Abridgment

Creation of Pedestrian Streets in City Centers

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On August 2, 1970, four downtown streets in Tokyo, including Ginza Street, were opened to pedestrians. By the end of 1975 the number of these original pedestrian streets had increased to 37 327 for a total length of 8535 km, and the trend is continuing. Most of these streets now ban vehicle traffic only for a certain period of the day.

The tendency to consider pedestrians in traffic planning is not unrelated to the motorization of Japan, which began in the late 1950s. As the rate of increase of motor vehicles was too high in comparison to that of the traffic safety facilities, the traffic accident rate increased almost proportionally to the number of motor vehicles. However, since pedestrian streets were instituted, in 1970, the number of deaths and injuries caused by traffic accidents has decreased steadily. Figure 1 shows the change in the number of motor vehicles and accidents, together with the total length of pedestrian streets. These indexes show that road safety and pedestrian convenience have improved simultaneously. This tendency should be encouraged in the future. For this purpose general traffic planning must consider the role of the streets within the city community.

CURRENT "PEDESTRIANIZATION" IN JAPAN

Japan has utilized the following three methods to turn streets into pedestrian streets:

1. Traffic ban—For certain periods of the day, traffic is banned on certain shopping streets, streets near schools, or other streets that have heavy pedestrian traffic.
2. Underground shopping centers—A vast number of pedestrians flow through these centers, which are located near large railway stations.
3. Arcaded shopping streets—Except for use by service vehicles in nonpeak hours, these roofed shopping streets are continuously free from traffic.

FUTURE PEDESTRIANIZATION OF THE NAGANO CITY CENTER

Pedestrianization of individual streets is now widespread throughout Japan (1). But a street should not be turned into a pedestrian street without considering the effects on other streets in that area; in other words, the pedestrianization should be planned within a framework of general traffic planning.

In Nagano City, a street that functions as both the main highway and the main shopping street is going to be pedestrianized as part of the general traffic plan of the city center (see Figure 2).

Nagano has 307 000 inhabitants and an area of 404 km^2. In its densely inhabited districts the population density is 683 inhabitants/km^2 (13 600 inhabitants/19.9 km^2). It is the capital city of the prefecture of Nagano and is famous for a large Buddhist temple that attracts 7 million religious people each year. Central Street, a 2-km long street, extends from the entrance gate of the temple to the railway station at the south end. The street is bordered by retail shops and department stores. The other streets at the city center are relatively narrow. The proportion of street area to the whole central area is only 13.5 percent. This causes difficulty for traffic flow in the city center. To relieve this problem, a 2.3-km-long section of highway has been under construction since 1974 on the site of a former local railway line. Completion is due by 1980. At the same time, a subway is being constructed beneath the road (A in Figure 2).

When this highway is completed, the traffic on Central Street should decrease and this should make it easier for Central Street to expand its pedestrianization from the present situation of once a month in nonwinter seasons.

The planning offices of Nagano City and the Police Headquarters have begun to make general traffic plans for the city center, in cooperation with the Chamber of Commerce and Industry of Nagano. I have made a presentation to these authorities about utilizing the traffic cell principle.

PRINCIPLE OF THE TRAFFIC CELL

Many cities in the Federal Republic of Germany have used the concept of traffic cells in the planning of central areas. An example of the scheme of traffic cells is shown in Figure 3. A city center whose area is at most 1 km^2 should be surrounded by a ring road in order to receive the in-city-oriented traffic. At the same time the city center is divided into four sectors by cross-shaped pedestrian streets, each sector of which is called a traffic cell. As a result, through traffic is eliminated from the city center and only those vehicles that have their destination in that cell enter the cell. Parking areas must be provided for these vehicles in each cell. Streets in a cell are usually old narrow medieval streets, so that these should be operated as one-way streets or dead-end streets, which terminate at multistory parking garages (2).

The pedestrian streets, which were originally main shopping streets, divide traffic cells and give safe and convenient areas for pedestrians. The pedestrianization makes the shopping street more attractive, and the number of pedestrians increases substantially.

ESTABLISHMENT OF TRAFFIC CELLS IN NAGANO CITY CENTER

The existence of a ring road that surrounds the central area is essential for the establishment of traffic cells in the city center. To form the ring road, a wide lateral street that crosses the northern end of Central Street should be constructed (B in Figure 2). The construction of this street has already been planned and will be completed by 1985. Thus, an inner ring road system will be formed. The traffic cells could be established in the northern and southern districts, both of which are surrounded by this inner ring road system and the lateral road (C in Figure 2). Thus two ring road systems can be formed.

A comparative analysis was made between the options by a consideration of the relative degree of the impacts of each option. The analysts scored each impact from 0 to 10 based on the relative degree of impact between that option and the others. High scores indicate a positive result or minimal impact on a given dimension. The scoring is given in Table 2. The options produced main impact scores given in Table 3.

As may be seen, although their total scores are quite close, the options vary widely in their impacts. Selection and recommendation thus depend on the relative importance placed on each impact and the degree to which system operation can be assured with maximum probability of success.

On this basis, the pedestrian bridge (Option 1) and the crosswalks (Option 2) would appear to be superior. Both of these options avoid the higher environmental costs of a lower staging area and ensure minimum pedestrian-vehicle conflict. Option 1 is more expensive, but the cost may be justified because pedestrian conflict is eliminated and maximum roadway capacity ensured. A possible permanent bridge (to tie together the HSG and ski-jump sites into a future winter complex area) also favor this option. Given the crucial need for roadway capacity to handle bus flow, those options that make use of NY-73 as a pedestrian path are less attractive and entail higher probability of failure in severe weather. Therefore, the recommended approach is

1. If cost is reasonable, the pedestrian bridge option should be pursued. Otherwise, a signalized crosswalk should be considered.
2. Bus staging and spectator circulation should be limited to the HSG area, leaving the second upper staging area for use by officials, dignitaries, and emergency vehicles.
3. Although the use of a pedestrian path through the woods would appear to have some environmental impact, traffic and pedestrian walking considerations generally outweigh these costs. The smooth operation of the transportation system during the games is too crucial to its success to consider joint use of NY-73 as a pedestrian path.

Several factors should be kept in mind when examining these results. First, the grouping of impacts meant that each issue had an unequal number of impacts grouped under it. This tends to bias the final decision toward the environmental and pedestrian factors. Second, certain salient impacts may not be properly scored within a 1 to 10 range or, more accurately, cannot be equated to other impacts on a numerical basis. For example, the vehicle delay impact is extremely high in the third and fourth options (low score), yet this does not truly begin to reflect the magnitude of vehicle delay caused by this option. In fact, traffic analysis may show the delay impact to be so critical as to become the key determinant and all other impacts must simply be accepted but minimized. Further, most of the analysis is not truly quantified. For example, cost and degree of maintenance necessary are issues that could be more easily and accurately scored if quantified, but the impacts that need quantification most are vehicle delay and pedestrian delay. The scores given in this analysis are based on intuitive relative scoring of the options as to those impacts. Quantification of these impacts would allow for a more accurate analysis.

Finally, the impacts and issues presented in this paper do not represent a total view of the problem: Many factors such as lighting, liability, environmental constraints, land availability, and a potential tie-in with a present path to Lake Placid Village must still be integrated into any final decision. This report is intended to provide a basis for these future concerns, in the form of approaches to follow as more information becomes available. Transportation needs for the Olympics are being developed and solutions recommended by a group of transportation professionals who are assisting the Lake Placid Olympic Organizing Committee. This group is the coordinator for the Olympics and is responsible for all phases of a successful Olympic operation. To operate the Olympics efficiently, they must make decisions for the best overall impact, and this problem is no exception. This paper will be input into such decision, but so will many other concerns, such as budgetary considerations and environmental restraints, outside the realm of purely transportation considerations.

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REFERENCES

1. G.S. Cohen, R.D. Albertin, and R.G. Knighton. Transportation Planning for the 1980 Winter Olympic Games. TRB, Transportation Research Record 626, 1977, pp. 10-12.
2. R.G. Knighton, G.S. Cohen, and R.D. Albertin. Travel Demand at the 1980 Winter Olympics: Estimation and Analysis. Planning and Research Bureau, New York State Department of Transportation, Preliminary Research Rept. 100, June 1976.
3. Fifth Report of the Lake Placid 1980 Olympic Winter Games Organizing Committee. Lake Placid Olympic Organizing Committee, 1976.
4. M.J. Vecchio and G.S. Cohen. Travel to the 1980 Winter Olympics in Lake Placid, New York: A Preliminary Analysis. Planning and Research Bureau, New York State Department of Transportation, Preliminary Research Rept. 96, Nov. 1975.
5. J. Fruin. Pedestrian Planning and Design. Metropolitan Association of Urban Designers and Environmental Planners, New York, 1971.
6. C. Carlson, G. Stahler, and G. Perregaux. Transportation Inventory, XIII Winter Olympic Games, Lake Placid 1980. Olympic Transportation Committee, Albany, NY, Aug. 1975.

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**Mr. Wolf conducted this research as a student intern at the New York State Department of Transportation, from the Geography Department of the State University of New York at Albany.*

Figure 1. Motorization, traffic accidents, and pedestrian streets.

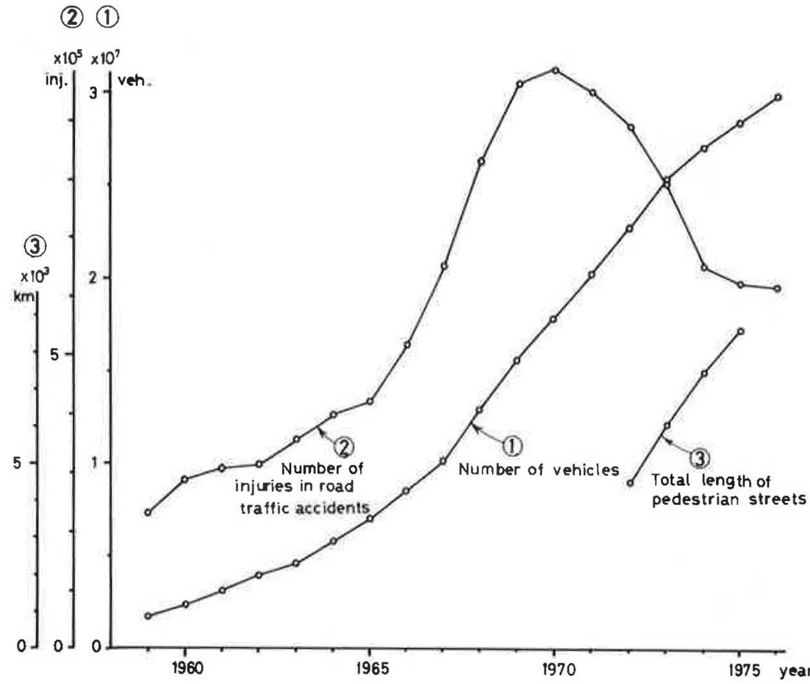


Figure 2. Road network in the Nagano city center.

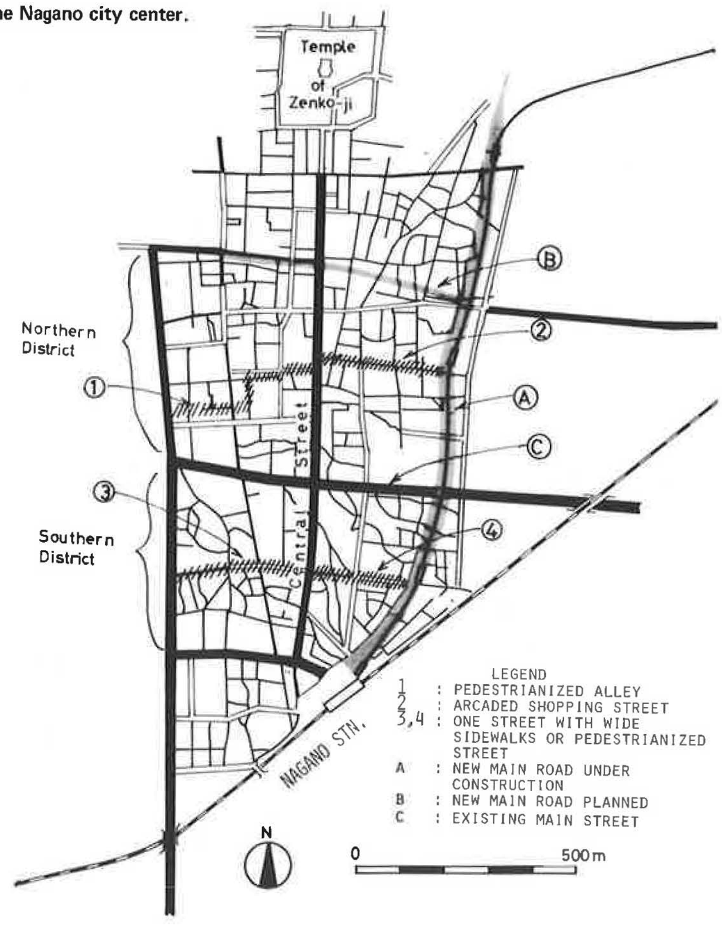
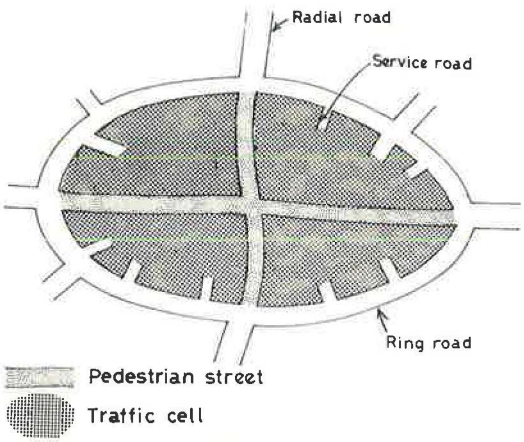


Figure 3. Scheme of traffic cell.



Together with the pedestrianization of Central Street, four lateral streets would be designated as the borders of traffic cells (1, 2, 3, and 4 in Figure 2). The street shown as 2 is now an arcaded shopping street; street 1 can be developed as a pedestrian alley; streets 3 and 4 can be developed as either one-way streets that have wide sidewalks or pedestrian shopping streets.

Within such a fundamental street network, it is now necessary to consider where to place multistory parking garages, how to change the bus routes that are now concentrated on Central Street, and how to redesign Central Street after its pedestrianization. In addition to traffic facilities, other plans such as redevelopment around the railway station and preservation of the historical area of the temple are related to the traffic cell system. The plan will be approved in a few years and, it is hoped, it will be realized by 1985.

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REFERENCES

1. City Planning in the Prefecture of Nagano. Prefectural Government of Nagano, 1977. (In Japanese.)
2. T. Murata. Pedestrianized Streets in German Cities. National Research Institute of Police Science, 1975. (In Japanese.)

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Abridgment

Treatments of Overpasses and Undercrossings for the Disabled: Early Report on the State of the Art

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This paper is based on an ongoing Federal Highway Administration (FHWA) study which began in March 1977. The main purpose of this 24-month study is to evaluate current facility treatments and recommend improvements. The primary objective of this paper is to report on the progress of one aspect of the study—evaluation of the state of the art of treatments for use by the disabled.

The general study approach for evaluating crossing treatments for the disabled used a team leader and panel of disabled persons. These persons contributed to discussions of on-site evaluations of facility treatments. This approach is a departure from recent practice. Much of the literature and standards reviewed were based on judgments of the nondisabled or perceptions of persons who have only one type of disability. Guidelines for treatments have generally not been based on empirical evaluation of behavior at facilities.

THE DISABLED POPULATION

At any one time, approximately 4.3 percent of the population has mobility limitations that affect pedestrian behavior. This estimate, derived from the 1972 National Health Survey, is based on respondents' self-appraisals of their mobility limitations (1, 2). The range of functional mobility limitations varies widely. However, mobility aids, such as handrails, can help several different disabled groups, such as semiambulatory or wheelchair-bound individuals and the visually impaired.

Recent studies and interviews of the disabled indicate that the walking mode may be more important to the mobility handicapped than to the nondisabled adult population. Walking and wheeling provide the disabled with exercise that is often crucial to good health (3). In addition, for a high percentage of disabled, the walking mode may be the only means of independent travel (4). One empirical study found that 63 percent of a sample of disabled respondents practically never drove an automobile.

The importance of the walking mode for the disabled was further substantiated by the FHWA study panel. All panel participants reported regular travel by walking or wheeling. Blind persons and those confined to wheelchairs indicated particular dependence on walking. The character of pedestrian travel by the disabled appears to vary by environmental setting, type of disability, and social role (e.g., employed, retired, student). The walking range of this study's disabled panel varied from a few blocks for a person using a walker to a small-sized