

# Pedestrian Characteristics and the Promotion of Walking in Kuwait City Center

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The rapid economic growth in recent decades in Kuwait has had a significant effect on the socioeconomic level and life-style of the people. In Kuwait City, the infrastructure, urban form, and transportation system have been completely transformed. Continuous out-migration of Kuwaitis from the City Center has changed the composition of the population and the land use activities in this area. Policies and decisions favoring the private automobile have made this the predominant mode of urban travel. Direct and indirect results of these policies have had a negative effect on the pedestrian mode of travel in the City Center. The general characteristics of Kuwait City and the study area (the City Center) are presented. The results of an ongoing study concerning pedestrian flow characteristics in the City Center are discussed. Existing pedestrian network and system deficiencies are identified, and recommendations for the promotion of pedestrianization in the City Center are made.

The objectives of this paper are to determine the characteristics of pedestrian flow and network and to recommend measures for the promotion of walking in Kuwait City Center.

Pedestrian trips account for a significant portion of urban travel (1) in spite of decades of domination by motorized transportation systems. As the competition between pedestrians and motorized traffic for space on urban roadways increases, pedestrians take a heavy toll in terms of injuries and lives lost. Worldwide, accidents involving pedestrians account for from 15 to 45 percent of total road accidents, depending on the country (2). In Riyadh, Saudi Arabia, 50 percent of fatal road accidents were inflicted on pedestrians (3).

In the rich developing countries, where the automobile has been favored as the predominant mode of urban travel, the recognition of the social, economic, and environmental benefits of walking is still in its infancy. This is in spite of the fact that the central streets of major urban areas in these countries are often crowded with pedestrians, many of whom are low-income expatriates who do not have cars or local driver's licenses.

The Iraqi invasion of Kuwait in 1990 resulted in the complete destruction of the infrastructure of Kuwait City. The need to reestablish transportation and other institutional components in Kuwait has provided a unique opportunity to lay the foundation for the inclusion and promotion of walking as a major mode of urban travel.

## CHARACTERISTICS OF THE CITY CENTER

Kuwait City is located at the northern end of the Persian Gulf at a latitude of 29° 20'N. Climatically, it is classified as a marine arid zone, which combines typical desert conditions (hot, windy, and dry) with proximity to the sea.

The total area of Kuwait City Center, the area under consideration, is approximately 805 hectares (nearly 2,000 acres). The roadway network in the City Center is 59 km (30 mi) long, with two to three lanes per direction and a median island separating the directional traffic. The geometric standards of the roadway network have provided generous space for vehicle flows but limited concern for the pedestrian. However, compared with pedestrian space allocations in most urban areas of the Middle East region, Kuwait City Center ranks favorably (4).

The general preinvasion socioeconomic characteristics of Kuwait City are as follows: population (681,288 Kuwaitis and 1,016,013 non-Kuwaitis), family size (8.9 persons per household for Kuwaitis and 5.0 for non-Kuwaitis), automobile ownership (3.5 automobiles per household for Kuwaitis versus 1.4 for non-Kuwaitis), and finally, monthly income (KD 584 for Kuwaitis and KD 390 for non-Kuwaitis) (5).

Over the last few decades, the City Center has witnessed a significant increase in the working population and a continuous decrease in the residential population. Recent preinvasion statistics indicate that the resident population of the City Center consisted mostly of low-income/single men expatriates. In 1980, out of 60,365 residents of the City Center, only 4,467 were Kuwaitis (6).

## Pedestrian Flow Characteristics

Because of the recent Iraqi invasion and the looting and destruction of the physical infrastructure and institutional properties, no data could be found on the characteristics of the pedestrian mode of travel in Kuwait City. Therefore, a framework for a comprehensive study of pedestrian flow and characteristics of the City Center was established in late August 1992. The study sampling plan called for a series of origin-destination surveys and flow measurements at 34 locations, both on sidewalks and in indoor shopping malls in the City Center.

The sampling and monitoring locations cover a variety of commercial, governmental, recreational, and residential land uses in the study area. The survey time period includes both

peak and off-peak hours [7:00 to 9:00 a.m., 11:00 a.m. to noon, 12:30 to 2:30 p.m., and 4:00 to 6:00 p.m. (on weekend nights, pedestrian flow is also monitored between 6:00 and 8:00 p.m.)]. The sampling plan calls for a systematic random survey of approximately 2,000 pedestrians. A total of 864 sample questionnaires have so far been completed.

Information was obtained on pedestrian characteristics (age, sex, education, employment, and nationality), characteristics of the walk trip (origin, destination, purpose, modes of travel before and after the walk, and trip length), and characteristics of flow (speed, volume, and density).

A preliminary analysis of pedestrian flow data with respect to walking speed indicates that mean pedestrian speeds at sidewalks and indoor shopping malls were 71 and 46 m/min, respectively. The low figure for walking speed at indoor shopping malls is mainly caused by a large number of window-shoppers. The sidewalk speed is higher than the indoor mall speed at the 99 percent significance level. Analysis of the sample data also indicate that female pedestrians walk considerably slower than males especially at indoor shopping malls. The mean indoor shopping mall walking speeds for female and male pedestrians were 23 and 57 m/min, respectively. Again window-shopping may account for the significantly lower speed of the female sample population. The difference between the mean walking speeds at indoor shopping malls for female and male pedestrians was significant at the 99 percent significance level ( $\alpha = 0.01$ ).

A comparison of mean walking speeds for pedestrians in different nations is presented in Table 1. Whereas pedestrians in Kuwait walk slightly faster than those in Riyadh, Saudi Arabia, their mean speed is considerably less than that of pedestrians in the United States, the United Kingdom, and, to some extent, Singapore (4). High temperatures may be the main cause for the low walking speed in Kuwait and Saudi Arabia. A comprehensive analysis of the data will be performed on completion of the sampling and monitoring surveys.

#### Existing Pedestrian Network Characteristics

In an urban area, the pedestrian network and the choice of walking as a mode of travel are greatly influenced by land use type, location of transportation-related facilities, and urban form (7). The existing urban form of Kuwait City Center may be characterized as follows:

- Nearly complete disappearance of the old traditional structures and passageways;
- Large vacant desert spaces that separate the built-up areas from one another, causing long walking distances with no protection from the sun; and
- Very large urban blocks on major commercial streets and on main arterial roadways.

The main reason for the existence of deficiencies in the urban form of Kuwait City is the fact that many sectors of the city have been partially rebuilt in accordance with different plans in a piecemeal fashion. Every initiative has followed its own independent course and has rarely taken into consideration the existing context.

The pedestrian network consists of two interrelated subnetworks. These include (a) the primary subnetwork, which follows the alignment of the street network (sidewalks) and is, therefore, a widely spaced grid walkway, and (b) the secondary subnetwork located within the block system, providing pedestrian access to various commercial land uses, office buildings, and car parks within each block. The two subnetworks are poorly connected to each other.

The souk (bazaar), which is the only surviving part of the city from the preoil era, contains a network of closely spaced pedestrian walkways that are closed to traffic, and it therefore provides the safest space for pedestrian movements in the City Center. Figure 1 shows the network of walkways in Kuwait City Center.

#### System Deficiencies

A preliminary survey and a subjective evaluation of the physical condition of the sidewalk network in the City Center (based on pavement condition, objects on the walkway, protection from vehicular traffic, continuity, and connectivity) indicated the following characteristics: approximately 30 percent of the network is in good physical condition, about 10 percent requires minor repairs, 5 percent is in need of major repairs, 1 percent is in poor condition (in need of reconstruction), and the remaining 54 percent is in acceptable physical condition but could definitely be improved.

In addition to its physical shortcomings, the pedestrian network in the City Center also suffers from a variety of indirect system deficiencies:

TABLE 1 Comparison of Pedestrian Walking Speeds (5)

City/Country	Author	Mean Walking Speed (m/min)
United States	Hoel	88
United States	Fruin	81
United States	Navin & Wheeler	79
United States	Sleight	82
London, England	Older	79
Singapore	Tanaboribeon et al.	74
Riyadh, Saudi Arabia	Koushki	65
Kuwait City	Koushki & Ali	71

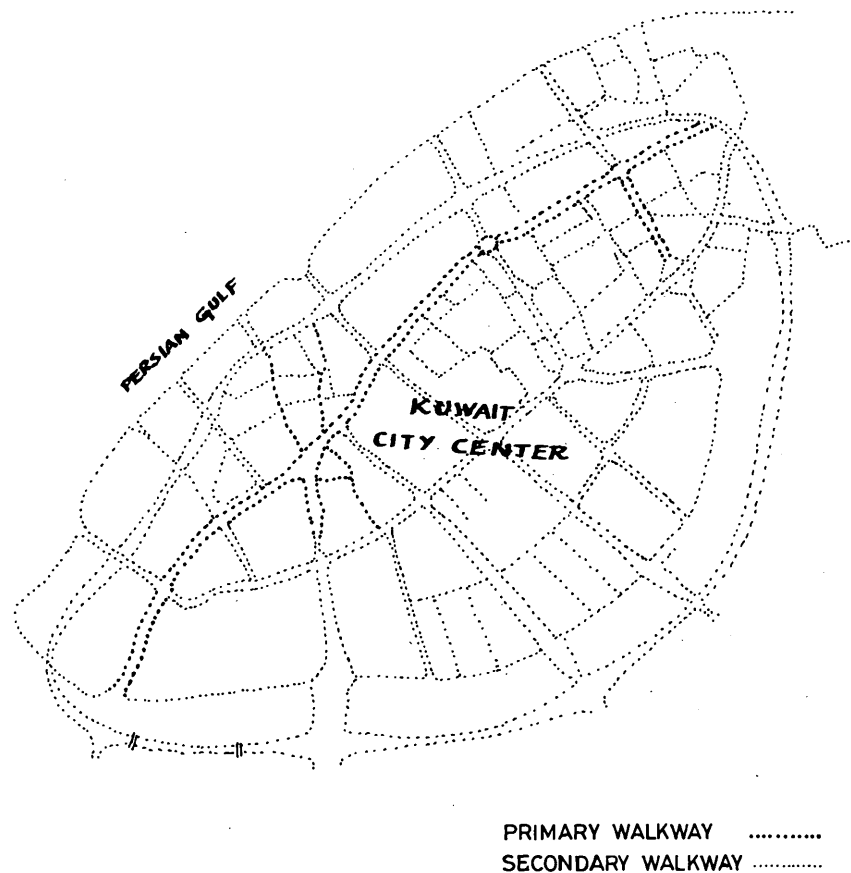


FIGURE 1 Study area and walking network in Kuwait City Center.

- Policies tailored to favor the automobile mode of travel have generally created difficulties and longer walking distances for pedestrians.

- Discontinuities in walkways force pedestrians to make long detours.

- Vehicles frequently infringe on pedestrian spaces and walkways.

- Crossing streets and intersections involves conflicts with hostile vehicular traffic.

- Lack of shade prevails at pedestrian walkways.

- The existence of large parcels of vacant land increases the distance between land uses and discourages walking.

#### RECOMMENDATIONS FOR IMPROVEMENT

Perhaps the greatest impediment to the promotion of the pedestrian mode in Kuwait City Center is the traditional policies and actions that favor automobiles and establish vehicular traffic as the predominant mode of urban travel. The inconsistency in urban forms, resulting from a piecemeal implementation of different urban design concepts over the last three decades, has also contributed to the present-day problems of the pedestrian mode in Kuwait City. These changes are, to a great extent, a consequence of the region's rapid and significant economic development in recent decades.

Recommendations for the promotion of the pedestrian mode of travel in the City Center incorporate three classes of im-

provement actions: immediate, medium-range, and long-term actions.

#### Immediate Actions

Actions in this category require a minimum of resources in terms of capital, materials, and time and include the following:

- Minor repairs in the walkway network;
- Improved walkway maintenance, such as cleaning, lighting and marking;
- Development of a driver and public education campaign emphasizing improved safety, health, energy, and positive environmental impacts of pedestrianization; and
- Enforcement of rules designed to protect pedestrian space from vehicular intrusions.

#### Medium-Range Actions

Actions in this category include the following:

- Continuation of immediate actions,
- Elimination of network discontinuities,
- Protection of pedestrians from the sun, and
- Development of a comprehensive walking network that incorporates the existing paths and expands to cover and fa-

facilitate pedestrian movements and accessibility to various land uses.

### Long-Range Actions

These include

- Continuation of immediate actions,
- Implementation of actions recommended by the comprehensive walking network plan, and
- Creation of a pedestrian-only area connecting the old souk and the main square (Safat) to the sea.

### CONCLUSIONS

Because of the recent Iraqi invasion and looting, no data are available on the characteristics of the pedestrian mode of travel in the City Center. This ongoing study attempts to fill the gap.

The study indicates that, like many urban areas, the favoring of the automobile as the predominant mode of travel in Kuwait has created the greatest obstacle to the promotion of walking in Kuwait City Center.

A preliminary analysis of the data has shown that, similar to pedestrians in Riyadh, Saudi Arabia, pedestrians in Kuwait City Center walk considerably more slowly than those in the United States and England.

Immediate, medium-range, and long-range actions were recommended for the promotion of the pedestrian mode in Kuwait City Center.

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