

Testimony  
before  
The Subcommittee on Transportation, Treasury and  
Independent Agencies

Of the Appropriations Committee of the  
U.S. HOUSE OF REPRESENTATIVES

BENEFITS AND COSTS OF TRANSPORTATION  
OPTIONS

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Alan E. Pisarski

RM 2358, HOUSE OFFICE BUILDING

Mr. Chairman, Members of the Sub-Committee: My name is Alan Pisarski. I am a consultant in national transportation policy and it is a great honor for me to be here this morning to testify before you. I particularly congratulate you for focusing on the topic of the Benefits and Costs of Transportation Options. It is my view that over the years we have systematically underestimated the benefits of transportation and unduly emphasized the costs. Today the demands being made on the transportation system are great, investment needs are dramatic in scale and scope, and at the same time resources are sharply limited; this requires that we examine every project in terms of the rewards and costs it produces as our measure of priority. We cannot afford to invest in anything but the best.

My testimony this morning addresses three areas:

1. The nature, scale and scope of present and future travel demand needs
2. The present economically justified highway investment backlog
3. Areas where extension of Benefit/Cost tools are crucial

#### 1. PRESENT AND FUTURE TRAVEL PATTERNS

It is my belief that we have moved into a new era of transportation demand. There are strong signs of greater stability in travel demand. Most importantly the boom era in many aspects of travel demand and particularly commuting seems about over. This is largely attributable to aging out of the baby-boomers.

In commuting much of the public policy focus has been on changes in share of the various modes – the lack of growth by transit; the continued growth in share of the single occupant vehicle to the exclusion of almost every thing else – but the main story is really that the increase in the number of commuters has dropped off considerably from past decades. The table below summarizes the key trends. The new census data show that in broad terms the dramatic dominance of the single occupant vehicle continues to increase. But there is more variation from area to area and state to state than in the past.

In the past we had a pattern where single occupant vehicle increases for commuting exceeded the number of new commuters. This meant that effectively all new commuters were solo drivers in private vehicles and substantial additional numbers of commuters shifted to the single occupant auto from car-pooling, walking and transit. The only other significant contribution to the commute was working at home. While this pattern continues to apply in general across the country it is nowhere near as uniform as in the eighties. There is more variation – places where carpooling has gained; or where transit has proven effective. For example, about half of the states gained in transit riders while the other half lost. Most changes were minor (less than +/- 1000) but 8 states gained more than 10,000.

## Some Observations on the Patterns

- The key commuting event in the press was that we added more than two minutes on average to work trip travel times in the last decade, about a 10% increase. This occurred even though the number of new workers traveling by auto increased by only about 13 million, in sharp contrast to an increase in travel times of only 40 seconds the previous decade when the sov use increase was over 22 million. This tells me that the highway capacity bequeathed to us from previous generations is running out.
- The long term trend toward the single occupant vehicle continues; now at 76%.
- Carpooling, while still losing share, gained in actual numbers, dramatically reversing the great losses of past decades. This surge is attributable largely to a very significant Hispanic orientation to carpooling. Some states, notably Texas, saw dramatic increases. I see this as a very real opportunity. We have not adequately supported car-pooling.
- Eleven states actually gained in transit share while 40 lost. Careful study of these successful areas to see what worked and how would be very valuable.
- Improvements in working at home or walking to work represent very low-cost high-payoff opportunities that also have not been properly recognized.
- An important trend was that while across the nation about 24% of workers worked outside their resident county in 1990, more than half of the 13 million new commuters traveled to outside their home county to work. Much of this was fueled by rural populations traveling great distances to job centers.
- Overall rates for trips of all purposes have stabilized as have miles of travel per driver.

<b>COMMUTE SHARES</b>	<b>1990</b>	<b>2000</b>
DRIVE ALONE	73.2%	75.7%
CARPOOL	13.4	12.2
TRANSIT	5.3	4.7
WALKED	3.9	2.9
WORK AT HOME	3	3.3
OTHER	1.3	1.1

U.S. Census Journey to Work, 2000

I use the following eight categories of travel activity as a guide to analysis of our transportation system needs. We too often say we are talking about transportation and immediately forget about freight. Then we talk passenger travel and forget everything else except commuting issues and then end up in a debate about transit versus highways. Commuting, although still of great importance, is now a small and declining share of total passenger travel, we must recognize this in our planning. I can assert to you with great confidence that no transportation agency in the USA is capable of speaking to the relative shares of total travel activity generated by these eight areas much less their relative values in a cost-benefit sense.

## A TRANSPORTATION TYPOLOGY

COMMUTING  
OTHER LOCAL TRAVEL  
TOURISM  
SERVICES  
PUBLIC VEHICLES  
URBAN GOODS MOVEMENT  
THRU PASSENGER TRAVEL  
THRU FREIGHT TRAVEL

How can we be making decisions when we don't know what those decisions will affect?

### Key Elements Forming the Trends of the Future

- In large part we are on the down-side slope of the immense boom in workers that choked our highways in the eighties and early nineties. We have new issues.
- Commuting, although still of great importance, is now a small and declining share of total passenger travel; we must recognize this in our planning.
- Our citizens in their travel decisions are reacting to the sharp pressures of time in their lives – especially working women. We too must recognize the primacy of time pressures in individual and household decision-making in our service decisions.
- The two great factors in travel demand increase are population growth and the increasing wealth of the population. The number of trips made and their length increases with affluence and the choice of individual rather than mass modes are all affected by incomes. High income people make 50% more trips and travel 75% more miles per day than low income people.
- Minority and immigrant populations will be significant sources of auto travel growth in the future at all travel levels as they join the mobility main stream – a process I call the Democratization of Mobility. Black households without vehicles dropped sharply from 31% to 24% in the past decade – but are still 3 times higher than white non-Hispanic households.
- In long distance travel the auto still dominates and I suspect has increased since 9/11. The levels of long distance travel by minorities have grown substantially in the last 20 years, but have only reached the levels of the general population back in the seventies.
- We have finally begun to appreciate the importance of freight movement to our economy and our well-being but we are almost totally incapable of recognizing this quantitatively in our investment trade-offs and planning decisions.
- The most important single social and economic factor that transportation must recognize in the future will be the lack of availability of workers, skilled workers, in our society. This means to me that employers will go where the workers are or where they want to be. There will be far greater flexibility on the part of

- employers in getting the most skilled workers. This will mean employing even more women, retaining or retraining older workers to keep them employed longer.
- This all suggests that time saving and flexibility will be central concerns in an affluent society – demand characteristics made for the personal vehicle.

## 2. PRESENT JUSTIFIED HIGHWAY INVESTMENT BACKLOG

We have immense cost-benefit pay-offs available in the backlog of investment needs identified in the FHWA *Condition and Performance* and AASHTO *Bottom Line* reports. I have had the great privilege to help prepare the AASHTO bottom line investment needs estimates for ISTEA and TEA-21 and now T-3 and can assert to you that while there are improvements we all would like to make these findings represent the state of the art in needs assessment and justification.

In this most recent cycle we have seen further progress toward a more comprehensive and technically sound benefit-cost based analytical process. Congratulations are due to FHWA/FTA, AASHTO and especially the Transportation Research Board for the work done in expanding and improving the highway investment technical process. It is a process second to none in substance and breadth. The Congress is well served by these efforts to continuously bring new technology and more comprehensive analysis to bear on the process.

In preparing for the national needs analyses, we identified, through the TRB, both short and longer term research needed to support the highway and transit evaluation process. The short-term research advancements we made paid off in a richer and sounder estimate of needs – not yet the perfect C&P that AASHTO Director John Horsley exhorted us to create – but getting closer. There is still an important body of research largely focused on improved benefit-cost assessment that needs to be pursued. An NCHRP project will soon be underway to further identify these future research needs. Among them are included greater linkage of highway investments to economic effects and a more detailed and sound transit benefit-cost process. We must undertake these long term research studies to assure that our needs analysis power in the future will be even stronger.

FHWA has undertaken the extension of the Highway Economic Requirements Systems (HERS) used for its analyses to applicability to state planning functions. Of what I have seen of its application it is a very desirable system and needs stronger support so that most states will be able to employ it in planning and in asset management. In Texas it was able to lay out needs to maintain and to improve the Texas road system with benefits calculated based on time and fuel savings, safety effects, efficiency benefits to the state etc. In my work in Texas with the Governor's Business Council we did establish that there are no available tools that permit a detailed treatment of the effects on the Texas economy of a proper level of transportation investment. Congressman Culberson of this Committee and I have discussed these needs in the past. The questions: What will these highway investments do to our long term competitiveness? Our employment prospects? Our tax revenues? Our international competitiveness? Cannot be answered! Those are the questions that every governor wants answered.

The AASHTO Bottom Line estimate of needs is roughly 20% higher than that of the C&P. Recognizing that the FHWA value is an average annual figure for a 20 year program starting in the year 2000, it is clear that adjustment to reach the six year program starting in 2004,

envisioned by the Bottom Line, explains the difference in the numbers [Other differences in method and estimated values are trivial]. So the committee can accept the AASHTO numbers as representing the correct adjusted values for the period 2004-2009 emanating originally from the C&P work. A further adjustment to bring these numbers forward for inflation would yield about \$100 billion to maintain and to \$136 billion to improve conditions for the total highway program. The \$136 billion dollar figure is the spending that exceeds a benefit-cost threshold of one.

the

**NEEDS ESTIMATES (Billions of dollars annually)**

	<b>FHWA</b>	<b>AASHTO</b>	<b>% difference</b>	<b>Inflation adj.</b>
Maintain Conditions	<b>75.9</b>	<b>92</b>	21% more	<b>\$100</b>
Improve Conditions	<b>106.9</b>	<b>125.6</b>	17% more	<b>\$136</b>

The program’s reaching something very close to the “Maintain” level after years of being well below that level is cause for considerable relief if not congratulations. This does not mean that we will have reached a steady state of the condition of the system. There are years of accumulated backlog of needs that will have to be addressed. For example, in recent years the bridge program has received rising expenditures beyond that needed to simply maintain bridges at present condition levels; as a result the bridge backlog has actually declined almost 20% as the number of bridges defined as obsolete or functionally deficient has been reduced. The American public is safer and more efficient as a result.

While most investment needs require the passage of time, either by the action of traffic volumes over the years or just the actions of time and weather, The backlog is that level of investment that can be justified right now; without the further passage of time. In one sense, it is a measure of the adequacy of past investment.

It is the existence of a major investment backlog that drives current investment needs, which says that it is not just the needs dollar number it is all about timing as well!

In the just released C&P report the backlog of investment needs is estimated to be \$272 billion, having grown over a 100 billion from the investment level of \$166.7 billion since the 1999 report. The AASHTO value is at least that level and perhaps considerably higher.

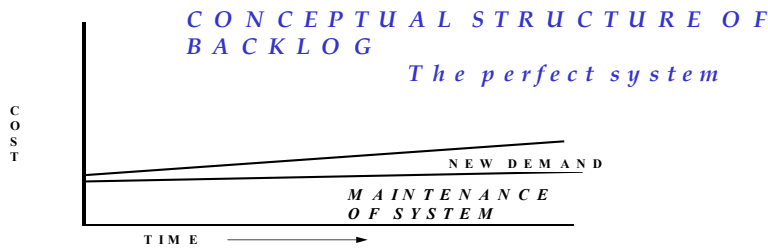
The backlog represents much more than simply a measure of past effort. It represents all of the benefits foregone, the lives lost, time wasted, fuel consumed, pollution generated that could have been reduced or eliminated by timely investment. If our investment program can be accelerated these backlog needs can be addressed and the benefits obtained immediately instead of some day in the future. While we cannot expect to fully draw down the entire backlog over the next cycle of reauthorization we should commit to a meaningful effort to at least make progress in reducing the backlog so that when we approach the next reauthorization cycle we will proudly have made a substantial down payment on the nation’s backlog of needs.

*The backlog concept perhaps needs some explaining. We can construe the future program as follows:*

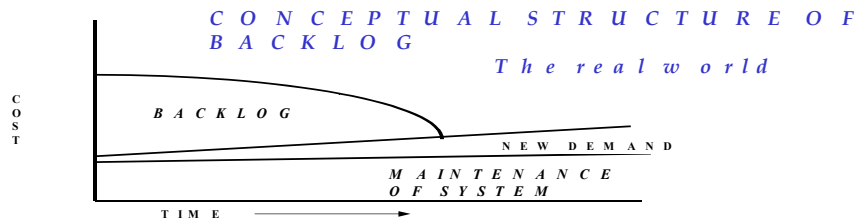
*The Perfect System*

*If the Highway system were in perfect condition today – both in terms of physical condition and performance – then future investment needs would consist of timely annual maintenance costs and the costs of expansion of the system to meet future needs as travel activity expanded. (see*

Figure – the perfect system) Most of us would agree that this would sound quite doable financially, with all costs to be borne by users.



But the present Highway system is not perfect. It has unmet needs in physical maintenance and in capacity to respond to past growth. The overlay of those investment needs can in fact burden spending levels and may appear to be more than we can afford at any given time. ( see Figure – the present system)



The program funding levels derived from the C&P describe a program over a 20-year period not for the 6-year reauthorization time frame. If the same amount of funds to be spent over 20 years were to be made available to the computer models with no constraint on annual spending the model would spend a far greater share of the total in the first 6 years of the 20-year period than that permitted by an amount constrained to a fixed average annual rate. This is because the investment analysis would address backlog needs immediately in the 20-year cycle in order to keep the total 20-year program cost as low as possible. It would stop deteriorating conditions and introduce investments early that produce continuing future benefits and reduce future costs. Spending in this way would reduce overall costs, or said another way increase benefits for the same amount of funds.

An approach that recognizes this and addresses the backlog will bring a greater share of the 20-year program into the six year reauthorization period than the amount attained by using a 20-year annual average. The backlog treatment that permits the model to invest as much as needed to assure the most efficient use of funds spends roughly 40% of the total 20-year program over the first six years in contrast to the nominal 30% under an average annual assumption. This

*represents on the order of a 33% increase in annual spending for the period. The proportion of total funds spent in the first six years is in effect a measure of the scale of the backlog and the rewards for addressing that backlog early.*

When the investment analysis is conducted with an increase in funds to address the heavy backlog it produces the best measures of success of all alternative scenario approaches. The benefits of addressing the backlog early are huge:

	2000	2004
MEASURE	Base Value	Growth Support
Avg. International Roughness Index	125	86
Avg. Speed	40.6	44.54
Total hours of Delay/1000 VMT	4.3	3.46
Total User Costs \$/1000 Veh. Miles	\$937	\$877

At this level of funding, the output successes included are extraordinary: pavement improves by almost a third; average speeds improve by 10%; and delay is reduced by 20%. Most notable is a reduction in user costs of 6.5%; that level of savings equates to well over \$200 billion a year in cost savings. Urban cost savings reach more than 10 cents per mile of travel. On the order of \$300-\$400 billion in benefits are forgone in the reauthorization period by failing to invest at this level.

### 3. EXTENSIONS OF BENEFIT-COST ANALYSES

#### THE PRESENT NATIONAL PROCESS

While in our present economic situation the job-generating power of highway construction investment is a very real consideration, the real pay-offs come after the road is built providing continuing economic reductions in costs, and improvements in access for passengers and goods. Building and operating schools and hospitals creates jobs but we would never think of justifying them on those grounds. It is all about the very positive things that result from the school or hospital after they are built that matters. It is the same with the road system.

As the value of time for both our citizens and our goods increases, the speed and control of highway activity will be even more central to our economy. I have defined congestion as:

*CONGESTION: People with the economic means to act on their social and economic interests - getting in the way of other people with the means to act on theirs!*

That will be even more true in the future than it is today.

For the first time the new C&P analytical process recognizes investing in increased reliability as a benefit to the system. In part this recognizes our failure in making improvements in travel times in our systems. There are other, far larger benefits produced by the system investment we make that we do not now recognize in our benefit-cost trade-offs that need to be incorporated more fully. The most important of these is the long term economic benefit from highway investment



that permits more efficient locations for factories and warehouses, and better access to suppliers and customers. These effects generate extraordinary benefits that are not fully appreciated and are certainly not incorporated in our analyses.

- Research has shown levels of return on the order of 16-17% from our highway investments just from the reordering of economic activities made possible.
- The Federal Reserve of Chicago in studies of the Midwestern economy showed that it was the very effective transportation and communications capabilities of the region that permitted it to overcome high labor costs and compete effectively in the world.
- Recent analyses have shown that highway investment has constituted upwards of 25% of all the productivity improvement enjoyed by the economy over the last decades.
- That research has also shown that public investment in highways stimulates new private investment in new plant and equipment.
- The World Bank has found that road development had higher payoffs than the average for all forms of investment made by the Bank throughout the world.

In our work we tend to emphasize the economic benefits of investments; but there are immense social pay-offs as well. Increased access to health care, emergency medical services, access to broader housing and job opportunities, greater recreation and cultural opportunities, are immense sources of social interaction and cohesion. These rarely find their way into cost-benefit analyses. Does anyone seriously believe that without the access to low cost land provided by highways that we would have two-thirds of our households owning their own homes?

One serious gap in the analytical process is the adjustment of theoretical capacity values to adopt as normal the current behavior by the American public that has learned to drive faster closer together in congested conditions. The safety of this procedure has not changed just because of our willingness to risk it. But present engineering procedures now accept that 20% more throughput is possible than previously estimated. This has direct bearing on our estimates of our definition of potential congestion. Some of our “success” in dealing with congestion stems from this. It is like we had estimated that 100 people could fit into a bus and then found due to lack of vehicles that 115 and even 120 people sometimes crammed into the buses; and then we blessed this disaster by shifting the standard to 120 as the new base for judging adequacy of space on buses. But it’s far more serious than that; the safety effects of assuming that more vehicles can traverse a lane in an hour at high speeds is a real threat. As a result of this “dumbing down” of the system, we have artificially defined away part of the problem. Maybe if we can just get Americans to go even faster, even closer together we can define away the rest of the problem as well.

#### LOCAL COST-BENEFIT APPROACHES

Our benefit-cost approaches require serious re-thinking and re-dedication.

We are all concerned about the problems of congestion. But the time lost in travel is not just a matter of being two minutes later getting home. Rather it is:

- The decline in affordable housing within a reasonable commute of my work
- the decline in the number of jobs accessible to my home in half an hour
- the decline in stores and services accessible in an half hour
- the decline in emergency services available in a key time limit
- the decline in customers, suppliers and services accessible to my business in half an hour.

These are all *market-shed* kinds of issues and we have no economic methods for adequately recognizing these benefits in transportation economic analyses.

Most certainly the key role of transportation in providing access to affordable housing is not properly recognized. More than 75% of Americans live in their own homes and highways have been instrumental in assuring access to affordable housing. As congestion rises the amount of affordable housing available declines. These are crucial factors to first-time home buyers, typically the young and minorities. We often look at transportation spending for commuting travel as a cost without benefits, not recognizing that the true economic trade-off is in the combination of transportation and housing costs. For many of those who pay high travel costs they more than compensate for that in better housing or reduced housing costs. Importantly it is a trade-off that people willingly make. Rural households for example spend almost 24% of their incomes on transportation contrasted to 19% typically spent in urban areas. However they spend only about 27% on housing contrasted to 33% for urban households. Black and Hispanic households spend the least on transportation but the most on housing of all groups; as a result their total housing-transportation costs are the highest among comparable groups.

Benefit-cost analysis is in effect a public sector substitute for the private sector bottom line. One way to institute a stronger benefit-cost process is to expand the role of the private sector in transportation investments. Private toll-based systems using bonding power introduce the strongest and most rigorous of benefit-cost measures. Especially when we have a backlog that needs to be addressed a bond-based approach is highly advisable. The more we can privatize the more rigorous our financial choices will become.

Another cost of congestion not recognized is the air quality effects generated by slow moving stop-and-go travel that wastes fuel and generates pollution. I am convinced that an objective assessment would show that highway investments that help assure free-flow conditions would be the single most cost-effective investment one could make to improve air quality in many areas. The improvement in fuel economy would be enormous. Texas Transportation Institute research suggests that almost 6 billion gallons of fuel would not be burned per year in congestion; that and the reduction in stop-and-go traffic could make major contributions to air quality.

Today a large part of state and metro planning is simply attempting to clear air quality or other environmental hurdles to keep federal funding flowing. Other goals are not being adequately addressed. This is not to say that air quality is not important but rather that safety, security, economic welfare and social cohesion are all key values that must have adequate recognition as well.

It was discouraging to see that the National Academy of Sciences study of the CMAQ program noted that no clear cut mechanism for discerning benefits was in place in the program. The Academy study, after noting strong support by interest groups, air quality officials and agency staffs for federal funds, stated:

*However, it was not possible to undertake a credible scientific quantitative evaluation of the cost-effectiveness of the CMAQ program at the national level.*

Worse there was not an imperative statement that strongly made the case for the necessity for credible benefit-cost criteria to be made a central part of the program.

It is my sad belief that much of our planning and analysis today is driven by advocacy. Instead of planning we have balancing between competing advocacies and advocacy groups. We have biking advocates, walking advocates, transit advocates, car-pooling advocates, work-at-home advocates, etc. (there are no admitted SOV advocates- it doesn't seem to need it) There is not a lot of interest in the right answer, only in the answer that supports the favored position. We now have a *Constituency for Congestion* in many states and metro areas; a constituency that sees the need for continued congestion in order to support their favorite programs. A strong benefit-cost mandate in law would force decision-makers to recognize the unnecessary costs they are imposing on the public or the benefits they are denying them by appeasing advocacy groups.

A very simple benefit-cost performance measure to apply to local projects that would provide a sense of scale would be:

What percent of the problem is this project solving compared to what percent of our resources is it consuming?

Many areas who asked themselves this question would find that their funding was gone and they had addressed 25% of the problem – at best.

I would like to think that I'm a transportation advocate who believes that transportation is central to enhancing our national social and economy goals. Today's America is a nation defined by transportation. Few nations have been challenged as greatly as we have been by "The Tyranny of Distance." No other nation has succeeded as we have in reducing the influence of distance on its economic future.

I believe in the continued great economic and social power of highway investment. Why? Because transportation is all about reducing the time and cost penalties of distance on our economic and social interactions. To the extent that nations succeed in that function they enable tremendous forces of economic opportunity, social cohesion and national unity.

Thank you very much for the opportunity to put my views before you. I would be delighted to respond to your questions.

*Alan E. Pisarski*

United States	1980	1990	2000	1980	1990	2000
Total:	96617296	115070274	128279228	100.00%	100.00%	100.00%
Car, truck, or van:	81258496	99592932	112736101	84.10%	86.55%	87.88%
Drove alone	62193449	84215298	97102050	64.37%	73.19%	75.70%
Carpooled	19065047	15377634	15634051	19.73%	13.36%	12.19%
2-person	13303701	12078175	12097346	13.77%	10.50%	9.43%
3-person	3360781	2001378	2159151	3.48%	1.74%	1.68%
4-person	1400527	702222	766012	1.45%	0.61%	0.60%
5+person	1000038	595859	611542	1.04%	0.52%	0.48%
Public transportation:	6007728	5890155	5867559	6.22%	5.12%	4.57%
Bus or trolley bus	3924787	3445000	3206682	4.06%	2.99%	2.50%
Streetcar or trolley car	***	78130	72713	***	0.07%	0.06%
Subway or elevated	1528852	1755476	1885961	1.58%	1.53%	1.47%
Railroad	554089	574052	658097	0.57%	0.50%	0.51%
Ferryboat	***	37497	44106	***	0.03%	0.03%
Taxicab	167333	179434	200144	0.17%	0.16%	0.16%
Motorcycle	419007	237404	142424	0.43%	0.21%	0.11%
Bicycle	468348	466856	488497	0.48%	0.41%	0.38%
Walked	5413248	4488886	3758982	5.60%	3.90%	2.93%
Other means	703273	808582	901298	0.73%	0.70%	0.70%
Worked at home	2179863	3406025	4184223	2.26%	2.96%	3.26%

*U.S. Bureau of the Census Journey to Work Statistics*