2001	2002	2003
One VA customer service	.555	.173	.243	.239
Return on taxpayer investment	.194	.088	.063	.05
High performing workforce	.140	.065	.089	.078
Risk analysis	.061	.087	.05	.034
Alternative analysis	.050	.074	In ROI	In ROI
Seismic/life safety		.301	.274	.209
Special emphasis		.212	.149	.153
Strategic alignment			.133	.103
Other priorities				.134

A Capital Investment Panel, which works for the board, is made up of seven members of each major departmental element. Prior to weighing proposals with this analytic tool, the panel performs a validity assessment of each proposal it receives, making sure that the proposal is complete and reasonable, and that there's a rationale for including it in the weighting process. If proposals do not pass this validity assessment, they are never scored or even put on a prioritized list.

Many issues affect our decisions. Population shifts are a big issue for us. We are looking at realigning our hospitals to where they should be and doing more community-leased outpatient clinics and more leasing in general. There are also technology changes. We have wired all of our facilities, especially in the health system, for telemedicine. Teleradiology is a big issue. We are also looking at a paperless benefits process.

In terms of the status of our infrastructure, the average age of our medical facilities is 50 years. There are a lot of seismic issues, especially on the West Coast. There have been a lot of changes in terms of functionality as a medical system in general in the country, and VA has moved from an inpatient basis to an outpatient basis, which has brought up a lot of functional issues in terms of space. Again, new technology has changed things. Five years ago, MRIs and CAT scanners were on the fringe of normal practice of medicine, and today they are commonplace. And there

are energy issues. We have a lot of energy issues at VA because the infrastructure is so aged, and we use energy performance contracting. We also have found that our enhanced-use legislation allows for energy, and we have entered into energy projects with other government agencies and private corporations or public subsidiaries of utilities to develop joint energy projects.

Our capital asset process is heavy into alternatives, forcing us to look at renovation, enhanced-use leasing, enhanced sharing, and contracting before we ask for appropriated funds. The use of Energy Savings Performance Contracts is another alternative to appropriated funds.

We just recently created an Office of Asset Enterprise Management to further strengthen this process and to ensure that there's coordination in our planning and muscle behind our decisions to make investments. This office was created to develop a capital asset policy, provide guidance and oversight, and maximize the leverage of our assets. In many cases, we need to combine a lot of our underused assets and see if we can reach some accommodation with the private sector. In our case, we look at individual sites where we have office buildings, clinics, and general office space as well as warehouse space. One of the things we are looking at is whether there is any way to bundle those investments, in essence, by putting the cream of the crop that the private sector wants, that building that has the great return, with what they might view as a dog but we would see as a real need of VA or the government.

Our Web site is <http://www.va.gov/budget/capital>. This presentation will be on it as well as a lot of our other information, including a standardized application for all investments, risk templates that have been developed with the consulting community over the last 3 years, an earned value template for our investments, and an alternatives analysis template. We use a tool called "expert choice," which is an analytical hierarchy process that forces structured decisionmaking. It forces people to put their subjective assessment of an investment into a structured environment. There's never going to be a totally objective proposal or a totally objective criterion, but at least we now have structured subjectivity.

Appendix XIV
Presentation by James Sullivan, Director of
Capital Budgeting, Department of Veterans
Affairs

Mr. Sullivan concluded his presentation by giving a demonstration of the VA's structured decisionmaking process tool.

Presentation by Steven Weiner, President, Signet Partners

Steven Weiner leads a consulting firm with engagements in the evaluation, asset management, acquisitions and disposition of diverse real estate assets for federal and private clientele. In 1997, Mr. Weiner brought to the General Services Administration a concept for the formation of federal public-private real estate partnerships. The concept used a private-sector business model to renovate underused federal properties. His governmentwide approach specifically addressed the concerns reflected in the budgetary scoring rules of the Office of Management and Budget. He also acted as an advisor in the formation and implementation of a portfolio management program for the agency's Public Buildings Service.

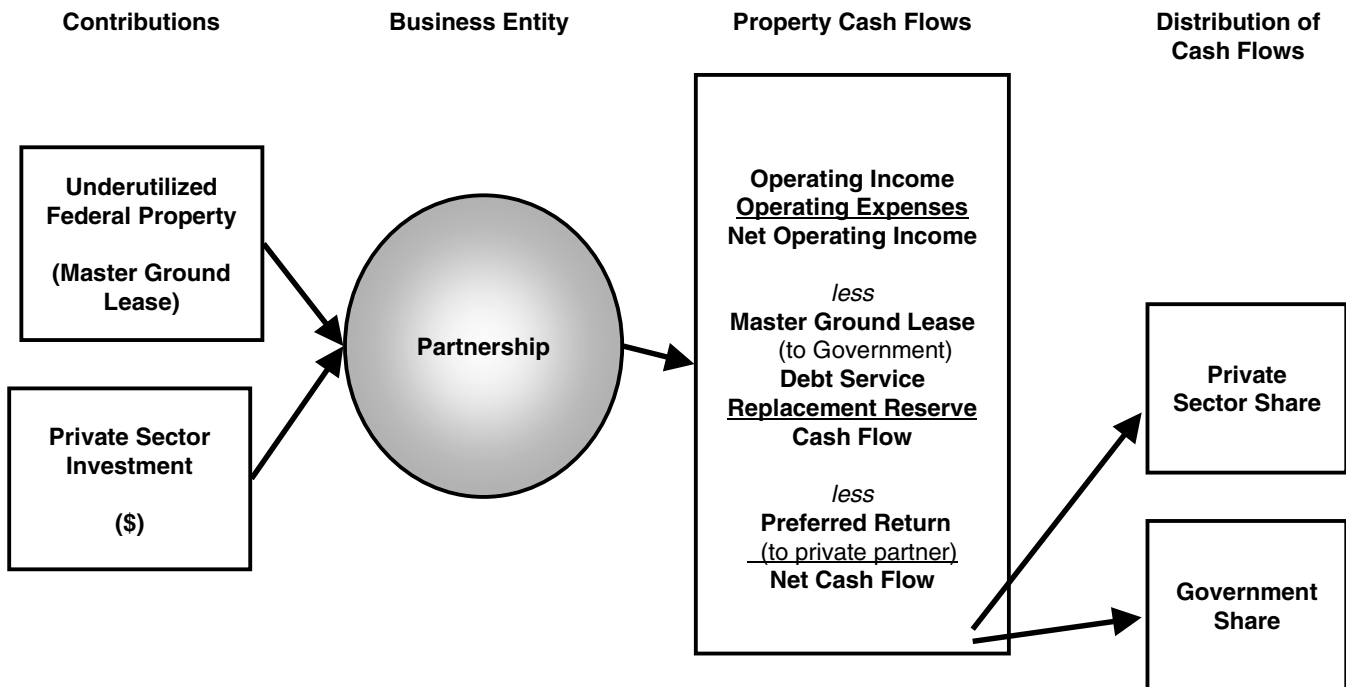
Public-Private Partnerships Hold Promise for Improving Some Federal Real Estate

Listening to the other panelists at this conference, I noticed a theme, and that is the issue of how we can use public infrastructure more efficiently. In a sense, my topic, a public-private partnership concept that was initiated by the General Services Administration (GSA) and resulted in a bill that led to GAO doing an investigation of the feasibility of the concept, fits with this theme. Our firm, in conjunction with Ernst and Young, conducted a study of these partnerships this spring, which we're very proud to have been part of.

Last year's legislation, H.R. 3285, authorized the exploration of public-private partnerships for the improvement of federal real estate. The idea is to use the private sector's approach as far as the structure and the roles of the parties are concerned while incorporating budgetary scoring rules into the design of the partnership. As the result, a partnership under the proposed legislation might include prerequisites such as that the property be available for lease, whole or in part, by a federal executive agency. Well, that's a given. But the agreements to form those partnerships also have prerequisites. For example, they must not result in a guaranteed occupancy of the facility by the federal government. The projects go forward more or less on a spec basis, which means that every property is not going to be a candidate. Also, the government will not be liable for any actions, debts, or liabilities of any person under a partnership agreement. There are no government guarantees. The government is going to put the land and the property into the partnership, but that's it. It's going to convey it to the partnership under a long-term lease, somewhat similar to the enhanced-use lease that the Veterans Administration is using. The leasehold interests of the federal government remain senior to any debt taken on by the partnership. The federal government is first in the food chain.

To make these requirements work, you need a certain kind of property. You can't take a dog property and expect the private sector to invest in the renovation of that property on a spec basis. In fact, to make these partnerships work, you have to have three things happening at once. First, you have to have the need for new or renovated government facilities, and you have to have the absence of conventionally appropriated funding. Second, you have to have a site that's located in a real estate market for which there is strong private-sector demand. The site must be situated so well that if we build it, they will come. Third, you also need the proper sector investment potential. Investors and real estate developers go through market cycles like everything else in the economy. Timing is everything. Two years ago, you couldn't build a spec building. Three years ago you could. A year ago you could. You have to time how you bring these projects on-line. This graphic (see fig. 21) shows how the proposed legislation would work.

Figure 21: Partnership Structure



It would be along the lines of the private-sector model, where one party, in this case the federal government, contributes the property to the partnership under the terms of a long-term master lease. The private sector then brings money and expertise. The private sector would run the partnership. The partnership itself in the past would have been a limited partnership. Today, it would be a limited liability company or a limited liability partnership. Effectively, it's a conventional structure for a project.

As far as the flow of funds, as a pure partnership, once the property collects its operating income and pays its operating expenses, then first in line from the net operating income is that master ground lease payment to the government. This is often based on current out-leases, if any, for the property. Again, this is in conformance with scoring edicts. Next, any debt service that is contributed to the property but not guaranteed by the government is taken out, setting money aside for a replacement reserve resulting in cash flow. Then comes a preferred return to the private partner, which is basically the cost of capital for the money contributed by the private partner resulting in a net cash flow.

The resulting net cash flow is shared by the partner and the government. That's a negotiating point. Each time you set up a deal, you negotiate what that split will be, but the private-sector partner is going to have at least 51 percent if they're going to control the project. You perhaps would also negotiate what the preferred return would be. But this makes it a pure partnership as opposed to necessarily a lease. Ninety-nine percent of the partnerships that go forward in the private sector for real estate development are fashioned using that sort of model.

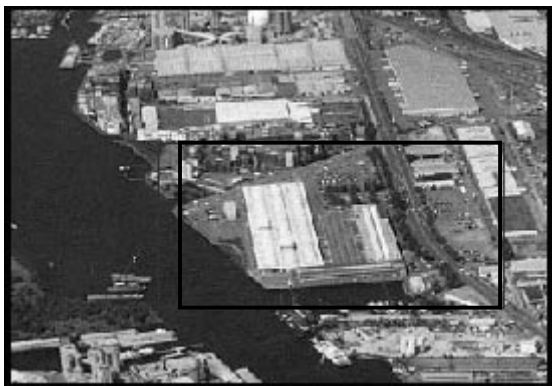
Several Federal Properties Studied Showed Promise for Public-Private Partnerships

Our approach for the study we did for GAO was to review all outstanding leases for GSA properties and choose 10 across the country to look at. For each of these 10 properties, we started by looking for agencies leasing space in private-sector buildings in the market area that have an expiration schedule coming up over the next 5 years. We wanted to get an idea of the theoretical demand for office space by candidates that had expiring leases and might relocate into the subject property that we were looking at for the renovation. We also looked at private-sector demand for the site. Our idea was to give federal agencies through GSA a first shot at leasing space in the renovated building, but then backfill what they don't take with compatible private-sector uses.

We also interviewed developers, brokers, appraisers, and public officials. We wanted to get a sense of the realities in each local community. We compiled local construction and demolition costs. We tried to understand the local politics as best we could. We built pro forma models. And then we ultimately ranked the properties: number one, how they could serve federal needs; number two, how they could benefit from nonfederal demand. We found that in some communities, the backfill potential was represented by local government. Third, we looked at how we could demonstrate the economic viability of the project. In 3 weeks, we went from Jacksonville to Boston to Seattle to Portland to Minneapolis. We covered a lot of territory.

This graphic shows federal center south, in South Seattle along the Dawamish Waterway (see fig. 22).

Figure 22: Federal Center South, Seattle, Washington



Situation

- 41 Acre Site in an Industrial Area
- 4 Functionally Obsolete Buildings (607,543 RSF 200k office)
- Corps of Engineers (Current Tenant) Requires Seismic-safe Facility
- Valuable Waterfront and Moorage Location
- Strong Federal Need for New FOB
- Strong Private Sector Market Demand

Redevelopment Strategy

- New FOB on 15 acres (+/-)
 - 300,000 sf in year 1
 - 200,000 sf in year 3
- Sublease Balance of Site (25 acres +/-) to Compatible Private Sector User, e.g. Seattle Port Authority

Results

\$74M Private Investment
17.7% IRR

\$29M Government Basis
9.6% IRR

This property has 41 acres and functionally obsolete buildings. The structures include an office structure with a little over 200,000 square feet, another small office, a huge warehouse, a motor pool for the Federal

Bureau of Investigation, and docks. This is prime real estate. It's a straight shot over a viaduct to downtown Seattle's central business district. The Corps of Engineers, which is the principle tenant, has expressed its concern that, since they are the national headquarters for seismic protection, it's embarrassing to be in a building that was built in 1935 with inadequate seismic protection. The Corps' enthusiasm is a driving force, along with the 1.4 million square feet of leased space in the greater Seattle area. In fact, Cushing and Wakefield did a study about 1-1/2 years ago that found that there's about 500,000 square feet of office space that needs a home. That became the focus of how we could use this site in a partnership. The partnership could also take economic advantage of the waterfront access and the balance of the site.

The redevelopment strategy became to build in phases a new federal office complex totaling about 500,000 square feet on about 15 acres and sublease the balance of the site. Actually, in this case we used a sub-sublease strategy to an entity like the Seattle Port Authority, because they are very interested in acquiring the balance of the site. But the partnership itself could have chosen to develop the balance of the site and then lease it to either public or private users. The site also includes 5 acres across the street. This would require a 50-year lease term. The net result was that the private sector would be investing something on the order of \$74 million, either through cash or through debt, with an 18-percent internal rate of return for the private investor over 10 years. These are attractive numbers, and they are based on an assumed value of \$29 million for the site, which is about 85 percent of the most recent appraisal. The government would earn through its share in net cash flow a 9.6-percent internal rate of return. This makes for a nice project. In fact, region ten is moving forward with the next step, which is to do a formal feasibility study and justification.

Another building we looked at is the old Food and Drug Administration (FDA) building here in Washington, D.C. (see fig. 23).

Figure 23: Federal Office Building 8 (2nd and C), Washington, D.C.



Situation

- Specifically Constructed in 1961 for FDA
- Potential office Space of 311,000 RSF
- FDA Scheduled to Vacate in 2002
- Location Proximate to the Capitol, Smithsonian, and the Mall

Redevelopment Strategy

- Completely Renovate Building
- Recapture Existing Laboratory Space as Office
- Add 150 Parking Spaces to the Existing 50

Results

\$52M Private Investment
17.5% IRR

\$14M Government Basis
9.6% IRR

FDA is scheduled to vacate this building in 2002. There are labs. Currently, there are a lot of uses that underuse the potential of the site. If reconfigured through a redevelopment strategy, this building could produce in excess of 300,000 square feet of modern office space. In doing so, the private sector would invest about \$52 million and would earn something like a 17.5-percent internal rate of return. The government's basis would be \$14 million, and again, it would earn 9.6 percent. These numbers are not cast in stone. This was done in a very quick study, but it represents the order of magnitude of the potential of this public partnership tool in the absence of appropriated funds.

Another property we looked at is in Andover, Massachusetts, about 18 miles north of Boston (see fig. 24).

Figure 24: IRS Service Center, Andover, Massachusetts



Situation

- 37 Acre Site at Interstate 93 & Route 133 Interchange
- 375,000 SF Single Story, Security Building Needing Capital Repairs
- IRS Goal to Consolidate Area Leases (336,000 RSF)
- Redevelopment Supported by City Planners and Local market

Redevelopment Strategy

- Office Park Layout
- New 4-story IRS Facility (700,000 RSF) with Parking Structure (15 acres +/-)
- Demolition of Old Structure
- 3 Additional FOBs and/or Compatible Use Subleases

Results

\$233M Private Investment
14.4% IRR

\$41M Government Basis
9.4% IRR

This is a 39-acre site located right off of I-93. There's a 375,000-foot Internal Revenue Service (IRS) processing center there. It's a single-story building. There's a large parking lot, and the building is in need of capital improvements and repairs. In addition, IRS alone has over 350,000 square feet of leased space in surrounding areas that it would like to consolidate into one complex. So there is the opportunity to redevelop the site to build a 700,000-square-foot facility for IRS that would be a secure facility with a parking structure. The balance of the ground could be developed as additional federal office buildings or compatible office buildings for the private sector. The private sector as well as the officials for the City of Andover were very supportive of trying to do something with this building, which is deteriorating. Here again, a large investment of \$233 million could produce just under a 15-percent internal rate of return. The government's basis is \$41 million, with the potential of a 9.4-percent return. How this project is configured and the time in which it goes forward will obviously affect the economics. But this is the poster child for an underused site of very strong demand. In fact, my partner and I were talking to a developer who has a beautiful office park about 3 miles away. And he said to us that our site was much more desirable than his. He was eager to get hold of this property.

This next property (see fig. 25) is in Charleston, South Carolina.

Figure 25: Federal Office Building, Charleston, South Carolina



Situation

- 99,695 RSF Office Building on 2.18 Acre Site
- Contaminated (asbestos), Unoccupied
Requiring Demolition
- \$300,000 Holding Costs
- Highly Desirable Location
- Moderate Federal and Strong Private Sector
Demand

Redevelopment Strategy

- Demolish Existing Structure
- Construct 150,000 RSF FOB
with Structured Parking
- 1st Floor Bank with Drive Thru;
Upper Floors for Federal Agencies
and Private Backfill

Results

\$30.5M Private Investment
13.7% IRR

\$5.5M Government Basis
9.9% IRR

It is a 100,000-square-foot building that is completely shut down. It was damaged by a hurricane and as a result has environmental contamination. It's costing taxpayers in excess of \$300,000 a year to sit there dormant. Meanwhile, it is in a prime location. Local officials and local real estate developers and owners are very anxious to see something happen with this site. It includes a little over 2 acres, and it really has great potential. The redevelopment strategy would be to demolish the building and redevelop a 150,000-square-foot federal office building. In our modeling, we assumed that there would be a bank on the first floor to use the site, maybe with a drive-up facility. It's been suggested that perhaps because of the demand, you could have luxury townhouses or an apartment building on the site as well. While the returns are about 14 percent over a \$30 million investment, the risk associated with putting a project up here would be so minimal that I think this would be very attractive to a private investor. The government's basis is only \$6 million, and it would earn about a 10-percent return.

That's a snapshot of four of the properties we looked at. Public-private partnerships are an exciting tool, but just a tool. There are other things that

Appendix XV
Presentation by Steven Weiner, President,
Signet Partners

agencies governmentwide need to augment the shortage of appropriated funds.

Thank you.

Introduction to Panel 4 by JayEtta Hecker, Director, Physical Infrastructure

Panel 4: What challenges does the federal government face in promoting increased efficiency and ensuring that consumers have access to infrastructure services, including transportation, telecommunications, and postal services?

Welcome to our fourth and final panel. The question for this panel concerns the challenges the federal government faces in promoting increased efficiency as well as ensuring that consumers have access to core infrastructure services. In the last 20 to 25 years, the nation has been undergoing a transformation in thinking about the federal role in major infrastructure service sectors, particularly regarding the necessity of strict price and entry regulation by the federal government versus the potential benefits of competition. Legislation deregulating the transportation sector was passed about 20 years ago, while legislation deregulating the telecommunications sector was passed more recently, and legislation deregulating the postal sector has not yet passed. For the sectors that have been deregulated, there is a significant debate about the impact of deregulation on consumers and communities, particularly with regard to equity and access to different services. Similarly for sectors where either no or incomplete deregulation has occurred, the debate goes on.

The question of the remaining role of the federal government in maintaining, promoting, and enforcing competition has two parts. First, what kind of direct federal actions are appropriate or have the potential to be effective in promoting competition, and more importantly in many cases, what indirect policies of the federal government may be creating perverse incentives that destroy competition or prevent it from working? Second, is competition resulting in an equitable distribution of services that aligns with congressional and/or popular expectations? Expectations might include the provision of universal service, or they might include the siting of an airport with low-cost operators an hour from my house or the availability of train service from my town, even if I'm the only one who uses it and I use it infrequently. To address these questions, we're privileged to have panelists who have been on the front lines of the debate on the impact of deregulation and competition on the provision of infrastructure services.

The remarks of panel 4's four speakers are contained in appendixes XVII through XX.

Presentation by Edward L. Hudgins, Director, Regulatory Studies, Cato Institute

Edward L. Hudgins is director of regulatory studies at the Cato Institute. He is an expert on the regulation of agriculture, pharmaceuticals, labor, space, and transportation, and on state and international regulatory comparisons. He is the former editor of Cato's *Regulation Magazine*. He served as a senior economist for the Joint Economic Committee of the Congress and was both deputy director for economic policy studies and director of the Center for International Economic Growth at the Heritage Foundation. Dr. Hudgins has testified on many occasions before the Congress, is widely published, and has appeared on numerous television shows. He has a doctorate from Catholic University and has taught at universities in this country and in Germany.

Government's Role in Infrastructure Should Be Limited and Local

Thank you for having me here today at GAO for this very important event. I'm from the Cato Institute, as you know, and I think GAO is one of the only government agencies that I have not called for abolishing. One of my great heroes is in the audience here, Bernie Ungar. I sit on the edge of my seat waiting for his reports on the postal service to come out, and I really do think that you guys are doing good work here.

Infrastructure is an important topic, especially today in the fast-changing, post-industrial economy with an information revolution, and given the fact that the traditional infrastructure—roads, airports, and utilities—are pushed to the limit. We face new challenges concerning how we evaluate infrastructure and the decisionmaking process on what infrastructure should go where. We also want to know how infrastructures best mesh together in a very fluid, changing, and dynamic economy. As I said, GAO is cognizant of these things and has done some good work in this area.

I'm told that I have 12 minutes in which to talk about all of these things, so I'm going to be the generalist. I'm going to do three things in my talk. First, I'm going to offer what I hope will be some uncontroversial guidelines to keep in mind when we consider infrastructure issues. Second, I'm going to comment on several infrastructure areas and sectors in light of these guidelines, hoping to give some insights. And third, I'm going to make a few suggestions concerning useful areas of research and investigation, so that when I get my GAO studies they will be even more interesting than they are now, if such a thing is possible.

Let me start by mentioning a few guidelines that I think are important concerning infrastructure. The first thing is that when we look at infrastructure issues, we have to ask whether infrastructure is really a

government matter or a private matter. Now it should seem obvious, except for the fact that everyone who calls me from Capital Hill or from elsewhere is usually saying, no, the private sector can't do that. But I think it's important when we think about infrastructure to start with a blank slate and ask the basic question about whether government should be doing something at all. Remember, early in this country's history, roads and turnpikes were privately built and maintained. At the turn of the century in cities, you basically had competing private utility companies. The monopolies were usually established by governments to favor one competitor over another. So even utilities initially were private without a monopoly. I think it's important not to make the assumption that because something has been government infrastructure, it should be so in the future.

Second, if infrastructure is a government matter, it is very important to ask at what level of government should the activity or the infrastructure be done. As a general rule, I think that the answer is as locally as possible, moving up to regional, state, and then federal only as the last resort. Partly, as you'll see in some of the illustrations, this is because in a federalist system it really is good to let a thousand flowers bloom, so to speak. Let transportation systems in Atlanta compete with transportation systems in Portland, etc., and let us learn from that, because that's going to be the best way we're going to be able to figure these things out. The third guideline is that if infrastructure is indeed a government matter, we should find an efficient process for judging projects and keeping the process as open and flexible as possible.

One of my big concerns is the politicization of the decisions. In one sense, infrastructure decisions almost by their nature are politicized because the government is usually involved in some way, shape, or form. Even if the government is not delivering the service, the government is often involved in a regulatory manner, and, thus, you get politicized decisions. For example, some years ago there was a move to have congestion pricing on the San Francisco-Oakland Bridge, which generally is a good idea, right? You pay more at rush hour and that will maybe get people into public transportation. What happened is that it became a big cash cow for interest groups. The pricing was done in a way that didn't relieve congestion. Prices just generally went up, and the result was it really didn't do a lot of good. The big dig in Boston, of course, is basically payoffs. The big dig is something GAO has done some great work on. It's important to look at the process by which government decisionmaking is made.

The Federal Role Has Caused Problems in Several Infrastructure Areas

Now, I want to make some general comments about a couple of infrastructure areas. First, I want to talk about roads and traffic jams and the fact that the most serious problem in virtually every metropolitan area is traffic. As you know, Washington actually went down on the list recently, only because, while we got worse, everybody else got worse still. It's cold comfort, I would suspect. Traffic is certainly a major problem. Congestion has grown. The interstates, which were, of course, meant to be, as the name says, roads to carry interstate traffic, really have become local roads and more often local parking lots. You have the irony that 66 out here in Virginia, which is supposed to be an interstate, is actually closed to traffic unless you are in an High Occupancy Vehicle situation. So people using the interstates for what they're supposed to be used for—interstate travel—can't actually travel on the interstate if they are alone. You all know the problems of traffic infrastructure. I maintain that a lot of the problem is indeed because of the federal role. The federal government uses funds to promote pet projects and to line the pockets of political friends in local areas. And, of course, it attaches a lot of strings.

One example is that federal highway funds usually promote rail use and the construction of local light rail facilities. That might be a good idea, but rail tends to cost from 10 to 100 times more than an equivalent length of road, and rail tends not to attract that many people out of their automobiles and into the trains. It attracts a lot of people out of buses into trains, because you'd rather be in a nice train. So quite often, what you find, and I can name different cities and different situations, is that cities will take their matching funds and spend a lot of money building a subway or a light rail system that they have the upkeep on after the federal money leaves but that doesn't relieve the traffic. It diverts funds that they might have used for roads or bus lanes or something else that would be more efficient and more locally useful, and then they are stuck with a transportation system that doesn't suit their needs.

By the way, here are some interesting numbers. These are 1990 figures. I don't have the updates. But they will give you a flavor. Out of 282 metropolitan areas in this country, in 239 of them, 90 percent or more of trips within the area are made by automobiles. In about 40 of them, between 80 and 89.9 percent of the trips are made by automobiles. And only in three are less than 80 percent of trips made by automobiles. New York City has the lowest level, and that's still 65 percent. The other two are small college towns where the people are not using rail; they are probably walking or bicycling. I'm using these numbers to show that rail is not

terribly efficient in many cases in attracting people out of cars and into rail, but this is the way the government often promotes.

This doesn't mean that local infrastructure decisions are necessarily better. For example, San Diego some time ago decided it was not going to take federal funds for its light rail system because it was just too expensive, and San Diego thought it could do it cheaper locally, which I thought was good. But then the city discovered that it still needed to put in extra roads, and so it had to come back and quickly retrofit. It thought the trains were going to take a lot more people. In the state of Maryland, the little train system up in Baltimore, which doesn't carry very many people, was built, I believe, mostly with state money as opposed to federal money. What that means is that Maryland has basically run down its highway fund and therefore complains that they don't have enough money to build roads out there. But that's something that people in the state of Maryland should get on the governor about.

The nice thing about keeping this localized is that you get competition. For example, most of you, I am sure, are familiar with the Portland experiment, which is an experiment in growth control, the use of rail, etc. Some people use the Portland experiment as an example of what we should do for the rest of the country. Other people, for example, the folks at the Cascade Institute out in Oregon, have done a number of studies pointing out that the Portland experiment really isn't all it's cracked up to be. But by keeping the infrastructure decisions local, you can have this kind of competition. You can look at Portland. You can argue about whether Portland is working well or not.

Another example is Amtrak, an infrastructure system where on time is certainly not an option. This is government infrastructure that competes very poorly with planes and automobiles. Even with a growing transportation sector, Amtrak only takes about 6 percent of that sector, and it's only in the northeast corridor that they barely break even. In the rest of the country, they lose a lot of money, and the federal government spends about a billion dollars a year bailing out Amtrak. If Amtrak were private, you would not only have Amtrak closing nonprofitable lines, you would have more labor flexibility, I suspect, in Amtrak contracts. You would also give Amtrak an incentive to find market niches that actually are profitable. As a government operating system with government subsidies, Amtrak really doesn't have that incentive or, in some ways, the power to do it.

I also wanted to say a few things about air travel, and I'm only going to touch on this briefly because we're going to hear more discussion about it. This is an area where deregulation since 1978 has been a real success. The real inflation-adjusted price of flying per passenger mile has gone down by about a third. I've seen numbers a little bit higher, but it's something along those lines. In 1978, Americans took 275 million trips by air. This year it's going to be 650 million trips; because the prices are lower, lots of people can afford to fly. The problem is that we haven't put an equivalent amount of runway space in airports that are local-government owned and operated and regulated from Washington. The air traffic control system is a mess, too, and we'll hear more on that later.

In fact, you are getting some regional competition with airports. For example, because we haven't got the runway space, Baltimore-Washington International Airport, one of the three local airports in the Washington area, now competes to take people, for example, not to Boston Logan Airport but to Providence or Manchester. So instead of going from National Airport to Logan, the competition is with regional airports, to go from Baltimore-Washington to Manchester, and you rent a car or you get into a super shuttle or something like that. You also have rail going out to Baltimore-Washington. So you are getting this regional competition to get around some of the inefficiencies caused by the fact that the government hasn't put in new runway space.

The postal service, I'll say very briefly, is a dying dinosaur. I have a nice book on the subject for those of you who are interested. Postal privatization is not just a matter of getting a big 900,000 person, \$65-billion government monopoly out of business. We have a very dynamic, changing communications and delivery infrastructure in this country. We don't know what it's going to look like in the future. What we do know is that if the U.S. Postal Service operates as a government monopoly, tax exempt, that can borrow from the treasury; that is not subject to the same regulations as the private sector; that is not subject to most of the regulations that apply to government agencies; and that has regulatory authority it can and does use against its competitors, these circumstances are going to create an inefficient system. So it's not just a matter of whether the stamp cost is 34 cents or 35 cents. It's much more profound. And I think that's something that you have to look at.

Let me touch on another important piece of infrastructure, space and the National Aeronautics and Space Administration (NASA). I'm going to go very quickly here. Space, I think, is the lost revolution. The shuttle was

supposed to bring down the cost of putting stuff up in space. Instead, what happened was that the real inflation-adjusted cost of putting something into space, as much as we can tell from NASA's creative accounting, has gone up since Apollo, which is unfortunate. Most people assume that space can only be handled by the federal government, but I want to give you a quick example here. In the early 1980s, NASA was thinking about creating a pod to do construction in space, kind of like in the movie *2001, A Space Odyssey*. They put the cost of development at \$1 billion. At the same time, the private sector was developing a thing called Deep Rover to work on the ocean floor. It was essentially the same system. The ocean floor is just as hostile as space because of the pressure and so forth. You're just as dead if there's a tiny mistake in Deep Rover at the bottom of the ocean floor. Deep Rover was produced with two prototypes for \$1 million. By the way, the guys who designed it were also the guys who were going to be in it on the bottom of the ocean. So \$1 million versus \$1 billion.

One of the reasons why space is so expensive is because the government is involved. There are a lot of things that commercialization and privatization would do. The reason I brought in a model of the shuttle is this: this is infrastructure that you're looking at, folks. This big thing on the back is the external fuel tank. It contains liquid oxygen and hydrogen, which is nontoxic. The shuttle flies 98 percent of the distance into orbit and then it drops this big 17-story tank. The tank burns up into the atmosphere and dunks in the ocean.

These tanks cost 40 million bucks. If this were privately owned, if we were the stockholders of a private company, would we be dumping 40 million bucks into the ocean? No. We would be putting these tanks into orbit. In fact, they would normally go into orbit if the shuttle didn't push them down. We'd have these tanks retrofitted with rockets to put them into a more stable orbit. Some private entrepreneur would have made one of these into an orbiting hotel or honeymoon suite by now, I assure you. The point is that NASA has done everything to frustrate the space revolution. In fact, in the paper today in space news, the headline was that the partners in the space station are concerned that there's going to be too much commercial competition for space, because the Russians will sell anything. They're not only selling rides into space—James Cameron, by the way, is going to be the next one—they are renting out part of their station so a private company can put a module on for telecommunications and other things produced by Spacehab. There are actually a lot of commercial uses for space, but not at the price that the government has caused to be driven up.

The fact is that the government is getting in the way and frustrating this revolution.

My final three points are lessons from all of these examples. Number one, look at what doesn't exist. In other words, we see the computer revolution that occurred beginning in the early 1980s with Steve Jobs, with Bill Gates, with all of those pioneers. Think about what would have happened if the government had started to go in and regulate personal computers back then. That revolution would not have occurred. I maintain that in a number of areas, like space—I'm doing a book right now called *Space, the Free Market Frontier*, that has this contention—when you do research, look at what doesn't happen. Look at the things that probably kept a revolution from occurring in space that would have been good not only for telecom, which is actually the one area that's been most commercialized, but for manufacturing, tourism, and lots of other things. Number two, study how markets get around infrastructure gridlock, as I mentioned with regional transportation around airports. There, we have an infrastructure problem because we don't have enough runway space, but now you're getting regional airport competition with shuttle buses and with rail making up for the fact that we have these problems. Number three—this is tough, I know, for the GAO, but I'll put it out there anyway—acknowledge the public choice dynamics that go on in any kind of infrastructure decision. We know it's politicized. I think it's important to point out to the greatest extent possible the adverse dynamics that occur because of these public choice issues involved and point out that in a lot of cases that's the origin of the infrastructure problem. Getting the government out so that some of these decisions are not politicized could lead to a much healthier use of infrastructure and much better infrastructure decisions.

Thank you for your attention.

Presentation by Robert Pepper, Chief, Office of Plans and Policy, Federal Communications Commission



Robert Pepper is chief of the Federal Communications Commission's Office of Plans and Policy, which is responsible for policy questions that cut across traditional industry and institutional boundaries, especially those arising from the development of new technologies. Dr. Pepper's responsibilities have included leading teams implementing provisions of the Telecommunications Act of 1996 and numerous other communications-related activities, such as assessing the development of the Internet and electronic commerce, developing the framework for digital television, and advancing more market-based spectrum policies. He was formerly the director of the Annenberg Washington Program in Communications Policy Studies and the director of domestic policies and acting associate administrator for the National Communications and Information Administration. He is a graduate of the University of Wisconsin, where he also received his doctorate.

In the Last 20 Years, Communications Markets Have Been Opened to Competition

I would like to talk about the empirical effects, that is, what has actually happened as we've opened up the markets in telecommunications to competition. If you think back 25 years ago, all you needed to know about the entire communications sector in the United States was four letters: A, B, C, and N. ABC, CBS, NBC, and AT&T. Those four firms essentially were the entire sector. We had a monopoly in telecommunications. We had a three-firm oligopoly in broadcasting. We had just begun to open up the cable television markets to provide consumers more choices, but our efforts were very limited because of fears that somehow this would result in ruinous competition to the broadcast television industry. Actually, the commission had just adopted what is probably the single most important competitive policy decision the commission has ever made, Open Skies. The Open Skies policy basically said we can have competition in communication satellites. It changed everything, including space policy.

People forget that until that decision, under the Satellite Act in the early 1960s, we had a monopoly called Comsat. IBM owned a third of it and AT&T owned a third of it, and then there were some public shareholders that I think owned the remaining third. That is all gone. The model for communications in the United States has been private ownership with until very recently monopoly or oligopoly. It's a little different than the infrastructures you've been talking about earlier.

One thing that's happened over the last 20 years has been the opening of the communications and especially telecommunications markets to very significant competition. I'd like to take a few minutes to talk about some of the things that we've seen. When we look at infrastructure investment, adjusted for inflation, in the cable television industry—the wireless industry, the incumbent local exchange carriers (ILEC), and the competitive local exchange carriers (CLEC)—we see an explosion in investment through the end of 2000. We've since had the NASDAQ correction, as they put it. Frankly, we don't think we're going to see this explosion in investment continue.

Competition Has Spurred the Wireless Industry

With the wireless industry, there are multiple competition stories. There are three important dates: 1992, with the Cable Act; 1993, with the Omnibus Budget Act, which gave us the authority to have spectrum auctions and opened up the markets by deregulating some commercial mobile radio service; and then 1996, with the Telecom Act. Prior to that, the Congress passed the Cable Act of 1984, which deregulated the cable television industry. It was less than a perfect market in terms of the introduction of competition, and we saw prices rise and some problems with service quality. Part of that law required the Federal Communications Commission (FCC) to report back to the Congress within 6 years on the state of competition in the cable TV industry, which we did in 1990. In our report, we said that there were still problems. The market was not as competitive as people had hoped, but we recommended against rate regulation. We said that any legislation should be focused on increasing competition, not on imposing regulation. In 1992, the Congress adopted part of what we recommended but not the other part. And so in 1992, as a result of the Cable Act, rate regulation actually reduced certain aspects of innovation in the industry.

At the same time, the Cable Act did provide a limited-term access to programming by vertically integrated cable operator programmers. This occurred as a result of findings based upon our investigation that programming was being withheld from potential new entrants, including the direct broadcast satellite industry. Direct broadcast satellites that had been authorized as early as 1983 and 1984 but could not get programming in order to launch, as a result of the 1992 Act actually launched in 1994 and began providing service in 1995 and 1996. That's been an enormously successful story. In what we call the multichannel video program distributor market (MVPD), cable has gone from essentially 100 percent down to about 80 percent of that market. There are now about 14 million

satellite households. And while there is less price competition, which people tend to focus on, there is enormous competition in packaging innovation, customer service, new services, and new content. It's really worked.

In the cable industry, you see essentially flat annual investment. Actually, in anticipation of satellites coming in to compete, the cable industry rebuilt its networks. Instead of 35 to a maximum of 50 channels, with satellite coming in with 100 to 200 channels, the fundamental architecture of the cable TV industry was rebuilt. It went from pure coax to fiber optic coax hybrids, increasing capacity and serendipitously creating the platform for two-way services, including Internet access, high speed data, and even telephony over the cable plane. At the same time that the 1996 Act eliminated local and state barriers to entry into telecommunications, there was the growth of the Internet with the privatization of the Internet in 1995. Cable investment increased significantly in each of the subsequent years as the industry began to provide these new services.

Cable modem service and the high-speed broad band services provided by cable are now at about 5 million households. About 1 million households now get telephone service over the cable plan. So there's this very interesting dynamic made possible and driven by the entry of a competitor back in the early 1990s as a result of programming being made available to the competitor. Our moderator talked about government decisions that promote competition versus government decisions that might thwart or pervert competition. I would argue that the 1992 Act had two aspects. One of them was rate regulation, which suppressed investment innovation. But another was program access, which created significant incentives for innovation investment and ultimately competition.

A significant change also occurred in the wireless industry, where we had a very cozy duopoly with two cellular operators. In 1993, FCC made a decision, which at the time was thought to be fairly radical, to open up the mobile wireless market to competition. Of course, the incumbent cellular industry said you don't need to do that. We can do everything that's needed. You don't need to go to digital. You don't need competition. As a result of the decision that the commission made, which was within our existing authority, we added as many as five more mobile wireless providers.

Then the Congress amended the Communications Act to give FCC the authority to use auctions to have market competition for licenses. It also

gave FCC the authority to preempt state regulation of wireless services. There were eight states that regulated cellular service, including entry price and the whole nine yards. We found that where there was regulation to protect consumers, the prices were higher than where there was no regulation. Funny how that happens. In fact, California had the worst case of this, with the highest prices and the most intrusive regulation by the Public Service Commission. The 1993 Act, however, changed that. By the way, the cellular industry said something that we hear all the time, especially from our European colleagues, and that is that if you have auctions and people are forced to pay for their licenses and for the spectrum, the industry won't be able to afford to build out to provide service, and consumers will be screwed because prices will be higher. Economic theory tells you that's bunk. But most of the people who write laws are lawyers, not economists, and they don't understand economics. They don't understand sum costs. They don't understand opportunity costs.

This was actually a very nice test of that theory. What happened was that investment increased dramatically once we introduced competition, notwithstanding the fact that people who had gotten licenses in the past for free ended up having to pay what at the time sounded like an outlandish amount of money, \$7.7 billion divided between two licenses. The average time to market was reduced by 50 to 60 percent. Retail prices have declined. Penetration has gone from about 15 million mobile wireless subscribers to 110 million subscribers, who now have available 4 or more wireless competitors. This has been an enormous success story.

We've also seen investment in the CLECs increase as a result of the 1996 Act's market opening. More importantly, regarding innovation investment with incumbents, again adjusted for inflation, the ILECs' investment was flat or declining for 8 to 10 years. The 1996 Act came along, opening up the market to competition. And what happened? Over a 4-year period, the incumbents' investment increased 25 to 30 percent in order to meet the competitive challenge. In 1995, there was \$30 billion a year in domestic transmission infrastructure. In 2000, there was \$80 billion. We expect that to decline because of the current market correction. But even in decline, we're going to be way ahead on an annual basis of where we were before the act. There were enormous benefits from competition. It's dynamic, and it feeds on itself.

What about innovation in services? There's a big debate, and this goes to the equity question that was raised earlier regarding digital divide and

universal service, etc. The question relates to broad band services. Are they being rolled out? Is broad band a failure? Again, there's a competition story here. Technology existed for several years for broad band service by cable with cable modem service, or digital subscriber line (DSL) service from local exchange companies. The year 1998 was the year of the cable modem, where cable modem service began to really take off, moving from about 50,000 units to 500,000. And then the following year, as a result of competition, the phone companies responded with DSL, going from about 35,000 units to 500,000. In terms of the competition story, the ILECs had DSL technology going back to the early 1990s. They didn't deploy it until the late 1990s, in part because DSL service would cannibalize what they call their T1 service. T1 service runs at about \$1,200 a month.

How many people here have DSL? One. How many people subscribe to cable modem service? Three. So it's three to one. That's about right. But this group actually has a lower penetration of broad band service than the average across America. I don't know what that says. But DSL service sells for about \$40 to \$50 a month. The business version is \$80 to \$100 a month. There's a real concern about cannibalizing an \$800,000, \$1,200-a-month service. The incumbent local exchange carriers did not have the incentives to roll that out. By 1999, two things happened. Cable began to deploy their broad band service as a result of the cable modem service, going after the residential market. Also, the CLECs began deploying in the small and medium-size business markets. As a result, the incumbents were being jammed on the residential side by cable and on the small business side by the CLECs, and they jumped in with both feet and now dominate the DSL market. So they finally made that decision—there's a flipping point, where it became worse to protect the past than to worry about cannibalization. It's sort of the innovator's dilemma. Now with DSL, the phone companies, the CLECs and the ILECs, have really begun to close the gap with the cable industry in terms of deploying broad band service.

The Question of Equitable Access to Services Remains Open

Regarding the digital divide or equity question, is this diffusion good or bad? Is deployment increasing fast enough? Do we have to push it more? Do we need special government programs to push it more? This is currently being debated. One way to think about this is to compare it with the deployment of other technologies. It took VCRs 16 years to get 85-percent penetration. It took color television 22 years to get 85-percent penetration. Essentially we are in year 3 or 4 in the broad band deployment, and broad band is now available in zip codes representing 76 percent of the population in the United States. By the way, that number of

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Presentation by Robert Pepper, Chief, Office
of Plans and Policy, Federal Communications
Commission

76 percent is up from about 55 percent 6 months ago. There are some rural areas where broad band is still not available. But things are moving in the right direction. The question is will it get all the way there or does it stop, and at some point you think about what actions the government can take to ensure that there's going to be ubiquitous deployment. But I don't think we are at that point yet. We're still trying to understand where that will be.

Presentation by Dorothy Robyn, Guest Scholar, the Brookings Institution

Dorothy Robyn is currently a guest scholar at the Brookings Institution. Until recently, she served in the Clinton administration as special assistant to the President for economic policy and senior staff member of the White House National Economic Council (NEC). Dr. Robyn coordinated administration policies to promote airline competition, improve aviation infrastructure, and reduce congestion. She worked to develop and enact policies to promote competition in other network industries, including intrastate trucking, railroads, postal delivery, and international telecommunications. Before joining the NEC staff in 1993, Dr. Robyn was with the Joint Economic Committee of Congress and the congressional Office of Technology Assessment, where she specialized in science and technology policy. From 1983-87, she was an assistant professor at Harvard's John F. Kennedy School of Government. She is the author of *Braking the Special Interests: Trucking Deregulation and the Politics of Policy Reform*. Dr. Robyn has a M.S. and a Ph.D. in public policy from the University of California at Berkeley.

Economists Believe Flight-Delay Problems Stem From Faulty Government Infrastructure Policy

Thank you. As JayEtta said, I'm a refugee from the Clinton White House. When I was there with the National Economic Council, I had a very broad portfolio. I worked with GAO on issues ranging from military-base closures to aviation concentration to defense procurement, and most recently aviation congestion. I came to feel very passionately about the issue of airline flight delays and why there is a problem, so I've continued to work on this issue at Brookings. The answer to the problem from an economic standpoint is clear, but there are institutional and political impediments to implementing it. That's what I want to talk to you about today.

Despite the extensive news coverage of this issue, there is a general misunderstanding of the problem. For example, you heard this morning from Joe Coates a view that airline deregulation is the problem. Jim Fallows, who should have known better, said the same thing in an op-ed the other day. There is another view that says that antiquated air traffic control technology is the problem. There is some truth to this view: we used to hold up the vacuum tubes that the Federal Aviation Administration (FAA) was still using that could only be procured in Romania because we didn't make them in this country anymore. Dave Barry captured this view in a recent column. The whole column is wonderful, but I'll read you just a portion of it. Barry writes,

“A recent audit of the FAA showed that, among other problems, air traffic controllers are relying on outdated maps that show giant serpents in the ocean and refer to North America as ‘New Spain.’ The FAA’s so-called ‘nationwide radar system’ is, in fact, a man named Murray standing on the roof of a Wal-mart in central Kansas with a walkie-talkie and a pair of binoculars. [And finally] The FAA’s Emergency Backup Aviation Communication System has become increasingly unreliable because, in the words of the audit report, ‘most of the pigeons are dead.’”

The third and most common view of the delay problem, and it’s certainly the view of the average member of the Congress, is that it’s the airlines’ fault. Planes don’t take off when they are supposed to. They sit on the runway. It’s the airlines’ fault. Specifically, most members of the Congress think that airline “overscheduling” is the problem. By contrast, as I’ll explain, economists and economic think tanks—Brookings, Cato, AEI, there’s no difference—are almost unanimous in laying the blame for delays on government, specifically faulty government infrastructure policy.

I want to explain why I think the economists’ view of this problem is the right one. GAO’s role here is critical, because as I said, there is a different view in the Congress—I think it’s the wrong view—and GAO can be a very important counterweight to that view. Let me talk first about the air traffic control—or airways—piece of the problem, and secondly about the airport—or runway—piece of the problem.

First, let me make clear that nothing I say is a reflection on the 50,000 people who work at FAA, who are enormously dedicated and talented. The major argument I’m going to make is that the problem is due to flawed structural incentives. It is not due to bad people. It is a deeply structural problem. You’ve got 50,000 good people at FAA, but you’ve got screwy incentives.

Air Traffic Control Problems Include Governance and Financing Issues

Regarding the air traffic control system (ATC), I’m going to talk first about the governance of the system, or the management structure, and then about the financing of the system. In 25 words or less, the governance problem is that there is a fundamental mismatch between the structure and culture of FAA and the nature of air traffic control. Air traffic control is really a big telecommunications network designed to keep planes separate from one another. FAA, as a traditional government regulatory agency, is simply not well suited to the task of running what is, in effect, a high-tech service business.

To elaborate, FAA has a command and control structure. (Some people refer to it as paramilitary in structure.) Like other government agencies, it is constrained by federal budget rules, and it is micromanaged not only by the Congress but also by the executive branch. Some aspects of this environment—certainly the cautious, insulated culture—have served FAA well as a regulator. Because in addition to operating the air traffic control system, FAA regulates it. It regulates the safety of the aircraft, the airlines, and ATC itself. And FAA is an effective regulator. But the same structural and environmental qualities that make it a good regulator make it a poor service provider for the high-tech service activity known as air traffic control.

Let me say a little more about the nature of air traffic control. First of all, air traffic control activities are purely operational. To be sure, they have to be regulated for safety, but there is no reason that the operational piece cannot be distinct and separable from the safety regulatory piece. Second, precisely because air traffic control service provision is purely operational, the mission is very clear. The mission of the service provider is very clear, and its performance is measurable. There are very few government activities where the mission is that clear and the performance is very clearly measurable. Third, the direct customers of the ATC—the commercial airlines and general aviation—are identifiable. And most of the benefits and the costs of the ATC accrue to those who are already paying the costs. These three characteristics are more typically associated with activities performed by the private sector.

David Osborne, whose 1992 book popularized the term “reinventing government,” talks about FAA in his latest book called *The Reinventor’s Field Book*. He summarizes everything I just said in two sentences. He says, “There is significant consensus about the basic problem. Air traffic control is a massive, complex, technology-intensive service business operating within a conventional U.S. government bureaucracy. It is a bit like putting a Ferrari engine into a dump truck body and still expecting it to win races.” Keep that image in mind.

Now let me talk about the financing piece of air traffic control, because this is equally problematic. Air traffic control services are currently financed largely through an 8-percent excise tax on passenger tickets. Every time you fly, 8-percent of the price of your ticket goes into something called the Airways Trust Fund, and that goes to support FAA. There are two problems with this approach. The first is that the actual users of the ATC—the airlines—don’t pay it. They are merely the collection agency. So they pay

only in a very indirect way. As a result, their incentive is to view the airways as a free good.

Second, there is very little correlation between what users pay for those services and the actual cost of the services. The actual cost to the ATC of handling an aircraft is roughly constant, whether it's a Boeing 747 filled with passengers or a regional jet or private aircraft. It doesn't make a lot of difference. Therefore, the ticket tax, which is an ad valorem tax, shifts the burden of cost toward the high-fare airlines and away from low-fare airlines, all else being equal. So a Southwest 737 pays a lot less than a Delta 737. In addition, if you take into account all of the different sources of FAA funding, the major commercial airlines subsidize not just the low-fare carriers but also the cargo carriers and general aviation, particularly business jets. That's the conclusion of a detailed study that was done in 1996, but the basic numbers haven't changed very much.

In sum, the current system for financing air traffic control leads to a major disconnect between the customers, or the users, and FAA, the service provider. As a result, the airlines and business jets don't have an incentive to use the system efficiently. And equally important, FAA is not getting the basic information that a pricing system provides to a service provider. It doesn't know how its customers value its service. It doesn't know where it needs to reduce costs. It doesn't know where it needs to invest and by how much. It's missing all of that fundamental information. In fact, FAA views the Congress as its real customer, because the Congress is the one that pays the bills. The airlines and other system users are not seen as the customer because they have no direct financial transaction with FAA.

There are three basic options for reforming the governance of the air traffic system. The first option is incremental change—that is, to leave the air traffic control system within FAA. That's the status quo. I think it's problematic. The second is "corporatization,"—that is, to move air traffic control into an independent government corporation. The Clinton administration recommended that option in the mid-1990s, but it was dead on arrival in the Congress. Let me note that about 20 countries have spun off air traffic control into an independent government corporation. The third option is what I'll call "privatization," although that term is sensitive. This option would put air traffic control into a not-for-profit entity that's outside the government altogether. Canada has done this very successfully. The entity is called NavCanada. The United Kingdom just did this. Air traffic control is still a monopoly, but it need not be a government-run monopoly.

In terms of ATC financing, the essential reform needed is to move to direct, cost-based user fees. Moving to user fees is easier or harder depending on which of the government structures you adopt.

Problems With Airports Include Capacity and Allocation Issues

On the airport side, there are two problems. The first, a supply side problem, is lack of capacity. We're not building enough runways. The second, on the demand side, is that we're not allocating what capacity we have efficiently. Jan talked this morning about demand management. That is the key story here. Airlines pay landing fees that are based solely on the weight of an aircraft, and the fees are set very low, just to cover historical costs. That's a perverse charge, because at least at a congested airport, a small aircraft, which is paying far less with a weight-based fee, actually contributes as much if not more to delay, because it is slower on the runway and slower to take off and so forth. Moreover, small aircraft take up places in the queue that could go to bigger aircraft.

Stated differently, the most fundamental problem with a weight-based fee is that it doesn't take into account the congestion that an additional aircraft in the queue imposes on the airport and other users. Delay is an externality. We need to internalize the cost of that into the price of the service. Weight-based fees do not do that, so predictably, a lot of small aircraft use congested airports at peak hours. The average plane size at LaGuardia last year was a mere 70 seats. Likewise, commercial aircraft don't have an incentive to fly off peak or to schedule fewer flights using bigger aircraft, rather than multiple flights with smaller aircraft. The delay you see is very predictable. Airline overscheduling is a perfectly rational behavior on the part of the airlines. In fact, they'd be derelict if they didn't do it.

What are the options? On the supply side, the option is building more runways. That is the campaign slogan of the airlines this year—"All we need is 50 miles of new runway." Unfortunately, there is a reason we haven't built many runways in the last 10 years. It's called NIMBY or—I learned a new term this morning—NOPE, Not On Planet Earth. I will say parenthetically that a nice exception to the NIMBY rule comes from some of the recent Air Force base closures like the one in Austin. We've got some nice new commercial airports as the result of the conversion of former military airfields. Unfortunately, they tend not to be in locations that are experiencing the most congestion. El Toro (in Orange County) and Homestead (near Miami) are in such locations. Both would make very nice airports, but there is strong community opposition. In sum, I don't think

you can put a lot of faith in getting a huge expansion of airport capacity where it's needed.

On the demand side, there are two basic approaches to allocating a scarce resource—that is, “demand management.” You can manage demand using either administrative mechanisms or market mechanisms. Not surprisingly, I come down on the side of market mechanisms. We know some of the problems with administrative mechanisms. FAA imposed “slots”—quotas on the number of take-offs and landings—at four high-density airports as a temporary measure in the late 1960s, and those quotas are still in place, although last year the Congress took action to eliminate them (at three of the four airports) in the future.

The good news about a slot system is that it does by definition reduce delay costs because it caps the number of flights at a congested airport. That's good. However, there is an unintended consequence. The airlines are able to raise fares. When airlines have a reserved spot at a high-priority airport like La Guardia or O'Hare, they are able to jack up the fares to capture the benefits of having access to that scarce resource. How do we know that? We know that because those slots at La Guardia and O'Hare have market value. They sell for millions of dollars. Those slots are equal to the “rents” that an airline can charge passengers over the life of a slot. A slot at Heathrow, I read recently, is worth \$14 million. So administrative mechanisms have some benefits but also some real downsides. The fundamental flaw is that an administrative mechanism does not get capacity to those people who value it the most. It allocates capacity in an arbitrary or administrative way.

A market mechanism, by contrast—and in the case of airports, this would be either congestion pricing or auctioning of landing and takeoff slots—has some major advantages. For one thing, it makes sure that the capacity goes to the people who value it the most. Now, even if, over the long run, the commercial airlines pass on the cost of congestion pricing, passengers will still be better off. Because even though they're paying slightly more to travel at peak times, the reduction in delay cost would more than offset that. My colleague at Brookings, Cliff Winston, estimates that congestion pricing alone, even without any additional investment in runways, would produce about \$7 billion in annual net benefits, largely from reduced passenger delays.

The Congress has come up with yet another approach to demand management, and that is to give the airlines antitrust immunity to sit in a

room together and coordinate their schedules in order to reduce delays. This approach has all the downsides and inefficiencies of administrative demand allocation, plus it potentially allows for collusion. It is such a bad idea that I wrote an article about it. It's called "Why Congress' Plan to Reduce Flight Delays Is Not Airworthy," and it's on the AEI-Brookings Joint Center on Regulatory Studies Web site.

The Key Is Changing Incentives Through Market Mechanisms

Let me leave you with a couple of concluding points. First, the system is broken, but this is very predictable because the incentives are all wrong. We keep coming back to incentives. Air traffic control is a high-tech service business being run by a traditional government agency. In addition, airlines don't pay directly for the airways, so they treat them as a free good, and FAA lacks the basic information that it needs about where to invest and how much. Similarly, runways are not priced economically, leading to inefficient use and a chronic imbalance between supply and demand. There are no bad actors. Everybody—FAA, the airlines, the airports—is responding to the incentives they face. If you want to change behavior, you've got to change the incentives.

Second, there are two ways to allocate scarce capacity: using market mechanisms or using administrative mechanisms. There are three fundamental advantages to market mechanisms. First, they allocate capacity to the people who value it the most. Second, they guide investment because prices provide a market signal as to where and how much customers value new capacity. And third, they produce revenue that can be applied to building new capacity at airports and that will ameliorate the underlying problem.

Third, the instincts of the Congress and most players in the executive branch are to solve the delay problem using administrative fixes, such as the lottery that was held for La Guardia slots last December or by giving airlines antitrust immunity to coordinate scheduling. GAO can be a very important counterweight to this strong tendency for the Congress to opt for administrative fixes rather than market fixes.

Let me end with a statement by John Meyer, who is the granddaddy of transportation economists. He chaired a blue ribbon panel assembled by the National Academy of Sciences 2 years ago to look at the problem of aviation competition—not infrastructure, but competition. That was their mandate. Nevertheless, they concluded that the single most important

thing government could do to promote competition is to fix the infrastructure problem, and this is what Meyer said.

“The laggard performance of the public sector in allowing more efficient development and use of critical aviation infrastructure is a serious deficiency that will become more troublesome as air travel expands. Crowded airports, flight delays, and passenger discontent over fares and services should not be seen as shortcomings of deregulation but rather as clarion calls to complete the deregulation process by instilling market incentives wherever sensible and feasible.”

Thanks very much.

Presentation by Nancy Staisey, Partner, PricewaterhouseCoopers



Nancy Staisey is a partner in PricewaterhouseCoopers' Management Consulting Service in Arlington, Virginia. She is the firm's lead partner for the federal civilian markets and the global leader for postal consulting. Dr. Staisey has over 15 years of management consulting experience in the public and private sectors, including strategic change assignments and reviews, research on best practices, benchmarking, and market research. Her contributions to the international postal industry include quality of service measurement systems that are now industry standards and the development of technology integration for the next generation of postal performance measures.

The Privatization of Postal Services Is Increasing Competition and Calling Into Question the Proper Regulatory Role

I have that cherished last spot on the agenda. I'm going to give you a brief overview, and I'll emphasize the word "brief," of some of the things that are going on in the postal industry. I'm going to focus on trends that are occurring globally because I believe these are going to have a profound impact on what happens here at home.

I'm a hockey fan, and when I think about what's going on in the postal industry right now, I often think that the federal regulatory role is somewhat akin to a referee in a hockey game who is very carefully calling fouls and enforcing the rules in one area of the ice while brawls are breaking out behind his back and out of sight, brawls that will have a real impact on the outcome of the game but are never noticed and never responded to. I'm going to describe a few of those brawls and some of the things that are behind them as a way of looking at their impact on regulatory issues.

I'd first like to read you a quote from Ad Scheepbouwer, who is the CEO of TPG. For those of you who aren't familiar with it, TPG is a TNT postal group. It was formerly the Dutch post office. It was one of the first posts to be privatized and traded, in New York, London, and Amsterdam. Scheepbouwer said, "In the future, there will be just four super posts, and the sleeping giant of the USPS will not be one of them. USPS is boxed in

between the Postal Rate Commission and Congress and the way it is organized. In principal, of course, it could stand up and start to do things if it can get its framework changed.”

This is one external view of the situation in the United States and the situation facing the United States Postal Service (USPS). When we look around the world, we see the force of deregulation continuing, but increasingly we see more of a movement toward reregulation as opposed to deregulation. Privatization is occurring, but after an initial flurry, it has proceeded more slowly than many expected. Nevertheless, posts are competing very aggressively. Their owners, primarily government owners, are putting pressure on them to produce financial profitability, and this is forcing them into greater competition, both in their domestic market and even more so in their international markets. While a lot of posts have made strides in commercialization, privatization, and competitive position, they’ve done so in the absence of the regulatory changes that were initially thought to be a requirement of those strides. As a result, the role of government is changing. Increasingly, the focus is going to be on issues of interconnection and network access, especially downstream access to delivery networks.

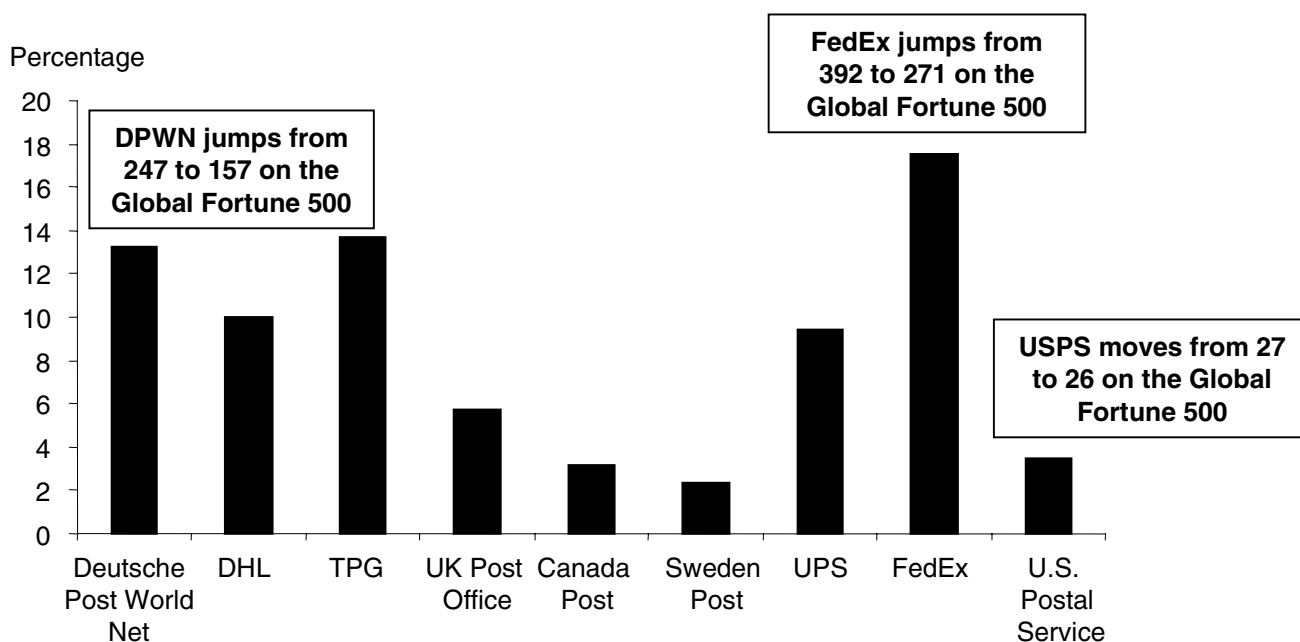
We’re also beginning to see a greater willingness of posts to accept fines and almost a greater impetus in terms of the regulatory structures. Recently, Deutsche Post Worldnet was hit with a fine within the European Union. The dollar value of that fine against the gains that they made is miniscule. It was not a true deterrent. We’re beginning to see more and more of the competitors acting in ways that show a lack of concern for the regulatory frameworks and the fines that could be imposed. Increasingly, the issue of competition and commercialization is more an issue of political will as opposed to the existing regulatory or legal framework. We’re also seeing a mix of government ownership and private ownership. It’s hard to define what Deutsche Post or Deutsche Post Worldnet is right now. A portion of it has been privatized, but it still has a monopoly in a very large domestic market in Europe. It acts at times as a private entity, while at other times it achieves the benefits of a public entity that can leverage a very large and profitable monopoly.

As a country, the United States has a relative lack of experience with privatization. Many aspects of infrastructure in the United States have been privately owned from the beginning. In Europe, in South America, around the world, governments and their citizens have gone through the steps of privatizing many of these types of infrastructure and are now

moving onto posts. The United States, on the other hand, started out with most aspects of infrastructure already privatized, and so our government and the people of the United States don't have very much experience with thinking of taking something that previously was government-owned and spinning it off into the private sector.

This graphic (see fig. 26) gives a look at what's going on around the world. I included a combination of government-owned and privately owned entities here. You'll see Deutsche Post Worldnet, which is basically the German post, a portion of which has been privatized, DHL, TPG, and U.K. Post Office, whose name I should have changed to Consignia. You'll notice the change from government-sounding names to names that can be used to compete privately on an international basis.

Figure 26: Key Postal Players in Position to Be Global Super Powers



This graphic shows the average revenue growth rate between 1998 and 2000. You'll see some surprisingly high percentage growth rates here. If we look at these in terms of movement on the global Fortune 500, Deutsche Post Worldnet has moved up a hundred spots in this time frame. FedEx similarly has moved up just under a hundred. USPS moved up one spot.

Now keep in mind, this movement occurred during a time in the economy when there was rapid expansion of a large number of industries. So this is relative to other industries that have also been expanding. I'll also point out that government-owned posts tend to be very much at the bottom of the growth rate.

Growth in the Industry Has Been Driven by Alliances and Acquisitions

What's driving this? To a large extent, this growth has been driven by alliances and acquisitions, and these alliances and acquisitions have been used to expand the role of the post. In this next graphic (see table 4), I highlighted a few that are more nontraditional. Here, you can see posts moving out of the traditional mail market, expanding in the express market, and then moving on to freight and logistics, financial services, and e-business. Why are they doing this? The notorious bank robber, Willie Sutton, was asked why he robbed banks, and his response was, "Because that's where the money is." Posts are expanding into these other areas because that's where the money is, and that's where the growth opportunities are.

Table 4: Alliances, JVs, and Acquisitions Used to Expand Offerings

Entity	Express	Freight and logistics	Financial services	E-business
Deutsche Post World Net	DHL, Guipuzaoana (Spain), Qualipac (Switzerland), MIT (Italy), Ducros (Spain), Interlink Express (UK), Securicor (UK)	Danzas (Switzerland), ASG (Scandinavia), Koninklijke Nedloyd (Netherlands), Global Mail (US), Air Express International (US)	Deutsche Postbank (Germany), Zouk Holding Ltd. (UK)	GFT (Germany), E-Stamp (US), Yahoo!
TPG (TNT Post Group)	Jet Services (France), Goldair (Greece), Tranjato (Portugal), Broos-Fouya (France), China Post, Swiss Post, Kintetsu World Express (Japan)	Technologistica (Italy), Ikea		Mail 2000 (US)
UK Post Office	Der Kurier (Germany), German Parcel (Germany), Citipost (US)		Money Gram Payment Systems (UK)	Microsoft (US)
New Zealand Post	Ansett Express (New Zealand), Phoenix Parcels (New Zealand), XP Group (New Zealand)	Kiwi Mail (New Zealand), Nike (New Zealand)	TSB Bank (New Zealand), Ergo Financial Systems (New Zealand)	Electronic Commerce Network (New Zealand), CheckFree (New Zealand)

For the most part, even when they are government-owned, there has been an increasing expectation that posts should not simply break even but should actually produce a profit and a return to government. The expansion is moving into logistics and packages, with much less of an interest in mail, with mail being used primarily to finance that expansion.

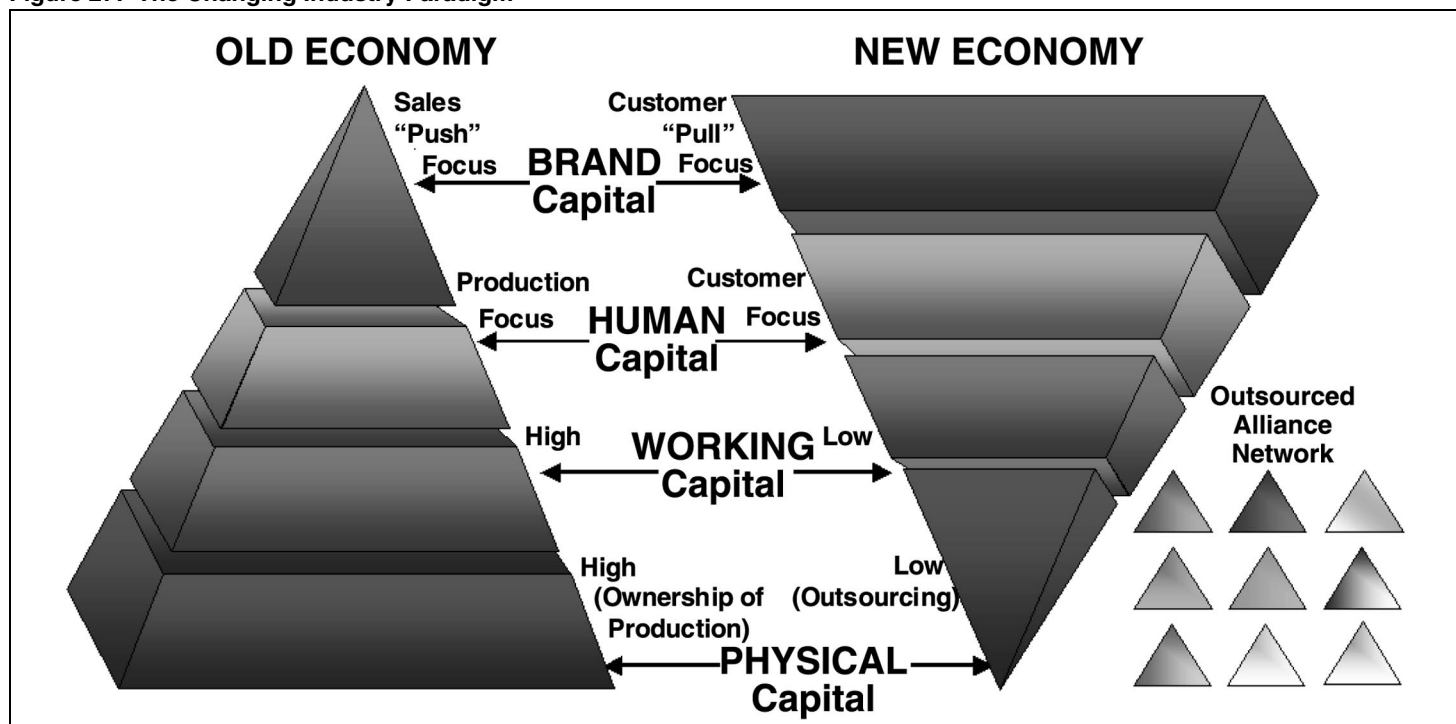
Trends Include
Diversification,
Experimentation, and a New
Business Structure

In terms of trends, we see the letter mail market reaching maturity, expansion into other areas, and a lot of experimentation in terms of e-business products. Typically we're not seeing a return on investment in e-business products in the postal industry except when they've been linked to package delivery or value-added services for traditional customers of posts. Increasingly, we're seeing a movement to looking at value-added, end-to-end, logistics solutions, not simple delivery of mail.

This diversification into logistics is leading to a greater convergence of the transportation networks with the postal networks. This is going to have a lot of implications in terms of the regulatory structures, because increasingly there are going to be overlaps between the regulatory structure that's in place for transportation and the regulatory structures that are in place for the mailing industries. We can already see the UPU, which is the U.N. sanctioned international organization for posts, trying to focus on some of the same issues that the courier industry is approaching the World Trade Organization over. Technical standards that cut across these areas and unite them will become increasingly important.

Now I'd like to turn to one of the changes that I think is going on. It's a very fundamental change in the industry and in the industry paradigm. I'm first going to build a model of what went on in the old economic postal industry (see fig. 27). The prevailing business model of posts over the past 20 years is represented on the left. This model involves a very large physical capital base in terms of equipment, vehicle fleets, etc; a very large human capital base that was used to operate that infrastructure; and a fairly low emphasis on brand capital. Winning in this model was primarily based on being able to efficiently leverage the capital infrastructure that was in place. Over the years, posts spent a lot of time developing new hub and spoke systems and new ways to be more efficient in serving their customers and delivering to the full population. Portions of the posts, after they got that under control, began to focus on more defined slices within them. Let's get our purchase of transportation in place. Let's gain greater efficiencies in terms of our human capital.

Figure 27: The Changing Industry Paradigm



We're now seeing a new economic model that literally turns this model on its head. Some of those divisions are now becoming outsourced alliance networks. Instead of owning all of the processing plants or all of the vehicle fleets, we'll achieve efficiencies by outsourcing those functions to separate entities that specialize in them. In the United States, certainly, the contract that USPS had with Emery would be an example of this, and the very recent contractor relationship with FedEx would be another example. What this means is a deemphasis on the physical capital structure and a greater emphasis on managing your brand capital and your relationships with customers. Winning in this model involves being clever in the way you form alliances and outsource. It also involves being able to leverage the brand and the set of solutions that you bring to the market in a way that provides better service.

This has some implications for moving forward. USPS was set up for a different business structure and a different business model. While partnerships and alliances are becoming critical to success, we have a framework that focuses more on what investments are made than on how

and when you can form and break alliances. This contracting to expand involves shedding those noncore activities to an outsourced network. It also moves the posts up and down the fulfillment chain much more broadly and enables them to very quickly add new products and services.

These Changes Call Into Question the Effectiveness of Government Regulation

In terms of the challenges and implications of this, internationally there is a terminal dues system that was put in place primarily by the UPU. As alliances are formed, especially global alliances amongst posts, more and more transactions will take place outside of that terminal dues system or network. Government representation becomes more complex since governments partially own entities that will be forming alliances with some fully owned government entities, and they will be forming alliances with some privately owned entities. The whole definition of a postal operator is becoming a bit hazier. An increasing concern is that this emergence of a few dominant future posts could potentially drive standard-setting activities that previously were regulated activities simply by the mass of business and volume that dominant posts bring to a given standard.

In summary, we see an industry that's undergoing incredible change. It's moving far more quickly than government in terms of its response to change. Competition is being played out on a global basis. JayEtta Hecker began with some questions about the role of government in pushing competition, since competition is entering the country in the absence of any particular push or attention being paid by government. If you think back a few years ago to the Million Man March, on that same day, there was a march in New York City. It was a parade of Dutch nationals who were parading in honor of TPG opening their first office in the United States. They now have multiple offices in the United States, as does Deutsche Post Worldnet, as do many of the other global competitors. In many cases, government-owned entities are opening for competition here. The world is becoming more complex. The industry is becoming more complex. And we're seeing a greater convergence with transportation, which I think is going to lead to a whole series of new challenges.

I'll end on the challenges and stay within your time frame.

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