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THE FUTURE OF U.S. GROUND TRANSPORTATION FROM 2000 TO 2020

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I have been asked to take a brief look at the future of ground transportation in the United States. Given the rapid speed of social change in our world, I will focus upon the period up to about 2020, with a few comments on a the longer period out to 2050.

Accommodating Future Population Growth

The first crucial consideration is the likely future growth of U.S. population. Even before receiving results from the 2000 Census, the Census Bureau estimated that, from 2000 to 2020, the total population of the U.S. will rise by 48.2 million persons, or by about 12 million every five years. That is a 17.6 percent increase in 20 years. And the first results of the 2000 Census indicate that future growth may be even greater than that. Somehow, U.S. ground transportation systems must expand their capacity to cope with this large increase in persons and households and goods.

This significant growth will occur mostly in the West and South, and in a small percentage of our metropolitan areas (MSAs). Average MSA growth will be slightly over one percent per year, but many MSAs will grow faster because of immigration from abroad or domestic

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immigration from other parts of the U.S. From 1990-1998, average net domestic immigration

into our largest 22 metro areas was about one tenth of one percent per year. But it was 2.2 percent per year in Phoenix and 1.2 percent per year in Atlanta.

From 1980 to 1997, we added more about 1.2 cars or trucks to our nation's vehicle population for every additional person in our human population. That implies that, from 2000 to 2020, there will be 48 to 62 million more vehicles in the U.S. That would be a 24-28 percent rise in vehicles over the 2000 total of 214 million.

Many existing residents facing greater congestion want to "limit future growth." But these sentiments are delusions. Existing residents in any region cannot stop either domestic or foreign immigration into it by adopting anti-growth policies. A region's growth rate is determined by such basic traits as its climate, its location in the nation, its topography, its natural resources, its demography, and past investments made in it by governments and businesses. These traits cannot be changed by local or even state-wide policies. ***Our challenge is to accommodate growth, not prevent it.***

Residents of a specific locality can limit future growth within its own boundaries, but that merely moves the region's growth to other localities therein – farther out or in overcrowded city slums. So local anti-sprawl policies make sprawl worse.

Over a longer period, future population growth will be even more enormous. The Census Bureau projects a mid-series estimate of 393.9 million residents by 2050 – a gain of about 119 million over 2000, or 43.4 percent. Imagine the road traffic if we keep adding more than one vehicle for each added person in our population!

The Continuing Dominance of Private Automotive Vehicles

Privately-owned automotive vehicles will remain the dominant form of ground

transportation for at least the near future, and probably longer. Attempts to cope with rising traffic congestion by luring more people to public transit will not work well enough to change this situation. During the next 20 years, the automobile will remain a preferred form of movement for most people in spite of worsening congestion. Under most circumstances, cars and small trucks are faster, safer, more comfortable, more flexible in timing and in linking scattered origins and destinations, and often cheaper. Hence private automotive vehicles will remain dominant even though they have significant social costs in deaths, injuries, and pollution.

Improving the quality, quantity, or frequency of public transit may be desirable in many MSAs, but doing so would not attract any notable proportion of present auto-driving persons into using transit. Only 3.5 percent of work trips in 1995 were on transit, compared to 90.7 percent in private vehicles. Even if the total percentage of persons commuting by public transit ***tripled,*** that would reduce the percentage using private vehicles by only 11.6 percent. Any reduction in congestion achieved through reduction would be more than overcome by sheer population growth.

The only way to substantially increase the percentage of trips done on public transit would be to make use of automotive vehicles far less convenient or far more costly**.** But doing so by greatly raising gas taxes as in Europe, or escalating license fees, would be strongly opposed by most Americans. So these policies will not be adopted. Eventually, rising congestion may require such steps, but probably not by 2020.

Public transit proponents complain that automotive vehicles get large public subsidies. But transit now receives over 20 percent of all public transportation spending, but provides under 2 percent of all person trips per year, and only 10 percent in large urban areas. So transit is even

more heavily subsidized per trip or per capita than private vehicles.

Why Traffic Congestion Will Inevitably Get Worse Everywhere

Most Americans consider traffic congestion as one of the most serious social problems they face in daily life, especially in fast-growth suburban areas. No doubt, it has been getting worse. But there is no way to prevent traffic congestion from intensifying even more in the future. This is a problem without a solution – at least no solution the American people will accept.

In some respects, perception is worse than reality. The actual average time spent commuting on each trip has not increased much over the past 12 years, except in a few large metropolitan areas. Average commuting time was 18.2 minutes in 1983, 19.7 in 1990, and 20.7 in 1995 -- a rise of only 2.5 minutes, or 13.7 percent, in 12 years. But average distance rose from 8.5 miles to 10.6 in 1990 and 11.6 in 1995.

We hear horrifying estimates of how much time commuters waste in traffic. The Texas Transportation Institute says that Los Angeles area drivers wasted 82 hours per driver in 1997 – the most in the nation. But spreading those 82 hours over 240 working days and 2 trips per day amounts to losing 10 1/4 min. each way each day. The ***average loss*** in 68 areas was 4 1/4 min. per trip. A similar analysis of the $72 billion annual "excess" cost of delay in those 68 areas combined estimated by the Texas Transportation Institute shows that, on a per commuting trip basis, that cost is 21 cents in cash outlays and 4 1/4 minutes of time lost at an imputed wage cost of $24.56 per hour.

Yet there is no doubt that congestion is impeding movement during much of the day in regions like the San Francisco Bay Area, affecting efficiency and the cost of living there.

Nevertheless, the American people will not accept any of the tactics that might actually reduce peak-hour congestion. Hugely escalating the cost of driving through higher gas taxes or other fees is a political non-starter. Improving public transit will not lure enough Americans out of their cars to cut congestion much. Once peak-hour congestion has appeared on major roads, widening them only temporarily speeds traffic there. Drivers soon converge on the improved roads from other routes they had been using, or from earlier or later time periods they had been traveling in to avoid the rush, or from other modes like public transit they had been using. That "triple convergence" soon returns peak-hour congestion on the improved roads back to the same level it was before they were widened. This does not mean there are no benefits from widening heavily congested roads. Doing so may reduce the length of congested peak hours, and may move more vehicles per hour during those peaks. But it will not eliminate the existence of crawling traffic during peak periods.

Similarly, it may often be desirable to build more roads to cope with population increases. But in the long run, improving roads often attracts even more population and other growth that eventually tends again to overload those roads.

Economists have long recommended charging high peak-hour tolls to ration scarce highway space during rush hours. But U.S. politicians have unanimously rejected that strategy for two reasons. First, most drivers would consider such tolls as "just another tax" on something they can do without monetary cost now. Second, most drivers would regard high enough peak-hour tolls to reduce congestion then to low levels as unfairly benefitting wealthy drivers who could always pay such tolls at the expense of poorer ones who would be forced to drive at other times. Perhaps "HOT lanes" – high occupancy toll lanes on major expressways onto which single

drivers could buy their way during peak periods – could provide some high-speed channels even during peak hours without forcing all other drivers off those roads during those hours. But "HOT lanes" would not eliminate peak-hour traffic jams for the majority of drivers. In short, no remedies Americans are willing to adopt can prevent peak-hour congestion from getting worse as future populations rise in the nation's metropolitan areas.

In reality, ***traffic congestion is essentially a balancing mechanism that enables people to pursue certain specific objectives they value other than minimizing commuting or driving time***. Employers want most firms to use similar work periods during each day so workers can communicate with each other for economic efficiency, but that requires most people to travel to and from their jobs at the same times. Employers also want to operate mainly in low-density workplaces, widely scattered across each metro area. Most households want to (1) have access to a wide range of choices of where to work and live, especially in multi-earner households, (2) combine multiple purposes into individual trips, (3) live in relatively low-density communities, and (4) separate their own dwellings spatially -- and within public school districts -- from families with lesser incomes and lower social status.

It is not possible for people to pursue all of these objectives effectively without generating a lot of traffic congestion, especially during peak travel times. Yet most of us will endure a lot of congestion before giving up any of these objectives. The congestion we encounter is bad enough to make us complain loudly, but not bad enough to make us change our behavior.

Thus, increasing traffic congestion is an inescapable part of living in modern metropolitan areas everywhere. Peak-hour congestion is actually worse in most other parts of

the world than in America. It is a mark of rising prosperity around the globe. If congestion gets bad enough, more people will react by relocating their homes closer to their jobs or vice-versa, or by moving to smaller metropolitan areas. To believe that future congestion will be remedied by adopting more public transit or any other set of remedies is a myth.

Consequently, my advice is that everyone should get used to being stuck in traffic some of the time. You should get a climate-controlled car with a stereo radio and tape deck and CD player, a hands-free telephone, a fax machine and even a microwave oven, and commute each day with someone you really like. Make it a part of your leisure life!

Changing Land-Use Patterns in Order to Reduce Future Congestion

In the long run, it would be possible -- at least in theory -- to influence traffic congestion by changing future land-use patterns to improve accessibility and ease of movement. Two basic approaches to changing existing patterns are being promoted as means of decreasing infrastructure costs, reducing congestion, and increasing accessibility. Unfortunately, both approaches are partly confounded by the fact that about 85 percent of the developed portions of the nation that will exist in 2020 were already in place as of 2000. Even if radical changes in the form of the to-be-added 15 percent could be achieved – which is not likely – that would not substantially change the patterns already in place today, which will necessarily dominate the overall picture in 2020. Even in fast-growing regions, well over half of all settlements in 2020 are already here today.

Over a longer run, existing settlements will comprise a smaller percentage of the total built environment, so more change can be achieved. By 2050, 30 percent of the then-existing

population will live in settlements built after 2000. But that means 70 percent of those future settlements are already here. Nevertheless, some discussion of these two approaches is desirable.

—**Adopting more Pedestrian Oriented Developments (PODs)**. The "New Urbanists" and others claim that adopting pedestrian-friendly and transit-oriented residential development can help remedy regional traffic congestion by causing much higher percentages of future residents to walk or use public transit. Their pedestrian-friendly design concepts, and grid street patterns, are genuine social contributions. But I do not believe their predictions of much higher future transit use are justified.

To illustrate this conclusion, picture an MSA initially containing one million residents, five percent of whom commute by transit, with an annual population growth rate of 1.5 percent from all sources. Assume ***half of its new residents*** are housed in circular Pedestrian Oriented Developments (PODs). That is a very high fraction, given the past low-density settlement patterns prevailing in the United States. Each POD is assumed to be one-half mile in radius because that is the maximum distance most people will walk to a transit station. (The number of PODs necessary to accommodate such population growth is a variable depending on the average residential density of the PODs; but neither their density nor their number is important in this example since we are assuming that one-half of all new residents live in PODs regardless.) Further assume that 50 percent of those POD residents commute by public transit. Then at the end of 10 years, total commuting by public transit would have risen from 5.0 percent of all workers to 8.1 percent. If all the rest commuted by private vehicles, that would leave 91.9 percent still doing so. Even if 100 percent of the people living in these circles commuted by

transit, total transit use would be only 11.6 percent. If the population growth rate in the MSA is 2.5 percent instead of 1.5 percent, and if 50 percent of all POD residents commute by transit, the total commuting by transit after 10 years would be 9.92 percent. That would still leave over 90 percent commuting by private automotive vehicles.

—**Using urban growth boundaries to limit outward expansion**. The second basic approach to reducing future congestion by changing land-use patterns is adopting urban growth boundaries to encourage higher-density new development**.** This would presumably make use of public transit more feasible in new-growth areas because they would have higher average residential densities than present fringe areas. This approach would also reduce the costs of building infrastructures to serve large low-density areas, and would rely heavily on in-fill development to slow future sprawl. But it has three major problems. In this scenario too, 85 percent of all 2020 settlements already exist now, although present settlements will comprise only 70 percent or a bit less of all future settlements existing in 2050, as noted above. .

Moreover, the only rational way to limit outward sprawl is through ***regional*** growth boundaries. But American political allegiance to the sovereignty of local governments over land use policies is rooted in the desire of the home-owning majority in each suburb to insure that property values keep rising, or at least do not fall. This pressures politicians at all levels both to reject regional land-use planning, and to permit exclusionary zoning that hurts renters and the poor. We now have regional planning only as a last resort in a few MSAs where crises have arisen. Such crises have occurred where development threatened environmentally-sensitive and highly-valued areas, such as the Everglades in Florida and the Willamette River Valley in Oregon, or where the Environmental Protection Administration cut off federal highway funds

due to high air pollution, as in Atlanta, or where state courts threatened to curtail local zoning unless more affordable housing was built, as in New Jersey. Almost everywhere else low-density zoning and sprawl prevail. True, sentiments regarding some regional arrangements are likely to change over the next two decades and beyond when the need for area-wide planning becomes more evident to voters. Traffic gridlock may create pressures for more rational planning, but only in some of the largest MSAs where the worst traffic congestion exists.

Another difficulty with this approach is that limiting outward expansion of growth requires raising densities in existing built-up areas. Yet residents of almost every existing neighborhood resist any increases in density, even near mass transit stations. It seems that Americans oppose both sprawl and higher density. In the model MSA discussed above that was growing 1.5 percent per year, the total gain in population over 10 years would be 16 percent. If all that gain settled within the territory of the original urban fringe, which had a density of 2,500 persons per square mile, that density would increase to 3,412 persons per square mile – a rise of 36 percent over the entire urban fringe. If the new settlers were concentrated in only half of the fringe, the density in that half would rise to 4,324 – an increase of 73 percent to above the central city level. It is hard to believe this would be politically accepted by residents today. Yet intensity of transit use rises moderately only at densities over 5,000 residents per square mile, and sharply only at densities over 10,000 per square mile. Thus, at least some further low-density peripheral expansion is inescapable, and it may include the majority of all growth in most areas.

In areas where future growth threatens popular environmentally sensitive open spaces, as near the Florida Everglades, politicians and the public in general are willing to impose regional goals on local government planning. But this is rare because most American MSAs have ample

peripheral land available for future urban growth – in spite of alarmist cries from farmland preservationists. So the political will to adopt regional coordination agencies and raise densities in existing areas is extremely weak. Yet without it, sprawl will rule at least until traffic congestion and accompanying air pollution become almost unbearable. That is some time off.

Over the very long run, it is hard to see how we can cope with huge population increases without some type of regional land-use planning coordinated with regional ground and air transportation facilities. But such regional arrangements have little popular support today.

Financing the Future Infrastructures Needed to Accommodate Population Growth

How should America finance the future infrastructures needed to accommodate our sizable population growth? In the recent past, peripheral low-density growth in most metropolitan areas has been accommodated by financing enough new streets and roads to cause relatively moderate increases in traffic congestion. But using all that money for new facilities means previously-existing streets, roads, and bridges have not been maintained adequately. This arrangement is not sustainable because too many older streets and roads will deteriorate into unusable condition. Fortunately, we have relatively effective means of collecting taxes for transportation uses and of coordinating transport spending among all levels of government – much more rational than our mechanisms for doing land use and housing planning.

Robert Burchell's projections of the infrastructure costs needed to continue sprawl, in excess of those needed to handle more compact growth, show very large absolute increases to finance sprawl. The total "excess costs" he initially projected were $250 billion over 25 years, or $10 billion per year. At first glance, that amount seems huge, especially to officials in fast-

growth states that must come up with the funds. On the other hand, in relation to our $8 trillion gross domestic product, these "excess costs" of sprawl are almost trivial. Beneficiaries of sprawl would probably be willing to pay the extra costs in order to enjoy what they believe are the advantages of continuing sprawl. But our politicians are not willing to adopt such assessments because they fear the negative repercussions in the next election.

The preceding points imply that we cannot accommodate projected future peripheral growth without either (1) under-investing in maintaining existing road systems to a dangerous degree, (2) failing to service the new growth adequately with new streets and roads, (3) greatly increasing the densities of new peripheral growth to reduce the costs of new roads and other infrastructures, or (4) hugely increasing the share of national production we devote to building and maintaining streets and roads. The first two alternatives – inadequate roads – are in theory unacceptable, leaving only the last two. Hugely increasing resources spent on streets and roads seems unlikely in light of competing budget pressures and the present heavy allocation of public spending to public transit. That leaves increasing density in new-growth areas, which we have seen requires going against the politically-powerful desires of homeowners.

Thus, we have not faced up to the facts that (1) our present low-density growth patterns require more spending on infrastructure than we are willing to finance, and (2) we are not willing to adopt much higher-density growth because it is opposed by entrenched existing residents. Unless one of these views gives way, we will have low-density growth and inadequate roads – not a very pleasing prospect.

Two Types of Dysfunctional Institutional Structures Concerning Transportation

To a great extent, approaching future ground transportation rationally and efficiently is hampered by two types of archaic institutional structures. First, existing means of governance in most metro areas are not capable of managing regional growth so as to create consistently higher densities in new-growth areas. Some type of regional planning and authority over land-use and transportation actions of local governments could create such a major change in existing development patterns. But only when traffic congestion reaches much worse crisis proportions are politicians likely to give up their loyalty to the concept of local autonomy, which portends that future policies will not work. Local governments seek to benefit only their own residents by shoving off all costs possible onto others. No one has any strong political incentive to focus on the well being of the entire region, so it is not well served.

The second major institutional road block lies in the regulations that govern public transit. Existing authorities bolstered by transit unions want to maintain monopolies of very inefficient large-scale systems that cannot achieve flexible approaches to serving low-density residential areas. Yet such areas will comprise the vast majority of all the new areas we are likely to build in the next two decades. We need to deregulate or even privatize public transit and allow small-scale operators that will serve low-density and low-income areas on demand. The construction of the Los Angeles subway is an example of legislative arrogance willing to spend billions on an approach guaranteed not to meet the real needs of future growth.

Imaginative management of public transit funds would encourage bidding for new types of services by private entrepreneurs. But the political power of transit unions and established institutions makes that unlikely. There is no need for both the ***funding*** of transportation and its ***production*** to be carried out by the same organizations. Public funds could support privately-

run transit systems, including highly decentralized systems that could possible provide effective service in low-density residential areas. There is no doubt that the nation needs widespread public transit services to provide mobility to persons who cannot drive because of old age, youth, infirmity, disabilities, or poverty. But continuing to focus the provision of such services in large-scale, high-cost public monopolies is not likely to work in the future any better than it does now.

Will the United States Resolve These Ground Transportation Difficulties Soon?

How likely is America to resolve the many problems with its future ground transportation described above?

Regarding traffic congestion, I do not believe there is any such thing as a "solution" or a "remedy" that will stop congestion from getting worse. We can and probably should built more roads to accommodate new growth areas, and better repair the roads we already have. We should also develop more effective means of public transit. But the desires of the American public for low-density living served by private transport and the immense flexibility it provides will not be diverted into any huge shift into mass transit. Moreover, all the added public transit we build will not really reduce future traffic congestion much, as our experience to date so clearly demonstrates. Some of the worst traffic congestion in the nation occurs in those MSAs best served by large-scale public transit systems, such as those in New York, San Francisco, and Boston.

Regarding land-use planning to reduce movement needs and emphasize public transit, only

regional governance arrangements of some type can make a dent in our present infatuation with further outward sprawl – and even that may not work. However, anti-sprawl sentiment is rising around the nation, and it may eventually lead to willingness to accept some type of regional planning or coordination of growth closely tied to ground transportation facilities.

I realize that my assessment of the future of ground transportation may sound very pessimistic. But I have not mentioned one very positive factor. It is the adaptability of our population if given enough freedom from government rules and regulations. As congestion and other undesirable conditions worsen, people and firms will react by moving their homes, their jobs, their offices and other workplaces, and even their areas of residence so as to minimize the worst impacts of those undesirable conditions. That may take a long time, because people moved into congested areas in the first place because those areas were more attractive than elsewhere. But such adjustments will gradually occur.

The key goals of public policies should be to remove the political and institutional barriers to this adjustment process that now block it at so many turns. These include local zoning barriers to new housing development, unwillingness to consider region-wide planning and decision powers, and excessive regulation of public transit. When we are willing to break down these obstacles, we will do a better job of coping with the problems I have described.

Conclusion

You may be surprised that I have not predicted more radical technical and other changes in ground transportation over the next 20 years. But when I look back 20 years to 1980, I do not see evidence of many radical changes from then until now. And high-tech ideas like high-speed

automated highways being proposed by many futurists frankly strike me as ludicrously costly and ineffective. My only radical conclusion is that, in spite of all our problems, I optimistically believe the nation will continue to be able to move around well enough during the next 20 years to maintain a rising standard of living for most Americans..