



# Transportation

# and the Urban Environ- ment



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National League of Cities

*Top*

*In many older European towns and cities, where streets are narrow and winding, priority lanes and specially designed vehicles make the use of transit an attractive and enjoyable alternative to the auto.*

*Special accommodations for passengers and coordinated traffic systems allow the transit vehicle to skirt congested auto lanes, and reduce trip time for transit users.*

*Middle*

*Although a city of narrow winding streets and canals, Amsterdam has closed many streets to all but pedestrian traffic, allowing deliveries during non-shopping hours, and making a pleasant setting for the famous flowers of Holland.*

*Bottom*

*The OECD delegation visited Delft, a small town in the Netherlands which has taken advantage of the woonerf system and has succeeded in bringing human scale back to a city that was being engulfed by the automobile.*

A report on the Seminar on Urban Transport and the Environment, held July 10-12, 1979, by the Organization for Economic Cooperation and Development and the European Conference of Ministers of Transport.

Published by the National League of Cities, 1620 Eye St. NW, Washington, D.C. 20006, July 1980

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Cover and interior photography by Diane Enos except as follows: p. 14, bottom, by Howard Simkowitz, p. 40 top and lower right courtesy of French Government Tourist Office, p. 40 middle courtesy of Belgian Institute of Information, and p. 40 lower left courtesy of Canadian Government Travel Bureau.

Prepared under project number DC-96-0007 from the United States Department of Transportation, Urban Mass Transportation Administration and a grant from the German Marshall Fund of the United States. The contents of this publication reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the views of the National League of Cities, the German Marshall Fund or the official views or policy of the U.S. Department of Transportation. This publication does not constitute a standard.



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# **Transportation and the Urban Environment**

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# Transportation Here and Abroad

BY JESSIE M. RATTLEY,  
PRESIDENT,  
NATIONAL LEAGUE OF CITIES

Transportation has become one of the chief factors affecting the quality of the urban environment. As the economy of America's cities comes to depend less on industry and more on services, transportation—automobiles, trucks, utility and maintenance vehicles, pedestrians and even bicycles—assumes a greater importance in environmental considerations. The pollution one notices on a city street today is more likely to be automobile exhaust than factory smoke; car horns, trucks and motorcycles make continuous noise; and clogged intersections create visual and physical barriers in downtowns across the country.

At the same time that unrestrained urban congestion and resulting transportation problems threaten to strangle our cities, we have learned how to control transportation and use it creatively to defeat its own worst tendencies. We have learned new ways to handle traffic: traffic collars and zones to keep the worst congestion out of the downtown, restraints on parking, pedestrian malls and transit malls, and preferential networks for certain kinds of traffic. We have learned how to combine environmental concerns with traffic control to protect neighborhoods, open up safe areas for non-automotive use, reduce noise and air pollution, and create alternatives to destructive freeway construction. City officials can now choose from an arsenal of economic means to achieve these goals, using special fares as an incentive for transit riders, special taxes on certain kinds of downtown traffic and on downtown merchants to make sure that those who benefit from traffic improvement pay for it, and land-use policies to increase tax bases while controlling transit ex-

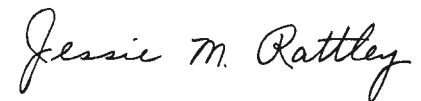
cesses. We are still discovering alternatives to conventional transit, increasing our reliance on public transport and, in many cities, making a significant investment in bicycle and pedestrian thoroughfares.

City officials in the United States can take pride in many native innovations, but we should also look with respect and interest at the successes of other cities in other countries. Different historical, economic, and cultural forces have shaped solutions very different than—and perhaps superior to—our own.

The Seminar on Urban Transport and the Environment, jointly sponsored by the Organization for Economic Cooperation and Development and the European Conference of Ministers of Transport, July 10–12, 1979, gave a group of U.S. officials an opportunity to take just such a look at transport solutions in other countries and to share American solutions with their counterparts.

This volume, published by the National League of Cities with funds from the Urban Mass Transportation Administration, U.S. Department of Transportation, is intended to make that information available to city officials across the nation. It includes several overviews of the seminar

from a number of different perspectives and summary data on the 16 cities examined as case studies for the seminar. Also included is a list of participants in the seminar, along with addresses, so that the vital exchange of information between city officials of the U.S. and other countries on this important subject can continue on an individual basis.



# A Starting Point for the 1980s

BY RONALD J. FISHER,  
CHAIRMAN, GROUP ON TRAFFIC  
POLICY

Whatever their differences, cities around the world share a common problem: how best to transport their citizens in and around urban areas without destroying vital residential and commercial areas. Attendance at the July 1979 Seminar on Urban Transport and the Environment testified to the growing worldwide search for solutions to urban problems. More than 300 representatives of 24 member countries of the Organization for Economic Cooperation and Development (OECD) met in Paris to share their experiences and study successful innovations in urban transport.

U.S. delegates found it especially valuable to study the successful and not-so-successful schemes tried by other countries; only recently has the United States recognized that the automobile is strangling its cities and that something must be done to relieve the situation. The United States thus had the benefit of other countries' longer experiences in dealing with the problems of urban blight, scarce resources, and high energy costs. The results of innovative schemes employed in other countries can be of inestimable value to U.S. planners and government officials. These individuals must recognize, however, that what works in one country cannot be transplanted into another country with a different political, social, and economic climate.

A common theme ran through the 16 case studies of cities considered as outstanding examples of urban transport innovations: all are experiencing slower urbanization, growing economic uncertainty, scarce resources, and increased citizen participation in the

decisionmaking process. Because of scarce resources, most innovations involve low-cost transportation management improvements. At the same time, putting management-oriented policies into effect has become increasingly difficult because of the unstructured and sometimes elusive nature of citizen support groups.

Delegates stressed repeatedly that increased citizen interest and involvement make it essential that objectives for an intended traffic policy be well defined and that the policy be understood and supported by the public and political leaders. A close technical/political alliance is necessary, therefore, for the success of innovations in transportation systems management.

Ideally, the interchange of information that took place during the Paris seminar will continue into the 1980s. It is certain that continuing energy constraints and environmental pressures will heighten the need for public policies that influence transportation supply and demand as well as for better management of existing resources.







# **Transportation and the Urban Environment**

# Urban Transport Today: A Global View

BY NEAL PEIRCE

A powerful idea and a grave reality came together when delegations from the 24 nations of the Organization for Economic Cooperation and Development met in Paris in July 1979 to consider "Urban Transport and the Environment."

Out of the merger of the idea and reality may come a synthesis that will profoundly affect the movement of peoples and the physical face of the world's cities.

The idea is one that has been gathering momentum through the 1970s—that the automobile, however great its advantages for personalized, direct transport, has monopolized so much space in cities, has created such a profusion of environmental problems, and indeed has disrupted the whole fabric of urban life to such a degree that it must be restrained for the benefit of society.

There was no official place on the Paris agenda for consideration of the automobile's future. Yet at the seminar's conclusion the general rapporteur, C. Kenneth Orski, reported that "deliberately or not, our discussions . . . have been a wide-ranging exploration of alternatives to a life style based on the unconstrained use of the private automobile."

As the Paris discussions made clear, the world's initial efforts to restrain auto usage are already apparent in the growing number of inner cities reserved chiefly or entirely for pedestrians, in major efforts to revive and expand public transportation, in a fresh interest in "foot-borne" and bicycle movement, and an array of small-scale transit innovations summed up under the title of "paratransit." It was clear from the delegates' comments and the case studies presented that these innovations represent a fledgling movement and are still subordinate to the overwhelming presence of motorized vehicles. Yet from virtual ground zero in the late 1960s, the alternative transport efforts have spread to virtually all developed and many underdeveloped countries.

The grave reality that may give impetus to efforts to restrain the automobile is that of limited resources—limited supplies of capital, limited tax resources, and above all limited petroleum supplies. The Paris seminar came directly in the wake of the latest—and massive—OPEC oil price increase, sure to represent a major economic burden for nations in all continents. Americans came with fresh memories of severe spot gasoline shortages, and long lines at service stations. And the delegates at Paris—like national leaders in virtually all countries—were aware that whether or not their own lands had yet suffered shortages, most predictions are for severe curtailment of world oil production by the 1990s if not the mid- or later 1980s. The problem of the Western world's "debilitating dependence" on petroleum, it was suggested at the final session, will be a primary challenge for the remainder of this century.

The fact that "time is now short to manage our cities for a low oil diet," according to conference chairman David Bayliss, of the Greater London Council, was the fact which most significantly distinguished the 1979 seminar from the OECD's only prior conference on urban transportation—a 1975 meeting on "Better Towns with Less Traffic."

## Thrift, Management and Caution

Energy and public tax resources, noted Jean Costet, France's Director-General of Inland Transport, at the opening session, "are becoming rare and valuable assets in the same way as space, air, silence, or nature." The question of the conference, he suggested, was quite simply: "Can one shape the development of the urban transport system in such a way as to ensure at the same time more thrifty manage-

### Top

*In addition to heavy fines for illegal parking that interfere with transit, French officials rely heavily on the use of limited underground parking to reduce the visual pollution of the auto parked on a city street. This opens up additional lanes to relieve congestion as well. Pedestrian zones that are well marked and landscaped are bringing people back to the streets of Paris.*

### Bottom

*As a part of its traffic management plan, RATP (Regie Autonome de Transports Parisiens) has imposed heavy fines for parking violations, especially those involving autos parked in reserved traffic zones or lanes. Fines can range as high as \$50 in the Paris region.*





*Limited parking in  
woonerven, strict speed  
limits, and right of way given  
to pedestrians allow children  
to play near their homes in  
Delft, without fear of  
speeding autos.*

ment of the three major resources, that is, the human environment, energy, and public money?"

Conservation, caution, careful management, a go-slow approach to major capital investments—these were the strong undercurrents of the seminar, whose participants included many of the chief actors in urban transportation reform from nations around the world. Why such extreme caution? Because, Bayliss suggested, so many failures had emerged from the rapid economic growth and urban redevelopment programs of the 1950s and 1960s. The growing concern of our time with air pollution and noise, neighborhood safety, energy scarcity and fiscal austerity, he suggested, "point to policies of conservation, rehabilitation, and more efficient use of existing facilities coupled with highly selective change and development."

Translating those principles into transportation specifics, Ariel Alexandre and Christian Avérous of the OECD Environment Directorate suggested in a background study for the seminar that instead of building expensive heavy rail mass transit systems or freeways, the new approach should be to make better use of transport facilities that already exist—roads, buses, taxis, light rail, and the like. Better use, they suggested, should come "through comprehensive and innovative management, building heavy infrastructure only as a last resort." In present-day transportation planning, they proposed, the emphasis should be changed "from moving vehicles to moving people."

Historically, the builders of cities and great economic enterprises—from the empire builders of ancient times to the automobile multinational firms of our own—have manipulated transportation systems for their own purposes, constantly building, paying little if any heed to the human or environmental consequences of their actions. Yet here, funded by their own governments, some of the world's noted authorities in urban transportation were assembled to offer radically unconventional counsel for the future. In place of constructing, they suggested recycle and reuse; in place of grand schemes for the city of power and prestige, they would make the city more habitable for humans; in place of unfettered consumption, they would conserve.

Their counsel, if heeded, would profoundly affect patterns of human settlement and the human environment. And the management of which they speak seems to go further than normal measures of efficiency, input and output, to a sensitive consideration of resources, both human and physical, and how these can be combined, nurtured and balanced to create a feasible, livable, as well as enjoyable urban existence.

## Ramifications of Automobility

In earlier decades, much or all of the discussion might have been viewed as nostalgia for some urban order hopelessly outmoded by the fact of the modern automobile and consumers' overwhelming choice of that form of conveyance, whenever they find it affordable. Delegates to the seminar presented figures showing the phenomenal expansion of "automobility" in the past two decades: in Japan from scarcely any private autos in 1950 to 20 million in 1977, in

Western Europe from 18 million in 1950 to 231 million in 1976 (a 1,183 percent increase), in North America from a fleet of 43 million to 119 million in the same time span. Automobile manufacture and servicing, they reported, account directly or indirectly for up to 5 percent of employment and a like percentage of the gross national product in OECD countries—scarcely a trifling economic force. In most modern countries, the auto is a "sacred cow." And cost factors, it was suggested, won't do much to change that. A Greek delegate noted that in his country, even \$3-a-gallon gasoline and \$17,000 prices for new cars hadn't stopped the growth in automobile ownership.

Contrasted with public transport, automobile usage was reportedly ever more popular because of suburban development, growing distances between home and work, the increasing tendency for women to go out to work, increasing part-time work, and more leisure time.

But the urban transportation experts gathered in Paris appeared to have foreseen the drawbacks of the automobile-dominated city. The auto, according to research papers prepared for the seminar, "is a bringer of traffic congestion, noise, air pollution, highway accidents, and the segmentation of districts by fast highways." Society's subsidization of the private auto is immense, particularly in downtowns, it was reported, "and results in gross misallocation of society's resources." A background paper by Gabriel Bouladon, former director of programs at the Battelle Institute (Geneva), placed conservative estimates on the cost to society of the congestion (time wasted by road users), accidents (not covered by insurance), air and water pollution and noise, vibration and visual intrusion of automobiles and trucks. The costs of these disamenities, Bouladon concluded, are two to three times what auto users pay in taxes and fees and are 4 to 7 percent of the gross national product of OECD nations.

The greatest concern of the delegates relates, naturally enough, to the auto's impact on the city. Dietrich Sperling, German Bundestag member and Undersecretary of State in his country's Ministry for Regional Planning, Building and Urban Development, expressed a rather general seminar sentiment in an opening address:

*The car conquered the living space, it became a part-time occupation force, and in one effect it forced the people out of the city. Finally suburbs grew at the expense of the "urbs" (cities) in a self-enforcing vicious circle. . . .*

*What seemed to increase private and individual wealth—possession of individual private cars—led into public and collective poverty, as soon as the massive use of private cars produced traffic jams, destroyed the public green, (and) confined streets to driving and parking only. . . .*

Yet the city is an irreplaceable asset for civilized life, Sperling observed: "Even the most beautiful suburbs need the 'urbs.' They need central cities, 'downtown centers,' not 'central suburbs.' The shopping center cannot replace the city. And the city is a place which mixes the different activities of private and public life: retail trade and administration, recreation and housing, playgrounds, schools, window-shopping."

There are those, of course, who question such a strong need for cities in a modern world of high mobility and telecommunications efficiency. But these individuals were not represented at the Paris meeting. And, even if they had presented their views, they would surely have been answered with the assertion that the energy imperative makes our cities as indispensable in the late 20th century as they were in earlier times.

To steer the world's cities down the road of less automobile and oil dependency, the delegates in Paris discussed a long list of strategies, ranging from the most voluntary and noncontroversial to radical, mandatory schemes to curtail the use of the automobile, particularly in city centers. Let us consider some of the salient ideas in that same order—from "soft" to "hard," and, correspondingly, in ascending order in the magnitude of political difficulty city officials may encounter in seeking to institute them.

## **"Soft" Paths: Walking and Cycling**

An entire seminar session was devoted to the very "soft" path of seeking to encourage increased walking and bicycle use. Especially for the relatively short journeys that constitute a significant percentage of trips within cities, these modes present a compellingly attractive alternative to auto use—or for that matter, often an alternative to mass transit as well. Walking and cycling, it was noted, are intrinsically healthy, highly energy efficient, nonpolluting, inexpensive, and modest in their investment requirements. And for persons in good physical condition, the bike can increase by several times over the radius that one might cover by foot.

One look at many world cities, especially the sections designed and built since World War II, discloses how callously scornful or unaware planners have been of the needs of pedestrians and cyclists. Freeways cut through city neighborhoods, isolating all but the riders of motorized transport. Streets often are built with minimal sidewalks or no sidewalks at all. The absurdities modern planning can produce are seen outside of Paris, in the massive La Défense development. Between the center of La Défense, with its huge office towers and plazas and the chief nearby residential area, there is no way whatever to go by foot. One must ride either by auto or rail line—for a distance of a few hundred yards.

Public attitudes, however, are changing. "The old perception that only high technology is capable of solving our needs for mobility," Orski summarized, "has given way to a new respect for the potential of walking and cycling as a practically and environmentally desirable method of moving in the city."

Unfortunately, making the city safe and attractive for cyclists can be expensive. Bikes do not mix well with the flow of vehicular traffic: cyclists (especially children) have high accident rates; there are frequent problems with rough or uneven pavement surfaces, open grates, parked vehicles and heavily trafficked intersections; bad weather can make cycling impossible during many days of the year. Ideally, bikes should be separated from vehicular traffic, but separate bikeways are often difficult to squeeze into already crowded streets and separate rights-of-way involve great expense. The realistic path, it was sug-

gested, was to proceed incrementally, extending bike paths as existing roads are rebuilt and providing bike paths through parks.

In some American cities (Madison, Wis.; Davis, Calif.; and others) bikes are now used heavily for commuting and other trips. Christchurch, New Zealand, has constructed a total cycle network and city officials report 25,000 children cycle to school. Osaka, Japan, has 333 kilometers of cycling roads and experienced a doubling in bike usage between 1973 and 1977. Osaka will soon have 30,000 bike spaces at 100 rapid rail stations, encouraging commuters to cycle to mass transit facilities. As world energy supplies constrict, it seems safe to predict that bicycle usage will soon increase dramatically.

## **Universalization of Pedestrian Zones**

Around the world, the most dramatic steps toward taming the auto have occurred in the heart of cities by means of pedestrianized zones. As Orski noted, "what began in the mid-1960s as a trickle of modest, tentative efforts to free main shopping areas from traffic in a few cities has flowered in the late 1970s to a widespread practice; and even crossed the oceans, from the first efforts in Europe, to take root in the United States and Canada, Japan, Australia, New Zealand, and South America."

There have been examples of unsuccessful pedestrian zones, particularly when the critical mass of retailing activity has already fled the center city zone. But the overwhelming evidence is of solid success. Merchants in almost every city at first were fearful of harm to their business, but they have been won over. In Munich, Vienna and other cities businesspersons are now actually clamoring to have the streets on which their stores front included in pedestrian zone projects. A recently completed survey of merchants by the West German Chamber of Commerce, distributed in the United States by the Council for International Urban Liaison, showed a ringing endorsement of the pedestrian zone—both for its impact on retail trade and for the general increase in urban livability resulting from the zones. West Germany has an astounding 500 zones, in its great and small cities alike; 311 of those cities participated in the survey.

When the OECD surveyed 105 cities around the world on pedestrian areas, it found business up in 49 percent of the zones and down in only 2 percent. The zones are widely advertised as creating a vibrant street scene good not only for business but also for the communal life of the city. The OECD survey found that a third of the zones were used for parades, markets, festivals, political meetings, or concerts—urban amenities rarely rivaled in the suburban shopping centers which now compete with center city areas on several continents. In addition, sharp decreases in automobile pollutants and noise levels are uniformly reported in pedestrian zone streets.

The West Germans caution that it is a mistake to establish inner-city pedestrian zones for retailing purposes alone. Some German cities have found that the city streets immediately surrounding the zone begin to fill up with parking garages and experience overall deterioration, creating an auto wasteland directly beside the prized pedestrian zone. Dietrich Sperling's advice:

### *Top*

*Pedestrians and bicycles have the right-of-way in the streets. Former streets in between the buildings are pedestrian ways, closed to auto traffic.*

### *Bottom*

*An effort has been made in Delft to mix the old with the new in a pleasing manner. Small shops are on the ground floor, and residential units are above in this project located near the central town square.*







### Top

Gothenburg, Sweden, a city of 450,000 population, also provides excellent transit interface. At this cell corner in the heart of the city, a few blocks from City Hall, autos are routed around and cannot cross into the adjoining cells as can transit vehicles and taxis. The auto must return to the ring road and enter the adjoining cell from that point. Although the system has reduced noise and air pollution in the center city, it has increased them along the exterior, and new lanes need to be added to the ring road.

### Middle

Light rail vehicles approach the central town station while vehicular traffic is routed around the main cell interface.

### Bottom

Gothenburg's cell system and 80 mile light rail system make it a unique transportation community. Signal priority for buses and an extensive exclusive guideway for its light rail vehicles provide for fast, safe transit service.

*You must reduce motorized traffic around the pedestrian zone, too. You must give the people a chance to live there, to have their apartments there, to have their playgrounds there. We always advise people who want to make pedestrian zones within their villages, towns, and cities: Don't do it for one street where you have all the business. Do it all the way around and make the people walk longer distances in order to get to the place.*

To facilitate access, many pedestrian zones have subway stops within them or allow buses and some taxis. Particularly popular in the United States are transit malls (in Minneapolis, Philadelphia, Portland, Ore., Madison, Wisc. and one planned for Columbus, Ohio). The transit malls fail to provide quite the degree of pedestrian amenities that the traffic-free zones do, but they make access to the city center rapid and convenient and appreciably increase the quality of street life.

Prominently considered at Paris was the rather new variant to the inner-city pedestrian zone: residential areas in which autos are strictly controlled but not banned altogether. The idea is to remake the entire neighborhood street into a zone of peaceful coexistence between automobile, bicycle, pedestrian and child at play. The traditional division between "sidewalk" and "street" falls away; the entire space between houses becomes a common space, usually through artful use of cobblestones, plantings, and well-designed traffic hindrances. This concept cannot, of course, be applied to major through roads. But as the Dutch have found in their "woonerven," and the West Germans in their somewhat similar "wohnbereichen," smaller neighborhood streets can be reclaimed for the pedestrian by domesticating the automobile but not banning it.

If applied increasingly in residential areas, the woonerf concept might by the end of this century claim for people around the world vast numbers of residential streets that had been given over almost entirely to auto transit alone in the automobile age of the 20th century. It is an idea at once deceptively simple and revolutionary. It may take years for urban planners and city officials to explain it throughout the neighborhoods of the world's cities. It will bring some forms of political strife: which streets, for instance, are granted woonerf status; which must accept the heavy flow of diverted traffic? Whatever the problems, the dividends in livable, safe streets for people are so great that the effort is surely worth whatever trouble—including headaches for politicians—may be involved in implementation.

## Mass Transit: The Foremost Means

The Paris discussions made it abundantly clear that an integrated, efficient, well-managed public transit system is the *sine qua non* of the more energy-efficient, less auto- and oil-dependent city of the future. A number of models—Paris, London, Ottawa, Oporto (in Portugal), Osaka, Ankara, Brussels, and others—were presented. Notably, the advanced transit cities included scarcely any in the United States, although valuable individual ideas for furthering mass transit were forthcoming from American cities.

Americans are understandably awed by the ad-

vanced nature of urban mass transit in so many foreign nations. Just last spring New Jersey's Commissioner of Transportation, Louis Gambaccini, reported on his visit to several European cities in *Urban Transit Abroad*, a publication of the Council for International Urban Liaison. "For an American transit professional," he observed, "a stay in Paris, Stockholm, Munich, Hamburg or London is surely paradise. How did they build these systems up from the ruined transit properties left after World War II?" Americans, Gambaccini suggested, had much to learn from the European experience "to help us rebuild our transit systems from the disarray caused by the automobile-dominated policies of the United States in the past four decades."

The specifics Gambaccini noted were echoed again in the Paris seminar: simplicity of transport information, effective coordination of routes and services, simplicity of passenger transfers from and between lines and systems, stability of capital funding, and public support for, and pride in, public transportation. That public support, Gambaccini said, had been translated in a country such as France into a firm, sustained national government commitment to public transit in Paris for a quarter century: "Governments have come and gone in France, but this commitment to transit improvement has never wavered."

Is the United States ready to make such deep, long-term commitments to mass transit? Until the very recent past, the answer was demonstrably negative. With the energy crisis looming ever greater, however, it is conceivable the time has come. If so, these specific tools of transit improvement, discussed in the Paris seminar, may be of assistance:

**Provide high quality, reliable service.** Good management of transportation demand does more to maintain and increase transit ridership than wholesale additions of new subway lines, bus fleets, or other equipment. Good service also is more effective in attracting riders than attempts to hold fares artificially low.

**Market transit services aggressively when they are of high quality.** The London transit authority, for instance, was praised for imaginative marketing such as a "Fly By Tube" slogan when its rapid rail lines were connected to Heathrow Airport. Given the myriad problems public transit sometimes faces, "if you have a good product, then market it," conference chairman Bayliss suggested.

**Employ monthly passes to increase transit demand.** The psychology that makes passes so effective is fairly simple. Since travelers are most aware of immediate out-of-pocket costs, trips by bus or subway are sometimes perceived (almost always erroneously) as being more expensive than those by car. But when citizens hold monthly or season passes for mass transit, they view the additional trips as costing nothing. In all cases where the passes have been successful, however, they have been accompanied by aggressive marketing and by a long-term, sustained effort to upgrade the quality of the entire transit system.

**Employ an economical, incremental approach to transit improvements.** Brussels, for instance, decided over a decade ago on an overall upgrading of mass transit "to prevent asphyxiation of the city," as one speaker put it. But as the city installed underground and segregated surface rail

lines, it didn't buy subway cars for them immediately. Instead, it used a "Pre-Metro" system of lightweight (trolley) cars. The first "Pre-Metro" cars appeared in 1969, the first actual heavyweight subway cars for the same lines in 1976. Brussels doesn't expect to complete its full subway system until 2000.

**Attempt to hold government subsidies as low as feasible.** Around the world, operating deficits—and thus required government subsidies—have risen sharply in the last two decades, most dramatically in the 1970s. Between 1970 and 1975, for instance, deficits (as a percentage of operating costs) went up from 32 to 69 percent in Belgium, from 9 to 29 percent in the United Kingdom, and from 15 to 46 percent in the United States. Labor costs were given as the chief reasons for this development. Research presented at the seminar indicated fairly conclusively that productivity—output per transit employee—declines in the wake of increased government subsidies. With tax resources strained in all nations, such a development is clearly unfavorable to the future of a sound mass transit system. The ideal, one British delegate suggested, would be to confine central government subsidies to capital expenses, although the speaker doubted that would suffice for systems' needs.

**Institute exclusive bus lanes.** In virtually all sizes and types of European cities where traffic lanes reserved exclusively for buses have been tried, they have reduced bus travel times significantly, cut down headways between buses, and permitted transit authorities to reduce the size of their bus fleets. Establishing such a privileged roadway for the public bus system, Dietrich Sperling notes, not only speeds the buses but motivates motorists caught in traffic jams, watching the buses speed by them, to reconsider their transit mode and often to decide "next time, take the bus."

The exclusive bus lane or bus street may provide a particularly important model for the rapidly growing and highly congested cities of less developed nations, Sperling suggests. The case study of Oporto, a densely packed city in northern Portugal, illustrated how, in a short period of time and with relatively little additional public investment, exclusive bus lanes and streets unclogged horrendous traffic jams. Introducing a reserved bus lane on only 400 meters of one particularly busy Oporto avenue reduced average travel and waiting time during peak hours from 18.5 to 3.2 minutes.

**Consider transit in the context of overall land use.** Even in Europe concern is mounting about growing suburbanization and its effect on mass transit systems appropriate only for relatively high-density land use patterns. OECD consultant Howard Simkowitz suggested that all future land use decisions be made in light of the travel they will require and the energy they are likely to consume. A coordinated transportation/land use program, he said, should include limiting urban sprawl, infilling and redeveloping central areas at greater densities, developing high mobility/high density corridors, and promoting mixed-use development so that residences, shopping and recreation facilities are all within walking or cycling distance or easily reached by mass transit.

In the United States the very idea of land use planning has, in past years, been considered almost subversive, a threat to unfettered free enterprise

development and a person's right to do what he or she pleases with individually owned land. But with a modicum of rationality, in the modern era of short petroleum supplies, the land use ideas advanced in Paris may take root in America; with a little luck they might actually be advocated by state and local officials who recognize the direct tie between sound land use practice and the nation's energy dilemma.

In Canada, the realization is coming more rapidly. The city of Ottawa, for example, has shifted public expenditures sharply from road building to mass transit, and now has a statute requiring that every house in a new subdivision must be within 500 meters of a bus stop.

## Paratransit Futures

The "new kid on the block" in the transit field is paratransit—the smaller, more demand-responsive, and ideally more economic way of moving people from place to place. The Paris seminar delegates showed clear interest in paratransit—but as a complement to, *not* as a replacement for, traditional mass transport services.

Paratransit, the discussions made clear, is still in its rather early, experimental stages. But dial-a-ride systems for the general populace received negative reports because of the high costs involved. Properly applied, however, paratransit could effect major economies. A World Bank representative, for instance, reported studies by his organization showing that cost economies per seat of smaller vehicles (minibuses, vans and others) were "greater than we could ever have imagined."

Two paratransit areas seemed to have the brightest possibilities for reducing the severe traffic congestion and energy wastage of single-occupant-per-auto commuting. These are specialized transit services for lightly populated rural areas and ridesharing—carpooling or vanpooling, which is more popular to date in the United States than in European countries. The Americans reported that 22 percent of all U.S. workers share cars on their way to work and that there are 2,000 organized vanpools in the United States and probably several thousand privately owned vans used for joint commuting.

Next to charter buses, vanpools are the most energy efficient of all forms of commuter transport. Even as the Paris conference met, the White House was working on plans for a vastly expanded U.S. vanpooling effort. As European nations experience their own suburbanization and recognize how many work trips do not carry workers into center cities, they may become increasingly interested in commuter vanpooling.

All paratransit forms, however, involve problems—economic, regulatory, or institutional—which have tended to slow implementation in all countries. Rural paratransit, for instance, has so far required significant government subsidies unless it can be combined with existing services (the Swiss postal buses, for instance), or can be run with volunteer drivers. With volunteers, the heavy expenses of generally unionized, high-paid drivers are avoided, but experience shows that a large number of volunteers are required to maintain service, unions fight such arrangements, and legal and safety problems may arise. Yet the final public good to be achieved—mobility for rural residents, including

### Top

*Paris has long been known as a transit oriented city. Origins and destinations are displayed on the back, sides and fronts of buses, as well as popular stops along the route.*

### Middle

*French bus stops are well and uniformly marked, as are entrances to underground parking facilities.*

### Bottom

*Weather in Sweden can be cold and wet. Stops such as this in Gothenburg are heated, as are sidewalks in the downtown area by return heat pipes located just under the sidewalk. They were placed there during the widening of pedestrian ways, and the narrowing of streets, as a part of the traffic management scheme.*



those who can't afford to drive private cars or are too old or too young, plus energy saving in the public interest—may justify a major effort.

Another public good in paratransit is its capacity to return some element of competition to the public transportation field by introducing new transit providers, such as small bus and taxi firms. As Ronald Fisher of the U.S. Urban Mass Transportation Administration put it, "paratransit can return the entrepreneurial spirit to transportation."

Fisher made another point that should be heeded seriously: the need for a brokerage function to work out the best combination of traditional mass transit and paratransit services among the regional public transportation authority, local communities, and paratransit providers. The problem, of course, is that if the transportation authority does the brokering, it may be biased toward their own operations. A strong case can be made that general purpose local or regional governments should at least oversee, if not conduct, the brokerage process, to ensure that the public interest is served.

## Traffic Restraint and Other "Radical" Proposals

Finally, one comes to the "hardest," most "radical" proposals advanced by urban transportation planners around the world as they seek to restrain the automobile and ensure the vitality and safe environment of cities. These are the plans embracing whole center cities—not just a few chosen pedestrianized streets—that attempt to effect major reductions in automobile traffic. Traffic restraint plans involve special licenses to drive in or across the center city, traffic cells which discourage transcity auto traffic, and heavy parking surcharges.

The world's premier example of special licensing, or "road pricing" as it has also been called, is the city of Singapore. Precisely at 7:30 each morning, warning lights flicker on across signs above the 22 roads leading into Singapore's central business district. They read: "Restricted Zone—In Operation." From that moment until 10:15 a.m., any automobile entering downtown Singapore must have a prepurchased \$1.70 a day (or \$34.40 a month) sticker on its windshield. Corporate cars must pay twice as much. Not even diplomats or high government officials escape the net. The only exempt vehicles are buses, some delivery trucks, and carpooling vehicles with four or more passengers.

Singapore city officials report that the number of cars entering the downtown district during the morning rush hour dropped an astonishing 73 percent following institution of the area licensing scheme in 1975. Carpooling increased by 80 percent and most recently accounted for 53 percent of commuters during the restricted hours. Buses run more frequently and on time through the unclogged streets, cutting commuters' delay and frustration. There has been a sharp drop in carbon monoxide air pollution; pedestrians not only can enjoy the cleaner air but are exposed to fewer hazards of heavy traffic.

Could such a plan be transferred successfully to other cities around the world? The World Bank, which has taken special interest in the Singapore

example, has been attempting to assist Kuala Lumpur (Malaysia) and Bangkok (Thailand) to develop their own versions of special licensing. The need is apparent, and typical of the Third World today: Kuala Lumpur, with 1 million inhabitants, is growing at an annual rate of 3.7 percent; Bangkok, with over 5 million people, is adding 8 percent per annum to the vehicle fleet that already clogs its streets so continuously that one cannot even speak of "rush hours" there—they exist all day long.

But what of the "developed" world? In both Stockholm and London, the OECD conferees heard, variations of area licensing, including rather stiff fees, have been prepared by local transportation planners and forwarded to political officials for decision. Responding to public concern, especially about air pollution, political leaders in Sweden have asked if inner-city traffic couldn't be reduced by about a quarter, said Bo Köhlmark, Stockholm's director of planning and design. That objective, he suggested, can be met only by some variant of area licensing, or alternatively by a major international petroleum supply crisis. "Then you'd have your 25 percent decrease immediately," Köhlmark said. David Bayliss reported that some form of road pricing has been under study in the Greater London Council for 16 years.

The hard fact, of course, is that politicians in any Western nation, given the overwhelming automobile culture of recent decades, instinctively shrink before the ideas of area licensing or road pricing, fearing a horrendous popular backlash. There seems little question that before the West's energy dilemma became so apparent, the backlash would have been immediate and severe. Whether this still is true will remain unanswered until a Stockholm, a London, or some other city finally gets up its courage to experiment with such a system.

The urban transport experts gathered in Paris clearly hoped that day would not be too far off. Up to now, said Dietrich Sperling, "the guardians of motorized traffic still think the ideas of liberty and those of nonrestricted driving within the city belong together." But, he suggested, the custom of viewing as identical "the trumpet of liberty and the beamlights of one's car" is living on borrowed time. He predicted that severe restrictions on inner-city traffic would appear in Europe within the next several years.

One form of restriction, less radical than area licensing, but still much more daring than pedestrian zones alone, has already appeared in Europe. It is the inner-city traffic cell system, pioneered in Bremen, West Germany, and copied in Groningen, the Netherlands; Nottingham, England; Besançon, France; and Stockholm and several smaller Swedish cities. The traffic cell is best exemplified, however, where city planners and merchants first conceived it in the years after World War II—in Gothenburg, Sweden's second largest city.

Gothenburg divided its central business district into five cells—roughly like pieces of a pie. From a ring road surrounding the central city, motor vehicles may enter (by a single entrance) any one of the pieces of the pie. But once within the pie piece, they may not cross to another; only public transit, cabs and emergency vehicles, plus cyclists and pedestrians, may legally make such a crossing. Motorists must drive out of the pie piece to the ring road, proceed around the ring to some other piece they may select as a target, and enter there. The result, of

course, is that the heaviest traffic flows on the peripheral route, and through-trips are diverted away from the center.

The Gothenburg planners' concept of the ideal traffic cell is quite sophisticated. The main streets for traffic are to be on the outside of the cell, lined by office buildings that won't be disturbed greatly by the vehicles' noise. The interior of the cell is to be bisected by major cross-streets, reserved largely for mass transit and lined with shops. Tucked away between the exterior and intersecting streets are to be pockets of housing—close to shopping, public transit, and parking garages, but insulated from the environmental hazards of traffic. This model of mixed use in intimately connected neighborhoods is rarely seen in world cities today—and actually is only partially represented in Gothenburg. But city planners say that future land use and building site decisions in Gothenburg will be obliged to conform to their prescribed cellular structure.

The full success of Gothenburg's effort—recorded at another point in this booklet—ranges from substantial reductions in traffic, air and noise pollution in the city cells to remarkable acceptance of the whole idea by merchants and citizens alike. At one central corner where 40,000 vehicles once passed, there are now but 10,000. The city has a relaxed, free-flowing atmosphere. The planners boast "you can hear the sound of footsteps again," and they are not guilty of great exaggeration.

A complementary strategy in many advanced traffic restraint cities has been a sharp increase in parking fees, sometimes with progressively higher rates for each additional hour, to favor short-term over long-term parkers (e.g., shoppers over office workers). Going a step further, some of the plans reduce the total number of parking places. The objective is to encourage all downtown visitors—employees and shoppers alike—to use mass transit.

It is questionable whether U.S. citizens would ever accept physical or financial restrictions on the movements of their private automobiles. In Europe there is a much longer, more deeply imbedded acceptance of public planning. In some of the Asian countries considering traffic restraint, democracy is less full-blown than in OECD nations; in Singapore, for instance, dissent against the governing regime is systematically suppressed.

Yet the fact cannot be ignored: Had an international conference on urban transportation been held in the 1960s, the theme of accommodating the city to the automobile—rather than the reverse—would surely have prevailed. And such progressive traffic restraint ideas as those now being translated into reality in many European and Asian countries would have been considered either foolhardy, impossibly visionary, or both.

Nor can the success of recent reforms be discounted. Analyzing OECD case studies since 1976, Ronald Fisher found that public transit trip rates were up 47 percent in Ottawa and 69 percent in Madison, Wis.; that transit use had risen 8 percent in Gothenburg and 15 percent in Brussels; and that bus use alone had risen 36 percent in Paris. Gothenburg, Besançon, Singapore, Geneva and Nagoya all reported greatly improved air quality. And rush hour automobile traffic—the alleged villain in virtually all those cities—was down from 15 to 75 percent in the cities surveyed.

## Features of a Successful Transport Program

In concluding the Paris seminar, David Bayliss provided a checklist of "lessons learned"—and to be heeded—in the reform era now dawning.

**Accessibility.** Properly prepared transport plans, Bayliss said, have shown that necessary access to central cities for business, commuters, and shoppers can be maintained, even if traffic is restrained. And the introduction of progressive transport management programs, he noted, has confirmed the vitality of city centers and shown conclusively that the spectre of lost trade is a false one.

**Complementary measures.** The need had been proven, he said, for a wide range of complementary measures in each city—supplementing transporta-

tion reform, for instance, with housing rehabilitation, tree planting, reintroduction of open air markets, changes in land use, and institution of flexible working hours. Transportation in this sense is seen as but one element in the effort to increase urban livability, environment and quality of life.

**Citizen participation.** Bayliss suggested the participation, "as appropriate," of the public at large in major transportation changes. This consideration, however, was a weakness of the Paris conference. When experts meet and plan, they too often think of the parties affected by change far too late. Even with the best of intentions, it is hard for a city to explain radical traffic changes to its citizenry.

**Reversibility.** A final "lesson" cited by Bayliss deserves mention. The various urban transport reforms cited at the conference, he said, contained few if any of the "irreversible" elements inherent in such

ambitious undertakings as urban freeways, new subway systems, or large-scale redevelopment. Thus the costs of "failure" in any one case, Bayliss suggested, are small, and the new reforms are by their very nature susceptible to modification and improvement after the initial operating experience had been obtained.

Thus the seminar concluded on its characteristic note of frugality, modesty, practicality. But David Bayliss, a mild-mannered man, showed the iron fist of determination beneath the velvet glove of accommodation—and doubtless spoke for the great majority of delegates present—when he ended the conference by saying that what is required most of all is "a determination to break the pattern of increasing congestion and pollution of our cities and reestablish the motor vehicle as man's able and willing servant for a better urban life." ■



### Top

*Stockholm interfaces its three forms of transit—light-rail, metro and bus—in attractive, well-designed facilities. Information on all forms of transit is readily available. This station also boasts an underground shopping mall with a variety of shopping activities. Small boutiques are mixed with grocery stores and art shops to provide the shopper with an opportunity to use transit for all needs.*

### Bottom

*Uniform signing and information maps and tables, easy to understand even for the international visitor, added to high on-time performance, make Swedish transit systems enjoyable for the visitor as well as the resident.*

# Reflections on a European Study Tour

BY TED LUTZ

The Paris urban transport seminar and study tour provided an excellent opportunity to reflect on a number of issues in public transportation and its role in shaping livable urban areas in our country and throughout the world. The delegates were exposed to some of the differing and often exciting strategies being used in other countries to incorporate public transportation as an integral element of comprehensive community planning and development. The various approaches were of particular interest to me, having recently stepped away from my position as General Manager of the Washington Metropolitan Area Transit Authority.

Four public transportation/urban development questions emerged that appear particularly relevant to the U.S. situation. These issues are:

1. The national government's role and perspective on financing public transportation capital and operating costs
2. The planning and decisionmaking process for public transportation programs
3. Public transportation service characteristics
4. The relationship of public transportation to improved urban livability

## Financial Assistance Issues

A major issue with public transportation, as with any public program, is how to pay for it. While all the countries studied provided meaningful support for capital investment programs at the national level, the role and extent of government financing of operating costs varied from country to country.

In Paris, for example, the French national government is reevaluating the degree of, and rationale

for, national treasury support for the operating costs of the Paris public transit system. French national treasury support for operating costs is not provided to other French cities but has been provided to Paris, apparently because of the national government's special relationship to the capital region. The reassessment of the national treasury role in financing Paris transit operating costs appears to reflect a desire to reduce the costs to the national government and to reduce its involvement in local service decisions, such as the setting of Paris transit fares.

In several other European countries—namely, West Germany, England, and Sweden, the national government emphasizes capital assistance exclusively, believing local and regional governments should have the key role in handling fares, service levels, and operating costs. The Dutch government, however, provides considerable assistance to defray operating costs, and the national government appears to have a major impact on all transportation planning and assistance decisions.

In many other countries, including the United States, more attention is being given to the role of the farebox in financing total transit operating costs. This point has several aspects.

First, localities are examining more predictable policy guidelines on what percentage of operating costs should be met by fares and related revenues. While these guidelines vary widely according to public policy, they are being used to provide guidance for the orderly development of transportation assistance programs. As a former transit general manager, I found it gratifying to see the degree to which Europeans recognize that the level of subsidy most often reflects public policy choices on service and fare levels, rather than the relative efficiency of transit management.

For example, the case study presentation by offi-

cials of Ottawa, Canada, showed that they operate under a premise of covering 60 percent of the costs of public transit operations from the farebox. It is my understanding that several U.S. cities (e.g., Dallas, Tex., and Portland, Ore.) and states (e.g., California) have adopted this same conceptual approach, although with different percentages, to guide service and budget planning. Because of the current complexities of financing public transportation operating costs in many parts of the United States, I expect to see more emphasis at all levels of government on gaining a relatively predictable division of cost between the user and the nonuser of public transportation service.

The second point regarding operating costs was that it is more desirable to raise fares to meet expenses than it is to reduce service. Many examples were given to show that the quality and reliability of service have a far greater impact on ridership than reasonable fare increases do, especially as the energy situation pushes up the out-of-pocket costs of automobile commuting. A delegate from Manchester, Great Britain, noted that a significant fare increase in his city last year did not reduce ridership, but disruption of service by bad winter weather and strikes cost the system 5 to 6 percent of its passengers.

Free or reduced fares with no improvement in transit quality were not considered effective in increasing ridership. The Urban Institute of Washington, D.C., reported that "reductions are ineffective as a way of inducing people to switch from cars to public transport." Efficient transit systems, however, "can be effective competitors for the motor-car."

In the United States, limited transit assistance funds have been used most often to hold down fare levels rather than to improve or even maintain the service level. The emphasis may shift to service quality, however, due to the energy situation and efforts to remove some automobile subsidies.

Throughout Europe, differing approaches exist to provide financial assistance to special groups, such as fixed income elderly, as part of an overall fare policy. It is recognized that if fares are raised to keep pace to some degree with cost increases, such groups will require additional assistance, although it may need to be more precisely targeted.

In both Europe and the United States, the realization that employers have a special stake in a good public transport system appears to be growing. The Paris region, for example, instituted an employers' tax in 1971, with the proceeds going to simplify and reduce fares for commuting workers. In 1978, the tax yield was 2.4 billion francs, 28 percent of public transit costs in the region. Recent actions by private employers in the United States (Chicago, Seattle) also have provided direct assistance to employees who choose public transportation to get to work.

Several countries offer monthly or family passes to encourage broader use of public transportation. Paris instituted its "Carte d'Orange," a monthly ticket and pass that allows for an unlimited number of trips in the region, based on differing base prices for five concentric zones. The device proved extremely effective in enhancing the image of public transit, increasing bus travel in particular, and shifting a small but significant percentage of trips from automobiles to the public transportation system. From an initial 700,000 users, the number of Carte d'Orange users has risen to 1.4 million.

Brussels and Ottawa also have experimented successfully with the pass system. In Ottawa, 60 percent of all transit riders now use monthly passes. The Netherlands last year introduced a yearly pass for families on all rail lines in that country; in fact, the authorizing statute ensures that the definition of family is not restricted to married persons but includes those living together on some permanent basis.

Although a graduated fare structure for large urban areas was favored over a flat fare system, most transportation systems recognize the need to make it as convenient as possible to pay fares. Extensive use is made of unified fares between various carriers in a region, easy transfer between different modes, and passes for both bus and rail. Gothenburg, Sweden, even allows passes to be purchased with a credit card. A number of systems used self-ticketing or the honor system for fare collection, procedures that promote efficiency and convenience and warrant further experimentation.

Over the next several years, I fully expect the U.S. federal government, as well as state and local governments, to grapple extensively with the complex issues involved in financing a transportation system. At the federal level, given the fact that we have had approximately five years to experiment with the Section 5 program in the Urban Mass Transportation Act, the time probably is ripe for another thoughtful assessment of the appropriate partnership between the federal and nonfederal governments in financing capital and operating costs. In addition, state and local governments will be wrestling with the question of sharing the financing of public transportation between users and the general population as well as between state and local taxpayers.

The decisions to be made will point up the need for more predictability and certainty in the existing, often chaotic, planning and financing systems for public transit. From my experience, predictability is as critical to the development of a sound operating budget for public transit as it is to a longer term capital program. Currently, there are too many variables to permit rational planning and effective management by even the most progressive U.S. public transit agency. The need for greater stability must be recognized in the U.S. federal legislative/appropriations process. At the same time, stability is a key force behind the drive to gain dedicated state and local tax sources.

## The Decisionmaking Process

Several themes regarding how public transportation decisions are made kept recurring throughout the tour. Most striking to people in the United States is the high degree of centralized planning exercised by the bulk of the European systems. In Europe, the state exerts considerable control over individual actions, a factor to be reckoned with before trying to implement similar transportation/land use programs in the United States. Because of the tradition of government planning and control, European countries place greater emphasis on the use of regulatory approaches to traffic control and urban planning. Many of the schemes that could be beneficial in U.S. cities rely on a degree of governmental regulation of individual citizen and property rights that U.S. offi-

### Top left / Middle

*La Défense, a new town development outside Paris, provides information aids for transit users. The city is linked to Paris by bus and commuter rail (RER). The U.S. delegation visited La Défense, a joint development complex, while in Paris.*

### Top right

*Marienplatz Station, the central U-Bahn station in Munich, is located below City Hall, and provides access to the pedestrian mall and to both bus and S-Bahn connections.*

### Bottom

*The Paris Metro has 353 stations and carries more than 4 million passengers daily over 113 miles of track. This particular line, which runs from Etoile to Nation, has rubber tired vehicles. Passengers may purchase individual tickets, either first class or second class, carnets (ten tickets at a reduced price) or a monthly pass, the Carte d'Orange.*







### Top

*A strong emphasis is put on transit information and marketing techniques in the city of Paris. Information on both bus and Métro is readily available, and easily understood. Even in a city that grew from a small island centered in the Seine to one of the world's most complicated urban areas, visitors have no problem finding the most obscure street. The Carte d'Orange, a monthly pass good on both the Métro and the bus networks, boosted ridership almost 80 percent when first introduced. It has since been expanded to include commuter trips.*

### Middle

*Ease in boarding makes using public transit in Stockholm more pleasant.*

### Bottom

*Interface among various modes is an outstanding aspect of the Munich transit system. Metro (U-Bahn) and commuter rail (S-Bahn) are designed to connect with bus loading areas. Many of Munich's buses are articulated. There is a unified concentric zone fare schedule, and tickets are not checked in stations. MVV officials estimate that only about 2 percent is lost to cheaters. Spot checkers hand out \$20 fines for those caught trying to get a free ride.*

cials have been reluctant to try. However, papers at the seminar stressed that regulatory actions, such as control of access of private cars as well as tax and other financial incentives, were essential to the success of most efforts to build more livable cities.

The centralized planning process, as practiced in many European countries, allows for a strong transportation policy at the national level. For the systems studied, each national government had, at one point or another, made a stated policy choice to start favoring public transport over the private auto in urban areas. This approach contrasts sharply with the U.S. system which has always emphasized state and local decisionmaking with federal financial assistance for transportation.

With the exception of Sweden, it appears that most of the countries visited are not too hamstrung by rigid financing mechanisms should they decide to shift priorities in transportation plans. Countries whose transportation financing structures are more similar to that of the United States are attempting to make their programs more adaptable to changing priorities.

The need for citizen involvement in developing and implementing transportation and land use programs was stressed repeatedly. Early citizen and merchant participation was viewed as particularly crucial before instituting the more innovative traffic management and regulation schemes. One speaker suggested that citizens should be involved in decisions leading up to important changes for as much as three to five years, especially when the changes would affect their own neighborhoods or lifestyles.

An urban planner from Delft, The Netherlands, advised, "Always go to the housewives to discuss local traffic problems. They are the ones who really know what's going on." West Germany and Sweden also stressed the need to involve citizens and merchants in each step of the process, although much of the consultation seems to occur during informal community meetings rather than through formal public hearings as in the United States.

Even when major traffic changes are publicized extensively, planners learned that citizens often are surprised when the plan actually takes effect. The deputy mayor of Groningen, J. Wallage, acknowledged that the city's large investment in advertisements, maps, and posters to prepare its citizenry for a traffic cell system proved largely ineffective. He said that the day the scheme was implemented, motorists acted "as if they had not been informed at all and had quite a shock." The nicer shock, he said, was for pedestrians, who suddenly discovered that the inner city was theirs again. Despite Groningen's experience, Wallage said that city administrations have no choice but to go to the people and spend a lot of time and money to explain why a new traffic plan is being instituted. Even then, they must recognize that it will still take some time for people to get used to it, he concluded.

## Public Transportation Service Characteristics

To a public-transportation-oriented visitor from the United States, European transit systems have many enviable characteristics. While obviously different in size and style from American systems, the good

general condition of European public transit reflected the high priority placed on good transportation with attention to system reliability, quality, and ease of riding.

The transit systems in the tour cities had consistently good physical characteristics. The lighting level was high in the stations and vehicles, contributing to a feeling of security and enjoyment. It was clear that maintenance receives a very high priority throughout these systems. Unlike U.S. systems, which seemingly relegate facility and equipment maintenance to the low end of the totem pole, these European systems hammered at system appearance and performance. Construction materials and designs appear to have been selected with ease of maintenance and good lighting in mind. At Washington Metro, it was a constant struggle to make sure the construction and engineering decisions gave some consideration to both long-term operating and maintenance consequences.

The European systems offer a variety of generally good graphics to the rider. To me, the Paris system graphics were most outstanding. On a sour note, it was discouraging to witness the growing graffiti problems in these cities, a problem appearing in many other areas of the communities as well as in the transit system.

Security was less evident in the European systems than in the major U.S. systems. Transit officials at several tour cities expressed growing concern over crime and fare evasion, however. Several cities—especially those with honor-type fare systems—were seeking to reduce revenue loss by raising substantially the penalty for failure to pay.

I was impressed with the extent to which all cities studied were using relatively precise service standards to guide transit planning. It is not easy to develop such standards, especially in a large metropolitan region, and particularly if there is no comprehensive regional financing source. Other countries seem to be making good use of service and planning standards, as exemplified by the Ottawa, Canada, bus system, which made locations more than a 20-minute ride by regular transit service from downtown candidates for express service, and the precise plan for maximum walking distances to subway stops in Sweden (with credits for escalators).

Another transit service trend that I believe will grow in importance in the United States is the more extensive use of larger vehicles on line-haul routes and smaller vehicles for residential communities that have not previously had significant public transportation services. In discussions of experiences with smaller vehicles in regular transit service, OECD seminar delegates focused on the mechanical reliability of the vehicles (or, as a seminar delegate from the United Kingdom put it, the problem of small vehicles "not being sufficiently mechanically robust" to stand up in intensive service). Should the demand for small vehicles materialize, one must hope that more bus manufacturers throughout the world will give additional attention to the small bus manufacturing question.

One of the most striking impressions of the tour was the effort that has been made to make public transportation more reliable and easier to use. Many of these steps also improve systems' efficiency and reduce costs to localities. Examples were exclusive and contraflow bus lanes on existing urban roads and



### Top

*The Greater London Council is responsible for transit and transit planning in London. Special services such as this shopper's special doubledecker are a part of the overall marketing strategy to make transit an attractive alternative in clogged downtown London.*

### Middle/Bottom

*Located just off Oxford St., this is one of the first pedestrian malls in London. Sidewalk cafes, antique shops and designer stores make a mid-day stroll delightful.*

signal changing devices to expedite and give priority to public transportation vehicles. These special provisions not only improved service and increased reliability, but also reduced bus fleet requirements, thus reducing operating subsidy requirements.

Several tour cities had arrangements to substitute taxi service for bus transit service at certain hours and locations. While these efforts are largely experimental at this stage and not without problems, they bear careful monitoring to determine whether meaningful cost efficiencies occur.

Several countries noted experiments in customized minibus service for the physically handicapped. Gothenburg Transit, for example, operates a fleet of 39 small vehicles and arranges taxi trips for residents who qualify. Only the United States, it appears, is seriously considering the far more expensive and difficult alternative of modifying all bus and subway fleets and stations to accommodate handicapped persons. The Europeans seemed to feel that in addition to the cost, inclusion of the handicapped on their crowded facilities would jeopardize the safety of other riders. Sweden in particular is watching U.S. experiments with lift-equipped buses in regular route service because that country also is caught up in political, social and economic debate over total accessibility and mobility.

## Improved Urban Livability

A major purpose of the study tour was to observe the innovative ways European cities are integrating transportation and community development planning to improve the quality of urban life. In city after city, we saw efforts to use creative transportation facilities and actions to make cities better places for "the vital mingling of functions," to use the description of a seminar delegate from the Netherlands.

A central theme of the urban revitalization programs was the need for a more "human scale" in city planning and an enhanced sense of community among the residents. To avoid the loss of established neighborhoods, several cities had abandoned plans

for disruptive urban freeways in favor of improved public transport facilities. A number of cities provide extensive separate facilities for bicyclists and pedestrians. I was amazed to note, however, that in the cities with good separate facilities to encourage walking, pedestrians generally took their lives into their hands the minute they stepped near a street with moving auto traffic. These cities appear to need stronger traffic control regulations and enforcement to protect pedestrians.

European governments have instituted a number of regulatory traffic control schemes to improve urban livability. These include parking restrictions and high parking rates, neighborhood traffic control plans, and pedestrian zones. Several specific projects of these types are described in detail in the preceding article by Neal Peirce. It is sufficient to note here that public transportation plays a key role in all efforts to preserve the character and vitality of the central city.

Several European cities visited also seemed to recognize the need to develop good public transportation service as a necessary component of planned "new-town" developments in a metropolitan region. Such planning for the future is never easy and not always completely accurate, but it shows a real commitment to use public transportation to serve and guide new population centers.

## Conclusion

While there were many valuable lessons and insights gained from attending the seminar and study tour, the feature that made the strongest impression on me was the careful integration of public transit planning and implementation into the development of truly living cities. The study tour, in particular, highlighted the emphasis on conservation and preservation of both resources and urban vitality, using public transportation and traffic planning schemes to foster a stronger sense of community among the urban residents. As the United States faces a future with new constraints on resources and seeks a stronger sense of community among its citizens, planners would do well to capitalize on the experimentation and innovations taking place throughout Europe. ■

# The Changing Role of Automobile and Public Transportation

BY C. KENNETH ORSKI

## Transportation and the Environment

It seemed particularly appropriate that this conference on Transport and the Environment should open with a session on "Pedestrians and Cyclists"—for walking and cycling are at once the most energy-conserving, least costly and most environmentally sound forms of locomotion; and those three concerns—energy conservation, fiscal economy and environmental soundness—seemed to dominate the thinking at this conference.

Yet for many years efforts to improve transportation on foot and bicycle received scant attention. Cities seldom catered to our needs as pedestrians or cyclists with the same zeal as they responded to our needs as motorists. Somehow, the subject seemed just a trifle frivolous.

Now all this seems to be changing, as the discussions at the first session clearly demonstrated. The old perception that only high technology is capable of solving our mobility needs has given way to a new respect for the potential of walking and cycling as practical and environmentally desirable methods of moving in the city.

During the first session we heard some serious discussion about the advantages and disadvantages of the bicycle. It seems that in urban areas the most serious obstacle to the widespread use of bicycles is their vulnerability in mixed traffic. Ideally, we were told, bicycles should be made to operate on separate rights of way. Unfortunately, separate bikeways are not always possible, or else can be built only at a great expense. So it was suggested that a more realistic policy might be to proceed in small steps, by extending bicycle paths incrementally as existing roads are rebuilt, and by gradually facilitating bicycle use in other ways.

Progress has been more impressive with respect to improvements for pedestrians. What began in the mid-1960s as a trickle of modest, tentative efforts to free main shopping streets from traffic in a few cities flowered in the late 1970s into widespread practice. Today hardly a city or town in Europe fails to protect its historic center from excessive automobile traffic. Some cities—such as Munich and Essen—have done so by closing downtown streets to autos entirely. Others—such as Gothenburg and Groningen—have chosen to restrict automobile access and divert through traffic with the help of traffic management techniques.

Nor are pedestrian schemes any longer confined to Europe. Thanks in part to the good efforts of OECD, the idea of rededicating streets to pedestrians has crossed the oceans and taken root in North America, Japan, Australia, New Zealand and South America. Today, in addition to 120 cities in Europe, some 50 cities in other parts of the world have thriving pedestrian precincts in their central core areas.

The reasons for these success stories have by now been well documented. Pedestrian streets are popular with shoppers; they create a lively, festive environment that attracts visitors and tourists; they lead to reduced pollution concentrations—at least, to less carbon monoxide; and they have proved to be good for business. Indeed, in the United States, pedestrian malls have become an accepted means of rejuvenating downtown areas. Downtown malls offer people an attractive alternative to suburban shopping centers which for a long time were the only places where people could shop in a traffic-free environment.

This is not to say that doubts about pedestrian areas have entirely disappeared. They have not—as we heard from Mr. Wallage's presentation of the Groningen scheme. But whatever doubts may still persist, they seem to relate to the proper form of implementation of car-restricted zones more than to their

*Top*

*The use of sculpture in zones created by the removal of auto lanes, located near transit lines, adds to the quality of life in our cities. Amsterdam, a city known for its art treasures, doesn't keep them all in museums, but has a program of bringing art into the urban scene, thereby enhancing the center city environment.*

*Bottom*

*Auto barriers need not be unpleasant concrete or steel pilings. Attractive landscaping, the use of flowers, unique lighting, and rest areas for pedestrians bring human scale into the city, and act as an attractive physical barrier to prevent the intrusion of the auto.*







### Top

*As was true in the United States and in many European countries, during the fifties and sixties traffic planning emphasized freeway development, and was weighted heavily in favor of the auto. In Delft, however, this trend was reversed early. The plan had called for the six lanes of this bridge to be extended to the town center. However, a thoughtful decision was made to stop the freeway at this point so as to route traffic away from the town center, keeping in harmony with the pleasing nature of this ancient Dutch town.*

### Bottom

*In Delft, the concept of the woonerf has become very popular. It uses specially marked parking spaces and traffic islands, which change the roadway so as to slow vehicle traffic and bring it more in concert with pedestrian and bicycle traffic. Citizen participation is considered to be very important in the development of woonerven areas.*

fundamental rationale. People no longer question whether pedestrian zones are good for the city; rather, they want to know how to make them work: how to determine their optimum size, how to involve the public in their planning and how best to enforce them.

## Traffic Restrictions in Residential Areas

As discussion at the second session revealed, a move is now underway to extend the concept of automobile management to residential neighborhoods. Limiting traffic has come to be viewed not only as a way of stimulating commercial and economic activity in the center city, but also as a means of creating a safer and more livable residential environment in existing inner-city neighborhoods.

In this area we owe a special debt of gratitude to our Dutch colleagues who have demonstrated that automobile management in neighborhoods can be more than a simple choice of "to ban or not to ban." The woonerf concept has shown that there is a third option: integrating the automobile into the fabric of a neighborhood so that it becomes compatible with walking, biking, playing in the street and engaging in neighborly contact outside the home.

Just as pedestrian streets proved to have a strong revitalizing effect on downtown areas, so protected neighborhoods—whether in their original form of a Dutch woonerf, their German variation of a wohnbereich, or in the simpler form of a residential parking permit scheme, as practiced in the United States—promise to become a powerful instrument of our efforts to make cities livable again and to stem the outflow of people to the suburbs.

## Paratransit

In the third session we talked of paratransit—a relatively new concept, born of the need for a more flexible form of public transportation to serve efficiently and conveniently the travel needs of people in contemporary, dispersed metropolitan areas.

Although paratransit was originally viewed primarily as a means of providing premium, door-to-door demand-responsive service in low-density residential suburbs, high operating costs have proved to be a serious impediment to the widespread application of such service.

Today, paratransit is viewed instead as serving three other objectives:

- Providing special transportation services to handicapped persons and others who are unable to use private cars or conventional public transportation. A number of delegates—including those from Sweden, Belgium, Germany, France, the United Kingdom and the United States—reported on programs in this field.
- Providing public transportation in low-density rural areas where private car ownership is low and patterns of travel are too dispersed to justify fixed-route transportation service. Germany and the United States reported on their efforts in this field.
- Providing an alternative to the solo use of the private car for commuting purposes. Commuter

ride-sharing has been receiving increasing attention, especially in North America, because of its high potential to reduce dependence on automobiles and to conserve petroleum.

Perhaps the greatest significance of paratransit, as revealed by the discussion at the third session, lies in its potential to bring about fundamental changes in the organization and management of public transportation. Because paratransit usually involves small-scale operations, it offers opportunities to a whole new set of independent service providers, including private taxi operators, and thus may stimulate competition in a field that has not been distinguished by high productivity and innovation. Also, since paratransit is often offered as a bundle of differentiated services tailored to the needs of individual users, it encourages a market-oriented, management approach to public transportation.

What is most noteworthy, however, is the great European interest in paratransit evidenced at this conference, compared with the interest at the conference four years ago. The message seems unmistakable: new travel patterns in European cities can no longer be satisfied effectively by conventional transit. The new interest in paratransit may be an expression of Europe's search for more flexible forms of public transportation that would more effectively help people cope with the problems caused by dispersed patterns of housing, shopping and employment.

## Management of Transportation Demand

Although the next two sessions were called by different names, they dealt with two aspects of the same issue—the management of transportation demand. The emphasis on demand management represents a significant new trend in transportation thinking.

For many years transportation policy was concerned primarily with investment planning. With money relatively abundant, the question was not *whether* to build new transportation facilities but where, when and how fast to build them. Today, with fiscal resources diminishing and environmental consciousness rising, attention is increasingly focused on how best to utilize transportation investment already in place. The issue has shifted from how to meet growth in travel demand through provision of *new* facilities to how to accommodate this demand through better management of *existing* facilities; from how to increase transportation *supply* to how to influence, and selectively restrain, transportation *demand*. Hence, the high interest in the use of fiscal and regulatory approaches as tools of transportation policy.

There was a consensus that both fiscal and regulatory approaches belong in a total transportation management strategy. Regulations and pricing must be considered as complementary rather than mutually exclusive means of influencing modal choice and travel behavior.

There was also substantial agreement that maintaining artificially low fares through subsidies is unlikely, in itself, to induce a substantial shift from automobiles to public transport. High-quality service and marketing innovations such as monthly system-wide passes were generally felt to be more effective

in attracting people to transit than were low fares. While the majority of delegates felt that transport subsidies are necessary, they agreed that justification for them must be sought in other policy objectives, such as equity considerations.

The greatest area of uncertainty—and debate—surrounds the subject of automobile pricing disincentives known as “area licensing” and “road pricing.” The conference heard with interest about Singapore, where automobile licensing has apparently been highly successful in inducing commuters with center city destinations to shift from autos to car pools and transit, but proposals for automobile disincentives generally encounter widespread skepticism and resistance. Still, the results of the Singapore experience have been dramatic enough to warrant serious considerations of its variants by other cities. Indeed, the conference learned that several countries, notably Sweden, the United Kingdom and the United States, are actively investigating the promise of pricing approaches, such as parking surcharges and differential tolls. It is possible that we will see more such efforts in the future.

## Financing

At the sixth session, on financing, concern was expressed about the rapid growth of transit deficits, which some delegates feared may lead to decreased transit operating productivity. However, there was general agreement that proper levels of subsidy to public transport must be considered in the context of total urban transportation financing. Some delegates expressed the view that the full cost of automobile travel is not accounted for by the present system of pricing and taxation of road transport, and that comparisons based on actual costs might lead to a false conclusion that the automobile “pays its own way,” while public transportation does not.

## Energy

With news of the latest OPEC price increase still reverberating throughout OECD countries, and with memories of lines at gasoline stations still fresh—at least in the mind of the rapporteur—it is difficult not to be impressed, and concerned, with the degree of our dependence on petroleum.

Our task for the remainder of this century will be to try to reduce this debilitating dependence. In these conservation efforts, transportation, we are told, will be called upon to play a critical role. And within the transportation sector the automobile—as

the dominant consumer of petroleum—must inevitably become the focus of these efforts.

It would be tempting to assume that technology once again will come to our aid, and rescue us from our present dilemma, as it has done on so many past occasions. But this time, I fear, we cannot rely exclusively on a technology fix. To be sure, there is still a considerable potential to increase—perhaps double or triple—the fuel economy of today’s cars, especially the larger American cars. Given sufficient resources and technical skills, we hope to realize this goal.

But even tripling fuel economy will provide only a temporary respite from the ever-growing petroleum shortfall. With automobile travel growing at an annual rate of 3 to 5 percent, it does not take higher mathematics to conclude that the benefits of increased fuel economy can only be short-lived.

Thus, whatever interim relief technology may offer, we must be prepared to face the fact that in the long run we have to do more than “reinvent” the automobile. *We must also rethink the manner in which the automobile is used.* We should approach this task not in a destructive way, by trying to banish the car from our lives, but in a creative sense of seeking a new equilibrium between our desire for personal mobility and the need to conserve dwindling oil supplies.

You may wish to consider whether this challenge of harnessing the automobile in an energy-scarce, inflationary era should warrant becoming the focus of a major, concerted international exchange. Indeed, in retrospect, the most important and lasting contribution of this conference may have been that it has launched just such a debate. For deliberately or not, our discussions over these 2½ days have been a wide-ranging exploration of alternatives to a life style based on the unconstrained use of the private automobile.

Whether the issue concerned pedestrian streets, or traffic restraint in residential neighborhoods, or transit subsidies, or ride-sharing, or management of transportation demand through pricing and regulation, the underlying theme, the unstated assumption, was the need to rethink the question of movement and mobility in metropolitan areas.

Thus, we may have already set our agenda. I hope that the dialogue this conference has launched will not be allowed to falter, but that it will grow. And that this forum, which has been so hospitable to us in the past, will continue to be available to foster and nurture this debate in the future. ■

### Top

*During the study tour, the U.S. delegation visited the M.A.N. plant in Augsburg, south of Munich. M.A.N. is building articulated buses for Seattle, Washington, D.C., and other cities across the country. In addition, they are experimenting with the production of a low floored vehicle, to make access easier for the elderly and handicapped. The vehicle pictured here is scheduled for delivery to Washington, D.C.*

### Middle

*Former Mayor of Portland and current Secretary of Transportation Neil Goldschmidt discusses new technology with M.A.N. officials.*

### Bottom

*Low floor buses that increase access for the handicapped were of great interest to the U.S. delegation at the M.A.N. plant.*





Top

*In Amsterdam, advertising revenues help offset operating costs. Signals and standard signing help protect exclusive rights of way.*

Bottom

*The use of international signing for better traffic management makes it easy for visitors to know where they can and can't park, what size and category of vehicles are prohibited and where special traffic routing is required.*

# Innovative Management of Urban Transport for a Better Environment

BY ARIEL ALEXANDRE AND CHRISTIAN AVÉROUS

Instead of building expensive metro systems or free-ways, the new approach to urban transportation policy is to make better use of existing facilities—roads, buses, taxis, light rail lines—through comprehensive and innovative management. Building heavy infrastructure has become the solution of last resort.

The OECD has carried out case studies on a number of cities that have adopted comprehensive policies. The cities vary widely in size, structure and level of car ownership. Together they present a broad picture of local and national efforts to improve the urban environment and to facilitate access to the city, both for persons with cars and those without. The measures taken are behavior oriented and often politically sensitive.

Scrutiny of these cities has made clear that management-oriented urban transportation policies, though local in inception, have implications for national policymakers in diverse fields: environmental protection, energy conservation, inner-city revitalization, institutional reform and finance.

## Traffic Management

The new management-oriented urban transportation policies are aimed at encouraging people in the city to make more efficient use of vehicles and infrastructure; emphasis is changed from moving vehicles to moving people.

Most countries' local authorities have it within their power to reduce traffic-caused nuisances and to enhance the urban environment. They can turn shopping thoroughfares blighted by noise and fumes into pedestrian streets. They can introduce "traffic cells" to keep through traffic from traversing the center of the city, and they can upgrade or create "ring" roads to accommodate the traffic thus di-

verted. They can control and reduce on-street parking and use computer-based area traffic control to smooth congestion. They can also require supplementary licenses for persons who want to drive into heavily congested areas.

Giving city officials the power to regulate commuter parking by charging progressively more for each additional hour or by reducing the number of available parking spaces and compensating people adversely affected by traffic management schemes (those who live on newly designated ring roads, for example) also can help achieve environmental and transportation objectives.

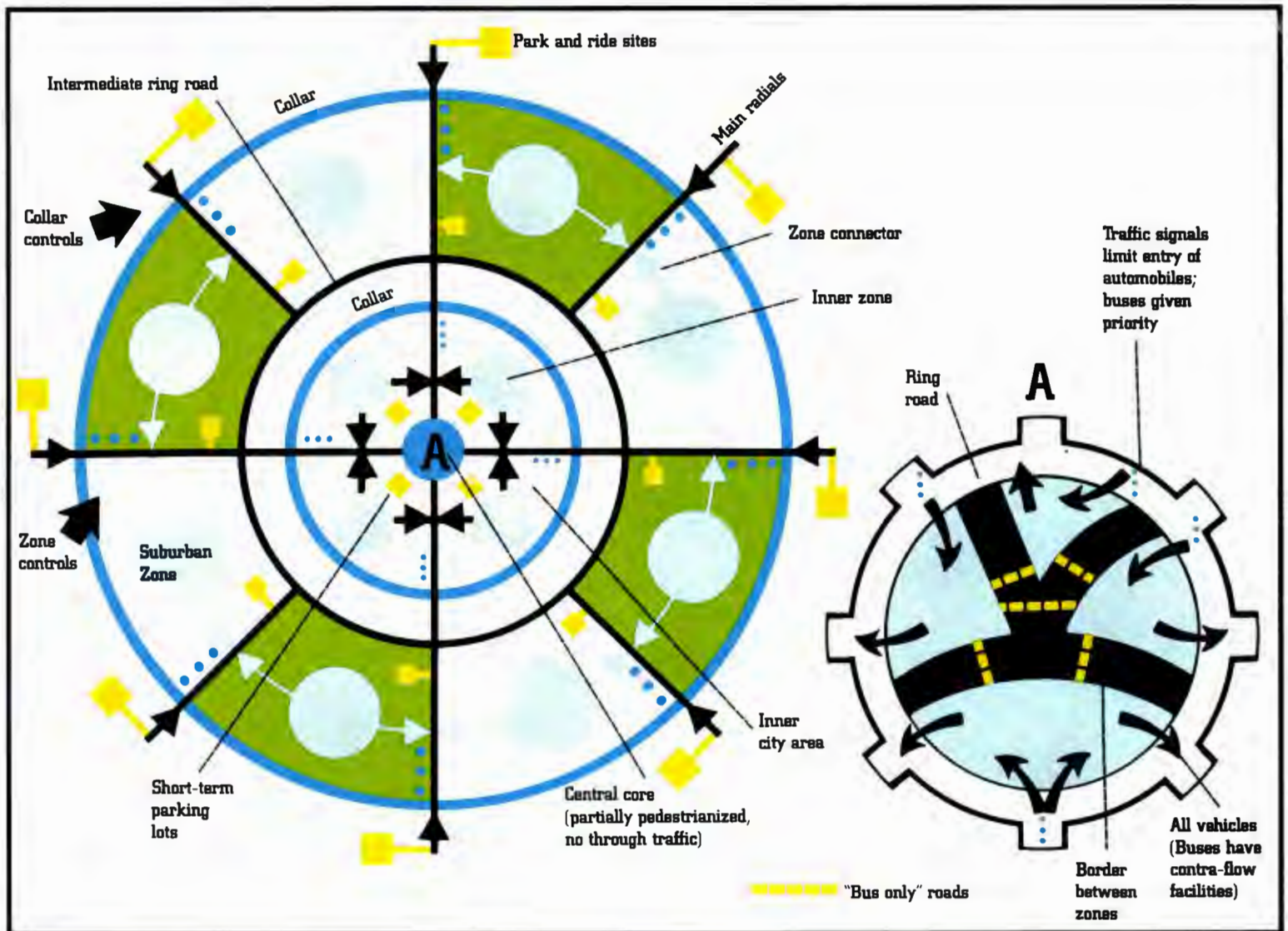
Restrictions on the automobile must be complemented by improved public transportation, which may require financial help from national governments for both investment and operating costs.

## Impact on the Environment

There is a strong positive correlation between traffic volume and air and noise pollution. Thus, sharp decreases in automobile pollutants have been registered on pedestrian streets. In Gothenburg, Sweden, for example, noise levels fell from 74 db to 67 db in pedestrian streets, and average levels of carbon monoxide dropped from 65 ppm to 5 ppm. Besançon, France, reduced carbon monoxide in the central city by 67 percent, while auto-related pollutants in Nagoya, Japan, declined by 16 percent.

It must be noted, however, that these large reductions in pollution may be very local in effect; unless the areawide volume of traffic is actually reduced (through a shift of auto users to public transportation, for example) pollution will merely be redistributed to ring roads and other diversion routes. This

# NOTTINGHAM'S CENTRAL ZONE AND COLLAR SCHEME



## 1. Traffic Cells

City centers or sensitive residential areas bounded by a ring road or major traffic arteries may be divided into a series of cells. Local access to each of these cells is possible only via a limited number of entry and exit points at the periphery. Through trips across cell boundaries are prohibited, and motorists can only go from one cell to another by means of a ring road. As a result, the heaviest traffic flows occur on the peripheral route and through trips are diverted away from the center. Such schemes are often combined with pedestrian zones, bus priority and other traffic management measures (e.g. parking restrictions and one-way street systems within each cell).

## 3. Pre-Metro Systems

Underground or segregated surface lines may be constructed along particularly congested corridors. Streetcar or "pre-metro" services are operated along these corridors until ridership reaches a certain level, at which point they can be replaced by a higher performance metro system.

## 2. Zone and Collar Schemes

Central city areas may be divided into a series of concentric zones bounded by a "collar" of traffic lights. Traffic entering each zone in the peak period may be restrained by reducing the green time at these lights. The amount of green time permitted depends on the traffic conditions in inner zones and the length of traffic lines on radial routes at each collar. Priority measures for public transport such as bus lanes and "preempted" traffic signals (a bus can turn the lights green by radio transmitter or a sensing device in the road) may be incorporated into such a scheme to avoid delays at the collars for public transport users.

## 4. Supplementary Licensing

Supplementary licensing is one form of road or traffic congestion pricing. Part or all of a city center is cordoned off and drivers must purchase a supplementary license to have access to or to drive within this area. Such schemes are mainly directed at restraining the use of private cars and through traffic during peak hours in congested city centers.

impact can be minimized if the alternative routes are carefully chosen (if, for example, they are streets with little human activity) and if traffic signals are synchronized to ensure a steady flow of vehicles.

## Energy Use

Motor vehicle transportation accounts for about 20 percent of all fuel consumed in Europe and more than 30 percent in the United States. Management-based urban transport can save energy in the following ways:

- By increasing car occupancy
- By encouraging a shift from private cars to public transport
- By encouraging inhabitants to walk or cycle when making short trips
- By encouraging more efficient use of existing roads.

For example, automobile load factors are very low in OECD countries, and an increase in auto occupancy from 1.2 to 1.6 persons per car would reduce the number of cars used by 25 percent.

If such approaches are to be successful, they must be supported by national policies and incentives such as increased taxes on motor vehicle fuel and development of more fuel-efficient vehicles.

In deciding upon such measures, policymakers need to consider the relationships between energy conservation and other measures. For example, auto emission standards need to be coordinated with fuel-efficiency measures, since at least some techniques for reducing such emissions tend to raise fuel consumption.

## Revitalizing Inner-City Areas

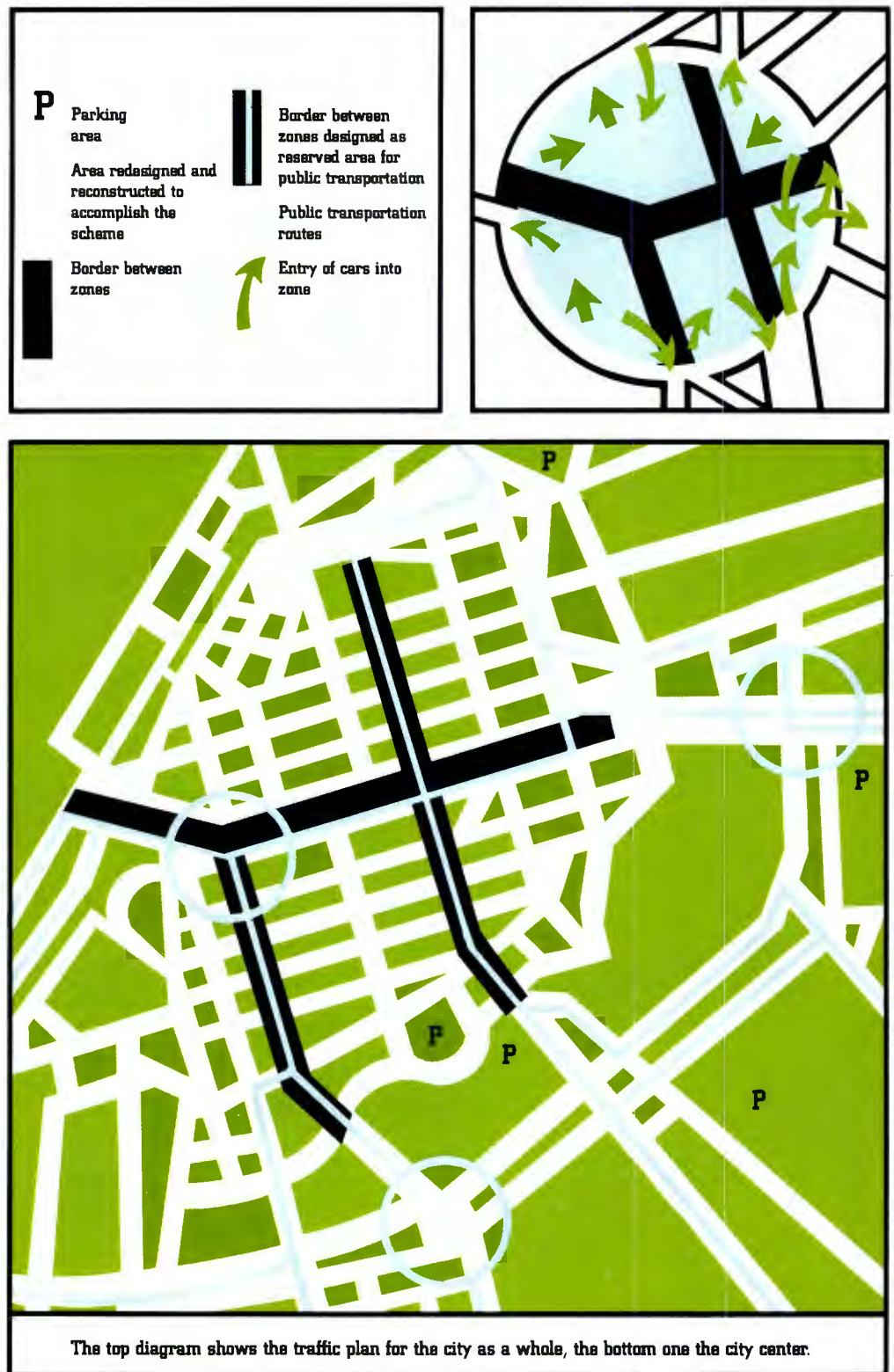
In many inner-city areas, the number of industrial and service jobs is declining and residents are moving to the suburbs. These changes tend to leave behind the economically, socially, and even physically disadvantaged persons, often in obsolete and decaying residences with declining services.

Countries have begun to realize that the existing urban infrastructure, cultural as well as physical, is too valuable simply to abandon—and that it cannot be recreated once it has been destroyed. Efforts are being made to revitalize cities, to restore their former quality of life and the role they play in the economic and social life of the city.

Management-oriented urban transportation policies can help by improving accessibility to jobs, reducing the cost of operating public transportation and providing a generally better environment. For example, pedestrian streets in business districts have helped to reverse economic decline in the area, and use of traffic diversion techniques in urban residential zones has visibly helped to restore the quality of life by giving streets back to the people. Delft in The Netherlands, where pedestrians have priority over vehicles on residential streets, is a particularly good example.

Supplementary measures to increase inner-city job opportunities and to improve housing and educational facilities and urban services are needed.

## GOTHENBURG'S TRAFFIC RESTRAINT SCHEME



## Institutional Adaptation

To be effective, urban transport planning and management must take into account all modes of transportation and be adapted to the needs of the entire area. Thus, transportation can be most effectively managed when the city and its suburbs are treated as a unit—a change that will generally necessitate some institutional reorganization. In the United States, for instance, local authorities in adjacent

areas have created metropolitan planning organizations to make regional plans, and some federal funding is dependent on the existence of planning on such a scale.

In Stockholm, all commuter railway, metro, bus and ferry services are operated by a single regional transport company set up about 10 years ago. Urban transportation policy in West Germany has aimed at integrating the services provided by various modes of urban public transport without abandoning their operational independence: In Hamburg, Munich and Frankfurt, limited liability transport associations

# Effect of Management-Oriented Urban Transport Policies: Analysis of Six Case Studies

TOWN	POPULATION	KEY POLICY FEATURES	TRANSPORTATION RESULTS	ENVIRONMENTAL RESULTS
<b>Gothenburg</b> (Sweden)	454,000	Traffic calls introduced. Streetcars and buses given reserved right-of-way and priority at signals. Suburb-to-downtown express bus service started. Central area parking controlled.	Traffic accidents reduced by 36 percent. Regularity of bus and streetcar services improved. Costs of running public transportation reduced by 2 percent. An increase of 6 percent in week-day trips to center by bus and streetcar. Traffic on inner ring road increased by 25 percent.	Noise reduced from 74 to 67 decibels in main shopping street. Average level of carbon dioxide above pavements reduced from 65 p/m to 5 p/m; reduction of peak carbon monoxide levels by 9 percent. A 17 percent reduction in number of cars entering the central city.
<b>Nagoya</b> (Japan)	2,000,000	Traffic calls established in residential quarters. Longer distance road movements segregated on a loop route equipped with linked signals. Computer-managed area traffic control, bus lanes, priorities for public transport at signals, staggered work hours, parking regulations introduced.	A 17 percent increase in traffic speeds on main roads covered by computer-managed signals. A 3 percent increase in ridership on buses using priority lanes. A 59 percent reduction in deaths from road accidents in the central area and a 57 percent reduction in residential areas covered by calls.	A 15 percent reduction in cars entering the central area in the morning rush hour. A 1.5 percent reduction in traffic circulating in central business district. A 16 percent reduction in auto-related pollutants.
<b>Ottawa</b> (Canada)	528,000	Between 1971 and 1976, bus services more than doubled. Fare subsidies raised from 7 to 46 percent of public transport operating costs. Flexible working hours adopted by 50 percent of Ottawa's city center employees. Charges of \$20 to \$24 (Canadian) per month introduced for 700 spaces in federal government parking lots. Express busway 7 km long created.	Between 1972 and 1976, annual public transport ridership increased from 37 to 60 million passengers per year. Public transportation's share of total evening peak travel by road increased from 20 to 30 percent. The proportion of government employees driving to work dropped from 35 to 27 percent between 1974 and 1975.	A 15 percent reduction in peak period car use. Carbon monoxide levels held constant at 13.15 p/m between 1973 and 1975. (The average in large North American cities is 23 p/m.) A population increase from 95,600 to 97,500 in the inner city between 1971 and 1976.
<b>Paris</b> (France)	2,300,000	A monthly transport pass — the "Carte d'Orange" — allowing an unlimited number of trips by any public transport mode in the Paris region introduced. A 2 percent payroll levy by local authorities on employers introduced to finance public transport. Reserved bus lanes were implemented to form a network of 100 km in Paris.	Sales of Carte d'Orange rose from 100,000 in October 1975 to 1,300,000 in December 1977. The scheme has led to a 36 percent increase in bus use in Paris (of this increase, 38 percent of trips were formerly made by Metro, 30 percent on foot, 14 percent by auto). The payroll levy produced almost 2 billion francs in 1976 (approximately 22 percent of the total expenditure for public transport in Paris). The reserved bus lanes have improved the regularity of bus service as well as the speed of the trips.	Survey results show that an average of 70,000 auto trips per day have been shifted to public transportation in Paris. All three measures have contributed greatly to improving the image of public transportation, particularly surface transportation, in the Paris region.
<b>Singapore</b>	2,000,000	Supplementary licenses introduced for vehicles entering the central business district during the morning rush hour. Tax disincentives on car ownership. Publicity for car pooling. Staggering of work hours. Park-and-ride services. Improved bus service.	A reduction of traffic during the morning rush hour in the zone covered by supplementary licensing of 75 percent. Car pools rose from 2,137 to 4,500. A 15 percent increase in bus passengers between 1974 and 1976. The rate of growth of car ownership fell.	A 43 percent reduction in overall daily traffic in the licensed zone. A 15 to 20 percent reduction in carbon monoxide levels.
<b>Nottingham</b> (England)	305,000	A variety of traffic management and restraint measures introduced, including zone and collar physical restraints, traffic calls and pedestrian zones, peak period waiting and delivery restrictions, synchronized traffic signals, and truck bypasses. On-street parking restrictions; restraint and pricing measures implemented for off-street parking. Public transportation services improved in frequency (33 percent increase during peaks) and with new services (free special bus service for shoppers, park-and-ride-services during peak periods and on Saturdays).	The zone and collar experiment was abandoned after 11 months, but significant results were achieved including the elimination of through traffic in the central core, a 50 percent reduction in circulating traffic, and significant improvements in bus reliability.	The central area scheme has reduced pedestrian/vehicle conflicts (accidents dropped 60 percent), has given buses and pedestrians priority over other traffic and has improved the downtown environment.



grouping representatives of federal, state and city government have been set up to determine transport routes, to develop equipment, to fix fare schedules and to distribute revenues to the participating companies.

Regional transportation must be integrated if management-oriented urban transportation policies are to succeed, but the form of integration will vary from place to place.

## Finance

The financing of urban transport systems is complex: Private funds finance the purchase of cars and trucks, public funds the purchase of transportation equipment and infrastructure as well as the operating costs of the various components of the urban transportation system. All costs, except of course the private purchases, are in turn covered to varying degrees by user charges, taxes and other sources of revenue. Although taxes on ownership and use of vehicles (including fuel taxes paid by urban vehicle owners) cover most investment in highways and parking, they do not pay for the costs of air pollution, noise, congestion, accidents or disruption that vehicle users impose on other urban residents. Some countries are considering special taxes on motor vehicle pollution, both air and noise, to remedy this situation.

In Singapore, supplementary licenses must be purchased by drivers of cars with fewer than four occupants which enter the city center during the morning rush hour. In effect, these drivers are thus

obliged to pay for at least some of the costs imposed on others by their vehicles. This scheme has resulted in a 75 percent decrease in traffic entering the central area during the morning rush hour and radical improvement in the environment. Profits from the sale of the licenses could be used to improve public transportation.

Experience suggests that supplementary licensing is a powerful and effective instrument, but it is a controversial concept primarily because motorists are not accustomed to paying all the costs of automobile usage. Such schemes also raise issues of equity, because they discriminate against lower income car owners. Kuala Lumpur will be the second city in the world to implement such a scheme while Bangkok, London and others are examining the possibility.

Generally, fares do not cover the costs of public transportation, and the amount of subsidy needed varies from city to city. Deficits have been due, in part, to rising labor costs and the labor-intensiveness of public transport. In addition, political decisions have been taken to keep fares low, particularly to benefit low-income residents, and to encourage more people to use public means of transportation. Public transportation enables cities to function better; in many cases, the absence of such a system would prove disastrous to the city's economy. Large subsidies can also be rationalized by noting that car users are implicitly subsidized since they do not pay for the costs they impose on others.

Whatever the theoretical arguments, subsidies to urban public transport are in fact rising in many OECD countries and causing concern to both local

and national governments. One response to this situation has been a search for new revenue sources. In France, for example, a payroll tax on firms with more than 10 employees has been imposed for the specific purpose of improving public transportation. First introduced in Paris and neighboring towns in 1971 and subsequently extended to cities with more than 100,000 inhabitants, this tax produced a revenue of \$500 million in 1976 for the whole Paris region.

In North America, attention has been given to what is called "value capture." This is a financing mechanism that involves evaluating how much a given transportation improvement has increased land values and then levying a tax on the increase. Some Canadian cities have used the technique, but they found it difficult to separate value increases due to transit improvements from other changes in a complex urban land market.

In the United States, local authorities (in Minneapolis, for example) have created special tax assessment districts around shopping streets rehabilitated for the exclusive use of pedestrians and buses. Shop-owners on the street (called a transit mall) are required to pay a special tax which is used to finance the improvements, to pay the operating costs, or both.

Revenues derived from financial measures such as these can be used to support public transportation, thereby reducing the need for central government subsidies. ■

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# A Personal View of the Seminar on Urban Transport and the Environment

BY DAVID BAYLISS

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Our cities' welfare has become an increasingly important public policy issue in recent years. An increasingly discerning public is demanding that citizens and decision-makers cooperatively deal with the issues that recent experience has shown can lead to economic, environmental and social problems. While the public speaks with many voices and partisan interests often contradict one another, debate is healthy. All views should be considered in the decision-making process.

Primarily because of the widespread failure of urban redevelopment programs associated with the rapid economic growth of the 1950s and 1960s, urban policymakers have, in recent years, become more cautious about wholesale change. In addition, growing concern over environmental quality (air pollution, noise, neighborhood safety, land use conflicts), energy scarcity and fiscal austerity is stimulating policies of conservation, rehabilitation and more efficient use of existing facilities, coupled with highly selective development.

Transportation is only one of many contemporary urban problems, but one to which this general philosophy applies with particular force. Urban road transportation depends heavily on the most vulnerable energy source, oil, and in most countries, this situation is likely to continue for years. Oil is a key determinant of the quality of the urban environment and one that has an especially sensitive relationship to economic and social developments.

## Current Policy Directions

Most cities have demonstrated a clear need for significant government intervention in their transportation systems, such as the application of incentives,

restrictions, or both, to encourage the use of more efficient methods of transportation. As the case studies have shown, the degree and form of government intervention will differ with the area. These differences will arise not only from the variation of transportation and environmental circumstances among towns but also from public attitudes and the willingness of governments to introduce the required measures. The common elements in these projects are the better use of resources, the improvement of the environment, the need to maintain and improve accessibility and the optimization of existing means of transportation rather than the construction of costly and often environmentally damaging new infrastructure.

The case studies and background papers have shown a range of measures to improve transportation and the urban environment and a variety of ways in which these measures can be combined. Transportation management schemes include, at one extreme, traffic management policies (such as one-way streets, channelization synchronized traffic signals and improvements in the quality of public transportation) that are designed to prevent obvious inefficiency and excessive environmental impact. At the other extreme, there are the more far-reaching approaches such as Gothenburg's citywide traffic cell system and parking program and Singapore's area licensing program, both of which use economic instruments to complement other regulations. In these cities, public intervention has changed the relationship between demand and supply by the shaping and limitation of demand. Between the two is a range of more or less progressive approaches that make full use of conventional techniques and employ additional measures to limit traffic demand; these approaches include parking controls, bus priorities, car-free zones and parking/public transport pricing

### Top

*In addition to some sixteen intersections equipped with bus priority equipment (VETAG system), Delft has bus pass-throughs that permit the transit vehicle to go through intersections prohibited to the auto. The Department of Public Works is continuing work on a computerized traffic control system which will eventually monitor all traffic and adjust signals to smooth traffic flow, give further priority to transit vehicles, and relieve congestion.*

### Bottom

*Even stiff fines have not solved the illegal parking problem on the Avenue Carnôt, just below the Arc de Triomphe in Paris. Delivery vehicles often clog streets when autos have filled loading stations.*



policies. It is clearly desirable that policymakers view all forms of urban transport as part of a whole and treat all consistently. Economic instruments appear efficient in achieving this unified approach. Some cities have attempted to identify the optimum limitation of vehicular traffic to contain congestion and to reduce its effects on the environment and public health, but agreement on what this limit should be is hard to find.

What is clear, however, is that many cities are discovering that they can no longer cope with their traffic problems through conventional traffic management. Therefore they are investigating and will be experimenting with progressive or radical policies. Radical policies, however, tend to stimulate opposition, and can be very damaging if implemented without careful preparation. Decision-makers therefore are understandably cautious about the introduction of such policies and are demanding that careful evaluations of the effects of the projects be carried out.

## Lessons Learned

Can the experience of the past few years teach us any lessons with respect to transportation policies?

**Flexibility and Reversibility.** Most of the case studies show that because the strategies adopted contain minimal costly "irreversible" elements (such as urban expressways, new metros and large-scale redevelopment), the costs of "failure" are small. The Nottingham experiment has shown that in a medium-size city a radical scheme can be repealed fairly easily and the worthwhile elements retained. Elsewhere it has been found that programs can often be readily modified and improved once the initial operating experience has been obtained. An example is the conversion of Singapore's shuttle buses to more conventional service. We would be deluding ourselves, however, if we did not recognize that failure can have costs and, where there are risks, programs must be designed to minimize the costs of total or partial reversion. All programs should be implemented in such a way as to ensure that the benefits sought are achieved as soon as possible.

**Economic Instruments.** In the past few years, interest has grown in the use of economic instruments to regulate road traffic. There have also been several innovations in public transportation fare systems, such as "period" tickets that allow travel on all forms of public transportation during a period of time. Parking charges, non-peak-hour concessions on public transportation and subsidized travel vouchers for certain groups are good examples of economic instruments.

Now that a supplemental licensing system is operating successfully in Singapore (and being studied by other cities), such programs should increasingly be included among the policy options for those places where the potential of established techniques has already been largely exploited.

**Political Considerations.** Political costs of traffic management must also be considered. No elected representative at local, regional or national level wants to be associated with an unsuccessful plan, especially if it has become a matter of political advocacy. Successful programs usually are based on careful planning and pragmatic implementation in the context of a political will to improve the urban environment and to relieve congestion more than a

commitment to a particular plan. The lesson seems to be to focus the political commitment on the objectives to be achieved rather than on the exact means for their achievement—and then to adopt pragmatic and progressive measures to achieve the goals.

**Accessibility.** Recent experience has shown that careful planning can yield substantial environmental and traffic benefits without undue restriction on accessibility. In certain situations, accessibility can be increased. What is more, preference can be given to priority users so that interests of the community at large are better served. The accessibility requirements of the elderly, the handicapped and other persons who have difficulty in traveling around our towns and cities must also be given proper weight in the design and operation of urban transport.

**Central Area Merchants.** The introduction of progressive transport management programs has confirmed the robustness of city centers and their ability to cope with and thrive on well-planned change. The success and well-being of central areas is of concern to several sectors of the community including local politicians and central area merchants. Often the specter of lost trade has been raised as a major objection to traffic management, even though history has shown these fears to be ill founded; in some cases, in fact, traffic management has contributed positively to revitalization of the urban core. The strong support of the business community is often a decisive influence in bringing about traffic management experiments and in making them permanent. Thus, business persons should be encouraged to participate actively in the planning process.

**Role of Governments.** A harmony of interests and coordination among all levels of government are important if programs of the kind described are to be effective. National governments must provide local government agencies with the power to exercise initiative.

**Complementary Measures.** Successful management approaches must include a careful blend of complementary measures related to the circumstances and aspirations of the individual areas. They must contain measures that encourage the use of public transportation and secure environmental benefits as well as measures that regulate and influence the use of private vehicles. Since the relative merits among transportation modes depend upon trip purpose and city form, a proper balance must be sought among modes to enable all population segments to satisfy their travel needs. Other measures such as changes in land use and activity patterns (e.g., flexible working hours) must also be considered.

**Participatory Process.** The principal interest groups likely to be affected and, as appropriate, the public at large should participate in the identification of objectives, plan design and evaluation.

**Effect of Urban Characteristics.** The size, complexity and design of the urban area are of major importance. In medium-size cities with a clear and dominant central area, it is possible to introduce a package of transportation management arrangements that can produce rapid and dramatic change, especially when the existing traffic management level is low. In larger cities, rapid and dramatic change is likely to be local; wide-ranging measures are usually introduced gradually and with little obvious impact in the short term.

*Flower vendors in The Netherlands, fruit and vegetable stands in Sweden and kiosks in Germany show the uses to which former streets can be put, when the decision is made to favor the pedestrian over the motorist.*





### *Top*

*In the Federal Republic of Germany, shopkeepers originally resisted the idea of the disruption caused by construction of the Munich Metro. However, because of subsidy systems provided by the government and the support of citizens who enjoy the ambience of the surrounding Marienplatz pedestrian mall, merchants ultimately asked for an extension of the zone, which is now one of the most delightful areas unencumbered by autos in the city of Munich.*

### *Bottom*

*These narrow light-rail vehicles were developed especially for Amsterdam's narrow streets. Moving on exclusive guideways for a portion of their journey helps to speed transit trips. Additional ways of dealing with the intrusion of the auto are being considered by the government of The Netherlands. Traffic management and parking schemes are among the low-cost investments that are making Dutch cities less reliant on the auto, and more amenable to pedestrian transit and bicycle traffic.*

## **Conclusion**

It is important to view urban transportation in the context of our main concern, the quality of life. A properly designed and functioning transportation system is essential to the environmental, economic and social health of cities. Low-cost management changes and economic instruments can enhance city life by encouraging changes that reflect the general desire to protect our urban heritage, to conserve scarce resources and to improve the economy.

Much remains to be done; success in these matters requires bold and innovative approaches, careful planning and consultation, good relationships among public officials and willingness to experiment and, perhaps, to suffer temporary setbacks. Most of all, however, planners must demonstrate a determination to break the pattern of increasing congestion and pollution in our cities and to reestablish the motor vehicle as the public's able and willing servant for a better urban life. ■



# Overview of Sixteen City Case Studies

This section presents an overview of innovative urban transportation programs which the OECD Environment Directorate undertook in 16 cities around the world between 1976 and 1979. The transportation programs were designed to improve the environment in the face of increasing car ownership and use in the 1970s.

Updated summaries of previous case studies of progress in Besançon, Geneva, London, Madison, Nagoya and Nottingham may be obtained from the Secretariat of the Urban Division, Environment Directorate, OECD.

## INTRODUCTORY EXPLANATORY NOTES

### *Traffic Cells*

City centers or residential areas bounded by main roads may be divided into a series of "cells." Entry and exit may be confined to a limited number of points on the boundary road. The effect is to prevent drivers from making through trips across cells and to oblige them to use the "ring" route, thus shifting traffic from the interior to the periphery of the affected area.

Pedestrian streets, bus priority measures, parking restrictions, one-way systems and other traffic management measures are often combined with traffic cells.

### *Zone and Collar Schemes*

Cars used to drive from residential areas to places of work may be controlled by using traffic signals as "valves." Selected residential areas are treated as traffic cells (see above) and traffic signals are used to regulate the flow of *departing* vehicles at all exits. These controlled areas are the zones. Traffic *entering* city centers and other areas that attract heavy flows of cars may be similarly regulated by traffic signals located on radial routes just before ring roads. These signals form "collars." Traffic wishing to avoid the controlled area may move into the ring route. Buses and other high-occupancy vehicles wishing to enter the controlled area may be assisted by means of priority lanes and preferential signals. Low-occupancy cars wishing to enter, on the other hand, may be forced to wait at the "collars" for as long as necessary to ensure free-flowing traffic conditions within the controlled area.

### *Pre-Metro Systems*

Existing surface streetcar services may acquire some of the characteristics of an underground railway by the construction of short tunnels under particularly congested parts of the road network. In the suburbs, streetcars may be provided with segregated or elevated lines. Streetcars may be operated along such lines until ridership reaches the levels which justify conversion to higher performance rolling stock and signaling systems.

### *Supplementary Cordon Licensing*

In city centers or other places where traffic congestion is serious, vehicular movement may be diverted and reduced if drivers entering the congested area are required to purchase and display a special, supplementary, vehicle license. The need to display such licenses may be confined to peak travel times or to other periods. To promote higher occupancy rates and to avoid **penalizing lower income car owners**, license-free passage may be given to buses and bicycles and to cars carrying more than a stipulated number of riders. Enforcement may be limited to recording the registration numbers of vehicles not displaying licenses at points of entry to the controlled area, but other solutions are also possible.

### *Car Pooling*

A voluntary arrangement under which two or more neighbors, work colleagues or other companions regularly drive to and from a common destination, such as a place of work, station, school, or shopping center.



# 1

## ANKARA, Turkey

(population 1,690,000)

### Objectives

\*To combat Ankara's history of uncontrolled growth and development through effective land use planning.

\*To improve public transportation.

### Key Policy Elements of Plan

\*Creation of 5.3 km of segregated bus lines.

\*\*"Pedestrianization" of 0.1 sq. km of shopping area between 10 a.m. and 8 p.m.

\*Inauguration of Light Rail Transit; first sections to open in 1981, to be integrated with bus and "dolmus" (collective taxis).

\*Establishment of a parking tax to help pay for parking facilities for residents without garages.

### General Results

\*Average bus speeds are not so high as hoped, because current infrequency of buses slows down boarding times.

\*Pedestrianization has been successful and a second zone is being prepared.

\*Need seen for two "bus only" streets in the central city.

\*Additional road capacity needed to ease congestion caused by reserved bus lanes.

### Specific Environmental Aspects

\*Environment is more pleasant, particularly for pedestrians.

# 2

## BESANÇON, France

(population 135,000)

### Objectives

\*To relieve congestion in and protect the environment of the historic city center.

\*To provide a comprehensive experiment in traffic control and public transportation improvement as an example for other French cities.

### Key Policy Elements of Plan

\*Restructuring of public transportation:

- increased rolling stock
- established bus lanes and new routes
- established new fare policy
- established paratransit for nonpeak hours.

\*Traffic Management:

- restricted road access for certain vehicles
- established traffic "cells"
- established "ring" road
- set up park-and-ride areas, plus central area parking restrictions
- improved traffic control equipment.

\*Pedestrian zones

### General Results

\*Public transportation has improved. Ridership rose 75 percent in two years.

\*Bus service has become very frequent, fast and comfortable.

\*Elimination of through traffic has markedly reduced central area congestion.

### Specific Environmental Aspects

\*Less noise from private cars has been offset by more noise from buses; fewer accidents have occurred.

\*Attractively designed pedestrian areas have stimulated social and recreational life.

\*Shops have improved their facades and city has become more attractive.

# 3

## BRUSSELS, Belgium

(population 1,029,000)

### Objectives

\*To enable public transportation to attract patronage with better services.

\*To promote public access to citywide activities.

\*To reduce travel time to and from work.

\*To reduce traffic problems adversely affecting the city's economy.

### Key Policy Elements of Plan

\*Immediate benefits from capital investment to be obtained by using streetcars in tunnels in "pre-metro" form. When sufficient underground sections are finally joined, the transition to metro operation is to take place. Eventually, there are to be five lines.

\*General policy to segregate public transport modes where they conflict with other traffic.

\*Decision to integrate all public transportation systems through the use of general season tickets encouraging interchange, particularly between metro and railway.

\*A rapid streetcar line is to complement the metro system.

\*Road infrastructure developments to concentrate on construction of a ring road.

### General Results

\*Of 19 streetcar lines measuring 153.4 km, 51.2 km are segregated tracks.

\*Metro lines measure 11.7 km; operation began in September 1976.

\*General season tickets were used by 28 percent of all people traveling on public transportation.

\*Modal split of 66 percent rail to 33 percent road transportation has been achieved.

\*Of 27 bus routes measuring 251.7 km, 3.9 km are in reserved lanes serving both metro and streetcars.

\*The number of passengers on public transportation is continuing to increase (up 2.14 percent between 1977 and 1978).

\*Parking building at the metro terminal has been a great success, and more buildings are planned.

### Specific Environmental Aspects

\*Surface vehicular traffic congestion has been reduced and traffic flow smoothed.

\*Central city is becoming revitalized.

\*No major effects are expected on air pollution and noise, but the authorities do not consider either to be a problem.

# 4

## CURITIBA, Brazil

(population 950,000)

### Objectives

\*To provide guidelines for urban growth by integrating land use, traffic control and mass transportation policies.

\*To encourage public concern about the city.

\*To avoid additional capital-intensive road infrastructure.

\*To reclaim urban space for pedestrian and cultural uses.

\*To discourage car use and to promote public transportation.

### Key Policy Elements of Plan

\*Central core functions to expand along two development axes, not in one central core.

\*Removal of through traffic by redirection of traffic.

\*Establishment of high-frequency bus service on development axes.

\*Establishment of special terminals and parking at transportation interchanges.

\*Control of land use activity to match street capacity.

\*Transformation of former roadways into gardens and playgrounds.

\*Establishment of pedestrian promenades.

\*Flexibility of plan to permit reevaluation and adjustment following early actions.

### General Results

\*Circulation related to the development axes is successful, as each uses three streets: The middle one is for essential access parking and public transportation; the two parallel outer streets are for one-way traffic circulation.

\*Patronage of public transportation is rising rapidly, thus encouraging the introduction of articulated buses.

### Specific Environmental Aspects

\*Congestion has eased.

\*As a result of street reclamations, per capita green space has risen from 0.5 square miles in 1965 to 12.0 square miles in 1978.

\*Pedestrians enjoy a much improved central city environment, and residential areas have more space for leisure activities.

# 5

## GENEVA, Switzerland (population 340,000)

### Objectives

- \*To reduce the amount of car traffic.
- \*To establish a preferential network for public transportation.
- \*To create public parking facilities while restricting private parking construction.
- \*To convert designated spaces to pedestrian areas.

### Key Policy Elements of Plan

- \*Construction of outer ring road for through traffic.
- \*Construction of intermediate ring road to link suburbs.
- \*Construction of inner ring road (two one-way loops, centrally controlled signals) around town center.
- \*Traffic management to reduce car traffic in the central city by—
  - parking restrictions
  - preferential treatment for buses
  - creation of pedestrian streets.

### General Results

- \*Pedestrian flow increased 10 to 15 percent in the Bassesville district.
- \*Inner-city traffic was reduced by 30 to 40 percent on the Ile bridges and Place Bel Air.
- \*Average speed of peak-hour travel on public transportation increased by 10 percent.
- \*Public transportation ridership has steadily increased, to 73 million in 1978.
- \*Public parking has been developed.
- \*Cycle paths have increased from 21 km to 33 km, and 6 km more are projected.

### Specific Environmental Aspects

- \*Road safety record has improved; accidents dropped 44 percent between 1970 and 1975.
- \*Noise and air pollution have decreased; carbon monoxide in central city dropped by 20 to 25 percent.
- \*Shopping environment is much improved.
- \*Fringe neighborhoods have experienced some negative effects from diverted central city traffic.

# 6

## GOTHENBURG, Sweden (population 450,000)

### Objectives

- \*To improve safety and the environment in the central business district.
- \*To improve public transportation.
- \*To impose quick and inexpensive solutions to traffic problems.

### Key Policy Elements of Plan

- \*First phase, in center city:
  - creation of five traffic "cells" which only public, taxi and emergency vehicles can enter
  - reservation of track space for streetcars
  - conversion of all downtown parking to short-term.
- \*Second phase, in central urban area:
  - extension of cell system
  - improvement of cycle paths
  - expected 10 percent reduction of traffic in central urban area by 1985 as a result of parking restrictions.

### General Results

- \*Public transportation, especially regularity of service, has improved.
- \*Some reduction in streetcar operating costs has been achieved.
- \*Car travel speeds have increased in central business district and on ring road.
- \*Business has flourished; no interest group has been adversely affected by the plan.
- \*Expected 7 percent increase in fuel costs caused by the longer journeys of the second phase, but traffic flow has improved.

### Specific Environmental Aspects

- \*Safety has improved; noise and air pollution have dropped.
- \*Residents, workers and visitors have enjoyed improved environments.

# 7

## GRONINGEN, Netherlands (population 160,000)

### Objectives

- \*To improve central city environment by reducing noise and air pollution.
- \*To increase road safety.

### Key Policy Elements of Plan

- \*Elimination of through traffic from the inner city.
- \*Improvement of facilities for public transportation and bicycles:
  - establishment of central bus station for urban and regional network
  - special provision for cyclists wherever possible.
- \*Establishment of pedestrian-only streets.
- \*Creation of four "traffic cells."

### General Results

- \*Car traffic in the central city dropped 40 percent (80 percent in Grote Markt), but only a small modal shift occurred.
- \*The number of cyclists in the central city increased 10 percent.
- \*The number of pedestrians passing the central cordon rose 5 percent (15 percent on Saturdays).
- \*Cars parked in covered or multistory parking lots increased 10 percent, but total central city parking facilities did not change.
- \*Bus service in the central city was speeded up.

### Specific Environmental Aspects

- \*Central area noise levels dropped by approximately six decibels.
- \*Few businesses or individuals wish to revert to previous conditions, as the current situation is environmentally safer, pleasing and less congested.

# 8

## LONDON, England (population 7,100,000)

### Objectives

- \*To slow the decline in population and employment by creating a better environment and improving mobility.
- Specific goals:
- increased safety for pedestrians
  - improved bus operations
  - increased speed and reliability for road traffic, especially commercial traffic.
  - reduced fuel consumption.

### Key Policy Elements of Plan

- \*Traffic restraint, chiefly through imposition of parking controls; target of 33 percent reduction from 1974 level of peak car traffic. Specific elements:
  - controlled, on-street parking zones
  - controlled provision of new public parking lots
  - controlled operation of existing public parking lots and use of temporary sites
  - controlled provision of new private parking spaces.

### General Results

- \*Parking controls in themselves appear to have done little to achieve the objectives.
- \*Average traffic speeds have increased somewhat.
- \*Proportion of auto trips into Central London has slightly dropped.
- \*Authorities believe parking controls should be extended to private, nonresidential areas and complemented with other means of traffic restraint, such as area licensing, physical barriers and traffic rerouting.

### Specific Environmental Aspects

- \*Main roads are less congested.
- \*Removal of clutter has improved road safety.

# 9

## MADISON, Wisconsin, USA (population 168,000)

### Objectives

- \*To create land use patterns that will encourage the use of mass transit.
- \*To create public recognition that public financing of buses is justifiable.
- \*To maintain the vitality of the central city.
- \*To maintain the physical identity of neighborhoods and to protect them from through traffic.
- \*To implement disincentives to low-occupancy vehicle use.

### Key Policy Elements of Plan

- \*Preferential treatment for transit and high-occupancy vehicles (establishment of bus lanes and transit malls).
- \*Extension of bus routes, so that 90 percent of residents are within 430 meters of a bus stop.
- \*Provision of cycling and pedestrian facilities.
- \*Coordination of public transportation through a single Metropolitan Transport Authority.
- \*Establishment of rates to encourage short-term parking.
- \*Improvement of traffic flow by improving the signal system and by introducing one-way streets.
- \*Extensive provision for information dissemination and citizen participation.
- \*Willingness to experiment with new management ideas backed by ordinance provisions.

### General Results

- \*Bus patronage rose from 8 to 12.5 million between 1971 and 1976.
- \*Transit operating deficits and road maintenance costs have increased.
- \*No demands for freeway construction have materialized.
- \*Transit share of total transportation has not increased, but car traffic in the isthmus area has significantly dropped.
- \*Popularity of bicycles has increased, but accidents have also increased.
- \*Decline in downtown area appears to have been halted.

### Specific Environmental Aspects

- \*Continued traffic growth has hampered efforts to improve road safety.
- \*Public awareness that in the long term land-use policies will more effectively reduce energy consumption and protect the urban environment than will short-term traffic management has grown.

# 10

## NAGOYA, Japan (population 2,000,000)

### Objectives

- \*Short-term measures to reduce congestion, to improve bus service and to reduce accidents, smog and noise.
- \*Longer term measures to extend underground transit system to relieve surface congestion and to construct 67 km of ring road and radial overhead toll expressways.

### Key Policy Elements of Plan

- \*Establishment of an on-street parking ban, coupled with introduction of parking meters, in the central city.
- \*Establishment of 21 bus-only lanes on approaches to river crossings.
- \*Campaign to popularize staggered travel hours.
- \*Introduction of area traffic control to divert through traffic from the central city.
- \*Creation of 186 residential and school area traffic cells to improve area environment.

### General Results

- \*Number of cars entering central business district during morning rush hour dropped 16 percent.
- \*Of approximately 1,884 civil servants affected by parking restrictions, 34 percent shifted from car to train travel, 15 percent from car to bus.
- \*Passengers on bus routes with bus-only lanes increased 3 percent.
- \*Traffic speeds on main roads with linked signal system increased between 20 and 24 percent.

### Specific Environmental Aspects

- \*Road deaths in central area dropped 59 percent.
- \*Road deaths in residential traffic cell areas dropped 57 percent.
- \*Car-related pollutants dropped 16 percent.
- \*Car trips within the central city dropped 12 percent.

# 11

## NOTTINGHAM, England (population 305,000)

### Objectives

- \*To increase benefits for bus passengers and pedestrians at the expense of motorists.
- \*To implement restraints to avoid the fiscal, environmental and social costs of continued pursuit of the long-term master highway plan.

### Key Policy Elements of Plan

- \*Removal of through traffic from central core.
- \*Establishment of free bus service throughout central city to serve developing shopping areas.
- \*30 percent increase in bus service.
- \*Control of traffic through "collars" on radial routes.
- \*Imposition of "supplementary zone" restraints.
- \*Creation of controlled traffic "cells" and pedestrian areas.
- \*Establishment of park-and-ride fringe areas to be served by express buses.
- \*Establishment of on-street parking restrictions and pricing restraints in public (not private) parking lots.
- \*Synchronization of traffic signals.
- \*Introduction of truck bypasses.

### General Results

- \*Central core traffic plan eliminated through traffic, reduced circulating traffic 50 percent, and improved bus reliability.
- \*Free shoppers' buses carried 120,000 passengers per week.
- \*No significant change occurred in travel patterns or in use of various modes of transportation in peak hours. The zone and collar delays were too short to favor buses significantly, most car commuters from controlled zones had free or subsidized city parking, and the zone and collar system was abandoned after 11 months.

### Specific Environmental Aspects

- \*Accidents fell 60 percent.
- \*Physical appearance improved as a result of attractive street paving and reduced congestion.

# 12

## OSAKA, Japan (population 2,300,000)

### Objectives

- \*To decrease dependence on cars, chiefly by improving the quality and capacity of mass transportation systems.
- \*To protect the urban environment and improve the pedestrian environment.

### Key Policy Elements of Plan

- \*Introduction of a "Ride and Ride System" (continuous terminal transfer between public transport modes) for 18 zones, and establishment of 25 transfer terminals, each with attractive amenities.
- \*Introduction of simple integrated fares.
- \*Introduction of bus priority signals and lanes.
- \*Introduction of computerized area traffic control.
- \*Reduction of parking in the central business district.
- \*Improvement of pedestrian and cyclist facilities.
- \*Improvement of information available to users.
- \*Introduction of paratransit "jumbo" taxis.
- \*Consolidation of freight deliveries from special centers.

### General Results

- \*Seven zones are operational; public transportation use has increased 10 percent.
- \*About 8 percent of this 10 percent total are new riders, 30 percent of whom used to travel by car.
- \*For about 29 percent of public transit riders, travel now requires less time and fewer transfers. For 34 percent, travel now requires less time but more transfers. For 23 percent, travel now requires up to two minutes more time but fewer transfers. For 14 percent, travel now requires more than two minutes more time but fewer transfers. For 0.1 percent of riders, travel now requires both more time and more transfers.

### Specific Environmental Aspects

- \*Pedestrian and cyclist facilities have improved.
- \*Urban environment has been beautified and more open space has been created.
- \*Authorities expected noise and air pollution to drop, but no measurements are available as yet.

# 13

## OTTAWA, Canada (population 528,000)

### Objectives

\*The 1975 Regional Plan for Ottawa-Carleton identified seven transportation goals, of which two were environmental: One was a general policy statement, while the other dealt with through traffic in residential neighborhoods.

### Key Policy Elements of Plan

\*Establishment of parking fees (\$20 to \$24 [Canadian] per month for federal government employees, the largest user group).

\*Introduction of flexible working hours for half of the central city employees.

\*Doubling of bus service between 1971 and 1976, and extension of service to poorly served residential areas.

\*Establishment of express bus lanes (7 km) and other priority traffic measures.

\*Diversion of through traffic away from residential areas.

\*Approval of construction for only those new subdivisions that meet transit requirements.

### General Results

\*Between 1971 and 1976, the number of transit riders rose from 35.5 to 60.3 million, while car travel to the central business district dropped.

\*The number of government employees using cars for driving to work dropped from 35 to 27 percent.

\*Accidents fell significantly in residential neighborhoods following diversion schemes.

\*New suburban areas with better transit plans were developed.

\*The city saved money by avoiding increased road construction and parking capacity, while individuals saved vehicle operating costs.

### Specific Environmental Aspects

\*Peak-period car use dropped 15 percent.

\*Individuals had more travel options and became less dependent on their cars.

\*Between 1973 and 1975, carbon monoxide levels held constant at 13.16 parts per million, compared with an average measurement of 23 parts per million for other large North American cities.

\*Population increase in inner city between 1971 and 1976 suggests the neighborhood traffic rerouting was successful.

# 14

## PARIS, France (population 2,200,000)

### Objectives

\*To promote public transportation.

### Key Policy Elements of Plan

\*Introduction of a monthly transport pass allowing unlimited trips by public transportation, effectively integrating the metro, express metro and regular train services.

\*Introduction of a payroll tax (1.9 percent of salaries) paid by employers to help finance public transportation.

\*Introduction of a network of reserved bus lanes to counter deterioration in operating conditions for buses; taxis also favored as "high occupancy" vehicles.

\*Connection of express metro and train system (under construction).

### General Results

\*Carte d'Orange fare system proved highly successful; number of passengers using system rose from 1,150,000 in November 1976 to 1,350,000 in November 1978. Bus use increased 36 percent (suburban bus use, 5 percent).

\*Bus regularity improved, but private cars regularly violate the bus lanes.

\*The transport payroll tax produced almost 2.5 billion francs in 1977.

### Specific Environmental Aspects

\*There has been little direct impact thus far on the physical environment. The image of public transportation, however, has greatly improved, and promotion of public transportation appears to be a prerequisite to further efforts to restrain car traffic.

# 15

## Oporto, Portugal (population 320,000)

### Objectives

\*To improve chaotic traffic, at low cost, through adoption of techniques common in northern European cities.

\*To improve urban center traffic.

\*To reduce regional disparities in transportation services.

\*To improve general road safety, especially for pedestrians.

\*To improve the quality of life in the central city and along the old streetcar routes.

### Key Policy Elements of Plan

\*Creation of a ring road by improving the flow conditions on existing streets.

\*Central traffic management:

- eight bus-only lanes
- three pedestrian zones, of which two act as transit malls.

\*Improvement of central city approach roads:

- bus-only lanes
- one-way streets with priority for transit
- platooned access for buses to Don Luis bridge. (Equal time division on one lane for transit and private cars to permit 180 buses and 1,200 cars per hour to cross the bridge.)

### General Results

\*Traffic has increased 9 percent since 1975, while commercial traffic speeds rose up to 50 percent.

\*On the most heavily traveled routes, traffic delays dropped by 500 to 700 passenger hours per peak hour.

\*Pedestrian mobility and convenience in the central city improved.

\*Further expansion of the traffic system is likely, with user approval.

\*Parking remains the most critical transportation management issue.

### Specific Environmental Aspects

\*Congestion has eased.

\*The traditional city center is now a more congenial pedestrian meeting place.

\*No quantification of noise and other pollution abatement has been made, but improvement is expected.

# 16

## SINGAPORE (population 2,200,000)

### Objectives

\*Incorporation of transportation policy into a comprehensive urban strategy to conserve basic resources by—

- restricting the ownership and use of private cars
- improving public transportation services.

### Key Policy Elements of Plan

\*Introduction of "supplementary cor-don licensing" in the morning rush hour.

\*Sharp increase in parking charges as stay in the central city lengthens.

\*Introduction of incentives for car pooling.

\*Improvement in bus service.

\*Imposition of tax disincentives for car ownership.

### General Results

\*The number of vehicles entering the central city in the morning rush period has dropped 43 percent (for private cars, 70 percent).

\*Car pools accounted for 53 percent of all cars entering the restricted zone in the controlled time period in November 1978.

\*Bus passengers increased; car-owning households increased their use of buses for trips to work from 33 percent to 43 percent.

\*Patterns established following the introduction of the scheme have remained remarkably stable.

\*The rate of growth in car ownership has slowed.

### Specific Environmental Aspects

\*A reduction in the total volume of central area traffic has given greater freedom to pedestrians, has improved the city's appearance and safety and has reduced air pollution in the morning rush hour.

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