International Efforts and Neighborhood Traffic Management

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Most residential traffic restraint schemes abroad are planned as part of urban rehabilitation in which landscaping is integrated with traffic management, but a number are limited to traffic controls. The schemes presented in this paper depict the size and nature of the areas planned and a variety of means used to control traffic. In Nagoya, Japan, which has one of the most inventive and comprehensive policies, a net reduction of 43 percent in fatalities and a 39.4 percent decrease in severe injury accidents were experienced within the cell area. At the same time, an average decline in noise levels of 3 dBA was recorded in some of the cells. Of the problems that have arisen from these schemes, one of the most common is residential and spillover parking. Another, noted in Uppsala, Sweden, was a map change that required some period of adjustment for motorists.

In 1975 the Organisation for Economic Co-operation and Development sponsored the conference on Better Towns with Less Traffic at which numerous examples of "pedestrianization" in countries outside the United States were given. Some of these are discussed below. OECD surveyed 300 cities, of which 59 percent had installed pedestrian schemes of one kind or another (1). Most were located in commercial centers, the most visible and dramatic use that affects more people and receives the most attention. In some of the central-area schemes residents benefit; in others, they do not because traffic is diverted into ring roads through residential areas.

DELFT, HOLLAND

The city of Delft has one of the most original programs: Residential streets are converted into pedestrian-dominated "residential yards." These yards have been created in 2 small residential areas of 550 and 1,100 dwellings respectively and a number of scattered streets with traffic levels of fewer than 100 vehicles per hour. Emphasizing pedestrian priorities, the program has stayed with integrated solutions in which vehicles and pedestrians are mixed. Sidewalk curbs are eliminated, and the whole street is paved for pedestrians. Streets are broken up with planters, walls, benches, barriers, and mounds and are designed so that the drivers must attend "incessantly to the fact that the car is only one of the users and a guest to other functions having priority" (2). The profile where a car can drive is no more than 3 m for 2-way traffic and a widening for passing every 50 or 60 m. Route changes are overaccentuated.

One-way streets are not advocated because drivers are tempted to drive at high speeds on them. At crosswalks where children play, additional narrowings, bumps, and thresholds are used. Parking spaces are designed and limited for the use of vehicles measuring up to 7 by 2 m. Right-angle parking spaces are preferred since they demand more attention from the driver and can be used better by children when they are empty. Traffic control devices are multifunctional in nature, telling drivers that con-

trol of automobiles is not their only purpose: "A tree is an obstacle but it is also part of the greenery; a small hill can force cars to the side, but it is also an object for children's play" (2). Planting in the yards is scattered, and illumination is geared to the residential character of the street. No tall electric standards are allowed (Figure 1).

Some difficulties have been caused by the reduction of residential parking places by 10 to 15 percent within the residential yards. One proposed solution is to charge residents for parking near their houses and use the funds to finance municipal parking facilities farther away. Another is to reverse the present situation so that parking is permitted only in designated areas as opposed to allowing parking where it is not expressly forbidden. Legislation giving pedestrians priority over vehicles in the residential yards is also thought to be desirable.

NAGOYA, JAPAN

Nagoya, a city with a daytime population of 2.3 million, has been particularly inventive and comprehensive with its residential traffic restraint policy. Unlike other major Japanese cities, Nagoya lacks a central freeway system. After World War II, the city took the dramatic step of widening all its main streets in the central area. With streets in a grid pattern, it looks more like an American city than other Japanese cities. Because of this and poor public transport, Nagoya has many more car commuters (33.6 percent of all commuters) than Tokyo or Osaka (17.3 percent and 7.7 percent respectively).

However, outside the central area the majority of the main streets narrow to 2 or 4 lanes and street expansion has been barred by local opposition. Twenty-eight percent of the city's streets are less than 5.5 m wide and 34 percent are from 3.5 to 5.5 m wide. There are few sidewalks on these narrower streets since they were originally constructed for pedestrians. The intricate network also results in frequent intersections; mean intersection distance is only 60 m.

In 1970, the city had an accident rate double that of Tokyo, carbon monoxide density at heavily trafficked intersections often exceeded the designated maximum (average 10 ppm in 16 hours), and a traffic engineering study predicted that air quality would be exacerbated to 1.8 times the 1973 level within 10 years.

Although one transportation group is now pressing for the construction of a cross-town freeway system, the ad hoc Traffic Management Committee reporting to the Prefectural Policy Headquarters is using computer control techniques to improve efficiency on existing routes and to protect residential areas. A 4-year program has been proposed, comprising the following steps:

1. Redesign the existing loopway mainly for the use of through traffic (and long automobile trips in the city), thereby diverting the through traffic from the central area;
2. Apply the traffic cell method (called "unit cell control" in Nagoya) to target areas plagued by accidents, noise, or other traffic problems, and, at the same time, put stringent access controls on arterial networks to prevent through traffic invasion into neighboring residential areas;
3. Expand pedestrian streets and bikeways such that users are led to their destinations with minimum disadvantages;
4. Establish a computerized areawide signal control system to secure optimum traffic flow with the least undesirable impacts on urban environment;
5. Exclude roadside parking from the central district of the city to restrain the use of private automobiles and to restrict the use of streets as a garage substitute; and
6. Introduce bus lanes and bus priority signals to compensate for the parking ban and to induce more bus passengers.

The unit cell control system to keep traffic intrusion from residential areas grew from a system aimed at protecting students walking to school by speed limits and stop signs (2):

A typical cell consists of a one-way system spanning the nucleus of pedestrian streets, aided by speed limits, parking bans, turning restrictions, commercial vehicle exclusion, etc. The one-way system in the cell is usually arranged in an L or a U shape.... The pedestrian streets also serve to exclude these vehicles having no entry permits that are issued to car owners in the related district.

Figure 2 shows smaller cells with some exclusively pedestrian streets, 1-way streets, right-turn restrictions, and limited entries. All streets under 3.5 m wide are restricted by traffic signs to pedestrian use. On wider streets the exclusion of traffic is limited to certain hours. An effort is also being made to develop bikeways leading to railway stations and bus terminals.

As of September 1974, 92 cells had been introduced at an average implementation cost per unit cell (1.1 km^2 average) of $30,000 including signs, road markings, signals, curb improvements, and publicity expenses.

A net reduction of 43 percent in fatalities and 39.4 percent in severe injury accidents was experienced; outside the cells fatalities decreased by 16.8 percent. Accidents on the major streets were counted as in-cell accidents, so we do not know whether there were increases in accident rates on those streets. An average decline in noise of 3 dBA from the previous 59 dBA was recorded in 12 spots of 6 cells.

Apparently problems still exist with traffic during hours of limited law enforcement, and there is a movement to "convert the cells into fully repaved, decorated streets, in some cases with the installment of physical barriers such as concrete blocks and small trees. It is expected that the unit cell control will pave the way for a complete redesigning of the community living environment" (3).

To reduce automobile congestion on major routes, a computer control system to redistribute traffic has been installed. This operates through traffic signals, radio announcements, and variable signs warning of congestion. Priority bus lanes and staggered work hours are also being proposed.

TOKYO, JAPAN

Residential areas in inner Tokyo, as in Nagoya, are characterized by high densities, high floor area ratios, and 2-story buildings. They have narrow, winding streets that were originally built for pedestrians but are now used by automobiles. The plan reserves many streets for pedestrians and develops a main pedestrian network focusing on the school. Since earthquakes and fire are major hazards (most buildings are constructed of wood), one aim of the plan is to construct fireproof buildings along the major pedestrian system as an escape route inasmuch as stalled automobiles would be a hazard blocking exit along automobile streets.

UPPSALA, SWEDEN

Uppsala, a town of 105,000 inhabitants and high automobile ownership, implemented a master plan in 1969 that proposed pedestrian and bus-only streets in the center. "An unbroken mall of about 550 meters... with some adjacent small squares... and a few short pedestrian side streets connecting with the periphery of the central zone" were created (4).

A careful evaluation of the project was made by using a variety of measures. General public satisfaction with the scheme, and an overall decline in accident rates were shown. A public opinion poll showed that 64 percent of the residents outside the central area and 56 percent within the area favored the scheme. Lower satisfaction within the central area was attributed to the concentration of traffic on the main streets resulting in greater pollution along those routes.

One consideration noted by the planning director of Uppsala was the effect on motorists. Since the plan changed the map of the city with which they were familiar, many motorists were confused and unhappy and some loss of business resulted until the adjustment was made (about 3 months).

MUNICH, GERMANY

Restriction of traffic in the central area of several German cities has been instituted. In cities such as Stuttgart or Bremen, large parts of the central areas are now free for pedestrians. Munich, which has been in the forefront of these efforts, placed a loop road around the pedestrianized central city and built a rapid transit system (5). In 1 or 2 residential areas, traffic has been restricted.

A temporary closure scheme for the core was implemented to handle traffic of the 2-week-long Oktoberfest. Difficulties arose because of the German concept of Anliegerverkehr, a right-of-way for residents or businesses. This makes it legally difficult to cut off access. Permits for these areas (more than 3,000) were given to local residents and businesses who incorrectly thought they had been provided parking space. A more permanent closure scheme has been developed whereby streets are blocked off toward the periphery of the inner city.

Four street sectors have also been turned into playground streets by reducing normal traffic through the use of 1-way systems, no parking during after-school hours, and barriers or blockings applicable to nonresidents. To warn motorists of the changed situation, conspicuous signs, flower baskets, and additional plantings have been set up.

Problems have arisen with regard to these schemes, however. By moving toward the cell concept, the city apparently has aroused opposition from residents complaining of route deviations and, together with the police, the loss of shortcuts. Because long-term parking is restricted in the core, automobiles have spilled over into the inner-city residential areas. One proposed solution for this problem is special parking permits for local residents.

These transportation policies have also generated considerable polarization among residents favoring and opposing automobile traffic restraints. Although emphasizing the political value of these discussions, the Munich planners also state, "Every change in the street and traffic system must be final: Provisional measures create negative results."

ROME, ITALY

In the central area of Rome an extensive pedestrianization scheme has evolved in an ad hoc manner although a comprehensive traffic plan had been commissioned by the city. A careful visual and land use analysis of each street was made to assess its sensitivity to vehicular and pedestrian traffic, its pedestrian potential, and its historic and architectural value. Streets were selected to form a network from one side of the Centro to the other to preserve pedestrian zones.

Although city officials never adopted the plan, the city traffic engineer's office has carried out some proposals on an ad hoc basis. Several shopping streets have been turned into crowded pedestrian thoroughfares. Other areas, such as the Piazza Navona, have also been made automobile-free zones although occasional illegal automobiles race through those areas. Other main streets such as the Carso Venezia are restricted to taxis, buses, and automobiles belonging to local residents. The impacts have not been evaluated, and the sudden changes, which were made without a clear plan, have caused some confusion for drivers and citizens. However, tourists find the effects increasingly attractive, though some merchants still complain. Buses and taxis move more rapidly, and it appears that the improvements are associated with considerable "gentrification," a common result of environmental improvement.

BOLTON, UNITED KINGDOM

British cities have experimented with approximately 150 schemes emanating from the Buchanan report relating to traffic restraint (6). In an area in Bolton, Lancashire, containing about 300 houses occupied by working and lower class residents, streets were closed off to traffic and adorned with planters and a sitting area. Alleys at the

rear of the houses were converted to 1-way travel and parking. Eighty-four percent of the residents responded positively to the project, and 60 percent considered living in the area preferable to living in a more modern dwelling or municipal corporation flat. The functioning of the area was more important than appearance to the residents. Pedestrianization was of paramount importance to those under 40, and street lighting was to those over 40.

NOTTINGHAM, UNITED KINGDOM

The city of Nottingham plans to introduce a much more comprehensive traffic restraint program on the major highway system. The focus on the plan is to limit the amount of traffic on major streets by controlling exit from the suburban areas through the use of traffic signals and exit closures. Operable during morning rush hours, the plan aims to reduce congestion on the main roads and remove long automobile queues from the main system. The zones, which have populations of 5,000 to 20,000 people, however, will have unrestricted entry. The rationale for the plan lies in the hypothesis that traffic may be less likely to transit residential areas having controlled exits (Figure 3).

Coupled with the traffic restraint program is an active program to encourage the use of public transport. Semiluxury buses (called lilac leopards!) painted in dramatic colors have been acquired by the city in an attempt to turn bus riding into a status activity. In addition, park-and-ride facilities are being provided at suburban bus terminals.

Control by the "collars" on entry to the inner-city area will clearly improve conditions for inner-city residents (7). As the system goes into operation entry controls for the major networks will be adjusted. If needed, 2 or 3 collars will be placed around the center at distances of approximately 1.5 to 4.5 km out.

The British firm of Colin Buchanan and Partners is engaged in several large traffic studies. Its Sheffield and Rotherham land use and transportation study illustrates the latest thinking (8). The study began by identifying residential localities rather than environmental areas. Not just a new name for the same thing, these localities are functional areas based on the combination of catchment areas for primary schools, a walking radius of 0.5 km from local shops, and groupings of physically homogeneous areas. Many of these areas have major roads passing through them, but have a common name or other kinds of homogeneous character. They vary in size from 170 to 24,000 people. The locales of heavy accidents were plotted including streets with shops where elderly people are often involved, streets where children are involved, and wide roads requiring more time to cross. The plan designates certain routes as major routes equipped with computerized signals, pedestrian railing to prevent crossing at grade, and grade-separated crossings. Relying heavily on a program of compensation for those living along the main roads, the plan may cost as much as $2.3 million for the whole city. At the same time, public transport with park-and-ride terminals is being actively encouraged.

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Figure 1. Residential yard in Delft.

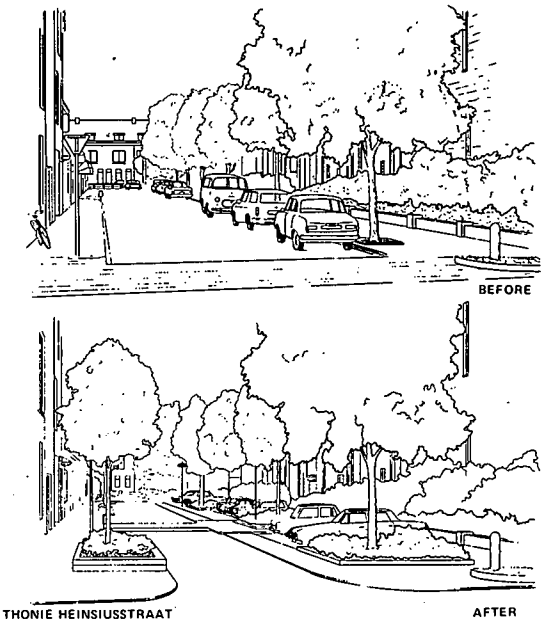


Figure 2. Unit cell in Yagoto area of Nagoya.

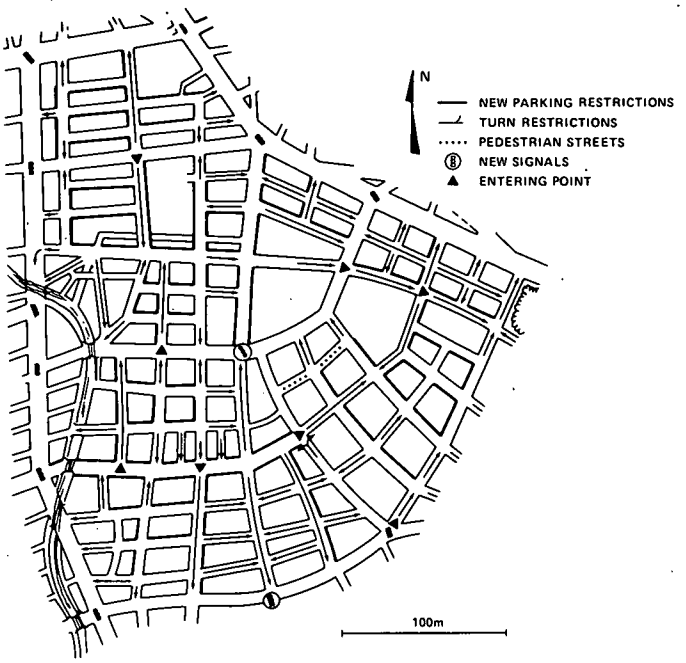
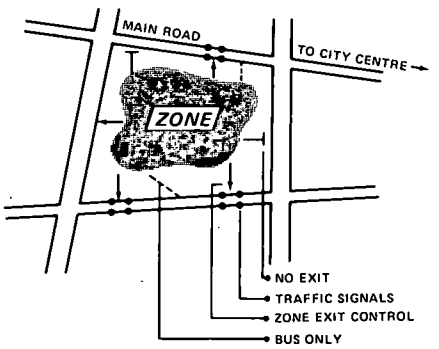


Figure 3. Zone control in Nottingham.



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