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Chapter 8

MOBILITY ISSUES, POLICIES, AND FINDINGS

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Chapter 8.— MOBILITY ISSUES, POLICIES, AND FINDINGS

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MOBILITY ISSUES, POLICIES, AND FINDINGS

CHAPTER 8

SUMMARY

Past and present Government policies have promoted increased personal mobility as a principal national objective. The automobile is the main means of travel for all but the longest intercity trips and trips within the densest urban areas. The automobile, however, does not well serve the needs of some handicapped, elderly, young, and poor persons, for whom remedial policies are required.

It is projected that auto travel will grow by 75 percent between 1975 and **2000.** Stricter fuel economy standards, reduced highway construction, and auto disincentives currently programmed to conserve petroleum and improve urban air quality will have little effect on the amount of auto travel. Only a severe petroleum shortage or gasoline rationing could bring about major reductions in auto use. In the long run—50 years or so—changes in urban development policies to channel growth into "high accessibility" areas would also be effective by reducing the need to travel. Changes in lifestyle or development of telecommunications as a substitute for travel could also have significant impacts on the auto system, but probably not before **2000.**

Under current policies, congestion—particularly on urban highways and streets—is expected to increase substantially. By 2000, urban drivers will encounter congested conditions 3 times more frequently than today. To avoid this congestion and maintain present levels of service on the Nation's highways through the year 2000 would require construction expenditures more than **60** percent higher than those forecast for the Base Case. Highway maintenance will also continue to be an important concern. The Nation's highways will deteriorate greatly, unless strong Federal initiatives are taken to increase maintenance.

Consideration was given to several measures to improve mobility. Major expansion of public transit assistance could increase transit ridership by as much as 55 percent in urban areas if accompanied by appropriate auto disincentives. Such a program would cost the Federal Government more than **$7.2** billion annually (in 1975 dollars) —about 5 times more than the 1975 expenditures of $1.5 billion. This program would also reduce State and local transit burdens in 2000 from the Base Case projection of $4.9 billion to $1.9 billion per year, close to today's levels.

Transportation system management techniques could be used in the short run to improve traffic flow and provide greater efficiency in the use of transportation facilities.

The utility of paratransit services was also analyzed. It was determined that a special services program funded at $5oO million annually could increase the mobility of the handicapped and elderly by 80 percent. (The young and the poor would benefit most from improvements in conventional transit.) Other forms of paratransit to provide community or general transit service would be beneficial, but extremely expensive under prevailing wage and labor conditions.

Within metropolitan areas, ridesharing has the potential to reduce petroleum consumption, automobile emissions, consumer costs, and traffic congestion. Increased acceptance of this form of transportation depends more on institutional changes than on financial assistance. Ridesharing would gain greater acceptance if accompanied by transportation use controls.

Except for gasoline rationing or allocation, none of the policies examined in this study would affect automobile travel by more than 4

percent. However, drivers and passengers will have to accommodate themselves to certain changes in the comfort and convenience of the automobile. The typical car of the future will be smaller and less powerful. It will carry fewer passengers, but not necessarily with any loss of comfort. Automobiles will have improved safety features but, because of the deterioration in roads and bridges, the ride may be less smooth, and perhaps less safe.

BACKGROUND

One of the goals of society is to enable citizens to take part in activities that improve and maintain their social and economic well-being. Essential to the attainment of this goal is the ability to reach jobs, consumer goods, recreation sites, and other desired activities. To this end, the Federal Government has acted as a major provider and regulator of transportation services. The challenge today is to find new technological and institutional solutions that will improve the individual's ability to reach desired and necessary activities by a mode of transportation that is compatible with other national goals—energy conservation, environmental protection, and public safety.

Mobility can be measured as the number of transportation options available for a trip as well as the cost, comfort, convenience, safety, reliability, and speed of the trip. Mobility can be improved by improving one or more of these seven characteristics of personal tripmaking.

There are two alternatives to improved mobility. The first is to improve accessibility by bringing people and activities into greater proximity. The other is to reduce the need for travel, by promoting substitutes for travel (such as telecommunications) or by fostering changes in attitudes and lifestyles to reduce the desire to travel.

The Federal Government has financed transportation since 1823 and has regulated it since **1887.** Originally these activities were prompted by a national interest in opening up undeveloped parts of the country. Because legal and constitutional limitations prevented the States from undertaking some transportation-related activities, a strong Federal role began to evolve.

The first Federal-aid highway act was passed in 1916. The Federal-Aid Road Act of 1916[1] provided for Federal and State sharing of highway construction costs on a 50/50 basis. Each State was to establish a highway department that would develop management and construction standards acceptable to the Federal Government. This was followed by other highway acts which, in addition to providing more Federal monies, increased Federal involvement.

Other milestones in the history of Federal highway policymaking include:

- 1930's—beginning of Federal aid for local roads,
- 1956—creation of the Highway Trust Fund, financed by taxes collected on petroleum products and tires,
- 1962—comprehensive State planning required as a condition for receipt of highway construction monies from the Federal Government,
- 1973—the Federal-Aid Highway Act of **1973**[2] allowed local jurisdictions to divert Highway Trust Fund monies to mass transit capital expenditures.

Mobility will continue to be an issue of major public importance. For most of this century, mobility has been steadily improving; and the degree of Federal involvement has grown. Substantial redirection of transportation policy may now be necessary to maintain current levels of mobility or to expand mobility further.

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[1] *Federal-Aid Road Act of 1916, Statutes at Large 39, sec. 355 (1916).*

[2] *Federal-Aid Highway Act of 1973 Statutes at Large* 87, sec. 250 (1973], *U. S Code,* Vol. 23, sec. 101 (1973).

PRESENT POLICY AND PROJECTIONS

The future mobility of the population will be strongly influenced by demographic trends and future economic conditions and by Federal transportation policies. Between 1975 and 2000, the population is expected to increase over 20 percent. The urbanization of the population will continue. More persons (particularly women) will be in the labor force, and real incomes will double. Thus, by 2000, it is projected that there will be 36 percent more licensed drivers than in 1975 and 56 percent more cars on the road. The total amount of automobile driving will increase by almost 75 percent to 1.8 trillion vehicle miles annually.

The Base Case assumes that the Federal Government will not build new highways at a pace sufficient to keep up with the growth in personal automobile travel. Although it is assumed that total highway spending by all levels of government will remain the same in constant dollars, the proportion spent on new construction will decline by 2000 to half of what it is now. As a result, travel times will increase, particularly in urban areas where average speeds will be 10 to 15 percent slower and where motorists will encounter congested conditions 3 times as often as today.

Transportation System Management (TSM) techniques can be used to improve the movement of persons and vehicles in urban areas at relatively low cost. Both the Urban Mass Transportation Administration (UMTA) and the Federal Highway Administration (FHWA) are encouraging the use of TSM to avoid costly capital projects such as new expressways and rail rapid transit systems. However, the responsibility for TSM is spread across many programs in the Department of Transportation (DOT), with no central focus. For the Base Case, therefore, TSM is assumed to have limited impacts on mobility.

The highway funding assumptions for the Base Case envisage that more money will be available for maintenance. However, much of it will be absorbed by minor reconstruction and bridge replacement, leaving roadways in appreciably worse condition than today.

Fuel economy mandates will make the typical car of the future smaller and less powerful than the automobiles of the 1960's. However, equipping all cars with passive restraints by 1984 and making them more crashworthy will make occupants less vulnerable to death and serious injury. It is assumed in the Base Case that the level of compliance—or noncompliance—with the 55 mph speed limit will not change significantly and that there will be little change in automobile safety or travel time.

Federal Government support for public transit has been growing in recent years. Financial assistance programs are assumed to continue growing until 1985 and then remain at that level through 2000. Operating deficits, already rising steadily, will grow even faster since the new services provided with this Federal assistance will also require subsidies. By 2000, the State and local transit burden could rise to $4.9 billion annually. Total ridership on conventional transit would increase only modestly (about 15 percent) over this period. Without an increase in the level of support, ridership by the transit dependent would decline slightly on a per capita basis.

As part of the RD&D program of UMTA, four downtown people mover systems are expected to be operating by 1985. Future installations will depend on the success of these demonstrations. Urban rail systems currently under construction will be completed, and several existing systems will be expanded. It is expected that only two or three new rail rapid transit systems will be started; UMTA will probably show a strong preference for light rail. These systems will have important effects on local mobility, but the improvements will be barely perceptible on a national basis. The future for automated guideway technologies is uncertain, but they are expected to have little or no impact on mobility by 2000. It is assumed that fares, which averaged 33 cents per ride in 1975, will fall to 20 cents by 1985 (in 1975 dollars) to encourage ridership. Fares are assumed to remain at that level until 2000. Most of the fare decrease will be in the form of reductions for the elderly and handicapped.

ISSUES AND POLICY ALTERNATIVES

Five mobility issues were identified for the automobile assessment. The first three raise the questions of whether, how, and for whom mobility should be expanded. The latter two, which are examined later in this chapter, consider alternatives to reduce the need or desire for vehicular travel. These mobility issues were used to construct the two alternative policy sets examined later in this chapter.

The Amount and Distribution of Mobility

The three issues pertaining to the amount and distribution of mobility are:

- To what extent and by what means should the Federal Government promote increases in the level of general mobility?
- To what extent should the Federal Government seek to change the distribution of mobility by changing transportation policy to aid the transportation disadvantaged?
- To what extent should the Federal Government discourage automobility as a policy for meeting national goals?

Americans have come to regard mobility as an inalienable right. To assure this right, all levels of government have been involved in sponsoring the auto-highway system. However, this arrangement has created two basic problems that have received increasing recognition in the last decade:

- The automobile is not the ultimate in mobility for large numbers of the population.
- The automobile imposes great costs on society because of its energy consumption, environmental pollution, and safety problems.

Recognition of these shortcomings is causing changes in automobile design and in the way that Government provides transportation services. Projections indicate that the automobile will remain the primary means of personal mobility, but changes need be brought about in the way in which the automobile system operates.

There are several ways to expand personal mobility:

- Enlarge the highway system,
- Expand public transportation and encourage ridership,
- Implement TSM projects,
- Encourage paratransit,
- Aid the transportation disadvantaged,
- Promote advanced transit technologies, and
- Restrict certain types of automobile travel.

Build More Highways

The first alternative, enlarging the highway system, was adopted by the Federal Government in 1916 and is still the most widely supported mobility policy of the Federal Government. Since the first "Road Act" in 1916, the level of service offered by the Nation's highways has constantly increased. Construction of interstate highways, the keystone of the system, has maintained this service up to the present day. Ninety percent of this system is now in place, and the remainder is scheduled for completion by 1990. While it would be possible to expand mobility further by means of new highways, this can be done only at great expense.

Provide More Transit

On the **other** hand, there are a growing number of environmentalists, energy conservationists, city officials, and transportation planners who maintain that the automobile has had too much Federal support. They feel that assistance should now be directed toward public transportation. They argue that mass transit systems are more energy efficient, less polluting, less disruptive to neighborhoods, and are the main source of mobility for the transportation disadvantaged.

Federal assistance to public transportation has grown considerably since the early 1960's. Current aid to mass transit is approaching $3

billion annually.[3] The assistance requested by AMTRAK for FY 1978 was $545 million.[4] Recently, intercity bus operators began lobbying for assistance to stem their deteriorating financial condition and to compensate for the detrimental effects of AMTRAK competition.[5] There are now proposals before Congress to aid rural and small-town public transportation as part of a new combined nonmetropolitan highway and transit program.[6]

Transportation Systems Management

One alternative to expensive new highway projects in urban areas is to improve the management and efficiency of existing transportation systems. This is known as Transportation Systems Management (TSM) and includes such actions as reserved lanes for high-occupancy vehicles, promotion of carpools and vanpools, shared-ride taxis, improved transit service, and automobile disincentives (tolls, parking bans, and parking taxes). (See table 97.)

Recognizing the need for TSM, UMTA and FHWA issued a joint regulation in 1975[7] requiring that TSM be part of the Urban Transportation Planning Process. This regulation labeled TSM as the short-term element of urban area transportation planning. Most TSM actions are designed to produce two principal effects: to improve the flow of vehicles on existing rights-of-way, and to improve the load factors of the vehicles on these rights-of-way.[8] However, many of the technologies listed in table 97, such as congestion pricing and auto-restricted zones, are still foreign to the American city. Further, many of these strategies will work at the expense of some stakeholder groups, even though benefiting others.

Table 97.—Spectrum of TSM Actions

Improved vehicular flow
• Improvements i n signalized intersection
• Freeway ramp metering
. One-way streets
• Removal of on-street parking
• Reversible lanes
• Traffic channelization
. Off-street loading
. Transit stop relocation
Preferential treatment of high-occupancy vehicles
. Freeway bus and carpool lanes and access ramps
Ž Bus and carpool lanes on city streets and urban arterials
. Bus preemption of traffic signals
. Toll policies
Reduced peak-period travel
• Work rescheduling
• Congestion pricing
• Peak-period truck restrictions
Parking management
. Parking regulations
. Park-and-ride facilities
Promotion of nonauto or high-occupancy auto use
• Ridesharing
. Human-powered travel modes
. Auto-restricted zones
Transit and paratransit service improvements
. Transit marketing
• Security measures
• Transit shelters
• Transit terminals
• Transit fare policies and fare Collection techniques
• Extension of transit with paratransit services
• Integration of transportation services
Transit management efficiency measures
. Route evaluation
• Vehicle communication and monitoring techniques
• Maintenance policies
. Evaluation of system performance

SOURCE U S. Department of Transportation, Federal Highway Administration and Urban Mass Transportat ion Adm inistrat Ion, *Transportation System Management State of the Art,* February 1977, p V.

Unlike master planning of land use and long-range transportation planning, TSM has not yet become institutionalized. Although there are a number of funding options for the Federal Government to support TSM, they are scattered over a number of separate categorical grant programs with differing requirements and matching ratios. This situation creates disincentives to an effective local TSM program.[9]

[3] "UMTA Asks Congress for Transit Money, " *Passenger Transport* **36** (Apr. 7, 1978): 1,3.

[4] "'Amtrak Asks for **$56.5** Million More, " *Railway Age 178* (Oct. 10, 1977): 26.

[5] U. S. Congress, House, Committee on Public Works and Transportation, *Highway* Transit Proposals, hearings before the Subcommittee on Surface Transportation, 95th Con,, 2d sess., 1978, sec. 405(a).

'U.S. Congress, Senate, *Highway Improvement Act of 1978,* S. **2440,** 95th Con., 2d sess., 1978, sec. 405(a).

'*Federal Register 40* (Sept. 17, 1975): 42976-42984.

'Most definitions of TSM include paratransit. The benefits of "ridesharing" or "pooling" in improving traffic flow are obvious. The small-bus and special services, while not necessarily having a significant impact on traffic flow, are more closely tailored to very specific markets and operate more effectively than conventional transit.

[9] "UMTA Red Tape Costs Millions, " *Passenger* Transport 36 (Apr. **7, 1978): 1.**

Many actions now labeled as TSM have been instituted in urban areas as part of normal traffic control improvements. In some cases, these TSM actions were adopted as alternatives to larger scale improvements which could not be funded. The joint regulation of TSM projects by UMTA and FHWA has institutionalized this process. As a result, TSM actions must undergo the same regional review and approval process as major long-range, capital-intensive projects. In addition, many TSM actions must also be submitted for DOT review and approval. UMTA is currently attempting to add staff and to decentralize its grant approvals to hasten this process.

While there can be little argument with the inherent virtues of TSM, the projected high growth in urban traffic congestion makes it clear that TSM alone is not the solution. A large capital improvement program is necessary just to maintain current conditions. Additionally, there is a limit to the amount of TSM that can be carried out in a given area without TSM programs themselves becoming capital-intensive.

Paratransit

One concept, often considered a part of TSM, is paratransit, This includes ridesharing and small-bus or special systems. Ridesharing (carpooling, vanpooling, buspooling) generally offers the rider cost-savings, reliability, and freedom from having to drive himself. A recent study of **21** cities revealed that 18 percent of the commuters traveled in carpools, **10** An additional incentive for a vanpool driver is the free use of the van nights and weekends. In some pools, where the institution organizing the pool owns or leases the van, a small mileage charge may be levied. A vanpool driver can sometimes make a small profit if the vehicle is subscribed to capacity.

Carpooling is currently the most popular form of ridesharing, mostly for workers at large installations. Carpools are generally formed by the riders, although there is a growing tendency for employers or communities to help organize carpools. Most vanpools are employer-sponsored, with the employer owning or leasing the vehicles and riders covering the operating expenses.

There are some major impediments to widespread pooling. The first is the loss of convenience. Pool vehicles run on tight schedules, and all riders must conform. There is no "late bus. " Unless priority is given to the pool vehicle, the trip usually takes longer than driving alone. The biggest impediment is in forming pools, For commuting, there must be enough willing people with similar origins, destinations, and work hours for the idea to work. Thus, pools are usually inappropriate for small towns, dispersed small-employment sites, and low-density residential areas.

The greatest potential for pooling would be achieved if a large share of commuters in a particular area or corridor would shift from private autos to higher occupancy vehicles, Congestion, travel times, and requirements for highway capacity would be reduced. Such conversions are unlikely without some strong incentive.

Paratransit most commonly connotes small-bus operations or special services. Even taxis are included in some definitions. In general, paratransit is expected to serve those travel markets (particularly the transportation disadvantaged) not well-served by the private car or conventional bus and rail transit. Also, certain other urban transit markets (i. e., low-density service or feeders and distributors) can be more efficiently served by small vehicles, dial-a-ride, or door-to-door service. However, the productivity and operating costs of these services are inferior to regular bus service, and paratransit often requires heavy subsidies. Many systems have trouble with the labor protection provisions of the Urban Mass Transportation Act that generally require the use of union operators. When a small bus replaces a large one, there is little opportunity for savings since most transit revenues go to pay the operator's wages.

The Transportation Disadvantaged

For physical, social, or economic reasons, certain segments of society lack the degree of mobility enjoyed by the majority of the population. These persons are commonly called the "transportation disadvantaged, " "transit dependent, " or "carless. " They include some of the

[10] U.S. Department of Commerce, Bureau of the Census, *Selected Characteristics of Travel to Work in 21 Metropolitan Areas: 1975* February 1978, p, 1.

elderly, the handicapped, the young, the poor, and the chronically unemployed. There are significant numbers of each. For example, there are some 10 million nonhandicapped elderly. [11] Persons under 17 represent 34 percent of the population. [12] People living below the officially designated poverty level (including some elderly, handicapped, and young) make up over 12 percent of the population. [13] Nationwide, nearly 20 percent of all households do not own a car.

During the past decade, the Federal Government directed special attention to the mobility problems of the handicapped and elderly; and today there are more than **30** Government-sponsored programs for these groups. These programs are of two general types:

1. Specialized transportation services (often paratransit), and
2. Reduced fares and physical improvements to make federally aided mass transit systems easier to use.

For the poor who are neither elderly or handicapped, there have been few programs to improve mobility—unless one includes public subsidies for mass transit systems. A justification often given for such subsidies is that they represent a form of welfare aid to low-income households. But, at best, this aid is indirect and limited to areas where mass transit exists. Large numbers of poor people live in rural or suburban communities, where there usually are no alternatives to the automobile. To overcome these disadvantages, proposals have been advanced to replace or combine mass transit subsidies with direct "user-side" subsidies to members of each disadvantaged group. The subsidies would enable individuals to choose the available transportation system that best fits their needs—automobiles, transit, or taxis.

The most commonly stated rationale for aiding the transportation disadvantaged is that higher mobility will reduce poverty and improve social well-being. However, the validity of this proposition has not been fully tested. The

Photo Credit: Washington Metropolitan Area Transit Authority

prospect for Federal commitment to transportation aid for low-income individuals depends, in part, on whether it can be shown that inadequate transportation—as opposed to low income—restricts shopping, working, recreation, and other activities beyond walking distance.

This issue is complex. It involves not only the disadvantaged, but also transit and taxi operators, vehicle manufacturers, all levels of government, and a variety of regulatory agencies. Progress is being made as more is learned about the problem. Recently implemented regulations require all federally funded systems and improvements to be fully accessible to the elderly and handicapped. This goal should be achieved by the mid-1980's, as new and replacement vehicles are purchased and as older transit stations are modernized. Independent mobility for the young and the poor will depend upon prospects for expansion of public transportation service. While current levels of capital assistance to buy buses and build and modernize rail systems are large and still growing, operating assistance is quickly being swallowed up by rising operating costs. Paratransit, which can be tailored to

[11] *Sydec/FEA*, p. III-42.
[12] Ibid.
[13] U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States: 1976*, p. 415.
[14] Motor Vehicle Manufacturers Association, *Motor Vehicle Facts & Figures '77* (Washington, D.C.: MVMA, 1977), p. 38.

special needs, is less cost-effective. The elderly of tomorrow, many of whom live in the suburbs today, will increasingly create a suburban transit demand as their driving skills wane.

Advanced Transit Technologies

One of the new approaches proposed for meeting urban transportation needs is the use of automated vehicle systems operating on exclusive rights-of-way. New heavy-rail systems such as in Washington, San Francisco, Baltimore, and Atlanta are extremely costly and feasible only in high-density corridors. Buses are limited by other street traffic. Automated Guideway Transit (AGT) systems provide an intermediate alternative. Three classes of AGT systems are summarized in table 98.

The only AGT system currently operating in regular urban transportation service is in Morgantown, W.Va. (although often referred to as a Personal Rapid Transit (PRT) system, this is really an example of Group Rapid transit (GRT)). A similar system, AIRTRANS, operates at the Dallas-Fort Worth Airport. Several other airports (Miami, Seattle, Houston) and some private theme parks also have AGT systems, but with less complex networks. UMTA has committed **$22o** million to assist demonstrations of four Downtown People Movers (DPM), which should be in operation by 1985. Additional installations will depend on the results of these demonstrations.

The mobility benefits of AGT depend on the type of system and the proximity of stations to

Table 98.—Characteristics of Automated Guideway Transit

	Shuttle-loop transit (SLT)	Group rapid transit (GRT)	Personal rapid transit (PRT)
Operations	• Simple, single route. • Switching in a constant manner.	• Complex multiple routes. Prescheduled. • Switching reacts to vehicle identity.	• Very complex multiple routes. • Vehicles actively responsive to demand. • Switching is tailored for each passenger's destination.
Passenger convenience	• Passengers use any vehicle. • Stops at each station. • All passengers on a route travel together.	• Passengers share assigned vehicle. • May bypass some stations. • Passengers travel in groups.	• Passengers are assigned vehicles. • No stops en route. • Passengers travel alone or in small, private groups.
System configuration	• Shuttles and loops. • Online stations. • Switches seldom required.	• Lines branch and merge. • Online and offline stations. • Switches required.	• Coupled guideways. • Off-line stations. • Many switches required.
Areawide formation network	• Many interfacing shuttles or loops.	• Multiple interfacing GRT systems.	• Single integrated PRT systems.

SOURCE: U.S. Congress, Office of Technology Assessment, *Automated Guideway Transit: An Assessment of Personal Rapid Transit and Other New Systems*, OTA-T-8, June 1975.

passenger origins and destinations. An important benefit of AGT is speed of travel, achieved primarily by operating on a private right-of-way. However, separation from other traffic contributes to the high cost of AGT systems. Automation reduces the labor costs to operate AGT systems, but not without increased maintenance expenditures, The energy savings of AGT have not been proven; however, since sources other than petroleum can be used to generate electricity, AGT systems have a distinct advantage over automobiles, buses, and paratransit. A **1975** OTA assessment of AGT suggested that more research was necessary on the economics, acceptability, and technical aspects of AGT operation. [15]

Restricted Automobile Travel

Ever since the private passenger car emerged as a significant mode of travel, mobility and automobility have been synonymous. Any attempt to restrict freedom of automobile use has been regarded as limiting mobility. However, it is now recognized that unrestrained automobility may conflict with other national goals and that reducing automobile travel may be an important means (albeit not the only means) of achieving significant energy, environmental, and safety benefits.

Limiting automobility and increasing overall mobility are not necessarily incompatible goals— not even in the short term. Knowledge of how the automobile best functions in a transportation system is imperfect, and it is not known at what point increased automobile use leads to diminished automobility,

The Department of Transportation has proposed restricting automobility as a means of improving mobility in general. DOT aims to increase the load-carrying efficiency of congested highways through incentives to use carpools or existing transit systems. One such incentive is the creation of special lanes for buses and carpools. Commuters who take advantage of these reserved lanes typically save 15 to **20** minutes per trip. Under favorable conditions, the commuters in single-occupancy vehicles can be little worse off (and possibly better off) than they would be without the lane restrictions, Another strategy, vanpooling, is believed to be one of the most energy-efficient modes of surface transportation. [16]

The issue of limiting automobile use often comes down to a question of the importance the Nation attaches to clean air, safety, and energy conservation compared to automobility. The Federal Government has already adopted at least one policy that favors some other goal over automobility. The Clean Air Act requires reduced emissions from mobile sources, including automobiles .17 Many large cities will not be able to meet the ambient air quality standards by 1982 through stationary and mobile source controls alone. *[8] In such cities, EPA may require the use of "transportation control strategies, " including parking limitations, auto-free zones, and improved transit to attract drivers out of their cars. The Act also provides for withholding Federal highway funds in areas where EPA finds that reasonable progress is not being made toward attainment of the standards. The requirement for the transportation control strategies has resulted in many court cases in the past. However, in general, EPA has retained the authority to require implementation in areas where air quality standards cannot be met by other means.

The controversy over reducing automobility to promote other social goals raises many questions. Can the American public modify its preference for automobility —a preference encouraged by the Government for decades and fostered through billions of industry advertising dollars? Will the intended reductions in automobile usage actually occur and will projected energy, environmental, and safety benefits materialize? Will, for example, parking restrictions for city commuters merely result in more auto trips by family members in the suburbs, using the cars that are left at home? Will a higher gasoline tax or a special tax on heavy,

[15] U.S. Congress, Office of Technology Assessment, *Automated Guideway Transit. An Assessment of* Personal *Rapid Transit and Other New Systems,* OTA-T-8, June 1975.

[16] U.S. Congress, Congressional Budget Office, *Urban Transportation and Energy The Potential Savings of Different* Modes prepared for U.S. Senate, Committee on Environment and Public Works, 95th Con., 1st sess., Committee Print No. 95-8, September 1977.

[17] "Clean *Air Act Amendments of 1977,* Public Law 95-05, 91 Stat, 685, U.S. Code, Vol. *42, sec.* 7401 -7626, (1977).

[18] The Clean Air Act Amendments of 1977 contain special requirements for areas that cannot achieve carbon monoxide and oxidant standards by 1982, These areas must develop plans for achievement of the standards no later than 1987.

Photo Credit: U.S. Department of Transportation

fuel-inefficient, polluting cars discourage their purchase, but actually increase the distances driven per carowner as consumers begin switching to fuel-efficient automobiles?

As technologies for pollution control, alternate energy sources, and automobile safety emerge, these problems could decline in importance. The leadtime for these technologies, however, is as long as 30 years, and significant actions may be necessary in the interim. Base Case projections indicate that insufficient progress on the air pollution question will be made by 2000, when at least 54 Air Quality Control Regions are expected to remain in violation of the oxidant standard and 24 regions will still be in violation of the carbon monoxide standard. Base Case projections through the year 2000 indicate that with the **27.5** mpg standard automobile petroleum consumption could be as much as 10 percent below current levels. The number of crashes, injuries, and fatalities will continue to rise despite some improvements in automobile safety. Thus, it appears that it will be necessary to reexamine the relationship between automobility and other goals of our society.

Reducing the Need and Desire to Travel

A fundamental alternative to improved mobility is offered by policies to reduce the need or desire to travel. Such policies raise two major issues:

- To what extent should the Federal Government promote land use controls as a long-term measure to improve accessibility while reducing the environmental and energy problems of the automobile?
- To what extent should the Federal Government attempt to reduce travel demand by

supporting nontransportation alternatives such as telecommunications, or by encouraging less travel-dependent activities and lifestyles?

The traditional approach to facilitate carrying out the activities of daily life has been to provide more and better transportation. There is an alternative—reducing the distances people must travel or reducing the need for travel.

Federal programs have supported the general trend toward low-density urban development. Federally funded highway construction has increased both the speed of travel and the distances that can be traveled in a given time. Federal mortgage loan programs have enabled families to buy new housing in the suburbs with low downpayments. These Federal programs have been very popular.

Recently, however, concern about neighborhood disruption by highway construction, worsening air quality, and increased dependence on foreign oil have caused some to question the desirability of continued highway building, urban sprawl, and the increasing costs that accompany them. In general, the effects of Federal policies that have led to scattering of development are not offset by strong land use control at any lower level of government. In a few limited instances, States have begun to take action to preserve valuable natural assets, such as the California and Oregon coastal zone and some of the more sensitive farm areas. Current Federal policy pertaining to development and land use planning merely supports analysis of land use impacts and information on certain grant programs. Federal policy provides no real encouragement for improved decisionmaking processes or stronger controls on development.

Changes in land use policies and tax laws could, in principle, counter urban sprawl by encouraging greater proximity between new residences and businesses. With higher densities and mixed land uses, trip lengths would be shorter, transit could become a more attractive alternative, and walking could replace some vehicular travel. The result of such a development policy would be a significant increase in small, self-contained, high-density communities.

There are basic uncertainties about the benefits of such a pattern of development. One uncertainty is whether the costs of providing energy and public services for high-density centers of multistory buildings might not be higher than for medium-density development

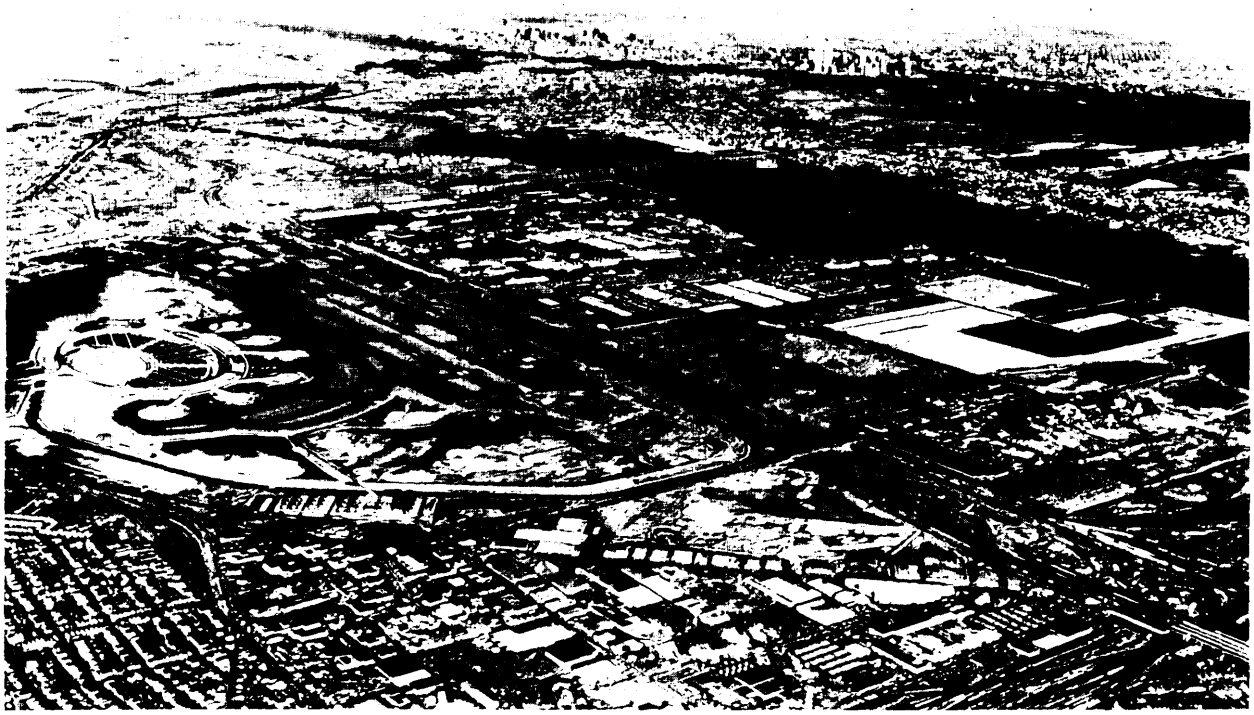

Photo Credit: U.S. Department of Transportation

composed mainly of two- and three-story buildings. The other question is whether the benefits of reduced automobile dependence justify the personal and intangible costs of high-density living. Based on current housing patterns, most Americans prefer low-density living, even with its attendant costs of pollution, energy waste, and neighborhood disruption.

Possible avenues of Federal involvement include:

- Eliminating tax deductions for mortgage interest and property taxes on single family homes,
- Requiring State or local land use controls either by law or as a precondition for Federal transportation aid, and
- Encouraging State land use planning through planning grants.

National interest in land use changes could increase substantially in the next decade as energy and air quality problems intensify. However, most benefits of land use controls would not become manifest for at least **20** or **30** years. Controls would affect only new construction and not existing development. It might take a generation or more for these controls to have an appreciable influence on the pattern of community development.

Telecommunications devices could reduce the need for business or private travel by enabling more people to work at home. However, the effects on travel demand are by no means certain. Increased use of telecommunications could expand the range of distant business opportunities and thereby increase the need to travel to conduct face-to-face business. The use of radio, telephones, and television does not appear to have diminished travel demand in the past.

In many ways, the policies of the Federal Government exert a direct and powerful influence on lifestyles and activities. Highway building, income tax deductions for home mortgage interest, and the welfare system are but three examples. But the inverse is also true. Government policy reflects, however imperfectly, the prevailing values of society. The recent concern for environmental quality is one example of public values influencing Federal programs. Other values may emerge as well—less emphasis on materialism, opposition to unrestricted growth, or even new public attitudes toward travel. Such new attitudes could be the impetus for change in federal policy.

If such fundamental changes in societal values occur, or if there are shifts in the priorities assigned to present values, the consequences for the automobile transportation system could be profound. While it would be speculative to predict the course that changes in attitudes and lifestyles might take, it is clearly important to recognize that the personal transportation system exists solely to serve society's ends. If those ends change, so will the means by which they are served.

ANALYSIS OF INCREASED MOBILITY POLICIES

Historically, Federal Government policy has emphasized increased mobility to open up undeveloped lands, promote westward expansion, assist marketing of agricultural products, and stimulate economic development. The economic prosperity and social structure of the country have been viewed as dependent on widely available, low-cost transportation. The policies studied in the Increased Mobility Case are based on the premise that it is desirable to expand the capacity and efficiency of highway and transit systems in the interest of promoting the continued economic and social well-being of the United States.

The Increased Mobility policies call for increased funding of highway and transit construction programs. The transit programs also emphasize improved services for the transportation disadvantaged. For highways, construction of new roads is supplemented by an extensive and vigorous program of transportation system management. Also included in the Increased Mobility policies are measures to improve vehi-

c!e crashworthiness and to discourage fuel-inefficient automobiles by means of taxation.

Effects

Highways

A major aim of the Increased Mobility policies is to expand the highway system to accommodate the expected growth in VMT and to avoid the congestion and speed reductions that are projected to occur under Base Case conditions. Instead of decreasing annual expenditures for highway construction to $7 billion by 2000, as in the Base Case, they would rise to **$20** billion by 1985 and remain at that level until 2000. (see table 99.) An additional annual outlay of $1.5 billion would be allotted for TSM projects, (ramp metering, lane controls, driver advisories, and safety improvements) benefiting autos, trucks, and buses. Expenditures for maintenance and other highway needs are assumed to be the same as in the Base Case.

Under the Increased Mobility policies, travel speeds in urban areas would be maintained at their 1975 levels, instead of the 12-percent reduction expected in the Base Case. Because of the higher levels of service, urban VMT in **2000** would be approximately 6 percent higher than in the Base Case, as shown in table 100.19 Approximately one-half of the increase in traffic volume and speed is due to the expenditure of funds for TSM improvements. The other half results from capital expenditures for new highways and highway widenings.

The programmed annual expenditure of $1.5 billion for TSM would not be as effective in the early years as it would be after **1985.** Before 1985, it will be difficult to find significant numbers of opportunities where TSM will provide

[9] Details of the assumptions used in these computations are given in *Sydec' EEA,* pp. VI-16 to VI-18. These computations are based on S. Schleifer, S. Zimmerman, and D. Gendell, *The Community* Aggregate *Planning Model* prepared for the 54th Annual Meeting of the Transportation Research Board, 1975; Yacov Zahavi, *Travel Time Budgets in Urban* Areas, prepared tor U.S. Department of Transportation, Federal Highway Administration, May ***1974;*** and Jack Faucett Associates, System Design Concepts, Inc., Methodology *for Estimating the Impacts of Changes in Highway Performance,* prepared for U.S. Department of Transportation, Federal Highway Administration.

Table 99.—Assumed Highway Expenditures, Increased Mobility Case (billions, 1975 dollars)

	Actual	Base Case		Increased Mobility	
	1975	1985	2000	1985	2000
Capital	14.3	11.2	7.0	20.0	20.0
TSM	0	0	0	1.5	**1.5**
Maintenance	7.1	8.7	10.8	8.7	10.8
Other (administration, police, debt, etc.)	6.8	8.3	10.4	8.3	10.4
Total	28.2	28.2	28.2	38.5	42.7

SOURCE *Sydec/EEA,* p VI.15

Table 100.—Vehicle Miles of Travel and Speeds, Increased Mobility Case

	Actual	Base Case		Increased Mobility	
	1975	1985	2000	1985	2000
Rural highways					
Daily VMT (millions)	1,180	1,510	1,890	1,510	1,900
Average speed (mph)	48	48	48	48	48
Urban highways[a]					
Daily VMT (millions)	1,630	2,410	3,000	2,460	3,190
Average speed (mph)	33	33	30	34	33
All highways					
Daily VMT (millions)	2,810	3,920	4,890	3,970	5,090
Average speed (mph)	38	38	35	39	38

[a]The distribution of speeds by type of road for the Increased Mobility Case is the same as for the Base Case in 1975
SOURCE: *Sydec/EEA,* p. VI-18.

large transportation improvements per dollar. However, by 2000, the growth in urban highway travel will provide more opportunities to employ this strategy.

It is expected that the condition of highways in the Increased Mobility Case will be as good or better than in the Base Case. Although the same amount of maintenance funds will have to be spread over more lane-miles, the construction program would allow the replacement of many badly deteriorated roads, which have high maintenance costs per mile.

The revenue sources for highway funding have not been estimated for the Increased Mobility Case as they were for the Base Case. However, the assumption has been made that the fleet fuel cost per vehicle-mile would be held constant .[20]

[20]The fuel economy standard is expected to remain at 27.5 mpg between 1985 and 2000 as in the Base Case. Diesel penetration of the new car market is expected to be 10 percent by 1985 and 25 percent by 2000.

Transit

To assure balanced improvements in mobility for all segments of the population, this set of policies provides increased funding for rail and bus transit systems above Base Case levels. An important feature is a major increase in the level of Federal operating assistance for transit systems to lower what would otherwise be a heavy burden on State and local governments. A portion of this subsidy would be used for special services for the handicapped and elderly.

The funds made available to transit under this financial assistance program are shown in table 101. The Federal capital funds to provide increased rail and bus service would almost double between 1975 and 1985 and then remain at the 1985 level until 2000. This constitutes more than twice the increase assumed for the Base Case.

The biggest change, however, is in operating assistance. With Federal operating funds in **2000**

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being 5 times greater than in the Base Case, the State and local operating subsidy would be cut from $4.47 billion to $2.12 billion. The amount of transit service provided by these funds would be 15 to 20 percent higher than the Base Case in **2000,** and 65 to 80 percent higher than in 1975.[21] (See table 102.)

Despite the new transit service which would be provided and the TSM improvements which would improve bus speeds and reliability, overall transit ridership would increase only slightly above Base Case levels. (See table **103.)** This is because TSM improvements will also benefit auto travel. The added and improved highway capacity will enable the auto to remain relatively more attractive than transit for many travelers. In the Improved Environment Case, a similar program for conventional transit is provialed, but with auto disincentives. The result is **8.7** billion riders in **2000** compared to **6.8** in the Increased Mobility Case.

The $500-million special services program would be effective in improving the mobility of the handicapped and elderly. It would serve a projected 333 million riders per year by 1985, in addition to the **530** million rides by the handicapped and elderly on conventional services. [22] The poor, the young, and other nondrivers would benefit more from the expansion of conventional services. Although the number of poor in the population would be decreasing, their ridership would increase somewhat. Ridership by those under 18 would increase from the 1970 level at about the same rate as their growth in the total population. These estimates are summarized in table **103.**

[21] *Sydec/EEA*, pp. III-36 to III-39, III-81, and VI-10 and VI-11.

[22] Ibid., pp. VI-35 to VI-37.

Table 101 .—Transit Financing Assumptions, Increased Mobility Case (millions, 1975 dollars)

	Actual	Base Case		Increased Mobility	
	1975	1985	2000	1985	2000
Federal assistance					
Capital [a]	$1,210	$1,710	$1,710	$2,360	$2,360
Operating —convention al service	300	930	930	1,610	4,420
Operating —special service	70	70	70	400	400
Total	$1,580	$2,710	$2,710	$4,370	$7,180
State/local share					
Capital [b]	$ 300	$ 430	$ 430	$ 590	$ 590
Operating— conventional service	1,410	2,270	4,470	1,780	2,120
Operating—special service	—	—	—	100	100
Total [c]	$1,710	$2,700	$4,900	$2,470	$2,810

[a] Includes Federal aid for transit projects built in lieu of interstate highways
[b] Assumed at 20 percent of project cost
[c] Excludes some small transit operations

Table 102.—Transit Service Levels, Increased Mobility Case

	Actual	Base Case		Increased Mobility	
	1975	1985	2000	1985	2000
Fixed guideway miles.:	560	650	860	680	990
Rail cars	10,800	11,700	15,700	12,200	18,200
Buses	51,500	60,200	75,400	63,100	89,300
Transit vehicle-miles (millions)	1,990	2,320	2,950	2,430	3,480

Table 103.—Projected Annual Transit Ridership, Increased Mobility Case (millions)

	Actual	Base Case		Increased Mobility	
	1975	1985	2000	1985	2000
Conventional transit					
Elderly and handicapped (not poor)	440	520	560	530	580
Poor (over 17, not elderly, not handicapped)	820	1,040	1,170	1,040	1,170
Total young[a]	1,390	1,360	1,520	1,390	1,570
All transit dependent	2,650	2,920	3,250	2,960	3,320
Other riders	3,280	3,560	3,230	3,610	3,480
Total conventional ridership	5,930[b]	6,480	6,480	6,570	6,800
Services *for elderly and* **handicapped**					
Conventional transit	440	520	560	530	580
Special services	40	40	40	330	330
Total service	480	560	600	860	910

aExcludes school bus riders.
bRIdershlp In 1975 was 56 billion
SOURCE Adapted from *Sydec/EEA,* pp S-54, S.55, and VI-35 to VI-38

Other Mobility Effects

The improvements in the quality of the highway system in the Increased Mobility Case are expected to cause auto VMT to rise by about 4 percent over the Base Case level in **2000.** A detailed analysis was not carried out on auto ownership and new car sales, but it is assumed that Base Case trends would be followed. The excise tax on fuel-inefficient automobiles would tend to deter sales of large cars and to exert such a strong influence on size class shares that, by 1985, 90 percent of new car sales would be small cars. Standard-size cars would all but disappear. These projections are summarized in table 104.

Table 104.—Auto Ownership and Other Impacts of Increased Mobility Policies

	Actual	Base Case[a]		Increased Mobility	
	1975	1985	2000	1985	2000
Annual new car sales (millions)	8.6[b]	13.1	16.4	13.1	16.4
Percent of small cars[c]	46	69	69	90	90
Percent of diesels	(d)	10	25	10	25
Total auto registrations (millions)	107	131	164	131	164
Total autos in operation (millions)	95	118	148	118	148
Autos per licensed driver	.73	.78	.84	.78	.84
VMT (trillion)	1.03	1.43	1.80	1.45	1.87
Average travel speed (mph)					
All highways	38	38	35	39	38
Urban areas	33	33	30	34	33

[a]Base Case A as defined in chapter 3.
[b]1977 new car sales totaled 11.2 million.
[c]Includes subcompact, compact, and small luxury cars
[d]Insignificant.
SOURCE: Adapted from *Sydec/EEA.*

As part of the program of improving mobility, a safety policy of increased vehicle crashworthiness was included to lower auto-occupant fatalities and injuries. It is estimated that the effect of this policy would be 6,000 fewer auto-occupant fatal i ties by 2000. [23]

Impacts

The policy of expanding and improving the Nation's highway system inhibits achievement of energy and environmental benefits. Assuming the same fuel economy and emission standards and diesel penetration rates as in the Base Case, Increased Mobility policies lead to 4 percent more petroleum usage by automobiles and 4 percent more emissions of CO, HC, and NO_x in 2000—both increases being directly proportional to the rise in auto VMT. (See tables **105** and **106.)**

[23]Ibid., pp. IV-76 and VI-28

Noise and water quality impacts are expected to be similar to those in the Base Case. However, the smaller automobiles in this case would reduce solid waste and recycling requirements somewhat, beginning in the **1990's.** Highway-related displacements in **2000** are expected to be more than double those of the Base Case due to increased highway construction. (See table **107.)**

The growth in highway construction would have an impact on employment. The Increased Mobility policies are estimated to yield 50 percent more construction jobs than in the Base Case. The net increase in construction employment in 1985 over 1975 levels would be 17 percent, as annual spending (in 1975 dollars) rises from $13.2 billion to $18.4 billion. " Employment impacts in the year **2000** were not computed.

Employment in the auto manufacturing industry is expected to sta, close to the levels pro-

"Ibid., p. }'1-31 and ***['1-32.***

Table 105.—Automobile Energy Demand, Increased Mobility Case

	Actual	Base Case[a]		Increased Mobility	
	1975	1985	2000	1985	2000
Automobile VMT (trillions)	1.03	1.43	1.80	1.45	**1.87**
Diesel penetration (percent of new car sales)	(b)	10	25	10	**25**
New car fuel economy (mpg)					
Regulation—EPA certification value	none	27.5	27.5	27.5	**27.5**
Attained—EPA certification value	15.6	28.5	29.4	28.5	**29.4**
Attained—actual driving	14.0	23.2	25.0	23.2	**25.0**
Fleet fuel economy (mpg)					
Attained—EPA certification value	15.1	24.0	28.5	23.9	28.5
Attained—actual driving	13.6	19.4	24.6	19.4	24.6
Annual auto fuel consumption					
Billions of gallons	76.0	73.9	73.3	74.9	76.2
MMBD equivalent	5.0	4.8	4.8	4.9	5.0
Percent of domestic consumption	30.6	23.9	21.4	24.3	22.1

[a]Base Case A as defined in chapter 3.
[b]Insignificant.
SOURCE: Adapted from *Sydec/EEA*

Table 106.—Air Quality Impacts of Increased Mobility Policies[a] (million tons per year)

	Base Case		Increased Mobility	
	1985	2000	1985	2000
Carbon monoxide	32.6	27.3	33.9	28.3
Hydrocarbons	3.5	2.9	3.6	3.1
Nitrogen oxides	2.7	2.9	2.8	3.0

[a]All differences between the Base Case and the Increased Mobility Case are due to the 3.9-percent increase in automobile VMT.
SOURCE: *Sydec/EEA*, pp. VI-23 to VI-26 and supplementary report.

Table 107.—Average Annual Displacements Due to Highway Construction, Increased Mobility Case

	Actual	Base Case		Increased Mobility	
	1971-75	1985	2000	1985	2000
Residential units	10,800	5,500	4,300	7,700	9,700
Businesses	2,500	1,800	1,600	2,400	3,700
Farms	200	200	160	220	370
Nonprofit organizations	100	80	70	100	170

SOURCE Sydec *EEA* p VI 34

jected for the Base Case. Although the same number of cars would be sold, the mix would change to an even higher proportion of small cars. This would affect auto suppliers (e. g., steel manufacturers) more than the auto industry itself. Service stations and the repair and maintenance industry would benefit from the increasing VMT between now and 2000.

The impact of vehicle crashworthiness standards on automobile prices has not been estimated. However, it is anticipated that one result of improved automobile safety would be to lower insurance costs in **2000** by about 10 percent compared to the Base Case projections. [25]

ANALYSIS OF IMPROVED ACCESSIBILITY POLICIES

Increased interaction among the members of society does not necessarily mean expanding the personal transportation system. The Improved Accessibility Case was constructed to test the hypothesis that economic, social, and cultural activities can be carried out satisfactorily without relying as heavily on the movement of people by private automobile and public transit.

The critical assumption is that the Federal Government would be able to influence land use planning at the local level and thereby promote a long-term change from low-density, scattered development patterns to more concentrated and self-sufficient "high accessibility" dwelling and business complexes. This would require a basic change in the Federal policy on urban development. Eligibility for Federal assistance in land development would be determined by criteria such as reduced energy consumption, conservation of natural resources, and lower travel time or costs. [26]

The role of the Federal Government would be to ensure that appropriate goals are set and to focus on criteria for measuring attainment of these goals, The Federal Government would not make local land use and transportation decisions. Instead, it would evaluate the performance of local agencies in reaching the objectives they set for themselves. Although it appears that such a program would not require any new powers at the Federal level, it is assumed that if such powers were required, they would be sought and obtained.

Many existing Federal programs have an influence on urban development patterns: housing, highways, mass transportation, schools, water supply, waste treatment, and economic development, to name a few, It is assumed that there would be closer coordination of these programs and that all programs would be made consistent with a common set of Federal policy goals.

The intent of this policy is to coordinate community development programs as a way of channeling metropolitan growth into areas most suited for development. This redirection of new development could begin on a modest scale within the next 10 years, and by 1990 half of all new development could be shaped into high-accessibility areas with the following characteristics:

- Land development would be completely contiguous, as contrasted with current suburban and exurban patterns where leapfrog

[25] Ibid., p. VI-31.
[26] Ibid., pp. VII-7 and VII-15.

development typically results in **40** to **80** percent of the land being left undeveloped.

- Balanced communities would be created with well-defined multipurpose centers at their cores.
- Housing would be closely integrated with the multipurpose centers to facilitate walking from residences to most activities.
- Transit service would link the parts of the high-accessibility community to the multipurpose center.
- High-accessibility communities would be directly linked by high-speed bus or rail transit to the metropolitan central business district (CBD) and to other nearby centers.
- Jobs and the resident labor force within each high-accessibility community would be in approximate balance. This would minimize the need for long distance commuting except for work trips to the CBD, which would be made largely by transit.
- Each high-accessibility community would provide a variety of dwelling units to serve the housing market. Incentives in the form of amenities to achieve clustering, open space, and somewhat higher densities would be included.
- Pedestrian and bicycle facilities would link neighborhoods with convenience centers, schools, and community facilities. This would maximize both the mobility of nondrivers and the opportunity for nonvehicular travel for trips within the community.
- Population density would average about 10,000 persons per square mile, roughly the present density of central cities such as Washington,D.C.

Effects

The effects of these policies would not emerge fully until well into the next century. By 2000, most of today's infrastructure would still be in place, but pockets of high-accessibility communities would have begun to appear—either as new developments or evolutionary replacements of present communities.

It might take 10 years or more to inaugurate such a program. It is anticipated that local opposition (and possibly court tests) would persist for some time, particularly in areas where State and local statutes conflict with Federal policy. Because no specific time frame for these factors can be foreseen, the 1985 and **2000** time points are only rough indicators of the pace of change envisioned.

Highways

The highway program in this set of policies is designed to concentrate on maintenance needs and to provide some support for new construction, mostly within the new high-accessibility areas. Typical facilities would include local and collector streets as well as arterial connections to regional freeways. Pedestrian and bicycle grade-crossings would be largely eliminated. Capital and maintenance funding for highways would be equivalent to Base Case levels, but with the addition of **$200** million per year for TSM projects. These would include ramp metering, traffic surveillance systems, bus and carpool lanes, auto-free zones, transit malls, and traffic relief in neighborhood and community activity centers.

Vehicle miles of auto travel would grow to 1.76 trillion in this case, slightly less than the 1.80 trillion forecast for the Base Case. (For comparison, VMT in 1975 was 1.03 trillion.) This lower level of VMT would occur because VMT per capita in high-accessibility areas would be approximately two-thirds that of typical suburban areas today.[27] This effect would become more pronounced nationally 1ater in the 21st century. Although the average auto trip length would continue to grow-10.1 miles in **2000** compared to **8.9** miles in 1975—it would still be somewhat less than the Base Case value of **10.3 .**[28] Most of this difference would be due to reduction or elimination of short auto trips within communities. Urban travel speeds would decline in this case, but not as much as in the Base Case.

[27] Ibid., p. VII-28.

[28] U.S. Department of Transportation, Federal Highway Administration, *National Personal Transportation Study*. Report No. 7, 1972, p. 4; *Sydec EEA*, p. VII-28.

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Transit

The transit program in the Improved Accessibility Case emphasizes expanded service, particularly community-oriented transit and use of small buses. As shown in tables **108** and **109,** expenditure for capital improvements would be the same as in the Base Case. However, slightly reduced emphasis on rail systems would lead to a bus fleet 43 percent larger than in the Base Case by 2000. Transit VMT would be 10 percent higher than in the Base Case. Small buses would make up approximately 5 percent of the fleet in **1985** and *10* percent in **2000.** The community-oriented, small-bus services would differ somewhat from the "special services" described in the Increased Mobility Case since they would be part of regular transit operations serving all types of riders.

State and local support for transit would be greater than in 1975, but considerably below the Base Case levels. Compared to the Increased Mobility Case, total State and local contributions under Improved Accessibility policies would be **20** percent lower in **1985** and about equal in **2000.** After 2000, higher operating subsidies would probably be required to offset deficits for extensive bus service,

Under Improved Accessibility policies, transit ridership would be strongly encouraged, and new highway capacity would not be provided for automobiles as in the Increased Mobility

Table 108.—Transit Financing Assumptions, Improved Accessibility Case (millions, 1975 dollars)

	Actual	Base Case		Improved Accessibility	
	1975	1985	2000	1985	2000
Federal assistance					
Capital [a]	$1,210	$1,710	$1,710	$1,710	$1,710
Operating —conventional service	300	930	930	2,010	4,820
Operating—special service	70	70	70	70	70
Total	$1,580	$2,710	$2,710	$3,790	$6,600
State/local/share					
Capital [b]	$ 300	$ 430	$ 430	$ 430	$ 430
Operating —conventional service	1,410	2,270	4,470	1,550	2,440
Operating—special service	—	—	—		—
Total [c]	$1,710	$2,700	$4,900	$1,980	$2,870

[a]Includes Federal aid for transit projects built in lieu of interstate highways
[b]Assumed at 20 percent of project cost
[c]Excludes some small transit operations.
SOURCE: *Sydec/EEA*, p. VII-33.

Table 109.—Transit Service Levels, Improved Accessibility Case

	Actual	Base Case		Improved Accessibility	
	1975	1985	2000	1985	2000
Fixed guideway miles	560	650	860	640	790
Rail cars	10,800	11,700	15,700	11,500	14,400
Buses	51,500	60,200	75,400	68,000	108,000
Small buses	—	—	—	3,500	10,700
Transit vehicle-miles (millions)	1,990	2,320	2,950	2,040	3,240

SOURCE *Sydec, EEA,* p VII 32

Case. Between 1975 and 2000, transit ridership would rise 35 percent, higher than in either the Base Case or the Increased Mobility Case. (See table 110.) The handicapped and elderly, who would be able to reach many destinations on foot within high-accessibility areas, would use transit only slightly more than in the Base Case.

Other Mobility Effects

Close to 10 percent of the population could live in high-accessibility areas by **2000.** It is estimated that almost half of the nonwork trips in such areas might be made by walking or transit.[29] In the 1970 Census, it was determined that 7.4 percent of all work trips were by walking.[30] In balanced communities, this percentage would reach as high as 15 percent. [31]

By **2000,** total automobile VMT would be 2 percent lower than in the Base Case. In urban areas, VMT would be **4** percent lower. New car sales and total auto registrations would also be lower. Because of the "gas guzzler" tax assumed for this case, automobiles would be smaller and more fuel-efficient. The general effects of Improved Accessibility policies on automobile travel are summarized in table 111.

Greater crashworthiness for automobiles is assumed, with improved front-end design to reduce pedestrian and cyclist injury. Safety would also be enhanced by the pedestrian and bicycle facilities built in high-accessibility areas. Quantitative estimates of the combined effect of these safety features have not been made. In general, however, reductions in fatalities and injuries can be expected by 1985. More significant reductions should occur by *2000* when the entire auto fleet would be equipped with improved safety features, and when auto-free zones and pedestrian facilities have become more prevalent,

Impacts

The Improved Mobility Case yields greater energy and environmental benefits than the Base Case. The factors leading to these improvements are stricter fuel economy and emis-

[29] *Sydec/EEA*, p. VII-10.

[30] U.S. Department of Commerce, Bureau Of the census, *Journey to Work 1970 Census of Population*, PC(2)-6D, January 1974.

[31] *Sydec/EEA*, pp. VII-34 and VII-35.

Table 110.— Projected Annual Transit Ridership, Improved Accessibility Case (millions)

	Actual	Base Case		Improved Accessibility	
	1970	1985	2000	1985	2000
Conventional transit					
Elderly and handicapped (not poor)	440	520	560	540	600
Poor (over 17, not elderly, not handicapped)	820	1,040	1,170	1,090	1,280
Total young[a]	1,390	1,360	1,520	1,490	1,860
All transit dependent	2,650	2,920	3,250	3,120	3,740
Other riders	3,280	3,560	3,230	3,740	3,860
Total conventional ridership	5,930[b]	6,480	6,480	6,860	7,600
Services for elderly and handicapped					
Conventional transit	440	520	560	540	600
Special services	40	40	40	50	50
Total service	480	560	600	590	650

[a] Excludes school bus riders

[b] Ridership in 1975 was 6 billion

SOURCE Adapted from *Sydec/EEA*, pp S-54, S-55, VII.31, and VII.50

sion standards and the relatively greater emphasis on public transit as opposed to highways, As shown in table 112, fleet fuel economy is expected to rise to **28.4** mpg by **2000,** compared to **24.6** mpg in the Base Case. Greater fuel economy, combined with a 3-percent decrease in VMT, is expected to reduce automobile petroleum consumption in **2000** by **20** percent, compared to the Base Case. [j] (See table 112.) The *58.7* billion gallons of gasoline used annually by automobiles would be *23* percent less than the *76.0* billion gallons consumed in *1975,* It is also significant that petroleum consumption by automobiles would then account for only 18 percent of domestic consumption, down from 31 percent in **1975.** As this would be a contribution to petroleum conservation, the question could then arise whether an acceleration of the trend toward high-accessibility communities might not be in the national interest as a means to reduce further our dependence on foreign oil.

The decreased automobile VMT under Improved Accessibility policies, combined with the stricter NO_x standard of 0.4 gram per mile that has been assumed for this case, is expected to yield further improvements in air quality over the Base Case in 1985 and 2000. (See table 113.) Projections beyond 2000 have not been made, but it is expected that the environmental benefits of high-accessibility communities would mount steadily as this pattern of land use becomes more prevalent.

Noise and water quality impacts would be similar to the Base Case. Because the assumed level of highway construction is also the same as for the Base Case, Improved Accessibility policies are expected to have little, if any, impact on average annual highway-related displacements of homes and businesses. For the same reason, employment in highway construction will be about the same. Due to reduced new car sales, employment in auto manufacturing, which was projected to fall slightly in the period 1975-85 in the Base Case, would fall slightly more as a result of Improved Accessibility policies. However, the magnitude of this potential decrease is within the error of the estimating process.

[j] Electric vehicles would account for about 5 percent of auto VMT by 2000 in this case. Their energy requirements are not included

Table 111.—Auto Ownership and Other Impacts of Improved Accessibility Policies

	Actual	Base Case[a]		Improved Accessibility	
	1975	1985	2000	1985	2000
Annual new car sales (millions)	8.6[b]	13.1	16.4	12.9	15-16
Percent of small cars[c]	46	69	69	90	90
Percent of diesels	([d])	10	25	10	([d])
Total autos in operation (millions)	95	118	148	117	141
Autos per licensed driver	0.73	0.78	0.84	0.77	0.80
VMT (trillions)	1.03	1.43	1.80	1.39	1.76
VMT per licensed driver	7,900	9,500	10,200	9,200	9,900
Average highway travel speeds (mph)	38	38	35	([e])	([e])
Urban areas	33	33	30	([e])	31

[a] Base Case A as defined in chapter 3
[b] 1977 new car sales totaled 11.2 million
[c] Includes subcompact, compact and small luxury cars
[d] Insignificant
[e] Not estimated
SOURCE Sydec/EEA, pp VII 18 and VII 26

Table 112.—Automobile Energy Demand, Improved Accessibility Case

	Actual	Base Case[a]		Improved Accessibility	
	1975	1985	2000	1985	2000
Automobile VMT (trillions)	1.03	1.43	1.80	1.39	1.75[b]
Diesel penetration (percent of new car sales)	(c)	10	25	10	(c)
New car fuel economy (mpg)					
Regulation— EPA certification value	none	27.5	27.5	27.5	**40.0**
Attained—EPA certification value	15.6	28.5	29.4	30.4	**40.0**
Attained—actual driving	14.0	23.2	25.0	24.6	**34.0**
Fleet fuel economy (mpg)					
Attained—EPA certification value	15.1	24.0	28.5	24.3	33.4
Attained—actual driving	13.6	19.4	24.6	19.7	28.4
Annual fleet fuel consumption					
Billions of gallons	76.0	73.9	73.3	70.6	58.7
MMBD	5.0	4.8	4.8	4.6	3.8
Percent of domestic consumption	30.6	23.9	21.4	23.1	17.8

[a]Base Case A as defined in chapter 3
[b]Includes 85 billion electric vehicle VMT
[c]Insignificant
SOURCE Adapted from *Sydec/EEA*

Table 11 3.—Air Quality Impacts of Improved Accessibility Policies (millions tons per year)

	Base Case		Increased Mobility	
	1985	2000	1985	2000
Carbon monoxide	32.6	27.3	31.6	25.4
Hydrocarbons	3.5	2.9	3.4	2.8
Nitrogen oxides	2.7	2.9	2.6	2.1

Factors influencing change in 2000

	CO	HC	NO.
Base Case projection	27.30	2.94	2.94
Decreased VMT	– 1 .91'	– 0.20	– 0.21
Stricter Nonstandard	—	+ 0.09	– 0.65
Improved Accessibility Case	25.39	2.83	2.08

SOURCE *Sydec/EEA*, pp VII.40 to VII.42 and supplementary report.

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