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Parking on Residential Streets

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PARKING ON RESIDENTIAL STREETS

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I. PROBLEM STATEMENT

An important part of the parking problem in Rockridge is the one of nonresidents parking on residential streets. Many residents complain of returning home from work in their cars and finding no space on their street to park. While every side street off of College Avenue is affected by the shopping district's customers, employees, and owners, some areas are additionally impacted by BART commuters, casual carpoolers, and students at the California College of Arts & Crafts.

Looking to the examples of San Francisco and Berkeley, some Rockridge residents have proposed Residential Permit Parking as a solution for the neighborhood. There is no neighborhood consensus behind permit parking, however. Some like the idea of giving residents priority, but strongly oppose permit parking on the principle that residents should not have to pay to park on their own street. Others oppose it on the grounds that the streetscape would be cluttered with permit parking signs. Some support permit parking wholeheartedly, while others think it is unfair to commuters. Still others don't think there is a problem at all.

Regardless of the prevailing opinions on the desirability of permit parking, important questions remain about its effectiveness. For example, even if a permit parking program was instituted, it is not at all certain that more spaces would be freed up for residents. More short-term nonresident parkers may be lured to the side streets once the long-term non-residents vacate those spaces. Increasing numbers of short-term parkers may create traffic problems, as would the scenario of local employees

moving their cars every two hours. Above all, effective enforcement is vital to the success of any permit parking program.

Given this background, the primary purpose of this paper is to evaluate the potential effectiveness of Residential Permit Parking for the Rockridge community. Findings are based on field research undertaken during Spring 1987. Additionally, the paper will give some thought to some possible "side effects" of a permit parking program - spillover effects, changes in the demand for metered parking and off-street parking, and economic impacts on the College Avenue shopping district. As a background to all future discussion, however, a look at the city's Residential Permit Parking ordinance will be required.

II. THE OAKLAND RESIDENTIAL PERMIT PARKING ORDINANCE

Oakland ordinance # 10689, passed February 4, 1986, provides for the establishment of a city-wide Residential Permit Parking program. Modeled after the San Francisco and Berkeley ordinances, the Oakland ordinance enables neighborhoods that can demonstrate both a sufficiently severe parking problem and sufficient neighborhood support for a permit parking program to have one designated by the city. The key elements of the ordinance are summarized in Table 1.

III. METHODOLOGY FOR PARKING STUDY

In order to assess the feasibility of a Residential Permit Parking program, a series of parking studies was conducted in Rockridge. The data from these studies were then analyzed, and

TABLE 1

KEY ELEMENTS OF OAKLAND'S RESIDENTIAL PERMIT PARKING ORDINANCE

Criteria for Establishment of an RPP District:

Minimum size of RPP District: 6 adjacent block fronts.

Petitions indicating support from at least 51% of household units in proposed area.

AT LEAST 75% OF ALL LEGAL ON-STREET PARKING SPACES WITHIN THE PROPOSED AREA MUST BE OCCUPIED during any two one-hour periods between 8:00 AM and 6:00 PM.

Permit stickers in a number representing at least 50% of all residences or 15 stickers, whichever is less, must be purchased before signs will be installed. If the required number of stickers is not purchased within 90 days of City Council action establishing the district, the district may be voided.

Cost to Residents: \$25 per vehicle for the first year,
\$15 per vehicle for each year thereafter.

Time Limits: Either 2-Hour or 4-Hour time limits can be established for those not exempted with stickers.

Time of Day in Effect:
Most districts will have permit parking in effect between 8:00 AM and 6:00 PM, but nighttime parking restrictions are not ruled out by the ordinance.

Areas of Responsibility:

Petition signature-gathering: Residents
Submission of valid petition: Residents
Occupancy study to determine 75% compliance: City
Administration of program: City

provided the background for the findings and conclusions. The main tasks can be summarized as follows.

TASKS

1. Based on a) field work and b) consultations with transportation planners, neighborhood residents, and others:
a) define a study area relevant to the residential permit parking issue:
b) select an initial sample of street segments in the Rockridge area for further data collection and analysis. (See Figure 1.)
2. Using the sample of streets defined in Task 1, perform an occupancy check during the following times:
5:00 - 6:30 AM
12:30 - 2:00 PM
5:30 - 7:00 PM.
These hours were selected to represent the period before nonresident arrival, the middle peak, and the evening peak, respectively. Due to resource limitations, it was not possible to collect data all day long.
3. Based on the information from Tasks 1 and 2, define a smaller sample of street segments which meet the City of Oakland RPP ordinance occupancy requirements, to be used for a more detailed license plate survey. (See Figure 2.)
4. Perform a license plate survey at one-hour intervals on the streets chosen in Task 3, conducted on a typical weekday during the hours of 5 - 6 AM, 11 AM - 2 PM, and 4 - 7 PM. As in Task 2, these hours were selected to represent pre-nonresident, midday peak, and evening peak conditions. Again, resource limitations prevented a full day of data collection.
5. Distinguish data into resident and nonresident vehicles for further analysis.
6. Based on occupancy data from Task 4, estimate the number of on-street spaces in the study area, and the occupancy on those streets.
7. Using the data from Task 5, calculate occupancy, duration, and capacity utilization for nonresidents and all parkers by blockface, potential RPP districts and all surveyed streets.
8. Summarize and interpret the occupancy, duration, and capacity utilization results to evaluate the effectiveness of Residential Permit Parking in various areas of Rockridge. Consider the possible "side effects" of such a program.

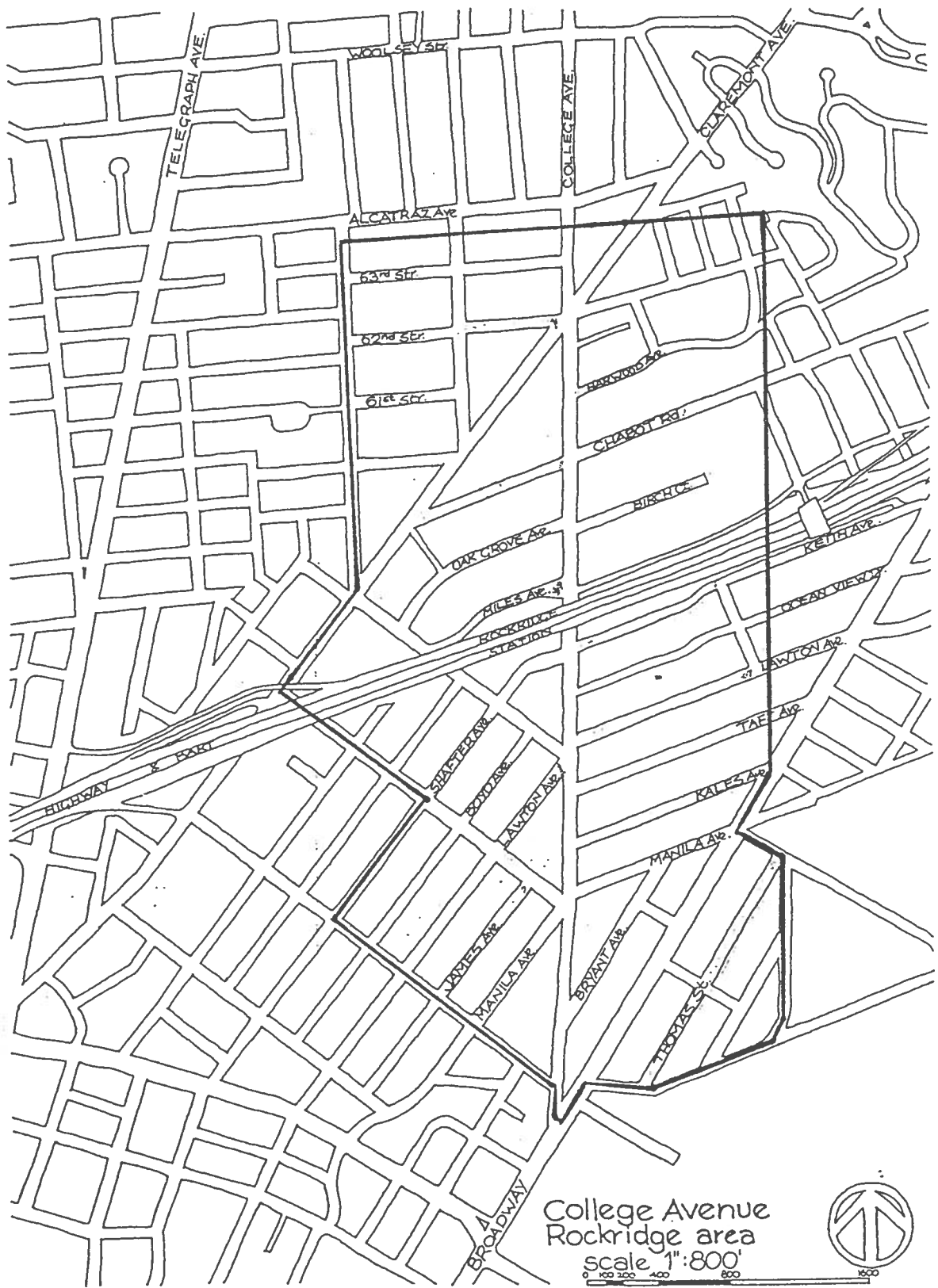


Figure 1: Occupancy Study Streets

— : Occupancy Study Streets

— : Study Area



Figure 2: License Plate Survey Streets

 : Northern route streets
  : Southern route streets
  : Study Area

9. Summarize the research into a draft report, to be presented to other members of the research team for review.
10. Prepare final report for presentation to the public.

Several of the tasks listed above require a more detailed description in order to provide an adequate background for discussing the findings.

Task 2: The Occupancy Survey

An occupancy survey is performed by walking down a given street and counting the number of cars parked in legal spaces, the number of illegally parked cars, and the number of unoccupied legal spaces. The number of legal spaces is the capacity of the street. The occupancy ratio is calculated by dividing the number of legally and illegally parked vehicles by the number of legal spaces. The occupancy ratio can exceed 1.0 if the number of illegally parked vehicles exceeds the number of unoccupied legal spaces.

Task 4: The License Plate Survey

The license plate survey was conducted as follows: first, the selected streets were broken up into two routes, each of which could be completed in one hour. They consisted of a northern route (62nd St., Harwood, Chabot and Miles) and a southern route (Keith, Lawton, and Thomas.) (See Figure 2.) A form was set up for each street, with one line for each legal space and some extra room on the form for recording illegal parkers. During the first pass through the route, the last three digits of each vehicle's license plate was recorded on the line corresponding to the space

that the vehicle occupied. In the next pass, if the same vehicle still occupied the same space, it was checked off. If a different vehicle occupied the space, the last three digits of its license plate were entered. If the space was vacant, a hyphen (-) was entered. This process continued throughout the day.

The main advantage of a license plate survey over the more simple occupancy survey is that it provides information on vehicle duration. Since parking duration is one of the most important variables affecting the feasibility of a permit parking scheme, the license plate survey was by far the most important data collection effort.

Task 5: Distinguishing Residents from Nonresidents

Understanding the parking characteristics of nonresidents is crucial for any feasibility evaluation of permit parking. These characteristics largely determine the effectiveness of a permit parking scheme, because they facilitate the comparison of parking conditions on a street before and after the implementation of a permit parking district.

In order to distinguish residents from nonresidents, each LP survey street was surveyed between 5:00 and 6:30 A.M. The assumption was made that any vehicle parked on the street before 6:30 A.M. belonged to a resident. The only places where the 6:00 to 6:30 period could involve significant numbers of nonresidents were streets with significant numbers of casual carpoolers (62nd St.) or BART parkers (Miles, Keith). In both of these cases, data were collected before 6 AM to avoid possible data contamination by nonresidents.

Task 7: Duration and Capacity Utilization Calculations.

Duration calculations based on license plate survey data that represents three distinct time periods involve a number of assumptions that are worth documenting. To do this, a situation will be considered in which a license plate survey was collected between 8 AM and 10 AM and between 1 PM and 3 PM. Several different cases of data combinations are possible, each of which requires certain assumptions. The cases can be summarized as follows:

	8 AM	9 AM	10 AM	11 AM	12PM	1 PM	2 PM
Case # 1	BYG	x	(NO OBSERVATIONS)			x	x
Case # 2	BYG	x				-	-
Case # 3	-	-				453	-
Case # 4	963	x				084	x

Case # 1:

Assume that the vehicle stayed in the space during the unobserved hours.

Case # 2:

Shortest possible duration = 1 hour. (i.e. arrived just before 8 AM observation, left just after 9 AM observation.)

Longest possible duration = 5 hours. (i.e. arrived 8 AM, left at 1 PM (just before 1 PM observation))

Case # 3:

Same principle as # 2 - Avg. duration = 2 hrs. (could have arrived as early as 9 AM (just after 9 AM observation) or as late as 1 PM (just before 1 PM observation), so the duration must have been between 0 and 4 hours.)

Case # 4:

Average duration for each vehicle works out by dividing the 3-hour period with no observations (10 AM - 1 PM) in half and adding half to the "base" duration of each vehicle, i.e. the average duration of vehicle 963 if only 8 AM and 9 AM observations are considered.

Resulting duration: 963: 3 hrs. (1.5 Base)

To summarize: Average duration = ((Avg. of observed hours) + (1/2 of the unobserved hours)). Assuming that a vehicle is parked

during half of the unobserved hours may overestimate duration, because one would expect more vehicles to park on the short-term side of the average duration than on the longer side. In the absence of an explicit duration assumption based on a particular probability distribution, the (1/2) assumption was made.

IV. FINDINGS

A. Overall Occupancy (Figure 3)

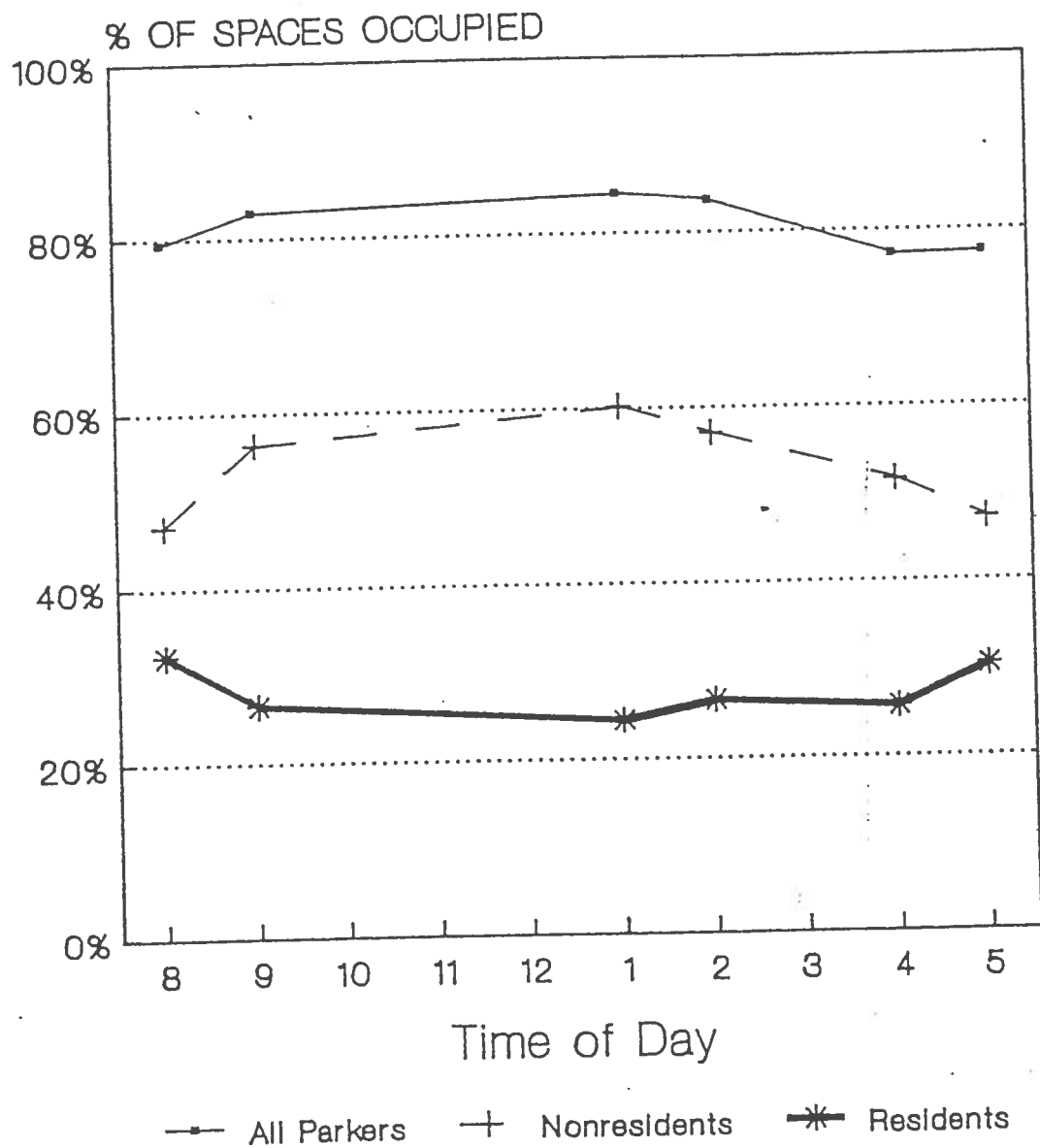
As Figure 3 indicates, at least 80 percent of the legal spaces on the license plate survey streets were occupied between 8 AM and 3 PM, and the average occupancy for all streets never fell below 75 percent. Although the precondition for doing the license plate survey on the street was that the street met the Oakland ordinance's 75 percent minimum occupancy requirement, these data confirm that the streets chosen (and probably most streets surrounding them) are eligible for the program from the standpoint of the occupancy requirement. Thus, the potential Residential Permit Parking area in Rockridge is quite extensive; it covers most of the side streets within one block of College from the Berkeley border to around Lawton Avenue. Streets further south than Lawton, except for Thomas, Bryant, and others affected by CCAC, tend to have lower occupancy levels than those north of Lawton.

Another interesting pattern in overall occupancy is that of the residents and nonresidents. (See Figure 3.) The residents' share of total occupied spaces is at a peak of 33 percent at 8 AM, when many residents have not yet left for work or school. Residential parking occupancy declines to a low point at 1 PM, and then gradually picks up as people return home. Not surprisingly,

Figure 3

PARKING OCCUPANCY

Residential Streets



Based on 3/25/87 License Plate Survey

nonresidential parking occupancy displays a mirror image pattern in relation to residential occupancy. Nonresidents' share of total occupied spaces increases from about 55 percent (45%/80%) in the morning to about 70 percent at 1 PM, and declines back to 55 percent in the early evening. Therefore, if a permit parking program was instituted, the greatest potential for reducing parking demand would be during the middle of the day.

B. Parking Characteristics of Non-Residents

1. Average Duration per Vehicle (Figure 4)

As the figure shows, the average duration per nonresident vehicle varies a great deal from street to street. On Keith and Miles, the high averages reflect the abundance of BART parkers, while the low average durations on Harwood and Chabot reflect a strong influence of shoppers and a relative lack of long-term parking. With an average between that of Harwood/Chabot and Miles/Keith, 62nd Street is an interesting combination of the previous two cases. Although it attracts the College & Claremont area shoppers like Harwood and Chabot, 62nd is also a major pick-up point for casual carpoolers, and many carpooling passengers leave their cars on 62nd during the entire workday. Thomas Street's average duration, also higher than Harwood or Chabot, reflects the parking patterns of students at the California College of Arts & Crafts.

These average duration figures have interesting implications with respect to the issue of 2-hour versus 4-hour time limits, the two choices specified in the ordinance. Since four out of eight streets have an average duration of under four hours, and two more

PARKING DURATION

Non-Residents Only

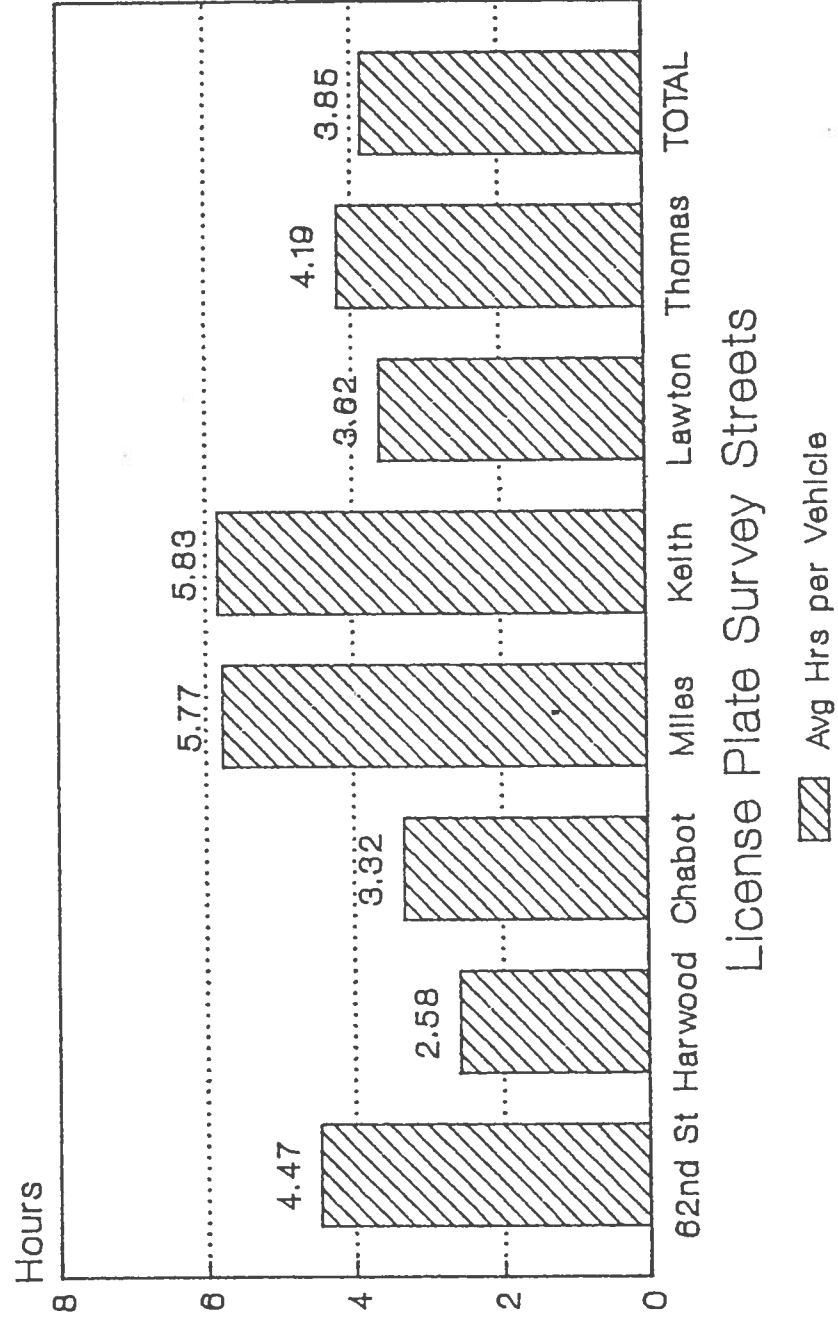


Figure 4

Based on 3/25/87 License Plate Survey

are not much above that, the conclusion that a 4-hour time limit is useless except on Miles and Keith could easily be drawn. Before jumping to any conclusions, however, two other perspectives on the non-resident duration data will be provided.

2. Duration Breakdown

The first perspective comes from the duration breakdown charts (Figures 5 and 6). Figure 5 shows the number of nonresident vehicles displaced by street under a 2 hour limit, and Figure 6 does the same with a 4 hour limit. On each chart, 62nd Street, Chabot, and Lawton each represent a 4-blockface area that could be the nucleus for a permit parking district. Figure 5 indicates that about 200 non-resident long-term vehicles are parked in these three areas on a given day. Given effective enforcement, it is reasonable to assume that if each of these areas became a 6-block RPP district, approximately 300 long-term vehicles could be displaced from these streets. Under a 4 hour limit, a total of $(139 \times 1.5) = 209$ nonresident vehicles could be displaced if these three areas each became 6-blockface districts. These results will be discussed more fully in the conclusions.

3. The Role of Parking Capacity (Figure 7)

This chart explains the effect of different time limits on the availability of on-street parking. Capacity is defined here in terms of "space-hours", a term that requires some clarification. The number of "space-hours" of parking available in a given area is determined by multiplying the number of

DURATION BREAKDOWN

Non-Residents Only

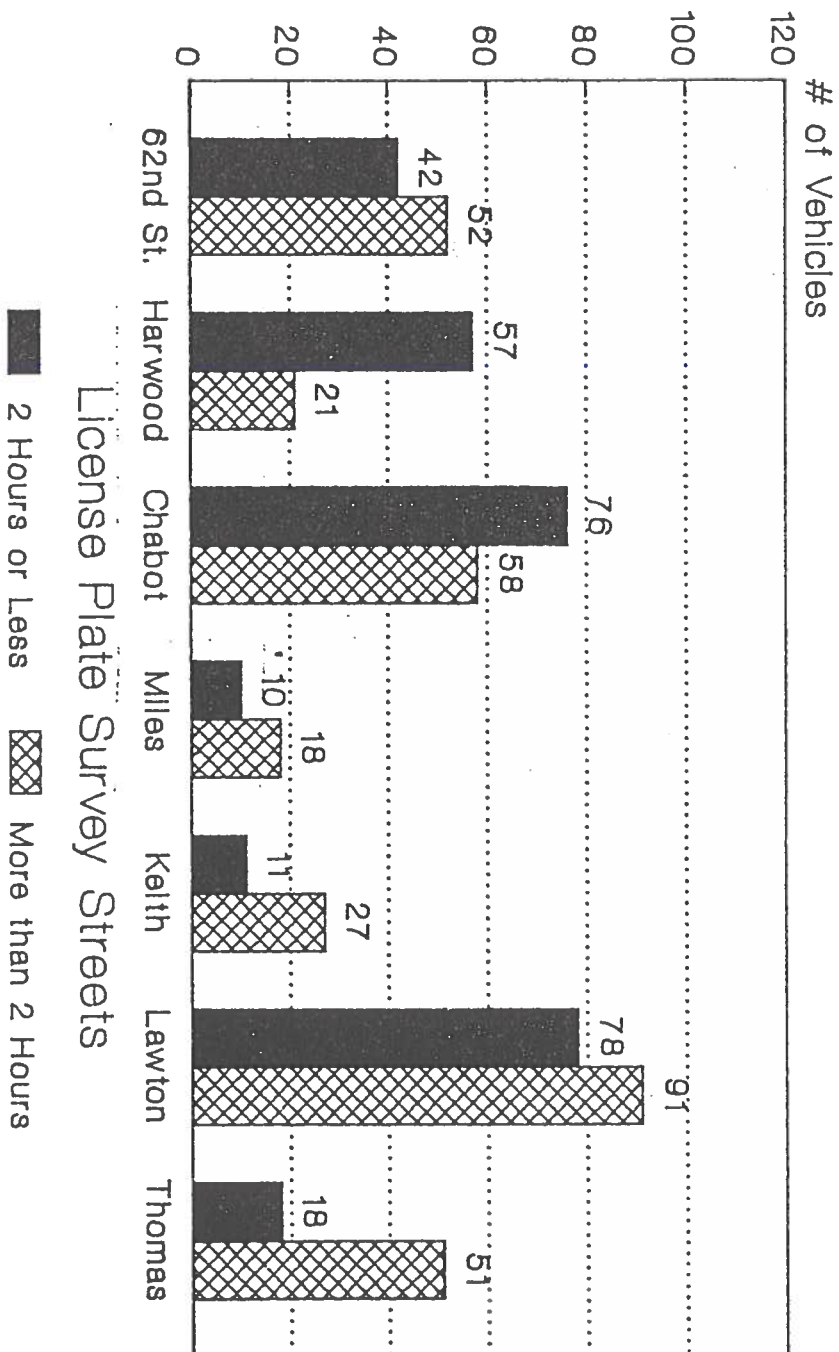


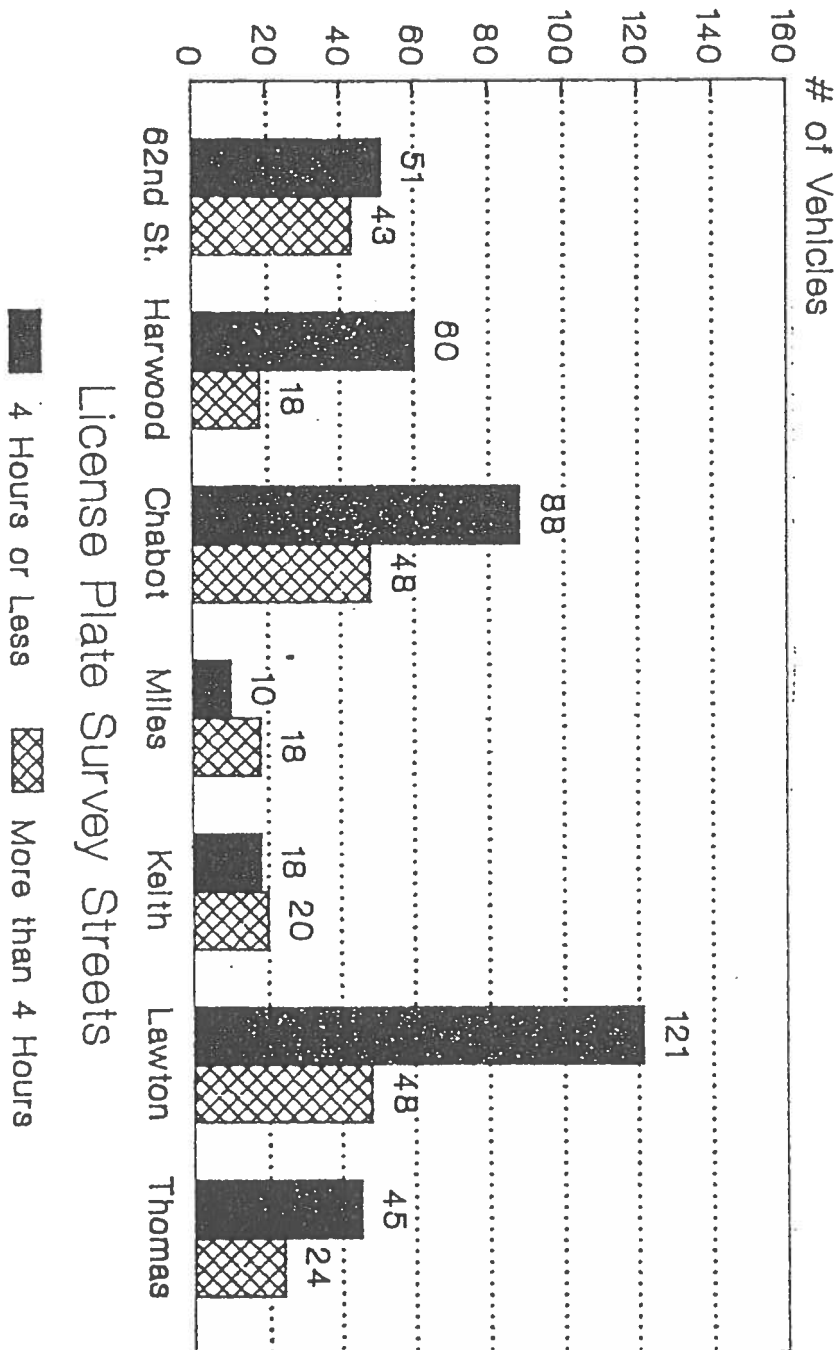
Figure 5

Based on 3/25/87 License Plate Survey

DURATION BREAKDOWN

Non-Residents Only

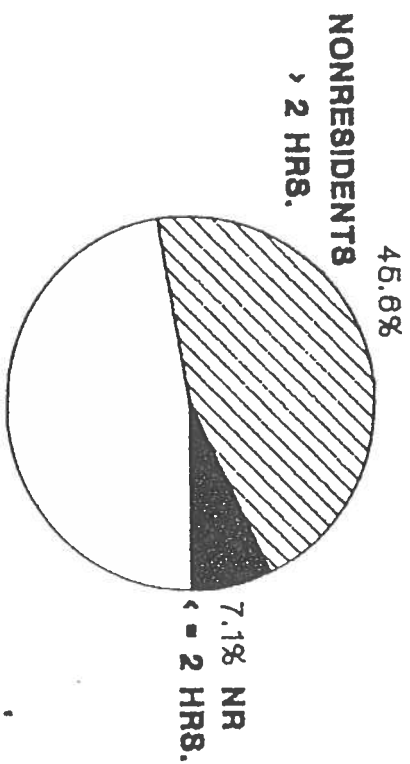
Figure 6



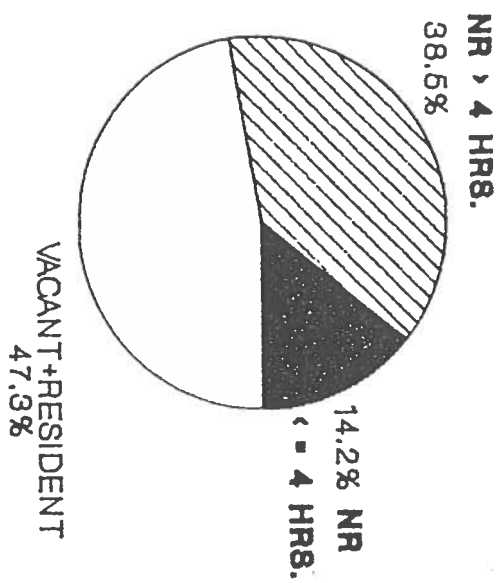
Based on 3/25/87 License Plate Survey

Availability of Parking under RPP 2 Hr. vs. 4 Hr. Time Limit

2 HOUR LIMIT



4 HOUR LIMIT



Percent of Capacity

Percent of Capacity

Total Capacity = 4520 space-hours

Figure 7

available legal spaces by the number of hours in the analysis period. For example, there are 452 total legal spaces in the sample of license plate survey streets, and our analysis period runs from 8 AM to 6 PM, so $(452 \times 10 \text{ hours})$ yields a total capacity of 4520 space-hours. The importance of this measure with respect to the availability of parking under a Residential Permit Parking program is illustrated by the fact that one vehicle parking for 10 hours uses up the same amount of capacity (in space-hours) as 10 vehicles each parking 1 hour. Thus, long-term vehicles use proportionally more space-hours than short-term vehicles. Since the success of a permit parking program is primarily measured in terms of the effect that removing long-term vehicles has on the availability of parking, the amount of capacity made available under different scenarios is worth looking at. Figure 7 compares the amount of capacity made available under a 2 hour limit with that under a 4 hour limit. Under a 2 hour limit, 45.6% or 2061 space-hours would be made available, while a 4 hour limit would make 38.5% more capacity (1740 space-hours) available. Theoretically, a 2 hour limit would free up the equivalent of 68 all-day parking spaces in each parking area, while a 4 hour limit would free up 58. These results argue that there is not much difference between a 2-hour limit and a 4-hour limit. In practice, however, a 2 hour limit would have a much more discouraging influence on nonresidents, possibly because most areas that have implemented permit parking have used a 2 hour limit. Partly because it is less frequently seen, and partly because it is less stringent, a 4 hour limit communicates that the neighborhood has a parking problem, but it is not as bad as those

with a 2 hour limit. Not too many neighborhood activists whose parking problem leads them to go to the trouble of implementing permit parking want to send out that kind of message.

V. CONCLUSIONS

A. Summary List of Conclusions

1. Implementing a Residential Permit Parking program in Rockridge could achieve the stated goal of removing long-term nonresident vehicles from neighborhood streets.
2. In areas of permit parking districts that are within easy walking distance (5 min. or less) from College Avenue, short-term nonresident vehicles will absorb the spaces vacated by long-term nonresidents.
3. Non-resident long-term vehicles will spill over into nearby non-permit parking areas, and will encourage those areas to establish their own permit parking districts.
4. Residential Permit Parking will increase the demand for off-street parking near College Avenue.
5. Effective enforcement is crucial to the success of a permit parking district in keeping out long-term nonresident vehicles.
6. While effective in theory, a 4 hour time limit has too many problems to be effective in practice.

B. Discussion of Conclusions

1. The information given in the findings adequately proves the potential effectiveness of permit parking in Rockridge. In the wording of the conclusion, the key word is "could": the subsequent conclusions address the conditions that would have to be met for the program to work in practice.
2. According to the Rockridge Customer Survey, 57% of all customers found unmetered parking (on residential streets) within 2 blocks of their College Avenue destination, while only 21% parked at meters. Clearly, if convenient free parking is available on residential streets, customers will prefer that to metered parking along College Avenue. Since a permit parking program will create an increased supply of short-term parking, one can expect that it would be used, and that the use of metered parking along College would decrease.
3. Given that few long-term nonresidents coming to the Rockridge district use transit, it can be assumed that available on-street parking within 1 or 2 blocks of a new permit parking district would absorb the majority of displaced nonresident parkers. It is important to note that the spillover effect would most likely occur from one parallel block to another, (i.e. from Lawton to Taft) rather than further away from College on the same residential street. Furthermore, the increased long-term parking on the non-RPP street would encourage that street to become part of the permit parking as well.
4. Even if only 3 or 4 permit parking districts were established, there would be an appreciable increase in the demand for off-street parking in Rockridge. If the spillover effect explained above induced more streets to join the program, the demand would increase even more. The problem is especially acute for employees with few transit alternatives. Based on Mundo's estimates of 900-1000 employees, 66% of those who drive alone, and 72% of those who drive alone parking on residential streets, between 425 and 475 employee parkers could be displaced by widespread adoption of permit parking in Rockridge. For those permit parking advocates concerned about traffic and increased commercial development in Rockridge, the possibility of 400+ new off-street parking spaces is a side effect worth being concerned about.
5. Because the habit of parking on residential streets has become so engrained for so many nonresidents, enforcement of permit parking will have to be both timely and consistent. A lack of effective enforcement could allow the same nonresidents to continue parking on the same streets, and residents would have to pay \$25 per year for the same parking conditions that led them to pursue the program in the first place.