

Accommodating Pedestrians in Contemporary Residential Neighborhoods: Riyadh, Saudi Arabia

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Abstract. Walking was the **major** mode of transport in the traditional **neighborhoods** in Saudi Arabia; however, during **the last few decades pedestrians** are disappearing from the streets of contemporary neighborhoods for a number of reasons. This paper will review and analyze the pedestrian situation in typical contemporary residential neighborhoods in the city of Riyadh, Saudi Arabia. The aim of the paper is to determine those physical and psychological factors which may prevent residents from walking as a way of enjoying the greatest freedom of choice and degree of contact with the people and places in their contemporary neighborhoods, and as one of the excellent means of exercising necessary for today's life-style.

Introduction

Today's luxurious and demanding life-style has reduced the physical activities of many people to a minimum and has increased their psychological wary to a maximum. The number of physical and psychological diseases has become a fact of the contemporary society. High blood sugar, fat deposits, back pain, fatigue, stress, and depression are just a few of today's common diseases. Exercise is one of the best solutions and the simplest answers to many of these problems. However, in order to continue practicing, exercise should not be something that we are forced to do, but rather something that we enjoy doing. One of the most practical and enjoyable exercise is walking.

"Walking is as natural to the human body as breathing. It is a muscular symphony; all the foot, leg, and hip muscles tend to contract and support their share of the weight, and the diaphragm and rib muscles increase their action. There is automatic action of the arm and shoulder muscles; the shoulder and the neck muscles get play as the head is held erect; the eye muscles are exercised as you **look** about you". [1, p.318]

In addition to all of the above physical and psychological health benefits, walking around a neighborhood encourages the social interaction and strengthens the friendly relationship between neighbors. Pedestrians will stop to chat anywhere if it is safe and convenient. Walking presents an opportunity for the residents to meet each other and rebuild those good and friendly traditional relations that are missing in many contemporary neighborhoods.

“The path system affects communication between people. ... Friendships are made along the street rather than across the park”. [2, p. 131]

The Islamic religion encourages walking, e.g. Muslims get good deeds for walking to and from the mosque to perform the five daily prayers⁽¹⁾, but walking has become almost impossible in many contemporary neighborhoods. A number of physical barriers and psychological obstacles not only discourages or prevents the residents from walking around their neighborhoods, in fact it encourages them to use a car for all their journeys, no matter how short. A large part of this difficulty arises because designers and planners have neglected the residents' needs as pedestrians.

“To neglect walking is to neglect a major and basic component of the transport system”. [3, p. 105]

We should not forget that, to many residents, walking is their only mode of transport. While they are dependent upon walking they are also handicapped by lack of appropriate and safe walking facilities. In Saudi society safe, convenient, and interesting walking system will help those who cannot drive, e.g. women and children in particular, to get around their neighborhood for shopping, going to schools, visiting neighbors, or meeting in the neighborhood park, without forcing many households to buy an extra car and to hire a chauffeur.

Walking is very much a part of the reality of daily travel; it is the most basic and ancient mode of transport. Although it is not considered in the design and planning of contemporary neighborhoods, walking will always remain a prime mode of transportation because everyone at some time is a pedestrian.

“Everyone at some time is a pedestrian, there are no tests to pass, limited learning of specific skills, and very few restrictions in behavior. In addition, the group incorporates a wider age range than found for any other road users”. [4, p. 42]

Therefore, since all residents are pedestrians, they are all affected by the quality of their neighborhoods' pedestrian circulation system. Likewise, they all stand to benefit from efforts to improve or provide facilities to accommodate walking. A neighborhood with a better pedestrian system is more convenient and pleasurable for its residents; time spent walking is not wasted if the experience is pleasant.

(1) Hadith books contain a number of hadiths (saying of the Prophet of Islam) which encourage walking to the mosque.

"The pleasures of quieter, pre-auto times, with greater self-awareness, out-of-door activities, clean air, and personal freedoms are again being sought by many people". [5, pp. 1-2]

Objective and Scope

A number of different physical, psychological, socio-cultural, socio-economic, climatic, etc. factors influence the quality of the neighborhood's walking facilities. However, the research reported here had two primary objectives: (a) to pin point those physical barriers and psychological obstacles which prevent residents from walking around their contemporary neighborhoods and (b) to recommend some guidelines or procedures for improving the existing pedestrian circulation system and correcting the planning and design of future neighborhoods. This paper will start with an overview of the pedestrian system in traditional and contemporary neighborhoods. Then those barriers and obstacles which may prevent walking are identified using an observation check list for a number of randomly selected streets in the city of Riyadh. Finally, some important guidelines and recommendations for a better pedestrian system are presented. It is hoped that this paper will aid in the improvement of the existing pedestrian system and in the future development of neighborhood circulation systems that will enhance pedestrian activity and encourage walking as an efficient, safe, healthy, and enjoyable mode of transportation.

Background Information

It would be difficult to think up of a simpler and more effective protection against a number of modern diseases than walking, both for its simplicity and effectiveness; besides it costs nothing, and it is available at all times for anyone who is not physically disabled. Walking also is a mode of transport that can satisfy many personal and social needs. However, why is it that residents seem unwilling to walk around the neighborhoods to accomplish many of their routine daily activities nowadays? Part of the trouble is that they do not have good walking facilities in their contemporary neighborhoods. However, in order for us to be able to understand the pedestrians' problems, we have to look first at the street layout of traditional and contemporary neighborhoods. The following section examines the circulation system in both traditional and contemporary neighborhoods.

Traditional Circulation System

The dense traditional development in Riyadh is linked with narrow, winding streets which continually change direction. The layout of the traditional neighborhood as a part of the organic pattern of the town, was identified by solid masses of connected houses broken up by narrow roads which would branch out irregularly into alleyways and cul-de-sacs. The irregularity comes from the natural organic growth of generations of adding and filling. The streets change shape and size according to need and depending on the number of houses. In the laying out of streets, the contextual requirements of culture and climate are also presented. The narrow meandering streets are comforting to the pedestrians and they provide an essential sense of unity.

They also provide enough shade to protect pedestrians from the direct solar radiation striking the earth surface in the region of Riyadh.

The urban spaces of the traditional pattern were organized in a hierarchical sequence from public open spaces to main roads and the semi-private cul-de-sac. The "*barahas*" or "*finas*" (open spaces), the "*sabats*" (chambers over the street or overpasses), the curve and angle of the traditional streets, the framed decorative entrances, all become points of reference that are easily understood. The concept seems to have evolved progressively into a refined whole. The "*baraha or fina*" is an interesting aspect of the streetscape where two or three narrow alleyways may open into a large public space. Such a space is used for children's playgrounds and for gatherings and festivities [6, p. 58].

"The *fina* was used for activities related to domestic life as well as to the community. It was also used for selling and for producing goods". [7, p. 96]

The common land between houses existed automatically in traditional neighborhoods. The public spaces, main roads, and cul-de-sacs which gave access to building were safe social spaces, and therefore functioned automatically as common land. The traditional street served many functions beyond that of passage. It was a market, workroom, meeting place, and festivities hall. Streets gave traditional neighborhoods their form and also provided a place for people to move and carry on many social and commercial activities.

Moreover, protecting the right of way, within the traditional Arab-Muslim cities by not narrowing the way, hindering circulation, or causing damage to the public, was a common maintained theme in the Muslim jurists opinions and was well illustrated in the physical level by the people's practice [7, pp. 86-88].

In traditional neighborhoods most movement was on foot, and so the street was scaled for pedestrians. Furthermore, traditional dwellings were narrow fronted, deep, and intricate so pedestrians could walk past many without becoming bored. The careful arrangement of overpasses framing the views and in the placing of handsome decorative entrances and windows along the narrow streets constitute an appropriate environment for pedestrian's speed. In contrast, streets of contemporary neighborhoods do not perform such a stimulating environment for pedestrian. The introduction of the car as a means of transportation very clearly affected the layout of contemporary neighborhoods.

Contemporary Circulation System

The contemporary neighborhood represents a completely different land subdivision and street layout from the traditional neighborhood. It is the adoption of a new residential pattern. The general practice of subdividing land for most contemporary

neighborhoods is based on the widely applied urban grid pattern, which is usually comprised of equally spaced streets at right angles, each block two lots deep. The average lot size in contemporary subdivisions has steadily increased through the years. Today 500-750 m² is typical in many new neighborhoods.

Aerial views or plans of contemporary subdivisions show the even spread of dwellings across the land. Each dwelling is in the middle of approximately square lot with front, back, and side yards. Each dwelling is similar, and the natural land form usually has been bulldozed away. What remains is hundreds of little parcels all exactly alike, each with a two stories high building surrounded with 3 m high wall. The densities are rather low and there is a good deal of open space that is not built upon.

The street layout of most contemporary neighborhoods has been designed to serve automobiles and encourages car use. This automobile domination has many adverse effects on the traditional life-style. With the extensive use of the car, greater pressure was put on the street, and both walking and social activities were compromised. Many traditional social functions have had to make way for vehicle traffic. Residents of most contemporary neighborhoods live in environments designed primarily to serve the speed requirements of those who drive.

"Since the car has become a temporary 'environment,' roads generally serve only to link different points. Inside cars, there is comfort, climate control, and entertainment. The road environment through which the car passes is not as important as the speed, efficiency, and continuity of the trip. Consequently, our roadways are just part of a dull but efficient vehicular movement system, connected to destination points with many parking places". [5, p. 15]

"In a society with cars and trucks, the common land which can play an effective social role in knitting people together no longer happens automatically. Those streets which carry cars and trucks at more than crawling speeds, definitely do not function as common land; and all houses are entirely isolated from the social fabric because they are not joined to one another by land they hold in common". [8, p. 337]

Movement on foot becomes very difficult in most contemporary neighborhoods. The single-use land pattern and the superior road system has made it difficult for residents to carry out activities on foot within a reasonable time limit. Residents have lost the ability to walk. They have forgotten what neighborhoods are about. The simple social intercourse is largely missing. It is missing because cars have taken over the streets, and made them unusable by pedestrians, partly because the streets, which have been purpose-built encourage the same process. The contemporary road system is damaging in its effect; it is damaging because it robs the streets of people; the street becomes empty of life and to some extent dangerous. There are very few areas along the streets of contemporary neighborhoods where people can comfortably congregate for hours at a time.

Pedestrians are at considerably greater risk in the roads of contemporary neighborhoods where a driver is encouraged by the road system to travel at high speeds and to assume priority. On the road residents have restricted pedestrian mobility due to a lack of adequate walking facilities. Then, too, contemporary neighborhoods generate such a buildup of internal traffic that it has become necessary for residents to drive to mosques, stores, schools, etc., when in fact walking would be preferable.

Automobile dominance over the streets and the possibility of through-traffic in the contemporary neighborhoods have also caused parents concern for the safety of their children. Fathers spend large part of their lives chauffeuring members of the household, especially children, to various activities. As a result, we cannot escape the frustration of seeing our children spend more time being driven to places than they do being out of doors.

“Children who have had exercise learn better at school, sleep better at night and feel fresher the next day. ... These [the play-activities] are not separate activities for “play-grounds”. This is activity indigenously to the whole life of the child, .. playing all the way to and from school: catch games-ball games-using and shouting-telling yourself stories as you go along. ... There need be no worry about traffic accidents, which is now sadly rational, as soon as anyone is late”. [9, p. 38]

Pedestrian safety, comfort, and convenience has been seriously neglected in most contemporary neighborhoods. In the last few decades, planning has been primarily concerned with the automobile and motorists' comfort and convenience. Even street lighting has been dominated by lighting for the automobile. The pedestrian's realm in contemporary neighborhoods is seldom planned, and usually happens as an outcome of some other activity. For instance, sidewalks are normally constructed after the road is constructed.

Ignoring climate and its effect on pedestrians, is another factor behind deferring pedestrians from using the neighborhood's streets. The impact of Riyadh's hot climate is almost ignored in the design and furnishing of the streets and sidewalks of the contemporary neighborhoods. The wide straight streets, with setback dwellings in both sides from the street line, do not provide the same amount of shaded area that was available for pedestrians in the narrow and winding streets of the traditional neighborhood. Moreover, many of the sidewalks are not provided with trees or other shading devices to protect pedestrians from the hot sun and to offer them the required level of comfort.

Today, there is also an array of regulatory and disciplining factors which control the appearance of the contemporary neighborhoods. Municipal setback regulations, for example, assured some standards for the individual dwelling on its own lot. But these regulations, applied over extensive areas of grid streets patterns, produced a monotonous environment. The grid street pattern in many contemporary neighborhoods runs long distances without any variation. The streets are straight and all dwell-

ings on the street are located in the center of each lot with equal set back distant from the street line. There is a monotonous street appearance even though the buildings' exteriors are to some extent varied in design.

"Grids are well suited to networks serving complex areas at large scales, they are clear and easy to follow. However, the extensive use of the grid places certain limits on the variations possible in urban design", [10, p. 125]

"The quality of walking along grid street can be very boring because of the lack of variety and lack indication that suggests you are getting someplace". [5, p. 105]

The grid system has been criticized for its visual monotony, for its disregard of topography, for its vulnerability to through traffic, and for its lack of differentiation between heavily traveled and lightly traveled ways, which prevents specialized design and the economical use of space and paving.

The streets hierarchy in most contemporary neighborhoods is frequently neglected, leading to confusion and overloading of some arterials. Most contemporary street organization schemes have merely shifted traffic from arterials to local roads without any consideration for the safety of those who live on them. Furthermore, along the arterials in contemporary neighborhoods, land uses have often been changed from single-family residences to apartments and commercial developments laid out along a strip.

"This [a strip of shops] is convenient for cars, but it is not convenient for pedestrians. A strip does not have the characteristics which pedestrian areas need". [8, p. 175]

Our dependence on the automobile in the contemporary neighborhoods has compromised many valued qualities of our traditional way of life. We should start to think of how we want to live, and how we can preserve our traditional socially tied lifestyle in our contemporary neighborhoods. Nowadays, there is evidence to prove that most residents will drive rather than walk. Why is this? Is it because people just do not like to walk, or is it because they do not have the appropriate walking facilities? The author feels the latter is the case, primarily because our contemporary neighborhoods are not designed to make walking safe, comfortable, and pleasant.

Barriers and Obstacles in The Streets of Contemporary Neighborhoods

The following section discusses and analyzes the reasons which prevent the residents from walking in their contemporary neighborhood. It starts with presenting some statistics about the pedestrians, who use the streets of contemporary neighborhoods, and their types. It is followed by examining the streets' general characteristics and the sidewalks' physical characteristics. Finally, it presents and discusses the physical barriers and psychological obstacles in the circulation system of contemporary neighborhoods. The data and statistics were generated from an observation check list of randomly selected streets with sample size of 170 streets in 32 different contempo-

rary residential neighborhoods in the city of Riyadh conducted during the spring of 1993.

Streets with Pedestrians and Pedestrians Types

Table 1 presents the percentage of contemporary streets which are used by pedestrians and the types of those pedestrians. It shows that there are pedestrians in only two-fifth (40%) of the residential streets and in less than half (45%) of all streets, although the streets observation has been conducted in different times of the day ranging from 9.00 AM to 11.30 PM. Table 1 also displays the type of pedestrians; it shows that in less than half (47%) of the residential streets the pedestrians are children. The data also indicates that in slightly more than one-tenth (11%) of the residential streets the pedestrians are women, and only in about one-sixth (16%) of the residential streets the pedestrians are men of the residents. It also shows that in about two-fifth (42%) of the residential streets the pedestrians are workers, e.g. garbage collectors, gardeners, car cleaners, construction labors, etc. Moreover, Table 1 shows that only a few (7%) of the sidewalks are used by pedestrians.

Table 1. Streets which are used by pedestrians and pedestrians types

	In residential streets	In all streets
Pedestrians	40.0%	44.7%
Type of pedestrians		
Children	46.7%	54.7%
Women from the residents	10.7%	16.0%
Men of the residents	15.8%	18.4%
Workers	41.3%	49.3%
Sidewalks used by pedestrians	7.0%	10.0%

Note: In the majority of cases there were no more than one or two pedestrians in the street, although the streets observation was conducted at different times of the day ranging from 9.00 AM to 11.30 PM.

This finding shows clearly that residents of the contemporary neighborhoods are using mode of transportation other than walking to accomplish many of their routine daily chores around their neighborhoods. Such reluctance to walking is an important matter that has to be investigated and corrected; because residents are pedestrians—this fact should not escape us as designers and planners. If we are concerned with the residents' well-being, walking should be made possible and more convenient within the streets of our contemporary neighborhoods.

“Mechanical devices for moving can extend the scale of accessibility, but the maximum contact with a place, so essential to every human settlement, is achieved by walking”. [10, p. 72]

Street Characteristics

As Table 2 shows, the overwhelming majority (95%) of the streets are residential streets, the remaining (5%), are commercial streets. The majority (56%) of the streets are 15m or wider and nearly one-third (30%) of the streets are 20m or wider. The average street width is 15.2m, but with the municipal setback requirement, the width between buildings in both sides of the street becomes 21.28m⁽²⁾. In such case, the height to width ratio of the street's enclosure is (1:2.6) (Fig. 1). Therefore, if sidewalks were not provided with trees or other shading devices, pedestrians will be exposed to the direct solar radiation most of the day time. Analytical study of climatic data for Riyadh shows that more than half (53%) of the time pedestrians will be walking in uncomfortable outdoor situation.

"An analysis of hour-by-hour occurrences of outdoor ambient air temperature, relative humidity, solar radiation, and air velocity [for Riyadh] has been undertaken in this assessment, using the bioclimatic chart developed by Olgay. About 4141 hours out of 8760 hours could be assumed to be comfortable". [12, p. 201]

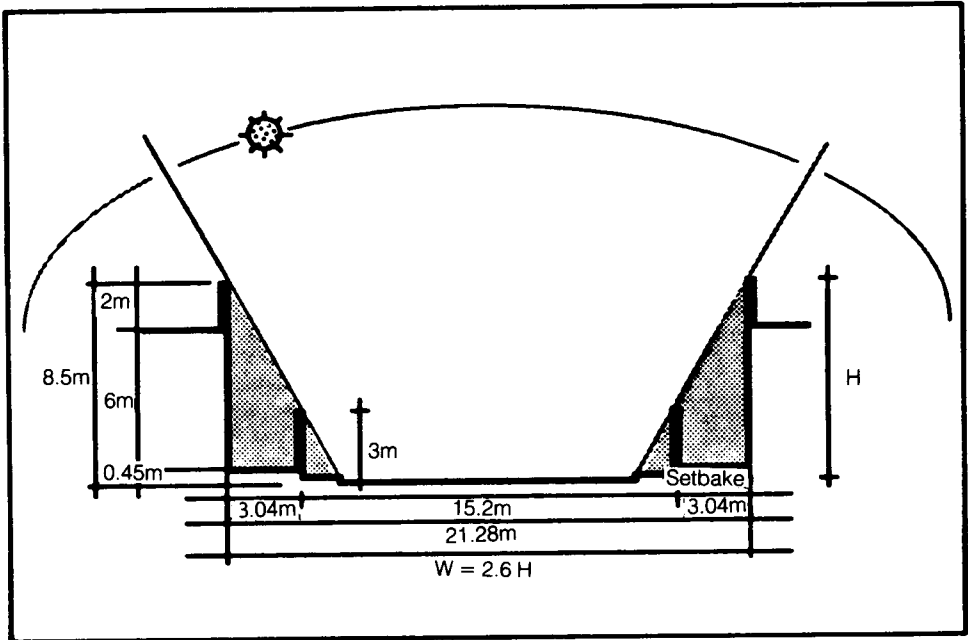


Fig. 1. The width to height ratio of an average residential street effects the available shading by building for pedestrians.

The Table also shows that the average number of intersections is 4.9 intersections/street. Table 2 also shows that about two-thirds (66%) of the streets have at least one end open to a major street. It is not surprising, with the intense application

(2) The building setbacks from the street sides should be equal to 1/5 of the width of the street and should not be less than 6 meters from the side of a street that exceeds 30 m in width [11, p. 1].

of the grid pattern on land where its natural form has been bulldozed away, that all of the streets (100%) are straight. It also worth noting that only about one-third (35%) of the streets contain sidewalks (see also Table 3).

Table 2. Streets characteristics in the contemporary neighborhoods

Characteristic	
Type of street	
Residential	94.7%
Commercial	5.3%
Street width	
Less than 10 m	12.3%
10 m	12.3%
12 m	19.4%
15 m	26.5%
20 m	21.8%
More than 20 m	7.7%
Average street width	15.2 m
Average number of intersections	4.9 intersections/street
Street's ends	
Both ends open to major streets	14.1%
One end open to a major street and the other to a local street	51.8%
Both ends open to local streets	34.1%
Shape of street	
Straight	100.0%
Other (curved and/or angular)	0.0%
Availability of sidewalk(s)	
Yes	35.3%
No	64.7%

These characteristics strongly suggest that the streets of the contemporary neighborhood were primarily designed to serve automobiles and to support the speed requirements of motorists with no concern whatsoever for pedestrians. In the last few decades, automobiles have become the predominant means of passenger transportation, as a result social contact between the residents of the contemporary neighborhoods is severely lacking.

"Social contact between people on foot or on bicycle is easy, while contact is almost impossible between people in cars. Most people enjoy walking, sitting, watching other people and talking as opportunities for relaxation and enjoyment of leisure time". [5, p. 2]

Furthermore, the preceding street characteristics suggest that contemporary neighborhood is open and vulnerable to through traffic; it also lacks any clear boundary which may preserve the neighborhood's identity and special character.

"The single most important feature of a neighborhood's boundary is restricted access into the neighborhood: neighborhoods that are successfully defined have definite and relatively few paths and roads leading into them". [8, p. 87]

Sidewalk Characteristics

A key issue regarding to a street is the sidewalk and its treatment. The sidewalk has become a regular feature of the residential street scene in the city of Riyadh, only in the past three decades or so. Previously, traditional streets had been shared. Camels and donkey carts moved as best they could among people on foot who used the street, not just to get from one place to another, but also to socialize and to carry on various commercial activities. Table 3 presents the physical characteristics of the sidewalk in the streets of contemporary neighborhoods. It shows that while one-quarter (25%) of the streets contain sidewalks on both sides and slightly more than one-tenth (11 percent) of the streets contain sidewalk(s) on one side or just on part of the street, about two-third (65%) of the streets have no sidewalks at all. Such large percentage of streets with no sidewalks create a dangerous environment for those who like to walk because the conflict between pedestrians and automobiles will be unavoidable.

"Most serious car / pedestrian conflicts occur along roads with no sidewalks". [5, p. 26]

The Table also shows that nearly three-fifths (58%) of the sidewalks are less than 1.8m in width and the average sidewalk width is 1.7m. Furthermore, the Table shows that the overwhelming majority (99%) of the sidewalks are paved with 40×40cm gray cement paving units. This type of paving treatment, which is monotonous and unpleasant to the eye, is one of the psychological obstacles which face sidewalk users.

"Texture and pattern are important in breaking up what could otherwise be bland and uninteresting surfaces". [13, p. 31]

Furthermore, these cement paving units have high conductivity and accordingly low energy storage capacity. They absorb and release heat quickly. They are hot in the summer and cold in the winter. In addition the air above them is often characterized by unpleasant temperature extremes [14, p. 154].

Physical Barriers

An important aspect of this study is to determine and examine the barriers and obstacles which may prevent residents from walking around their contemporary neighborhoods. Table 4 presents the physical barriers which impede the pedestrian flow on the sidewalk and/or in the street. As Table 1 shows, there are only a few (7%)

Table 3. Characteristics of the sidewalk

Characteristic	
Availability and location of sidewalk(s)	
On both sides of the street	24.7%
On one side of the street	5.9%
On part of the street	4.7%
No sidewalk	64.7%
Sidewalk width	
Less than 1.2 m	11.7%
1.2 m - 1.8 m	46.7%
1.81 m - 2.6 m	36.6%
2.61 m - 3.2 m	3.3%
More than 3.2 m	1.7%
Average sidewalk width	1.7 m
Type of pavement	
40 × 40 cm gray cement paving units	98.8%
Other (cement units with different shapes and/or different color)	1.2%

of the sidewalks in the residential streets which are used by pedestrians. The reason for such low use of sidewalks is due to the existence of a number of different barriers. This study locates fourteen different barriers which defer the pedestrians from using sidewalks (Fig. 2). As Table 4 shows, in the overwhelming majority (97 and 95%) of the sidewalks, the 1.2 × 1.2m tree pits and trees exist as major barriers. Car ramps and stairs which lead to the front yard's entrances exist on more than four-fifths (88 and 85%) of the sidewalks. The level difference between the high yard and the low street is the reason behind the use of those stairs and/or ramps. This difference has occurred because many of the early dwellings were constructed before the street was paved or its level was determined; however, in some of the later cases the lot was left higher than the street because either the owner wanted to save the cost of reducing the plot level, or as a result of the bad memory of those flooding problem that some residents used to experience with their traditional mud houses during the rainy season.

Lighting poles, electrical power transformers, hydrants, and directional and/or regulatory signs are also fixed barriers which exist on a number of sidewalks. Lighting poles exist on two-thirds (67%) of the sidewalks. Electrical power transformer exists on half (50%) of the sidewalks. Furthermore, on one-quarter (25%) of the sidewalks, hydrants and directional and/or regulatory signs stand as barriers. The choice of design and location of some of these elements of street furniture such as fire hydrants, regulatory signs, and street lighting units may be outside the control of the designer.

Table 4. The physical barriers which may prevent walking

Barriers on the sidewalk	occurrence	rank
Trees	95.0%	2
Tree pits	96.7%	1
Stairs leading to the front yards' entrances	85.0%	4
Car ramps	88.3%	3
Projections in the front yards' walls	66.7%	7
Mounted drinking cooler	45.0%	11
Espalier or climbing plants	50.0%	9
Lighting poles	66.7%	5
Directional and/or regulatory signs	25.0%	13
Electrical power transformer	50.0%	10
Hydrant	25.0%	14
Garbage cans	63.3%	6
Parked car(s) on the sidewalk	26.7%	12
Other (building materials, construction wastes, etc.)	60.0%	8

Note: Most sidewalks have more than one of the above barriers.

Barriers in the street

Leaking water or sewage	40.6%
Parked car(s) next to the sidewalk(s)*	95.0%

* This figure represents only parked car(s) on streets which contain sidewalks, however, other streets also accommodate parked car(s) on both sides.

However, other street furniture also occupy a large part of the sidewalks in the contemporary neighborhoods leaving no room for pedestrians.

A number of elements, which are projected from, mounted to, and/or climbed over the front yard's wall, also exist as major barriers in the way of the sidewalk's users. Table 4 shows that projected decoration structures, built in flower boxes, and/or mounted window type air-condition units or desert type coolers exist on two-thirds (67%) of the yard's walls over the sidewalks. Drinking coolers also exist on slightly less than half (45%) of the sidewalks, while espaliers or climbing plants exist over half (50%) of the sidewalks. Although, the 3m high fences or yard's walls are a socio-cultural phenomenon⁽³⁾ these fences or yard's walls represent an impediment to pedestrian flow by their proximity to the sidewalks.

"Pedestrians do not like to brush a wall with their shoulder, so they stay away from it; this means that a strip of walkway immediately adjacent to a building wall remains unused". [16, p. 151]

- (3) When the setback requirement was put in practice, the yards in the front and on the sides of the dwellings become wasted space, because they are open to the vision of the passerby in the street; they cannot be used by a Saudi family wishing to ensure its privacy. To make these spaces usable, an above eye-level wall has to be used [15, p. 75].

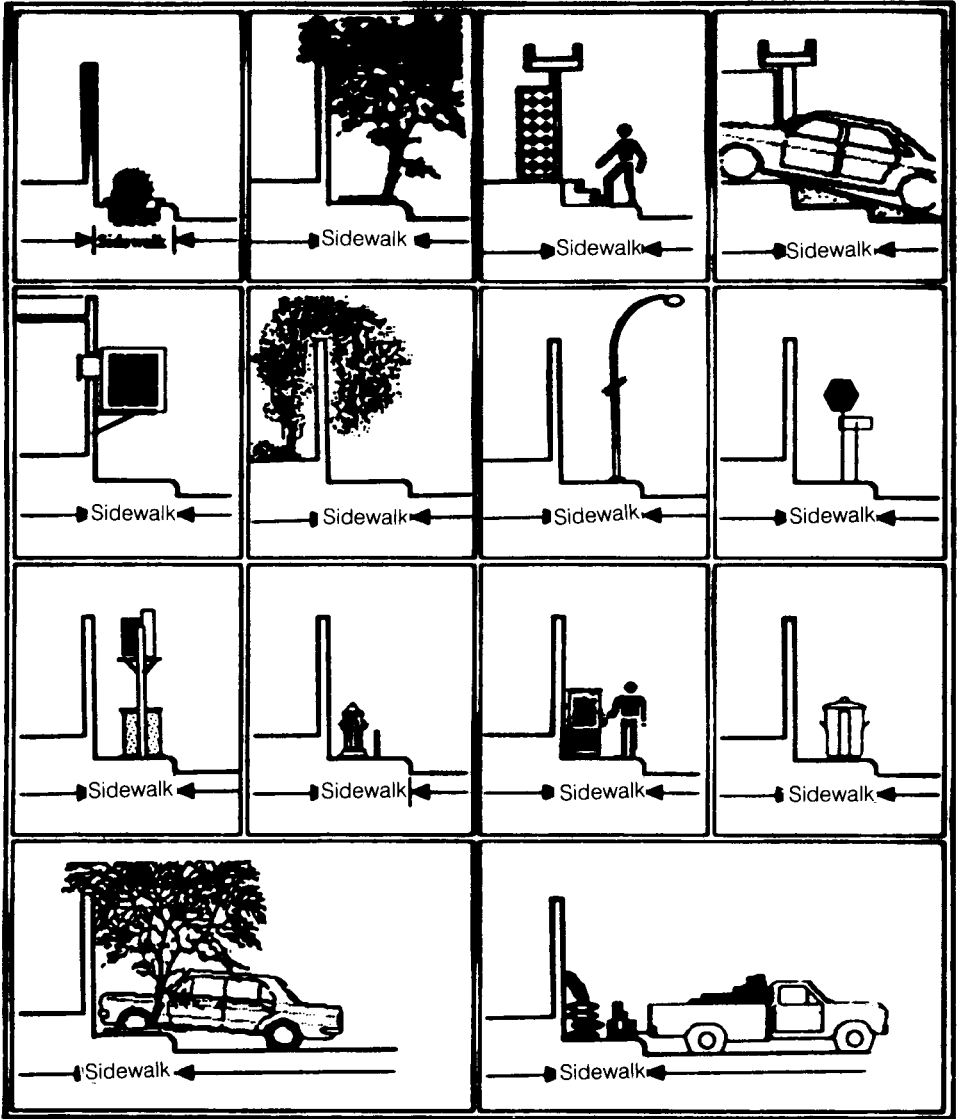


Fig. 2. The types of physical barriers which exist on the sidewalks of the contemporary neighborhoods.

The Table also shows that a number of unfixed elements exist as barriers on the sidewalks in contemporary neighborhoods. Garbage cans were found on nearly two-thirds (63%) of the sidewalks. Cars were parked on more than one-quarter (27%) of

the sidewalks. Other movable barriers such as building materials, construction wastes, etc. were left on three-fifths (60%) of the sidewalks.

All those frequent barriers are very difficult to move around (Fig. 3); their existence forces the people to get off the sidewalk to the impending danger of moving vehicles, which consequently make the pedestrians situation further complicated. Street environment is full of non-static obstacles which required a complex series of response performed in an attempt to cope with ever-changing situation and danger of moving vehicles.

“Where the pedestrian encroaches into the domain of fast moving obstacles, even a slight error can result in severe injury or death to the pedestrian. Accident statistics illustrate these points well”. [4, p. 41]

“Where fast moving cars and pedestrians meet, the cars overwhelm the pedestrians. The car is king, people are made to feel small”. [8, p. 286]

Moreover, Table 4 presents other barriers in the streets than the fast moving vehicles. Parked cars are one of such barriers, they existed in the overwhelming majority (95%) of the streets. Leaking water or sewage, which is usually due to the absence of public sewage system and/or draining system, is another barrier; it happened in more than two-fifths (41%) of the streets of the contemporary neighborhoods. All of these fixed and unfixd barriers on the sidewalk and/or in the street are a prime reason behind the residents dependence on driving and not on walking for moving around their neighborhoods.

Psychological Obstacles

The design of a good pedestrian circulation system involves the simultaneous consideration of many issues including the visual quality of the street. There is a number of perceptual factors which can attract or repel people from walking, understanding these factors would help in providing more walking oriented neighborhoods because people tend to move towards and through pleasant areas and spaces. The data in Table 5 displays a number of elements that induce the negative aesthetic characteristics of the contemporary streets and which consequently diminish the residents' interest in walking around their neighborhoods. The Table shows that all (100%) of the streets are straight, these long straight streets seem to go nowhere, reducing the visual pleasure of pedestrians with a recurring serial vision.

“Space is seen, not as a single view, but in sequence over an extended period of time while the observer is in motion. The eye, like a motion picture camera, registers a series of images”. [17, p. 292]

Changing views is important to heighten interest; to involve the viewer consciously in the urban environment; to evoke emotions such as mystery, suspense, and anticipation; as well as to provide a sense of movement through space.

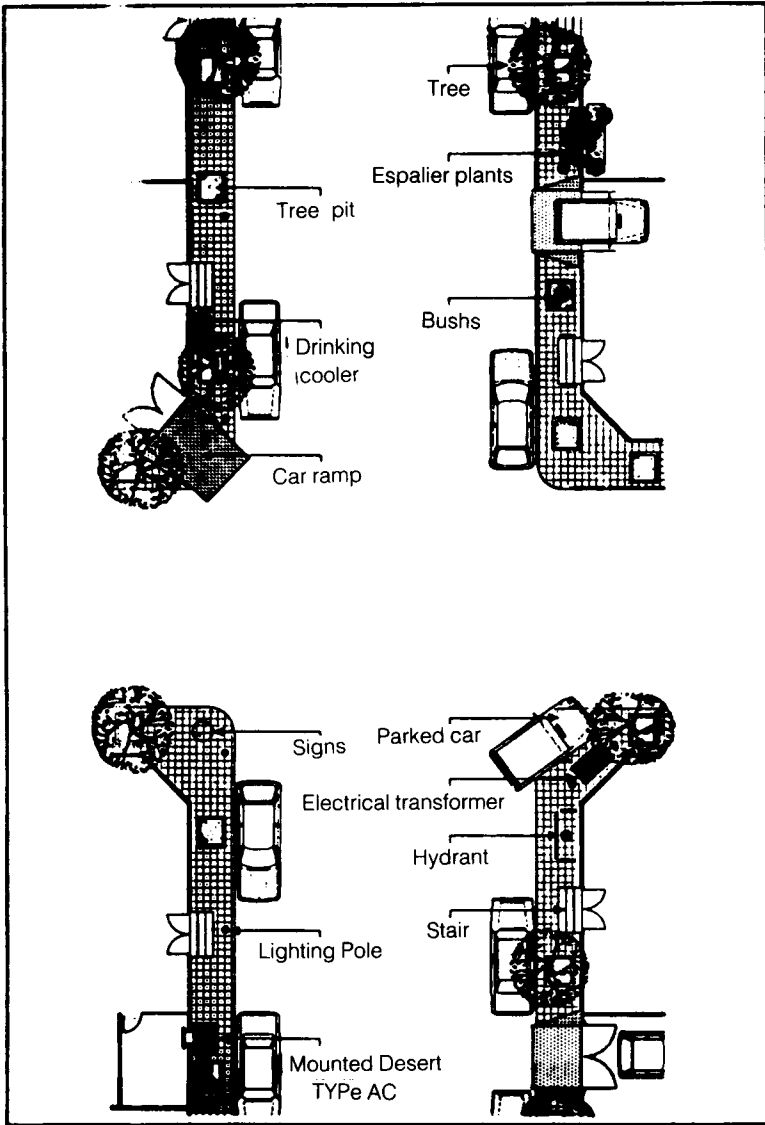


Fig. 3. A plan of a typical street with sidewalks in a contemporary neighborhood shows the location and the type of barriers which existed on the sidewalks.

Table 5. The psychological obstacles which may decrease the interest for walking

The street visual quality		
Street shape		
Straight		100.0%
Other (curved and/or angular)		0.0%
Availability of trees		
Yes		66.5%
in most of the street	48.5%	
in part of the street	18.0%	
No		33.5%
Existence of undeveloped lot(s)		
Yes		84.7%
No		15.3%
Existence of extra partition(s) onto the dwelling(s)' yard wall(s)		
Yes		65.0%
No		35.0%
Availability of lighting units		
Yes		53.3%
For pedestrian	1.2%	
For pedestrian and/or automobile	9.5%	
For automobile	42.6%	
No		46.7%

"The pedestrian may take a longer route because of its added aesthetic enjoyment". [18, p. 53]

Moreover, because all streets in the contemporary neighborhoods are straight and all houses are set back equidistant from the street line, a monotonous street appearance results. Such an environment is very boring for pedestrians. Views are the same in relation to the street, the buildings, and the path alignment. It is important to remember that in serial vision there is, in addition to what one can see, an interest in what one is about to see.

"Straight streets, same set-back, and same building and walls height create monotonous environment. In order to create identity and interest in the layout of housing fronting streets, variations in building heights and setbacks are recommended". [19, p. 9]

Providing an environment which encourages walking depends on understanding how people observe and use the environment. Table 5 also shows that there are no trees in more than one-third (34%) of the streets. In nearly one-fifth (18%) of the streets there are trees in just part of the street. Trees exist only in less than half (49%)

of the streets. The Table also shows that undeveloped lot(s) existed in more than four-fifths (85%) of the streets. Extra partitions of light materials; e.g. corrugated plastic or metal sheets, canvas, etc.; onto the yard's wall exist in nearly two-thirds (65%) of the streets (Fig. 4).⁽⁴⁾ Furthermore, Table 5 shows that lighting units, which

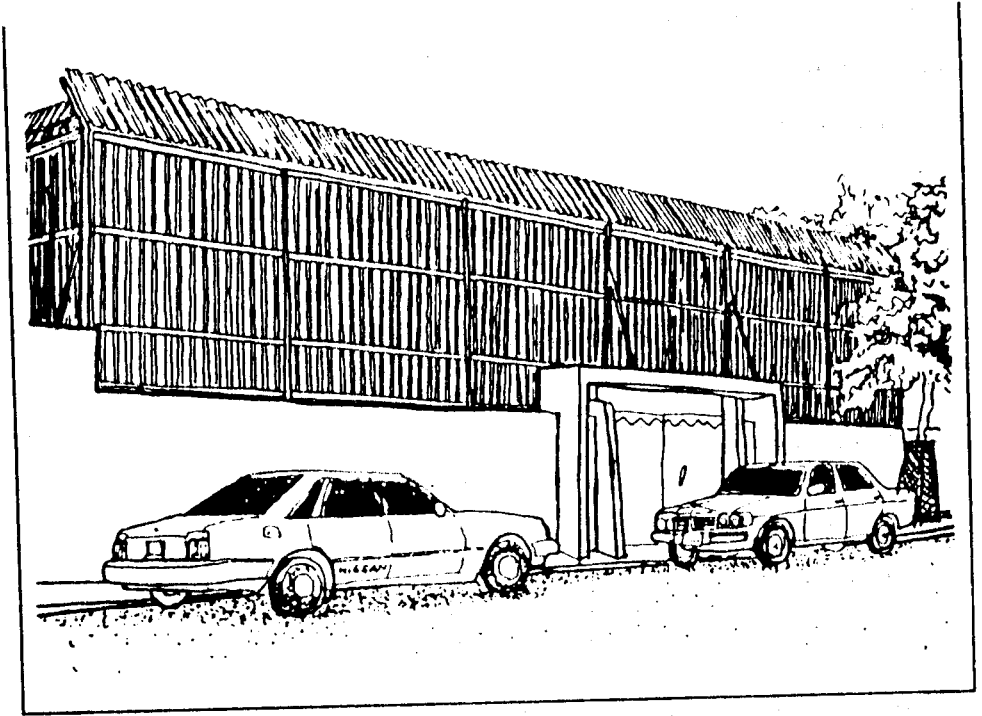


Fig. 4. An example of the unpleasant looking plastic or metal sheets which are added onto the exterior fence of many of the contemporary dwelling units to protect the yard's privacy.

are adequate for pedestrians, exist only in about one-tenth (11%) of streets. It also shows that less than half (47%) of the streets have no lighting units at all and about two-fifths (42%) of the streets contain types of lighting units which are appropriate for automobiles. As a result of such unsightly street characters, those who desire to move around their contemporary neighborhoods perceive negative visual images. These negative images affect the pedestrian's mood and discourage walking.

"[As pedestrians] We seek the most pleasant experience, both physiologically and psychologically. ... As we move, we tend to avoid places that are unsafe, disorders, ugly, or uncomfortable". [14, pp. 152-153]

(4) To achieve privacy in the surrounding open space around the detached villa type dwelling, an unpleasant looking very high extra partition of light material is usually added onto the exterior walls.

Furthermore, there is an instinctive urge in man to define the limits of his individual territory. This applies to all areas of life, inside as well as outside the home. However, the current utilized regulations and the designers of most contemporary dwellings ignore the household's need for a transitional area or a territorial extension of their dwelling. Transitional areas between the public street and the private dwelling is missing because the whole lot are enclosed within a 3m high solid wall with entrance doors. Therefore, the sidewalk in front of the dwelling, which is enclosed between the solid wall and the household's parked cars, resembles a transitional area and a territorial extension of the adjacent dwelling(s) (Fig. 5). This kind of feeling psychologically repels pedestrians from using the sidewalk.

"It has been suggested that the aggressive defense of territory is a form of self-expression fundamental to all animals, including humans. Territoriality can be seen not only in the walls and fences we erect around our houses and gardens, but also in the areas we stake out for ourselves on the public beach or in the camping ground, which indicate territorial rights to be infringed at peril ... territory has been identified as one of the fundamental human drives". [20, p. 157]

Community Facilities

Studies of pedestrian behavior make it clear that people seek concentrations of other people whenever possible. Availability of community facilities brings in concentrations of people into the streets of the neighborhoods. Community facilities, which are available within walking distance, add life to the streets and encourage residents to walk around their neighborhood. Table 6 presents the available facilities in the streets of the contemporary neighborhoods. It shows that mosque(s) are available in only about one-quarter (28%) of the residential streets. Stores and corner shops existed in a few (8%) of the residential streets. The absence of local stores that provide grocery and other daily needs of the inhabitants, from the streets of contemporary neighborhoods is another reason behind the residents' heavy dependence on automobile.

"Neighborhood stores are one of the two most important elements in people's perception area as a neighborhood. Apparently this is because local stores are an important destination for neighborhood walks. ... they draw a residential area together and help to give it the quality of a neighborhood". [8, p. 441]

Table 6 also shows that school(s) are found in more than one-tenth (15%) of the streets; while neighborhood parks and playgrounds exist only in a few (1 and 2%) of the residential streets. The Table, also, shows that nearly two-fifths (39%) of the residential streets contain at least one of the above facilities.

We all hope that young and old residents integrate socially, so the young can benefit from the experiences of the old. However, this cannot happen unless a number of community facilities, which will help to integrate them physically, exist in the neighborhood. For strong social integration, old and young alike must share the same streets and the same community facilities. Availability of different community

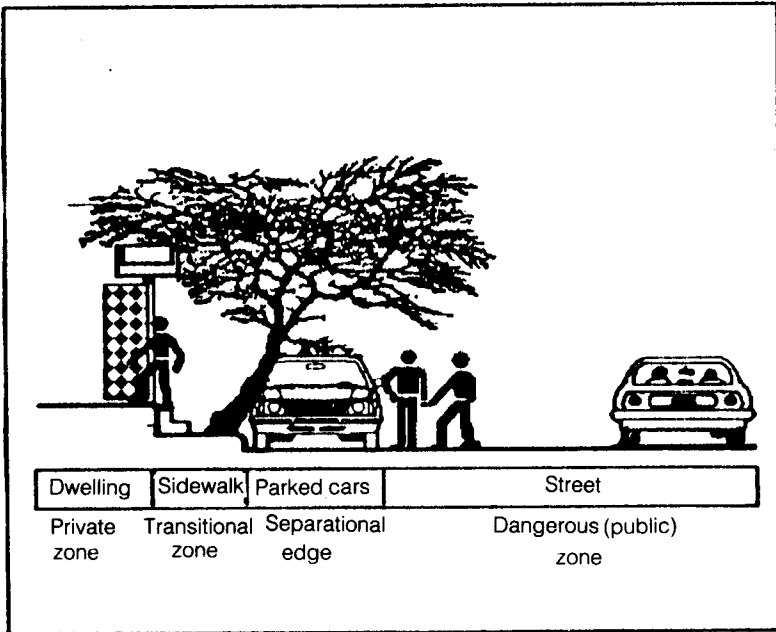


Fig. 5. Sidewalks in front of many contemporary dwellings act as a transitional area and as a territorial extension of the dwelling.

Table 6. Availability of major community facilities

Type of facilities	In residential streets	In all streets
Mosque(s)	27.7%	30.6%
Shop(s)	8.2%	12.9%
School(s)	13.5%	14.8%
Neighborhood park	1.2%	1.2%
Playground	2.4%	3.0%
Streets contain one or more of the above facilities	39.1%	42.0%

facilities around the contemporary neighborhood will make streets alive and inviting for all pedestrians. Residents will also have the opportunity to meet each other, restore those traditional social interactions, and rebuild good and friendly relationships.

Finally, from the preceding findings and discussion, we can conclude that streets in most contemporary neighborhoods were constructed without much planning and with little integration and less thought about the impact on the residents as pedest-

rians. The discussion also suggests that walking has been made difficult and unpleasant by the utilized circulation system and the resulting over-dependence on the automobile. Many residents become so fearful that they refuse to walk to places, even if walking is their only means of transport. Until those residents are able to perceive that their neighborhoods are safe places to walk, their anxiety may prevent them from carrying out their daily activities on foot.

Correcting this condition involves eliminating automobile dominance; eliminating pedestrians/automobile conflict; increasing land-use flexibility; eliminating existing barriers and obstacles; assuring continuity of travel; providing weather protection from the harsh climate; distributing community facilities within a walking distance; and increasing visual diversity and amenity. Therefore, potential improvements to accommodate pedestrians can be classified into two broad categories that can offer frames of reference for planning and implementation. The first is functional improvements including making the route safe, continuous, direct, free of obstacles, well lit, weather protected, and provided with some street furniture. The second is aesthetic improvements including making the street pleasant, relatively quiet, landscaped, and well maintained; in order to provide the opportunity for social contacts, exercise, and relaxation.

Improvement Guidelines

The existing pedestrian condition in contemporary neighborhoods persuaded some of the local architects and planners to request a total separation between pedestrians and cars in future land subdivisions. Separation systems of this kind were first developed in the United States in the late 1920s, but most widely used in post world-war II. However, many schemes of such systems fail to achieve their ideal [13, p. 61]. The theory of separate systems of streets and footpaths in residential areas is fine; pedestrians can walk freely, away from traffic, on paths where children can play safely, while vehicles can drive right up to each house on streets from which pedestrians are meant to be excluded. However, this practice fails to take account of the fact that cars and pedestrians also need each other: and that, in fact, a great deal of the people's social life occurs where cars and pedestrians meet; because this is the main point of arrival and departure. Experience in such schemes has shown that the street is also used as the principal entrance to the units about it. It attracts most of the pedestrian flow, much of the close-to-home play activity of children, and becomes the social focus.

Automobiles have become so much part of the people's way of life. Planners and designers are mistaken if they think that residents will easily be separated from their car. The car provides too many satisfactions and meshes with too many aspects of the people's lives. Therefore, a complete dissociation of foot and vehicular travel now seems neither necessary nor desirable. However, to improve the pedestrian's situation, we should first ask ourselves what the roads around the houses are really for?

Is it essential for people to be able to drive up to their front doors at high speed? Or should the residential streets be considered as an extension of the dwellings and act as common land. However, this cannot be achieved unless safety was provided. Improving and extending pedestrian safety along the streets of contemporary neighborhoods is essential for viable communities. Safety improvements through the elimination of automobile dominance will enhance and encourage walking. For safer streets and more pedestrian-oriented neighborhoods, through speeding traffic has to be eliminated completely from all local residential streets.

In order to encourage walking, pedestrians should be given priority over vehicles. The philosophy of creating residential areas in which vehicles are clearly intruding into a living area and have no priority, should be the aim of designers. The designers have to create an environment that forces drivers to slow down naturally, perceiving that they are intruding into a residential living area. The local residential street in the layout should give an overall impression which indicates to drivers and pedestrians alike that this is no ordinary road but a part of the living space of an essentially residential area. Providing a street environment where one automatically recognizes that vehicle is the intruder and the pedestrian has dominance, should be the main goal.

The planning of new neighborhoods should also take into account the elimination of all through speeding traffic. By designing the street layout to fit topography through bending, warping, varying size of blocks, and establishing a hierarchy of flow for streets, a more interesting, pleasant, and workable pattern that discourage through traffic will be attained. A deliberate disorder of local streets can also be applied to discourage through traffic or to create interest in the street picture; but such disorders need not to be continued over large areas to avoid confusion and exasperation. It is obviously easier to design an entirely new housing area on the basis of creating a safe environment which is not dominated by vehicles than to convert existing residential streets. However, the following will present some guidelines for improving the existing pedestrians condition in the streets of the contemporary neighborhoods.

Nobody wants fast through traffic going by their homes. Through traffic is fast, noisy, and dangerous. At the same time cars are important, and cannot be excluded altogether from the areas where people live. Moreover, the layout design of the residential street is a major factor influencing pedestrian safety, however, restricting vehicles access, speed, and flow increase safety and decrease accident rates. Environmental measures which eliminate through traffic, force drivers to reduce their speed, and acknowledge the presence of pedestrians in their neighborhood's streets are most likely to affect pedestrian accident rates. For safer streets and more walk-oriented neighborhoods, through-traffic has to be eliminated completely from local residential streets. Restricted access into the neighborhood is an important factor for dis-

couraging through-traffic. The result is that people do not come into the neighborhood by car unless they are invited; and when they are in the neighborhood, they recognize that they are in a distinct part of the city.

Local residential streets must provide access to houses but prevent traffic from coming through. This problem can be solved if all roads which have houses on them are converted into cul-de-sacs or loops. One of the solutions for reducing through-traffic in the case of the contemporary grid pattern is to close the street entirely to through-traffic with a cul-de-sac; the additional space that is gained from the street closure can be converted to pedestrian use; so it can be used for active or passive recreation. Since this treatment is so different, it may cause problems for drivers unless the entrance to the street is carefully sign-posted. However, the local residential street that comes off the collector as a loop allows alternate exits as well as continuous progressive movement for service circulation. A simple grid can be changed to have looped local streets⁽⁵⁾ A street diverter, which connects sidewalks at an intersection in a cornered fashion, is an ideal solution for eliminating through auto traffic. With this solution, automobile traffic is diverted to the right or the left in a loop. Diverters reduce speed and minimize unnecessary auto intrusion. The loop street provides the privacy, safety and economy of a dead-end street without the difficulties of turning; traffic circulates easily to and from a collector street (Fig. 6).

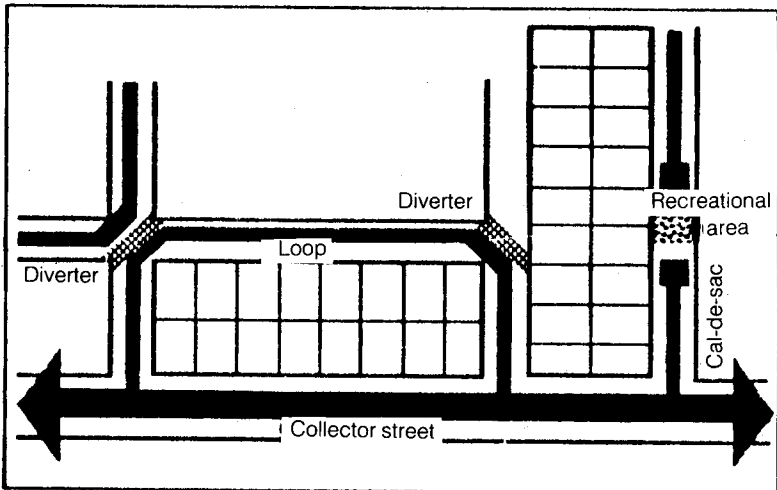


Fig. 6. Converting the streets of the contemporary grid pattern into cul-de-sacs and/or loops will provide access to each dwelling and eliminate the dangers of through traffic in residential neighborhoods.

(5) A looped street is any street in a street network so placed that no path along other roads in the road network can be shortened by travel along the loop.

Furthermore, if drivers are forced to pass through a 'transitional zone' between one area and another they are made aware of the different characteristics of the new zone. For example, if the driver was leaving a collector road to enter a residential local loop serving a small number of dwellings, the transition zone could in effect act as a 'door keeper' posing questions such as 'Are you a stranger?', 'Have you been invited here?' or 'Watch out for pedestrians!'. The transition may be direct, such as a gate, or implied, such as a difference in road texture or color. The elimination of through traffic brings with it the feeling of safety and belonging.

Moreover, to encourage walking in residential neighborhoods the automobile speed limit has to be reduced for the sake of safety. To accomplish this goal there are several ways, including widening the sidewalks, narrowing the traffic lanes, using a roadway alignment weaving slightly to left and right, using rough pavements, etc. The avoidance of long stretches of straight streets by the use of cul-de-sacs, short loops, or T-junctions is also recommended to reduce vehicles speeds.

Although reducing the speed of traffic and the number of cars in residential streets is a big step toward making pedestrians feel more comfortable, it is also necessary to provide protection from weather, enough light at night, and a pedestrian scale that makes walking visually comfortable. Barriers must also be eliminated from the sidewalk, while pavement details, furniture, and activities along a sidewalk must be varied so the walkway will not be cluttered or boring. Barriers are the thing that most affect how much, how fast, and how often the pedestrian walks on the sidewalk. Removing obstacles and installing sidewalks where none exist is one of the first steps toward a walk-oriented community. Walking can be enhanced by removal of all obstacles and barriers from the pedestrians' walkway. With respect to street furniture, efforts have to be taken to develop well-designed street fixtures and to reduce the cluttering of sidewalk space. For example, trees and plants provide amenity and visual pleasure but can also interfere with pedestrian flow. Therefore, part of the sidewalk width must be subtracted to accommodate trees or planting boxes. A differentiated shoulder can be developed into a buffer zone between pedestrians and vehicular traffic. It can take the shape of a landscaped mall of continuous trees and planting boxes. Such a visually pleasant boundary will shield pedestrians from vehicles, providing protection from the hot sun for both pedestrians and parked cars, and discourage vehicles from parking illegally in the sidewalk.

Furthermore, most sidewalks in contemporary neighborhoods should be widened. The extra width may make the sidewalk more pleasant or attractive and it may afford additional protection from the street. Sidewalks should also be widened in places to allow spaces for pedestrians to wait, rest, meet, and talk. Most existing sidewalks are constructed to serve as channels for through movement. The actual sidewalk width required to handle pedestrian traffic is often less than is required to

allow for other social functions. Since narrow sidewalks by their very nature are suggestive of movement, they do not function well for people who want to wait, rest talk or watch other people. A solution that would serve all these activities is to widen the sidewalk in some places. These widened places should be provided with some benches or raised planters with wide edges. They should also be protected from the hot sun and dusty wind. For the convenience of the daytime walker, sidewalks should be adequately shaded with trees or pergolas, pedestrians have to be protected from the direct solar radiation that otherwise would take its toll of them. However, at night, well-lit and busy sidewalks provide a feeling of security. Thus, lit sidewalks are more appealing for night-time walking.

There should also be some logic for selecting, combining, and changing sidewalk paving materials. Changing surface provides variety, which may be related to some factor of use or communication about use. Any change in material has to reflect a change in use, purpose, or function, or a change in level. Differences in paving materials, especially texture and color, can be used where a warning is needed to indicate a danger or hazard. Where the type of traffic changes, the surface has to change. Changes in surface should also suggest direction of movement, and the texture of the material or the linear arrangement of paving blocks and expansion joints can be used to emphasize direction. Paving patterns should also be used to provide information about the environment.

Furthermore, in contemporary residential neighborhoods all sidewalks are paralleled with the street. While they may visually unify the neighborhood from the perspective of motorists, parallel sidewalks provide a boring walking experience for pedestrians. Pedestrians need not be channeled into efficiency lanes or move at a continuous pace, but instead should be able to meander, rest, seek protection from the hot sun, or stop to chat. Walking environments must be much more varied than road environments. For drivers, the road is a medium, while for pedestrians, the route is an experience. The sidewalks along the streets need not follow the road alignment slavishly but can merge and diverge in response to the nature of pedestrian movement. Therefore, sidewalks should be curved, narrowed in places or widened in others, or be separated from the street by hedges or trees, and in general, be more random.

Pedestrians appreciate the enhanced walking experience. We have to remember that motorists generally use their cars to move from one place to another, while pedestrians usually travel for the experience as much as the destination. There are social and aesthetic factors to be considered along channels where people move. The quality of the street environment can have almost as much effect on people's lives as the quality of their own homes. Therefore, local residential streets must be environmentally acceptable and feel right for all who use them. For example, a residential

street with good landscape obviously creates the kind of peaceful atmosphere in which most pedestrians would prefer to use. Planning and designing sensitive and responsive environments to the human condition required finding a way to interpret and take into account the pedestrian's psychological and emotional needs. Avoiding a monotonous and unpleasant street appearance is another step toward a more sensitive and responsive environment. The monotonous street appearance of the contemporary neighborhoods can be avoided by varying the setback of the houses from the street. The street space can also be strong or richly varied by a different path alignment, dwellings setback, and more landscaping.

In conclusion, what has been presented here is a general guideline for improvement, however, there is no hard-and-fast organizing rule which will fit and solve each and every case. Moreover, improving the quality of the streets, to meet the required physical and psychological needs of the residents, does not guaranty that all residents will be walking down the streets of their contemporary neighborhoods. The socio-economic changes, that have taken place in the country within the last three decades or so, have made it affordable and to some extent prestigious for some of the households to own a number of luxury cars and to hire chauffeur(s). Therefore, walking, for some of those, will be out of the question, but for the rest of the residents safe and pleasurable walking around their neighborhoods will be a welcome activity. Finally, although, the aim and scope of this paper is to determine those physical and psychological factors and their influence over the quality of the neighborhood's walking facilities, a number of other factors, i.e., socio-cultural, economic, climatic, etc., are important too. Therefore, future research projects, with the appropriate research methods, have to be cared out in order to determine their influence and effect on the contemporary walking facilities.

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تيسير حركة المشاة في الأحياء السكنية المعاصرة: الرياض، المملكة العربية السعودية

علي سالم باهمام

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ملخص البحث. كان المشي في ما مضى الوسيلة الأساسية للتنقل في الأحياء التقليدية في المملكة العربية السعودية. ولكن من الملاحظ خلال العقود القليلة الماضية اختفاء المشاة من شوارع الأحياء السكنية المعاصرة وذلك راجع لعدد من الأسباب. لذا سوف تحلل وتناقش هذه الورقة وضع المشاة في الأحياء السكنية المعاصرة في مدينة الرياض، بحيث تهدف هذه الورقة الى تحديد العوامل الطبيعية والنفسية التي قد تمنع السكان من المشي الذي بمزاوته يتمكنون من الاستمتاع بأقصى حرية للاختيار وأقصى درجات الاتصال مع الناس والأماكن في أحيائهم المعاصرة، والذي يعتبر أيضاً أحد الوسائل الممتازة لممارسة التمارين الرياضية اللازمة لأسلوب الحياة في هذه الأيام.