Trends in Downtown Pedestrian Traffic and Methods of Estimating Daily Volumes

SIIM SOOT

This study examines the pedestrian traffic changes in the Chicago central business district from 1981 to 1989, dates of two major pedestrian traffic surveys. Each interviewed more than 1,400 and counted more than 3 million pedestrians. Pedestrian flows have changed with land use changes and the growing importance of the two major train stations on the west side of downtown. Office space has increased and retailing has moved north. Some areas have experienced declining pedestrian traffic as pedestrian traffic generation rates of downtown office space declined. Some basic characteristics of pedestrians and their traffic patterns have not changed. The stability in the daily pattern of pedestrian traffic, even when volumes rise or fall, leads to a method to estimate 10-hr pedestrian volumes. This method is proposed because it is easy to use, it requires little data, and existing Milwaukee and Los Angeles models do not work well without recalibration.

In the past few decades, most major American downtowns have experienced dramatic changes. Although skylines reflect the growth of office space and the concomitant employment, many historically important shopping streets no longer have the vibrancy that they did during the middle of this century. At the same time that resident populations continue to decentralize into the suburbs, the immediate fringes of the central business district (CBDs) enjoy an increase in high-rise residences. These trends have had major impacts on downtown pedestrian traffic.

Recently, pedestrian traffic has been studied from a variety of perspectives from pedestrian characteristics to planning issues (*1–3*). Many studies have also focused on trip characteristics, distance traveled being a common theme (*4–6*). Several studies have gone beyond the necessary descriptive works to model pedestrian traffic with intersection models (*7*) and automobile traffic flow relationships (*8*). All the studies recognize that data collection is key, and several authors have focused on data collection methods. Partly to avert the resource-intensive aspects of manual data collection, surrogate methods have been explored as a means of estimating pedestrian volumes; Ness et al. (*9*), the Los Angeles Department of Traffic (*10*), and Patel (*11*) focus on the interrelationship between downtown land use and pedestrian traffic.

All these studies, which have substantially advanced the knowledge of downtown pedestrian traffic, have one thing in common: data are examined for one or more cities during a short time window, generally less than a few months. In contrast, in this paper data collected for two Chicago pedestrian studies in 1981 (*12*) and 1989 (*13*) are used. Both represent major efforts in which several million pedestrians were counted and approximately 1,500 were interviewed. Where appropriate, reference is also made to the 1963 Chicago data used by Rutherford and Schofer (*2*).

The purpose of this paper is to (a) discuss the characteristics of current pedestrian activity, (b) identify the major changes in the decade of the 1980s, and (c) suggest how the data can be used to estimate pedestrian volumes in downtown areas. Existing methods to estimate pedestrian volumes appear to be inadequate for the task because they require too much data or they do not yield satisfactory results. Therefore, a simple procedure is proposed until more sophisticated methods are developed.

DATA COLLECTION

Pedestrian Count Data

The data from the two studies used here were collected using the same methodology and were supervised by the same personnel. The first study (*12*) was conducted in 1981 and included 332 10-hr mid-block counts for the Chicago CBD, also known as the Loop; the 1989 study (*13*) covered a larger area and therefore more locations. About 300 sites were common to both studies. Each study counted more than 3 million pedestrians, many individuals more than once as they passed several mid-block sites. In both cases data were collected on summer days without rain.

Pedestrian Interviews

Both studies included pedestrian interviews using a spatial and temporal sampling design. On the basis of land use, the downtown was divided into 16 zones: a primary retail zone, a specialty retailing zone, a government zone, a financial zone, and so on. Within each zone a random sample of five block faces was selected for interview sites. The day was divided into three periods: peak, lunch, and off-peak. The basic interview design then had 48 spatiotemporal cells (16 zones times 3 time periods), with 30 interviews in each, resulting in 1,440 interviews. The larger 1989 study area had 17 zones yielding 90 additional interviews.

This interview design accomplished two things. First, it provided the desired breadth, covering the entire study area and the 10-hr day. Second, and equally important, it allowed the

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computation of a scaling factor for each interview. From the count data it was possible to determine the number of pedestrians in each zone during the respective interview period, yielding the scaling factor. Thus, the scale weighted interview should better reflect the entire pedestrian population, reducing bias.

EMPLOYMENT, RETAILING, AND OFFICE SPACE TRENDS

Employment has been increasing in Chicago's downtown for more than a decade. In the 1970s, when the metropolitan area employment increased by approximately 300,000 jobs, a third of this growth took place in the CBD. This yielded an average rate of 10,000 new CBD jobs per year in the 1970s. Employment growth has slowed slightly in the 1980s, increasing by 40,000 from 1980 to 1985 (*14*), bringing the total jobs to approximately 450,000 in the 1 mi^2 Chicago Loop. Employment growth trends tend to be cyclical, however, and could have changed before the end of the decade. The 1990 census will provide more current data.

Two major retailing changes have occurred during the study period. First, State Street, the traditional downtown shopping street, has had a decline in the number of anchor stores from six to two: Sears, Montgomery Ward, Goldblatt's, and Wieboldt's have closed. These multifloored stores each occupied either half or full blocks. At the same time major department stores, such as Marshall Field's, Neiman Marcus, and Bloomingdale's were built on North Michigan Avenue, just beyond the study area. Second, and just as important for this study, is the diffusion of retailing throughout the downtown area. Building lobbies now contain restaurants and convenience stores; the range of goods is limited but certainly greater than a decade ago. A good example is the new State of Illinois Building, in which the first floor is devoted to retailing. In contrast, the Daley Center, a 30-story city office building built in the mid-1960s, is devoid of street-level retailing.

The growth in employment has been facilitated by the increase in office space in the downtown area. During the 8-year study period between 1981 and 1989, 1.93 million m^2 of office space (20.7 million ft^2) was added in the immediate study area and another 0.46 million m^2 (4.9 million ft^2) within a few blocks of the study area boundary. This resulted an increase of approximately 25 percent in the general downtown area.

PEDESTRIAN TRAFFIC

High-Density Travel

Because high pedestrian densities often contribute to movement conflicts, the relationship between density and conflicts has been studied frequently. The Chicago studies shed some light on where and why some of these high densities develop.

The 1989 summer study reveals that 10-hr mid-block volumes vary from more than 30,000 to less than 1,000. In both the 1981 and 1989 studies, the highest volumes—the only ones over 30,000—were at major retailing sites. Because much of the retailing in the greater downtown area has shifted to North Michigan Avenue, the highest volumes are now outside the traditional Loop (beyond the area of Figure 1). Intensively used retailing areas result in high daily totals because they are not characterized by sharp drops in traffic found in office space environments, where sidewalks are quiet when workers are on the job. In retailing areas, traffic builds rapidly when stores open and is busy throughout the day. The lunch period has significantly higher volumes, but retailing districts have no other distinct pedestrian traffic peaks. If more distinct peaks of traffic were to occur, there would be more potential for pedestrian congestion and movement conflicts.

The area of greatest pedestrian intensity is found in the West Loop near the commuter rail stations (Figure 1). Two of the bridges crossing the Chicago River near these stations have more than 2,000 pedestrians (on one side of the bridge) during peak 15-min periods. The traffic there, approximately 300 m (1,000 ft) from the trains, comes in waves, and there is little activity between waves. Two factors tend to keep this area from being one of serious concern. First, despite the high densities of traffic, the great majority is destined to or from the train station and walks at a brisk and steady pace. Visual observation suggests that differential speed among pedestrians is only a minor problem. Second, the stream moves overwhelmingly in one direction, minimizing the number of conflicts caused by opposing traffic. Anyone walking counter to the main flow will experience difficulty maintaining a steady pace.

The contribution of the two largest downtown structures to pedestrian traffic also merits examination. Both the Sears Tower and the Merchandise Mart have more than 300,000 m^2 (3.1 million ft^2) of office space (Figure 1). One might think that such buildings would generate large amounts of traffic. The pedestrian data do not show unusually high levels near these buildings. The Sears Tower has two main entrances, east and west. The 10-hr mid-block counts are approximately 17,900 and 15,700, respectively. The other two block faces (the building occupies the entire block) have volumes under 15,000. None of these numbers suggests congested sidewalks.

Moreover, the combined 1989 street counts at the entrances—33,600—are very close to the 1981 combined totals of 33,000. The area around the Sears Tower has grown during this time, but this has not translated into many more people on the street.

Because it is relatively isolated, the Merchandise Mart better reflects its impact on pedestrian traffic volumes. The 10-hr volumes near the Mart are unimpressive (Figure 1). Neither side of the two bridges connecting the Loop with the Mart carries more than 5,000 pedestrians per day. The area north of the Mart has even lower volumes. These lower volumes imply that a large building by itself does not necessarily lead to overly crowded sidewalks. Even if everyone decided to leave the building at 5:00 p.m., it is logistically infeasible that everyone would reach the sidewalk at the same time. The delays associated with elevator use within the building play a major role in spreading out the pedestrian traffic. The use of the rail rapid transit directly connected to the second floor of the building and the use of taxis minimize the effect on nearby sidewalks.

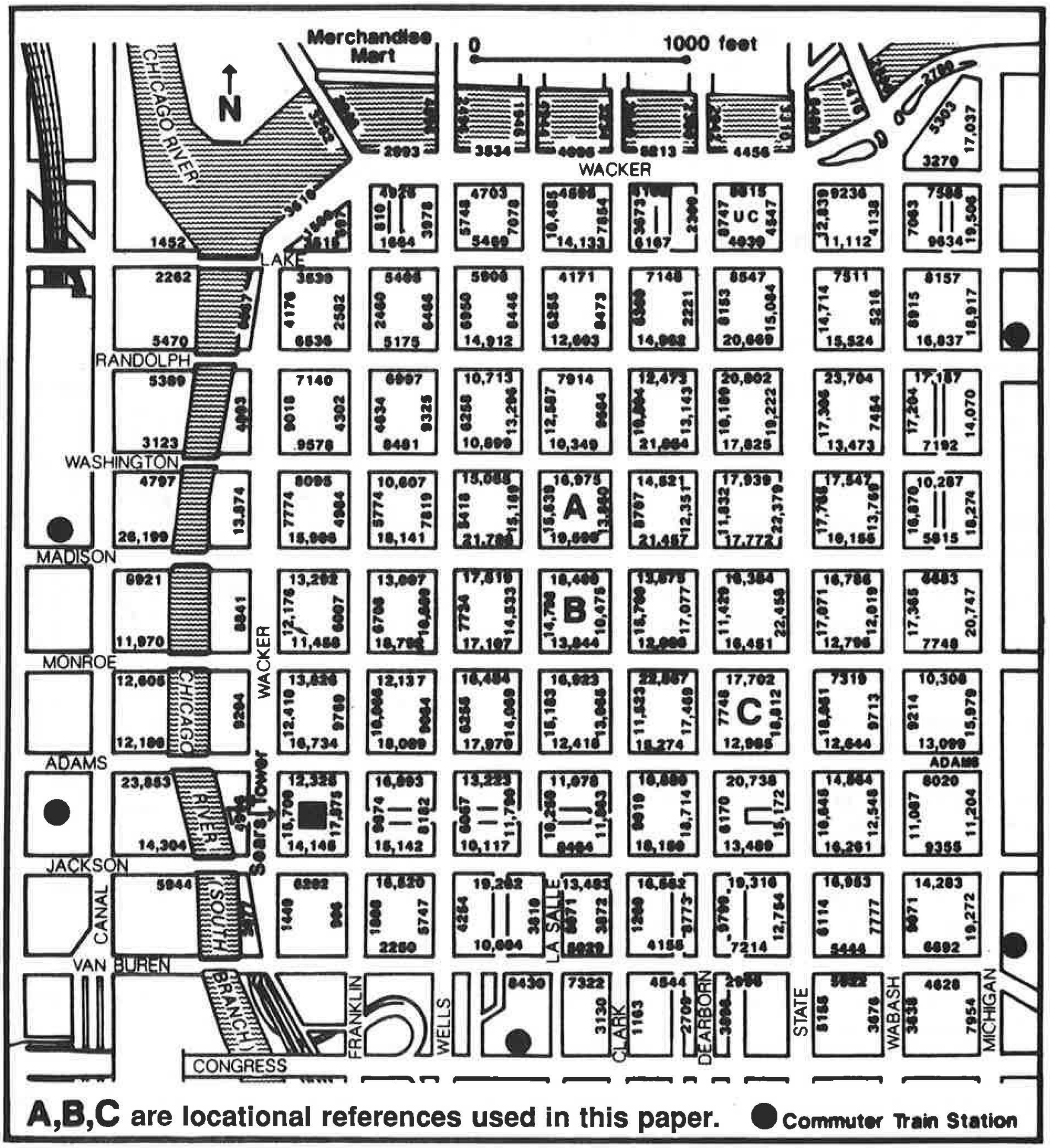

FIGURE 1 Weekday 10-hr pedestrian traffic, 7:45 a.m.–5:45 p.m., 1989.

Changes in 1981–1989 Daily Volumes

One major change is apparent in contrasting the two studies: the number of very high and very low volume sites has declined. At the high end, the number of Loop locations (Figure 1) with more than 25,000 pedestrians has declined from eight in 1981 to just one in 1989 (Table 1). The drop can be attributed to the decline in shoppers evident from the locations of these sites and the interview data discussed below. The traditional shopping district—State Street—had seven of the eight 1981 sites over 25,000; currently, there are none on State Street. Aggregating the top two categories (more than 20,000 pedestrians), 12 sites have been lost from 1981 to 1989. Eight of those sites were lost from State Street alone. The remaining four are scattered, and little can be concluded about their decline. Three of the four are in commercial areas where office space is on the increase but pedestrian traffic apparently is not. This seeming paradox will be addressed later.

At the lower end of the pedestrian volume table, there are also declines. The number of sites with 5,000 or fewer pedestrians daily has decreased by 16. Many of these sites are in a three-block-wide north-south band in the West Loop.

After 20 locations found west of and including both sides of Wells Street moved out of the 5,000-or-fewer class, a few other locations also dropped down to this class (Table 1).

As a generalization, the pedestrian traffic volumes declined in the east and increased in the west (Figure 2). Enjoying increased popularity, Michigan Avenue at the far east fringe of Figure 2, is excluded from this generalization.

Relationship Between Change in Pedestrian Traffic and Building Construction

In a broader sense the declines in traffic cannot be attributed only to the decrease in shoppers. The decline or lack of growth in pedestrian traffic characterizes the southeastern part of the Loop. This area has had very little new office construction, as Figure 2 shows. On the other hand, the western and northwestern parts of the Loop have had a significant increase in both new office space and pedestrian traffic.

There is nothing remarkable about the growth in pedestrian traffic in the northwestern corner of the Loop, but the lack of pedestrian growth on LaSalle street—the financial street—is noteworthy. With two new buildings having a combined total of 0.17 million m^2 (1.6 million ft^2) and high occupancy rates, one might expect to see an increase on LaSalle, but most of the block faces in a three-block expanse in the core of LaSalle Street have experienced declines of more than 10 percent.

There are several places in this study where sidewalk pedestrian traffic generation per square foot of office space has declined. Whatever the reason, this phenomenon calls for further study. There are a few plausible explanations. First, it is possible that as Rutherford and Schofer conjectured (*2*), buildings are less intensively used. Second, flex time and alternative work schedules cause more traffic to miss the 10-hr time window (7:45 a.m. to 5:45 p.m.). Third, many more buildings provide services within, reducing the necessity to go outside. Fourth, advances in telecommunications designed to decrease the need for person trips may be beginning to have an effect. Fifth, in some areas the downtown may be overbuilt, resulting in high vacancy rates.

Effects of Train Stations

Still, it is apparent that pedestrian traffic has grown in the western part of the study area. This is attributable to the office space completed in the 1980s and the increased use of Metra, the commuter rail service (Figure 2). Many developers have sought sites close to the commuter rail stations on the western fringe of the Loop. Because the expense of parking in the Chicago downtown for most commuters is significantly more than the cost of a round-trip train ticket, approximately a quarter of the CBD workers arrive by commuter rail as do more than half of all suburban commuters who work in the CBD. Between 1983 and 1989 all but one of the five commuter rail stations shown in Figure 1 experienced at least a 25 percent increase in patrons. Though much of this came from lower fares, the train station locations are still important, especially the two west of the Chicago River. In 1989 these two stations accounted for 66 percent of the five-station total.

TABLE 1 AGGREGATED 10-hr PEDESTRIAN VOLUMES, 1981 AND 1989

Number of Pedestrians	Number of 1981 Sites	Number of 1989 Sites	Difference 1981 - 1989
Over 25,000	8	1	-7
20,001-25,000	17	12	-5
15,001-20,000	57	62	5
10,001-15,000	66	80	14
5,001-10,000	87	96	9
0- 5,000	86	70	-16

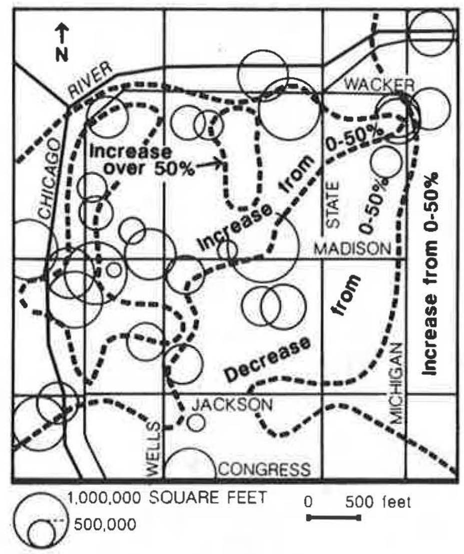

FIGURE 2 Changes in pedestrian traffic and office buildings completed, 1981–1989.

Interview Data

The interview data corroborate some of these findings. They verify that the CBD is a place to which people come to work but less often to shop. Since 1963 the proportion of those who came for the primary purpose of shopping has declined about 10 percentage points from 14.3 to 8.0 percent in 1981 and to 4.5 percent in 1989. Interestingly, the percentage who indicated that they came downtown to work has essentially not changed, remaining at approximately two-thirds of all pedestrians. In the 1980s, of the remaining trip purposes, the greatest increase was for leisure activity. Leisure is a category that includes those walking for exercise or pleasure, as well as some homeless or others who may have provided this as a convenient response.

The distances pedestrians walk has changed little. The median distance was about two blocks in 1963 (*2*) and is about the same today. Many in 1989 were walking for exercise, accounting for long trips and a higher mean than median.

Last, the interviews show that the downtown still has a male majority. Men account for approximately two-thirds of the 1981 and 1989 weekday downtown pedestrians and in both years outnumbered women in all trip purposes except shopping.

ESTIMATION OF PEDESTRIAN VOLUMES

These data suggest that, in order to adequately estimate the traffic at a given location, a model must incorporate two key elements: the land use in its immediate vicinity and its location relative to major CBD entry points.

Estimates Based on Land Use Data

The Toronto work of Ness et al. (*9*) considers these elements. Their calibrated model is specific for either journey-to-work trips or lunch-hour trips. Because it is calibrated on a 9 percent and 5 percent sample of these trips, respectively, it has significant data requirements. The data were collected with a mail-back survcy of Toronto's downtown labor force. Although satisfactory results were found in Toronto, the model is resouce-intensive.

Because of these requirements for the Toronto model, a more basic model was developed for Los Angeles (*10*). A multiple regression equation was estimated for the number of downtown pedestrians in which the combined four-block-face pedestrian total was used as the dependent variable. The independent variables included a list of land uses ranging from office space to parking space. The approach was logical, but two of the land uses—hotel-institutional and manufacturing—had negative coefficients. And, because the constant in the equation for a 12-hr day was 19,980, the equation appeared to be more of a description of downtown Los Angeles than a model usable elsewhere. As expected, the model fits the high-traffic blocks—more than 15,000 pedestrians—better than the low-volume blocks.

A similar model was used in Milwaukee by Behnam and Patel (*11*), relating the land use in a block to the total traffic on the four block faces. The availability of land use data highlights its ease of use. Whereas the derived regression equation fits the Milwaukee data well, several disadvantages become apparent. First, some model parameters are not intuitively appealing. They suggest that commercial space generates more traffic per square meter than office space, which the Chicago data support, but both are outpaced by the traffic-generating rates of vacant space. In the application described, 1,022 m^2 of vacant space generates more traffic than 3,251 m^2 of commercial space and the 3,948 m^2 of office space combined (*11*). Second, of the four directly comparable coefficients, vacant space had the highest traffic-generating rates, higher than land uses for storage and maintenance, residences, and cultural activities and entertainment. It should be cautioned that when this was verified, the Milwaukee examples were presented in the original work with land use expressed in square meters, but the model coefficients were given for data expressed in square feet. In the computations above, data were converted to square feet before the model estimates were derived.

Although neither the Los Angeles nor Milwaukee study makes any claims of geographic transferability, it is tempting to observe how well these models perform in Chicago. Several sites were tested: the Sears Tower, the Merchandise Mart, and two blocks on LaSalle Street. The LaSalle Street blocks are marked with the letters *A* and *B* on Figure 1. Both models overestimate the two large-building traffic volumes, the Sears Tower and the Merchandise Mart, but underestimate the traffic for the LaSalle Street blocks. The Los Angeles model (*10*) does best for the Sears Tower, estimating 72,000 in comparison with the actual of 60,000, but it misses each of the other three sites by more than 25,000 pedestrians. Not surprisingly, the Milwaukee model (*11*) does very well for one of the LaSalle blocks. Because of the logarithmic comparisons of the model, however, it estimates more than a million pedestrians at the Sears Tower. Because only one in eight estimates for the two models is within 20 percent of the actual level, it is apparent that they must be recalibrated for Chicago. These models would probably yield better results if the land use within a two-block radius were used, the median Chicago CBD walking distance. This would make data manipulation more demanding, but it would recognize the immediate surrounding environment.

Estimates Based on Samples

It is clear that existing models calibrated for other cities either do not provide satisfying estimates of pedestrian traffic in Chicago or are difficult to use. One then reaches the conclusion that there exists a solid, fundamental base for modeling pedestrian traffic but that the model has not yet been generalized.

In the meantime, the emphasis has been on extrapolating daily totals from samples (*15*), a strategy used here. The reasons for sampling are amply outlined by Davis et al. (*16*). By testing short sampling periods, they obtained satisfactory results for a variety of largely non-CBD land use settings in Washington, D.C. Their objective was to estimate 1- to 4-hr counts from samples of 5 to 30 min. They concluded that the sample period should be in the middle of the period being sampled and that the longer the sample period, the more accurate the estimate.

Their method holds considerable promise but needs modification for the Chicago downtown. The principal reason is that the Chicago volumes are much higher and the major fluctuations in pedestrian traffic during the day require that the sampling period take into account the time of day, absent in the Washington study. To apply the Washington technique properly, samples must be drawn from several times during the day, requiring that the design of when and where data are to be collected be well thought out. Moreover, the field operatives must be well qualified to follow directions and move from place to place in a timely fashion. In general, the more elaborate the sampling scheme, the greater the potential for time savings—but also greater the potential for error while transferring a greater share of the design and extrapolation work to more highly paid individuals in the office. This is not always cost-efficient. Therefore, a system is advocated that minimizes both sampling and mathematical work.

An Alternative Approach

The method relies on knowing or estimating the daily pattern of traffic and then sampling during just 1 hr. Data need to be available on how pedestrian traffic fluctuates by time of day in different land use environments, because each environment has a distinct daily pattern (*13*).

Typically, data are collected and recorded every 15 min throughout the day, as suggested by Haynes (*17*), and graphed as a percent of the daily total. This graph of the daily pattern of pedestrian traffic is unique to every block face, and is thus here called the block-face pedestrian signature, or merely signature. These signatures reflect the land use in the immediate area; though they are unique, they can be classified into distinct groups (*13*).

Examples of 10-hr signatures can be seen in Figure 3, which shows the 1981 and 1989 signatures for a selected block face. Because the land use in the immediate area has not changed, the signature remains largely unchanged. The location is on a block face with office buildings that is very close to the traditional State Street shopping district. Note that despite the constancy in the signature, the total 10-hr pedestrian volume has declined by more than 2,000 pedestrians to 12,795. This may reflect higher office-vacancy rates or fewer shoppers at the nearby stores.

For most sites, the 1981 and 1989 site signatures are similar, but this may not be true for sites experiencing major land use changes. In 1981 the selected site in Figure 4 was typical of the West Loop in which much of the pedestrian traffic passed during the two peak periods to and from the nearby commuter train station. By 1989 a new 0.11 million-m^2 (1.2 million-ft^2) office building was added to this location, and the signature changed dramatically.

In places where the signature has not changed, it would be possible to sample a few 15-min segments and extrapolate the 10-hr total. Few Loop sites show the minor changes seen in Figure 3. Still, so many sites show sufficiently little change that it is worthwhile considering use of 1981 signatures and 1989 samples as a means of estimating 1989 totals. For this purpose a block bounded by State, Adams, Dearborn, and Monroe was selected (*C* in Figure 1). This block was selected for two reasons: it is located near the center of the Loop, and it has experienced a dramatic change, the closure of the Montgomery Ward store sited on the southern half of the block. By 1989 the store was razed and the site was left empty. Traffic

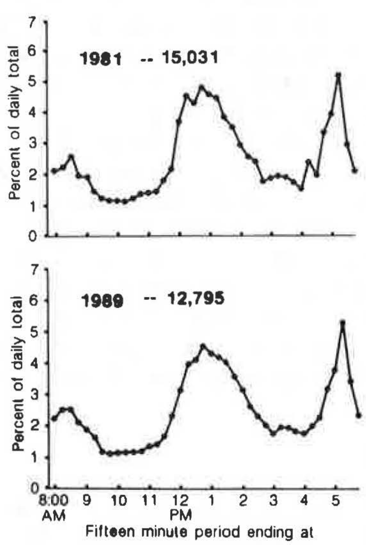

FIGURE 3 Signatures for north side of Monroe between State and Wabash, 1981 and 1989.

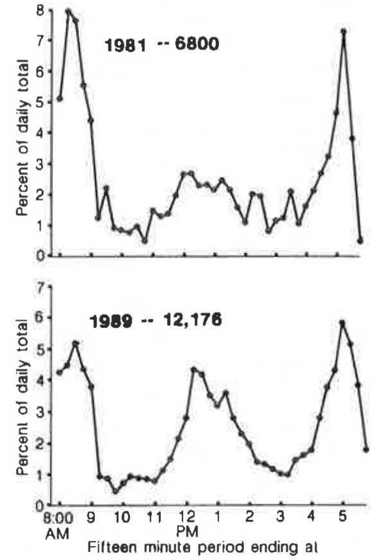

FIGURE 4 Signatures for north side of Wacker between Madison and Monroe, 1981 and 1989.

dropped by approximately 10,000 pedestrians on the east and west sides of the block. One might expect the store closure to have affected the signatures, but because the area remains a mixed office and retailing area, the effect should not be great. Overall, the 1989 signatures resemble the 1981 signatures, even on the west side where the 10-hr volume has dropped by more than 50 percent (Figure 5). On the south side (Figure 6), where the drop in pedestrians was only about 1,500, the signature, with high levels of morning activity for both years, is different from the west-side signature (Figure 5).

The lack of change over time in the signature suggests that the 1981 signatures and 1989 samples can be used to estimate 1989 totals. Table 2 summarizes this effort. It would be easier to take a 1-hr sample than to take three or four 15-min samples scattered throughout the day, so each estimate was derived from one sample. In the majority of cases (23 of 36) the estimates were within 10 percent. It is quite possible that even day-to-day variations would fluctuate this much.

The method can be summarized in the following steps. First, selected signatures must reflect the land use in the area. Most places where pedestrians are being counted have a record of previous counts, and signatures can be obtained. A guide is

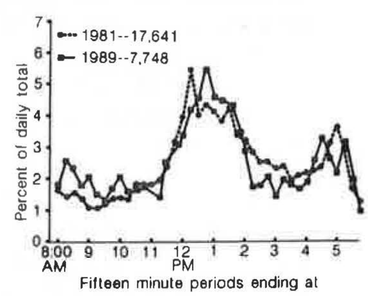

FIGURE 5 Signatures for west side of Block C on Figure 1, 1981 and 1989.

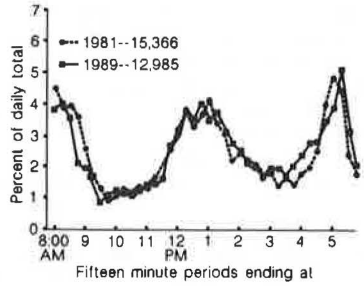

FIGURE 6 Signatures for south side of Block C on Figure 1, 1981 and 1989.

TABLE 2 ACTUAL AND 1989 ESTIMATED 10-hr PEDESTRIAN VOLUMES FOR FOUR BLOCK FACES IN DOWNTOWN CHICAGO

	North	East	South	West
1981 Actual	19,888	29,028	15,366	17,642
1989 Actual	17,702	18,812	12,985	7,748
1989 Estimates Based on One-Hour Samples				
Sample period	Estimates			
8 A.M. - 9 A.M.	16,429*	24,155	11,020	12,352
9 A.M. - 10 A.M.	16,855*	18,872*	12,877*	10,034
10 A.M. - 11 A.M.	19,376*	16,514	12,776*	7,694*
11 A.M. - 12 Noon	19,608	16,044	12,563*	7,045*
12 Noon - 1 P.M.	19,529	17,462*	12,813*	8,114*
1 P.M. - 2 P.M.	18.665*	18,274*	13,930*	7,938*
2 P.M. - 3 P.M.	20,939	20,018*	12,869*	5,325
3 P.M. - 4 P.M.	20,399	18,617*	16,643	6,534
4 P.M. - 5 P.M.	16,270*	17,767*	12,421*	7,236*

Block identified on Figure 1 with the letter C.

* Estimate within 10% of the actual volume.

being compiled for those circumstances in which signatures are not available. Second, a 1-hr sample must be collected. Third, from the signature, the percent of the daily total accumulated during the sample period is determined; fourth, the sample is factored up to derive the estimate.

The technique is simple, and it holds promise. It would not work as well in areas such as the site used in Figure 4, but even in this case a different signature can be assumed and a longer sample period can be used.

CONCLUSIONS

Significant changes have occurred in the patterns and volumes of pedestrian traffic in downtown Chicago. The main changes include a decline of traffic in peak retailing areas and an increase in the West Loop. Also, because of the move toward the development of mixed-use office buildings (that is, more self-contained units with retailing), there are fewer sidewalk pedestrians per square foot of office space. Many new retailers primarily serve building traffic and do not generate sidewalk traffic in the manner common to large retailers on State Street or Michigan Avenue.

The consequence is the emergence of a CBD with fewer places that have exceedingly high pedestrian volumes and therefore potentially fewer pedestrian conflicts in movement. Even the largest office buildings do not generate the volumes of traffic that overburden sidewalks.

The areas with the greatest intensity of traffic per 15-min period are associated with the two principal commuter rail stations. Parking lots and subway stations do not have the same effects. Mercifully, these stations are located on the fringe of the CBD, so the traffic moves in largely one direction, causing fewer pedestrian conflicts than would be the case if the stations were located near the core of downtown.

These changes have taken place, but some fundamental things have not. During the 8-year period, retailing areas are still retailing areas, and the financial district is still the financial district. Despite the fact that some areas have higher or lower pedestrian volumes, it is remarkable that the pattern of daily traffic—the pedestrian signature—has changed very little. This lack of change provides an opportunity to estimate traffic by using sample counts. This has the distinct double advantage of minimizing both field sampling work and the conversion of these data to daily estimates. The method is simple.

There are still many questions. With all the increase in office space, why are the pedestrian traffic totals not higher? Are telecommunication systems having an effect? It would appear that increases in downtown office space may burden the transportation systems that bring these workers into the CBD, but, with the exception of the immediate commuter rail station areas, the sidewalks do not appear to be suffering the same fate.

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