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Prospects for Future Transportation

The State's transportation system has changed with the tremendous network of freeways, toll roads, and bridges that you have. The innovative ways you've approached some of the problems -- your financing methods and others that we've been hearing about this morning -- is a great inspiration.

I can remember the gravel roads we used to have. And frequently, when you'd come to a river, there was no bridge and you'd have to cross on the ferry. It would be an all-day major effort to get from here to the western part of the State. Today you can travel there in a few hours. It's amazing to see those changes.

I was pleased Calvin decided to use the theme "The Future of Transportation" for this Forum. I think somewhere back in the 70's, we got the notion we'd built the system and all we had to do now was learn to manage it and we were through. I think there was fat in the system at that time; we had a little excess capacity, and we were able to coast along with that notion. I think those days are past and we're having to face up to the new realities that transportation demand is continuing to grow and we've got some future to think about.

A couple of years ago, I was asked to write a paper and to testify before a group in Washington about what the future outlook for transportation might be, looking 30 or 40 years into the future. I first looked at that assignment and said that's a ludicrous thing to ask somebody to do at a time when weather forecasters can't look forward to a day's forecast with any confidence and economic forecasters strain with a one-year economic forecast. The idea that anybody can look ahead 30 or 40 years on anything is absurd. But, I accepted it anyway and thought about it awhile and felt a little better about it. I went back and looked at

some of the literature on transportation planners and engineers right after World War II or in the early 50's to see what they were saying about the coming three decades and how close it was to what we've actually been faced with. Frankly, it was a little encouraging, because the end of World War II was characterized by a lot of optimism about the future and about growth, and while some of the things being said then -- like the domed air conditioned cities with freeways that wind around between the buildings, and private planes and helicopters that would reside behind every suburban house, with people commuting to work by air -- turned out to be nonsense. The serious literature was pretty much on the mark. We knew, for instance, about automobiles and we knew about freeways in those days. They were expected to become more widely available and prognostication about the impact of freeways was widespread and remarkably accurate. Further urban decentralization was expected, and that's happened. Goods moving by truck could be seen getting faster and more efficient and taking business away from the railroads, and that's happened. Aircraft were well known and were expected to get bigger and faster and induce the need for bigger and larger airports, and certainly that has happened.

Probably our greatest lack of foresight has turned out to be in the "extranalties," where we got blind-sided by environmental problems and energy problems, things that came in from left field; and probably that's where we're going to be in the future as well. But as far as looking at the transportation technology that was going to impact us, we were pretty close.

So, since history has shown that it was possible to forecast usefully in those days, I began to feel a bit better about it and thought that perhaps it would be useful if today we'd go through a quick list of what technology is out there and see what it means to our future.

One of the items on the list is the dual-mode bus, a bus that can run around on local streets picking up passengers, move to a guideway, couple into trains, move at high speeds in a narrow corridor through high-density areas, and discharge the passengers or else break up for distribution to local neighborhoods. Such systems exist now. I saw one in operation in Australia a couple of years ago and one of them also is available in Germany. I suspect we'll have these in certain selected places, along with expanded use of light rail, which we're seeing. Not a major difference, not a major impact perhaps, but at least it will be there and it will be effective in some locations.

High-speed rail is here and, in most of the advanced nations of the world, it exists right now, certainly in Japan, Germany, France, and Britain. We have a marginal version of it in the northeast corridor, but really significant speeds of 160 to 180 miles per hour are now being achieved. The French let me drive their high-speed train between Paris and Leon a couple years ago; driving at 160 miles an hour and approaching another train coming by four feet away at the same speed is a hair-raising experience. A unique experience as far as I know. I suppose the fact that the French let me drive it shows they're more interested in public relations than safety. But in any event, it's not just an experiment

since they're running 90 trains a day between those two cities at that speed, and building another line to go 180 mph out to their west coast.

We're going to have some of those in this country in a few selected corridors (inner-city movements of the right distances with the right densities), but as far as having a major impact on our transportation across the country, I suspect it will be limited.

Magnetic levitation may take the place of rolling wheels in some cases, especially with high-temperature superconductivity.

Improved walkways also are likely, which permit you to step on a moving sidewalk at 1 or 2 mph and be moved up to maybe 10 or 12 miles per hour, then decelerated to step off. Operating models now exist. They probably will expand the utility of transit systems in a few locations. This would certainly be useful but limited in its impact.

I think we'll see further rail automation taking the drivers off trains, (it is happening in Leon and Vancouver and a number of other cities) perhaps reducing costs, at the margin, for the operation of rail systems.

Automobile improvements will continue, lighter materials, ceramic engines, and other innovations can be expected to continue to improve fuel economy, especially if fuel prices continue even a gradual escalation. Equipping cars with radar or other sensors capable of detecting the proximity of other vehicles also is likely, and information services for drivers as well as taking some of the driver's functions may, in fact, occur. The so-called "smart vehicle smart road" concept is something on which large amounts of money are being spent for research and development in Europe and Japan. It could have an impact, exactly how big an impact, though, is too early to say and too unknown to put all our eggs in that basket, but we certainly should be carefully evaluating it.

The question of telecommuting -- the use of personal computers so you can work at home -- could have tremendous impact. We've been talking this for 25 years; well, it's here today, people are doing it, and the scale of the impact is the question. I was looking at some figures the other day and somehow the number of people working at home continues to decline, not increase but decline, despite the advent of the personal computer. Obviously the personal computer is off-setting other factors so far. It appears that the impacts of telecommuting may be limited.

Our air industry has been characterized by literally cascades of ever bigger and faster planes, giving better service, greater productivity, and lower cost. The latest generation of new planes, the 767's and 757's, etc., are not giving us that quantum jump in speeds and mobility. But it is giving us the quantum jump in productivity as a result of the use of computers, smaller flight crews, less fuel because of better engines, and lighter materials with greater payloads. One of these days in the next decades, no doubt, we'll have a hypersonic aircraft that will give us a tremendous advantage for long distance travel. We've got tilt-wing aircraft coming on-line now that will have an impact on shorter distances. The big impact for us will probably be the need for more and bigger airports. Providing them will be a major challenge.

I mentioned superconductors earlier. Another potential impact of that technology could be the building of the power plant at the mine

mouth and transporting electricity instead of coal, which could have a disastrous effect on freight rail transportation.

We could add some others, but that's probably the major list of technology. So, what can we conclude?

I conclude that progress will be made on all fronts -- trains are going to get faster, buses will be more efficient and reliable and perhaps dual-mode in some cases, cars will be safer, more reliable, more convenient. We will have smarter roads and smarter cars and computers will allow us to work at home in some cases. But the problem with all this is it looks as though the impacts are all in the 5 - 20 percent variety, whereas the scale of increased demand appears to be an order of magnitude higher -- 100 percent and 200 percent. There's some sort of a discontinuity between what technology apparently is going to produce for us and the kinds of problems we have. It puts us all in the position of being like those guys who were rearranging the deck chairs on the Titanic as the great ship rolled over. We are not necessarily addressing the major issues, although we certainly have to be pushing ahead on all of the things I've mentioned.

It would appear, in fact, we are, in the future, going to be faced with using, managing, and expanding this auto-truck highway system (as supplemented by rail and bus) that we currently use and depend upon.

Now, if that's the case, and I think it is, then it's useful to stop and look at just how this road system, truck system, bus system, and auto system is performing, and if it will be responsive to these needs in the future. It seems to me the system is characterized by six major problems. Actually, there's a seventh, the financial problem, but I heard it well-covered this morning.

The first of them is a shortfall of capacity. You've heard the figures I've already alluded to with the increased demand running anywhere from three to four percent per year. There are parts of the country where it's expanding even faster than that and other parts not so fast, but it's big.

We had a cushion of excess capacity that we've been resting on for the last 10 or 15 years; that cushion is rapidly running out and now we see the congestion rapidly mounting. The percentage of our road system that operates in level of service D, E, and F is increasing at a rapid rate every year. Not just suburban sprawl, but exurban sprawl, makes it even more difficult for conventional transit to have much of an impact. But capacity is only growing marginally. And our systems management strains to get three and four percent improvements. Thus, to think they are a substitution for expanding the system has got to be a mistake.

The second problem is a shortfall of people. The Transportation Research Board did a study on this problem a couple years ago at the request of Congress. The exodus of large numbers of our experienced management people and technical people in our road and transit and other transportation departments is a major problem. People who were brought in 20 or 30 years ago (and are now ready to retire) are being retired, and at the same time an insufficient supply of new people are coming online. Ultimately, we know that this problem will be solved by economics; one of these days we're going to get an expanded program, it

just has to happen for a lot of reasons. When that happens, we're suddenly going to have a desperate need for people, salaries will go up and people will be attracted into the field. But, what a disruption and what an inadequate response at the time.

I was encouraged to hear some of the things I heard this morning about the private sector. I just came from Auburn, where I was encouraged to see the National Center for Asphalt Technology that the National Asphalt Pavement Association is sponsoring. And I think the new University Research Program (of which Kentucky is a part), which established new transportation research centers around the country, is a step in the right direction. We, in the industry, need to be supporting these -- not reluctantly but enthusiastically -- because that is where we're planting our seed corn to assure that we'll have new transportation professionals when we need them.

The third problem I see is the shortfall of plans. In some respects the things I've been saying the last few minutes are almost *deja vu*. I came into this business 30 years ago, doing one of the first transportation studies for the city of Nashville, Tennessee. One of the first things I discovered was I had to go out and talk to the people in the luncheon club circuit, I found myself saying the same things as today -- demand going up, supply not responding. We've got to do something. However, there was a difference then in that people were prepared to respond. There was an enthusiasm about the future, a willingness to do something, in contrast to today when there is a hand-wringing but an unwillingness to look out and say that we can handle this problem.

Now it's true we made a lot of mistakes then. We were probably too enamored with technology, and we were certainly not very sensitive to some problems we should have been sensitive to, not the least of which was the environment. But, now we have this historic conflict between mobility and environment that we've got to somehow resolve. In any event, with the passage of the Interstate Highway Act in 1956, there was a requirement to develop plans in every metropolitan area in the country, and we began to produce those plans. I was interested in the colloquy that went on this morning about planning in the State. In contrast to most places where we're not planning, we're demapping things; plans that were on the shelf we're dumping in the wastebasket or have been for the last 10 years. But even if we had the plans, there's nobody pushing to implement them. Many of the road departments around the country have been burned over the last 10 to 15 years, being accused of wanting to pave over the country. So, they're going to stand aside and wait until the problem gets bad enough that somebody begs them to do something about it.

The fourth problem I see is the shortfall of programs. Since 1916, road progress, and I think public transit progress to a lesser extent in our country, has been a product of a consensus about a federal, state, and local partnership where each knew its responsibilities and roles, and they were able to move ahead.

Initially, after World War I, there was a consensus about getting the farmers out of the mud and giving us some space to use the vehicles we were buying. Then we gained a consensus on connecting all our major

cities with limited-access roads. But today, we are without such a consensus about what to do, or who's to do it.

You've had some speakers who have dealt with this more extensively today so I won't spend a lot of time on it, but we are desperately in need not only to know what to do but who's supposed to do it. What is the role of the federal, state, local government?

The fifth problem I see is a shortfall of technology. We just don't spend enough on research and development in this business. High-tech industries spend seven or eight percent of gross revenues for research and development. Low-tech industries, such as clay tile products and food processing, spend one to 1-1/2 percent, sometimes two percent, and we spend 0.7 percent -- about a fifth or an eighth percent of what even low-tech industries do. The reason we do that is because we're a vast decentralized country and we conduct transportation in a very decentralized, even fragmented manner, and so no one is in charge. If somebody was in charge, of course, they wouldn't put up with this, they would say "My gosh, we've got to do something." But it's nobody's responsibility, and the management of the industry, I think, is appropriately concerned about finances and they turn over so fast they never quite get around to thinking about the research and development problems. TRB is proud of the role it played in getting the SHRP going. This unique highway research program was a product of recommendations from TRB's Special Report 202. But even with SHRP, we still underspend on research.

And finally, the sixth problem is that we suffer desperately from a shortfall of communications. This was best illustrated summer before last when I had the opportunity to go to Vancouver, British Columbia, where many of you perhaps remember the World's Fair was located that year. The theme for that World's Fair was "Transportation and Communication". All of the advanced nations of the world brought their best transportation exhibits. They bought pavilions and spent millions putting up exhibits to show what they were doing to solve tomorrow's transportation problems. In fact, many of the lesser developed countries had pavilions as well, and many of the great private firms of the world -- the high-tech firms, the large, heavy industries -- had their exhibits to show what the transport future was going to be and how they were going to contribute to it. I saw vast exhibitions of railroad rolling stock, aviation, search-and-rescue vehicles, space travel, rail transit, bus equipment, riverboats, ships, submarines, linear induction motors, air-cushion vehicles, hydrofoils, vertols, monorails, light rail transit, barges, and on and on.

But you could scarcely find any mention of the road system, and this despite the fact that in all of the developed countries of the world -- certainly the U.S., France, Britain, and Germany -- four out of five passenger miles are on the road system and \$4 out of \$5 spent on passenger transport in those countries are spent on the auto-highway mode. And \$3 out of \$4 spent on goods movement is spent on the truck-highway mode. Road transport is going to continue to be the dominant mode, yet you couldn't find a single exhibit that even mentioned it.

Now, the danger of that, other than it being humorous, is that the informed elite of our nations, the decision makers, go to those kinds of exhibits, and are left with the impression that there is a technological fix to our problems. The message of that whole fair was that the barriers to progress are primarily technological and, if we just do a couple of things, we'll get a silver bullet that will bail us out of our problems. When, in fact, our problems are attitudinal, legal, environmental, institutional, and financial. They are attitudinal because of the "NIMBY complex" -- the "Not in my backyard" complex. It affects not only transportation and highways and airports, and rail transit, but waste disposal, prisons, and sewage, and a lot of other things. The legal, environmental, institutional, and financial problems are all ones with which we are familiar.

I'll conclude by summarizing all of this. First, technology will continue to advance. It will provide important but marginal benefits of 10 to 40 percent on our existing systems. But travel demand is increasing at least twice that fast and in the 100 and 200 percent range in the coming decades. There's no technological fix available that we can see. The future will see us dependent as now on the auto, road, truck transport system as improved by the technological improvements we just described. And this system has major problems that limits its ability to respond in addition to financial problems of capacity, professionals, plans, programs, technology, and communications with our constituency on what the real issues are; and those issues are environmental, energy, legal, financial, and institutional.

This problem is not like so many others that come and go away. In Washington, and I suppose here as well, one becomes cynical about these buzz projects that come in and are on everybody's lips for a year or two and suddenly you discover they've gone away and nobody's talking about them anymore. We didn't do anything about them, they just disappear. However, it's hard to get used to a tack in your shoe, and I don't believe that this problem is going to go away. In fact, time is pushing in the other direction, which is what convinces me that we're ultimately going to have a new national program. What it calls for is future transportation professionals not only skilled in the latest technology but also with abilities in being able to articulate the alternatives, to narrow the debate, and to try to encourage consensus. In that respect, I don't think the challenge has ever been so daunting nor have the opportunities been so abundant. Thank you very much.