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Shuttle Service Options for the Rockridge Commercial District

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Publication Date

1987-05-01

Peer reviewed

SHUTTLE SERVICE OPTIONS FOR THE
ROCKRIDGE COMMERCIAL DISTRICT

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MAY, 1987

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1. INTRODUCTION

The commercial activity in the Rockridge district of Oakland, concentrated along College Avenue, has generated levels of traffic and parking demand that have become a problem for the residential areas of the Rockridge community. Rockridge area residents and merchants have identified a cluster of traffic and parking concerns, including:

- * parking on residential streets by customers and employees of College Avenue commercial district.
- * difficulty in providing off-street parking for customers and employees within reasonable walking distance of the shops.
- * customers' use of cars to travel between different locations along College Avenue.

Some observers have suggested that shuttle buses might offer a way to reduce some or all these problems. This paper explores the probable utility and feasibility of shuttles in the Rockridge area, considering two variants of service:

1. Shopper's shuttle on College Avenue
2. Park & Ride service for employees.

Based on the characteristics of the existing transit service, interviews with private transit companies as well as data gathered from customer and employee surveys it is determined the impact of the shuttle service on the current situation and recommendations are made.

2. Rockridge District Transit Service

Since improve Rockridge district transit service or promote its use by customers and employees may constitute an alternative to the shuttle service, a brief description of the existing transit services in the Rockridge area is included in this section (1). The description places an emphasis on transit route configurations, hours and days of operation, and frequency which are considered the service characteristics that determine the transit service convenience.

2.1. BART Service

BARTS's Concord line provides service from the Rockridge district to San Francisco, downtown Oakland, and other East Bay locations. The service is provided every 15 minutes on weekday and Saturdays from 6 am to midnight, with service every 7 1/2 minutes in the peak direction from 7 am to 8 am and 5 pm to 6 pm, and every 20 minutes after 7 pm. On sundays the service is provided every 20 minutes from 9 am to midnight.

(1) A detailed transit service analysis was performed by A.B. Nash, "An Evaluation of Transit Service to the Rockridge District," April 1987.

The Rockridge BART Station is approximately located in the center of the Rockridge district, being equally accessible to the whole community.

2.2. AC Transit Service

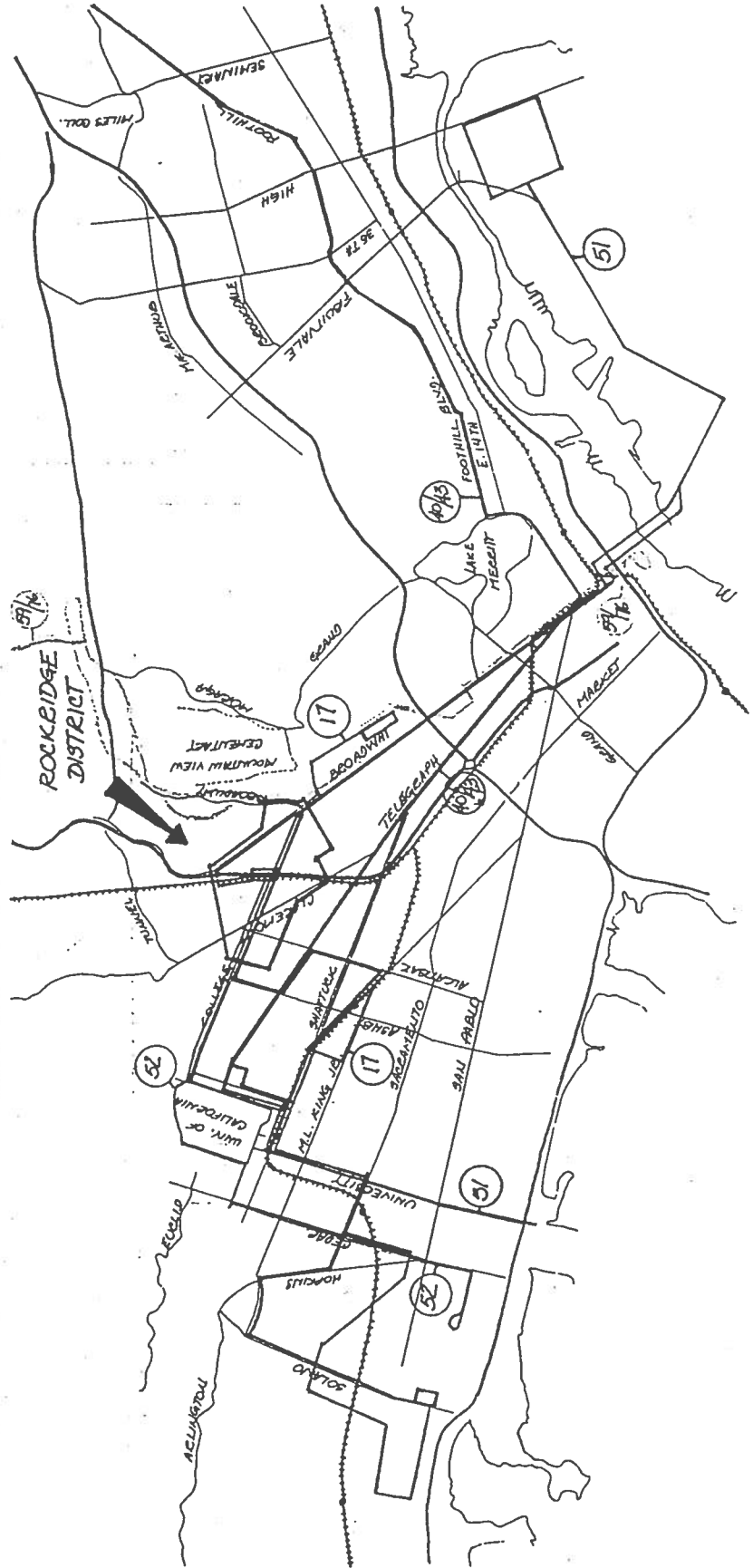
Several AC Transit routes serve the Rockridge district, their configuration are shown in Figure 1 and their characteristics summarized as follows:

- * AC Transit 51 line runs on College Avenue linking the Rockridge district with Oakland, Alameda and downtown Berkeley. It provides service to 19th Street, 12th Street, Berkeley and Rockridge BART Stations. Line 51 operates from 5 am to 2 pm daily. On weekdays line 51 operates on 5-7 minutes headway from 6 am to 9 am and from 4 pm to 6 pm; 10 minutes from 9 am to 4 pm; and 20 minutes from 6 pm to 6 am. On weekends line 51 headway changes to 12-20 minutes.

- * AC Transit 17 line runs on College Avenue from Ashby Ave. to Broadway Ave. It links the Rockridge district with south Berkeley residential areas, Pleasant Valley and Piedmont Ave. Ashby and Rockridge BART stations are served by line 17.

AC Transit 17 line operates only on weekdays from 6 am to 6 pm, on 20 minutes headway from 6 am to 9 am and for

FIGURE 1: TRANSIT SERVICE



4 am to 6 pm and 30 minutes the rest of the time.

* AC Transit 52 line runs through College Ave., starting at the Rockridge BART station it serves the Rockridge district, UC Berkeley, downtown Berkeley and UC Village in Albany. Line 52 service in Rockridge is limited to 7:36 am - 9:36 am in the morning and to 3:24 pm - 6:24 pm in the afternoon.

* AC Transit E line through route EX provides express service to San Francisco in the commute hours, and through routes E, E1 and E2 local and San Francisco service. During commute hours line EX provides service every 10-12 minutes and line E every 20 minutes.

* AC Transit 59/76 line runs to the south of the Rockridge district. Through Broadway Ave 59/76 line links downtown Oakland with the residential areas to the east of Rockridge. On weekdays this line operates from 6 am to 8 pm with service every 11 minutes in commute hours, every 30 minutes from 9 am to 4 pm, and every hour the rest of the time.

* AC Transit 40 line links downtown Oakland with downtown Berkeley. Even though 40 line does not run through

the Rockridge district it is important because of its connection with the other AC transit lines mentioned. It provides 24-hours daily service on 4-12 minutes headway in commute hours, 7 minutes during midday and 15-20 minutes in the night. On weekends service is provided every 7-20 minutes.

It can be concluded that the Rockridge district is served by a good transit system. AC Transit 51 and 17 lines are considered the most important lines that serve the Rockridge district because their route configurations make it accessible from residential areas of potential customers.

From the service frequency point of view, 51 line headway of 5-7 minutes during commute hours and 10 minutes from 9 am to 4 pm on weekdays, and 12-20 minutes on weekends, imply an average waiting time of 3-5 minutes and 6-10 minutes respectively. A waiting time of 10 minutes or less is considered suitable to the needs of customers and employees. On the contrary, the average waiting time of an user of 17 line is 10-15 minutes which is relatively high and may prevent potential riders from using the service.

3. Shopper's Shuttle

Implementation of a shopper's shuttle service on College Av., between Broadway and Alcatraz Av., is the first alternative considered in this study. The objectives of this service would be reduce traffic congestion and parking demand as well as shoppers' use of cars to travel between different business along College Av.

Analyzing the feasibility of a shopper's shuttle service on College Avenue requires to know the shopper travel patterns which ultimately determine whether or not the current traffic and parking problems can be partially or totally solved by the implementation of the shuttle service. If it is established that the service implementation would have a positive impact on the existing situation, then service characteristics and cost are pertinent considerations.

3.1 Shopper travel patterns

A survey at different Rockridge business was conducted during April, 1987 to determine customer travel patterns on weekdays as well as on weekend (2). The results of the -----
(2) For complete information about the survey, its sample size and results see: M. Kunttemeyer, "Travel Characteristics of the Rockridge Commercial District."

survey, significant for the purpose of this analysis, are presented in this section

* 56.3 % of the customers of College Avenue live in Oakland, 26.5% in Berkeley, and 9.7% in other locations (3). In Oakland the areas with higher percentages are those to the east, west and south-west of the Rockridge district (ZIP codes 94618 and 94609) while in Berkeley are the areas to north and north-west of Rockridge (ZIP codes 94705 and 94704).

* 57.3% of the customers visit Rockridge alone and 42.7% in group.

* 44.5% drive alone and 27.1% share private vehicle whereas users of AC Transit and BART for 2.5% and 4.9% respectively. In order to determine if the customer transportation mode changes with the day of the week, the percentages were estimated for customers surveyed on saturday and for those surveyed on weekday separately. The results are shown in table 1.

It can be noted in table 1 that the percentage of customers who drive alone is even higher during weekday while the percentage of those who share a private vehicle -----
(3) Percentages do not add up to 100% because of incomplete surveys

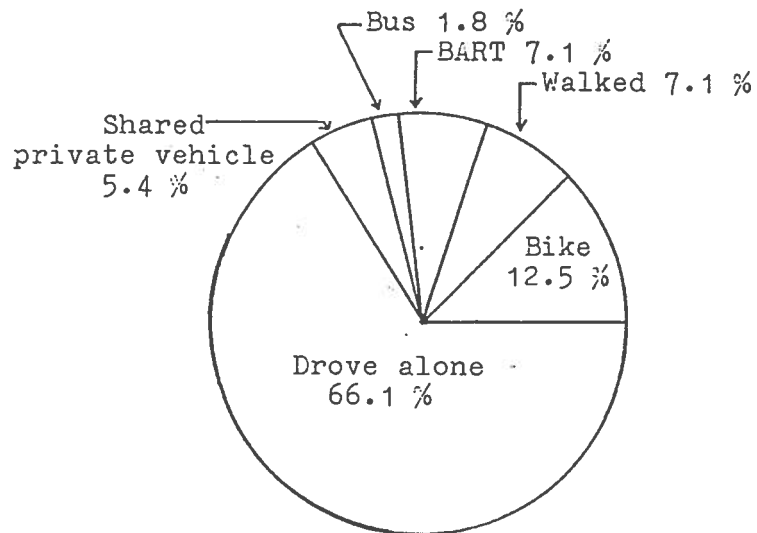
TABLE 1
a. TRANSPORTATION MODE (CUSTOMERS)

MODE	TOTAL	PERCENTAGES
Drove alone	199	44.5 %
Shared private vehicle	121	27.1 %
Bus	11	2.5 %
BART	22	4.9 %
Walked	74	16.6 %
Bike	6	1.3 %
Other	14	3.1 %
TOTAL	447	100.0 %

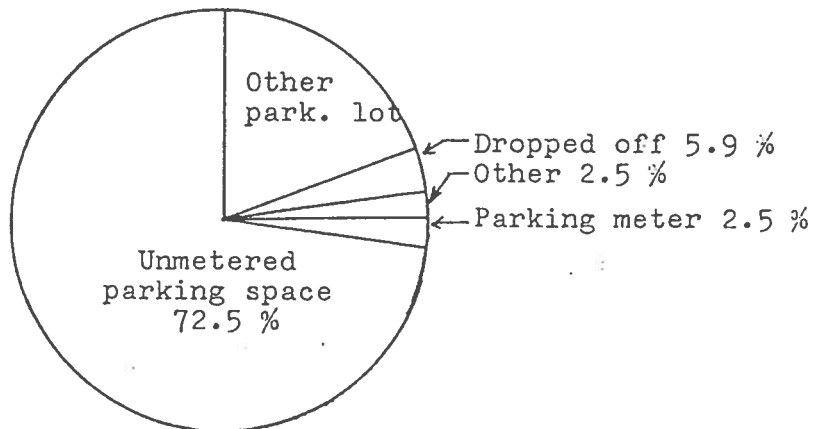
b. TRANSPORTATION MODE BY DAY OF THE WEEK (CUSTOMERS)

MODE	SATURDAY		WEEKDAY	
	TOTAL	PERCENTAGES	TOTAL	PERCENTAGES
Drove alone	116	40.6 %	83	51.6 %
Shared private vehicle	97	33.9 %	24	14.9 %
Bus	6	2.1 %	5	3.1 %
BART	6	2.1 %	16	9.9 %
Walked	48	16.8 %	26	16.2 %
Bike	6	2.1 %	-	-
Other	7	2.4 %	7	4.3 %
TOTAL	286	100.0 %	161	100.0 %

TRANSPORTATION MODE (EMPLOYEES)



PARKING LOCATION (EMPLOYEES)



drop. This result was expected since people is more involved in social and recreational activities during weekend. On the other hand, the percentage of trips made by AC Transit and BART increase which may be due to trips with work purpose. Nevertheless, in either case, the percentage of customers who drive alone is significantly higher than that of those who do not.

* Out of 320 customers who drive alone or share a private vehicle, 30 % park their cars in unmetered spaces and 24% at parking meters. This means that 5 to 6 customers out of every 10 park their cars on the streets.

* The percentage of trips with Home as origin and destination is the highest on weekend (44%). Work related trips becomes relevant on weekday with 36.3% of the customers having their work as origin; however, home still is their main trip destination. Table 2 summarizes customer trip origins and destinations.

* 22.6% of the customers visit more than one business establishment. The transportation mode used between Rockridge businesses was reported in 63% of the cases, out of which 23% drove a car and 77% walked.

TABLE 2
MAIN ORIGINS & DESTINATIONS

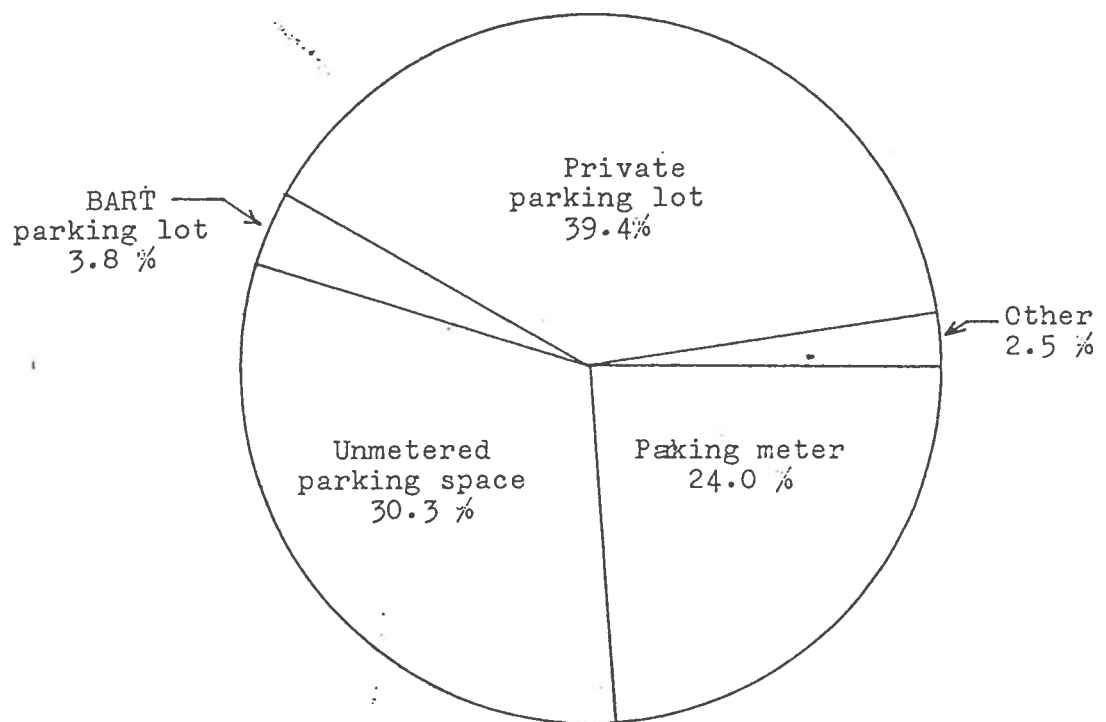
SATURDAY:

	TOTAL	PERCENTAGES
Home-Home	48	44.0 %
Home-RR business	6	5.5 %
Home-Other	6	5.5 %
RR business-Home	10	9.2 %
RR business-Other	6	5.5 %
Other-Home	20	18.3 %
Others	13	11.9 %
TOTAL	109	100.0 %

WEEKDAY:

	TOTAL	PERCENTAGES
Home-Home	20	25.0 %
Home-RR business	2	2.5 %
Work-Home	17	21.3 %
Work-Work	12	15.0 %
RR business-Home	4	5.0 %
Other-Home	10	12.5 %
Others	15	18.7 %
TOTAL	109	100.0 %

PARKING LOCATION (CUSTOMERS)



3.2. Feasibility Analysis

Coinciding with Rockridge resident and merchant observations, survey results indicate that the majority of the customers goes to the district either driving or sharing a private vehicle. Initially, this travel pattern may lead to think on a shuttle service as solution to reduce traffic levels on College Avenue and parking problems on residential streets. However, other important finding might raise doubts about such solution: 83% of the customers live in areas where AC Transit service constitute an alternative transportation mode, fact that can question the willingness of the customers to abandon their cars in favor of any other transportation mode.

It can be argued that the type of business establishment that the customer is going to visit, determine his/her need for using his/her car. To examine this possibility, it was found the trip modal distribution by type of business; the results are shown in table 3

Percentages in table 3 show that for any business type the larger proportion of customers drive or share a private vehicle; business establishment number 5 is the only exception to this pattern, but its location next to the Rockridge BART station explains such variation in modal

TABLE 3

TRANSPORTATION MODE BY BUSINESS TYPE

	Drove Alone	Shared pv	Bus	BART	Walk	Bike	Other
SATURDAY:							
Business est.1	58.6%	24.1%	0.8%	-	13.5%	0.8%	2.3%
Business est.2	38.9%	33.3%	-	-	11.1%	11.1%	5.6%
Business est.3	-	68.8%	6.2%	-	18.8%	6.2%	-
Business est.4	42.3%	34.6%	-	-	23.1%	-	-
Business est.5	28.5%	18.4%	6.1%	12.2%	28.6%	4.1%	2.0%
Business est.6	14.3%	71.4%	2.4%	-	11.9%	-	-
WEEKDAY:							
Business est.1	71.4%	12.7%	-	1.6%	12.7%	-	1.6%
Business est.3	77.8%	11.1%	-	-	11.1%	-	-
Business est.4	50.0%	20.0%	10.0%	-	20.0%	-	-
Business est.5	18.9%	8.1%	10.8%	37.8%	24.3%	-	2.7%
Business est.6	71.4%	12.7%	-	1.6%	12.7%	-	1.6%

Note: Business establishment 1 : Supermarket
 Business establishment 2 & 4: Clothing retail
 Business establishment 3 & 6: Restaurants
 Business establishment 5 : Small grocery store.

distribution.

Knowing that the business type does not affect significantly the customer choice for a particular mode of transportation, the subsequent phase of this analysis was to plot on a map the place of residence of those customers who drove to the Rockridge district. Emphasis was place on trips made by people driving alone for considering that they would be the target of any new service.

Figure 2 shows the results obtained from this analysis. Approximately 70% of the customers live in adjacent areas to the Rockridge district within walking distance to AC Transit 51 and 17 lines.

Customers can be prevented from or encouraged to use a particular transportation mode because of their trip origin and destination. Considering this fact, it is possible to live next to Rockridge in areas served by transit and whose origin and/or destination are either home or other Rockridge business, would use transit. However, in figure 3 it is shown that 42% of the customer trips with these characteristics are still made by car.

FIGURE 2: VEHICULAR TRIPS

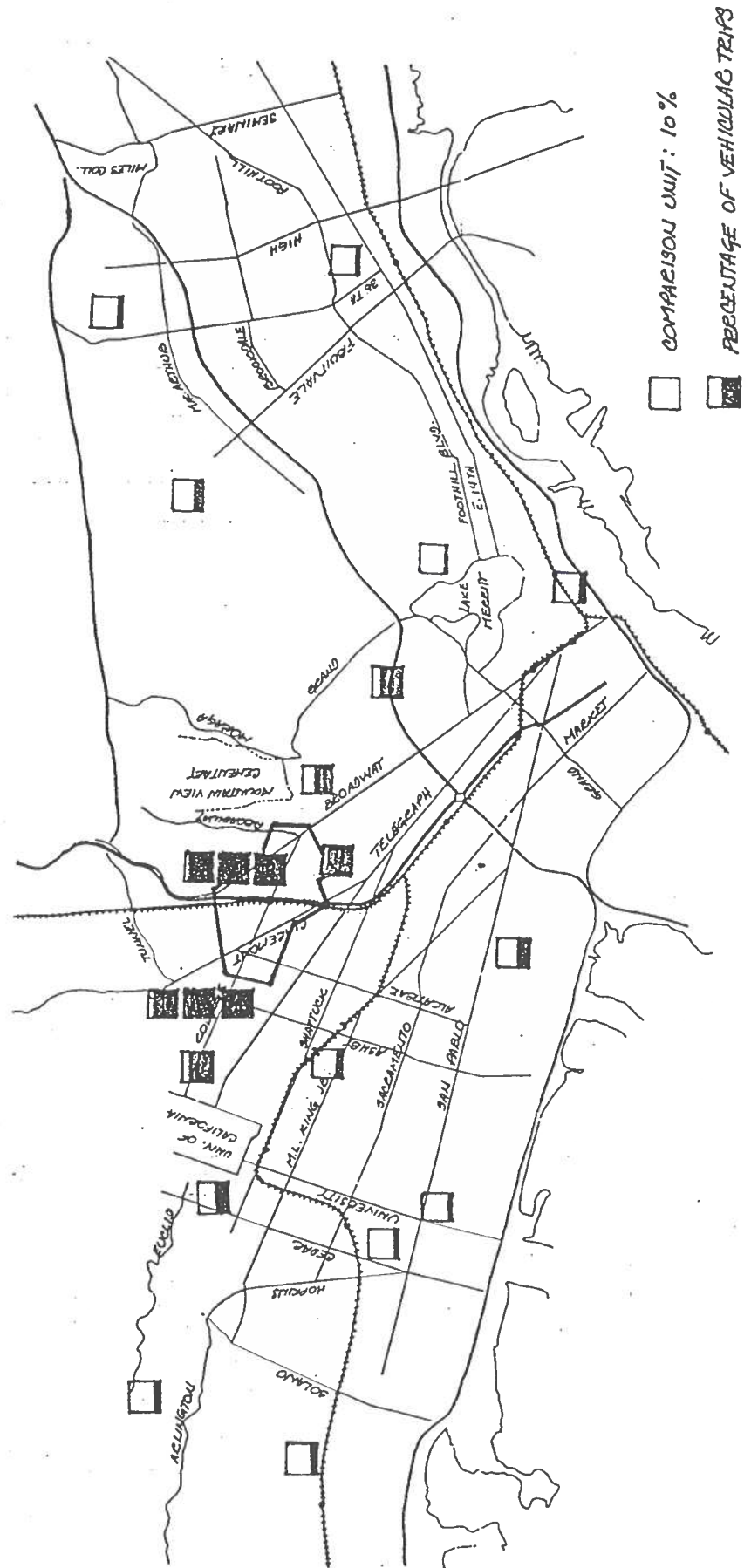
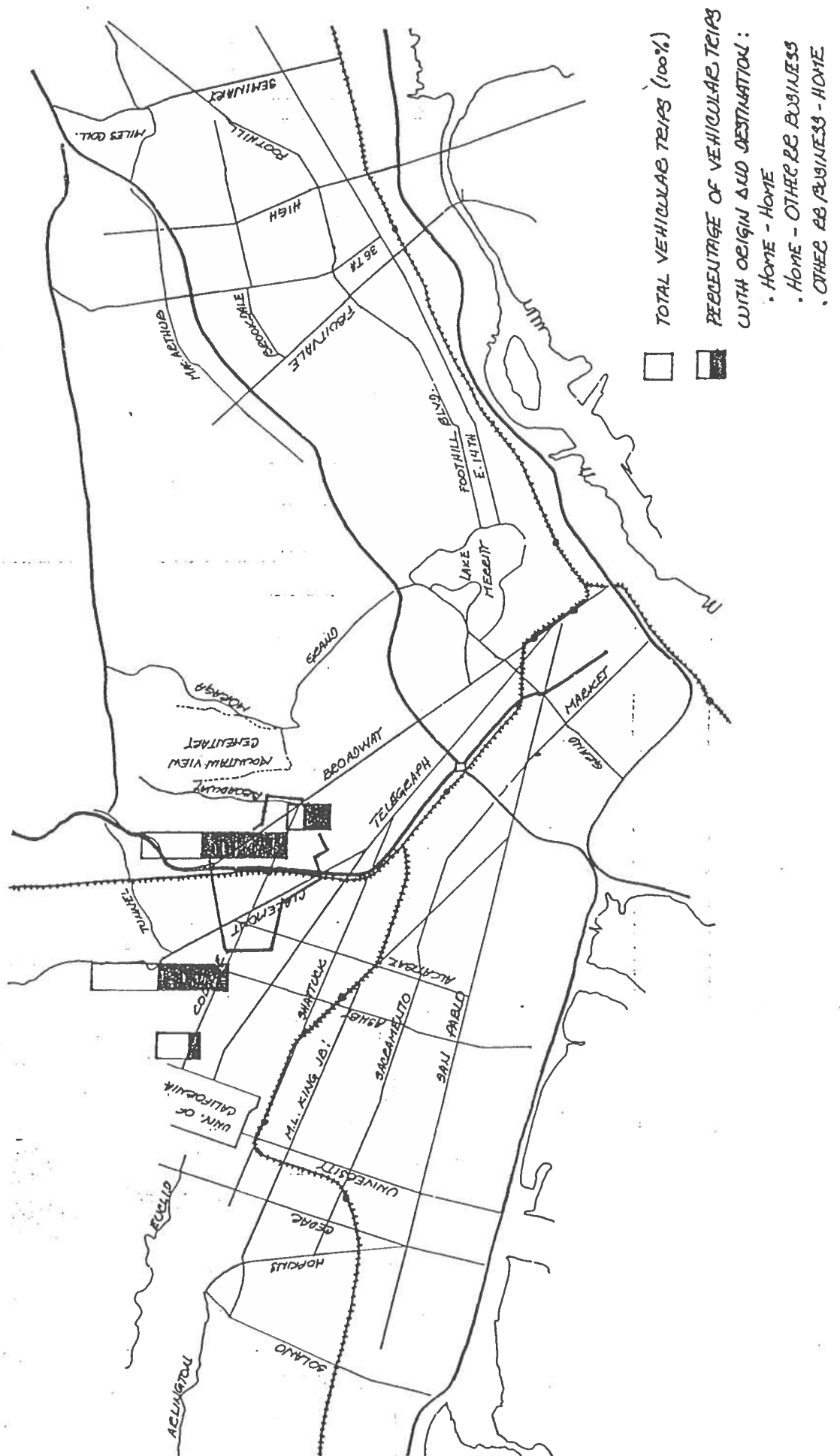


FIGURE 3: ORIGIN AND FINAL DESTINATION OF VEHICULAR TRIPS



3.3 Conclusions and Recommendations

The precedent analysis led to the following conclusions:

- * AC Transit lines offer a good service to most of the residential areas of the Rockridge district customers.

- * Customer travel patterns indicate that a shuttle service would not succeed in reducing traffic congestion and parking demand. Despite the service people will continue using their cars, and the efforts and costs involved in implementing it will not be reflected on any substantial improvement of the current conditions.

- * The Rockridge community and AC Transit should joint efforts in promoting the use of 51 and 17 lines by shoppers; in doing so, an increase in the frequency of 17 line to reduce travelers waiting time should be studied.

4. Park & Ride Service for Employees

The second alternative examined in this analysis is a Park & Ride Service for employees of the Rockridge commercial district. This service would have as foremost objective to reduce parking demand on residential streets.

Considerations about costs and operational characteristics of this service are included in this section.

4.1. Employee travel patterns

In order to know the employee travel patterns and to be able to estimate the impact of a Park & Ride service on parking demand, a survey was conducted among Rockridge employees. However, resource limitations and a low rate of responses prevented from having a sample size that allowed to formulate definite conclusions. Despite the fact that only 5-6% of the Rockridge employees were surveyed, the obtained results offer a good idea about the employees travel patterns, permitting to determine the utility of a Park & Ride service.

The main findings derived from the survey can be summarized as follows:

- * 68% of the employees live in Oakland, 16% in Berkeley, and 16% in other locations (San Francisco, San Leandro, Alameda, Richmond, etc).

- * 66.1% of the Rockridge employees drove alone to work, 5.4% shared a private vehicle, 8.9% used public

transportation (AC Transit and BART), 7.1% walked and 12.5% rode a bicycle (See table 4).

* 72.5% of the employees who drove to work park their cars in unmetered spaces on residential streets (See table 5).

* The majority of the employees works for 6-8 hour period on weekday and Saturdays, and 5-6 hour period on Sundays.

4.2. Feasibility analysis

Survey findings confirm the observations and concerns formulated by Rockridge residents and merchants. A high proportion of the district employees driving along to work, parking on residential streets for long periods of time generating a parking shortage that affects residents as well as customers. At the same time, according to employees comments, find a parking space within a reasonable walking distance to shops has become a difficult task.

TABLE 4

TRANSPORTATION MODE (EMPLOYEES)

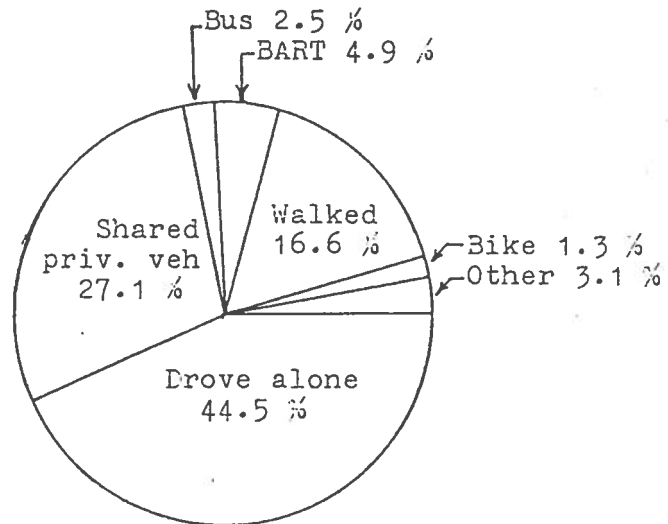
	TOTAL	PERCENTAGES
Drove alone	37	66.1%
Share private vehicle	3	5.4%
Bus	1	1.8%
BART	4	7.1%
Walk	4	7.1%
Bike	7	12.5%
TOTAL	56	100.0%

TABLE 5

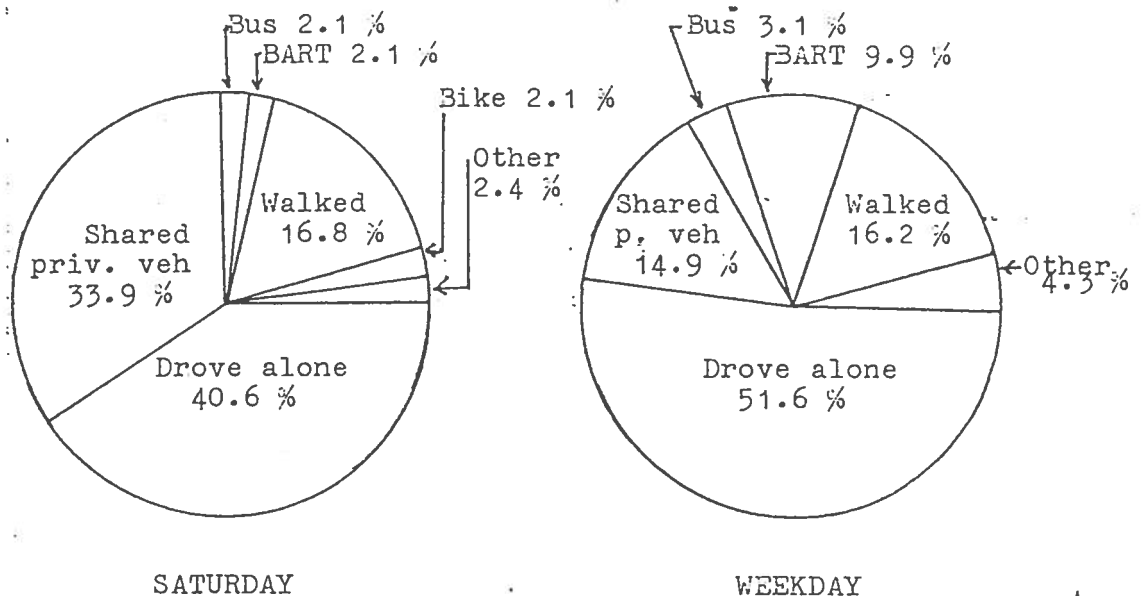
PARKING LOCATION (EMPLOYEES)

	TOTAL	PERCENTAGES
Parking meter	1	2.5%
Unmetered parking space	29	72.5%
BART parking lot	-	-
Other parking lot	7	17.5%
Dropped off	2	5.9%
Other	1	2.5%
TOTAL	40	100.0%

TRANSPORTATION MODE (CUSTOMERS)



TRANSPORTATION MODE BY DAY OF THE WEEK (CUSTOMERS)



The described situation leads to think on a Park & Ride service for employees as viable alternative to reduce parking problems in the Rockridge district.

The success of the measure will depend on the employee willingness to use the service. Assuming three different acceptance levels, the impact of the service on parking demand was estimated and the results are shown in table 6. It can be noticed that the service promotion is important for getting positive results.

TABLE 6

PARK & RIDE SERVICE IMPACT ON PARKING DEMAND

Total number of employees estimated:

ACCEPTANCE LEVEL (% of employees who drive and park on residential streets, using the service)	REDUCTION OF PARKING DEMAND (# spaces)
80%	386
50%	242
20%	97

The service would consist of special vehicles that

would pick employees up in a parking lot; and run on College Avenue from Broadway to Alcatraz Ave., stopping every two blocks. The parking lot could be located in Broadway Avenue where cheaper land may be available.

The regular 15-passenger van is proposed as the most suitable vehicle to provide the service. This proposition is based on the characteristics of this type of vehicle which are reflected in the following advantages: first, maneuverability to operate in congested traffic; second, ease to entry and exit; and third, accordance with College Avenue environment.

4.3. Service Hours

To succeed in reducing parking demand on residential streets requires that the Park & Ride service operates during the hours at which the majority of the employees arrives and leaves work.

Some business establishment in the Rockridge commercial district are open until late at night or even during 24 hours a day. This implies that even if the service were provided until late, workers on the night shift would not use it, since they would rather have their cars parked nearby for security reasons.

Excluding the mentioned segment from the employee population, and according to the information gathered from the survey, it was concluded that the service should operate from 7 am to 9 am in the morning and from 4 pm to 6 pm in the evening.

4.4 Fleet Required

The number of vehicles needed to provide the service depends on the time need for a vehicle to complete a round trip and the number of passengers to be served.

Estimating the round trip time, the following assumptions were made:

- * Round trip distance: 3 miles. Distance between Broadway Ave. and Alcatraz Ave. (approximately 1 mile) + distance between the parking lot and College Ave. (assumed to be half a mile).

- * Operational speed: 12 mph (considering stops)

- * Loading time: 5 sec/passenger

- * Unloading time: 3 sec/passenger

According to this presumptions the round trip time would be 17 minutes. This means that a vehicle will be able to complete 7 trips in a two-hour period, serving 105 passengers.

The fleet needed ultimately depends on the number of employees participating in the program. For each of the three levels of acceptance previously defined the fleet required would be:

- * 80% of employees: 4
- * 50% of employees: 3
- * 20% of employees: 1

Determining the fleet cost considerations should be made since funding could be a restriction for providing the service.

4.5 Cost and Management Considerations

The Park & Ride service implementation can be addressed either by purchasing the vehicles or leasing them to private companies. For small scale service leasing the vehicles offers two advantages : first, it requires a smaller initial investment; and second, it allows to update the fleet.

A common practice is not only to lease the vehicles to a private company, but also to contract the service. This alternative is considered the most appropriate in the case of College Avenue for different reasons: 1) it avoid management problems, since it is assumed that the service would be provided by Rockridge merchants, therefore would not be a single operator, and 2) it eliminate the responsibility for operational problems.

Since costs are involved in implementing the service (administration, maintenance, insurance, fuel and driver wages). Estimates for the overall costs are approximately \$30-32 per vehicle hour. The daily cost of providing the Park & Ride service is shown in table 7.

TABLE 7

SERVICE COST

	DAILY COST	COST/PASSENGER
80% of employees	480	1.25 \$/day
50% of employees	360	1.50 \$/day
20% of employees	120	1.25 \$/day

4.6 Conclusions and Recommendations

The former analysis led to the following conclusions:

* It seems that a Park & Ride service would be a viable alternative to reduce parking demand in the Rockridge district. Considering the daily cost of the service and the benefits that could be achieved, it is recommended to provide the service for at least 50 % of the employees who drive and park on residential streets.

* A survey with a larger sample size should be conducted in order to determine the definite characteristics of the service.

5. General Recommendations

The intensive use of the private automobile by customers and employees of the Rockridge commercial district has generated the current level of traffic congestion and parking demand which conflict with the residential areas next to the district. To overcome these problems, the analysis developed allows to recommend the following actions:

(1) Promote shoppers' use of AC Transit 51 and 17 lines.

(2) Implement a Park & Ride service for the Rockridge district employees.

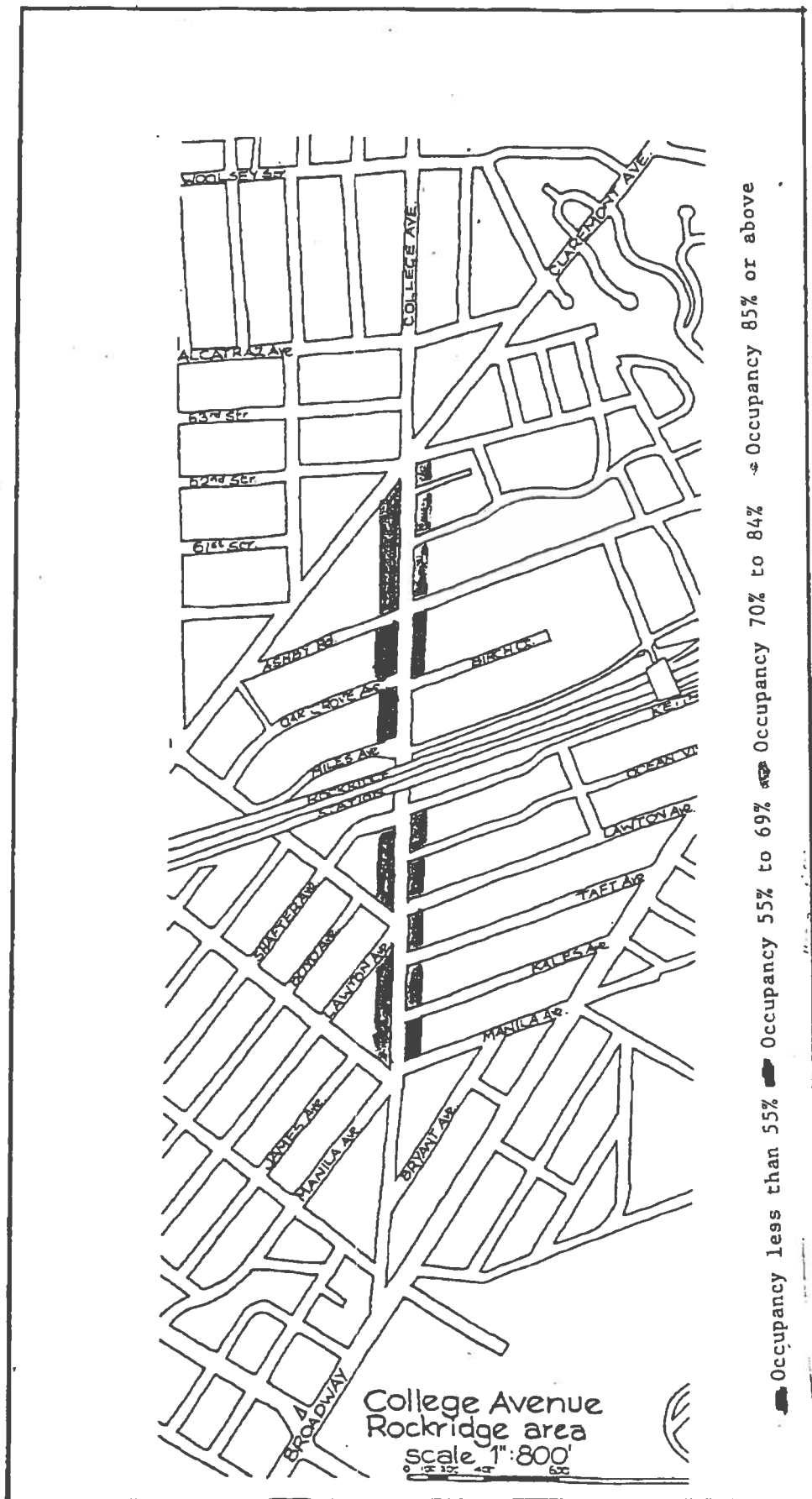


Figure 3.6 Percent Occupancy During 4:30 pm to 6:30 pm

the eastern curb side. The block between Claremont and Armanio Ct, Chabot and Birch, and Kales and Manila were the only blocks having occupancy less than 85%. It is interesting to note that the blocks between Shafter and Manila appear to have more demand for parking than the other blocks. Figure 3.4 to 3.6 show the occupancy levels on various blocks.

Turn-over rates also follow a similar trend. The highest turn-over rate, 4.3 (per 120 minutes) was found in the block between Harwood Avenue and Chabot Avenue. For the 120 minute meters as a group, the turn-over rates varied from 0.33 to 2.44 during 8:00 am to 10:00 am, 2.11 to 3.4 during 11:30 am to 1:30 pm and 2.0 to 3.5 during 4:30 pm to 6:30 pm. For the one hour meters, turn-over rates respectively are 0.00 to 3.25, 1.5 to 4.3 and 2.25 to 3.30.

A high occupancy combined with a high turn-over suggests that motorists are not staying throughout the allowable durations.

Parking Duration

To determine the distribution of parking duration, a separate analysis was performed on a block by block as well as time-limit basis. The results are shown in tables 3.12 to 3.17. It is shown that a majority of motorists used the parking spaces for less than 15 minutes. Along the western curb side 57%, 40%, and 46% of the motorists stayed less than 15 minutes for the three time intervals studied. Similarly the figures for the eastern curb side were 46, 41 and 36 respectively. Figures 3.7 to 3.18 show the parking duration graphically.

Table 3.12 Percentage of Parked Vehicles During 8:00 am to 10:00 am (Western Curb Side)

Block	Spaces	Time limit	Number of vehicles	0-15	15-30	Parking Duration 30-45	45-60	60-75	75-90	90-105	105-120
Claremont to Chabot	15	120	18	50.0		22.2	22.2				5.6
Chabot to Oak Grove	11	120	10	30.0	20.0		30.0	20.0			
Oakgrove to Niles	3	120	1	100.0							
Shafter to Forest	16	60	52	46.2	28.8	19.2	3.8	1.9			
Forest to Manila	7	60	12	50.0	33.3	8.3				8.3	
Forest to Manila	9	120	22	63.6	18.2	9.1		4.5			4.5

Table 3.13 Percentage of Parked Vehicles During 11:30 am to 1:30 pm (Western Curb Side)

Block	Spaces	Time limit	Number of vehicles	Parking Duration							
				0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Claremont to Chabot	15	120	44	52.3	18.2	11.4	4.5	4.5	2.3	-	6.8
Chabot to Oak Grove	11	120	21	42.9	23.8	19.0	-	-	9.5	-	4.8
Oakgrove to Miles	3	120	8	50.0	25.0	12.5	12.5	-	-	-	-
Shafter to Forest	16	60	43	27.9	18.6	18.6	20.9	2.3	7.0	2.3	2.3
Forest to Manila	7	60	19	42.1	10.5	26.3	5.3	-	5.3	10.5	-
Forest to Manila	9	120	20	25.0	25.0	10.0	30.0	-	10.0	-	-

Table 13.14, Percentage of Parked Vehicles During 4:30 pm to 6:30 pm (Western Curb Side)

Block	Spaces	Time limit	Number of vehicles	Parking Duration							
				0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Claremont to Chabot	15	120	52	61.5	15.4	11.5	1.9	3.8	1.9	-	3.8
Chabot to Oak Grove	11	120	23	47.8	30.4	4.3	8.7	-	8.7	-	-
Oakgrove to Miles	3	120	5	20.0	-	40.0	40.0	-	-	-	-
Shafter to Forest	16	60	51	41.2	25.5	17.6	5.9	-	5.9	2.0	2.0
Forest to Manila	7	60	21	42.9	14.3	19.0	14.3	4.8	-	4.8	-
Forest to Manila	9	120	28	60.7	14.3	10.7	7.1	-	7.1	-	-

Table 3.15 Percentage of Parked Vehicles During 8:00 am to 10:00 am (Eastern Curb Side)

Block	Spaces	Time limit	Number of vehicles	0-15	15-30	Parking Duration 30-45	45-60	60-75	75-90	90-105	105-120
Claremont to Armanio Ct	80	60	4	50.0	25.0	-	25	-	-	-	-
Armanio Ct. to Harwood	10	120	11	54.5	9.1	18.2	-	9.1	9.1	-	-
Harwood to Chabot	5	120	8	37.5	12.5	12.5	12.5	-	12.5	12.5	-
Harwood to Chabot	3	60									
Chabot to Birch	6	120	52	40.0	20.0	20.0	-	20.0	-	-	-
Keith to Ocean View	2	30	7	71.4	-	28.6	-	-	-	-	-
Keith to Ocean View	6	60	15	33.3	40.0	-	13.3	13.3	-	-	-
Ocean View to Lawton	6	60	13	23.1	23.1	38.5	15.4	-	-	-	-
Lawton to Taft	7	60	16	43.8	12.5	25.0	-	-	18.8	-	-
Taft to Kales	4	60	2	100.00	-	-	-	-	-	-	-
Kales to	8	60	15	53.3	20.0	13.3	6.7	6.7	-	-	-

Table 3.16 Percentage of Parked Vehicles During 11:30 am to 1:30 pm (Eastern Side)

Block	Spaces	Time limit	Number of vehicles	Parking Duration (Minutes)							
				0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Claremont to Armanio Ct	8	60	8	50.0	25.0	-	-	-	25.0	-	-
Armanio Ct to Harwood	10	120	33	57.6	24.2	9.1	-	3.0	3.0	-	3.0
Harwood to Chabot	3	60	17	64.7	11.8	5.9	17.6	-	-	-	-
Harwood to Chabot	6	120	13	53.8	38.5	7.7	-	-	-	-	-
Chabot to Birch	6	120	14	50.0	21.4	21.4	7.1	-	-	-	-
Keith to Ocean View	2	30	.5	20.0	40.0	-	-	20.0	20.0	-	-
Keith to Ocean View	6	60	21	38.1	23.8	4.8	19.0	4.8	4.8	-	4.8
Ocean View to Lawton	6	60	13	15.4	23.1	15.4	23.1	7.7	-	7.7	7.7
Lawton to Taft	7	60	18	44.4	16.7	11.1	-	5.6	5.6	16.7	-
Taft to Kales	4	60	6	16.7	-	16.7	33.3	16.7	16.7	-	-
Kales to Manila	8	60	17	41.2	35.3	11.8	11.8	-	-	-	-

Table 3.17 Percentage of Parked Vehicles During 4:30 pm to 6:30 pm (Eastern Curb Side)

Block	Spaces	Time limit	Number of vehicles	Parking Duration (Minutes)							
				0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Claremont to Armanio Ct	8	60	10	30.0	60.0	10.0	-	-	-	-	-
Armanio Ct to Harwood	10	120	29	41.4	17.2	17.2	13.8	6.9	3.4	-	-
Harwood to Chabot	3	60	10	50.0	20.0	20.0	10.0	-	-	-	-
Harwood to Chabot	6	120	12	25.0	25.0	25.0	8.3	-	-	16.7	-
Chabot to Birch	6	120	21	66.7	23.8	4.8	-	4.8	-	-	-
Keith to Ocean View	2	30	7	14.3	85.7	-	-	-	-	-	-
Keith to Ocean View	6	60	19	36.8	21.1	21.1	15.8	-	-	-	5.3
Ocean View to Lawton	6	60	17	11.8	29.4	35.3	5.9	5.9	5.9	-	5.9
Lawton to Taft	7	60	18	38.9	11.1	22.2	11.1	5.6	5.6	5.6	5.6
Taft to Xales	4	60	9	22.2	33.3	-	33.3	-	-	11.1	-
Xales to Manila	8	60	23	56.5	17.4	8.7	4.3	4.3	4.3	4.3	-

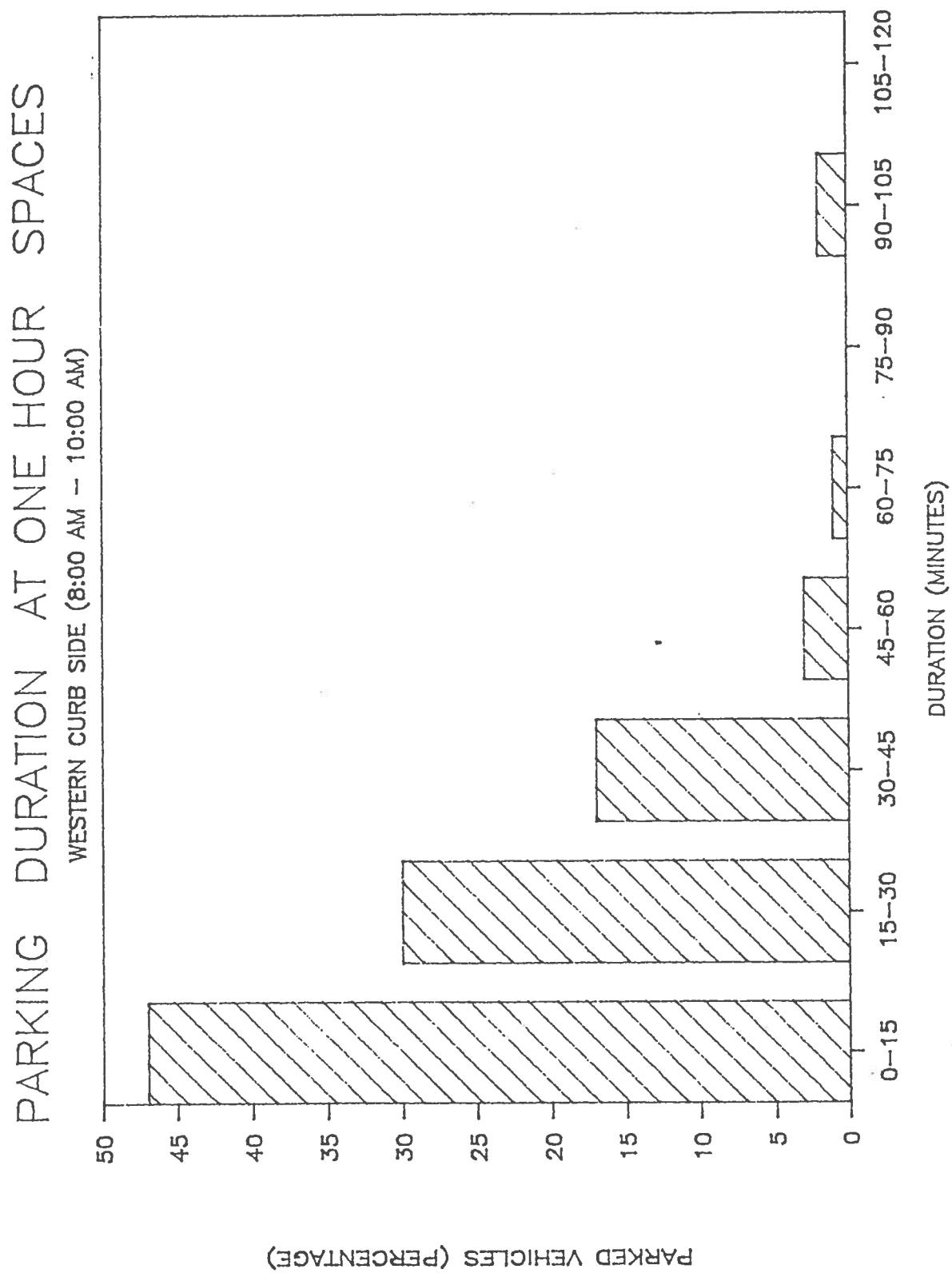
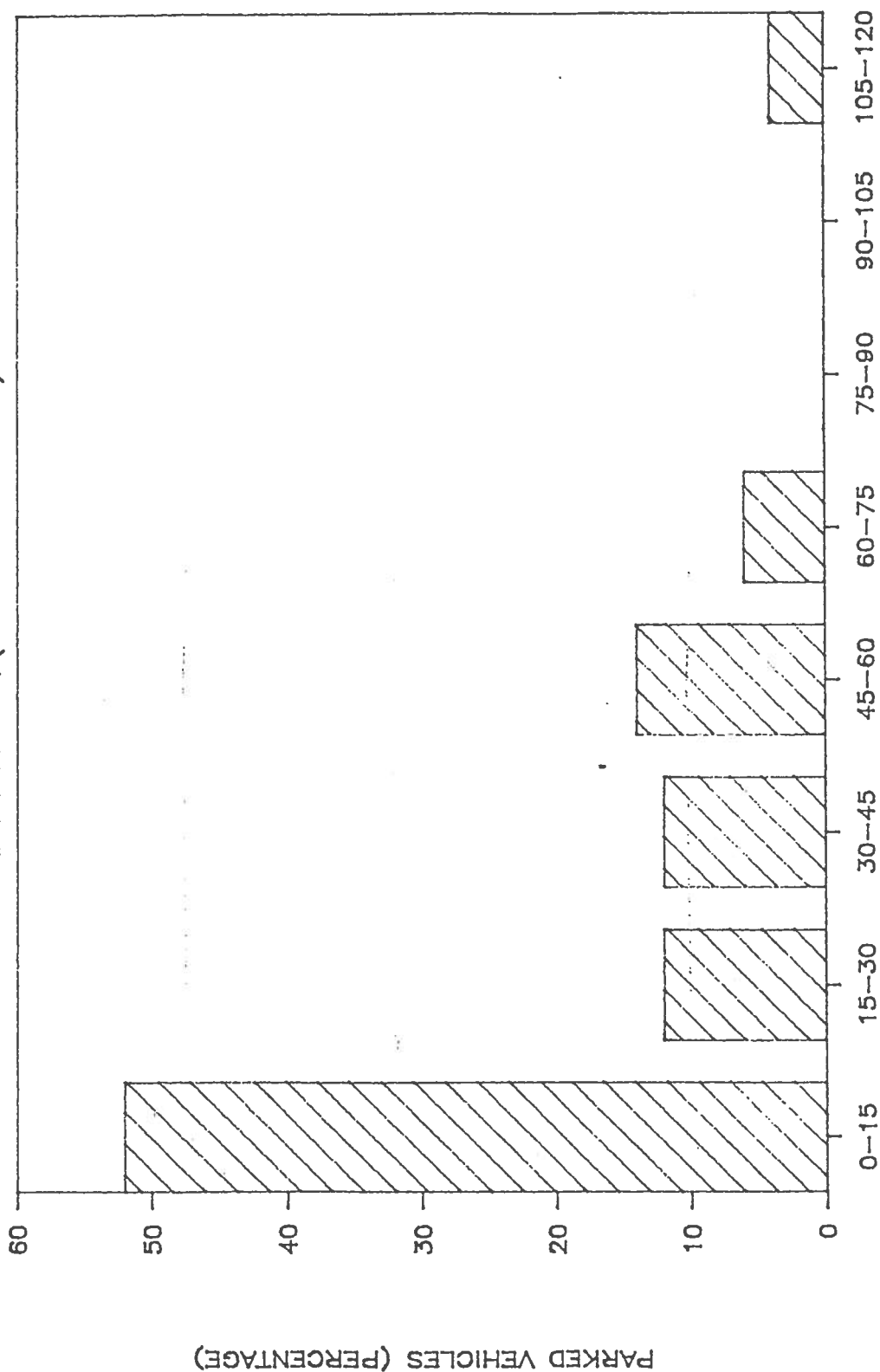


Figure 3.7 Distribution of Parking Duration at One Hour Spaces (Western Curb Side, 8:00 am - 10:00 am)

PARKING DURATION AT TWO HOUR SPACES

WESTERN CURB SIDE (8:00 AM - 10:00 AM)



DURATION (MINUTES)

Figure 3.8 Distribution of Parking Duration at Two Hour Spaces (Western Curb Side, 8:00 am - 10:00 am)

PARKING DURATION AT ONE HOUR SPACES WESTERN CURB SIDE (11:30 AM - 1:30 PM)

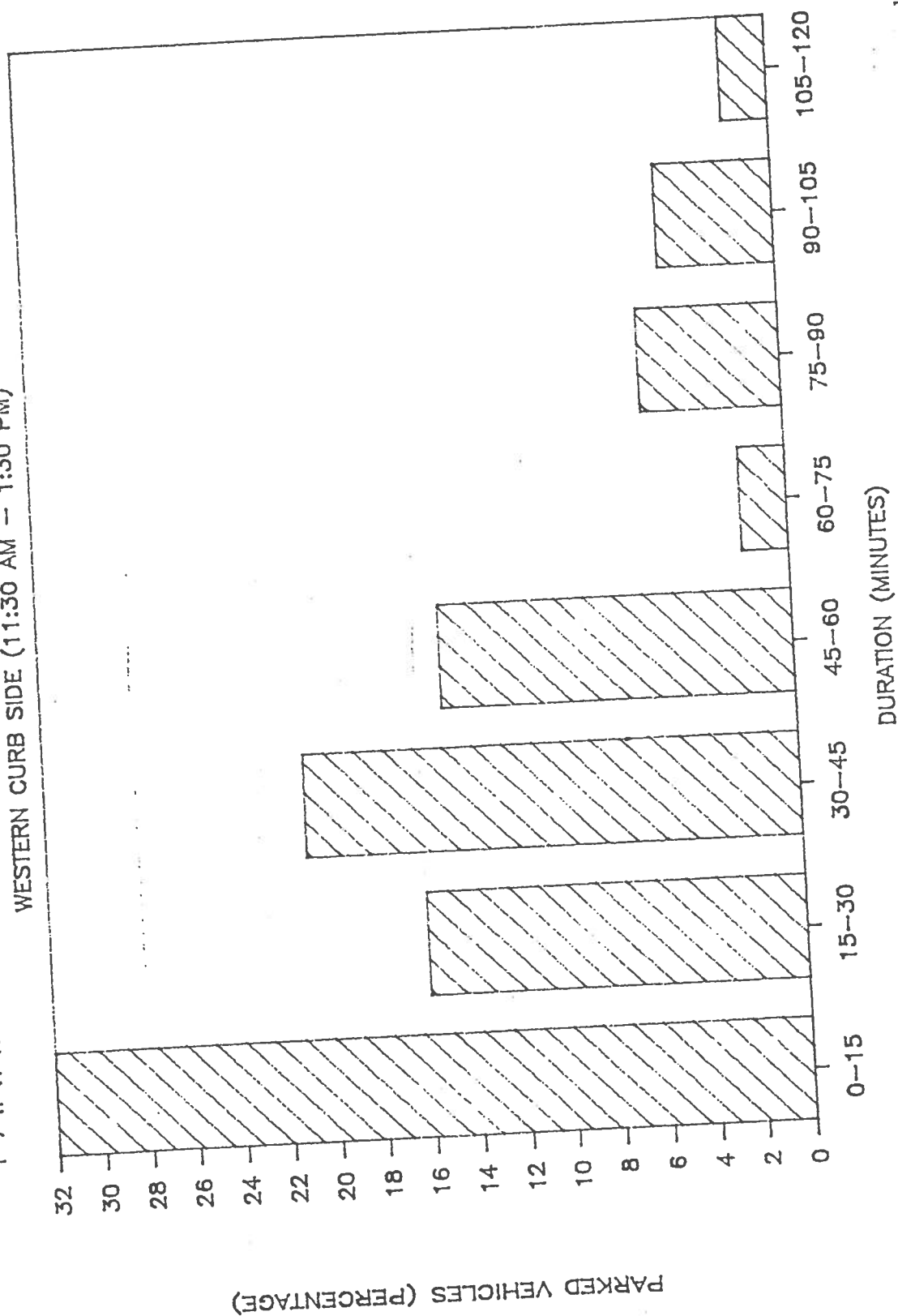


Figure 3.9 Distribution of Parking Duration at One Hour Spaces (Western Curb Side, 11:30 am - 1:30 pm)

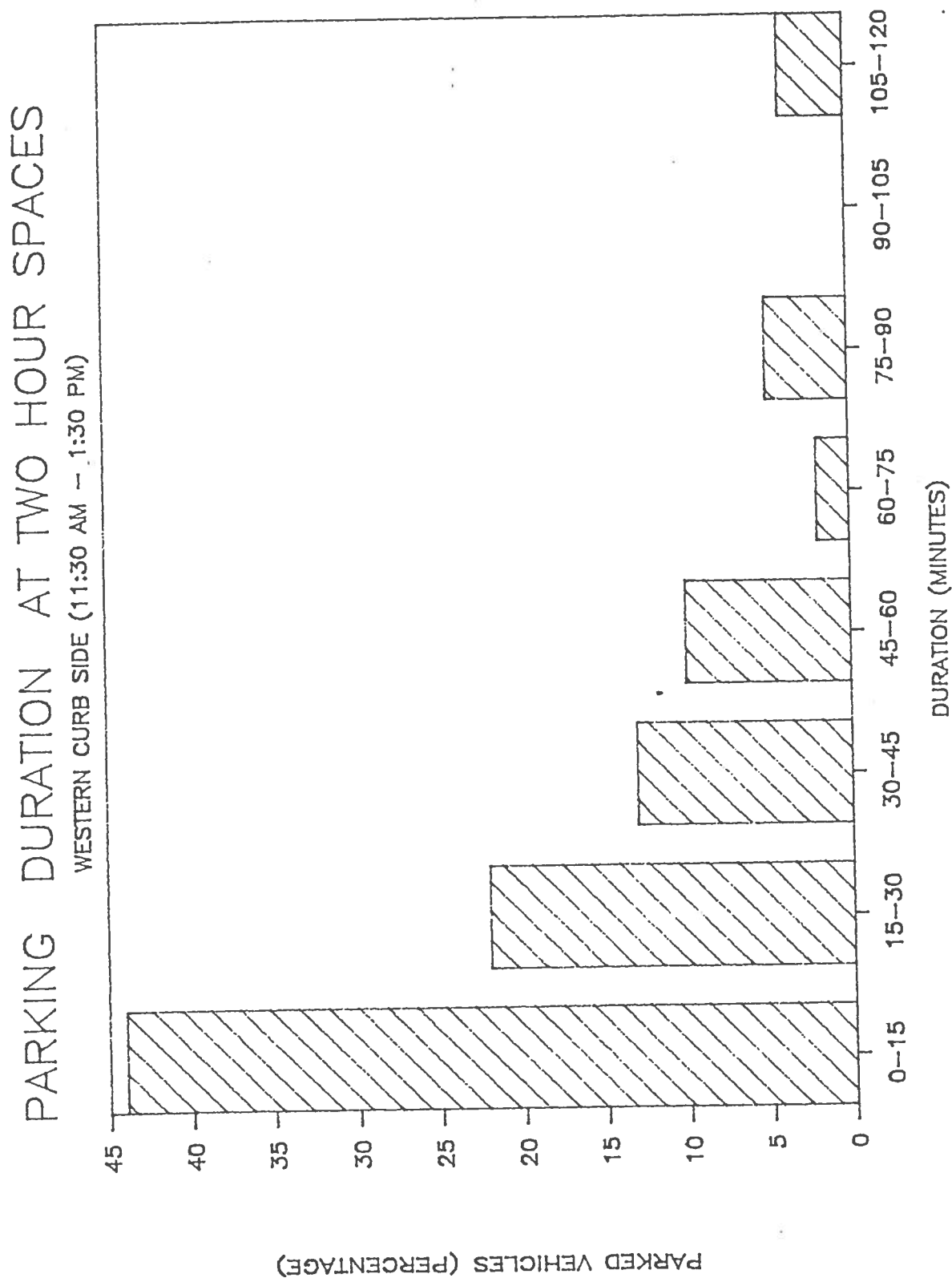


Figure 3.10 Distribution of Parking Duration at Two Hour Spaces (Western Curb Side, 11:30 am - 1:30 pm)

PARKING DURATION AT ONE HOUR SPACES

WESTERN CURB SIDE (4:30 PM -- 6:30 PM)

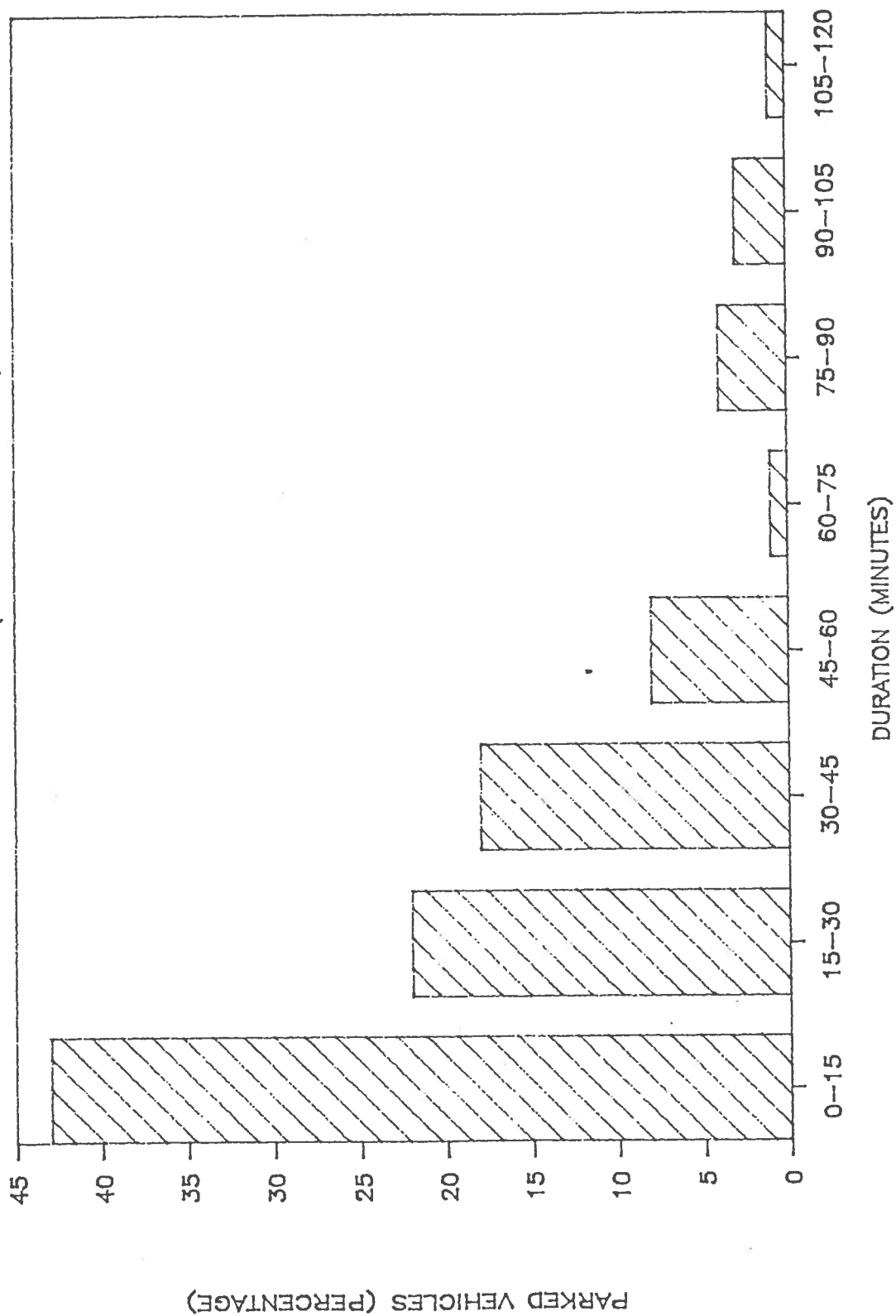


Figure 3.11 Distribution of Parking Duration at One Hour Spaces (Western Curb Side, 4:30 pm - 6:30 pm)

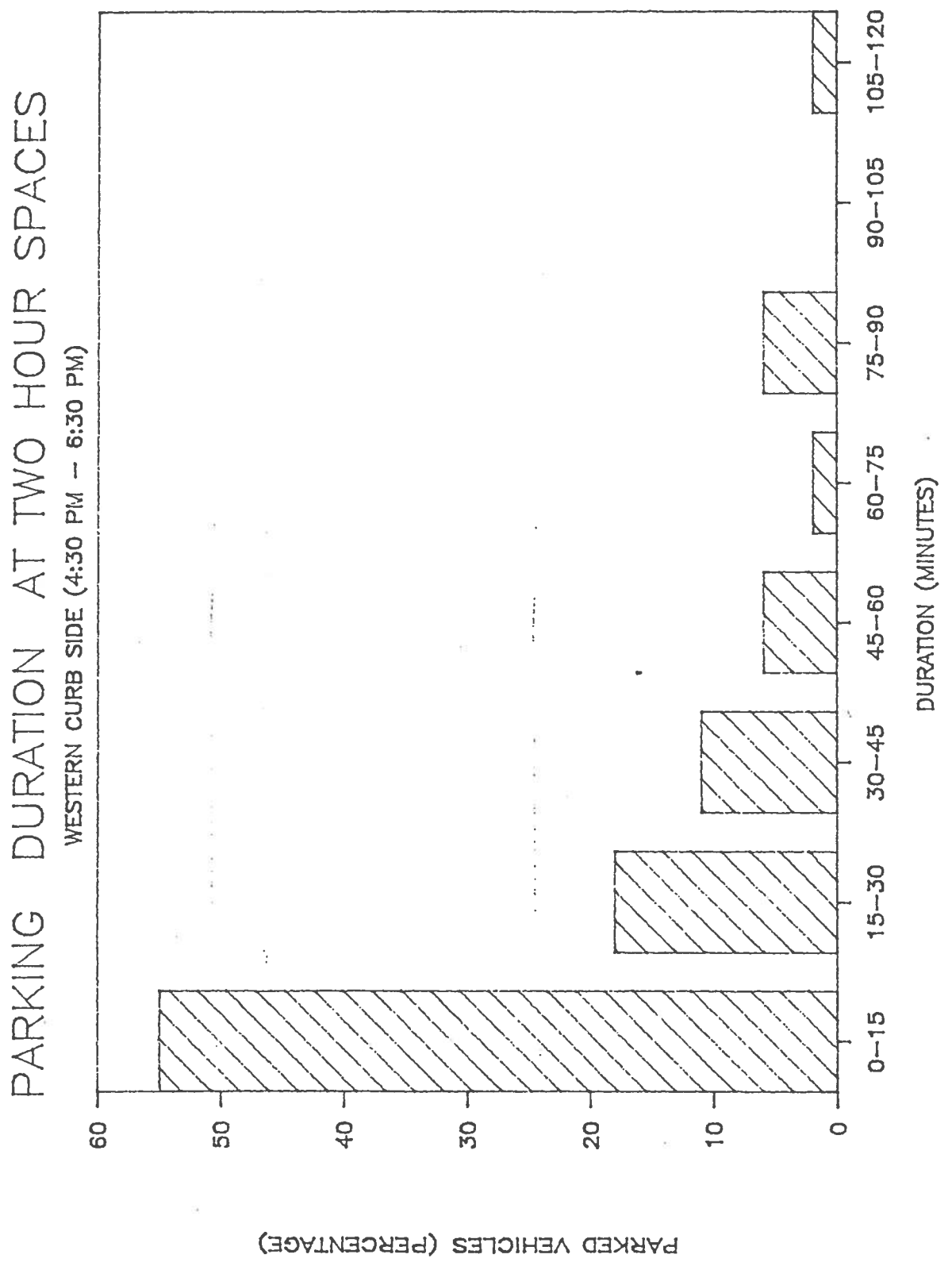


Figure 3.12 Distribution of Parking Duration at Two Hour Spaces (Western Curb Side, 4:30 pm - 6:30 pm)

PARKING DURATION AT ONE HOUR SPACES

EASTERN CURB SIDE (8:00 AM - 10:00 AM)

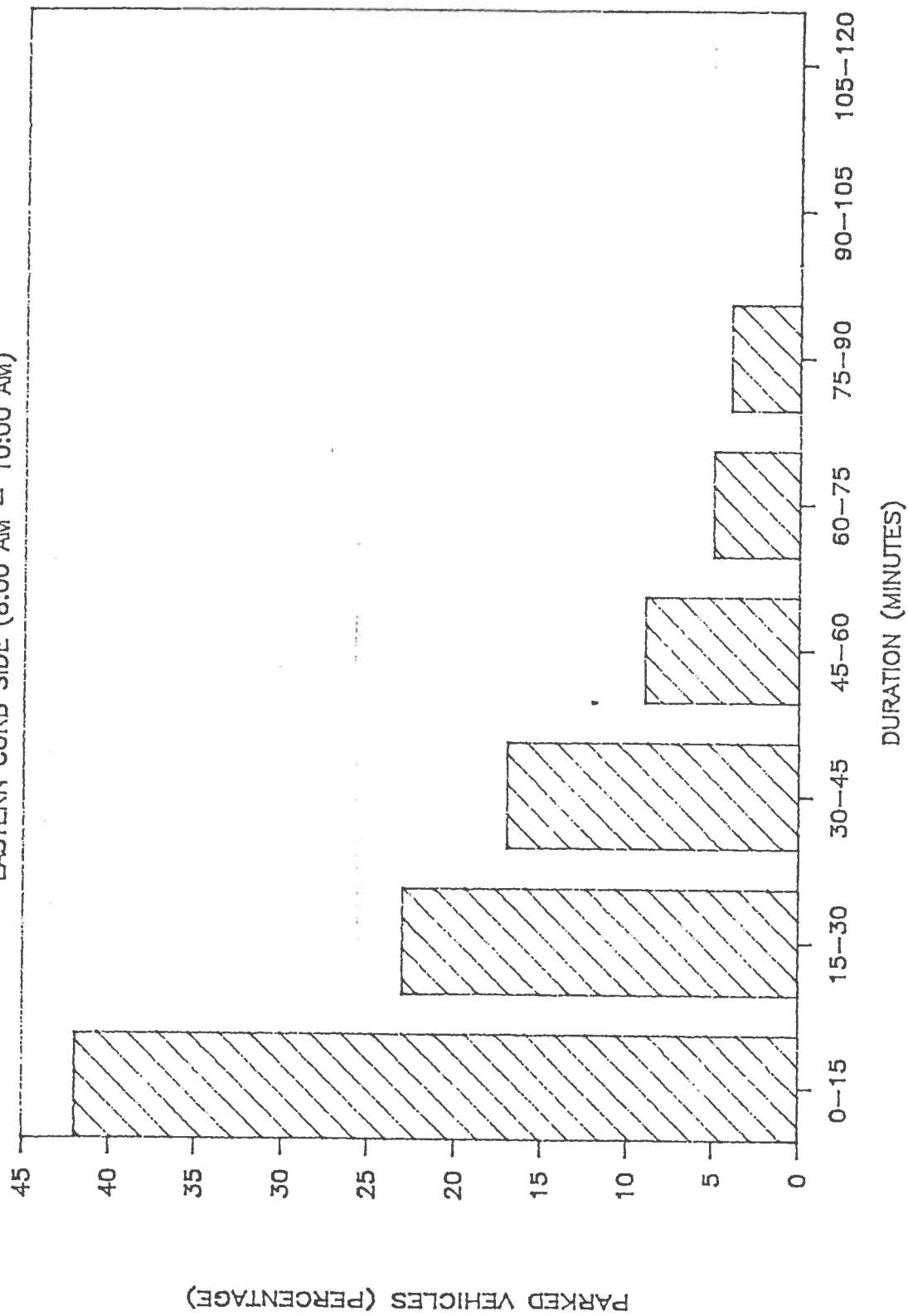
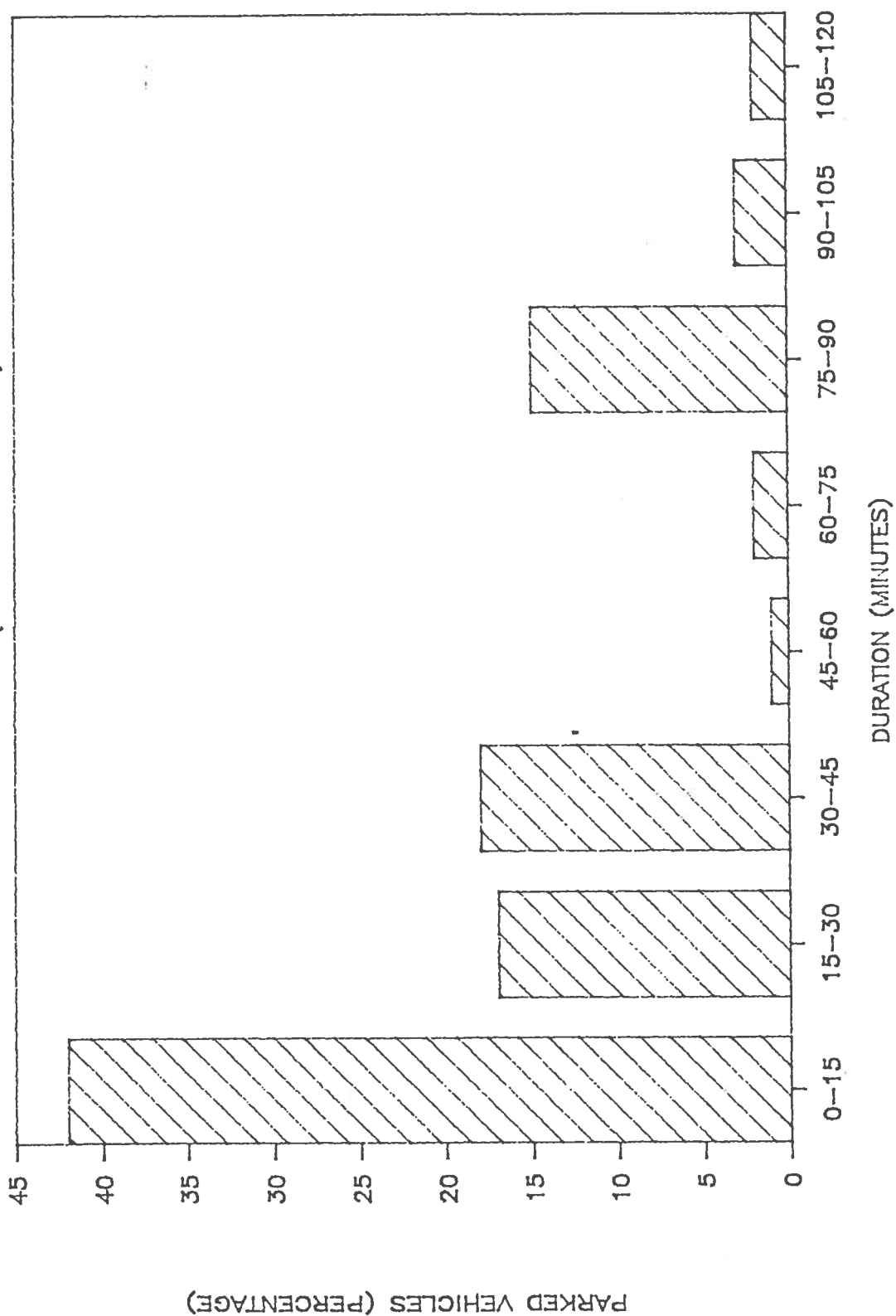


Figure 3.13 Distribution of Parking Duration at One Hour Spaces (Eastern Curb Side, 8:00 am- 10:00 am)

PARKING DURATION AT TWO HOUR SPACES

EASTERN CURB SIDE (8:00 AM - 10:00 AM)



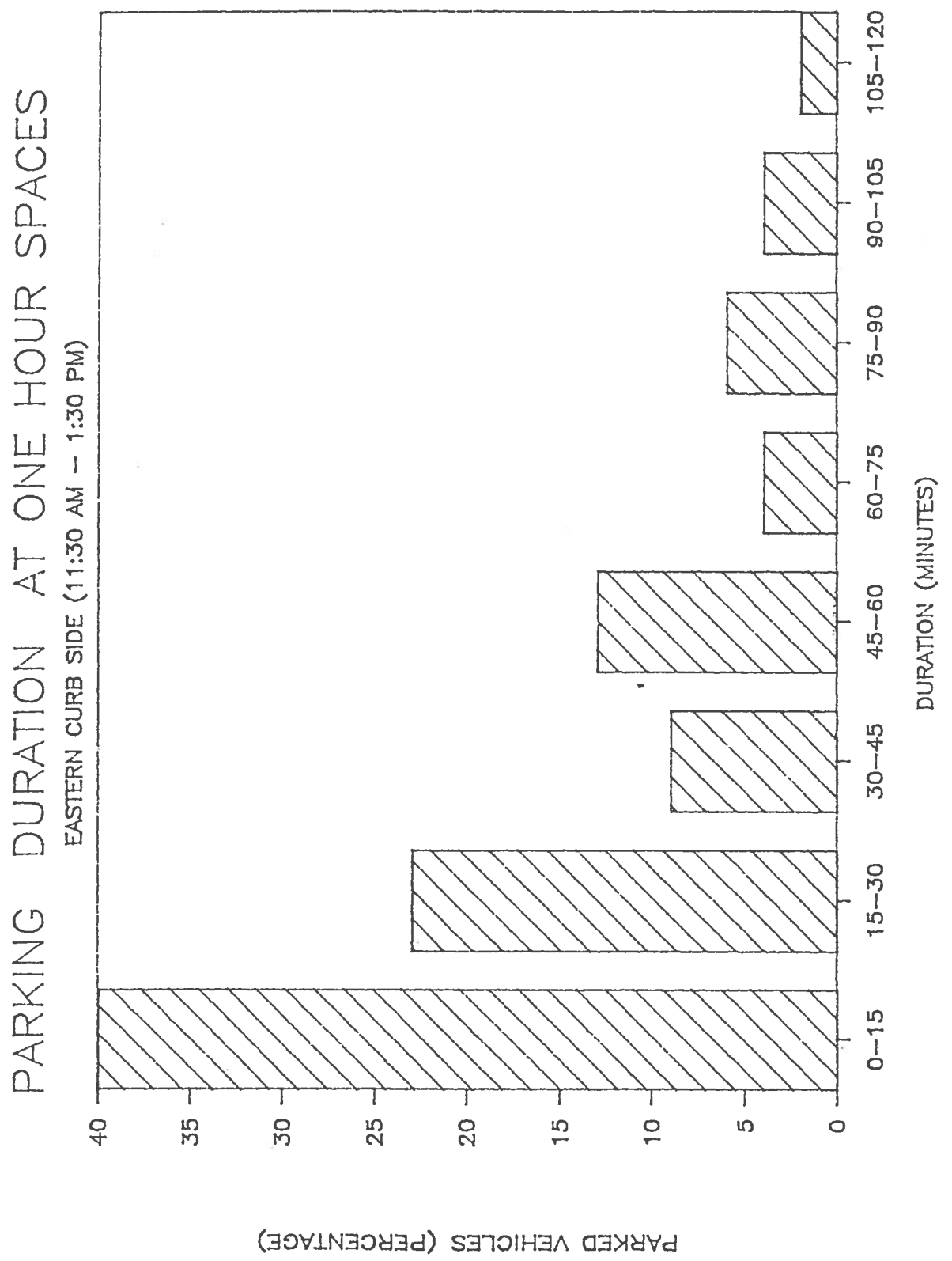


Figure 3.15 Distribution of Parking Duration at One Hour Spaces (Eastern Curb Side, 11:30 am - 1:30 pm)

PARKING DURATION AT TWO HOUR SPACES

EASTERN CURB SIDE (11:30 AM - 1:30 AM)

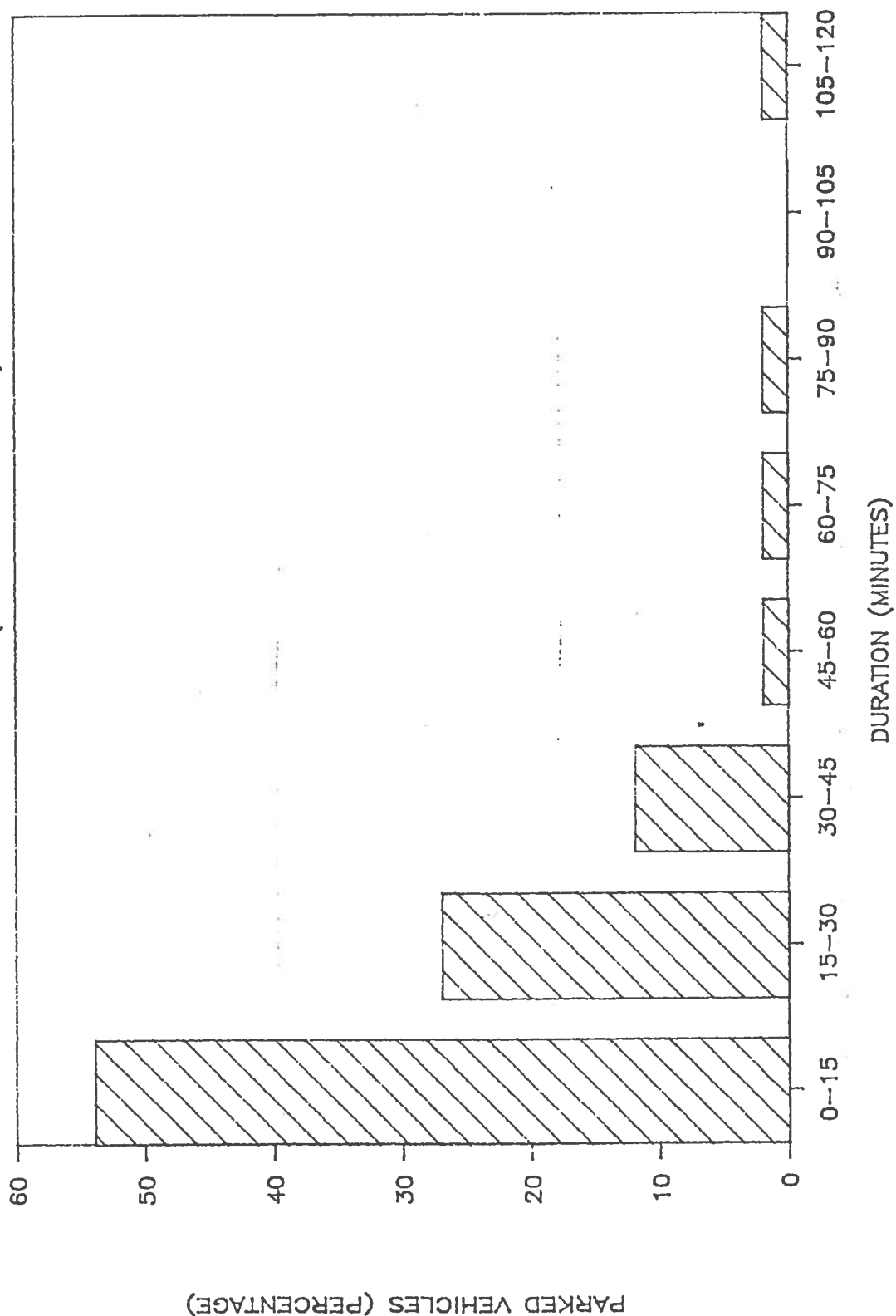


Figure 3.16 Distribution of Parking Duration at Two Hour Spaces (Eastern Curb Side, 11:30 am - 1:30 pm)

PARKING DURATION AT ONE HOUR SPACES

EASTERN CURB SIDE (4:30 PM - 6:30 PM)

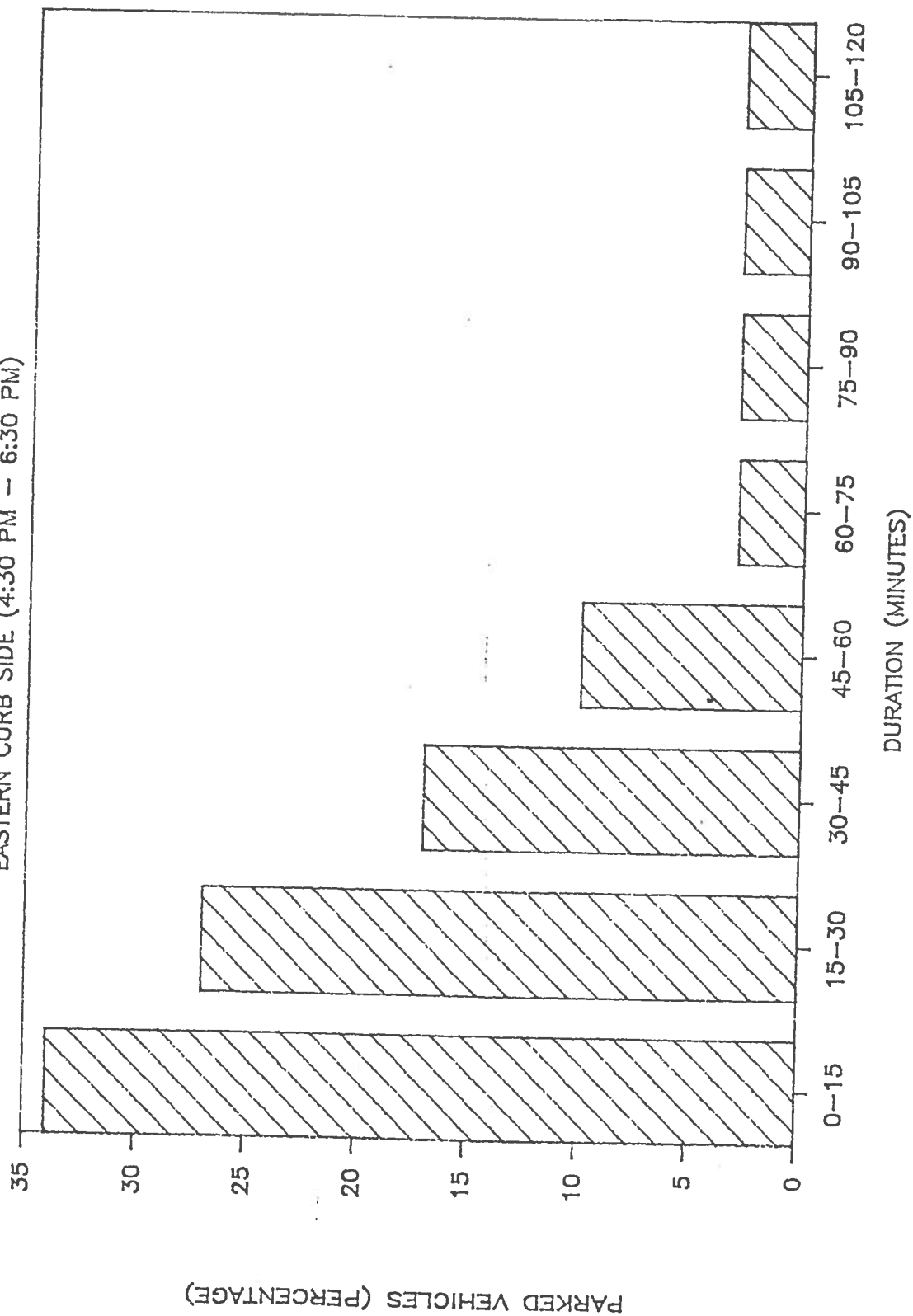


Figure 3.17 Distribution of Parking Duration at One Hour Spaces (Eastern Curb Side, 4:30 pm - 6:30 pm)

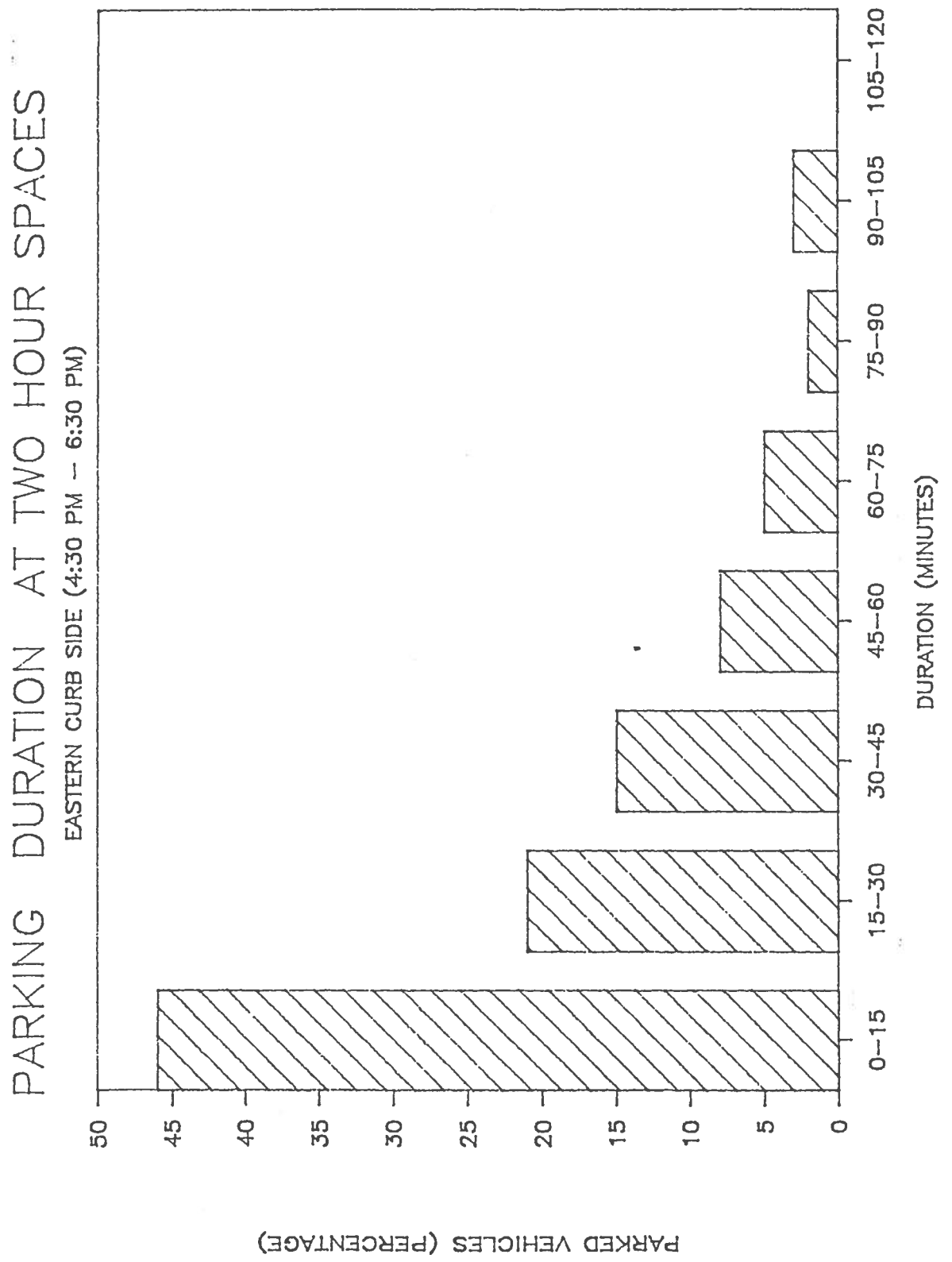


Figure 3.18 Distribution of Parking Duration at Two Hour Spaces (Eastern Curb Side, 4:30 pm - 6:30 pm)

Parking Violations

The predominant type of violation was found to be the overstaying of the time limit. The vehicles found parked in the illegal spaces and on the loading/un-loading zone were found to be negligible. Table 3.12 shows the percentage of vehicles which overstayed the time limit.

Table 3.18 Percentage of Vehicles overstaying the Time Limit

Curb Side	Time interval		
	8:00 - 10:00 am	11:30 am - 1:30 pm	4:30 - 6:30 pm
Western	6.5	6.3	4.0
Eastern	13.0	16.0	27.0

Conclusions and Recommendations

* In general the traffic flow conditions were found to be acceptable. However, in few locations, such as the section between Alcatraz Avenue and Claremont Avenue, congestion exists due to intense business activities, combined with angular parking and loading and un-loading from travel lanes.

* At Claremont Avenue, although the level of service seems to be acceptable, the vehicles turning left from Claremont Avenue onto College Avenue not only block the through vehicles, but often were observed to rush through small gaps between the opposing vehicles, which might be dangerous for the pedestrians crossing College Avenue. A separate green phase might be provided for the left turning vehicles, instead of the present permitted left turns. Further analysis, providing a separate green phase to the vehicles turning left from Claremont, using the CALSIG signal

timing program, indicates that there will not be any serious increase in delay if such a provision is made.

* Parking violations, predominantly in terms of overstaying was found to be higher during the midday and evening times. Enforcement measures might be stepped up during these periods. Alternatively, the permitted duration might be increased if it is found that larger parking periods are needed

* Parking demand was found to be higher at sections between Claremont Avenue and Chabot Avenue and Shafter Avenue and Manila Avenue, the areas with more intense business activities. Additional parking should be provided as developments proceed, since the on-street metered parking is not able to absorb very many additional vehicles.