

**TESTIMONY BEFORE
THE
US HOUSE OF REPRESENTATIVES
COMMITTEE ON TRANSPORTATION AND
INFRASTRUCTURE
SUB-COMMITTEE ON HIGHWAYS AND
TRANSIT**

Surface Transportation System: Challenges for the Future

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Mr. Chairman and distinguished members: it is a great pleasure to appear before this Committee once again to discuss with you the substantial challenges the nation faces in transportation. I treasure the past interactions I have had with this great body over the years.

The just past 50th anniversary of the Interstate provided a valuable opportunity for examination of the past triumphs of our transportation system and to engage in much needed introspection about our approaches to transportation issues today and our failure to live up to the kinds of successes – the kinds of vision – exhibited by our predecessors. As Chair of TRB's Transportation History Committee I studied, wrote and spoke extensively about the forming of the Interstate – first the vision; then the plan; then the financial system. Make no mistake it was at least a 20 year development process, with a depression and a World War intervening.

Examining the great work done by the forerunners of the US Federal Highway Administration makes a deep impression; and to read again the words of President Roosevelt and Eisenhower is truly inspirational. (I actually held in my hands the map on which President Roosevelt sketched three blue lines across the nation and three North South and asked for an analysis by the engineers.) They understood what was at stake – nothing less than the nation's future. What does impress even more is that the challenges they faced were so massive, so great, especially given the limited resources they had at their disposal. By comparison today our resources are far greater, and the challenges we face are far more circumscribed. They would be astonished, I think, that we are daunted by the present challenges, but daunted we are. Our surface transportation system has declined continuously in its service to the society and the economy.

Let me sketch out here the nature of the future challenges that will face us over the next 25 years or so and the kinds of solutions that we can envision now, that we can begin to work on now to successfully address those challenges and to produce a vision of future transportation consistent with those of our predecessors.

The Challenges

If one tends to look at the surface systems from the freight perspective then that perspective, to be serious, will be world-wide in its scope – the global economy will dominate domestic freight transactions. A focus on passenger travel would tend to be more domestic in its scope. That is where my emphasis will be today.

The list below, succinctly lays out what I believe is the fundamental background understanding about where we are and where we are going that can guide our actions. What that list tells us is that we will be an affluent but challenged society. Our population increase will be substantial but our growth in economic output will be far greater so that all of us will enjoy greater wealth. Such a society will demand high quality transportation services to meet the high values of people's time and the high values of their goods. We should plan for a society in which the average value of time is

on the order of \$50 an hour and the average value of goods shipped is three times its present level.

This will be occurring in a period of the greatest demographic upheaval the nation has faced for a hundred years. Only in the great immigration wave of the 1900's is there a similar wrenching period. In addition to dramatic immigration we will be facing the closing of the working years of the baby boom generation. My work in preparing the Commuting in America series, the first of which began in the mid-eighties, culminating last November in the publication of Commuting in America III, has evolved into the history of the working years of the baby boomers – the same people who challenged our grammar schools and high schools in the fifties and sixties filled our transportation systems in the seventies and eighties. Remember the Commuting in America series could have been about the massive unemployed struggling to find work, rather than the congestion created by the surge in affluent workers all going to work at the same time. It was the great triumph of the American economy that produced the jobs that generated the very positive congestion. After all, *congestion is people with the means to act on their economic and social interests getting in the way of others with the means to act on theirs!*

The first of the baby-boomers will reach 65 around 2010 and the last of them circa 2030. just as their advent challenged us to create the opportunities for that massive surge in working age population in the sixties, their departure from the working scene will lay down dramatic challenges of a kind we have never had to face before.

More significantly, as this major component of our work force goes off stage, our population will not automatically produce the new labor force to fill those jobs. In this decade 2000-2010 we will add about 20 million persons of working age to our population but in the succeeding two decades 2010-2030 we will in total produce about 12 million, according to Census projections. The percentage of the population of working age will drop from approximately 60% to 54%. Where then will the workers come from to produce the affluent society I envision?

Employers will have to work very hard to hold the potential retirees in work a little longer; to attract retired workers to new opportunities; to attract even more women into the workforce; to attract underemployed minorities and rural populations, and of course to use the potential immigrant work force. The problem will be exacerbated by American workers being attracted abroad to work in high-powered economies as nations compete world-wide for skilled workers.

Government will have to play a key role here as well; assuring that laws don't impede older workers from staying in the workforce, or women or the other potential working groups from participating as fully as they wish. Education and retraining will be critical. And transportation will become a central concern providing the reach of job opportunities over vast labor markets spread across the landscape.

FUNDAMENTAL SOCIO-ECONOMIC PREMISES FOR AN AMERICAN VISION OF THE FUTURE

- ✓ The nation will be facing perhaps the most dramatic changes in demography since the great immigration waves of the late 19th and early 20th centuries.
- ✓ Population will grow at a stable rate according to the census interim projections at about 1% (3 million) per year.
- ✓ Variability in population growth will largely be a function of immigration which can change with a stroke of a pen.
- ✓ The dominant demographic reality will be the aging-out of the baby-boom generation, the first of whom reach 65 in 2010 and the last circa 2030.
- ✓ This will have dramatic impacts on the numbers of people of working age and the ratio of working age population to those above and below that age (the dependence ratio)
- ✓ The decline in the baby boom work force will create a sellers market in work services and force employers to be highly responsive to worker interests yielding greater flexibility in hours, days, weeks of work.
- ✓ Employers will seek to attract workers from the retired, from even more women, from the underemployed minority and rural populations and, of course, immigrants.
- ✓ National GDP will grow at roughly 3% per year based on education levels, technological change, productivity improvement, and population increase.
- ✓ Population growing at 1% and national GDP growing at circa 3% means that GDP per capita will grow as dramatically as in the last 50 years.
- ✓ The affluence of the emerging society and the resulting immense value of time, will drive most decisions, including those related to transportation.
- ✓ Increased value of goods will make similar demands on the freight side of the transportation system.
- ✓ Both passengers and freight will demand and be able to pay for high quality, reliable, amenity-based, personalized transportation.
- ✓ A large segment of society will have the time and resources for extensive recreation and leisure travel.
- ✓ Globalization of everything will increase business and recreational tourism travel within, to and from the United States.
- ✓ The increases in services as a share of GDP will permit more population to act on location preferences as workers and employers are less tied to resources and more attracted by amenities.
- ✓ Multi-job households will complicate job and housing choices.
- ✓ Areas of the country will compete for workers on the basis of life-style, climate, and ease of living reinforcing the shifts of population to the South and West.
- ✓ Transportation and mobility will be one of the more important amenities on which competition is based.

It will be a footloose job structure with employers willing to go wherever skilled workers are and those workers free to seek high amenity attractive living arrangements. Never before will it have been so true that Americans will be able to live where they want and work where they want. Access to housing that people want will be the critical interacting force with commuting and transportation activity in general. Fitting people to the transportation system we choose to provide will be a comic or tragic failure. We will have to accept consumer sovereignty in transportation just as we do everywhere else in our nation. Cities, metropolitan areas and states will compete for workers and the employers they attract with amenities not the least of which will be effective transportation.

Perhaps more important for future surface transportation than the size of the expected population will be where that population locates in the nation. Clearly, the ways in which future population will distribute itself across the national landscape will be critical to transportation demand and the services required to support that demand, with immense implications for national productivity and societal well-being.

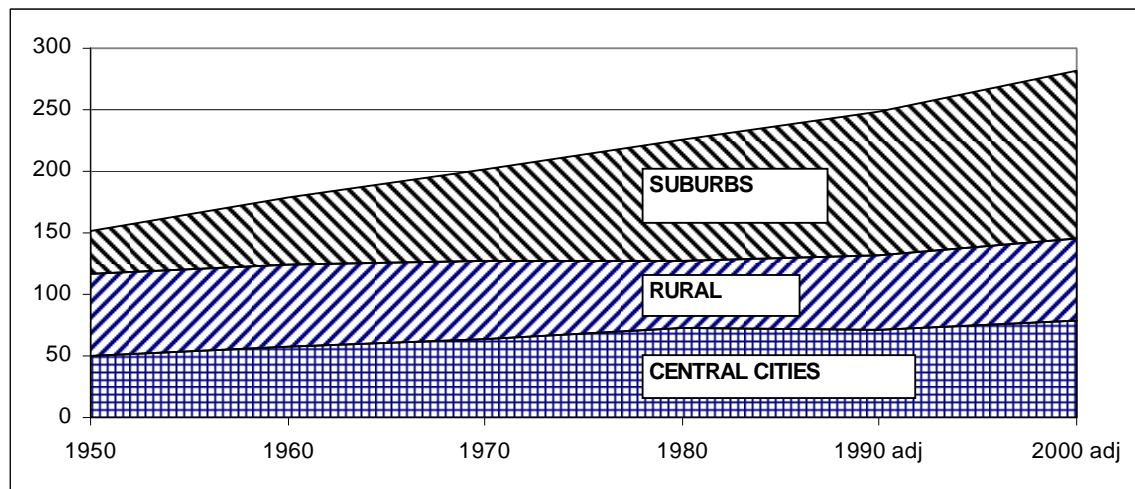
America is truly unique in the world with a large land area, a large population, and a nation that is both technologically advanced and wealthy. No other nation on earth combines these four attributes, although several will approach it over the coming 50 years. These four attributes will define largely how the population will be distributed in the future. It will further define how the nation will serve its people, how it will interact nationally and in the world economy.

At present, the US population can be roughly divided into four main population groups :

- **Metropolitan Areas of more than a Million Population** – In 1960 America had 34 areas with populations over a million. There were 53 such areas in 2005. It can be estimated that there will be at least 60 such areas by 2020. At least 60% of the nation's population can be expected to be in these areas.
- **Metropolitan Areas of more than Five Million Population** – In 1960, of the areas over a million only New York, Philadelphia, Chicago and Los Angeles were over 5 million; in 2005 we reached 12 such areas containing close to one-third of the US population. By 2020 there could be an additional two or three such areas. These great areas will be the economic engines of the nation.
- **Smaller Metropolitan areas under a million** – Many of these areas will grow toward the million mark while many will be absorbed into the expanding orbits of the major metros.
- **Rural Areas:** From a population and transportation standpoint rural areas are separable into those rural counties soon-to-be-metropolitan; and that other group that is more truly rural in nature. The counties on the metropolitan fringes are often the location of rapid growth, housing development, and long commutes. Given the orientation to suburban job opportunities many of these areas have only a limited connection to the metropolitan center. They will be the sites of much of our future congestion.

There is substantial evidence from the last 100 years, and certainly over the last 50, as to the almost inexorable nature of future trends. Figure A below shows the fifty year growth trend of central cities and suburbs, which together constitute metropolitan areas, and non-metro (rural) areas. Effectively all of the nation's growth has occurred in metropolitan suburbs where today more than half the national population resides.

Figure A Long Term Population Trend by Geographic Area



Source: Commuting in America III, NAS, TRB

A large part of the “suburban” growth has in fact been rural growth on the fringes of metropolitan areas which become incorporated into the metropolitan area as they reach certain population and commuting thresholds. More than 40 rural counties became metropolitan in the 2000 Census. Rural growth, focused on the metropolitan fringes has been substantial – As a result metro areas grow together and more square miles of area will be incorporated into these metropolitan agglomerations. This will continue for the foreseeable future as general population migration continues from the metropolitan areas to the rural fringes with households in search of residential amenities and affordable housing. The results will be immense megalopolitan areas with spans of a hundred miles. Importantly these areas will frequently grow together and so the ability to delineate discrete areas will come close to disappearing.

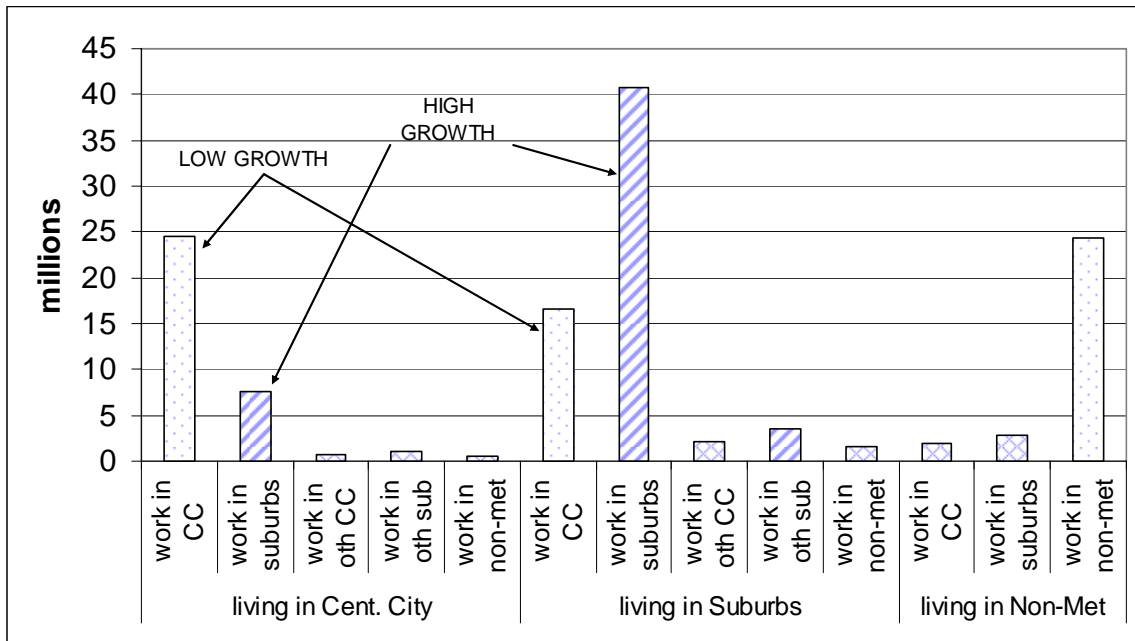
The retirement of the baby boom population and the consequent lack of working age population will sharply affect the character of rural areas. Part of it will be the need to provide access for underutilized rural labor forces to reach suburban job opportunities. Additional important changes will be the expansion and success of new retirement-based communities in attractive areas with good weather; and the expansion of amenity-based communities as work sites. About 800 of our nation's rural counties, those oriented to recreation and retirement, enjoyed levels of growth of 20% or higher in the nineties, more than double the non-metro average rate and above the average metropolitan growth rate.

This trend could become a major factor in national population distribution in the future as more baby boomers reach retirement. As a result, the US rural population which is already better connected to the national economy than ever via modern technologies such as the internet, cellular technology and satellites will be even further integrated into the society. It will be a high mobility rural population with high percentages of income spent on transportation.

The central reality of future metropolitan areas will be the dominance of the suburbs – not merely in population, but in jobs and other measures such as retail sales. The “Donut Metro” will result. Commuting flows already reflect this, as shown in Figure B below, but will increasingly follow this pattern as very different growth rates continue.

- the predominant national work “market” is suburb to suburb commuting – increasing in dominance as metropolitan areas increase in scale;
- the internal flows within central cities and within non-metro areas, are among the other major markets, tend to be among the low growth flows;
- the “traditional commute” from suburbs to central city has exhibited limited growth, whereas;
- the rapidly growing markets are from central cities out to jobs in the suburbs, had a greater share of growth than the traditional inbound commute in the nineties, and;
- the flows from rural areas or from other metro areas into suburbs.

Figure B Metropolitan Commuting Flows 2000
(in millions of commuters)



Source: Commuting in America III, NAS, TRB

The growth markets will continue to be those difficult to serve by carpooling and traditional radially-oriented transit. A major transit emphasis then becomes providing access to jobs within the center city and out to the suburbs for inner city populations particularly those who are vehicle-less. General access to community services in both metropolitan and rural areas will be an important focus. Longer distance oriented commuter-rail-like services will benefit from the dispersed population that continue to travel to those job and other activities oriented to the center.

The worker dynamics operating in the new metropolitan complex will be these:

- It will be a sellers market for workers resulting from decline of persons of working age. Employers will go where skilled employees are or want to be. Much of this will center around universities and research centers. This, coupled with more affluent, amenities-seeking workers will abet the shift to the South and West.
- Employers will be more forthcoming re flexibility regarding hours and days of work in order to retain/obtain workers.
- Employers will shift to suburbs to be near workers, permitting workers to shift even farther out in search of rural amenities and lower cost housing. The attachment of minorities to the center city will be broken especially as their access to private vehicles continues to grow.
- Both center cities and suburbs will move toward balance in jobs and workers (i.e. fewer jobs per worker in cities; more jobs per worker in suburbs) but this will not change the need to commute significantly due to persisting skills mix differences.
- Increases in specialization in the labor force will mean that workers will need to be drawn from larger and larger worker pools over greater distances.
- Multi-worker households, frequent job changes, housing preferences, and the general friction of changes in residence will generate very long work trips.

The extraordinary increases in commuters leaving their residence counties to work will continue to expand with substantial shares of the population crossing both metro and rural areas to reach their job sites. The share of workers leaving their home county rose from less than 24% in 1990 to 28% today. At present more than half of new workers leave their home counties to work. This will not just affect commuting but other travel purposes also, as doctors, restaurants, and recreation activities become more specialized their market sheds will expand and the average trip lengths to these attractions will increase. Particularly the commuting and other interactions between rural and metropolitan fringe areas will expand in importance.

The resulting pattern could be summarized as workers able to live where they want and work where they want but where they will have to accept the penalties associated with longer commutes.

The non-worker related dynamics will also be of great significance, not the least of which will be:

- The decline of the working age segment from approximately 60% of the population to about 54%, will give rise to a large dependent population.

- In the fifties the surge in the dependent population consisted of the early school years baby-boomers, now it will be a product of their reaching 65.
- As the first generation to have grown up with the auto retires, there will be dramatic increases in the numbers of those over 65 with drivers licenses and vehicles, especially women.
- For the first time in history we will have two generations of retired people.
- The result will be a surge in tourism and recreation travel for those with disposable time and income.
- The safety implications will be critical.

In summary the defining characteristics of America in this period will be:

- A highly dispersed, high-value, high-mobility, globally-engaged society is envisioned with sharp growth differences between regions and within metropolitan complexes.
- Long distance travel (i.e. exceeding 100 miles) for both business and personal purposes will grow dramatically.
- The critical interactions will be between skills-seeking employers in search of replacements for the retiring baby-boomer generation; and amenities- seeking workers and their families, taking place in a context of greater logistical freedom for both workers and employers to locate where they choose. Connecting distant workers with jobs will be a critical productivity function of transportation.
- Massive metropolitan regions will result with approximately half the US population living in metropolitan areas of over 5 million; such delineations, however, have already become merely definitional artifacts. These agglomerations will be increasingly critical to national productivity and serving their transportation needs will be a major input to that productivity.
- Continued “suburbanization” of people and jobs; and declines in the densities at which people live should be expected, leading to a blurring or, in some areas, complete eradication of metropolitan and non-metropolitan boundaries.
- Within this metropolitan context it is possible that community nodes will evolve with a greater emphasis on walking for some local trips. A world dominated by the personal vehicle and walking could evolve.
- Rural populations will be more critical to the nation’s economy; and rural development will follow functional lines based on retirees and amenities seeking workers: focused around recreation/tourism retirement based areas; or specialized economic development features.
- The transportation result will be high frequency trip-making, of increasing lengths to and from increasingly dispersed origins and destinations. Metropolitan core-oriented transit usage could rise, in an overall trip-making context that will be difficult or impossible for traditional transit or carpooling to serve and in which overall transit and carpooling shares of travel are likely to continue to decline. Greater competition will arise between air and auto travel for intermediate trips between the usual ranges of each, roughly 250 to 500 miles.

The Vision

The tools employed to assess national investment needs for highway and transit capacity tend to produce incremental adjustments based on observed or expected growth in demand, but no roads on new rights-of-way nor new facilities designed to stimulate or channel growth are identified by existing modeling processes. The process fails us in providing sweeping, visionary statements of goals and needs. The Interstate System would not have been produced by a computer model. It took a certain vision – a sense of possibility – a sense of what could be – in the 1930's to produce it. Perhaps it also took a period of hard times to help envision a better world and its makeup. Today such an envisioning process must begin with the Interstate and the rest of the National Highway System as a starting point and then go on from there.

Many of the transportation implications derivable from the trends described here have already been identified as part of the discussion, but several need further delineation.

- Immediate Action Opportunities – there are immense immediate opportunities for improvement in the ways we operate and utilize our existing infrastructure that need to be realized and that can be employed in the very near term to wring the maximum thrupt out of our existing systems. These are low cost operations and technological solutions applicable to both highways and transit that can address congestion on a very low cost-per-hours-of-delay-removed basis. In removing obstacles to improved traffic flow they also improve safety and the environment. In the near future the promise of new Vehicle Infrastructure Integration (VII) initiatives can be added to the now more traditional ITS tools. We must deploy these to ease present problems and to demonstrate that everything we can do to serve the public has been done before resorting to immense infrastructure investments.
- Community and Neighborhood Design – There is nothing in the foregoing discussion that indicates that development must take the form of widely dispersed housing. There will be interest in and pressures for more clustered development that create walking opportunities. Given that much work will be addressed by those working at home or working on flexible schedules the opportunities will exist for more responsive patterns of development at the neighborhood level while at the same time the entire metropolitan area is more widely dispersed. Working at home will be the fastest growing “mode” to work, especially among the over 65 worker population.
- Transportation and Productivity – As employers and suppliers reach out farther and farther to obtain the needed skills and supporting goods and services they require, the ability to sustain the mobility of people and goods will be crucial to our economic effectiveness. Social and economic “Communities of Interaction” will grow, encompassing the entire nation that will be served by communications advancements but will further the needs for transportation as well.
- Time and cost of travel – Affluent societies, such as described here, tend to travel more frequently, at longer distances, and on modes more responsive to their needs for

timely, rapid service. The further dispersal of the population will add to those demands. Designing for a society with a value of time of \$50 per hour in which households spend roughly 20% of their income on transportation would be a useful starting point from which to examine future needs. The same transportation system next year will be less acceptable to a society whose value of time has increased. The system will be judged more harshly in the future in these terms. The values of products moved in the freight system will also grow and will make similar demands on the system for timeliness and responsiveness. The traditional notion of neatly dividing passenger and freight travel between urban and intercity components will be strained as much of the new travel lies somewhere in between.

- Safety – The safety implications of these changes will be immense. A high mobility society, that is aging and that is increasingly operating over deficient rural roads, will be a major national challenge. There are substantial opportunities for changes that can ameliorate these effects – some technological, some in facility design but also in land use arrangements that will welcome more walking in safe surroundings with limited interactions with vehicles.
- Long Distance Intercity Travel – Only brief reference has been made here to the prospective growth in long distance intercity (and international) travel. Tourism, including both leisure and business travel, has grown dramatically throughout the world and particularly in the US, and will play a substantial future role in defining transportation needs. The pace of international markets and the orientation to visitations of an affluent society with increasing amounts of discretionary time and incomes suggests continued dramatic growth. A large part of this activity will involve family connections and second home travel. The advent of new light, low cost jet aircraft and eventually the Vertical Take-Off and Landing (VTOL) aircraft will make inroads into the land based auto-oriented travel markets in the less than 300 mile ranges. The American Travel Survey of 1995 indicated that about 25% of travel occurred in trips over 100 miles and about half of those trips under 500 miles were in personal vehicles for both work and recreation/leisure activities. It is this market that can be expected to expand dramatically and that will require innovative response.
- Congestion and Capacity Needs – the immense national backlog of needed capacity improvements and reconstruction is the critical factor for the immediate future. Given the relatively benign growth rate levels and the substantial affluence of the society future needs can be met once the present backlogs of capacity, maintenance and reconstruction in highways and transit are overcome. Among the responses to the patterns identified here are the following:
 - An expanded Interstate system reaching more areas;
 - Increased rings of beltways around our metropolitan areas supporting greater circumferential travel, and increased by-pass opportunities;
 - Improved access to the city center including commuter railroad-like facilities;
 - Improved rural two lane roads for safety and mobility;

- Improved local circulation services in urban and rural areas that focus on integrating the lower income populations into the productive society;
- Expanded safety and operations enhancements for more effective and safer use of existing facilities.

A number of kinds of new system constructs could be envisioned. Those discussed below are divided into two parts: Nationally Networked Facilities and Nationally Pervasive Facilities.

NATIONALLY NETWORKED FACILITIES

- The Interstate System is the centerpiece of our national surface transportation capability. It must be preserved and extended.
- Additions to the Interstate/National Highway System are needed whether based on socio-political connectivity criteria or on economic development grounds. Such additions might be subjected to geographic coverage tests, a redundancy test (a key national security concern in the past which has all but been forgotten in recent years), as well as a capacity test. A simple criterion might be that all areas of over 50,000 population should be connected to the national system, or every county seat, or no population center should be more than 20 miles from such a facility. New routes based on NAFTA corridors would be an example.
- A National Parkway System might be envisioned, with simplified, less expensive features, predicated on a light-vehicles-only design criterion. Such facilities developed with scenic and aesthetic values in mind could provide connectivity between areas without threatening local abutting land uses. The Taconic State Parkways in New York and some of the National Park Service Parkways, are examples. Such a system would provide an alternative for those drivers fearful of large trucks and would provide needed capacity with low cost design features. It could be conceived as a toll-based system with travelers willing to pay tolls to avoid truck conflicts and gain a pleasant travel experience.
- A National Truck Freight Network has been suggested on a number of occasions in the past. Such a network would be designed specifically for trucks with all the extra cost features that entails. It could include the option of permitting larger vehicles perhaps especially designed for such a facility. There may be rewards in finally separating cars from trucks in major corridors. We should be happy to build the roads that the truckers need and they should be happy to pay for them.
- NATIONAL PERVASIVE FACILITIES -- Facilities that are extensively distributed around the country but not particularly designed to be connected in any way.
- Metropolitan HOV/HOT lanes have been proposed frequently in different venues. What would be different here would be realization that these should be designed as systems throughout a metropolitan area and should be pervasive nationally (in the 60 areas expected to be over a million by 2020, for example). The massive orientation to carpooling of our immigrant populations is noteworthy.

- Similarly, TOT (Truck Only Toll) facilities have been proposed in several areas. Most typically proposed as special solutions to bottleneck situations rather than as a complete TOT network.
- One of the dramatically changing factors in America metropolitan travel is the huge scale of our major metropolitan areas. There are now 12 areas over five million in population with a third of the nation's population. In these and other metropolitan areas the burgeoning suburb to suburb and exurb travel patterns define the need for beltway expansions as a new tool to respond to development needs. Areas may need to consider two and three beltways as part of an effective system based on hub and spoke concepts.
- Heavy focus of rail transit services will be on access to the center in those areas over 5 million. This will not be a rapidly growing market. More low cost options, Bus Rail Transit, and jitney/van type systems (carpool/transit hybrids) keyed to the dispersed demands of the new era, will need to be developed.
- The very weak systems of social services transport in both urban and rural areas needs national recognition and attention.
- The pathetic nature of our data collection programs and analytical capabilities demands Congressional focus. We are effectively naked with respect to our ability to understand and interpret national patterns and trends. Our future decision-making must be keyed to performance-based reporting systems. If our future decisions are to be founded on sound understanding of our rapidly changing society and grounded in effective performance-based, economic justification it will have to be supported by far superior data and analytical capabilities than now exist. The costs are trivial contrasted to the cost of ignorance.

Closing

I see a very positive future for America and for American transportation. One in which the problems are more operable than they were in the past and our financial and other tools are better equipped to address the challenges. The major provisos are that the nation must first recognize the immense importance of mobility in realizing its ambitions for the people as individuals, as a society and as a challenged nation in the world; and we must then be willing to act with the abundant political, technological, intellectual and financial resources at our disposal to respond to those challenges.

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