ESTIMATION OF POTENTIAL USE OF PERIPHERAL PARKING FOR LOS ANGELES CBD

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Peripheral parking is one of the proposals currently being examined in Los Angeles in an effort to cater to the growth in automobile traffic destined for the CBD. Major emphasis has been on investigating whether peripheral parking can help to reduce the concentration of automobiles in the CBD and the amount of area devoted to parking. A feature of the proposals is the inclusion of a people-mover system to link peripheral parking facilities with the CBD. This paper describes the major findings of the demand forecasting work carried out for the peripheral parking proposals. It was found that, with suitable headway times on the people-mover system, 10 to 15 percent of all-day parkers could be expected to use peripheral sites.

•THE CENTRAL CITY of Los Angeles is the major activity center of a region that has more than 10 million inhabitants. In addition to providing a diversity of commercial activities, it is the principal location of government, financial, and cultural services. It lies at the center of an extensive regional freeway system and is encircled by a freeway loop that provides 360-deg access to the core area.

Recent economic growth in the central city, fostered by the elimination of the 13-story, 150-ft height restriction on buildings in 1958 and promoted by private enterprise and city government, has resulted in a dynamic and rapidly expanding urban core. The city is beginning a major development program designed to direct the new economic growth into an organized pattern that will provide an attractive environment for residents and workers.

Although plans are now being considered for the possibility of constructing a regional rapid transit system sometime in the future, the private automobile can be expected to remain the principal mode of travel for urban area workers until well into the next decade. A major parking program will thus be required to provide the additional facilities necessary to accommodate the increased parking demands resulting from new CBD development.

If an urban environment is provided that is attractive to workers, residents, and visitors, then the practical limit to which the central city can be structured to accommodate this increased demand for automobiles is being reached. Studies are, therefore, being made of possible ways to reduce the number of vehicles entering the central city and, at the same time, to increase the capacity of the city to accommodate higher volumes of workers, shoppers, and residents. One such proposal, which recognizes the inherent importance of the automobile to Los Angeles residents and yet meets the desired objective of reducing the increasing number of vehicles entering the central city, is to create peripheral parking facilities. An integral part of the proposal is a people-mover system that would be within the CBD and would extend to the peripheral parking areas. The people-mover system would also function to provide intra-CBD mobility and link major transit lines to the CBD. It would operate on its own right-of-way and would be free of conflicts with other traffic. Coordinated with transit in this way, peripheral parking could strengthen the overall transportation system and consolidate the core area of the city.

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A study of the feasibility of peripheral parking in the Los Angeles CBD was undertaken to answer the following questions:

1. What factors are involved?
2. How many people would use peripheral parking facilities?
3. What level of revenue could be expected?

A particular characteristic of the Los Angeles CBD is that employees account for more then half of the automobile parking demand in downtown. If a significant number of persons who drive their cars to work could be attracted to peripheral parking, peak-hour traffic in the downtown area could be reduced and more efficient use of the downtown area could be realized. The study was thus aimed at estimating the potential diversion of all-day parkers into peripheral parking facilities.

At the same time, it was recognized that parking lots in downtown would continue to serve a large number of parkers, not only those who would park on a short-term basis but also downtown employees who would choose to pay higher prices to park closer to their destinations rather than park in peripheral areas. Hence, it was necessary to determine the conditions under which a sufficient number of CBD employees would be attracted to the peripheral parking system for it to be feasible and achieve the objectives of the overall transportation plan.

THE STUDY AREA

The study area includes the major areas of parking activity in the central city. It is approximately 1.9 miles long by nearly 1.2 miles wide and contains 63 million ft^2 of development. Serving approximately 183,000 employees, the 84,000 parking spaces are used by more than 120,000 parkers a day; the maximum accumulation of parkers reaches almost 64,000. Seven percent of the parking spaces are on-street, and the remainder are in privately owned or operated off-street lots. Figure 1 shows the downtown area and cost contours for all-day parking costs.

The peripheral parking sites evaluated for downtown Los Angeles are shown in Figure 2. Each site is intended to intercept a portion of the traffic destined for downtown. To a person driving on the Hollywood Freeway, for instance, and destined to the downtown area, the Hollywood peripheral facility represents another parking opportunity relative to all others in the downtown area.

Figure 3 shows the basic route alignment of the proposed people-mover system connecting the peripheral sites to the CBD. The alignment and the location of stations were planned to serve the destinations of the greatest number of potential users of the system. It was assumed that the people-mover system would operate at an overall speed of 15 mph.

PARKING ALLOCATION PROCEDURE

Basic to the parking allocation process was the assumption that the peripheral parking opportunities would compete with the other parking opportunities within the CBD. Drivers would be able to choose which facility they used on the basis of walking (or transit riding) time from their ultimate destination and the cost of using the facility. The actual choice of parking facility by the CBD employee involves a trade-off between the parking cost and the time spent between the parking facility and the destination. Some parkers prefer to pay a high parking cost and park very close to their destinations, but others are content to walk or ride some distance in order to pay a low parking cost. Those differences in parking behavior are explained by different values of time.

The parking allocation forecasts in Los Angeles required that the actual characteristics of downtown parkers be identified. That was achieved by conducting surveys at several office buildings and obtaining information that would help to identify parking behavior under different conditions of parking supply and cost. The surveys revealed the parking choices of the employees from each location. Associated parking costs were used to develop the actual trade-offs of parking cost and walking time to the parking facilities. Figure 4 shows the type of frequency distributions developed for parkers destined to 2 of the points surveyed. Those distributions indicate the effect

Figure 1. Parking cost contours in the Los Angeles CBD.

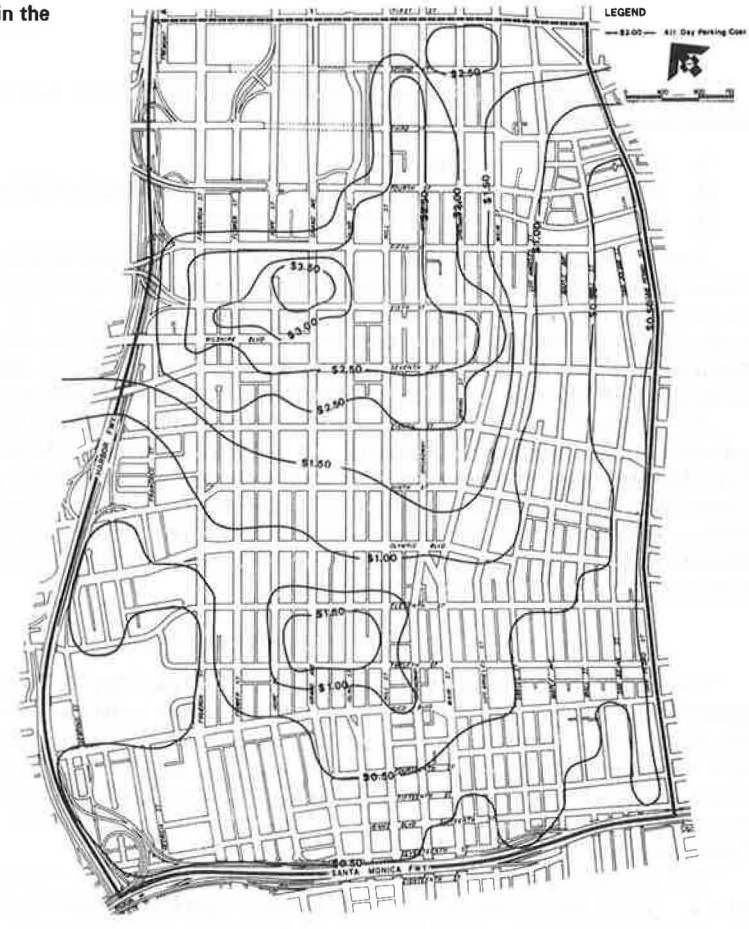
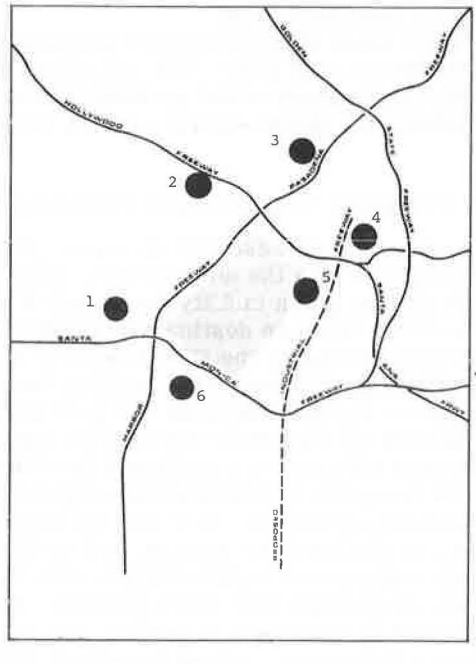


Figure 2. Freeway accessibility and potential peripheral parking locations.



● Potential Peripheral Parking Locations

Figure 3. Alignment of proposed people-mover system.

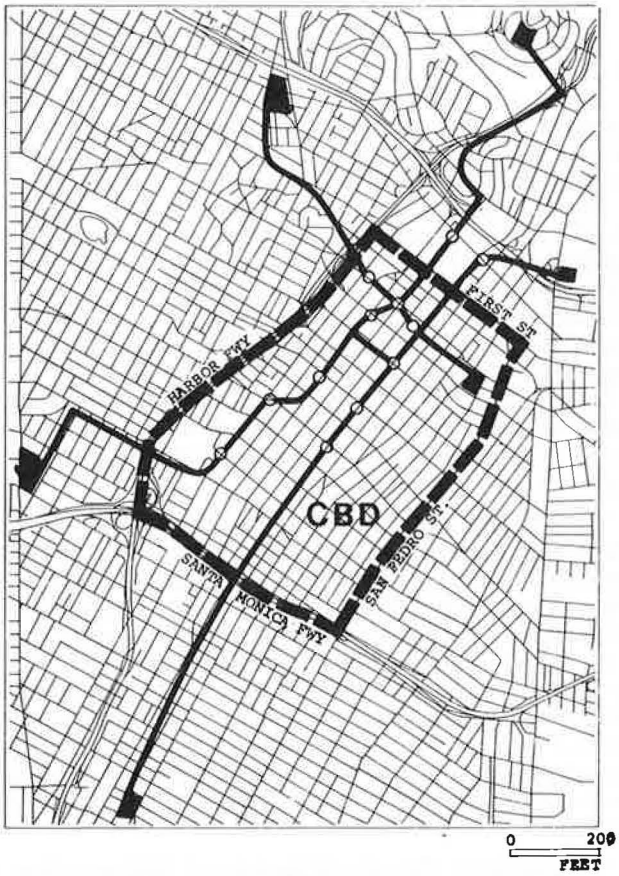
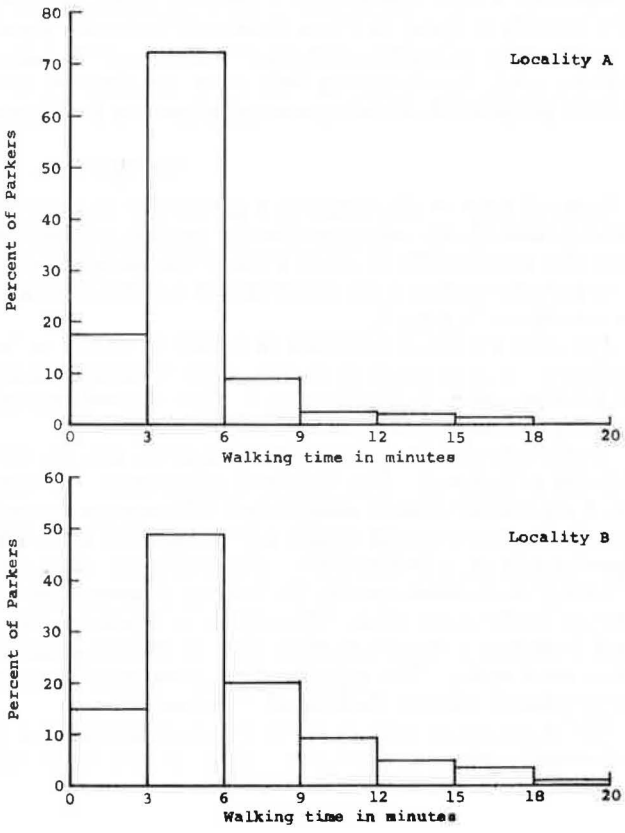


Figure 4. Typical walking-time frequency distribution.



of parking supply and cost conditions on parking behavior. CBD employees destined to locality A tended to park closer to work than employees destined to locality B because of lower parking costs in that area.

Demand estimates for the projection year of 1980 were developed for each block in the CBD. The necessary information was made available through an inventory of development plans and estimates of future employment in each block. Those data constituted the fixed factors in the analysis and were assembled along with the proposed peripheral parking sites, people-mover system, and pedestrian network into a composite picture of the Los Angeles CBD. Total 1980 daily parking demand for CBD employees was estimated to be 90,000.

Downtown parking costs and the service level of the peripheral parking and people-mover system were the variables in the analysis that needed to be tested for their effect on the feasibility of the proposed peripheral parking system. The following assumptions were tested:

1. Parking cost—The CBD was divided into different areas, based on estimated future employment densities, and 3 levels of parking cost conditions were developed, based on the current situation. Figure 5 shows the areas and sets of conditions tested. The cost of peripheral parking was assumed to be $1.25 in all cases, and that amount included the round trip to the CBD on the people-mover system.
2. Service level of people-mover system—From the viewpoint of the parker, the perceived time would consist of the time necessary to park and board the people-mover system plus the actual travel time on the system. Depending on the design of the system and the frequency of service, it was determined that the transfer time could vary as much as 15 min. That range was, therefore, tested in the analysis. Allowance for the reduced automobile travel time was also made by deducting this from the system travel time.

To determine the use of peripheral parking sites, a special procedure was used that distributed parkers among all the various available facilities. That allocation procedure based the distribution of parking demand on the observed behavior of CBD employees with respect to their trade-offs between parking cost and distance from place of work. The peripheral parking facilities were introduced as additional parking opportunities, and, depending on their cost and time-distance to each block in the CBD, a certain proportion of drivers were shown to be attracted to them.

RESULTS

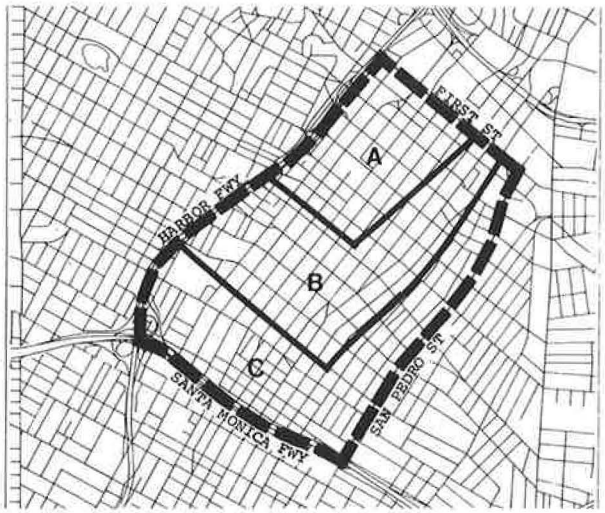
Several runs of the allocation procedure were made, and the results were used to develop sensitivity relations for the peripheral parking facilities. Curves were developed that related the service level of the peripheral parking system and the level of CBD parking costs to the diversion of parkers to peripheral parking. These curves are shown in Figure 6.

The service level measure is shown in terms of the transfer time at the peripheral facilities. For a delay of 4 min, a level could be obtained of 10,400 daily users with the parking costs in the CBD equivalent to cost condition II and 13,000 daily users with costs equivalent to cost condition III.

A summary of the parking patronage by site for the 3 CBD parking cost conditions is given in Table 1. The figures in this table are based on a 4-min transfer delay time. The main factor contributing to the differences in estimated usage among peripheral sites is the travel time from each peripheral site via the people-mover system to the high-density area in the CBD. The influence of that factor is most pronounced in the patronage estimates for the Hollywood Freeway site. That site is ideally situated with respect to the core area, where potential peripheral parkers are destined. The Hollywood Freeway site is less than 10 min via the people-mover system to most destinations in the core area. The effect of that proximity is to attract a considerably higher number of parkers to the Hollywood Freeway site.

The central component of the ultimate peripheral parking system is the network of the transit system in the CBD. If there is a basic transit network in the CBD, the

Figure 5. Parking-cost test conditions.



ASSUMPTIONS	AREA A	AREA B	AREA C
Cost Condition I	Current Costs*	Current Costs	Current Costs
Cost Condition II	50% increase	50% increase	25% increase
Cost Condition III	100% increase	75% increase	25% increase

* amended to account for new developments presently under construction

Figure 6. Total peripheral parking facility use.

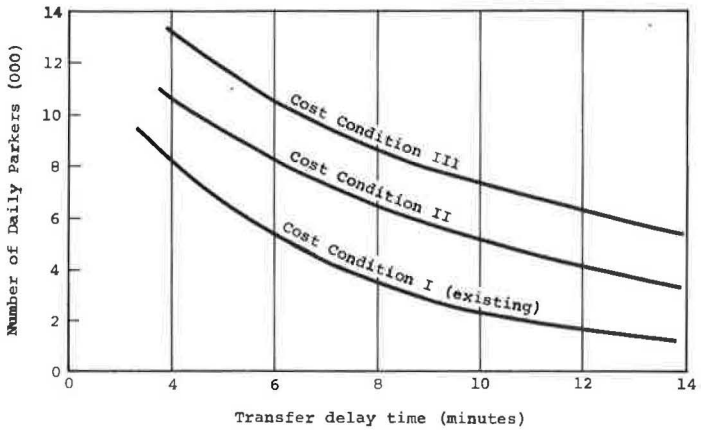


Table 1. Estimated daily parkers at peripheral parking sites.

Site Number	Location	Cost Condition I	Cost Condition II	Cost Condition III
1	Santa Monica Freeway	650	1,050	1,600
2	Hollywood Freeway	2,700	4,200	4,500
3	Pasadena Freeway (Dodger Stadium)	1,100	1,750	2,200
4	San Bernardino Freeway	650	1,100	1,100
5	Fourth and Los Angeles St.	825	1,350	2,200
6	Washington and Broadway	575	950	1,500
Total		6,500	10,400	13,100

Note: Avg all-day parking costs are $1.60 for cost condition I, $2.25 for cost condition II, and $2.90 for cost condition III.

individual peripheral sites can be added independently. The recommended program for Los Angeles involved several development phases and stressed the advisability of implementing those sites, such as the Hollywood Freeway site, that would serve the most parking demands.

CONCLUSIONS

The projected patronage at all peripheral parking sites would be a significant portion of the 90,000 daily parking demands by CBD employees estimated for 1980. With suitable parking cost policies, 10 to 15 percent of the needed parking supply could be successfully provided at the periphery. That represents a significant amount of land area that would otherwise be devoted to automobile parking in the CBD. In addition to relieving the congestion within the CBD, a successful peripheral parking system could allow greater flexibility in development plans; there would be no need to plan so extensively for automobile circulation and parking. The evaluation in this study does, however, indicate the importance of the system design—peripheral parking locations and connected transit system—and of parking policy in the achievement of this objective.

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