# Urban Development, the Environment and Automobility

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North Carolina shares four transportation-related problems with the rest of the United States:

- Environmental quality
- Dependence on petroleum
- Congestion and delay on highway and transit systems
- The changing nature of cities

More specifically, the relationship shared by these problems involves the emergence of the automobile as the dominant means of personal individual transportation in the United States and the characteristics of the automobile itself.

*During the 20-year span from 1910 to 1930, the automobile became the dominant means of individual, personal transportation. This photo was taken in Rockingham County, North Carolina.*

## Background

The automobile began to be available in the United States in significant numbers in the decade between 1920 and 1930. As Table 1 shows, in 1910 there were only about 458,000 automobiles in the United States and only one automobile for every 201 persons. The number of automobiles increased between 1910 and 1920; however, by 1930 it had jumped to 23 million passenger cars, while the ratio of persons to cars had fallen to 5.3. During that 20-year span (1910-1930) the automobile replaced the horse as the dominant means of individual, personal transportation.

Second, during those same two decades, there was considerable growth in national population and in housing. Specifically, as Tables 2 and 3 show, since 1930 the number of non-farm occupied housing units has more than doubled, from slightly over 23 million to over 60 million, and the urban population has increased from 69 million to 149 million. Significantly, one-half of the current non-farm houses and urban population were added during the period from 1930 to 1970, *after* the automobile began to make its presence felt in significant numbers.

Third, for much of this same period, federal housing and

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**Table 1. Passenger Car/Taxi Registrations (in 1000's)**

| | *Passenger Cars* | *Population* | *Persons per Passenger Car* |
|---|---|---|---|
| 1910 | 458 | 91,972 | 201.0 |
| 1920 | 8131 | 105,711 | 13.0 |
| 1930 | 23035 | 122,775 | 5.3 |
| 1940 | 27466 | 131,669 | 4.8 |
| 1950 | 40339 | 151,326 | 3.8 |
| 1960 | 61682 | 179,323 | 2.9 |
| 1970 | 89230 | 203,212 | 2.3 |

**Table 2. Occupied Housing Units (in 1000's)**

| | *Total* | *Non-Farm* | *Farm* |
|---|---|---|---|
| 1910 | 20,256 | 14,132 | 6,124 |
| 1920 | 24,352 | 17,600 | 6,751 |
| 1930 | 29,905 | 23,300 | 6,605 |
| 1940 | 34,855 | 27,748 | 7,107 |
| 1950 | 42,826 | 37,105 | 5,721 |
| 1960 | 53,024 | 49,458 | 3,566 |
| 1970 | 63,450 | 60,351 | 3,095 |

**Table 3. Urban Population (in 1000's)**

| *Year* | *Population* |
|---|---|
| 1910 | 41,999 |
| 1920 | 54,158 |
| 1930 | 68,955 |
| 1940 | 74,424 |
| 1950 | 96,847 |
| 1960 | 125,269 |
| 1970 | 149,325 |

tax policy encouraged the ownership of single-family homes. Today the deductibility of the personal home mortgage remains the single major tax break for the majority of American families.

These surges of growth occurred in a context about which Anthony Downs, a prominent urbanologist at the Brookings Institution in Washington, D.C., has written:

> For the past few decades, one major vision about how U.S. metropolitan areas ought to be developed has become totally dominant.... This dominant ideal vision is built upon four pillars. Each is a key desire or aspiration shared by nearly all American households: The first pillar is ownership of detached, single-family homes on spacious lots. Repeated polls show that over 90 percent of all American households would like to own their own homes, and the vast majority want single-family detached units...
>
> The second pillar is ownership and use of a personal, private automotive vehicle. Every American wants to be able to leap into his or her own car and zoom off on an uncongested road, to wherever he or she wants to go, in total privacy and great comfort--and to arrive there in not more than 20 minutes....
>
> The third pillar of the dominant ideal vision involves the structure of suburban workplaces. They are visualized as consisting predominantly of low-rise office or industrial buildings or shopping centers, in attractively landscaped, park-like settings. Each such structure ought to be surrounded by a large supply of its own parking....
>
> The fourth pillar for this ideal vision concerns governance. Most Americans want to live in small communities with strong local self-governments. They want those governments to control land use, public schools, and other key elements affecting what they perceive as the quality of neighborhood life....[1]

Finally, although it is self-evident, suburbs of American cities, small and large, have been the primary location in which Americans have built the single-family homes that have realized their dreams and provided the basic shelter needed to accommodate large increases in population. Moreover, since the end of World War II--but particularly beginning in the 1960s and at an accelerated pace in the 1970s and 1980s--retailing and a considerable amount of employment, both manufacturing and office-oriented, have followed the residential boom to the suburbs.

Just as U.S. families have pursued the vision described by Downs, these employers have behaved in a rational and economically sensible way, as have retail developers. The employers are moving to the employees and building the workplaces Downs describes. Perhaps just as importantly, developers are behaving rationally in that they are building where development is relatively inexpensive. Land in the center of any urban region, where the highway and transit infrastructure exists to serve dense concentrations, is expensive because the competition for it is keen. Low-priced land on the periphery or in the suburbs makes much better sense from the cost point of view of the investor-developer. But the land is low-priced in part because there is no investment in infrastructure and very little competition for the land. Although the developer puts the local government in the position of providing the infrastructure after the fact of development, local governments welcome the development because of their perception that it adds to the base available for ad valorem taxation.

Alan Pisarski, in *Commuting in America,* describes the result of this shift in auto dependence and location within urban areas: a sharp, relative and absolute increase in commuting and travel within and between suburbs, and a relative and, in some cases absolute, decrease in the amount of travel oriented radially to the central city.[2]

One of the obvious by-products of this change in travel patterns is a relative reduction in the use of public transportation services in all but a very few of the largest cities. In part this is due to the reorientation of travel away from the radial corridors traditionally served by public transportation. It is also due, however, to the difference in the nature of travel in the suburbs: radial travel, while originating in fairly scattered

locations, at least has its destinations concentrated in the central part of the city. The new circumferential *inter*suburban and *intra*suburban travel is scattered both at the origin and the destination, making public transportation almost totally ineffective.

In summary, there is now a completely different pattern of residence, employment and travel than that of the 1910s and 1920s, and there are millions more people following this pattern. The emergence of the automobile as the dominant means of personal travel and mobility has been followed by changes that have increased its use and increased our dependence. All of these factors contribute significantly to the four problems cited at the beginning:

- Degradation of environmental quality, in some large measure due to automobile emissions and their effect on the atmosphere.
- Dependence on petroleum, directly attributable to the consumption of motor fuel.
- Congestion and delay, directly attributable to the amount of automobile use and available capacity in our street and highway system.
- The changing nature of cities, for which the automobile and the mobility it provides, was certainly a necessary if not sufficient condition.

## Are There Solutions?

Almost without exception there is agreement that reduction in the dependence on and use of the automobile for personal mobility would have a significant effect on at least three of the four problems cited above. Some see a conscious effort to change the nature of urban development as contributing to the solution of the other three problems. Others believe that the form and density of our cities might change in response to a shift in personal transportation from the automobile back to public transportation.

Elizabeth Deakin has divided suggested views of, and implicit solutions for, suburban congestion and dependence on the automobile into seven groups:

> One view is that there is, in fact, no problem, or at least not one that demands special attention.... Doing nothing --or business as usual--is seen as the most prudent and expedient course of action....
>
> A second view is that the problem is simply one of inadequate financing: that the plans and programs to alleviate congestion are available and could be implemented expeditiously if only there were enough money....
>
> A third diagnosis of the problem focuses on institutions. Federal and state transportation agencies are not providing leadership, this argument goes; they are unable to break out of old ideas.... New ideas, a redefinition of missions, and a realignment of responsibilities are seen as prerequisites to obtaining the necessary commitments to proceed with actions to alleviate congestion....
>
> A fourth view is that the central problem is one of improper pricing of transportation facilities and services... New pricing strategies...could simultaneously discipline transportation demand and generate needed transportation financing efficiently and fairly....
>
> Other diagnoses emphasize failures of current planning practices. One such diagnosis is that government officials, civic leaders, and regional planners and engineers have failed to acknowledge the shifts in land development away from a central city orientation, and to respond with plans for facilities--principally roads--designed to serve suburban realities.... The need is for a major effort to plan and implement suburban-oriented roadways--both freeway mileage and local collectors and arterials....
>
> Another view is that transportation planners have failed to devise realistic, effective commuting alternatives for the suburbs. It is argued that increased emphasis on transit services, carpooling and vanpooling programs, alternative work hours, work-at-home options, and the like would encourage travel choices that are more energy efficient and less destructive of the environment....
>
> Finally, there is the argument that the failure to control land uses in the suburbs has produced the current congestion problems.... In this view, it is hopeless to expect transportation providers to build their way out of the congestion problem; coordinating land development with transportation capacity is seen as a necessity.[3]

## A North Carolina Commentary on the Seven Views: How Well Do They Work?

Charlotte is approaching the ranks of large cities and, like Raleigh, Greensboro, Winston-Salem, Durham and several other cities in the state, is beginning to suffer the effects of suburban congestion which Washington, D.C. and Atlanta have "enjoyed" for several years.

Charlotte has attempted to cope with suburban congestion, and the four larger problems cited earlier with which it is linked, contemplating each of the implicit strategies suggested by Deakin. In roughly reverse order of their effectiveness, or potential effectiveness, here are the results to date.

### *Doing Nothing*

As a conscious strategy, this simply is not politically feasible. Congestion is a political issue and local elected officials have promised their constituents that they will do something about it. Certainly, this is the case in Charlotte.

### *Pricing*

Although sophisticated methods of *road pricing* now are proving the technical feasibility of the strategy, application to a wide-spread suburban network is still horrendously expensive and without legal precedent. Overcoming those two

barriers makes it beyond practical consideration in the near term. *Parking pricing,* however, is technically feasible, but in a context like Charlotte's, it simply does not occur outside the Central Business District. It is highly improbable that local elected officials would move to encourage or require parking fees throughout the city, even if they had the authority. Interestingly, a bill has been introduced this year in the General Assembly calling for a statewide tax on non-residential parking. More probable is the possibility that suburban developers and land owners will begin to charge parking fees as the value of land and the cost of constructing parking begin to climb. Even this seems unlikely in the near term.

*Encouraging the Use of Alternative Modes of Commuting*

Alternative modes of commuting are transit, ridesharing, etc. Charlotte is trying, but is having extremely limited success outside the market oriented to the Central Business District. Most important is the question of pricing. Free parking at suburban destinations, particularly for those who work, removes one of the major factors in encouraging carpooling, vanpooling or transit use.

> ***"Automobile use and petroleum consumption are simply too massive and ingrained to rely entirely on marginal measures."***

*Improving Institutional Arrangements*

Institutional arrangements include planning agreements, joint action and cooperation among governments, particularly local governments. This is not so much a solution strategy as it is a means to ensure concerted action on other strategies among the numerous jurisdictions/players in most urban situations. Setting aside those other strategies for a moment and speaking only of cooperation, both informal and formal among different political bodies, there certainly is interest in the Charlotte area, and there is limited informal activity. The problem also is not so severe in North Carolina because the state has given municipalities both unusually good annexation power and equally strong legislation regarding the formation of "island" suburban municipalities. North Carolina does not have the common situation of numerous small, incorporated suburbs, nor is Charlotte "landlocked."

Regardless, there are several stumbling blocks. Local governments are creatures of the state and the powers that they may exercise are assigned, reluctantly in this case, by a state without a strong tradition of home rule. This means that agreements between the cities and towns are difficult because there is no general authority or framework available. That particular problem may not be peculiar to North Carolina, but a second is: counties in North Carolina are forbidden, under the state constitution, to build or maintain roads. All roads outside a legal municipality are the responsibility of the state of North Carolina. This means that a significant local actor, the county, cannot participate in most strategies to deal with automobile dependence and suburban congestion, regardless of its interest.

*Building Additional Capacity or Providing Additional Services*

In short, this means spending money. Similar to municipalities across the country, those in North Carolina rely primarily on the real property, ad valorem tax and on sales taxes. Small additional sources of revenue have been made available by the legislature (and it controls the local governments' ability to raise revenue) over the past few years, but they are not large enough to cope with the demands of financing additional roadway construction or operation of significant transit service in the suburbs. The solution has been general obligation bonds, with some pay-as-you-go construction. But many cities, including Charlotte, find most of their bonding capacity used up and must work in a climate of resistance to additional ad valorem taxation (although there is no arbitrary cap such as California's). Small towns face an even more critical problem, given the disparity in the scale of facility needs and their potential revenue, while, as noted above, counties in North Carolina cannot participate at all.

While the peculiarities of North Carolina's circumstances may not generalize well to other city and state situations across the country, the point nevertheless remains that cities and counties simply do not have the revenue sources required to construct or operate large transportation programs.

*Increasing System Capacity*

This strategy shares most of the difficulties of building new system capacity, but on a smaller scale. Certainly, if Charlotte has pursued any of the strategies listed here, this is the one which has been the most active. The city has enjoyed considerable success through operational improvements to increase capacity at intersections, add lanes at critical points in the system, and judiciously expand its transit service. This is a "more bang for our bucks" strategy, providing marginal improvements to the existing system. But like building new capacity, it is expensive, and there are the complications of work outside city boundaries and in suburban municipalities.

*Coordinating Development With Transportation Planning*

This strategy is potentially the most rewarding for cities such as Charlotte. Many cities, particularly across the Sun Belt, still operate in a context where development and growth

are regarded positively. North Carolina only recently has begun to grant local governments the power to impose impact fees, but Charlotte has used the limited powers that it has available, along with negotiation, to facilitate the construction of additional capacity through right of way reservation and actual construction. Mecklenburg County has been able to protect some right of way and negotiate construction. In a few instances, smaller communities in the county are beginning to recognize the potential of both ordinances and negotiation. Unfortunately, like many jurisdictions across the country, North Carolina's local governments do not have the funds available to hold up their end of a bargain made with a developer.

Boiled down, Deakin's seven views and the potential solutions that can be inferred by some of them actually suggest:

- Pricing to reduce travel consumption
- Additional capacity
- Encouraging use of alternative modes
- New arrangements of land use, either to reduce consumption or stimulate a shift to transit

The first three of these also are applicable to one or more of the first three of the major problems cited earlier:

- Environmental quality
- Petroleum dependence
- Congestion and delay

The fourth solution, new arrangement of cities and the fourth problem, the changing nature of cities, are opposite sides of the same coin and may or may not contribute to the solution of the first three problems. To some extent, they appear to operate at cross-purposes; however, two difficulties remain--individual behavior and lack of vision.

Downs cites four individual values or preferences which, when realized, are counterproductive from a larger, societal point of view. Any solution to the problems brought about by the behavior flowing from these preferences *must* come from some change in the circumstances which make them not only attractive, but, in the main, rational. Road-use pricing or parking pricing, a change in housing policy, and massive investment in public transportation, alone or in concert, will change behavior because they will change the context in which individual decisions are made. But there is not yet the societal will to make the hard decisions they require.

Just as importantly, not only is there no consensus on these hard choices, but also there is no vision of what we as a society want our cities to be--if it is something other than what we are getting from Downs' four pillars. A strong central area is a goal, but we shop and work in the suburbs and wonder why the downtown area is dying. We extol the virtues of small stores and personal service, and shop at Wal-Mart. We want an "urban place," but we build and live in miniature versions of rural "estates."

Unfortunately, the conclusion is that unless we develop a vision around which consensus can be built *and* translate that consensus into decisions and actions that will change individual behavior, the course we are on will take us deeper into the consequences of the four problems.

## And If That Doesn't Happen?

There may be some utility in separating the main problems into pieces.

For example, building additional road capacity can reduce congestion. It is expensive, in several ways, but it does help.

Clearly, if we burn less petroleum we will reduce one of the main contributors to the degradation of environmental quality and we will reduce our dependence. Certainly, the efforts underway to improve vehicle fuel efficiency, capture pollutants, and encourage transit and ride-sharing should continue. But they may not be enough and they may not be sustainable. Perhaps the electric automobile will be a catalyst, in combination with pricing. But the implied shift in the source of energy production is prodigious.

Finally, the clearest but perhaps the most difficult to understand conclusion is that there is no simple, neat, painless solution to the side-effects produced by our incorporation of the automobile as the major means of personal mobility. While we certainly cannot "do nothing," we must recognize that no single action is a cure-all; each of those on the current menu can have, at best, only a marginal effect.[4] Further actions not only must have a demonstrable effect on petroleum consumption, but they also must be effective in motivating--not mandating--change in consumer/voter behavior if they are to have a significant effect. Automobile use and petroleum consumption are simply too massive and ingrained to rely entirely on marginal measures.

Perhaps the greatest danger is that we will be complacent about the long-term effectiveness of some of the currently popular measures. □

## Notes

1. Downs, Anthony, *The Need For A New Vision for the Development of Large U.S. Metropolitan Areas,* The Brookings Institution, Washington, D.C., 1989.

2. Pisarski, Alan E., *Commuting in America* , Eno Foundation for Transportation, Westport, CT, 1987.

3. Deakin, Elizabeth A., *Suburban Traffic Congestion, Land Use and Transportation Planning Issues: Public Policy Options*, Transportation Research Circular 359, Transportation Research Board, NRC; Washington, D.C., 1990.

4. Pratt, Richard H., *Planning Solutions--TDM and Beyond*, Transportation Research Circular 359, Transportation Research Board, NRC; Washington, D.C., 1990.