

walk railing on the tunnel downgrade which would read 75 Ft. and be mounted at that spacing. It is hoped these signs will promote better spacing of vehicles on the downgrade

and thus reduce the slowing effect from the braking which is now occurring. This will be our first step and its success will determine our later action.

Walking Distances in Parking

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FROM comprehensive parking studies made in 32 cities in six population groups, data are presented showing the walking distances of illegal parkers, free-curb parkers, and those parking at free and pay off-street facilities. The patrons of pay lots and garages walk much further than do any of the other classes. It is evident that walking distances increase as the population increases but that the rate of increase falls off after the 500,000-population mark is reached, and it appears that there is a relationship between this fact and the increase in the proportion of illegal parking, which thus becomes a rough index of toleration.

Data are given on median distances walked by off-street pay parkers, together with the average and the range, and it is suggested that these be used as tentative criteria in the location of new pay facilities, subject to adjustment for various other factors which may affect acceptance of a location.

The basic assumption is made that, in each population group, added facilities must be so located as to improve the parking conditions, which can best be done by reducing the current distances walked.

● IN any city where parking is a problem and where more parking spaces are needed, two questions of primary importance are: How many additional spaces are needed? Where should new spaces be located?

The Bureau of Public Roads has summarized certain of the results of the comprehensive parking studies¹ made in nearly a hundred cities by state highway departments in cooperation with the cities. These studies serve very well in showing, for each block in the central business district, the number of spaces available for parking, the demand for spaces, and the deficiency. However, since blocks deficient in parking space frequently are adjacent or very close to blocks having surplus spaces, balances must be made before net deficiencies may be determined. In the decision as to how much of the surplus space may be considered available, the factor of walking distance between those spaces and

the ultimate destination is of course introduced. One of the bureau's summaries relates to walking distances.

The availability of existing surplus space is not the only reason for the importance of walking distance. The area of space deficiency is nearly always concentrated in the core or center of the business district, just where valuations are highest. Since it usually is economically impracticable to install parking facilities exactly where they are needed, the question arises as to how far away new facilities may be located. Also, in many cities, zoning ordinances, referring to parking generators, require that appropriate parking space be provided within a specified distance. Indeed, if walking distance is not considered to be a factor, then there is no parking problem in any city. The reason for this paper is the question: How far is too far for parkers to walk?

The comprehensive studies referred to have provided data upon which an approach may

¹ Described in 1945 PROCEEDINGS of Highway Research Board.

TABLE 1

AVERAGE WALKING DISTANCES OF PARKERS AT VARIOUS TYPES OF FACILITIES, THE PERCENT PARKING ILLEGALLY, AND THE PERCENT USING PAY OFF-STREET FACILITIES

Population group (urban area)	Number of cities	Distance in feet										Percent illegal	Percent using pay off-street
		Curb			Off-street			All legal curb and off- street	Illegal curb	All park- ers			
		Free	Pay	All legal	Free	Pay	All						
Under 25,000 (Avg. 13,332).....	4			215	158		158	208	139	201	11.2		
25,000-50,000 (Avg. 33,388).....	8	421	306	338	266	491	315	311	184	285	8.0	3.9	
50,000-100,000 (Avg. 82,683).....	3	454	307	354	255	588	358	355	202	344	6.2	5.2	
100,000-250,000 (Avg. 164,545).....	6	428	387	395	283	660	521	438	192	426	7.0	8.9	
250,000-500,000 (Avg. 399,043).....	4	482	527	512	365	851	715	614	270	581	9.3	29.9	
Over 500,000 (Avg. 880,145).....	7	612	516	543	352	799	720	621	204	564	13.6 ^a	24.8	

^a 19.4 for cities over a million population.

be based. Table 1 summarizes data on average walking distances for population groups, for several types of parking (for passenger cars parked between 10 A.M. and 6 P.M. in the central business districts of cities) and Figure 1 presents the same data graphically. Some comments may be made:

1. As would be expected, the illegal parkers have the shortest average walking distance, more so in the larger cities.

2. Since the free off-street spaces are usually provided by parking generators, on their own or adjacent properties, for use by their tenants or customers, these afford the lowest walking distance of the legal spaces.

3. Since the most-centrally located curb spaces are usually those which are metered, the meter parkers generally walk shorter distances than those using free curb spaces.

4. It is perhaps common belief by the layman that the patrons of commercial lots and garages, since they pay for the privilege, will not walk so far as other parkers. Actually, they walk much further than the others. It may seem incongruous that off-street pay parkers walk further than free curb parkers, but this is no doubt due to the fact that most of the curb space (in the central business district) has time restrictions, usually one hour, while the parkers using off-street space require more time.

5. There is a rather common misconception that the walking distance summaries as found in parking studies show how far parkers will walk, whereas, they actually represent only how far parkers *did walk* or *had to walk* under the existing conditions.

6. It is evident, logical and generally recognized that walking distances (from park-

ing spaces) increase as the population increases. It will be noted, however, that the curves flatten off after the ½-million population mark is reached. It appears probable that this flattening off ties in with the rapid increase in the proportion of illegal parking, which jumps to nearly 20 percent above the million population mark, and represents the tolerable limit for the average person, where a choice is made between illegal parking or staying away from downtown.

The data presented show how far parkers *did* walk, the distances increasing as conditions became more severe with increasing population. It might, therefore, be argued that, since they did walk further when conditions required, still greater distances might be acceptable (if not liked). On the other

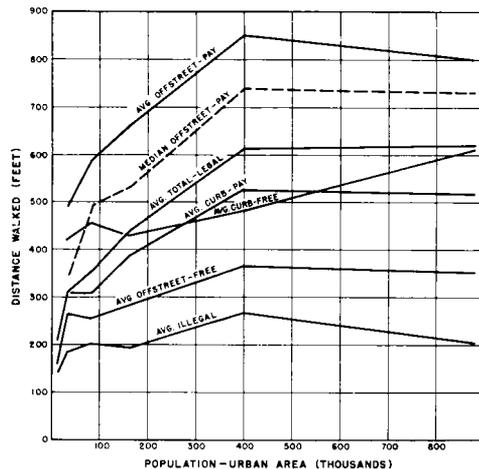


Figure 1. Average distance walked by parkers using various types of facilities.

hand, there is the concrete evidence offered by the proportion of illegal parkers (as much as 20 percent in the largest cities) and the fact that the data on distances walked have come from studies in cities greatly dissatisfied with current parking conditions. Therefore, it may be concluded and the basic assumption is made that, in each population group, added facilities should be so located as to improve the parking conditions, which can best be done by reducing the average distance walked.

All passenger car parking falls in the several categories shown in Table 1. Illegal parking, of course, should be eliminated so far as possible. The number of curb spaces, whether free or metered, cannot be increased and may even be reduced by the demands of traffic for the space used, but some increase of turnover may be possible through tighter time restrictions. Any added parking spaces, obviously, must be off-street, either in free or pay facilities. Also if these added facilities are to improve conditions, they should be so located that the resulting average walking distances will be lower than the current averages.

These two types of off-street facilities, free and pay, are not similar in their characteristics and so must be considered separately. The data presented show that the users of pay lots and garages walked from 225 feet to nearly 500 feet further than the users of free lots and garages, due probably entirely to the fact that the free lots available were largely those provided by and immediately adjacent to the generators. Future free spaces provided will presumably be either those provided by specific generators for their patrons or tenants (hence very close) or in the form of municipal lots for common use. The

location of a free municipal lot will of course depend in part on whether it is intended to be a fringe facility for the use of all day or long-time parkers, or close in, for the benefit of shoppers and short-time parkers. A fringe or long-time lot with no fee or a small one may be either of the type served by mass transit, (with which this paper is not concerned), or available only by walking. This latter type is found in smaller cities, and no data are available on the walking-distance habits, but it appears that its distance (from the main street) may range from one block or 350 feet in the cities of 5,000 to 10,000 to as much as 500 or 600 feet in cities up to 50,000 population. The short-time type of municipal free lot is usually found in the small cities (under 50,000), where pay lots are few or nonexistent, and it seems reasonable to assume that a tolerable walking distance in these cases will be somewhat larger than the pay-curb distances found in the same population group. Since these cities are largely in the less than 25,000-50,000 group, that distance presumably should not greatly exceed one block or perhaps 400 feet.

The principal concern, in terms of number of facilities, is with the walking distances to be involved with off-street *pay* facilities, in cities of 50,000 population and more. Table 1 and Figure 1 show the average distance walked by users of these facilities ranging from 491 feet (in cities of 25,000 to 50,000) to 799 feet (in cities over 500,000), and show that the average walking distance increases

TABLE 2
PERCENTAGE DISTRIBUTION OF PARKERS CLASSIFIED BY DISTANCE WALKED FOR SEVERAL POPULATION GROUPS, ALL FACILITIES

Population Group (Urbanized area)	Percent of Parkers Walking						Total
	Less than 400 ft.	400 800 ft.	800 1200 ft.	1200 1600 ft.	1600 2000 ft.	Over 2000 ft.	
Under 25,000	75	19	4	1	1	0	100
25,000-50,000	78	16	4	1	1	0	100
50,000-100,000	68	20	7	3	1	1	100
100,000-250,000	62	23	9	4	1	1	100
250,000-500,000	64	19	8	5	2	2	100
Over 500,000	51	23	13	6	3	4	100

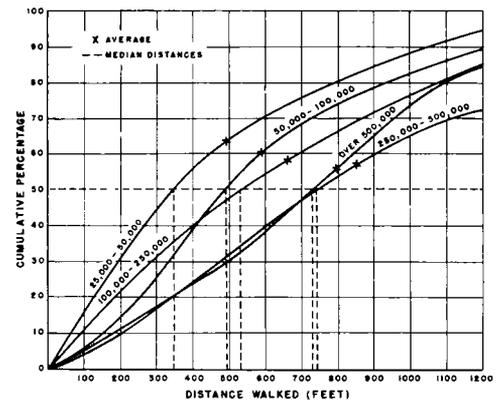


Figure 2. Cumulative percentages of off-street pay parkers by distance walked for various population groups.

with the population. Table 2 shows the great range of distances walked in each group (up to 2,000 feet and even more) and also shows that in each group the great majority of parkers are found in the shorter distance groups; it is apparent, therefore, that the average distances shown in Table 1 are swollen by the relatively few parkers who walk extreme distances, and that while the averages are genuine, they do not give a realistic picture of the situation. The curves on Figure 2, made from the basic data of the studies, offer a simple method of determining the approximate median distances walked by the off-street pay parkers (50 percent walking less, 50 percent more). These median distances are shown in Table 3 and also shown by an added curve on Figure 1, and are believed to be more representative than the average, although either may be a useful tool.

The average distances, for off-street pay parkers, range from 490 feet in cities of 25,000 to 50,000 to 850 feet in larger cities, while the median distances for the same parkers range from 345 feet to 740 feet. It is probable that in cities as large as Chicago and New York the distances may be larger, perhaps as much as 1,000 feet. The proposal of this paper is that these distances be used, in the appropriate population groups, in the absence of data from a local study, as criteria in the location of new facilities, on the principle that conditions will best be improved by a new facility which affords an average or a median walking distance lower than those figures. However, the application of these data requires understanding and judgement. In each population group, there is a range; in the 250,000-to-500,000 group, for example, with an average distance of 850 feet, the range among the cities was from 716 feet to 895 feet. Similarly, although the averages are for all off-street pay facilities, it must be borne in mind that there may be a considerable range in the fees charged, and that longer distances are compatible with lower fees. In Providence, Rhode Island, for example, a municipal lot on the fringe of the central business district, charging only 5 cents for 2 hours and 15 cents for 4 hours, shows an average walking distance of 1,590 feet, yet is well patronized. The great majority of off-street pay facilities in the central business

TABLE 3
AVERAGE AND MEDIAN DISTANCES WALKED BY
OFF-STREET-PAY PARKERS IN SEVERAL
POPULATION GROUPS

Population group (urbanized area)	Range ^a by cities	Average	Median
	<i>feet</i>	<i>feet</i>	<i>feet</i>
Under 25,000	—	—	—
25,000-50,000	112-756	491	345
50,000-100,000	482-725	588	490
100,000-250,000	339-858	660	530
250,000-500,000	716-895	851	740
Over 500,000	726-929	799	730

^a Range of average among cities of each group.

districts, however, have very much the same fee schedules, and it is for these that the problem of location is critical.

In a specific city the determination of a location is simplified if a comprehensive parking study has been made, since this will give data on (1) the parking demand (and supply) by individual blocks and perhaps even by block faces or individual generators, (2) the local average walking distances, (3) the current fees, (4) the extent of illegal parking, (5) an inventory and map of all existing facilities, (6) a property valuation map, and (7) the location of the principal generators of parking demand.

The conclusion has been stated that an added facility should show an average walking distance no greater than the previous average for existing off-street pay facilities. If the facility is being provided primarily for use by the users of a specific generator, all going to one destination, then its actual distance (along the streets) from that generator should be no more than the average walking distance shown in this paper or found in the particular city, and preferably closer to the median distance, or lower.

For a facility such as the usual commercial lot or garage, however, the determination is not quite so simple. Table 2 demonstrates that, in every population group, the average walking distance results from the majority, who walk somewhat less than the average, combined with a much smaller group who accept much larger distances, and this same gradation undoubtedly will appear in any facility intended for general use. Using all the data available on the location and extent of existing parking spaces, together with the capacity and probable turnover of the proposed facilities, it should be possible to test

or evaluate any considered location, apportioning the expected or probable usage among the several generators, with the objective or criterion being an average resulting walking distance somewhat between the average and median distances of Table 3 (or of the particular city, if there are indications that the city is not average) and bearing in mind that there are many parkers unwilling to walk even as much as the median distance.

It is usual that, in the core of the central business district, land values are so high that establishment of parking facilities immediately adjacent to the main street is economically impracticable. There is evidence, however, that the parkers having main-street destinations form a large part of the group shown as walking more than the average distance. This suggests that if service to the main street area is the objective, a facility may be located somewhat more than the average distance from it, but should be convenient to substantial secondary generators.

Distances must be measured as the parkers would walk, from the facility to the entrances of the generators. Thus, where a block has several generators on each block face, some may be 800 feet more distant than those on the nearest face.

In the determination of distances and of locations, there are factors permitting an increase in the acceptable limits, such as a low fee schedule, the frequency of other generators between the facility and the center of demand of the area, or a desire to cater to long-time parkers. Factors indicating a reduction of the distance may be a desire to serve shoppers and other short-time parkers, pronounced grades between the facility and the generators, the obstacle of poor crossings or busy intersections, or the presence of psychological barriers (such as grade-crossings or bridges) along the pedestrian paths. Also, it is probable that somewhat longer distances will be acceptable in a city which has long blocks—

the range of block lengths in the cities studied varied from 150 to 650 feet, the more common length being 300 to 400 feet.

In the choice of a location still other factors must be weighed, including the value of the property, the expense of site preparation, the use of interior-block parcels, the shape and adaptability of the parcel, its location with respect to the origin of the majority of the prospective users, the character of the neighborhood, and the volume and pattern of the street traffic.

Mention has been made of the need for walking-distance criteria in the establishment of zoning ordinances requiring the provision of off-street parking facilities in connection with various types of generators. The Highway Research Board's Bulletin 24, "Zoning for Parking Facilities," shows that in the great majority of cases such ordinances require that these facilities be located on the premises or within specified distances up to 300 feet, but there are frequent cases where the limit is as high as 1,500 feet. This bulletin, in its model ordinance, suggests 800 feet as a limit, but notes that consideration should be given to the fact that shorter walking distances prevail in smaller cities. The data now presented should be helpful criteria in framing future ordinances.

This paper in no way attempts to be a text on site location. But no matter how many other factors are involved, that of walking distance is always present. This paper has attempted in place of the rather cloudy concepts and generalizations on that factor, to suggest some more-definite criteria based on actual practice throughout the country, to call attention to their limitation, and to mention some reasons for variances. It is hoped that discussion will be provoked and that constructive criticism may lead to refinement of the conclusions and to standards usable by the profession and to others requiring guidance in this problem.