PEDWAYS VERSUS HIGHWAYS:
THE PEDESTRIAN'S RIGHTS TO URBAN SPACE

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•TRANSPORTATION has always been a determinant of urban structure. Many of the cities of the past were characterized by their more human qualities because their design was based on walking as the primary means of internal transport. For example, the buildings and monuments of the Acropolis, the upper city of ancient Athens, were said to be placed in such a way that when approaching it on foot it could be viewed as a unified whole but with each building and monument still individually discernible and not interfering with the other.

The ancient Romans and Hebrews recognized the disruption to scale caused by vehicular intrusion. Julius Caesar decreed that heavy wagons be forbidden within the central city after dusk. The Forum of Pompeii (Fig. 1) was an extensive pedestrian precinct protected by large slab-like stone barriers placed at all entrance points to prevent intrusion by vehicles. The Talmud, the Hebraic book of laws, decreed that special areas be set aside along main thoroughfares for pedestrians to unload their burdens and rest. These areas were to be clearly marked and separated from vehicular intrusion by a perimeter of metal spikes or stone bollards.

Medieval city planners recognized the need for human communication and interaction by providing a central pedestrian plaza. It was designed as an open space to serve and visually complement the cathedral and other important buildings located around its perimeter. The plaza was the marketplace, a place for public pronouncements, religious and festive occasions, and recreation. The size of the plaza was a function of the number of people who might come together for these purposes.

The human comfort and convenience of pedestrians also were not overlooked by medieval planners. Pedestrians were protected from the elements by gallerias, canopies, colonnades, and porticos. The old city of Bologna (Fig. 2) has a 20-mile network of sidewalks covered by porticos that provide a cool, dry, pedestrian way in the summer and are free from snow in winter. This latter aspect is significant in a mountain town that has its quota of snowstorms. Bologna's system of covered sidewalks has been admired by many famous writers and philosophers for its pleasurable strolling and the native sociability that it encourages. The covered, elevated sidewalk, a feature of some recent pedestrian proposals, also makes an occasional appearence in medieval architecture.

The great Leonardo da Vinci, master of all arts and sciences, recognized the value of a grade-separated system for pedestrian and vehicular traffic. He planned a city with a double network of streets, one elevated for pedestrians, the other at ground level to serve vehicles. Da Vinci the engineer recognized that the most efficient traffic system for both pedestrians and vehicles required separate, continuous networks for each. Da Vinci the artist recognized that the requirements of visual aesthetics could best be satisfied by a distinctive human perspective set above the city's milieu.

There also appears to have been at least some recognition by medieval planners that building floor area should be a function of street width. Medieval cities limited building heights to two times the width of the street. Da Vinci was of the opinion that a ratio of one to one was more desirable. This contrasts with some modern cities where pavement and sidewalk widths have remained constant for a century or more, while building heights have been extended by hundreds of feet. In many of these instances sidewalk space has actually been reduced during this time to facilitate the movement of vehicles.

THE PEDESTRIAN AND THE CITY OF TODAY

The advent of machine transportation has changed the perspectives of city planning, forcing man into an unbalanced competition for urban space (Fig. 3). The railroad made the first great incursions into the city, lacing them with ribbons of steel. But the railroad is confined to its tracks, which can be hidden underground if necessary. The ubiquity of the auto has introduced much greater demands for space, pervading every part of the urban structure, literally confronting man at every turn, causing a vast dichotomy in the goals of city planning and design.

Despite its advantages of personal mobility, the auto is responsible for a great many negative changes in our society. It is a force that has imposed itself on every aspect of urban life, destroying many of the elements that made cities cohesive units dedicated to the social and cultural advancement of their inhabitants. The auto's fumes contaminate the air, and its noises and vibration disturb sleep, conversation, or contemplation. It kills and maims pedestrian man, forcing him to remain constantly alert and vigilant lest their paths cross. It imposes its scale on urban design, requiring the allocation of vast amounts of space for its movement and storage. It isolates pedestrian man in a limited, ever-narrowing sidewalk environment, reducing opportunities for human social interaction and visual enjoyment. It has produced a visual clutter of traffic signals and signs. It is a source of frustration and humiliation to the pedestrian, who is not only forced to wait in the rain and snow while the autoist in his climatized capsule environment enjoys traffic priority, but who may even be honked at or splashed if he does not react quickly enough.

The street and building spaces of the urban core of the typical central business district magnify these problems because of their intensive concentration of pedestrians. The central business district (CBD) is usually made up of variable land uses: office buildings, government centers, shopping and entertainment centers, restaurants, historical sites, and, in some cases, high-rise residential developments. The CBD is the focal point of the regional transportation network and the center of confluence of transit and highways. Walking, because of its infinite diversity, is the only means of transportation that can satisfy the many short, dispersed trip linkages required within the CBD. Downtown origin and destination surveys show that, in most cities, about 90 percent of all internal trips within the CBD are walking trips.

The traditional urban core is usually superimposed on an archaic street system surviving from the land use and functional scale of the past. The street system of the downtown financial district of Manhattan, for example, is a survivor from colonial times, when the tallest structure was of 2 or 3 stories. Now these same streets serve buildings that rise 50 to 100 stories in the air, representing millions of square feet of office space. Thousands of workers and visitors enter and leave these buildings each day, exceeding the capacity of the sidewalk and spilling over into the roadway. In a situation like this, maximum use of sidewalk area and flow capacity is a necessity.

In many high-density central business districts, the sidewalk width has actually been reduced to facilitate vehicular traffic movement. This results in a reduction of pedestrian traffic capacity but does not always produce a commensurate increase in vehicular capacity. The wider streets increase the probabilities of pedestrian-vehicle crosswalk conflicts, which limit the vehicular capacity of the intersection. The potential pedestrian capacity of the CBD sidewalks is reduced further by the intrusion of various sidewalk impedimenta. Refuse cans, fire hydrants, fire alarm boxes, parking meters, traffic signals and poles, news stands, telephone booths, kiosks, mail boxes, planters, sewer and ventilation gratings, and similar devices detract from sidewalk capacity. In addition, building-service operations, such as the unloading or loadings of trucks, inconvenience and sometimes endanger the pedestrian. In many instances, no control has been exercised over the location of fixed sidewalk paraphernalia, and they often appear in clusters at corner intersections, the most critical points in the pedestrian circulation network (Figs. 4 and 5). Space is needed at intersection corners for accumulations of pedestrians waiting for traffic signals and for the weaving of intersecting sidewalk flows. Because of its concentrations of traffic, the corner is the ideal location for news stands, telephone booths, and mail boxes. It is also the most common for bus stops and rapid transit entrances. The pedestrian is further harassed at the corner by vehicles stopped in the crosswalk or turning into crossing pedestrians. When a rapid transit entrance is situated within a narrow sidewalk near an intersection, it is an outstanding example of compounded insensitivity to the pedestrian. Because the sidewalk itself is narrow, excessively narrow subway stairs are provided, causing pedestrian queues both in the transit station below and on the surface above at the point where pedestrian space is already critically deficient. All these factors add up to inconvenience and delay for the pedestrian. But despite the fact that the total amount of pedestrian delay time may far exceed driver delay time within the CBD, traffic signalization is invariably designed to facilitate vehicular flow (Fig. 6).

The rectangular grid pattern of the typical CBD is not conducive to the characteristically short pedestrian trips that occur there. In some instances, the grid pattern of Manhattan's streets requires a time- and energy-consuming 1,000-ft walk for a straight-line trip distance of only 200 ft. Larger mid-block buildings with frontages on adjacent streets are often used as through-routes so that the pedestrian can shorten trip distances. This practice is more common in inclement weather. Depending on city location, one day in four may be too windy, cold, or wet for the pedestrian's comfort. Protection of the pedestrian from the elements is an almost forgotten amenity in most cities.

PEDESTRIAN SAFETY

Each year about 50,000 people are killed by motor vehicles in the United States, and about one-sixth of this total is pedestrians. An additional 150,000 pedestrians are injured annually by motor vehicles. This loss of human life and the suffering caused by these accidents are a serious national problem. The economic cost in salary loss and medical expenses probably exceeds a half-billion dollars annually.

The majority of adult pedestrian fatality victims are persons who have not been licensed to drive. The pedestrian who has never driven faces special hazards because he is unfamiliar with the limitations of the vehicle or driver. He is not aware of the driver's limited vision, particularly at night, nor is he capable of estimating a car's minimum stopping distance at various speeds. The child pedestrian is an especially vulnerable accident victim because of gaps in language, perception, and visual and auditory comprehension.

Many aspects of human perception, such as peripheral vision, depth perception, judgment of speed and direction, and sound recognition, are attained through experience, which the child pedestrian has not yet acquired. This lack of experience causes not only perceptual difficulties but also uncertain reactions under the stress of frightening or unusual confrontations with moving traffic. In addition, children do not comprehend road signs, or, if they do, they do not fully understand their responsibilities to obey these signs.

Reduction of the pedestrian accident toll is a national problem that is being treated at the local level with varying degrees of concern. Although some standardization of pedestrian signs and signals has been recommended in the Manual on Uniform Traffic Control Devices, the manual itself has two standards for pedestrian signals, one for neon tube signs with a green "walk" and the red "don't walk" indication, and the other for incandescent signals with white "walk" and orange "don't walk" indication.

Similar confusion exists in pedestrian signing and traffic laws (Fig. 7). Some states have strong pedestrian right-of-way laws, whereas others do not. Motorists and pedestrians accustomed to signs, signals, and rules in one part of the country may be confronted by significant differences in another. The lack of a uniform national approach to pedestrian safety causes confusion for both motorist and pedestrian and undoubtedly results in unnecessary pedestrian casualties. Pedestrian safety is a problem that crosses all state lines. This requires the establishment of a national system of traffic laws, traffic signalization, and signs implemented uniformly throughout the country, with federal assistance if necessary.

THE HANDICAPPED PEDESTRIAN

An estimated 12 million persons in the United States have serious physical disabilities that limit their mobility and the activities and work that they may do. The seriously

Figure 1. The Forum of Pompeii was an exclusive pedestrian precinct protected from vehicular intrusion by barriers at all entrances.

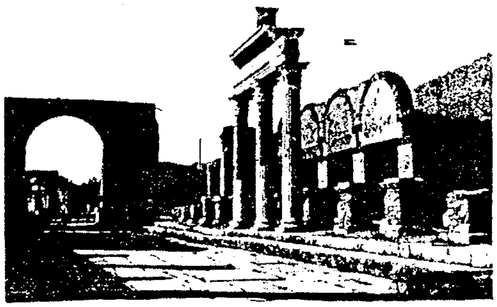

Figure 2. Covered sidewalks were common pedestrian amenities in medieval cities; this scene is from Bologna, Italy.

Figure 3. The automobile has forced man into an unbalanced competition for urban space.

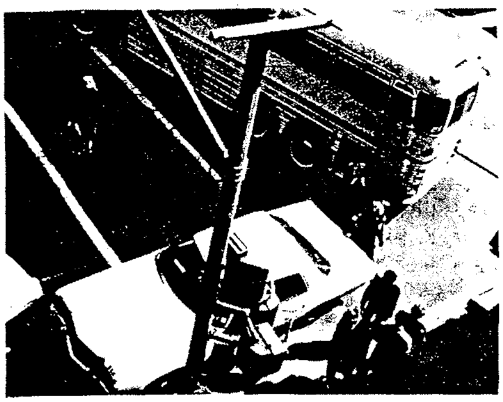

Figure 4. The placement of pedestrian traffic flow impedimenta on the sidewalk is virtually uncontrolled in most cities.

Figure 5. This collection of sidewalk paraphernalia literally blocks a pedestrian crosswalk.

Figure 6. Traffic signals are timed for vehicles although total pedestrian delay time in the CBD may exceed vehicular delay.

handicapped include 250,000 in wheelchairs, 2 million orthopedically impaired children, and 5 million cardiac cases. Each year, 100,000 children are born with birth defects that will force them to use crutches, braces, or wheelchairs for the rest of their lives. In addition to these serious disabilities, many millions have minor sight deficiencies or other physical impairments that limit their locomotive capabilities. Added to the ranks of permanently handicapped pedestrians are the aged whose motor capabilities have slowed down, persons temporarily disabled due to accidents, and persons encumbered with baby carriages, heavy baggage, or packages. The ranks of the physically handicapped have been expanding much faster than the general population growth for a variety of reasons:

1. Medical advances have decreased the number of accidental deaths, thus increasing the number of disabled;
2. Longer average life spans have increased the number of aged and infirm; and
3. More leisure time, greater personal mobility, and expanded opportunities for recreation have increased accident exposure for all persons.

Because of thoughtless barriers, many of these persons have been denied opportunities for education, employment, and recreation. Although they comprise a large segment of the public, they have been denied access to many "public" buildings and transit systems. This has relegated many of the aged and handicapped to the status of disenfranchised citizens who are denied access to courts, polling places, or public educational and cultural institutions. There are instances where handicapped citizens have been unable to attend court to defend their own interests.

The common barriers to the aged and handicapped include (Figs. 8 and 9) steps or curbs that are too high; long flights of stairs; inaccessible elevators; steep and narrow walks; gratings in walkways; doors that are too narrow, that revolve, or that are hard to open; too-narrow aisles in theaters, stadiums, and other public gathering places; and lack of accommodations for wheelchairs. In addition, little if any consideration has been given to improving the mobility and safety of the blind and partially sighted by supplemantary auditory or tactile means. Needless to say, every effort should be made to improve the personal mobility and quality of life for these persons subjected to the daily hardships connected with their disabilities. Furthermore, improvements made for the aged and the handicapped are improvements that enhance the mobility of all.

NEW DEVELOPMENTS IN PLANNED PEDESTRIAN ENVIRONMENTS

A number of cities have recognized a need for a return to the human scale of the cities of the past, an increased awareness of the need for human interaction and communication, and realization of the importance of the human sense of belonging to, and relating with, the design environment. All this stems from the recognition that a space should serve its users free of the incoherence and confusion of conflicting purposes.

The London Barbican is an example of one such development. During World War II, bombs devasted a large area adjacent to the downtown section of the city of London. Because of its proximity to the downtown financial district, the area could have been easily reconstructed with high-density office building developments. However, the area is rich in historical importance, dating back to the days of the early Roman occupation. The magnificent dome of St. Paul's Cathedral, designed and built by Christopher Wren after the great London fire of the late seventeenth century, is the dominating landmark in the area.

Instead of more office buildings, the Corporation of London built the Barbican, a combined cultural and residential complex designed to serve the needs of the business district and to preserve the historical significance of the area. The Barbican contains 2,113 flats, maisonettes, and terrace houses for up to 6,500 residents; a 200-room hotel for students and young city workers; the new Guildhall School of Music and Drama; a theater; an art gallery; a concert hall; a cinema; a library; shops; restaurants; and pubs. The development is served by a segregated system of elevated pedestrian walkways (Fig. 10) with roads, truck service bays, and parking below, out of sight of the pedestrian level.

The network of elevated pedestrian ways connects directly with the financial district so that it is possible to live, work, and enjoy all the area's cultural advantages without vehicular conflicts. The elevated plazas have been attractively landscaped, and particular care has been taken to maintain and enhance the vistas of historic St. Paul's. An ancient Roman wall, perhaps 1,500 years old, presents an unusual interest feature at one location. The Barbican is an excellent example of human-scale design and the preservation and enhancement of the sense of place or space image.

Both Montreal and Toronto, Canada, have embarked on programs to establish pedestrian networks beneath their central business districts. The Montreal system began in 1962 with the development of the Place Ville-Marie shopping mall and its associated 42-story office tower. Underground linkages were built between the Place Ville-Marie complex and the nearby Canadian Railway Station and Queen Elizabeth Hotel. The initial small-scale network proved so popular that subsequent linkages were made to other large developments in the area. In 1971, the system totaled approximately 2 miles of connecting pedestrian passageways serving 40 acres of prime office, hotel, and retail space, including 300 underground shops, 50 restaurants, and 2,500 hotel rooms.

The underground network is completely enclosed and climate-controlled in both summer and winter (Fig. 11). This is most appreciated during the rigorous Canadian winter because it allows the pedestrian to avoid the cold and slush above. A reduction in downtown-district pedestrian accidents has also been noted since its inception, which has been attributed to the reduction of pedestrian-vehicle conflicts. Montreal's system is largely unplanned, and there is no overall master plan. Each developer initiates his own plans, and the total network is somewhat deficient because of it. There is also lack of visual relationship with surface elements, which affects the imageability of the system. The city planning department has initiated studies and developed concepts for a more coherent system for the future.

Toronto's underground pedestrian circulation system is less developed than Montreal's, but a completed downtown network is envisioned by 1980. The Toronto concept is similar to that of Montreal, linking major generators such as shopping centers and hotels with transportation nodes. The Toronto system is also dependent on individual developers, but there has been active participation by city planners and partial funding by the city. The Toronto Transit Commission, which owns and operates the Metro system, has also taken an active part in the development, promoting direct linkages to subway stations and major traffic generators in the system. Toronto planners are convinced that the total image of the city and its ability to attract new investment is dependent in a large measure on the ease, freedom, and pleasure with which pedestrians can move about. Profiting from Montreal's experience, they have attempted to increase the imageability of the underground network, opening it to the street environment above. This has limited opportunities for climate control but has contributed to an increased variety of visual experience. Plans for the proposed Metro center, an air-rights development above the Union Station that would have 20,000 residents and 40,000 daytime workers, include provision for visual relationship with the underground pedestrian network. The visual orientation of the pedestrian has been considered in the design of the Center's approaches from the underground network. Outdoor courtyards, entrances, and building shopping ways may all be encompassed in a single gaze.

The cities of Cincinnati and Minneapolis have embarked on programs for aerial walkway networks in their downtown central business districts. Unlike Montreal and Toronto, the two cities have no underground subway system to integrate with, allowing the freedom to choose the less expensive skyway alternative. The overhead systems have the advantage that they can be built quickly, without conflict with underground utilities or surface traffic. Also, the overhead systems allow a clearer visual relationship with the elements of the cityscape. However, the design of aesthetically attractive bridge connections between buildings is a challenge to the architect and structural engineer. Elevated street bridges in Minneapolis have been constructed of prestressed concrete, with finished steel railings and tinted glass paneling enclosures. Maximum

Figure 7. The lack of a uniform national system of traffic laws, signs, and signals undoubtedly causes unnecessary pedestrian casualties.

Figure 8. High curbs and sewer gratings cause difficulties for all pedestrians, particularly the handicapped.

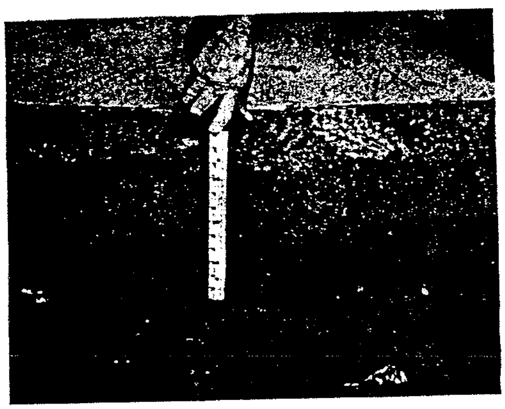

Figure 9. Long flights of stairs make some buildings inaccessible to the handicapped.

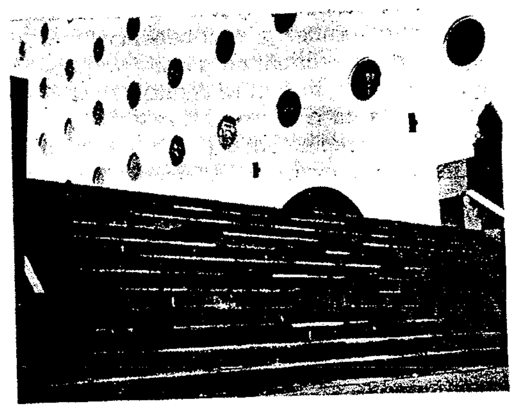

Figure 10. The London Barbican elevated pedestrian system enhances the human sense of place image.

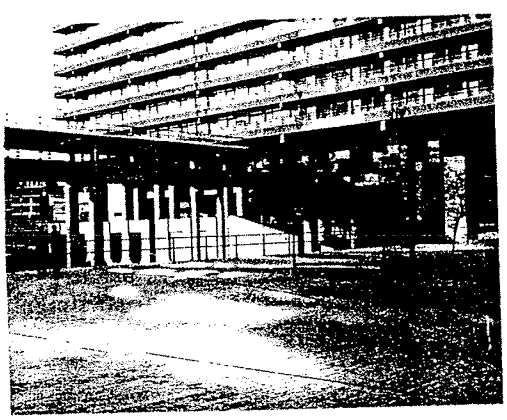

Figure 11. Montreal's underground pedway network provides a functional and attractive pedestrian system protected from the elements.

use has been made of glass and high levels of lighting for security purposes. Although all skyways have not been climate-controlled, provision has been made for this eventuality.

The Cincinnati system interconnects 10 square blocks in the heart of the downtown district. An additional spur serves Cincinnati's 56,000-seat riverfront sports stadium. The Cincinnati skywalk system is being developed with a combination of private, municipal, and federal financing. Plans for pedestrian circulation within the core recognize the need to walk quickly and unencumbered by vehicular conflict between major pedestrian traffic generators. The second-level walkway system connects the city's retail section and a showcase concentration consisting of the convention hall and hotels on the west, the office building concentration on the east, and the riverfront stadium on the south. An added moving walk linkage to the stadium has been considered because of long walking distances from the CBD. The city's plans include provisions for additional grade-level improvements for pedestrians, with arcading of building fronts, widening of sidewalks, and the improvement of street furniture design. A pedestrian mall containing Cincinnati's historic Tyler Davidson Fountain is designed as the central focal point of the development.

The elevated connection to the riverfront stadium has proved to be one of the most valuable links of the system. Originally intended to make downtown parking available to stadium spectators because of a parking capacity deficiency at the stadium itself, it brings large numbers of these persons into the downtown area during sporting events. This has significantly increased downtown restaurant and shopping business volumes on these days.

Minneapolis has the distinction of being one of the most people-oriented cities in the United States. Its famed 8-block-long Nicollet mall is an outstanding example of the development of a prime retail street into a visually exciting pedestrian precinct where private vehicles are banned. Although the Nicollet mall development is significant by itself, the ambitious skyway plan of Minneapolis has received much more attention. It is expected that, by 1985, 64 pedestrian bridges will connect 54 blocks of the downtown CBD. An additional 13 blocks will be joined by underground concourses.

Minneapolis city officials began studying elevated walkway systems as early as 1958 but literally could not get the development "off the ground" because of merchants' concern for potential loss of business from street-level stores. Finally, a few private developers thought that such a system would be economically feasible and proved their point when the first skyway was built in 1962 as part of the Northstar Center development. Property values immediately soared in the vicinity of the Center, persuading a number of businesses to remain downtown instead of moving to the suburbs. Five more skyways were privately financed and built, linking a total of 16 downtown buildings.

Instead of decreasing rental values, the skyway and arcade system increased the rental receipts of the second level of the connecting building so significantly that the second-level rates now approximate the rates on the street floor, without lowering street-floor values. Costs of skyways have been surprisingly low, averaging about $100,000, split between owners on each side of the street. Remodeling of second-story arcades has proved to be more expensive than the skyways themselves, but these costs are substantially less when the arcade is included in original construction.

The guidelines for the skyway system development adapted by the Minneapolis Planning and Development Department include provisions for adequate walkway dimensions, pedestrian comfort, security, and imageability. Minimum clear walkway widths are set at 12 ft, and preferably 20 ft, for connections to major traffic generators. Minimum headroom is set at 8 ft. Unobtrusive design is recommended for all skyways with a use of glass and high lighting levels for "openness" and security. Pedestrian access and use of the system are to be facilitated by good signing, and arcades will make use of multilevel courts and open spaces to visually link the street with the second-level system. Every effort to introduce interest and variety along the route of the system is advocated. Standardized structural design and details are recommended to simplify skyway construction and reduce costs.

These examples indicate what can be done with a dedication to improvement and enhancement of the rights of the pedestrian to urban space, with the concomitant benefits of improvement of the human qualities of the urban environment.

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