PREFERENTIAL TREATMENT FOR HIGH-OCCUPANCY VEHICLES

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Preferential treatment for buses and car pools is one of the transportation system management actions that can be applied in many areas to promote shifts by commuters from low-occupancy automobiles to car pools and buses. Although the concept is relatively new, the experience gained from projects undertaken in many cities with diverse conditions has shown that it does work. Dramatic results have been achieved on I-95 in northern Virginia where two bus and car-pool lanes handle 17 000 persons/lane during the peak hour with space capacity. There are many different ways that buses and car pools can be given preferential treatment depending on the type of highway facility. Traffic flow models are available to facilitate the simulation of various alternative strategies, and projects are eligible for Federal Highway Administration and Urban Mass Transportation Administration program funds. With the increased attention on TSM and the expression of it in the transportation improvement programs, traffic engineering, transit operating, and enforcement agencies must work cooperatively with metropolitan planning organizations to develop and implement more preferential treatment projects.

The concept of preferential treatment for high-occupancy vehicles is one of the transportation system management elements that deals directly with the highway portion of the transportation system. It is applicable where highway system capacity is insufficient to accommodate the number of vehicles that compete for the available space. It recognizes that the private automobile, especially the one used for the commuting trip and carrying only the driver, not only demands a disproportionate share of the available highway space, which is in short supply, but at the same time is the most inefficient from the standpoint of moving people, fuel consumption, air pollution, and fiscal resource consumption. For example, vans such as those used in employer-sponsored van-pooling programs occupy the same road space as an automobile but carry 12 people; buses using the road space equivalent to two automobiles transport 50 or so people; and automobiles with one person occupy the same road space as those with five persons.

Most urban highway facilities experience their greatest vehicular demands and consequently are most congested because of insufficient capacity to handle the demand during the commuting periods when the average number of persons per automobile is the lowest. Therefore, the thrust of the preferential treatment concept is to offer an incentive to the 70 to 85 percent of the one-person-per-car highway users to travel in higher occupancy vehicles. The rationale supporting the approach is simply that high-occupancy vehicles—public transit and bus, van, and car pools—move people more efficiently than do low-occupancy vehicles. Further, many preferential treatments can be implemented in a short time at relatively low cost and with minimal institutional obstacles.

The application of this concept is certainly not new. For decades, buses have been given preferential use of curb lanes on many congested streets in numerous downtown areas. Within the last 10 years the practice of also giving buses preferential use of freeway lanes was started on the Shirley Highway in northern Virginia. Although the concept of using a freeway lane exclusively for buses has a great deal of merit from the standpoint of being able to provide tremendous person-moving capacity, only a limited number of freeway corridors have the potential for this level of bus use. Recognition of this led to the concept of using a freeway lane exclusively for buses and other types of high-occupancy vehicles. In essence, this makes it possible to have a preferential freeway lane for the most efficient vehicles that can be expected given the conditions that exist on the freeway, regardless of the existing or potential number of buses. This concept of reserving a freeway lane for high-occupancy vehicles was recognized in 1963 by Nathan Cherniack, former president of the Institute of Transportation Engineers, in advising traffic engineers on what to say to freeway users.

> If you wish to use these high-cost, high-quality facilities in peak periods as superior passenger transport facilities, you must avoid unduly dissipating their inherent passenger carrying capacities; in rush hours, you must avoid occupying a car space with less than two persons when a pooled car in that same space can carry five persons and when a bus in the same car space can carry 50 seated persons. You must agree to forego wasting the passenger capacity of at least one of the expressway lanes in the preponderant direction in peak hours, to give way to those vehicles which will carry a high portion of their passenger carrying facilities. This is only fair.

Despite this urging 14 years ago, the concept has been tried only within the last few years.

TYPES OF PREFERENTIAL TREATMENTS

The types of preferential treatments are many and varied especially when the possibilities include those for all types of high-occupancy vehicles rather than just buses. A logical way to classify them is according to the type of highway facility upon which they can be applied.

Freeway Techniques

The types of treatments that are appropriate for freeways include (a) one or more lanes physically separated and with controlled access from the regular freeway lanes for use by buses or buses and car pools, (b) one lane adjacent to the median but not physically separated from the regular lanes for high-occupancy vehicles, (c) one lane in the contraflow direction adjacent to the median clearly visible to oncoming traffic for contraflow buses and possibly car pools, (d) inside or outside shoulder for buses or car pools or both, (e) separate access ramps to or from freeways for buses or car pools or both, (f) bypass lanes for buses or car pools or both around queues on freeway ramps that are metered to optimize main-line freeway flow, and (g) various types of "queue jumpers" or "head of the line" privileges to high-occupancy vehicles at merging points or lane drops. Examples of all of these types of freeway applications have been implemented on freeways in metropolitan areas such as Los Angeles, San Francisco, Portland, Seattle, Honolulu, Miami, Minneapolis, Washington, D.C., New York, and Boston.

Major Arterial Techniques

Types of treatments that are appropriate for major arterials include (a) one lane in a contraflow direction on a divided arterial for high-occupancy vehicles, (b) one lane in the normal flow direction for high-occupancy vehicles, (c) reversing the direction of a lane for use by high-occupancy vehicles on undivided arterials, and (d) various forms of signal preemption by buses at intersections. Examples of all of these have been implemented on arterials in Miami, Honolulu, and San Juan.

CBD Street Techniques

The types of treatments that have been used and appear to be most appropriate for CBD streets all deal with preferential treatment for buses. These include (a) the curb lane for buses only, (b) the curb lane for buses and right-turning vehicles, (c) reversing the direction of the curb lane for buses on one-way streets, (d) bus-only streets, (e) exempting buses from left-turn restrictions at intersections, (f) various forms of signal preemption by buses, and (g) automobile-restricted zone with bus entry. Examples of the first two types can be found in most any large CBD. Examples of the other types are not so widespread but can be found in San Juan, Seattle, Los Angeles, Miami, Harrisburg, Washington, D.C., Cleveland, Minneapolis, and Portland.

Miscellaneous Techniques

The remaining types of preferential treatments consist of those involving toll facilities and parking facilities. These consist of (a) exclusive lanes through toll plaza areas for buses and car pools, (b) reduced or no toll charges for car pools and buses, (c) assignment of space in parking lots or garages for car pools, (d) special car-pool parking rates, and (e) provision of outlying parking for automobiles to facilitate change of mode to buses and car pools. Examples of the various types of toll facility preference for both buses and car pools exist in San Francisco, Seattle, New York, and Connecticut. A large and growing number of employers are allocating space in their parking facilities for car pools. Seattle has experimented with a reduced rate for car-pool parking, and numerous places provide change-of-mode fringe parking.

RESULTS ACHIEVED

The most dramatic results of any preferential treatment project are those exhibited by the Shirley Highway bus and car-pool lanes in northern Virginia. The highway has been under construction since the early 1960s to upgrade it from a four-lane to an eight-lane freeway consisting of three lanes in each direction separated by a two-lane reversible roadway. Starting in late 1969, buses were given priority use of various portions of the lanes through the construction areas. In December 1973, car pools with four or more persons were also allowed to use the completed sections of the reversible lanes as they were finished. At the start of the project in 1969, 1900 persons in 38 bus trips used the highway during the 2½-h morning peak period. After 3 years, the transit ridership increased by 500 percent to 11 500 persons in 240 buses. In addition, there are more than 1000 persons carried by nontransit intercity and private contract service bus operators. To date, with the inclusion of car pools, these two preferential lanes accommodate 30 550 persons in 2100 car pools and 425 buses during the 2½-h peak period. During the peak hour the two preferential lanes carry 17 000 persons in 250 buses and 1400 car pools at a high level of service with substantial spare capacity, and the three regular lanes carry 8000 persons in 6000 vehicles at a stop-and-go level of service.

The San Bernardino project on I-10 extends from a 1000-automobile fringe parking lot and bus terminal at El Monte to the Los Angeles business district. It is one lane in each direction, is physically separated from the regular freeway lanes, and has two intermediate bus stations. Since its beginning in January 1973 as a bus-only lane, patronage has grown steadily from 1800 to 17 000 daily person trips. In October 1976 it became a high-occupancy vehicle lane by admitting vehicles with three or more persons.

On the Moanolua Freeway in Honolulu, the median lane in each direction was designated as a high-occupancy vehicle lane upon completion of construction work along this newly widened freeway. Initially, the lane was preferential for vehicles with four or more persons during the morning peak period, but it is now a permanent 24-h lane in each direction for vehicles with three or more persons. Initially, about 530 car pools used the lane during the morning peak period, but by February 1975 the lane carried 4650 persons in 1300 car pools and 11 buses.

In Honolulu there is also a high-occupancy vehicle lane on the Kalanianaole Highway. The preferential lane operates as a contraflow exclusive lane on a four-lane undivided section and has a with-flow median lane on a six-lane divided section. The bus-only operation started in August 1973, and an experimental car-pool use was initiated in September 1975. The car-pool experiment resulted in an increase of 1000 car pools to the 15 buses during the morning peak period, and the car-pool use is now considered permanent.

One of the shortest high-occupancy vehicle lanes is on the lower level of a two-level bridge on I-93 leading into the Boston CBD. The left lane is reserved for buses and car pools and also serves as a left exit ramp for traffic not destined for the CBD. The third lane is a barrier lane between the reserved lane and the two congested regular traffic lanes leading to the CBD. A state trooper enforces the head-of-the-line privilege for buses and car pools at the merge of the reserved lane with the regular lanes by directing vehicles with fewer than three persons to the left ramp, which increases the travel time of CBD-destined vehicles by 20 min. The reserved lane provides up to a 10-min saving to 2600 persons in 32 buses and 500 car pools during the morning peak and has increased automobile occupancy from 1.35 to 1.44 persons.

In Los Angeles on three freeways (I-5, I-405, and I-10), car pools and buses are given preferential bypass treatment at metered on-ramps. Average time savings for those vehicles using 13 such ramps range from ½ to 5 min. There has been a 50 percent increase in the number of car pools using these ramps, and the average vehicle occupancy has increased from 1.24 to 1.33 persons.

No description of preferential freeway lanes operations would be complete without a discussion of the Santa Monica Diamond Lanes in Los Angeles since this has generated more newspaper coverage, nationwide as well as locally, than any other highway project. This publicity has been mostly adverse mainly because of a series of unfortunate incidents that occurred on the opening day. The project, which started on March 15, 1976, involved reserving one of the existing lanes next to the median in both directions for buses and car pools during the morning and afternoon commuting periods. Extensive ramp metering was also used to control the volume of traffic attempting to use this freeway. The opening-day

events that caused so much adverse reaction included a multiple rear-end accident, a truck that overturned and spilled its load (both outside the limits of the project), and a malfunction of the ramp-meter signal at the highest volume on-ramp. The extreme congestion resulting from these events was nonetheless attributed to the Diamond Lane. Despite the demands for an abrupt end to the experiment and considerable pressure generated by the press, which encouraged motorists not to accept the lane restriction, the operating conditions rapidly improved. Within weeks the number of car pools was 2½ times and bus riders 3 times the "before" situation, and the average number of persons per automobile on the freeway increased by 10 percent. In addition, the average travel time on the nonpriority lanes became equal in the morning to and only 2 min longer in the afternoon than the before situation, and the average delay to motorists at the metered on-ramps became equal to or lower than the before delays. At the time the project was suspended by a court order for failure to follow correct environmental assessment procedures, about 10 percent fewer vehicles were serving the same number of people on the Santa Monica Freeway with spare capacity available in the preferential lane to serve additional demand.

GENERAL OBSERVATIONS

These projects have demonstrated that they do work. The public will accept them. They do promote shifts of commuters who formerly drove alone to car pools and buses. They are enforceable. They can be implemented quickly, and because of their low-capital nature they are extremely cost effective. The experience gained particularly reinforces the observations contained in a February 1975 report to the Congress by the Department of Transportation.

Experience with preferential highway treatment for carpools, although limited, is very promising. Preferential treatments are practical and effective in inducing more carpooling. Too few urbanized areas are systematically pursuing opportunities to develop preferential highway facilities and traffic control treatments which favor high occupancy vehicles.

Development of preferential highway facilities for high-occupancy vehicles is an important way for highway and transit efforts to be supportive. In most cases there will not be an adequate number of buses to justify reservation of a lane exclusively for transit vehicles. Inclusion of car pools in such a preferential facility can often make an otherwise infeasible transit project a cost-effective and implementable one. On some high-volume bus facilities, car pools should not be included since bus operations would be adversely affected.

Increases in car pooling lead to a greater dependence on public transit for a variety of midday trips made by employees, especially those located in the central areas where convenient transit service exists. Building transit patronage during the off-peak periods when equipment is grossly underused is of particular significance. From a longer range point of view, formation of new car pools is constructive since the habit of always depending on one's own car is broken. Improved attitudes toward ride sharing are thus developed and may evolve into a greater propensity to use transit services as improvements are brought on line.

In many metropolitan areas, active car-pool and transit improvement programs are under way. There is a real danger of being lulled into complacency by these programs in that it may be reasoned that no further action is needed. In most every case, however, these programs only provide commuters who have decided to car pool with information about others who feel the same way or provide them with information on improved transit availability. The main ingredient that is lacking from nearly all of these programs is positive highway-use incentives for making more commuters want to decide to car pool or use transit. When all of the necessary ingredients are applied in concert—incentives on the use of public highways, incentives at the employment site, the ready ability to find others to car pool with, and the availability of transit service—we will be able to see dramatic changes.

The technique that appears to work best is also the most expensive: the physically separated facilities for high-occupancy vehicles such as the Shirley Highway and San Bernardino facilities with express bus service. Despite the high costs associated with the provision of the lanes and the bus service, the public is more accepting of the physically separated facility than of the nonphysically separated facility. The separated facility is recognized as more permanent and more distinct than, say, an adjacent lane, and enforcement is easy and safety is excellent.

Contraflow bus lanes on all types of highways have also been well received and safe. The most significant safety problem has been in the initial weeks following implementation on other than freeways when users may still be unfamiliar with the operation. Contraflow lanes also tend to be self-enforcing.

Concurrent flow lanes without a physical barrier have potentially the widest application. They are inexpensive to implement and have the same capacity and speed of any single lane. However, concurrent flow lanes present several problems. Most concurrent flow lanes require more police enforcement to hold the number of violators down to tolerable level. Motorists just cannot resist the urge to pull into what appears to be an underused, nearly empty lane. Only when the lane is full of buses slowly moving does it become self enforcing.

Allowing buses and car pools to bypass ramp metering seems to have few technical problems. It is easily enforced and can usually be provided by restriping or with minimal widening on the ramp.

Signal preemption has been shown to be an effective technique for providing priority treatment for buses. However, it appears to be more effective in some applications than others. The most effective application appears to be in expediting express buses over long distances on arterials. Signal preemption is less effective in the CBD network and in individual street applications because of greater congestion, more closely spaced intersections, and the high proportion that bus passenger service time is of total delay time. Signal preemption can be effective in special locations such as those requiring difficult merging or weaving maneuvers or at low-volume approaches to major roads.

Bus-only streets in CBDs are relatively new; the first major one began in Minneapolis on Nicollet Street in the late 1960s. Bus-only streets, or transit malls as they are sometimes called, represent a compromise solution to the desires to enhance the environmental qualities of the principal downtown shopping street and to provide priority treatment for buses. The most pleasant environmental characteristics for a downtown street would probably result from complete pedestrianization. Some have provision for automobiles to get to selected places on the bus street such as hotels and parking garages, but do not allow them to use the entire length. Those transit malls that have been implemented have been well received and have aided development and transit service.

The single most important predictor of success of any priority facility is the travel-time savings of a user over those of a nonuser. The accumulated evidence shows that travel-time savings of less than 5 min are barely perceivable and thus generally have little effect in inducing shifts from low-occupancy vehicles. Travel-time savings greater than 10 min generally do bring about shifts in mode, and the greater the savings are the greater the shift will be. The greatest time savings can generally be achieved by operating over a long distance in a preferential manner on a facility in a corridor with severe congestion. Although the possible time savings on any individual facility may appear to be too small to warrant consideration, significant time savings can be attained by adopting a "system" improvement philosophy, i.e., by providing preferential treatment improvement for a number of facilities. In that way, small increments of time savings can be added together to produce a significant overall advantage. If time savings do not appear to be significant, there still is benefit to providing preferential treatment since travel-time reliability is usually improved as a product of preferential treatments. Evidence has shown that the commuter in particular has responded to improvements in reliability.

The provision of preferential fringe or change-of-mode parking facilities outside of congested downtown areas where persons can park their automobiles and use transit for the portion of the trip into the downtown area is well established. These facilities are successful when they are located with easy access for automobiles and for buses, connected by frequent and convenient transit service, and located upstream from a bottleneck area so the transit vehicles can take advantage of the time savings of a priority lane through the bottleneck. A relatively new aspect of this is the provision of fringe car-pool parking facilities in locations that are not served by transit. In many of these, the fringe car-pool parking lot also serves as an impetus for specialized commuter bus clubs. For example, Connecticut's program, which started in 1969, has been expanded to encompass more than 100 car-pool parking lots. Of these, 16 are served by commuter bus runs.

Finally, there is the intangible but critical element of community and media support for preferential treatment projects. The Santa Monica Diamond Lane project certainly showed how adverse media reaction can hinder the ability of a preferential-lane project to remain in operation despite opening-day start-up problems. Had the media heralded the points that after the first 4 weeks bus ridership increased by more than 200 percent, car pools doubled, and 3000 fewer vehicles were on the freeway serving more than 97 percent of the former persons on the freeway rather than heralding the initial problems and thereby encouraging hostility to the project, the diamond lane on the Santa Monica Freeway might still be operating. This is a difficult issue to cope with as evidenced even by the occasional complaints noted by the media in Washington, D.C., on the Shirley Highway. Despite the fact that the reserved lanes during the peak hour serve 8500 persons/lane in only 800 vehicles/lane at over-80-km/h (50-mph) speeds while the regular lanes serve only 2700 persons/lane in 2000 vehicles/lane at stop-and-go speeds, there are occasional comments made by the news media that opening up the "clearly underused" lanes to all traffic would relieve congestion on the Shirley Highway.

ESTABLISHING PROJECTS

With the increased attention to transportation system management and the expression of it in the transportation improvement program, the establishment of preferential treatment for high-occupancy vehicles is more institutionalized. The important consideration, however, is that the successful planning, implementation, and operation of preferential treatment projects involve the close cooperation among a number of agencies and jurisdictions. A typical project may involve all of the following organizations: city traffic engineering department, county traffic engineering department, state highway department, transit operator, city police department, state highway patrol, and metropolitan planning organization.

This cooperation should be established at the outset of initial planning. It should continue throughout the development and assessment of alternative strategy stages, and most important, into the specific project detailed design and implementation activities. This cooperation will also be essential during the early stages of operation to facilitate modifications that are often necessary, to communicate with the media, and to objectively evaluate the effectiveness of the operation in accomplishing the objectives that were intended.

The assistance of federal-aid highway system funding for these types of projects has been available for years and expanded as a result of provisions in the 1973 Federal-Aid Highway Act, the 1974 Emergency Highway Energy Conservation Act, and the Federal-Aid Highway Act of 1976. For example, as an added encouragement to get more of these types of projects operational, federal-aid highway funds, normally available for urban highway construction projects at a 70 percent federal share, can be used for preferential-lane car-pool demonstration projects at a 90 percent federal share. The types of projects that are eligible for this bonus federal share include the work necessary to designate existing highway lanes (whether or not the highway is on a federal-aid system) as preferential car-pool lanes or bus and car-pool lanes, including traffic control devices that are necessary to advise motorists and control the movement of car pools. Eligible costs even include those associated with additional enforcement efforts that might be required as well as public information and promotion expenditures.

Any of the normal federal-aid highway system funds are available for the construction of exclusive or preferential bus lanes, fringe parking, and passenger transfer facilities including shelters. The minimum four-lane requirement for an Interstate Highway project is waived if the project is one for an exclusive or preferential busway.

Various UMTA funding programs are available to support preferential treatment for transit vehicles. UMTA section 3 can support such activities as bus-only streets or transit malls, busways, signal preemption, and transit shelters and stations. On an 80-20 sharing basis, UMTA section 5 can also support the same capital acquisition. UMTA section 6 funds have been used in the past to develop and test new techniques. UMTA continues to be open to demonstrate preferential techniques on an experimental or exemplary basis. UMTA section 9 funds can be used for technical studies for planning and design of preferential treatment techniques.

Despite the existence of traffic flow models that can analyze all combinations of possible reserved lane strategies for any car-pool or bus criterion; feasibility studies that looked at the safety, operational, legal, public information, and enforcement considerations; availability of federal assistance; and actual successful experience with a number of projects that have been implemented, far too many areas have not been willing to give this option serious consideration.

The techniques tried thus far have proved one thing:

They can work. What is needed now is further expansion of these applications to other locales that are confronted with similar pressures: to unclog streets, to comply with air quality standards, to encourage the use of more energy-efficient modes, and at the same time not to impair the mobility and safety of highway users.

The challenge is whether we will take the initiative and use our expertise in employing traffic management techniques to influence the highway user to switch from the most inefficient highway travel mode (one person per automobile) to the much more efficient modes (car pools and buses).

We must be willing to implement techniques that can solve several problems simultaneously. Preferential treatment for high-occupancy vehicles is one of those rare solutions that offers relief from the intricate problems of energy consumption, urban congestion, and air and noise pollution at maximum benefit with minimum harm.

PEDESTRIAN AND BICYCLE PROVISIONS OF TRANSPORTATION SYSTEM MANAGEMENT

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Walking and bicycle transportation modes can complement the transportation network and yield desirable social, economic, environmental, and health benefits. Among the actions that should be considered to ensure the efficient use of existing street space are the appropriate provisions for bicycle and pedestrian facilities such as bicycle paths and exclusive lanes, pedestrian malls and other means of separating pedestrian and vehicular traffic, and secure and convenient storage areas for bicycles. This paper estimates that potential for travel by walking and bicycle modes and hypothesizes that this potential will continue to increase. The various options for pedestrian and bicycle facilities are described and examples are given. Pedestrian and bicycle provisions included in the transportation system management elements of the Tri-State and Delaware Valley regions are described.

The development of pedestrian and bicycle facilities in this country has traditionally been affected by advances in technology. Historically, walking distances have determined the patterns of human settlements. The development of rail and roadway systems lessened the need to live close to one's work or market area. Transportation networks developed to meet the demands brought about by the segregation of land uses and the desire by many people to live in a suburban or exurban environment. This network, which relied primarily on the automobile and the accompanying highway system, gave minimal attention to alternate transportation modes. Subsequently, the needs of the pedestrian and the bicyclist have been largely ignored. It is interesting to note that in the earlier part of the twentieth century bicyclists were one of the major forces behind the "good roads movement" that eventually benefited the automobile.

In recent years, we have recognized that a single mode of transportation, such as the automobile, cannot solve all urban transportation problems. We have also developed a heightened sensitivity to natural surroundings and increased concern about energy depletion and our dependence on foreign energy sources.

Since our basic transportation systems have been developed and represent a substantial investment, to scrap them and start anew is not feasible. The basic objective then becomes one of making better use of existing facilities. Traditionally, better use has meant an increase in highway capacity by improved signs, signal controls, and other techniques. Recently, there has been an increased effort to improve use of public transportation facilities. The major emphasis is on moving people, not vehicles.

Since the 1960s, the bicycle has been increasingly used as a transportation as well as a recreational vehicle, and facilities for bicyclists and pedestrians are being planned and built in many urban areas. Although biking and walking are not expected to replace the automobile or public transportation as major modes of transportation, they can complement the transportation network and yield desirable social, economic, environmental, and health benefits.

As stated in the September 17, 1975, issue of the Federal Register (1),

> Automobiles, public transit, taxis, pedestrians and bicycles should be considered as elements of one single urban transportation system. The objective of urban transportation system management is to coordinate these individual elements through operating, regulatory, and service policies so as to achieve maximum efficiency and productivity for the system as a whole.

The purpose of this paper is to discuss the options that are available for providing adequate facilities for pedestrians and bicyclists. But, first, the potential for travel by pedestrian and bicycle modes is discussed and considered in the context of the total system.

POTENTIAL FOR TRAVEL BY PEDESTRIAN AND BICYCLE MODES

In 1975, the population of the United States was about 214 million persons. If it is assumed that 10 percent have handicaps that prevent them from walking and another 8 percent are too young to walk, then the total number of persons potentially able to travel by walking is about 176 million. In general, travel by all other modes requires at least one pedestrian link for access to the primary mode, circulation within major activity centers, or modal transfer. Therefore, the potential of travel by a pedestrian mode is great and can be expected to increase.

Estimates are that in 1975 there were 75 million bicycles in use and 100 million users and that there is a potential market of 75 million new customers consisting of 25 million who use but do not own bicycles and 50 million who neither own nor use bicycles (2). The potential for bicycle travel is great and can be expected to increase.

It is important to know the potential for travel by