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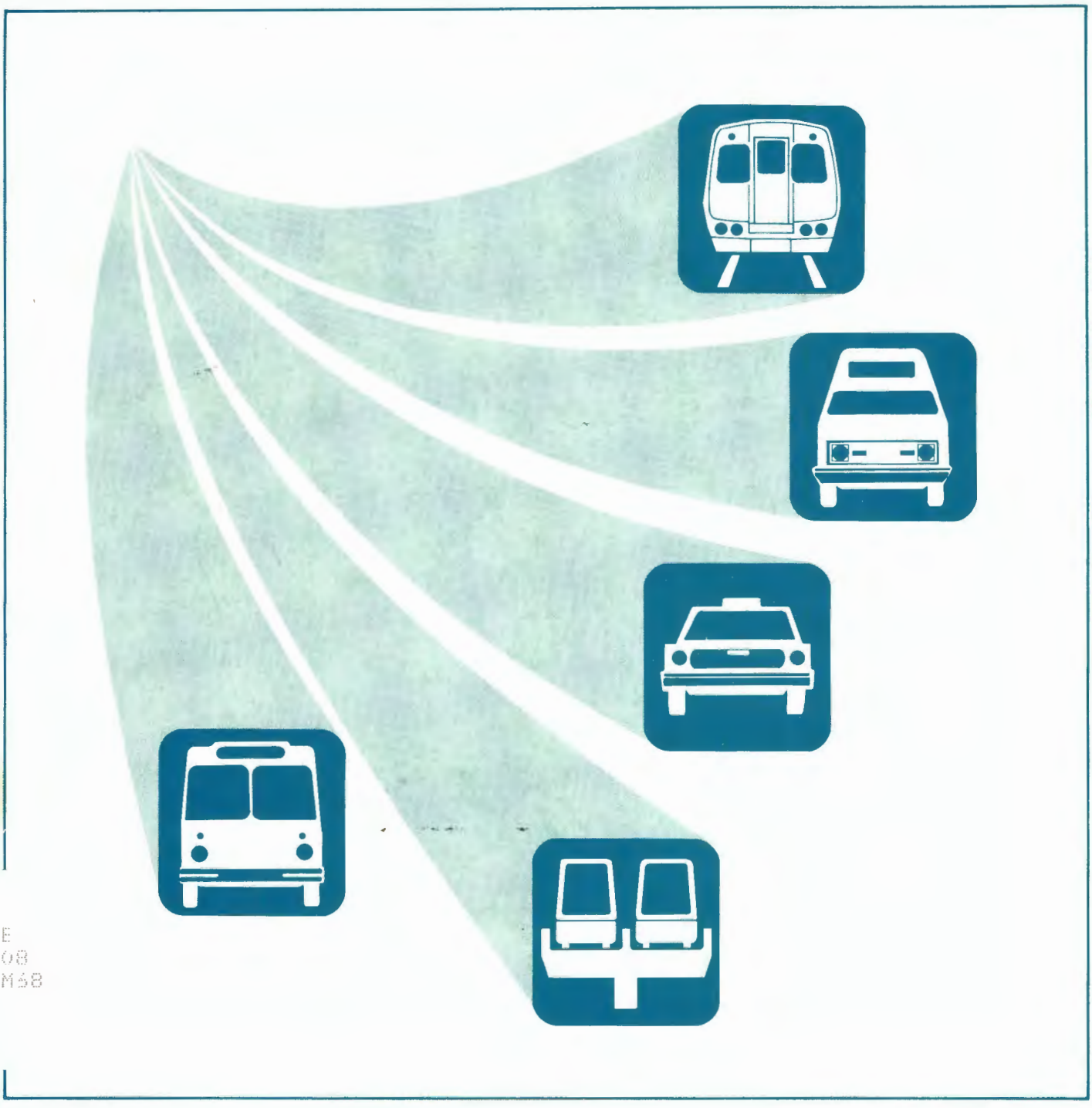
U.S. Department of Transportation
Urban Mass Transportation Administration
Office of the Secretary of Transportation

Moving People

An Introduction to Public Transportation



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Moving People

An Introduction to Public Transportation

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JANUARY 1981
FINAL REPORT

Prepared for
U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION
University Research and Training Program
Washington, D.C. 20590

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Preface

Cities in the United States are showing a renewed interest in public transportation. In 1964, Congress passed the Urban Mass Transportation Act, which sets out national public transportation policy and provides a means for the federal government to assist local communities in planning and financing public transportation. While support for public transportation is growing, many people question the large subsidies from federal and local taxes that have been necessary to maintain and expand transportation systems.

The purpose of this handbook is to explain how public transportation is planned, how the individual citizen can make his views heard, why subsidies are necessary, how much value the public gets for its transportation tax dollars, and finally, what is being done to improve public transportation. These issues are explored in a question and answer format. Several case studies are included to illustrate complex issues and explore topics in greater detail.

The original version of this handbook was prepared by the School of Urban Sciences at the University of Illinois at Chicago Circle under a grant from the Urban Mass Transportation Administration. It is available from the National Technical Information Service in Springfield, Virginia at cost as PB 80-182686. This version of the report has been augmented with additional visuals and reference material, and has been minimally revised in some sections.

What is Public Transportation?

When people think of public transportation, typically they think of buses or subways. But these are only two of a family of transportation services that fall under the heading of "public transportation." Included in this family are airplanes, oceanliners, intercity passenger trains, taxis and chartered buses. Each offers transportation to the public in return for payment. Some are privately operated for a profit; others are supported by tax dollars as a public service. Some are multimillion dollar operations, and others involve only one vehicle operated out of the family garage.

This handbook focuses on those transportation services which provide mass public transportation within urban areas. This includes a very diverse set of conveyances.

Bus. The most common form of urban public transportation is the bus. According to the American Public Transit Association, in 1978, more than 1,000 bus systems were operating in the United States, comprising 95% of all public transit systems and accounting for 68% of all trips taken on urban pubic mass transportation. Typically, a bus system operates over an established route, with stops at scheduled points.

Commuter rail. Commuter rail provides service between a city and surrounding suburbs or cities, frequently using the same track and equipment as intercity passenger and freight trains. A total of 15 commuter rail lines serve New York, Chicago, Philadelphia, Boston and San Francisco.

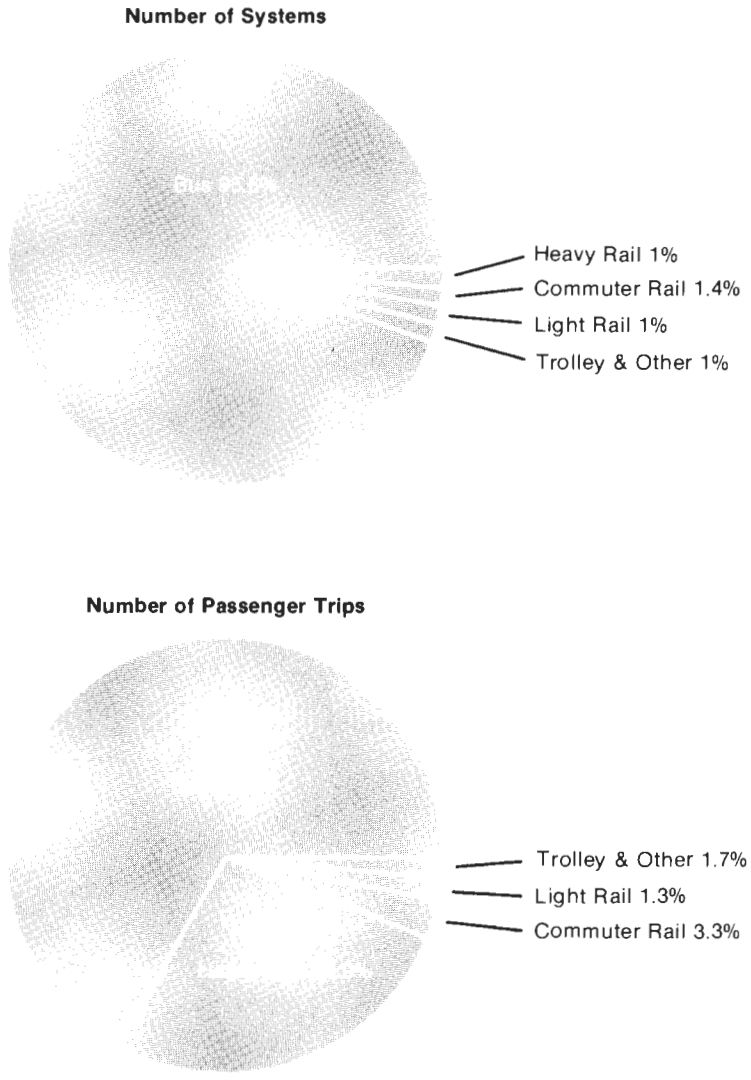
Rapid rail. These are the subways and elevated railways that form the backbone of the public transportation system in such large U.S. cities as Chicago and New York. They are also called "heavy rail" or "rapid transit."

Light rail. Light rail vehicles, such as the streetcar, run on rails laid in the street or in a reserved (exclusive) right-of-way or tunnel, and are powered by electricity. They are called light rail because they use a lighter rail than subways. Many cities eliminated their streetcars because the rails were a nuisance to automobiles and buses were considered to be more flexible. However, as concern over pollution and energy shortages grows, there is a resurgence of interest in light rail.

Trackless trolleys. Trackless trolleys, or electric buses, are similar to light rail vehicles, but trolleys have rubber tires and do not need rails. Trolleys have suffered a decline similar to that of light rail.

Other transit. There are also 14 ferries, two inclined planes (a vehicle propelled up and down a hill by a cable attached to a stationary motor—similar to a ski lift), one cable car system, and one automated guideway system (vehicles which run on a fixed guideway and operate without drivers or other crewpersons on board) in the United States.

EX. 1—Transit System by Vehicle Type and Ridership



Source: Transit Fact Book, American Public Transit Association, 1978

Paratransit

In recent years, several new forms of public transportation have emerged which are called by the general name "paratransit." Paratransit services generally use smaller vehicles and flexible routes, and frequently offer door-to-door service.

Paratransit services can operate economically in more sparsely settled areas than conventional transit. As a result, they have become a means to extend transit coverage to the suburbs, small towns, and rural areas.

Demand responsive paratransit includes dial-a-bus and shared ride taxis. The user calls for service, much like calling for a regular taxi, but the vehicle picks up several passengers on one trip.

Pooling types of paratransit include car pools, van pools, and bus pools. Pooling is used most often for the work trip. Passengers are picked up on a prearranged route and pay a fare which covers the cost of operation. The vehicle may be owned by the employee who drives it or it may be provided by the company.

Another form of paratransit, subscription bus service, is similar to pooling, but full-size buses are generally used and the driver is not a fellow commuter.

New Technology

New systems based on advanced technology such as monorails, pneumatic tubes, automated guideway systems, and moving sidewalks are being studied now at test sites in the United States and around the world. Although these systems may someday form part of our urban transportation systems, they are not in widespread use and cannot yet replace conventional transit in moving large numbers of people quickly.

Each of these types of public transportation has its unique niche in the urban mass transportation system. While various members of this family of services will be referred to, the primary focus in this handbook will be on bus and rail systems, which account for the majority of the trips made by public transportation today.

What is the Role of Public Transportation?

Public transportation may appear to be a very small part of a total transportation network that includes thousands of miles of expressways and millions of cars and trucks. Indeed, in 1975, only 4% of all urban trips were made by public transportation. Most of the rest were made by automobile. But from the perspective of the individual without an automobile, public transportation is vital. Further, the figure of 4% can be deceptive. In older cities such as New York and Chicago, close to 90% of the trips entering the central business district are by public transportation. It has been estimated that if rail transit alone were eliminated in Chicago, 88 more expressway lanes would be needed, and all of the land downtown would be needed for parking.

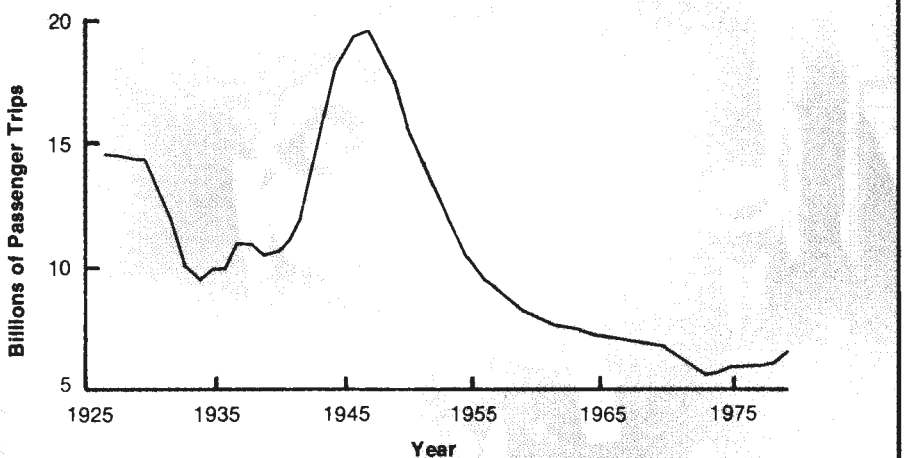
Nevertheless, until recently the decline in transit ridership caused many experts to prophesy that eventually only a few of the largest cities would have public transportation systems. However, that trend has reversed, and since 1973 transit ridership has been increasing. In 1979 the American Public Transit Association reported a 5% increase in ridership nationwide over 1978.

This turnaround is due in part to rising prices and shortages of gasoline, but a large portion of the change can be attributed to federal, state and local programs to support public transportation.

Significant federal funding for local public transportation began in the late sixties when many legislators realized that a further decline would have serious effects throughout urban areas. In 1961, an Office of Transportation was formed within the Housing and Home Finance Agency. In 1968, after several restructurings, the Office of Transportation was transformed into the Urban Mass Transportation Administration (UMTA) within the U.S. Department of Transporation. UMTA helps set national transportation policy and administers a variety of funding programs designed to breathe new life into public transportation.

Total federal investment in public transportation has increased from $680 million in 1975 to $2.7 billion in 1978. This infusion of capital and operating assistance has resulted in new, more comfortable equipment, better service, and lower fares (relative to inflation), which have made transit more attractive to the public.

EX. 2—Transit Passenger Trips 1926-1978



Source: Transit Fact Book, American Public Transit Association, 1978

Since the mid-1960s, urban public transportation has become a cornerstone of several important national policies:

Environmental protection. In some large cities, public transportation is an important tool in reducing air pollution caused by automobile emissions.

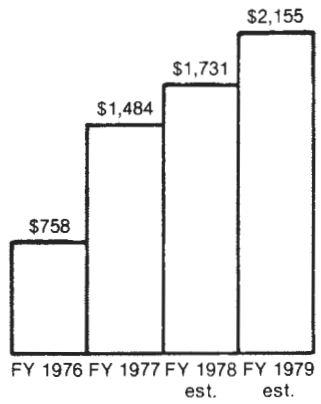
Energy conservation. A fully loaded bus is 15 times more energy efficient than an automobile carrying one person. In addition, electric-powered forms of public transportation, which do not use petroleum-based energy, can help the U.S. reduce its dependence on foreign oil.

Employment policies. With 162,000 employees and expenditures of over $4 billion for operations in 1977, the transit industry is a major employer in the United States. A study by the Congressional Office of Technology Assessment indicates that for every million dollars invested in public transportation, 80 man years of employment are created to manufacture the buses and rail cars as well as to build and operate the transit systems. The money these workers spend also creates more jobs in the rest of the economy. In addition, public transportation provides essential access to jobs for people without cars.

Elderly and handicapped policies. Section 504 of the Rehabilitation Act of 1973 requires that the elderly and handicapped have access to all federally subsidized programs, including transportation. Whether this should be done by removing the physical barriers preventing the elderly and handicapped from using conventional transit or by providing special transportation shaped to their needs is a major issue among transportation planners and providers.

Urban revitalization. In providing high-speed access to downtown areas, public transportation can help to revitalize these areas by attracting new commercial development and office complexes, shoppers and employees, and by reducing congestion.

EX. 3—UMTA Grants for Mass Transit
(dollars in millions)



Source: The Budget of the Unites States Government: Appendix, Fiscal years 1978 and 1979

While public transportation's key role in these diverse areas has produced a broad base of support for funding mass transit, it has also meant that public transportation has been asked to help accomplish many different and sometimes conflicting goals—goals that cannot always be evaluated by numbers of riders. In trying to serve so many purposes, public transportation may not appear to operate in the most efficient or economic manner.

In the following pages, some of these goals, issues and conflicts are explored in the hope of bringing about a better understanding of the role of public transportation in American society.

How Is Public Transportation Planned?

How is a bus route selected? How does a city build a new rail system? Who decides that a new transportation service is needed, and once the decision is made, how is a new system selected and implemented?

Establishing goals and objectives. Often the general and widely accepted transportation goals, such as increasing mobility or decreasing travel time, are established at the time the planning agency is created. For a particular project, the objectives are more specific, for instance, taking the elderly to senior citizens' centers, or reducing the congestion along Main Street.

Analyzing the deficiencies of the existing system. In many cases, a transportation project is a direct result of a deficiency in the existing transportation system. In evaluating the existing system, a major question transportation planners must ask is whether it will be adequate for future transportation needs. The planners study census data or conduct surveys to learn where people live, work, and shop; then, often using sophisticated computer techniques, they predict where people will live, work, and shop in the future. From this information, they can determine what types of transportation services and routes will be needed.

Developing alternatives. The number and range of alternatives considered depends on the size and time frame of the project. For a short-range project, such as relieving congestion at a particular street corner, usually only a few alternatives are considered, such as adding a stop light or widening the intersection. For a long-range project, such as providing transportation to the suburbs, many alternatives might be studied, including rail systems, buses, ride-sharing programs, or low capital investment modifications to the current system, such as express bus service.

Evaluating the alternatives. The planners compare the cost of each alternative and its effect on such factors as travel time, number of people served, air quality, economic development, taxes and neighborhood disruption.

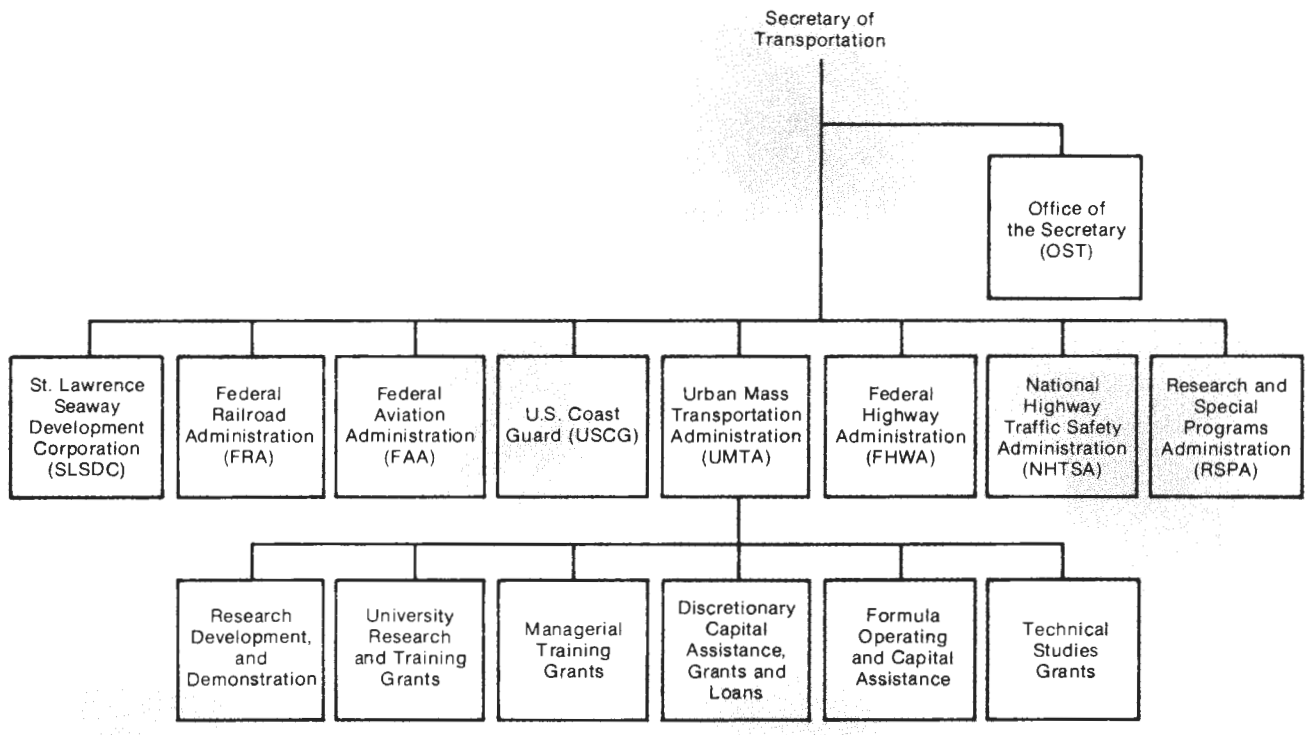
Choosing a plan. The technicians can estimate the impacts of a transportation plan, but the community must place a value on them. Frequently a series of public hearings is held to inform local citizens of the transportation plans being considered and to hear their opinions before a decision is made.

Implementing the plan. Finally, public officials, planners, and transit operators must put the plan into effect. Depending on the alternative chosen, financing must be determined, engineering and architectural plans drawn up, land acquired, a contract for construction put out for bids, vehicles ordered, operators hired and trained, and the public informed about the new transportation service.

EX. 4—Planning Documents and Procedures Required by the Federal Government

Document	Description
Long-Range Plan (also called 20 year plan or horizon plan)	The long-range plan includes projected long-term expansion of both highways and mass transit, and should be consistent with the region's long-range land use plan, population projections, and urban development objectives. The plan is updated every five years.
Transportation Improvement Plan (TIP)	A TIP is developed for those highway and transit projects from the long-range plan that will be undertaken in the next five years. It also has an "annual element" for each year.
Unified Planning Work Program (UPWP)	The UPWP encompasses all planning projects that will be undertaken in the next one or two years.
Alternatives Analysis	If a community is considering an expensive or capital intensive project such as a new rail system, it is required by U.S. DOT to conduct an analysis of alternative plans to ensure that low-cost alternatives that may accomplish the same goal are considered.
Grant Application	In seeking federal assistance for a project, the MPO must make a grant application. The application must include documents ranging from a detailed project description and justification to a legal opinion, environment statement, labor agreement, consideration of the aged and handicapped, and affirmative action program.
Environmental Impact Statement (EIS)	The EIS documents how a proposed project will affect air, water, noise, and visual pollution. It is submitted to U.S. DOT for review by various federal agencies, including the Council on Environmental Quality, and must be made available to the community prior to a public hearing.
A-95 Review	The Office of Management and Budget requires that one local agency (which may be different from the MPO) coordinate all federal assistance applications for the region to ensure that there are no duplicate or conflicting grants. This coordination is called an A-95 review.

EX. 5—U.S. Department of Transportation



Source: United States Government Manual 1979-1980

The Decision Makers

The organizations and individuals involved in transportation planning include elected officials, planning and transit agencies, and the public.

Elected officials. Elected officials, including the mayor and council members, represent the views of their constituents in deciding how tax dollars will be spent and determining transportation policy, goals, and objectives. They usually appoint the heads of the local planning agencies.

Local planning agencies. Most cities have a planner or an agency responsible for general planning, including land use, zoning, commercial development, and transportation. In addition, there may be one or more departments that are specifically in charge of transportation. In large metropolitan areas, there may also be a regional transportation planning agency.

The staff of these local planning agencies usually includes professional planners who are trained in engineering, computer programming, sociology, or economics. Usually one or more of the planning agencies analyzes the present system and develops and evaluates alternatives as necessary. The governor of the state designates one agency to serve as the Metropolitan Planning Agency (MPO). The U.S. Department of Transportation requires that the MPO coordinate the other agencies and all transportation plans for the region. The MPO is also responsible for providing many of the documents required by the federal government (see Exhibit 4.)

Local transit agency. The management of the transit agency has a voice in most stages of the planning process through its representation on the MPO board and various technical committees. Many transit agencies also have a planning department which handles short-range projects such as route changes, schedule extensions or bus shelter locations.

Citizen committees. These may include community groups, general citizens organizations such as the League of Women Voters, or special committees set up to oversee a long-term project. An example of a special committee is the Bay Area Council, an association of local businessmen who backed and helped finance the planning of the Bay Area Rapid Transit (BART) in San Francisco.

State agencies. The governor and the state department of transportation participate in the planning of many projects.

U.S. Department of Transportation (DOT). The Secretary of Transportation supervises eight agencies which oversee all major forms of transportation in the United States (see Exhibit 5). The two agencies which have the most influence on urban transportation are the Urban Mass Transportation Administration (UMTA) and the Federal Highway Administration (FHWA). U.S. DOT provides many of the funds for planning and providing transportation, and requires that local agencies which receive federal funds follow prescribed planning procedures.

The public. The public has not only a right but an obligation to take part in the formation of transporation policy and plans. The three chief means by which citizens can influence transportation planning are by electing officials who represent their point of view, by attending the public hearings required by the government, and by joining special interest groups that are concerned with transportation.

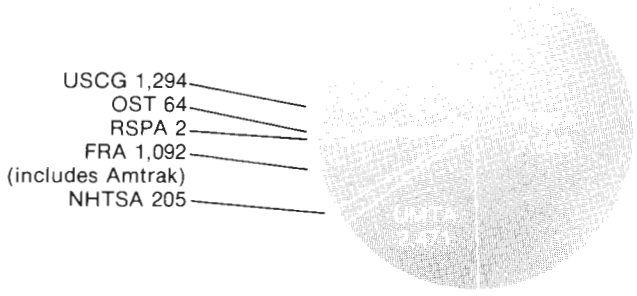
The Time Frame

Because of the complexity of the planning process, changes in the transportation system cannot be made quickly. It takes time to reach a consensus on what projects should be undertaken, to accomplish each step in the planning process, to prepare and to review the documents, and to hold public hearings.

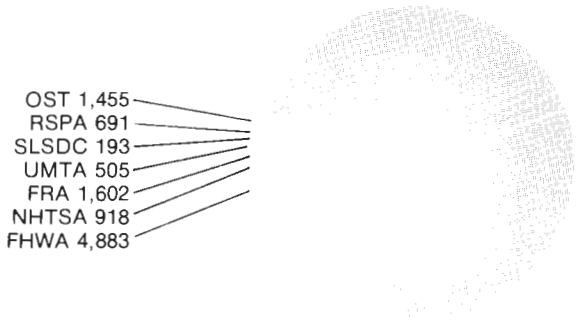
To realize concrete results from the planning process can take even longer. For example, two or more years may elapse between ordering and taking delivery of a new bus. Projects involving major construction, such as the Washington, D.C. subway (Metro), require a significant investment of time: the Congressional recommendation to build Metro was announced and planning began in 1960, construction began in 1970, and the first line was open for use in 1976, a total of 16 years.

EX. 6—Size of DOT Agencies
(Fiscal Year 1977)

Program Levels
(dollars in millions)



Authorized Full-Time Permanent Positions



Source: U.S. Department of Transportation, 11th Annual Report, Fiscal Year 1977

Mass Transit for Buffalo

On April 2, 1979, a small group of transit authority officials and community leaders stood in a driving rainstorm and watched as ground was broken for the nation's first all new light rail system in Buffalo, New York. Despite the weather, the watchers' spirits were high. The start of construction of the 6.4 mile system marked the culmination of almost a decade of planning and design by the Niagara Frontier Transportation Authority (NFTA), local government agencies, and the Buffalo community. Five more years of effort lay ahead before the system would be in operation.

Interest in a rapid transit system for the Buffalo area grew rapidly in the last half of the 1960s. On September 1, 1967, the New York State Legislature created the Niagara Frontier Transportation Authority to serve as the area's publicly owned transit operator. One of NFTA's tasks was to develop a mass transit program for the Niagara Frontier transportation district.

In addition to NFTA, federal, state, regional, county and city organizations took part in the transportation planning process. The major organizations involved at the state level included the following:

The Division of Community Affairs. This agency is responsible for coordinating and controlling the planning budgets for various state departments, including transportation, and for coordinating these programs with the regional office of the U.S. Department of Housing and Urban Development.

The New York Department of Transportation. The New York State Department of Transportation is responsible for the planning and development of mass transportation and administers the financial assistance programs under the Transportation Capital Facilities Development Act.

The State University of New York at Buffalo (SUNYAB). The university is responsible for transportation on its campuses, and is also concerned with transportation to and from its campuses for students, faculty and staff.

The Erie and Niagara Counties Regional Planning Board, and the Niagara Frontier Transportation Committee (NFTC) participated in the planning process at the regional level. NFTC was designated by the governor as the Metropolitan Planning Organization (MPO) responsible for coordinating and approving all transportation planning for the region.

In addition, both Erie and Niagara Counties have planning departments, the city of Buffalo has a planning and a transportation department, and the City of Niagara Falls has a planning department. All of these agencies are active in area transportation planning.

In 1971, NFTA recommended an 11-mile heavy rail system linking downtown Buffalo with the new campus for the State University of New York in Amherst. The NFTC endorsed the project in September 1972.

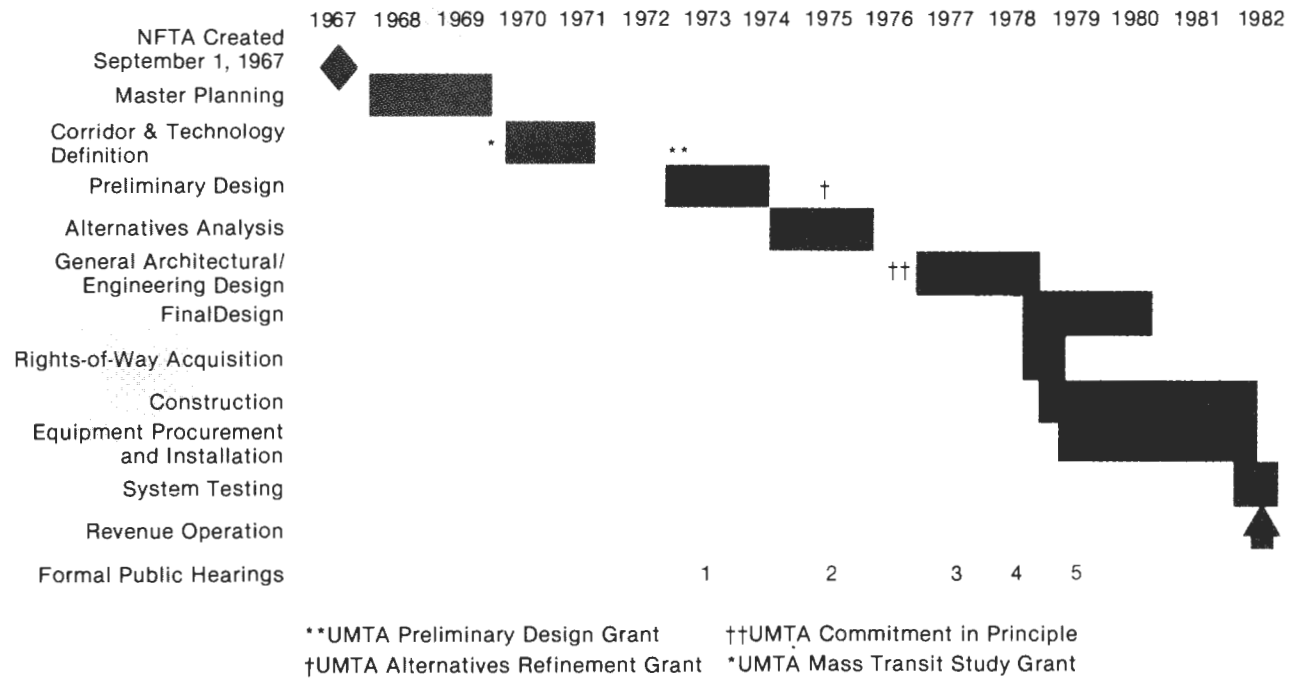
A series of advanced planning, preliminary engineering and environmental impact analyses were carried out between 1972 and 1974 in conjunction with major public hearings held in April of 1972 and a series of community forums beginning in 1973. These forums, which were announced through newspaper ads and radio and TV public service announcements, were designed to reach the groups with an interest in the project. These included the funding agencies, such as the Urban Mass Transportation Administration (UMTA) and the New York State Department of Transportation; federal and state legislators, and local officials from Buffalo, Erie County and the town of Amherst; community groups such as the Area Committee for Transit, the Sierra Club and the League of Women Voters; and representatives from local institutions such as the State University of New York at Buffalo and Meyer Memorial Hospital. The format for the forums included presentations by NFTA, statements by elected representatives and citizens, and a question-and-answer session. The public was given the opportunity to comment on such features as route alignments, station locations, and system design.

Along with these forums, community workshops were held to discuss specific aspects of the plan with local civic groups and clubs. In addition, an ongoing Mass Transit Advisory Committee comprised of 50 representatives of federal, state, county, and local government and concerned citizens was created to review and comment on the plan's long-term effects on the area. In all, 380 meetings were held, reaching nearly 12,000 concerned people.

The preliminary design and environmental impact analysis completed in June 1974 dealt solely with the 11-mile rail rapid transit line endorsed by NFTA in 1971. But in reviewing the completed work and its projected cost, UMTA observed that a number of factors had changed since 1971 (construction costs had risen, transit ridership had declined) and asked the study team to look at other alternatives.

NFTA conducted an initial alternatives study in the last half of 1974. UMTA reviewed the results and requested a number of refinements. The second phase of the alternatives study, in which the alternatives were narrowed down and evaluated, began in July 1975.

EX. 7—Schedule of the Buffalo Rapid Transit Project



Source: Light-Rail Transit: Planning and Technology, Transportation Research Board, 1978

More than 21 alternatives were examined, including bus, light rail, and heavy rail. Consultants made a detailed review of the alternatives to justify the proposed system both in terms of its cost effectiveness and its impact on the community. Their report, an Environmental Impact Statement published in 1976, analyzed pollution level, obstacles to implementation, economic effects, quality of service, and projected use level of each alternative.

The alternative Buffalo selected is a light rail rapid transit system to be built in stages. The 6.4 mile line connecting downtown Buffalo with the South Campus of the State University of New York is the first stage of a 17 mile rail system that will eventually extend to the Amherst campus and to the Tonawandas (neighboring communities north of Buffalo).

On June 10, 1976, U.S. Secretary of Transportation William T. Coleman, Jr., and UMTA Administrator Robert E. Patricelli committed UMTA to participate in financing the project.

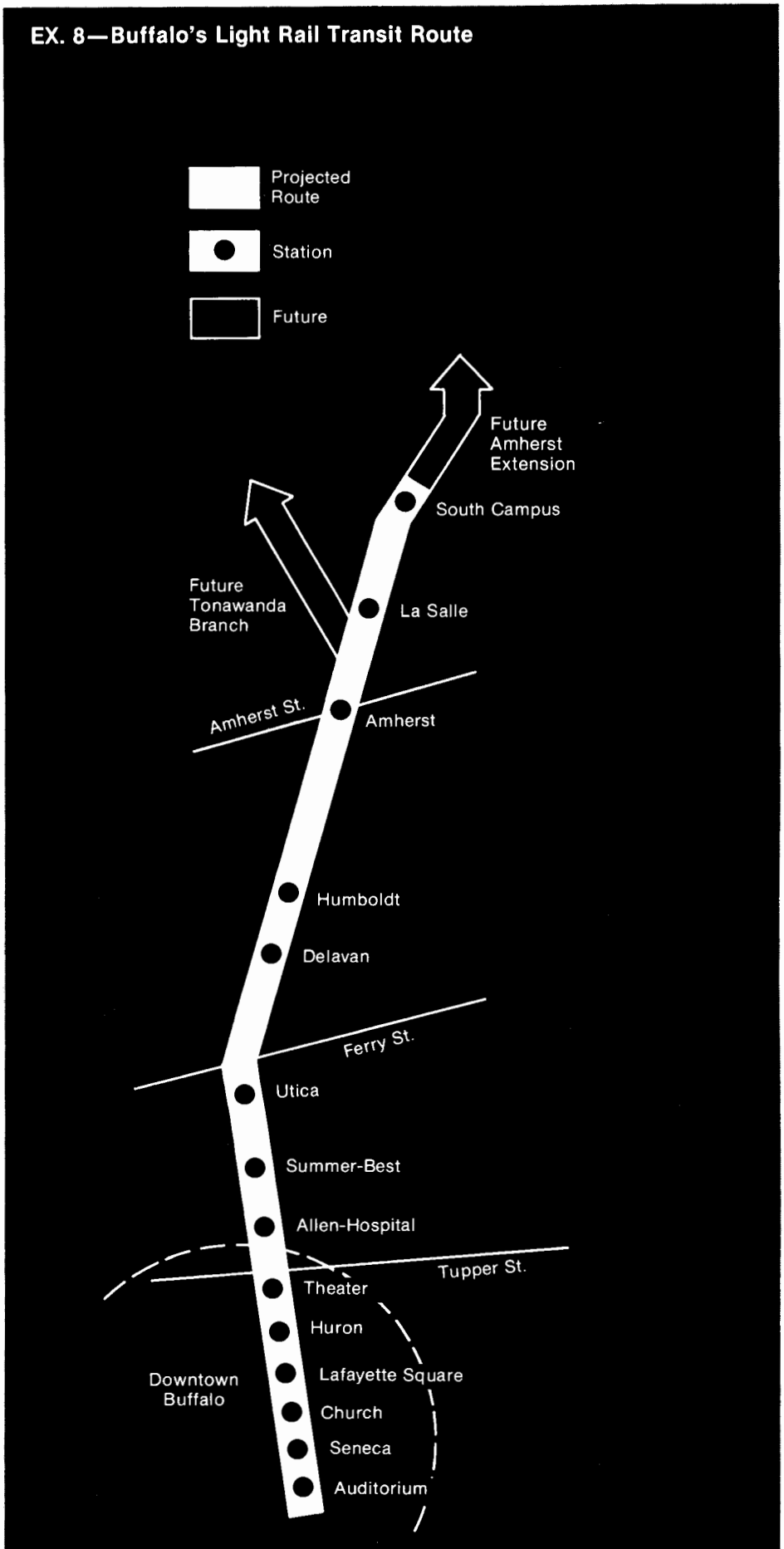
Then the general architecture and engineering phase of the project began, using an $8 million grant from UMTA and $2 million from New York State. The standards and criteria used in final design and construction were established. Schedules and cost estimates were refined. Contracts were identified that would be needed to complete the project.

A second, final Environmental Impact Statement (EIS), required by UMTA, was written in detail during this phase, again with citizen input through more forums and workshops.

Following UMTA's acceptance of the EIS and the preliminary engineering plans, the new U.S. Secretary of Transportation, Brock Adams, announced on September 15, 1978, that the federal government would commit $359.8 million to the Buffalo project. The remaining 20% was pledged by the State of New York.

From NFTA's inception in 1967, it took 13 years before the first shovelful of earth was dug. It is easy to understand why no one minded the rain on April 2, 1979—construction had finally began!

EX. 8—Buffalo's Light Rail Transit Route



Source: Niagara Frontier Transportation Authority

How Can the Public Participate in Transportation Planning?

A national study on transportation planning conducted for the Pennsylvania Department of Transportation in 1973 included a survey on the effectiveness of citizen participation. The response from 43 states indicated that in the previous five years, 111 projects with a total cost of $4 billion had been stymied by citizen opposition.

The U.S. Department of Transportation developed the Consumer Representation Plan to ensure that the public participates in the early stages of major transportation projects, *before* U.S. DOT or the local transit agency makes any commitment to a project. The plan furnishes guidelines for notifying the public of transportation projects, holding public hearings, and conducting opinion polls. In addition, U.S. DOT requires each state to develop a State Action Plan which also contains specific guidelines for public participation in transportation planning.

Illinois' State Action Plan, a typical plan, requests that at the beginning of a transportation study citizens be informed through the following processes:

- A news release should be sent to general circulation newspapers announcing the beginning of the study.
- Letters of intent should be sent to the appropriate public officials.
- The state planning agency should be notified.
- Informal meetings should be held with interested individuals or groups.
- A mailing should be sent to interested parties.

After alternatives have been developed and evaluated, but before a decision is made, the State Action Plan specifies that informal meetings be held with interested individuals and community groups. At this time, a draft Environmental Impact Statement must be distributed to federal, state and local agencies, where it must be made available for public inspection. This must take place 60 days before the public hearing.

Finally, public hearings must be held in several convenient geographic locations. Two legal notices of the hearings must be published in local newspapers. At the public hearings, the results of the study are presented and public comment is recorded. Written comments from people unable to attend are also entered on the official transcript, which is sent to Washington for review. A final report on the project includes an analysis of all comments received.

Besides the public hearings, UMTA has recommended a number of other methods for soliciting public opinion:

Meetings. The planners may organize workshops and informal planning meetings with civic and business groups and interested citizens to present information on a particular project and "sound out" opinions.

Community liaison. Planners may maintain liaison with community groups through personal contacts and attendance at meetings.

Advisory committees. Citizen advisory committees can be set up to represent the ideas and attitudes of their groups or communities.

Surveys. Surveys of a statistically representative sample of citizens may be used to test public views.

Hotlines. A telephone hotline can be set up to answer citizens' questions and receive their comments.

Direct mail. Civic organizations or other segments of the community can be polled by mail for their comments on specific policies and proposals.

Public participation in the planning stages can help avoid citizen opposition.

Citizen participation: The Boston Experience

In 1970, as the result of a growing public controversy about the construction of interstate highways in the Boston area, Massachusetts Governor Francis W. Sargent declared a moratorium on the construction of most of the expressways that had been planned, and ordered a restudy of the basic transportation program for the region. The governor was committed to citizen participation in the restudy, with the affected communities and individuals having a voice in the decision-making process.

Since the end of World War II, transportation planning in the metropolitan Boston area had focused on expansion of the region's expressway system. The process used by the decision-makers was essentially closed to the public. The community was informed of a particular highway plan only when construction was imminent, usually just before the legally required public hearings.

The expressway program was the biggest public works program in Boston's history. It would cost more than $800 million to complete and would provide jobs for a substantial portion of the state's construction industry. It had the support of highway builders, the Greater Boston Chamber of Commerce, the real estate developers, and most elected officials.

In the early 1960s, when the expressway program was in the planning stages, there appeared to be no widespread opposition to the plan. Most people accepted the assumption that the expressways were necessary. But when construction began, strong local opposition emerged in the towns that would be disrupted by the new expressways. This opposition remained local and disorganized until a number of technicians and professional planners began to question the methods used to develop the expressway plan. They pointed out that no alternatives had been examined and the traffic projections were biased and self-serving. As a result, the focus changed from the expressways' impacts on particular neighborhoods to a questioning of the methods used in regionwide transportation planning.

In May of 1969, the Greater Boston Committee on the Transportation Crisis (GBC), a coalition of community organizations opposing the highway program, organized a demonstration on the steps of the State House to urge Governor Sargent to reverse the highway construction program. In August, the governor appointed a task force under the chairmanship of Alan Altshuler of MIT, a nationally recognized authority on transportation and community problems, to review all transportation plans on the agenda and to examine the planning process. The task force found that the Department of Public Works' main argument for continuing the highway program was that it was already well under way and that any delays might jeopardize the federal highway funding allocated to Massachusetts. The department presented little information on the proposed expressways' impacts on the communities where they would be built. As a result of these findings, in early 1970 the task force recommended that the proposed highways be restudied.

In February 1970, the governor declared a moratorium on the highway construction and ordered a restudy.

The design phase of the restudy began in July 1970 with a meeting of representatives of the cities and towns that would be affected by the proposed highway construction, all the transportation agencies, private organizations such as the League of Women Voters, the Greater Boston Chamber of Commerce, GBC, and environmental interest groups, professional societies, and local community leaders. By October, a draft study design was prepared. Four categories of work were called for in the study:

1. Transportation planning and engineering.

2. Analysis of the impacts of the transportation plans.

3. Special transportation studies (e.g., of currently unserved groups and neighborhoods, new transportation technology).

4. Community liaison and technical assistance.

A consultant team was selected in March of 1971 and in July the Boston Transportation Planning Review (BTPR), as the restudy was officially called, began operations. The restudy was done in two phases. In Phase I, the study team examined the range of transportation alternatives. In Phase II, they analyzed the best alternatives to present to the governor.

The key to the participatory process of BTPR was the working committee. There were four categories of committee members: the transportation and development agencies. the municipalities, regionwide citizens organizations, and business, labor and professional organizations. All meetings of the working committee were open to the public. The role of the committee was advisory; all decisions would be made by the governor.

Ten percent of BTPR's $3.5 million budget was set aside for the community liaison and technical assistance group, known as Study Element 2 (SE2). SE2's function was to prepare informational documents and to organize public meetings, briefings, and workshops. It also provided technical assistance to those groups that requested it and ensured that the community's concerns were communicated to the study team and ultimately to the governor.

The restudy opened with a series of public meetings to inform people about the restudy and to develop a structure for future participation. Later, open public meetings were held about once a month in each area where an expressway was proposed. The meetings were announced through the local press and the BTPR newsletter, and by word of mouth. At the meetings BTPR staff members presented their work plans, preliminary findings, and initial views of the transportation problems and the alternatives available. The presentation was usually followed by a question-and-answer session.

In the fall of 1971, a series of smaller workshops was begun to discuss specific issues raised at the larger meetings on topics of limited interest. SE2 also held special briefings to keep elected officials up to date on the restudy's progress.

In December 1971, at the end of Phase I, Governor Sargent announced his first set of decisions. Two of the expressways were dropped from further consideration and the scale of the expressways remaining on the agenda was reduced. The latter decision was based on the governor's growing belief that the expressways should not be designed to satisfy future peak-hour demand for auto travel to and from downtown Boston, and instead public transportation should be improved to serve future downtown travel demand.

As a result of these decisions, Phase II of the restudy was framed to deal with the following issues: an exploration of expressways designed to handle local traffic rather than as part of a regionwide network; a more thorough look at public transportation; and some attempt to look at regional transportation issues.

The final products of Phase II were the combined Environmental Impact Statement and Program Package Evaluation reports, which reflected both the work of the technical staff and the participatory process. The massive reports were distributed to all the interested parties. Summary reports describing the basic issues and the options being presented to the governor were prepared for mass public distribution. The summary reports included "response forms" which could be filled out and mailed to the restudy team.

At the end of Phase II, public hearings were held in each area so individuals could express their views on the various alternatives. At the public hearings, citizens voiced strong anti-expressway feelings and an almost universal sentiment for a greater emphasis on public transportation.

On November 30, 1972, Governor Sargent announced his final decisions. None of the expressways under consideration would be built. Instead, large-scale improvements would be made in the public transportation system. The governor credited the restudy, with its involvement of both citizens and the various professional disciplines, with giving him a solid basis for his decision.

The success of the Boston Transportation Planning Review led to the formation of the Joint Regional Transportation Committee (JRTC), an advisory forum providing for citizen participation in the planning process. Through the JRTC, which has representatives from the planning agencies, municipalities, and private organizations, citizens of the Boston region are assured of a continuing voice in regional transportation planning.

How Much Does Public Transportation Cost?

Between 1970 and 1976 the national transit deficit increased an average of 49% per year. The cost of operating public transportation systems over the same period grew by 26% over and above the general rate of inflation.

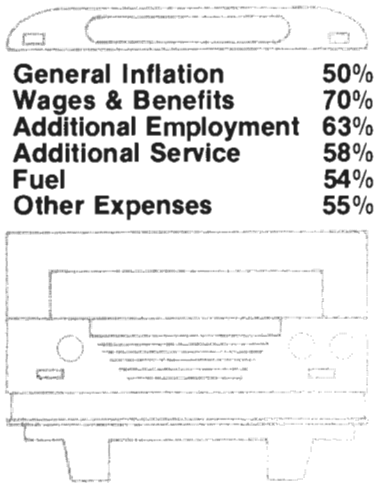
Capital costs accounted for a large portion of this increase. Constructing a rail system requires a large initial capital investment; if the system is built underground, this cost can double. It has been estimated that Washington's Metro, when complete, will cost $60 million per mile. The estimated price for the proposed 18-mile Los Angeles subway is $1.21 billion or nearly $70 million a mile, about the same figure as for an urban freeway. Weighed against these high initial investments are the long life of a rail system (up to a century or more) and the ability to expand capacity without increasing labor costs by adding rail cars to a train. In addition, average vehicle costs in 1978 were over $110,000 for a bus, $500,000 to $600,000 for rapid transit cars, and up to $1 million for an electric commuter rail car.

The other component of the increasing transit deficit is operating costs. The average cost to operate a bus in 1975 was $15 per hour (the actual cost varied from $7.50 to $30). The average (projected) cost in 1979 was nearly $18 per hour. Operating a rapid rail car cost $35 per hour in 1973 and a projected $55 per hour in 1979. These costs include fuel, maintenance, driver wages, administration, insurance, and taxes, distributed as shown in Exhibit 9.

Until the 1960s, public transit recovered nearly all its operating expenses through the fare box. Prior to World War II, it recovered nearly all its capital expenses as well. By the late seventies, however, the fare box covered only about half of public transit's operating expenses and virtually none of its capital costs.

Four major factors contributed to the increased deficit: the population movement to low density suburbs; rising labor costs; the concentration of ridership during the rush hour; and the use of public transportation to help meet social and environmental goals.

EX. 9—Increases in Transit Cost Components Between 1970 and 1976



General Inflation	50%
Wages & Benefits	70%
Additional Employment	63%
Additional Service	58%
Fuel	54%
Other Expenses	55%

Source: "Transit Financing: Trends and Outlooks for the Future," Burbank, 1977

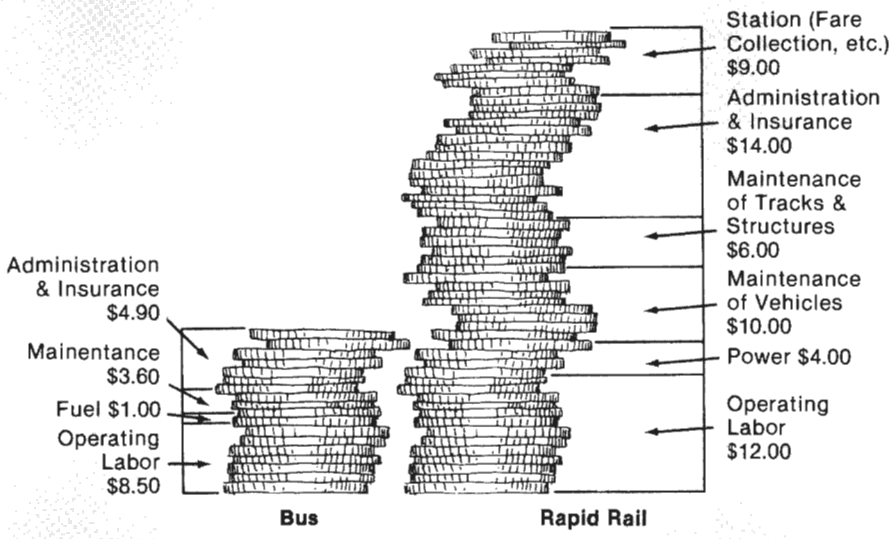
The Cost of Low Density Suburbanization

In the early part of this century, cities were very compact. People lived within walking distance of their jobs or near transit lines that provided easy access to the central business district. There was fierce competition and price cutting among the public transportation lines for the most profitable routes.

Even with the introduction of the mass-produced automobile in the 1920s, mass transit remained an attractive, inexpensive transportation alternative.

The Depression and World War II slowed outward growth from the city. After the war, Federal Housing Administration and Veterans Administration mortgages enabled returning veterans to move to new homes in the suburbs, beyond transit lines, and massive highway construction made jobs in the city quickly accessible to them. Highways became the key link to the central city as well as to suburban employment and shopping centers. Nationwide, transit ridership declined from 13.8 billion passengers in 1950 to 5.7 billion in 1977. Transit's market share declined from over 17% to about 4% of the trips taken.

EX. 10—Average 1970 Operating Costs
(dollars per vehicle hour)



Note: Because rail systems are located only in large metropolitan areas, their average costs are higher than those of bus systems, which are found in both large and small cities.

Source: Characteristics Of Urban Transportation Systems. De Leuw, Cather & Co., 1975

People moved to the suburbs, but following them has proved to be prohibitively expensive for transit. In a low density suburb, work, shopping, and recreational facilities generally are widely dispersed. Because it is difficult to provide frequent, convenient bus service to widespread locations, people rely instead on their cars. Consequently, suburban buses are seldom filled and frequently carry only two or three passengers. As a result, the cost per passenger is much greater in low density areas. In Chicago, for example, the averge subsidy per trip is about 32 cents, compared to subsidies of over one dollar per trip for suburban service.

The Cost of Labor

Wages for maintenance crews, drivers, and administrative personnel account for 80% of the cost of operating public transportation. As a result, even small increases in labor costs have a significant effect on overall operating expenses. From 1970 to 1977, wages in the transit industry rose 61%. In 1976, transit workers had the highest average earnings $16,032 per year —of any public sector employees.

Wages are not the only labor cost. A recent study found that every 1% increase in wages is matched by a 3.3% increase in fringe benefits and a 4.6% increase in premium and non-operating time payments. In New York, pension costs are about 26% of the hourly wage rate. In Detroit, pension costs represent 39% of the total payroll.

Although driver wages are the largest and most visible cost, maintenance personnel wages also have risen dramatically in recent years. In 1977, over $900 million was spent nationally on transit maintenance. The sophisticated equipment in use today often designed to lower operating costs requires highly skilled and well paid technicians to keep it running.

Labor costs are estimated to account for one-third of the total rise in transit costs since 1970.

The Cost of Peaking

Since World War II, travel on public transportation has become increasingly concentrated around the rush hour. This is known as peaking.

If an operator supplies capacity for the rush hour load, the majority of his fleet and labor will be unproductive the rest of the time. Unless the transit operator charges a premium fare or does not increase capacity during the rush hour, rush hour service actually costs more than the revenue it produces. This problem is aggravated by many labor contracts that do not allow the use of part-time drivers. It has been estimated that non-peak transit service recovers 94% of its expense, while rush hour trips recover just 47%. So even when rush hour ridership increases, transit systems may lose money.

The Cost of Meeting Social and Environmental Goals

Public transportation is frequently asked to help accomplish many goals beyond the general goal of providing mobility. But accomplishing social and environmental goals can add to a transportation system's costs without increasing fare revenue. One of the most expensive and controversial of these broader goals is providing transportation to the elderly and handicapped.

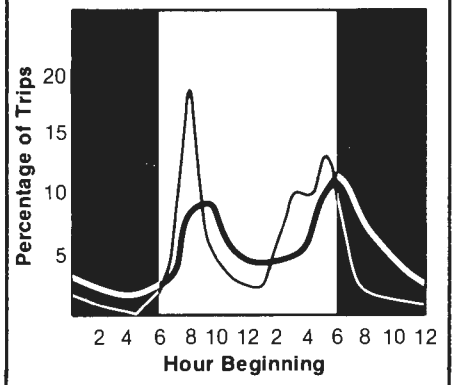
Section 504 of the Rehabilitation Act of 1973 requires that "No qualified individual in the United States shall solely by reason of his handicap be excluded from the participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving federal financial assistannce." This has been interpreted as a mandate to make public transportation systems accessible to the elderly and handicapped.

One response to Section 504 was to include accessiblility features in the specifications for buses on fixed transit routes. Features discussed include low floors, wheelchair ramps, and place for wheelchairs to be secured. It is estimated that these features will substantially increase the cost of buses.

Washington Metro's accessibility features added an estimated $65 million to the total cost of the project. For older rail systems, such as those in New York and Chicago, the cost of making just one station accessible could run well over $1 million.

All of these factors—low density service, peaking, capital and labor costs, serving the elderly and handicapped—add to the cost of public transportation. Yet fares cover only about 50% of the average cost of a ride. The result is that public transportation deficits have risen from $10.6 million in 1965 to almost $2 billion in 1977.

EX. 11—Hourly Distribution of Transit and Automobile Trips in Washington, D.C.



Source: The Urban Transportation Problem. Meyer, Kan, and Wohl, 1965

The Labor Question

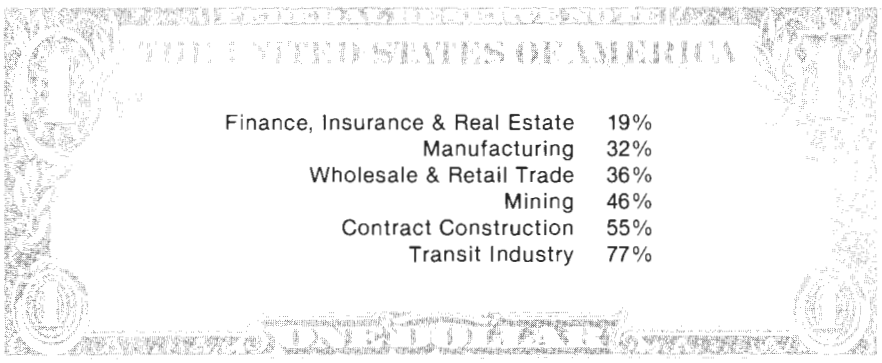
Because labor costs represent the largest portion of transit costs and are rapidly increasing, some critics have accused transit unions of seriously aggravating the transit industry's financial plight. Transit unions represent 95% of the drivers, the largest segment of the industry's work force. A transit strike can cost a city millions of dollars in lost sales and disrupted business. In New York City, where public transportation is used by 61% of the work force, the local Commerce and Industry Association estimated that a 12-day bus and subway strike in 1966 cost the city $1 billion in lost revenue. Further, after a long strike, some riders do not return to public transportation.

To avoid strikes, city and transit officials have sometimes agreed to settlements favorable to the union. However, in 1973, 33 states prohibited strikes by public employees.

Although the transit industry has experienced a financial downturn in recent years, one study found that between 1961 and 1975, unions succeeded in obtaining real hourly wage increases of over 77%. The study found that transit wages kept pace with the wages of unionized truck drivers and surpassed the gains of manufacturing employees. Transit workers earned an average of $13,849 in 1974, compared with an American industry average of $11,000. In the following year, wages of local transit operating employees rose 11.3%. The average wage gain of all collective bargaining units with at least 1,000 workers was 8.5% in the same period.

The unions say transit workers are not responsible for the industry's financial problems and should earn a fair wage regardless. They point to the value of the human cargo and argue that drivers should be paid accordingly. Critics counter that driving is not a scarce skill and drivers should be paid wages comparable to those of other semi-skilled workers.

EX. 12—Real Increase in Hourly Wages by Sector of Economy 1975



Source: Monthly Labor Review, Bureau of Labor Statistics, 1978; Labor in the Transit Industry, Lieb, 1976

At the same time transit wages have been rising, productivity has not been improving. Because a bus will always require one driver, dramatic improvements cannot be expected, but there are areas where productivity could be increased. For instance, under many contracts a bus driver must be paid for eight hours of work even though he may be needed only during the rush hours (usually a total of four hours). Further, contracts frequently require that the eight hours be roughly consecutive or overtime must be paid. To use one driver for both rush hours, transit agencies must therefore pay a premium. Seattle, which recently negotiated with its union a new contract allowing part-time employees, estimates it will save 8% of its operating budget by using part-time labor.

The union position has been further strengthened by the "13 (c)" clause in the Urban Mass Transportation Act, which requires that no employees' working conditions be made worse by a transit project receiving federal funds. The 13 (c) clause has been interpreted to mean that a locality may not obtain federal assistance for public transit without a union sign-off, which effectively gives the unions veto powers.

The unions point out that labor certifications (necessary for federal assistance) have rarely been denied, there have been few calls for U.S. Labor Department intervention, and processing time for the applications has grown steadily shorter. Management contends that transit operators rarely propose innovative services in their applications for fear they will be vetoed by the unions.

The Transitville Bus Company

A look at Transitville, a hypothetical community, illustrates the costs involved in establishing and operating a small bus company.

Transitville's downtown area, where employment and shopping are concentrated, has two major roads leading through it. Transitville's planner, Joe Brown, believes that if bus service were available, many commuters would take the bus to work, relieving congestion in this area.

Joe advises Transitville to install two bus routes along the major roads. Each route will be eight miles long (16 miles round trip) and will require four buses. If the buses average 12 miles per hour (with rush hour trafic and stopping and loading time), each bus will take about 80 minutes to make the round trip. The time between buses will be 20 minutes. One extra bus is needed as backup, so the system will need a total of nine buses to provide 20 minute service along both routes during the rush hours. Joe decides to limit service intitially to weekdays from 6 a.m. to 6 p.m. This schedule will cover the two rush hours and provide mid-day service for shoppers.

In order to estimate the total cost of the bus system, Joe contacts bus manufacturers and bus companies in nearby communities to obtain some base prices.

In 1979, a full-size transit bus cost about $170,000 and had a life expectancy of 12 to 15 years. Taking into account replacement cost, which increases about 1% each year, and the cost of capital (interest), the annual cost will be about $12,000 per bus, or $108,000 for the fleet of nine buses. Fees, licenses, and insurance will cost almost $3,000 per bus, or $27,000 for the fleet.

With a 12-hour service schedule, Transitville must plan on a 13-hour working day (half an hour at each end of the day for bus preparation). The community would like to hire 16 drivers and pay them for six to seven hours of work, depending on the shift, for a total daily cost of $780 (bus drivers in the Transitville area earn $7.50 per hour, including wages and fringe benefits) and an anual cost of $200,000. However, like most bus companies, Transitville will hire union drivers and will have to abide by union work rules, which may guarantee an eight-hour work day. Other union rules may require overtime pay for more than eight hours of work or for a split shift (work spread over more than 10 hours).

If Transitville's bus company has two eight-hour shifts, its annual labor cost will be $246,000, about 23% more than if it hires part-time drivers.

If the buses operate continuously at 12 miles per hour, 12 hours a day, five days a week, the fleet will average 300,000 miles per year. With fuel efficiency of four miles per gallon and diesel fuel costs of about 65 cents a gallon, the company's annual fuel bill will be about $49,000.

Transit operators in neighborhood communities tell Joe that they spend about $3,500 a year for each bus for the maintenance garage and equipment, plus another 14 cents per mile. For Transitville, that comes to a total of $74,000 a year for maintenance.

Joe decides administration can be simple for such a small company. Three people—a general manager, a maintenance and scheduling foreman, and a secretary—are minimum staff. Total salaries and administrative costs will be $56,000.

Promotion will be handled by Joe and the staff, but he sets aside $10,000 for printing schedules and putting up bus signs. He hopes to gain the support of the local newspaper and radio station in publicizing the new bus service.

The total cost for the bus company will be $570,000 per year, or approximately $2,200 per day of service.

Vehicles	$108,000
Licensing and insurance	27,000
Drivers' wages	246,000
Fuel	49,000
Maintenance	74,000
Administration	56,000
Promotion	10,000
Total	$570,000

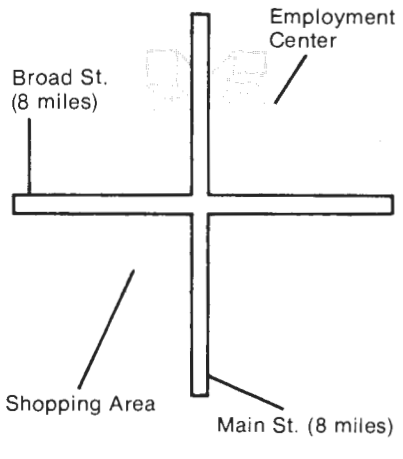
After informally surveying local citizens and talking with other bus company operators, Joe decides that most of Transitville's potential bus riders would be willing to pay a 40 cent fare. At that price, the company would need 5,500 riders per day to break even.

There is a two-hour peak period at each end of the working day. As a bus will start each route every 20 minutes, seven bus runs will be made from each of the four directions in the two-hour peak period. These 28 bus loads will hold a total of 1,400 people (50 seats per bus). For both rush hours, this will produce 2,800 fares, or $1,120.

From other bus companies Joe learns he can expect about one-third of the total ridership to come in the hours between the two peak periods. That would be another 1,400 riders, bringing total fare revenue to $1,680. This will leave a deficit of $520 per day, or $133,000 per year, which requires a 24% subsidy.

However, Joe knows there is a good chance that UMTA will approve a capital grant application to assist in buying the buses. The grant will cover 80% of the cost of the buses, reducing the annual deficit by $86,000. The community, recognizing the benefits it will receive from a bus company, has voted in a referendum to pay the remaining $47,000 out of general taxes.

EX. 13—Transitville



Where Does the Money Come From?

In 1976, the combined bill for operating public transportation systems in the United States was about $4 billion, not including the three-quarters of a billion dollars spent to purchase new buses and construct or rehabilitate rights-of-way. During the same year, the industry recorded a total income of $3.8 billion, or about $200 million less than its direct operating costs.

There are four primary sources of this income: revenue from fares, which accounts for over half of the income, and contributions from local, state and federal government.

In a study of the transit systems in 26 of the largest U.S. metroplitan areas, John Pucher of Massachusetts Institute of Technology (MIT) found the following breakdown of government contributions toward transit operating subsidies in 1976: federal government, 21.5%; state government, 22.0%; regional government (metropolitan-wide transit units), 28.2%; local municipalities, 20.2%; and other income, 8%.

While public transportation's operating deficit is shared roughly equally among the various levels of government, 80% of the money for new vehicles and construction is provided by the federal government, with state and local governments contributing 13.4% and 6.9%.

Source of Federal Funding

Since the creation of the Urban Mass Transportation Administration (UMTA) in 1964, the federal government has steadily increased its participation in financing public transportation. The MIT study found that between 1973 and 1976, federal subsidies to mass transit increased over 350 times ($1.2 million to $422.5 million), compared with increases of 128% for state, 150% for regional, and 40% for local subsidies. A major part of the federal increase came in 1975, when UMTA implemented the Federal Operating Assistance Program (Section 5). The Surface Transportation Act of 1978, the current bill providing federal transportation money, mandates increased federal funding levels of approximately 17% per year from 1978 through 1987.

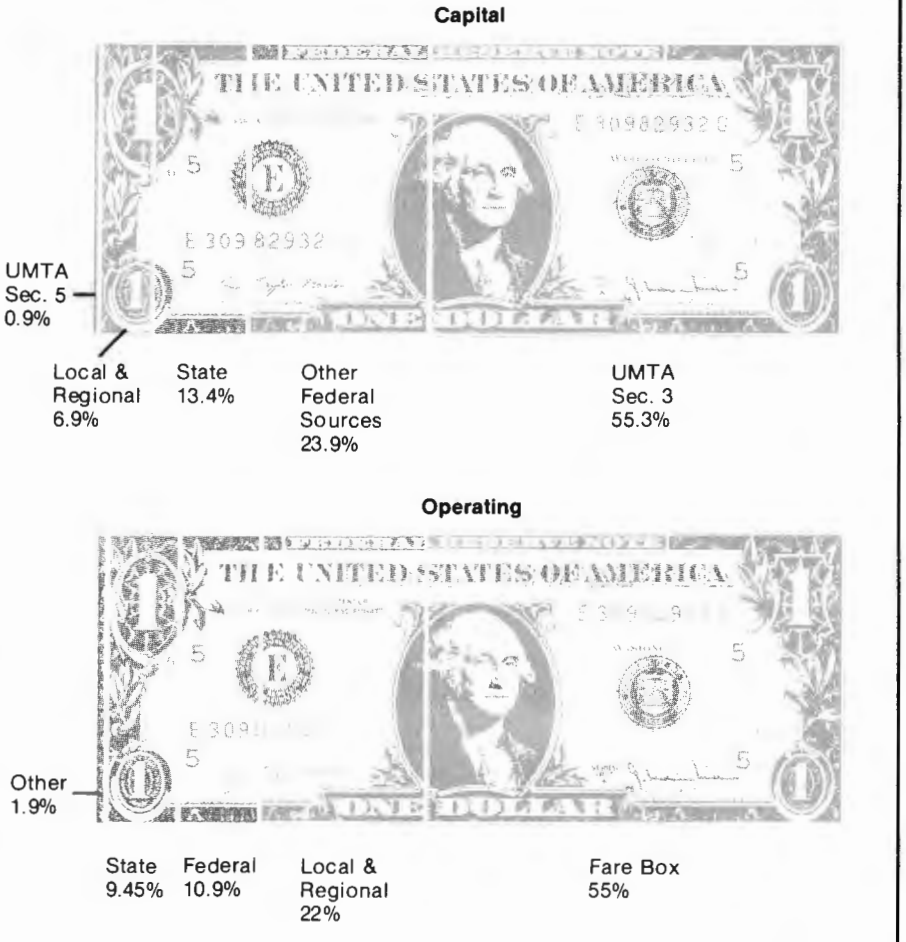
There are five primary sources of federal financial assistance for urban mass transit. Three are authorized under the Urban Mass Transportation Act.

Capital funds ("Section 3"): Section 3 of the Urban Mass Transportation Act of 1964 as amended through 1978 authorizes grants for the construction of new fixed guideway systems, detailed alternative analyses for new fixed guideway systems, and acquisition and/or improvement of mass transit facilities including rolling stock. These funds are distributed at the discretion of the Secretary of Transportation with the stipulation that $350 million must be spent every year to upgrade existing facilities.

Operating and capital funds ("Section 5"): The Surface Transportation Act of 1978 authorizes the expenditure of $6.5 billion over a four-year period for both capital and operating assistance.

These funds are distributed under four formulas. A basic grant distributes funds to urban areas for operating or capital assistance based on population and population weighted by density. The second grant distributes 85% of its authorized funds to urban areas with populations over 750,000. The third grant makes $550 million available over four years for commuter rail and fixed guideway systems. The last grant provides $1.4 billion for new bus purchases.

EX. 14—Sources of Transit Revenue



Source: Transit Financial Assistance, American Public Transit Association, 1976

Section 5 funds may provide up to 50% of total operating costs and up to 80% of capital costs.

"Section 6" funds: Section 6 funds may be awarded as grants or contracts to public transit authorities, transit manufacturers and suppliers, and transit consultants to engage in research, development and demonstration (RD&D) projects. The federal government may fund up to 100% of an experimental public transportation project. RD&D projects may include development of advanced technology (for example, new transit bus design and performance), improvements in management and operating techniques (such as training programs for transit management and staff), and demonstrations of new ways to provide service to special user groups. Many paratransit projects and experiments giving priority treatment to buses and carpools were initially funded under this program, as part of UMTA's Service and Methods Demonstration (SMD) Program.

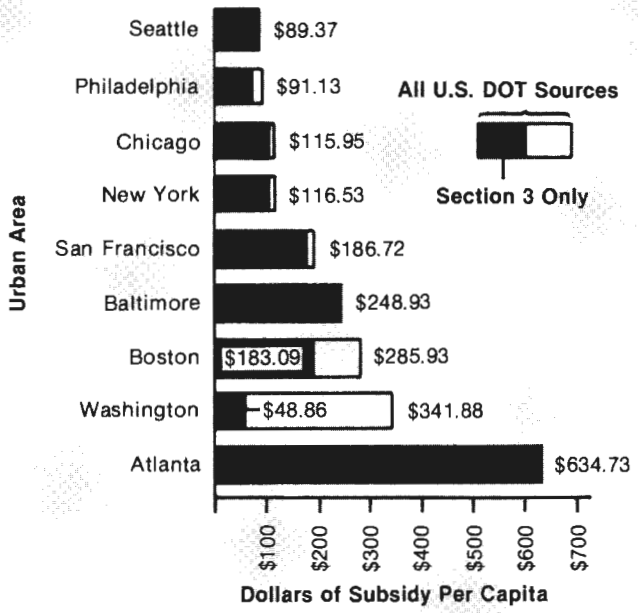
In addition, urban transit has two sources of assistance from the Highway Trust Fund.

Urban Systems Highway funds: The Surface Transportation Act of 1978 authorizes the expenditure of $3.2 billion in Urban System funds between 1978 and 1982. Local officials have the option of using these funds for either highway or mass transit projects. The funds are distributed to states according to population and may provide 75% of the total cost of a project.

Interstate Transfer funds: Until 1983, state and local governments can agree to transfer funds for non-essential urban segments of inter-state highways either to mass transit or to other highway projects. These projects are also funded on a 75% federal/25% local match basis.

EX. 15—UMTA Capital Investment in Transit

(per capital by urban area—to September 30, 1977)



Source: Unpublished memorandum, Northeastern Illinois Regional Transportation Authority, 1977.

Transit systems have also been known to use revenue sharing funds to pay transit capital or operating costs. This practice is more common in small or rural systems than in major transit properties.

Sources of State and Local Funding

State and local tax revenues currently pay more than 50% of public transit's operating deficit and that portion is likely to grow in the future. As local governments look for new sources of transit funding, there are a number of questions that need to be asked: Will the revenue generated be adequate for present and future program needs? Is the tax proportional to the benefits derived from the program being funded? Is the tax proportional to the individual's ability to pay?

The following taxes are potential sources of transportation revenue.

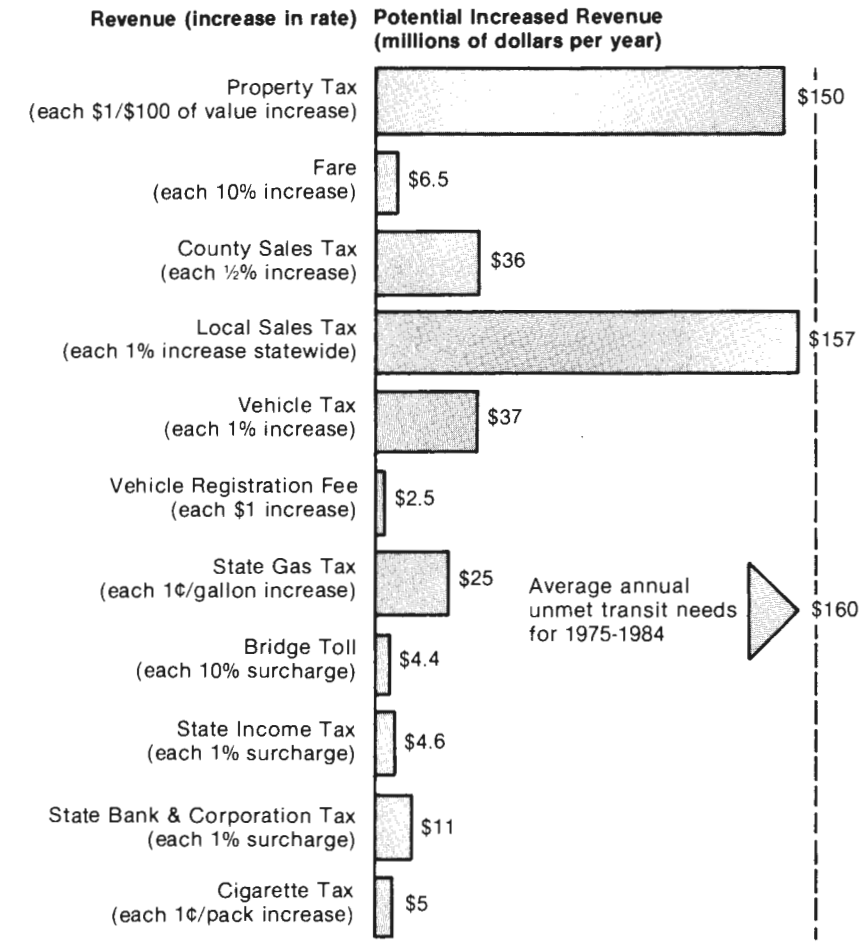
Property tax. Property taxes are a primary source of state general revenue. Because of the broad tax base, a small increase can produce significant revenue at little additional administrative cost. The revenue will also grow somewhat with inflation. However, property taxes already support a number of public services and may have reached their limits.

Sales tax. The sales tax also has a broad tax base, and a small increase will produce substantial income which will grow with inflation.

Motor vehicle fuel tax. A portion of the motor vehicle fuel tax can be earmarked for transit, as it is in Illinois. However, if the tax is a flat rate, energy conservation will result in shrinking revenues. With a percentage rate, revenue is likely to grow with increasing gasoline prices.

Income tax. Income taxes contribute an increasing portion to many state general revenues. A local surtax on state income tax payments is a possible source of transit funds.

EX. 16—Potential Sources for Transit Funds
(Bay Area Rapid Transit)



Source: Financing Bay Area Transit, Policy Study and Recommendations, Bay Area Council, 1975

Business tax. There is little precedent for levying business-related taxes specifically for transit, but because business benefits substantially from transit improvements through increased accessibility and decreased parking demand, it may be realistic to ask this group to bear part of the cost for public transportation. However, there is a risk of raising business taxes so high that the area is no longer attractive to businesses.

Excise and utility taxes. Taxes such as cigarette and liquor taxes bear little or no relationship to transit and by themselves generate only small amounts of revenue. However, they are used as sources of transit revenue because often they are the most politically acceptable tax. Massachusetts uses cigarette taxes to subsidize the Massachusetts Bay Transit Authority.

There are also non-tax sources of transit revenue, for instance bridge and road tolls, parking surcharges, and automobile licensing fees. In New Orleans, the transit service is run by the utility company, which uses the profits from utility fees to finance almost all of the transit deficit. Other financing techniques include selling or leasing transit air rights or other property, participating in property development, and levying special assessments on the groups that will benefit from transit improvements.

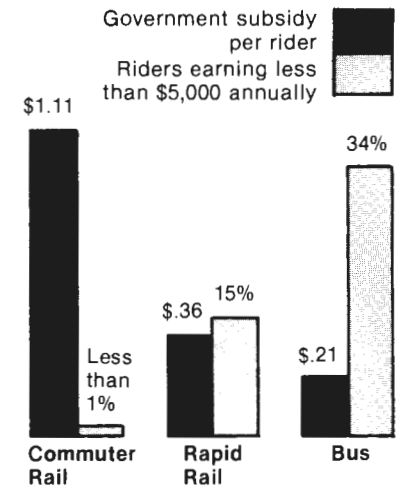
Equity in Public Transportation Finance

Riders and non-riders both benefit from improved public transportation. Although the non-rider often is unaware of the fact, he too enjoys the reduced congestion, cleaner air, and economic stimulation that result from good public transportation. The rider pays a fare for his benefit. Both rider and non-rider are taxed. An issue in public transportation finance is how high the fare should be, and conversely, how high taxes should be.

A primary justification for public investment in mass transit is to improve mobility for those who cannot afford an automobile. But studies done at Massausetts Institute of Technology (MIT) and in New York and Chicago suggest that in some cases low income riders pay more than their fair share and in fact subsidize high income riders. The argument is as follows:

In a flat fare system, individuals traveling short distances pay more per mile than long distance riders. An analysis done at MIT in 1978 showed

EX. 17—Government Subsidies by Mode



Source: The Urban Transportation System: Politics and Policy Innovation, Altshuler, 1979

that short distance riders tend to come from low income groups, while long distance riders come from middle or upper income groups. A study of Albany, N.Y., riders found short distance riders paid 32.7 cents per mile compared to 4 to 5 cents per mile for long distance riders. The study concluded "the bulk of these (short distance riders) is comprised of inner city riders."

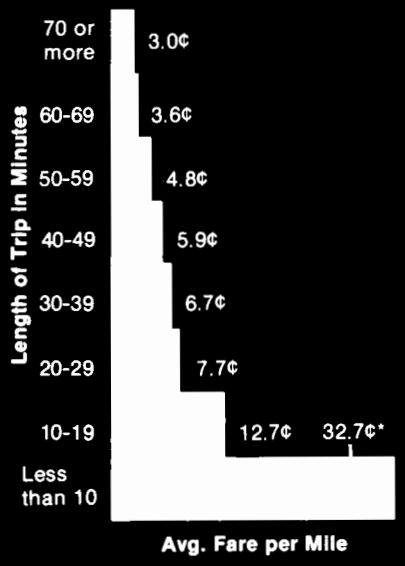
Low income riders may also benefit less from subsidies than high income riders because of the form of transportation they use. Transportation expert Alan Altshuler points out that less than one percent of commuter rail riders earn less than $5,000 annually, yet the government subsidy is $1.11 per rider. Thirty-four percent of bus riders earn less than $5,000 annually, but the government subsidy is only 21 cents per rider.

Several studies have shown that peak-hour service is significantly more expensive to provide than off-peak service. Moreover, the MIT analysis showed that the highest proportion of peak-hour users are middle and upper income individuals. A greater proportion of low income individuals use public transit in the off-peak periods.

Finally, some taxes such as property and sales taxes are regressive; that is, they fall more heavily on middle or lower income groups. If these methods of taxing are combined with pricing inequities, low income people in a given area may be carrying a disproportionate share of the cost of public transportation.

Some of these inequities can be corrected through differential fares which charge the peak user more, zone fares which make the fare roughly proportional to the distance traveled, discounts for special user groups, and exempting food and other essentials from sales taxes.

EX. 18—Cost of Bus Travel in Albany, N.Y.



*Trip length of one-third of all riders; these people are mainly inner city residents.

Source: Who Pays the Highest and Lowest Per-Mile Transit Fare? Leutze and Ugolik, 1978

Should Public Transportation Pay for Itself?

Could public transportation be paid for through the farebox without requiring subsidies of any sort? The answer is yes, there are many heavily traveled routes in New York, Chicago, and other large cities which more than recover their operating expenses. Less heavily used transit systms could also cover their operating expenses if fares were raised or if service were cut. But studies have shown that, in general, every time fares are increased, riders are lost. As a rule of thumb, a 10% fare increase will reduce ridership by 3% (the actual figure will differ among communities depending on such things as the average income of the user and what his other options are). However, because costs do not go down in proportion to the loss in ridership, fares must continue to rise to compensate.

Reducing service results in similar problems. Many studies have shown that riders are even more sensitive to convenience, reliability, and time savings than they are to fares. One study indicates that a 10% decrease in service resulting in increased walking or waiting time can result in a 5 to 6% loss in ridership. Moreover, higher fares and reduced service tend to hurt those who rely most on public transportation—the poor and the elderly.

But should public transportation pay for itself? Because transit benefits the entire community—by reducing pollution and congestion, conserving energy, and providing mobility for those without cars—a case can be made that transit is a public service and should be supported out of general revenues. However, despite a drop in overall transit fares in real terms over the last decade, a large portion of the U.S. transit bill is paid through the fare box (see Exhibit 19).

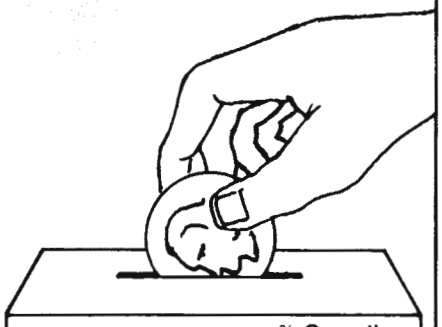
Instead of raising fares, some cities have moved in the opposite direction, experimenting with lower fares or free fares in an attempt to attract more riders to public transportation.

Denver instituted free off-peak fares from February 1, 1978 through January 31, 1979. Daily ridership rose from 101,800 to 146,500, the area's highest public transit ridership total in 20 years. The free fares resulted in increased ridership by the young, low income groups, and senior citizens. An unexpected benefit was a boost in sales at several downtown stores, apparently because people found free transit easier than driving downtown and finding a parking space. One major downtown Denver store experienced a 15% increase in gross retail sales for which it could find no explanation other than the free bus service.

Denver's experiment cost nearly $5 million. The free fare program was instituted as a short-term "habit-breaker" to lure people out of their cars and onto public transportation. Surveys indicated that more than 80% of the ridership increase was new patronage and that 68% of these new riders intended to continue using the bus after the free fare project ended. Ten percent told surveyors they would not have made the trip at all without the free fare.

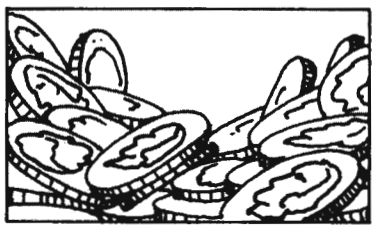
Transit lines in some smaller municipalities, such as East Chicago, Ind., Commerce, Calif., and Independence, Mo., have experimented with longer term system-wide no-fare programs. In Commerce, transit use in real numbers increased 42% from 1972 to 1976, but deficits increased from $120,000 to $220,000 per year over the same period.

EX. 19—Fares in Major U.S. Cities in 1978



City	Base Fare	% Operating Expenses Covered by Fare Box
Atlanta	15¢	25%
Boston	25¢	25%
Chicago	50¢	65%
Houston	40¢	50%
Los Angeles	40¢	40%
New York	50¢	60%
Philadelphia	45¢	55%
St. Louis	25¢	31%
Seattle	30¢	32%
Washington		
Bus	50¢	57%
Rail	45¢	48%
Average (17 cities)	37.2¢*	43%

*average fare



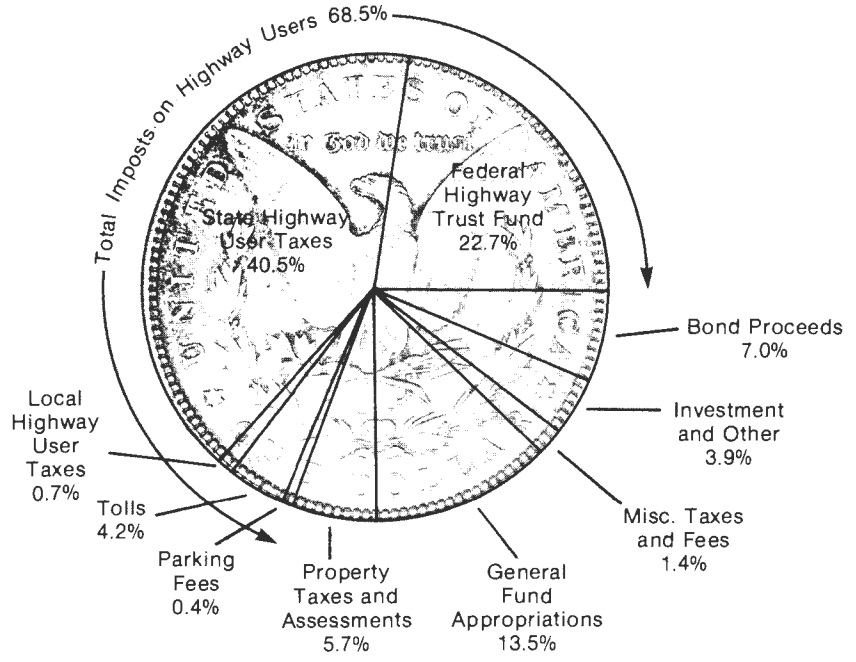
Source: "Transit Fare Survey Shows Subsidy Levels Vary Greatly," Metropolitan, 1978

EX. 20—Operating Deficit as Percent of Total Operating Expenditure for Selected Cities 1975-1976

Vienna, Austria	21%
Adelaide, Australia	36%
Belgium (whole country)	70%
Grenoble, France	50%
Munich, Germany	56%
Kobe, Japan	36%
Arnhem, Netherlands	55%
Stockholm, Sweden	51%
Zurich, Switzerland	26.6%
Derby, England	14%
United States (whole country)	43%

Source: "Urban Transport Policies and National Government Concerns," Organization for Economic Co-operation and Development, 1977

EX. 21—Sources of Highway Funds



Source: The Highway Fact Book, Highway Users Federation, 1977

Other cities such as Seattle, Akron, Birmingham, and Fort Worth have instituted no-fare programs in the downtown area which have induced more shopping in the central business district. These cities are subsidizing low or no-fare programs not only for their social and environmental benefit, but also to spur commerce in the downtown area.

People who object to public subsidies for transit systems often base their objection on the argument that automobiles pay their own way, so transit should also. In addition to the direct costs of owning and operating an automobile, they point out, drivers pay gasoline taxes, tolls, and parking fees which help to finance highway construction (see Exhibit 21).

What these critics overlook is the dollar amounts that highway user taxes don't cover, leaving the balance to come from general revenues. Highway user taxes fund 92% of the cost of constructing and maintaining the highway system. When highway administration and police costs are included, that figure drops to 68% of the cost. In 1976, $7 billion out of general revenues was spent for highways, compared to about $5 billion for public transportation.

Moreover, revenues from highway user taxes aren't sufficient to maintain the highway system. The Federal Highway Administration has determined that the nation's highways are wearing out 50% faster than they are being replaced for lack of funds. One reason for this is that gasoline taxes in the U.S. are among the lowest in the world—around 12 cents per gallon (4 cents federal tax and an average 8 cents local tax). The federal gasoline tax hasn't risen since 1973.

In addition, many highway support services are funded out of state and local general revenues. One out of every 10 local government employees provides highway support services ranging from directing traffic to driving an ambulance or fire truck, and local courts spend more time on automobile accident litigation than on any other type of case.

How Does Public Transportation Benefit the User?

According to its proponents, public transportation offers users a number of advantages over the automobile. One advantage is lower costs. In many cases, it may be more economical to take the bus than to drive a car. In addition, taking public transportation is safer than driving, and can be a lot more relaxing.

Cost Savings

The average bus or subway fare in 1978 was about 40 cents, according to the American Public Transit Association. Because Americans make an average of 2.5 trips per day, their average daily direct cost is $1.

The main alternative to public transportation, the automobile, is far more expensive. Owning and operating automobiles absorbs one-quarter of the nation's personal income. The American Automobile Association has determined that in 1978 the average American paid more than $1,800 per year just to own a car—without driving it a mile. This included:

Insurance	$ 483
Licenses, registration, taxes	90
Depreciation and finance charges	1,238
Total	$1,811

This comes to almost $5 per day. Garage space, another automobile-related expense, costs up to $100 per month in some large cities:

Driving a car costs an additional six cents per mile in 1978 for fuel and maintenance:

Fuel	4.11¢
Maintenance	1.75
Total	5.86¢

If a car is driven 10,000 miles a year, the cost for fuel and maintenance is $586 per year, while the total cost of owning and driving the car is $2,397. Exhibit 22 shows the effect of driving more or fewer miles on the total annual cost. Depending on whether a car is driven 5,000, 10,000, or 20,000 miles a year, the cost can amount to $5.50, $6.60, or $8.20 per day—far higher than the average daily bus fare.

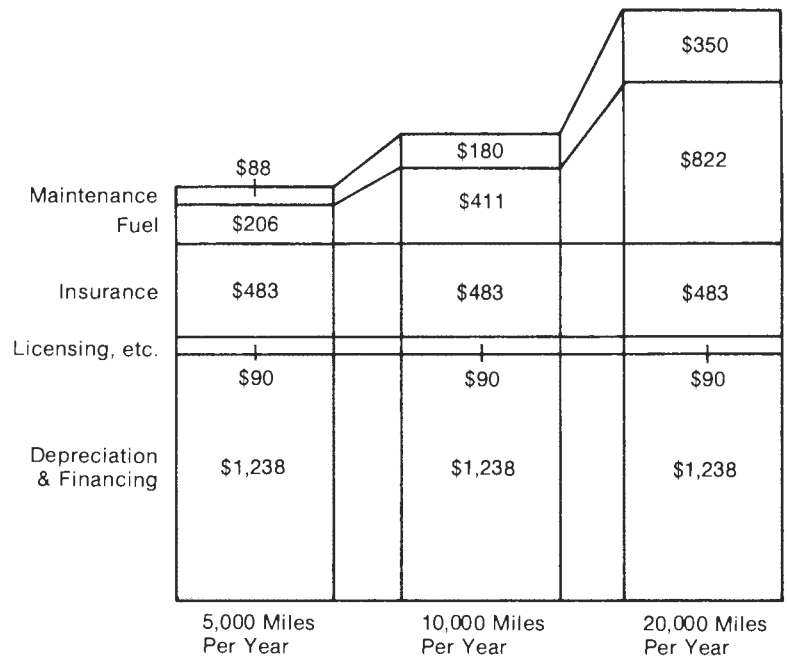
The amount an individual can save by taking public transportation instead of driving depends on whether he owns a car, how much driving he eliminates, and how much public transportation costs in his area. Here are three possible situations:

Situation 1. Jack lives in an area with excellent bus service, so he decides to sell his car and take the bus instead. Because he drove about 10,000 miles a year, he saves almost $2,400 by giving up his car. Jack now takes an average of 2.5 bus trips per day, or about 915 trips per year. With a 35 cent bus fare, his total cost per year is $320. His net savings is more than $2,000 per year.

Situation 2. Most people don't want to give up their cars entirely. Because Sue doesn't like to drive in rush hour traffic, she takes the bus to work, but uses her car the rest of the time. Because she lives nine miles from her job, she had been spending $1.05 a day (18 times 5.86 cents the average fuel and maintenance cost per mile) to drive to and from work. She pays only 80 cents a day to take the bus, for a savings of 25 cents a day, or $60 a year. If Sue had also paid $1 a day to park, her savings would be $320 a year.

Situation 3. The Johnsons, a suburban couple, own two cars. Dan decides to take the commuter train to work instead of driving, so they sell the second car for a savings of $1,000 per year (it's a smaller, older car). He lives 20 miles from work, but only one mile from the train station where his wife drops him off in the morning and picks him up at night, saving 36 miles of driving at a cost of about $2.11 a day (36 times 5.86 cents) or about $548 a year ($2.11 times 260 work days). He also saves $260 a year in parking fees. From his savings of $1,808 ($1,000 plus $548 plus $260) he subtracts the cost of his train pass ($35 a month, or $420 a year). So his actual savings is $1,388.

EX. 22—Annual Cost of Owning and Driving a Car



Source: Your Driving Costs, American Automobile Association, 1979

Safety

Many forms of public transportation are safer than the automobile. For example, in 1977 the passenger fatality rate per 100 million passenger miles was 0.02 for intercity buses, compared with 1.4 for automobiles. While these are intercity statistics (comparative fatality rates for urban transportation are not available), urban public transit is similarly safer than urban automobile travel.

Automobile accidents are the third major cause of death in the United States after cancer and heart disease, and they are the leading cause of death among Americans between 15 and 35 years of age. More than 46,000 people died on the nation's highways in 1975. Another 1.8 million people were permanently or temporarily incapacitated. The Highway Users Federation estimated that the 16.5 million highway accidents in 1975 cost the country $21.1 billion, or about $99 for every person living in the United States.

A shift of more people to public transportation could reduce highway deaths and save the country billions of dollars in medical costs, property damage, legal costs, and lost time due to traffic accidents.

Stress

Many irritable mornings at the office and tired evenings at home have been caused by stop-and-go rush hour driving. Driving during a blizzard or downpour, or on icy streets, also takes its toll on drivers. Studies on driving stress show that rush hour driving causes stress which can contribute to high blood pressure, ulcers, and other ailments.

While riding on public transportation during rush hour also has its drawbacks, it relieves the commuter of the constant decision-making pressures of driving. Well-maintained systems with sufficient capacity for rush hour crowds can offer the commuter a comfortable ride with time to read or nap.

How Does Public Transportation Benefit the Community?

Many people who rarely use public transportation nevertheless support it. In a 1975 survey of New York State residents, almost 60% of the respondents said public transportation is important because it "provides transportation to people without cars." Other reasons given for supporting public transportation were "reducing traffic congestion," "reducing air pollution," "saving energy," and "keeping the downtown area strong." These are benefits that the entire community receives from a healthy transportation system.

Mobility

Most Americans (84% of all households in 1974) own an automobile which is typically their major means of transportation. But many people either do not own a car or do not drive. This group of transit-dependent people includes the poor, the handicapped, the elderly, and the young.

The poor. Of the nearly 18,000 families with incomes below $5,000 per year in 1974, 51% did not own cars. For many of these families, public transportation is their only way to travel about the city. But a 1971 survey by Market Facts, Inc., revealed that while 38% of people with incomes below $4,000 use buses, only 50% of the poor have bus service available. In contrast, only 28% of people with incomes over $15,000 take buses, but 71% have bus service available.

Moreover, transit frequently does not take the poor where they need to go. Most transit routes travel from outlying residential areas to central business districts, but many industries have moved to the suburbs. It is difficult to design cost-effective routes from the older residential areas where the poor and unemployed live to the new suburban industrial sites where jobs are located. Transit agencies are looking at new transportation solutions, such as car pooling and van pooling programs, or subscription bus, to link the unemployed to jobs.

The handicapped. Over 12% of the people in the United States are handicapped. While some handicapped people can drive (or could if their automobile were modified), many also are poor. Others, the blind for example, could not drive under any circumstances. Of those handicapped with physical disabilities, 83% rely primarily on the automoble, the majority as passengers, because conventional transit is difficult for them to use. They are unable to walk several blocks to a bus stop, climb the stairs of a rail station, or stand on a moving vehicle if there are no seats.

Within the last decade, the Urban Mass Transportation Administration has sponsored a number of programs to improve service to the handicapped. Under one such program, UMTA provides funds to non-profit service organizations to operate special transportation for the handicapped. UMTA has developed regulations requiring that all new rail stations, trains, and buses be made accessible, and has developed specifications for an accessible bus with a ramp for wheel chairs and a low floor which can be lowered even further at a bus stop by adjusting the suspension system. UMTA also provides funds for demonstration projects that provide demand responsive transportation (dial-a-ride, for example) for the handicapped.

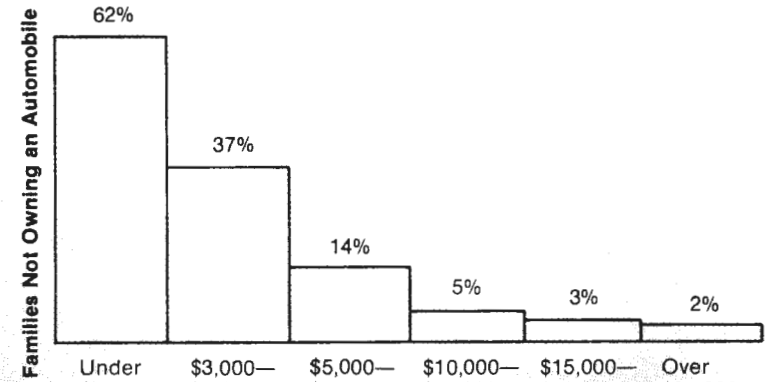
The elderly. For many elderly persons, "isolation is the No. 1 problem," according to Bently Lipscomb, staff director of the Senate Special Committee on Aging. "These people get cut off from the mainstream of human existence.

One way in which the elderly become isolated is through the lack of mobility. Some of the elderly never learned to drive. Others may have given up their cars because of skyrocketing insurance rates for older drivers. While public transportation provides an important alternative, it is not always suited to the needs of the elderly. Bus and rail routes that serve downtown areas may not take the elderly to an outlying senior citizens' center or medical clinic, or to visit friends and family. Moreover, a person who traveled by automobile in the past may find the crowds on public transportation and the need to transfer confusing. Many older people lack the stamina to stand and wait for a bus, especially in bad weather. They also feel particularly vulnerable to street crime.

The elderly often are grouped with the handicapped because they have similar physical disabilities (indeed, 42% of the elderly are also handicapped) and the accessible and demand responsive systems being developed for the handicapped are improving mobility for the elderly as well.

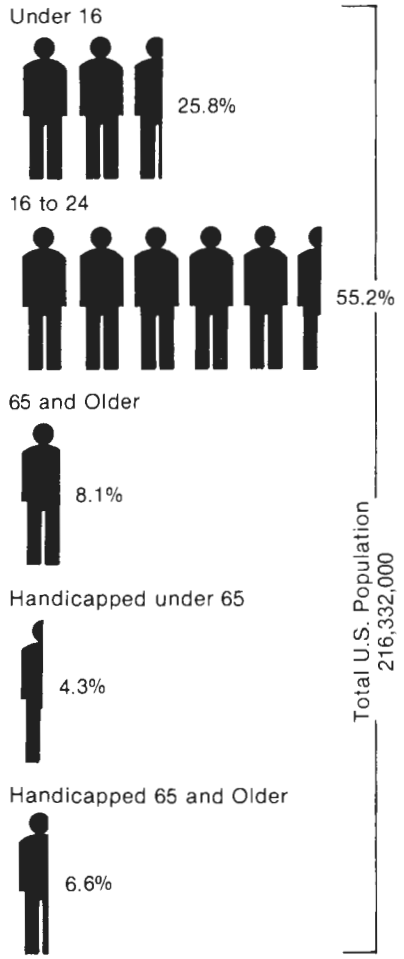
The young. In cities with extensive bus systems, the young can move about easily by public transportation. In other areas, however, children are dependent on adults for rides. Demand responsive transit is often suggested as a way to free parents from becoming chauffeurs to their children.

EX. 23—Automobile Ownership by Family Income 1972-1974



Source: Motor Vehicle Facts & Figures '79, Motor Vehicle Manufacturers Association

EX. 24—Percentages of U.S. Population by Age and Handicap in 1977



Sources: Statistical Abstract of the United States, 1978, Bureau of the Census: Transportation Problems of the Transportation Handicapped, Crain and Associates, 1976.

Congestion and Land Use

One subway line can carry 40,000 people or more per hour. Twelve expressway lanes are required to carry the same number of people in automobiles at average occupancies. Traveling by car with occupancies of one or two people requires on the order of 500 square feet of road space per person, while commuting by bus can take as little as 20 square feet per person. As a result, moving people from cars to buses or trains can vastly reduce traffic congestion and increase travel speeds. For example, if a bus replaced 42 cars on a congested arterial street, the sum of the time savings to the other automobile drivers and passengers could be as great as two hours per mile.

Congestion also increases freight costs. *McCall's* estimates that congestion costs the magazine $50,000 a year in drivers' time. Stanford Research Institute estimated that if a rapid transit system were built in Los Angeles, the reduction in congestion would save truckers $1.2 million in time annually.

Cities build to provide the space needed for transportation. As a result, cities with good public transportation generally are more compact than auto-oriented cities.

In Los Angeles, where most people drive to work, 68% of the land is taken up by streets and highways. In downtown Chicago, which has an extensive bus and rail system, only 36% of the land is roadways. When people travel by automobile, parking lots and gas stations take up additional land, leaving less land for other uses or for green areas.

Using large amounts of land for streets and highways also can lower a city's tax base. The League of Women Voters estimated that in 1965 tax loss due to land clearance for expressways in Minneapolis-St. Paul was two million dollars.

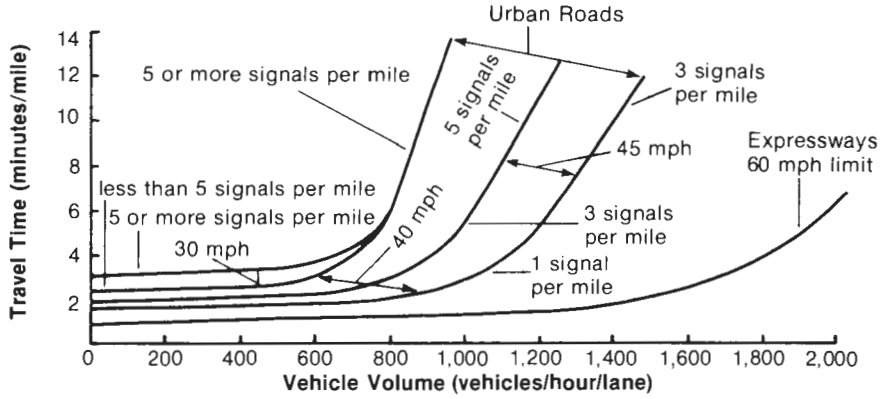
In many cities where automobiles have replaced public transportation, downtown shopping areas do not have enough parking space to compete with new shopping centers at the edge of town. This has led to disuse of the downtown area, economic losses to local businesses, and a less vital city center. Some cities have used public transportation to help turn this process around, for instance, by providing a shoppers' bus service.

Public transportation also affects housing. Residential areas have become less dense, both because the automobile allows people to live further from where they work and shop, and because the automobile requires more space. But studies have found that low density development costs the homeowner more because single family housing is more expensive to build than multi-family units. Low density also costs the taxpayer more because water and sewer lines and roads are longer.

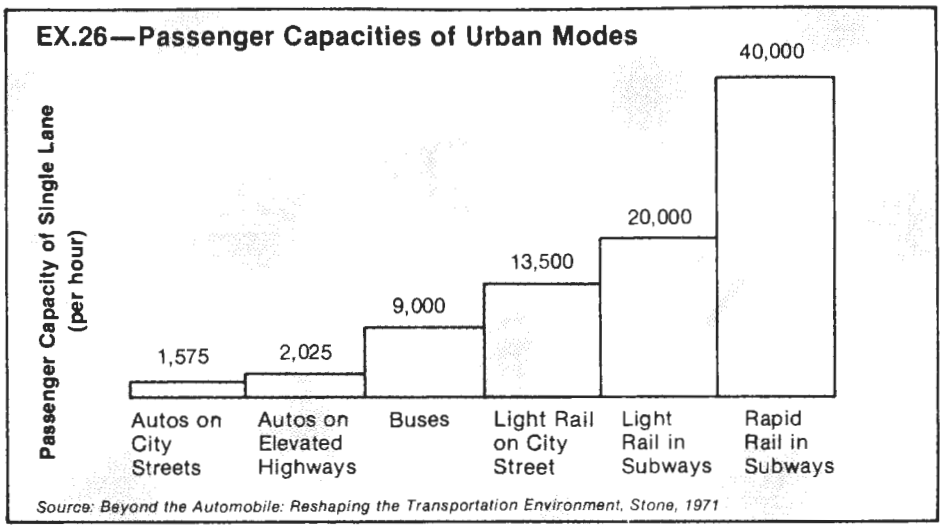
Further, two major causes of air pollution, automobile travel and residential heating (high density housing shares more walls and floors), increase with low density development.

The low density development encouraged by the automobile also affects the agricultural sector. Around 1900, before the automobile was predominant, an increase of 1,000 people in a city required 10 new acres of land. But by the late sixties, an additional 1,000 people required 200 acres of developed land. The White House Council on Environmental Quality has stated that "prime farmland is being lost to residential and commercial development in the U.S. at the 'disproportionate rate' of nearly four square miles a day."

EX. 25—Effect on Congestion on Travel Time



Source: Principles of Urban Transport Systems Planning, B.G. Hutchinson, 1974



Economic Development

Public transportation, by increasing access to an area, attracts economic development. This is most noticeable for rail transit, which carries greater numbers of people than other types of transit, and which is relatively permanent, assuring the developer it will be there 10 or 20 years or longer after his decision to build.

Historically, cities have expanded in areas served by public transportation. In cities such as Boston and Philadelphia and even Los Angeles, residential areas grew up along streetcar lines. The North Side of Chicago experienced a building boom after the North Side elevated rail was completed around 1900. Within 20 years of the rail line's completion, property within a half mile of the transit stations was three times as densely settled as other areas and property values were higher.

Many people maintain that the automobile has reduced public transportation's impact on development, but recent experience shows that public transportation still has an important influence. Between 1962 and 1969, office space in San Francisco increased by 78%; all of the new construction occurred within five minutes' walk of Bay Area Rapid Transit (BART) stations. The chairman of Roos/Atkins, a major San Francisco retailer, said, "With the construction of BART, Market Street has become the finest retail street in this country. It influenced our decision to locate here where we can connect directly into the Powell Street Station."

BART also helped to increase construction in other cities it serves. It encouraged retail and office activity in a previously declining area around the 19th Street Station in Oakland. The City Center Project near the Oakland 12th Street Station is much larger than originally planned due to BART.

The first link of the Washington Metropolitan Area Rapid Transit (Metro) opened in 1976, and while many analysts believe it is too early to see the full effect on development, some building spurts have already occurred. Woodward and Lothrop, a major department store, has invested one million dollars to remodel its downtown store and build an underground Metro entrance.

In the late 1970's substantial interest was emerging from both government and the private sector in joint development, where new construction projects or activity centers are installed close to transit terminals. Sometimes this provides additional options for financing the transit service itself. For example, a local developer constructing a building with direct access to Metro agreed to share his profit with the transit authority in return for the increased access.

While a new transit system's impact on development is more noticeable, existing transit systems also influence location decisions. In a 1978 survey of Chicago area corporate executives, two-thirds of those considering moving said closeness to mass transit is a primary factor in choosing a new site.

Air Pollution

Half of all air pollution comes from transportation sources, and the majority of that has been attributed to the automobile. Moreover, pollution from automobiles is most concentrated in the areas where people live and work.

Denver is a prime example of the harm caused by automobile pollution. Once known for its clean air, Denver now is second only to Los Angeles in air pollution. According to the Environmental Protection Agency, in 1977 Denver had a record 177 days of "unhealthful, or hazardous air." This pollution has been linked directly to Denver's mountain setting, which makes it easier for pollutants to be bottled up in the valleys, and to its high automobile usage, the highest in the nation for a city of its size (825,000 automobiles and trucks for a population of 1.2 million).

A bus is from two to five times more polluting than an automobile, depending on weather and traffic conditions. But if 50 cars are replaced by one bus, air pollution is reduced by 10 to 25 times.

Pollution from vehicles inclues nitrogen oxides, hydrocarbons, carbon monoxide, and lead, which recombine in the air to form photochemical smog and ozone. In high concentrations, these pollutants contribute to respiratory diseases and cancer. But the most pervasive and underestimated effects of pollution are not major illnesses, but headaches, eye irritation, blocked sinuses, and just not feeling good. Estimates of the dollar cost of air pollution in terms of lost salaries and medical costs range between one and ten billion dollars for 1977.

Noise Pollution

While traffic noise is not the loudest noise in our environment, it has the greatest impact on the most people. At 30 miles per hour at 50 feet, light automobile

traffic generates noise in the 50 to 60 decibel range. At 70 miles per hour, the noise level reaches 70 decibels. Sustained noise over 70 decibels can impair hearing.

Noise is not just a hearing problem. It can cause long-lasting, possibly permanent, damage to health. Noise, particularly irregular noise such as honking horns or screeching brakes, creates tension which can lead to headaches, high blood pressure, ulcers, and other ailments.

Energy Use

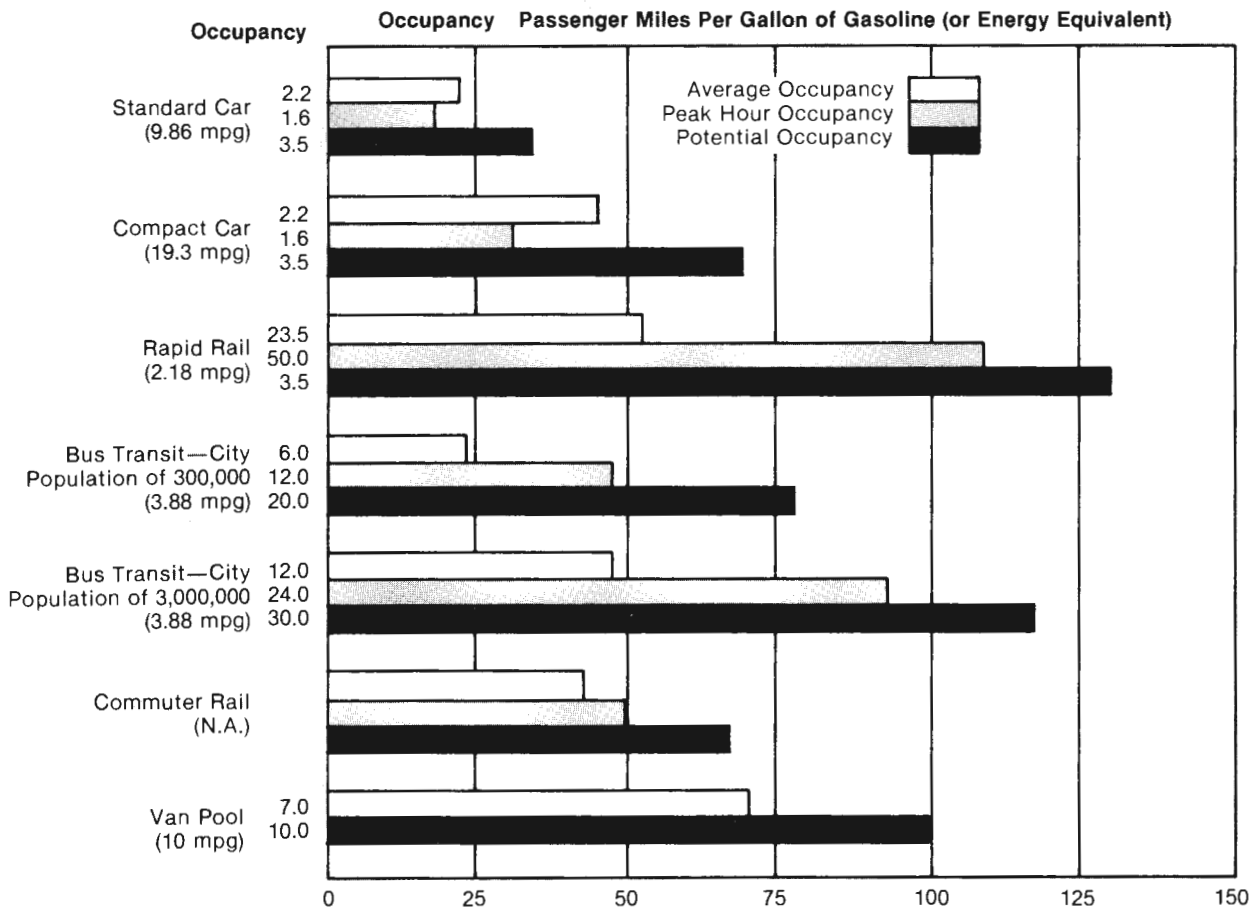
A fully loaded bus is 15 times more energy efficient than an automobile with one occupant. A fully loaded electric rail car is 10 times more energy efficient than a car, and can use fuel other than petroleum. However, buses and trains are full only part of the day. Exhibit 27, which compares fuel efficiencies under three loading conditions (average, peak-hour, and potential), shows that public transportation does not reach its potential in fuel efficiency.

To reach its potential fuel efficiency, public transportation would have to signficantly increase its 4% share of the transportation market. But it is unlikely that an *immediate* increase is possible or cost effective. During rush hour, most public transportation systems operate at capacity. It has been estimated that a sudden shift of only 5% from automobiles to mass transportation would require an additional 9,200 buses at a cost of $920 million. Yet the energy savings from such a shift would amount to only about 0.16% of the total 1970 transportation energy budget because living and working locations in the U.S. are too dispersed for fuel-efficient mass transportation.

Exhibit 28, developed by the U.S. DOT Transportation Systems Center, compares several energy conservation options on the basis of their energy conservation potential, cost, and implementation time. On a short-term basis, reducing speed limits and car pooling are the most cost effective ways to conserve transportation energy.

An even more effective means of reducing petroleum use is to increase the fuel economy of automobiles. The U.S.

EX. 27—Energy Efficiencies of Urban Modes



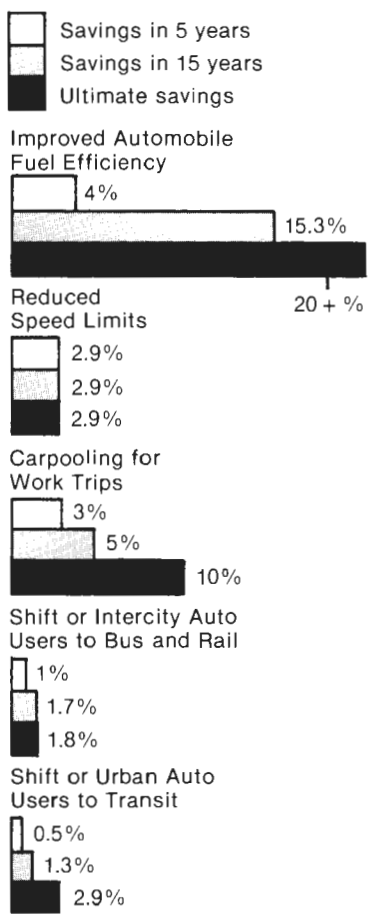
Source: Energy Primer: Selected Transportation Topics, U.S. Department of Transportation, 1979.

Department of Energy estimates that each increase of one mile per gallon in the average fuel efficiency of all cars would save about 400,000 barrels of petroleum per day.

But energy is a long-term as well as an immediate problem, and in the long term, as energy becomes more scarce, living patterns may have to change, allowing public transportation's energy-saving potential to be more fully realized.

However, the importance of public transportation as an immediate energy conservation measure should not be overlooked. If all the trips made by bus and subway in the Chicago area in 1978 had been made by automoble, the U.S. would have had to import an additional nine million barrels of oil.

EX. 28—Energy Conservation Options in Transportation



Source: Transportation Energy Conservation Options, Rubin, Pollard, Honig, 1973

The Energy Supply and the Automobile

Many Americans do not believe that the nation is facing an increasingly serious shortage of petroleum. The conflicting public rhetoric on the subject contributes to that doubt. But three facts establish the reality of a long-term energy crisis:

Petroleum is non-renewable. The supply of petroleum is finite and cannot be regenerated. Moreover, petroleum used for energy cannot be recaptured and recycled. Every tankful of gasoline permanently reduces the world's supply of petroleum.

The supply of petroleum is running out. Experts estimate that approximately 1.6 trillion barrels of recoverable petroleum remain in the ground. Petroleum presently supplies 54% of the energy used by the non—Communist countries. If there is no growth in world petroleum consumption, this supply of petroleum will be depleted in less than 80 years.

The demand for oil is growing. Since World War II, consumption of oil and natural gas has increased at an annual rate of 7 to 8%. Though this rate of increase was sharply reduced following the oil embargo of 1973-74, the growth in demand continues.

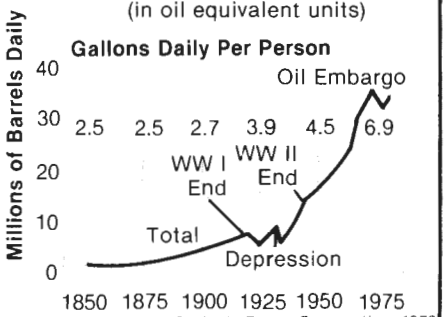
Historically among the Western industrialized nations a healthy, growing economy has been linked to growth in energy consumption. Many economists think that increased energy consumption is a necessary accompaniment to industrialization and economic growth. As Third World countries become more industrialized, they too can be expected to increase their petroleum consumption.

Many experts predict that world demand for petroleum will exceed the available supply in the mid-1980s. The International Energy Agency predicts that the West will face an oil shortage of between 4 and 12 million barrels a day by 1985.

Within the next 20 to 30 years, however, the major issue may not be an oil shortage, but the rising prices that the United States will be forced to pay for foreign oil. The first manifestation of a petroleum shortage is likely to be economic strain.

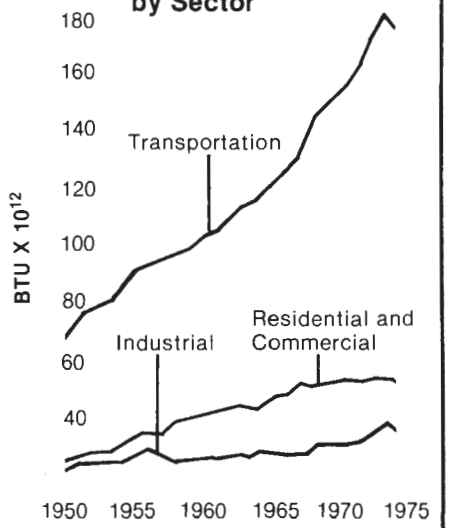
The United States imports almost 50% of its petroleum. By mid-1979, the cost was almost $200 million for 9 million barrels of oil per day, or $60 billion per year. This expense adds to our balance of payments deficit and weakens the dollar. As the value of the dollar drops, petroleum exporters can be expected to raise their prices, which are based on the dollar. The increased fuel prices spur an inflationary spiral, while the balance of payments deficit

EX. 29—Historic U.S. Energy Consumption
(in oil equivalent units)



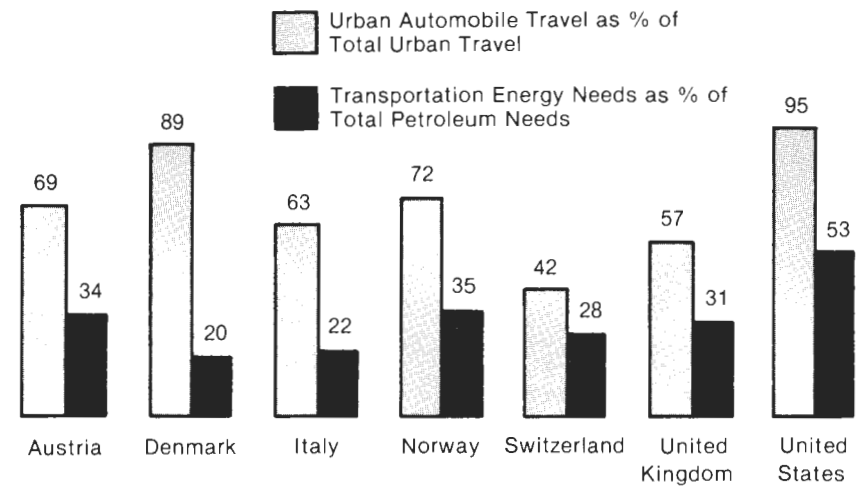
Source: World Energy Outlook, Exxon Corporation, 1978

EX. 30—Petroleum Consumption by Sector



Source: Transportation Energy Conservation Data Book. Loebl, et al., 1976

EX. 31—Relation of Automobile Use and Energy Requirements for Transportation in 1975



Source: Energy Conservation, International Energy Agency, 1976

means fewer total dollars in the U.S. economy. Energy consultant Rod Lemon has estimated that the additional indirect cost of inflation and the balance of trade deficit caused by imported oil is more than $18 per barrel. This cycle can be broken only by reducing our dependence on petroleum.

The Energy Crisis and Personal Mobility

Although petroleum supplies only about half of this country's total energy needs, a petroleum shortage has severe impacts on transportation, as over 95% of transportation energy is petroleum based. During the 1970s, about 50% of our petroleum—25% of our total energy budget was used for transportation. That is higher than transportation allocations in nearly every other Western industrialized nation. The primary difference is our overwhelming dependence on the automobile for personal transportation.

Forty-two percent of the U.S. transportation energy budget is devoted to local travel: shopping, visiting friends, going to work. Because the journey to work is the longest local trip (an average 9.4 miles one way), it alone accounts for nearly 20% of total U.S. petroleum consumption. For these reasons, transportation, in particular personal travel and the journey to work, is a primary focus of our national energy policy.

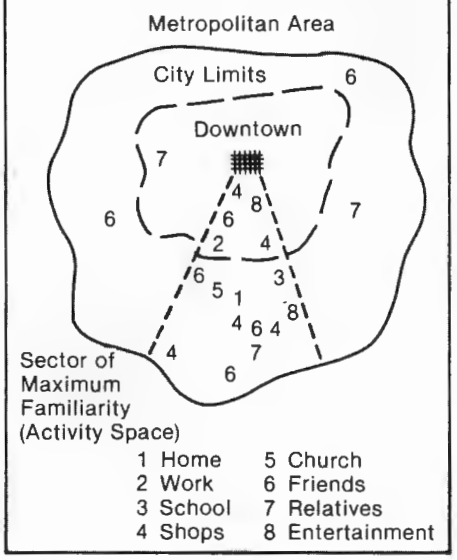
Why Don't More People Use Public Transportation?

Despite the advantages of public transportation, only 4% of all trips taken are on public transit. Reasons include inadequate information on the part of the public about their transit system, the image that many people have of transit, and the inconvenience of transit compared to the automobile.

Information

Inadequate information about the transit sytem can keep the public from perceiving transit's usefulness. Public transportation requires that the rider make the initial effort to learn to use the system. Often this effort is insufficient. A survey in Orange County, Calif., revealed that 40% of the respondents didn't know where the nearest bus line was. Another survey, in Atlanta, indicated that most people were unaware that transit fares there were only 15 cents.

EX. 32—Perception of the City



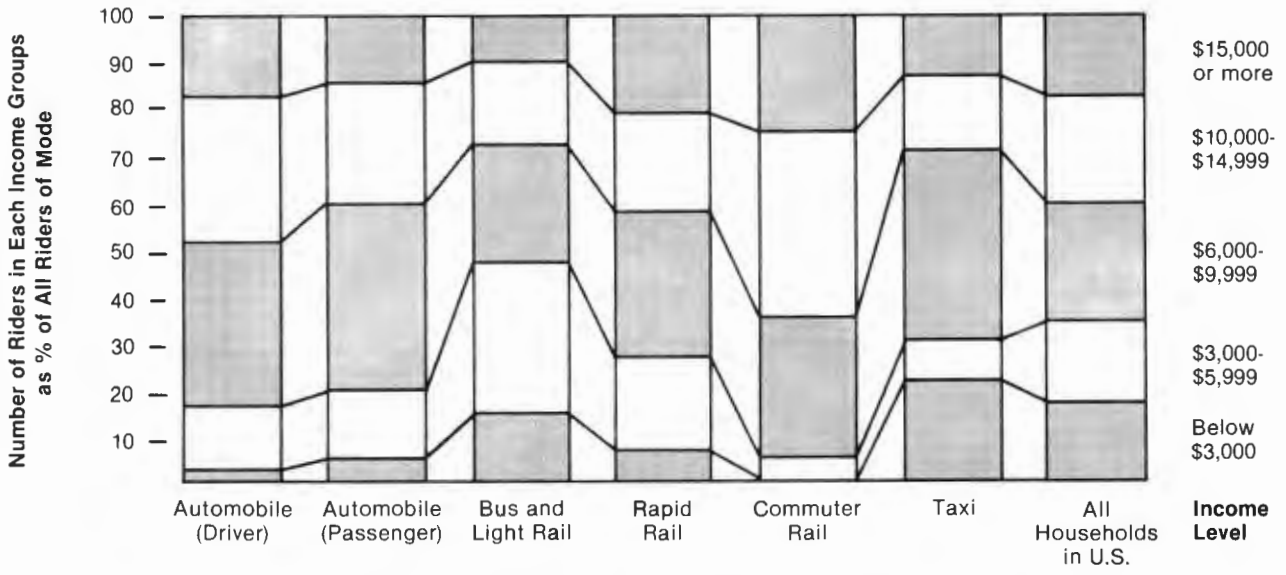
The less people know about public transit, the less likely they are to use it, and the more likely they are to underrate it. In a survey rating the quality of bus service in Portland, Ore., 88% of the riders indicated service was good or excellent, compared with 55% of the non-riders. Similarly, 60% of the riders in Atlanta, but only 31% of the non-riders, rated their system as good.

Further, people's knowledge of the transit system is frequently limited to the small area of the city in which they live, work, and shop (see Exhibit 32). They don't realize that "their" portion of the transit system is only a small part of the entire system.

People who are unfamiliar with the transit system are understandably reluctant to use it. They are concerned that once they get to their destination, there may not be a bus returning when they need it. They are anxious that the trip may take longer than the time they have allotted. If they get on the wrong bus, they may have to wait a long time, or in a bad neighborhood, for another one; in a car, a mistake can be corrected by rounding the block, or by changing direction at the next expressway interchange. If a person gets lost on the transit system, he may have to ask a stranger for help; in a car, he can look at a road map or drive until he sees a familiar landmark.

For those reasons, few non-users voluntarily try transit until forced by bad weather or a gasoline shortage. But this is the very time when transit is overloaded and not operating at maximum efficiency. Thus the non-user's negative perception of transit is reinforced.

EX. 33—Transportation Use by Income Levels in 1970



Source: The Income Characteristics of Transit Riders, Pucher, 1978

Over the last several decades, city dwellers have become less knowledgeable about their transit systems for three reasons: 1) urban areas have undergone a major reorganization; 2) most transit systems have changed substantially; and 3) the automobile has become firmly established as the preferred mode of travel.

Most cities have experienced widespread reorganization of land use. The shopping and industrial centers have shifted to the outskirts, causing major changes in travel patterns. These shifts have been conducive to the use of the automobile.

In order to remain competitive, transit services have been vastly restructured. Frequency of service has been increased, route coverage has been expanded, new equipment has been purchased, and fares have stabilized (as subsidies have increased). But because these changes have occurred at a time of low ridership, the large group of non-users is unaware of them.

Image

Many people see transit as "second class" transportation. Over the past several decades, the typical transit user has come to be perceived by non-users as someone who cannot afford to own an automobile. While this was often true in the past, it has been changing. In recent years, a diverse new group of riders has been attracted to transit.

Many riders today are not "captive," that is, they have other means of transportation. In a 1978 study in Portland, Ore., 66% of transit riders said they use transit by choice. In Atlanta also, 66% of transit riders own automobiles. In San Diego, 81% of transit riders are from households with automobiles, compared with 64% of the general population.

In cities like San Francisco, Cleveland, Boston, and Chicago, rapid rail and suburban commuter rail lines attract riders whose income vastly exceeds that of the average non-rider. A 1974 survey in New York State showed that transit there is used most frequently by middle income groups.

Another image problem transit must overcome, particularly in urban areas, is the perception that taking public transportation is dangerous. Available statistics show that significantly less crime is committed on transit systems than is committed on city streets.

Only 1.1% of all crimes committed in Chicago in 1978 took place on transit property. In 1976, only 421 serious incidents occurred on Los Angeles buses, which carry 282 million passengers a year: 1.5 crimes per million passengers. Similar figures are available for other transit systems. In fact, a 1970 study shows that for most major crimes against persons, transit property is safer than streets, homes, workplaces, schools, or taverns (see Exhibit 34). The only place with a lower crime rate than public transit, according to the study, is parks.

This is not to say that crime is not a problem on public transportation. But the patterns of crime are generally predictable: higher risk rapid transit stations generally are those located in the high crime areas of the city; crime rates are highest in off-peak hours—at night and on weekends. With this knowledge, transit operators can boost security in high-risk areas and during off-peak hours.

Because fear of crime is an emotional issue, newspapers and non-riders emphasize crime perhaps more than it deserves. A study conducted on a Milwaukee bus line showed that riders consistently rated frequency of service, fare level, travel time, and convenience of route as more important than personal security.

EX. 34—Place of Occurence for Major Crimes Against Persons (except homocide)

Place of Occurence	% of Crimes Committed
Street	40.1
Residences	31.1
Taverns & Liquor Stores	4.5
School Property	2.9
Businesses	2.3
Taxis & Delivery Trucks	1.5
Transport Property	1.0
Parks	0.7
All Other Premises	16.0

Source: Reduction of Robberies and Assaults of Bus Drivers, Volume II, Misner and McDonald, 1970

Inconvenience

Even for a rider familiar with the transit system, inconvenience may prevent using transit. In a 1976 study of the Syracuse transit system, convenience was determined to be a much larger factor than cost in influencing ridership.

In Milwaukee, reduced waiting time and arriving on schedule were two of riders' major concerns. In Lafayette, Ind., having a bus stop within a block was riders' most important concern. Riders want convenience above all, and in most instances are willing to pay higher costs for it.

But convenience is largely a matter of habit. People frequently find those things with which they are not familiar to be inconvenient. They may perceive waiting for a bus to be inconvenient, but not waiting in congested traffic or searching for a parking place. Similarly, many transit riders who read while they ride would find driving inconvenient.

Other problems may result from a mismatch between the services available and the pattern of trips potential riders have to make. This is especially true in the suburbs, and has resulted in the growth of paratransit and neighborhood bus systems for local trips. This new class of services can substantially improve the flexibility and convenience of transit.

It is hard to claim that a bus or train can beat the door-to-door and ready-when-you-are aspects of the automobile, but the inconvenience of transit is often overstated.

Transit eliminates the bother of dealing with flat tires, dead batteries, accidents, and gas lines. In bad weather, a professional transit driver deals with the poor visibility, slippery streets, and other irritable drivers.

The point is, transit and the automobile both have their good and bad features, and which one a person thinks is most convenient depends on what he is used to.

What Are Operators Doing to Improve Public Transportation?

Prior to 1970, transit operators viewed public transportation as a standard, utilitarian service. In the early 1970s, however, this attitude began to change, and transit operators began to view their service as a commodity to be marketed in a highly competitive consumer marketplace. In marketing public transportation, operators have followed a three-part approach; finding out what the public wants, expanding and improving service, and telling the public about their service.

Surveying the Market

In the early days of public transportation, captive transit riders had no voice in what services transit operators provided. But in the 1970s, after a long decline in transit's share of the transportation market, operators began making an effort to find out what services riders and potential riders want, and then to provide those services.

One way transit operators are finding out what services the public wants is by conducting surveys. For instance, a Metropolitan Transit Authority survey taken in New York City showed that subway cleanliness was high on the public's list of desired transit improvements. The result was "Operation Facelift," a program to repaint 84 of New York's most heavily used subway stations and to install better lighting, more platform seating, and new signs.

Expanding and Improving Service

Millions of dollars are being spent to build new systems and to extend and modernize existing ones.

New service. In the past few years, several cities have begun new rail systems to move people quickly and efficiently and to reduce central city congestion and pollution. In June of 1979, Atlanta put into operation the first 6.7 mile segment of MARTA, its rapid rail system. All stations and cars are fully accessible. The cars are carpeted and air conditioned for maximum passenger comfort, and can travel up to 70 miles per hour.

Also in 1979, Miami broke ground for a 20.5 mile elevated rail system and Washington, D.C., completed the first 26 miles of a projected 101 mile rapid transit system.

Other cities building new transit systems include Buffalo, Baltimore and Pittsburgh.

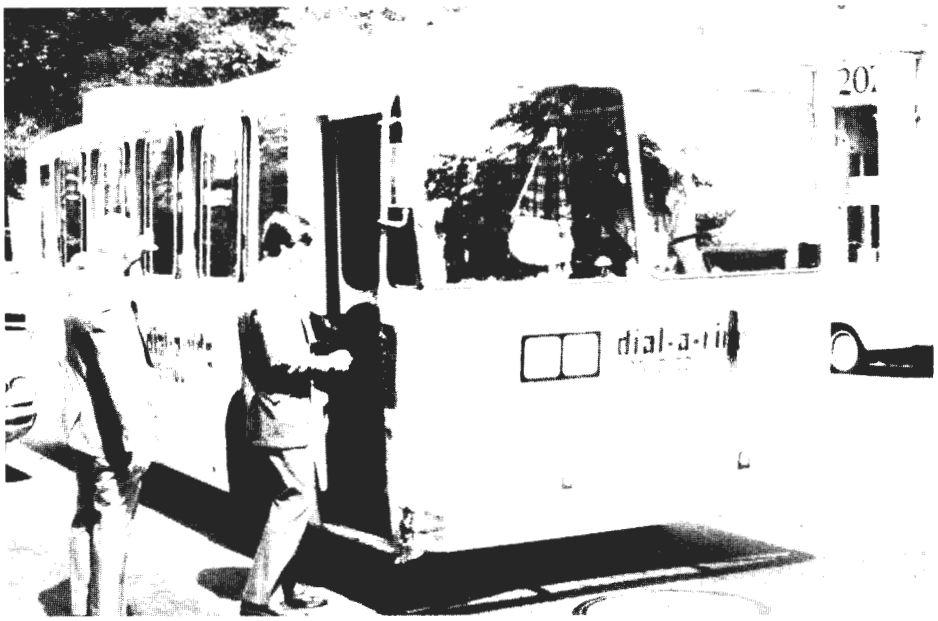
Expanded service. A number of cities which already have transit systems are extending routes to provide better service to riders:

- In San Francisco, BART plans to implement direct Richmond/Daly City service.
- Dallas plans to expand its bus service by 5% in 1980.
- Philadelphia is constructing a rail link between the airport and the central city.

Modernized service. In addition, cities with older systems are purchasing new equipment to carry passengers more comfortably, modernizing stations and making them accessible to the elderly and handicapped, and adding such conveniences as bus shelters and bike racks.

Cleveland, for example, has begun a $270 million capital improvement program which includes bus and rapid transit construction, new transit equipment, 750 bus shelters, and rehabilitation of 16 heavy rail stations and parking lots by the end of 1980. Another city, Chicago, has scheduled a modernization program to provide five rapid transit stations with elevators and escalators to service the elderly and handicapped. The Chicago Transit Authority also plans new public address systems for all 140 rapid transit stations. Boston, too, is modernizing and expanding its transportation system, spending $1.8 billion over several years to provide access for the elderly and handicapped, and to improve circulation, noise levels, lighting, comfort, and safety.

New technology. For several decades a bus was a bus. Automobiles went through numerous design changes, but buses remained the same. Recently, however, as more capital has been allocated to public transportation, funds are available to design vehicle improvements.



"Dial-A-Ride" is one of the many demand response options available to meet local service needs.

Photo Courtesy of Transportation Systems Center, U.S. Department of Transportation

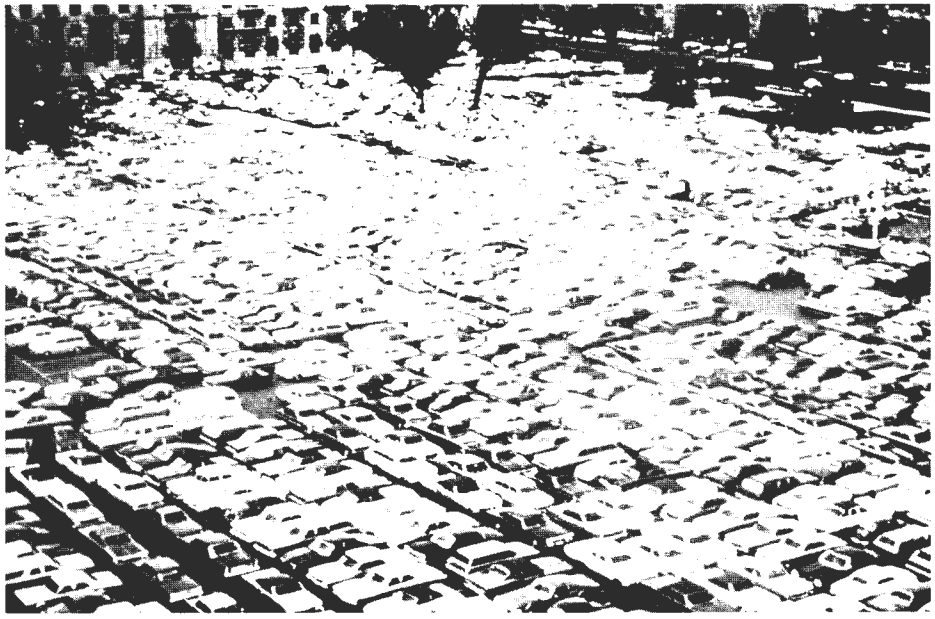
One significant design change has been the kneeling bus. The front end of the bus lowers to curb height to allow easier entry for the elderly and handicapped, then rises to conventional height for driving.

Another new generation vehicle is the articulated bus, an extra long bus with an accordion-like section in the middle. This section moves independently to enable the bus to maneuver more easily. Designed for large capacities, the articulated bus provides a more comfortable ride on heavily traveled routes. It also helps to keep transit costs down, since the passenger-driver ratio is higher in these vehicles.

Automated guideway transit systems, sometimes called people movers, are another outgrowth of the new technology in the transit industry. They consist of driverless closed vehicles which move around a single or double lane track. An 8.7 mile single lane automated guideway system in operation in Morgantown, W. Va., carries some 23,000 passengers a day in its fleet of 73 computer-controlled vehicles. Similar systems are being considered for several other cities, including Miami, Detroit, Los Angeles, and St. Paul. Automated guideway systems can help revitalize cities by providing a cheap, safe, and reliable way of moving around within downtown areas.

New kneeling bus designs facilitate transit for the elderly and handicapped.

Photo Courtesy of Washington Metropolitan Area Transit Authority



Downtown parking lots can occupy large portions of valuable real estate.

U.S. Department of Transportation photo

New types of service. Transit operators are also introducing innovative types of services to bring public transit to more riders.

Some operators are providing, or are assisting employers to provide, ride sharing programs at sites which are hard to serve with buses. The Minneapolis Transit Commission (MTC) sponsors a project to help employers establish car pool, van pool, or subscription bus programs. If an employer selects van pooling, a van leasing company under contract with MTC provides the company with vans and collects the fares. Commuter/drivers transport 10 fellow employees to and from work at a cost of between $1.50 and $2 per day.

Subscription bus service is similar to van pooling, but the transit company provides the transportation. Seattle Metro transit planners custom designed a subscription bus service for a garment company. The bus picks up company employees in downtown Seattle and three other neighborhoods and takes them directly to work.

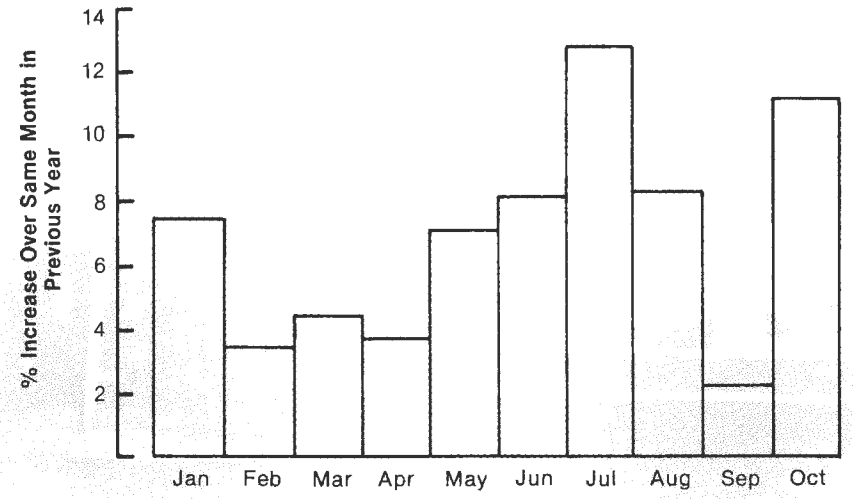
Another new service being offered in some communities is a dial-a-ride, a form of personalized service on a public transit system. The rider calls for a vehicle, specifying his origin and destination, and commonly receives nearly door-to-door service. However, because he shares the vehicle with other riders, trip costs are kept down.

To improve service for traditional transit riders, many transit operators are providing park-and-ride lots in outlying areas. From the park-and-ride stations, many of which have indoor waiting areas or bus shelters, riders generally have access to several bus routes.

Improved security. Although only a small percentage of crime is committed on public transit, transit operators are implementing programs to make transit safer:

- In 1979, Philadelphia spent $10 million for a closed circuit television surveillance network for rapid transit stations throughout the city.
- New York has its own 2,800 person Transit Police force, and spends $100 milion a year to police its rapid transit system.
- The Chicago Transit Authority (CTA) in 1979 initiated a Safety Aide Program to augment the 260 police who patrol the trains and stations. CTA also sought funds from the Illinois Law Enforcement Commission to hire off-duty police to ride buses in high-crime areas.
- San Diego Transit experimentally installed cameras in buses as a crime deterrent. The cameras virtually eliminated interior vandalism and driver harassment.
- New systems, like Washington's Metro, have used architecture to reduce vandalism and crime by eliminating columns and closed stairwells and leaving stations fully open to view.

EX. 35—Transit Ridership Growth in 1979



Source: Passenger Transport, 1979

Providing Information

Because lack of information prevents many people from making greater use of public transportation, one way operators are working to promote transit is by providing more and better information to riders and potential riders.

In Fort Worth, City Transit Service officials installed displays showing schedule information in more than 100 neighborhood bus shelters and at 60 major downtown bus stops. Each information station shows arrival times for all routes using that stop, as well as a system map, fare information, and points of interest.

Baltimore produced an illustrated pocket-size users guide to acquaint passengers with the new features of advance design buses. The booklets explain the kneeling system, the new chime strip and rear door exiting.

Transit operators also have initiated promotional campaigns and have hired advertising agencies to tell the public about the benefits of the transit system.

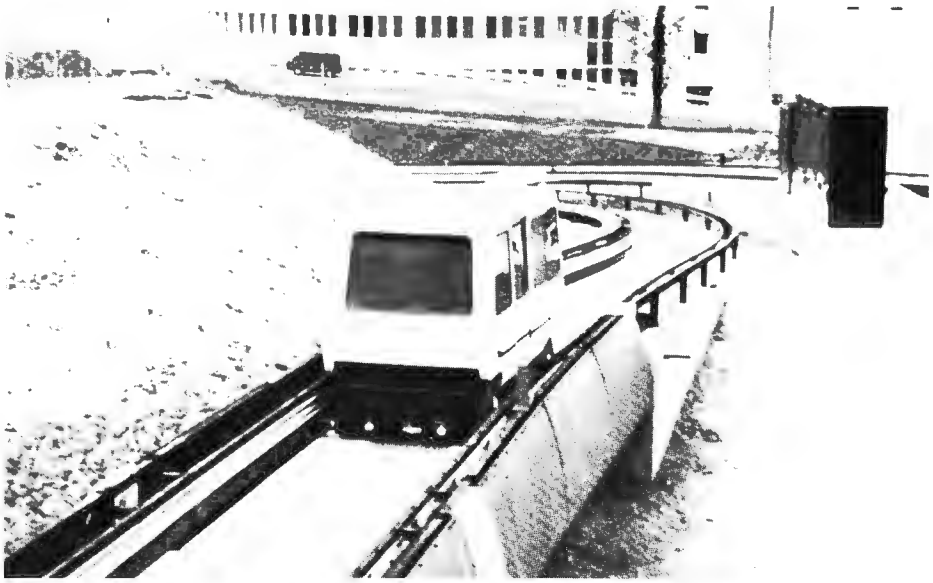
The Rhode Island Public Transit Authority instituted a promotional campaign highlighting the energy crises. Newspaper ads offered readers a comparison chart to figure out their commuting costs. A radio station gave away coupons good for a free ride on any RIPTA bus, and aired 30 second "Bus Facts" every hour. The bus facts covered commuting costs, and how, when and where listeners could catch a bus.

In Peoria, Ill., the business community, in cooperation with the Greater Peoria Mass Transit District, offered a "Fare Deal" program. Bus riders received a Fare Deal Coupon which they could exchange at 170 participating businesses for a free bus ticket home.

Citizens called for jury duty in Dallas received in their official summons package a pass good for a free bus ride to the courthouse. Dallas Transit

Articulated buses with bending characteristics can carry more passengers down congested streets

Photo Courtesy of Washington Metropolitan Area Transit Authority



This People Mover in Morgantown, WV. loops along a designated path without the need of an operator.

U.S. Department of Transportation photo

Poster developed by the U.S. Department of Transportation & The Advertising Council.

System made the offer to reduce traffic congestion and alleviate parking problems in the downtown area, as well as to introduce bus riding to the more than 4,000 persons summoned each week.

Other transit systems have experimented successfully with prepaid passes and discount tickets to promote ridership. Boston, for instance, had a 49% increase in monthly pass-holders in 1978 over 1977.

The Results

Do these efforts accomplish their intended purpose—to improve public transportation's image and increase ridership? The answer would seem to be yes.

According to *Monthly Transit Ridership*, a publication of the American Public Transit Association, transit ridership has been increasing. Some 350 million more riders took public transit during the first eight months of 1979 than during the same period in 1978. August of 1979 marked the 25th consecutive month that ridership had risen compared to the same month of the previous year. This is the longest period of consecutive increases since World War II, surpassing the 16-month record previously set as a result of the oil embargo of 1973.

But the best evidence of public transportation's improving image is the public's willingness to support it. A survey conducted by Hart Research Associates, Inc., in December 1977, found that nearly two-thirds of all Americans want more government spending on public transportation. Thirty-seven percent of respondents nationwide indicated 'much more' money should be spent on public transportation, and 25% indicated 'a little more' money should be spent. Asked about future transportation needs, 54% said more buses are needed, while 26% specified more freeways and 23% called for more major roads and streets. The results of this survey suggest that people recognize the need to support public transportation, and that they were willing to use tax money for this purpose even before the gasoline crunch of 1979.

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