

POPULATION AND HOUSING
IN THE
SPECIAL STUDIES ZONES

by

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Special Publication
Number 1

**Natural Hazards Research and Applications
Information Center**





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ABSTRACT

The Alquist-Priolo Special Studies Zones were defined to encompass areas in California containing active or potentially active earthquake fault traces. This paper analyzes the population and housing composition of these areas, comparing and contrasting special studies zones residents with the general population of California with respect to economic, ethnic, and demographic characteristics. Three major findings emerge: first, the zones are racially, ethnically and economically diverse; second, the population in the zones is slightly wealthier and includes more white persons than California as a whole; and third, the housing is slightly newer and larger. It is argued that the findings have important implications for a geologically differentiated lending policy.

PREFACE

Social science research on environment and behavior often yields results which are useful but do not lend themselves to dissemination through existing outlets. The Special Publications Series was created as a means of making such information available to interested persons.

This paper is the first in a series which will be published on an occasional basis by the Natural Hazards Research and Applications Information Center.

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POPULATION AND HOUSING IN THE SPECIAL STUDIES ZONES

Introduction

The 1972 Alquist-Priolo Special Studies Zones Act passed by the California legislature directed the state geologist to designate areas encompassing active or potentially active earthquake fault traces. These areas, termed "special studies zones," were to be mapped and their presence disclosed to prospective purchasers of property. Construction of large-scale residential projects could be approved in these areas only after a report from a geologist on the likelihood for major damage: in short, large-scale construction of buildings for human occupancy was to be initiated astride active fault traces only after serious consideration of the hazard.

The impacts of this legislation on the resale of existing property, the diffusion of hazards information to the general public, and the response of lending and real estate institutions have been studied both through surveys of buyers, real estate agents and lenders and also through sales data (Kockelman, 1980; Brookshire and Schulze, 1980; Palm, 1981). However, the population composition of the identified areas has never in itself been the object of study, and, in fact, little is generally known about the economic, ethnic, or household composition of special studies zones populations. An exception is the existence of daytime and nighttime population estimates for the San Mateo County special studies zones completed by

the Association of Bay Area Governments (ABAG) (Perkins, 1980). Even this study, however, did not attempt to provide population breakdowns by income or race, or to assess the types of housing within the county zones.

The purpose of this study was to investigate the nature of occupance of the special studies zones: the housing types and the population groups inhabiting these areas which are judged by geological investigators to be particularly susceptible to damage from surface fault rupture. Although its findings are more general than the detailed study of the population present during the day and at night within San Mateo County compiled by ABAG, it provides a useful portrait of the population-at-risk within the zones. Such information is useful not only as a form of "regional geography", but also for two practical reasons: to assess the impacts of possible changes in lending policy; and to provide useful baseline data to groups interested in communicating emergency measures or mitigation strategies to the affected population.

The importance of information about the occupance of special studies zones lies in the analysis of possible changes in lending policy. Although mandatory earthquake insurance for persons purchasing property in special studies zones or other high-risk seismic hazard areas has been considered by secondary mortgage lenders (Kaplan, Smith and Associates, 1981), the impacts of such regulations on particular population groups

has been unknown. In addition, although banks and savings and loans may wish to institute measures which would permit geographic differentiation of lending policy based on environmental hazards, interviews with lending officers have revealed that there are fears that zoning any area as inappropriate for loans or as liable to higher loan charges may make the institution vulnerable to charges of redlining or racial discrimination. When lenders and policymakers do not even know the ethnic or economic composition of areas zoned as susceptible to particular environmental hazards, any such discussions must perforce be carried out in vacua.

Agencies interested in the diffusion of emergency information or in the adoption of mitigation strategies need the sort of baseline data provided by this study. To target such information most effectively, the economic and ethnic characteristics of the population-at-risk must be identified. For example, if it were found that large numbers of inhabitants of the surface fault rupture zones were Spanish-speaking, it would be important to provide information about hazards and mitigation measures in Spanish. Since individualized information is a basic tenet of persuasive communication (Zimbardo and Ebbeson, 1970; McGuire, 1968), it is essential that agencies charged with information diffusion be aware of population composition.

Organization of the Study

In order to estimate the composition of special studies zones occupants, census tract boundaries were matched with the

boundaries of special studies zones. The entire population of a census tract crossed by special studies zones was considered to be "within the zone", unless it was clear from the land use maps of the zones that the major population center of the tract lay outside the zone. For example, the town of Thermal, located 35 miles southeast of Palm Springs, is located in tract 453. However, that portion of the San Andreas Fault which is also in that tract is unpopulated, so the tract was not used in the data.

The most serious problem of this method is that of over-estimation and possible associated bias in calculations: since the tracts and zones are not coterminus, it is usually the case that people living within the tract but not actually living within the zone will be included in the population estimate for the zone. This procedure probably resulted in some over-estimation of the population within the zone, and possibly resulted in some distortion of the population composition estimates in tracts with high degrees of internal heterogeneity.

Data on 21 variables were collected from the 1970 census of the population and percentages describing the socioeconomic characteristics of each tract were calculated. The tracts were then aggregated into 14 Alquist-Priolo Special Studies Zones and the mean for each variable was calculated for each study zone (Table 1). The data were further aggregated and the median for the composite of the Alquist-Priolo Zones was calculated for each variable.

TABLE 1

VARIABLE % OF THE POPULATION	STATE OF CALIF	SAN FERNANDO FAULT	NORTH NEWPORT INGLEWOOD FAULT	SOUTH NEWPORT INGLEWOOD FAULT	RAYMOND HILL FAULT	COMPTON FAULT	SAN JACINTO FAULT	SAN ANDREAS SAN BERNARDINO	SAN ANDREAS DESERT COMM.
BLACK	7.0	2.3	17.4	1.1	0.6	95.8	0.7	9.2	0.8
SPANISH-SPEAKING	7.9	12.6	7.5	6.1	12.4	4.1	11.4	30.3	2.6
OVER 65 YEARS	6.0	4.9	16.5	12.7	14.1	1.3	23.0	7.4	34.9
OVER 75 YEARS	4.0	2.7	5.1	5.6	9.1	0.7	4.1	2.7	10.0
HUSBAND/WIFE HOUSEHOLDS WITH CHILDREN UNDER 18	47.0	59.4	36.8	41.4	48.9	58.5	35.2	48.8	16.6
FEMALE HEAD OF HOUSEHOLD	11.0	8.0	11.9	9.9	14.3	18.8	7.2	8.0	6.6
FEMALE HEAD OF HOUSEHOLD WITH CHILDREN UNDER 18	7.0	5.7	6.1	5.8	7.3	15.4	5.0	8.5	2.8
MOVED WITHIN 5 YEARS	57.0	56.0	66.0	55.7	63.2	49.4	66.0	54.3	46.7
LESS THAN 8 YEARS OF SCHOOL	19.8	15.0	5.1	0.0	20.9	25.9	23.2	27.7	41.6
OPERATORS, TRANSPORT WORKERS AND LABORERS	18.0	22.1	14.3	13.6	12.7	26.6	13.8	55.5	14.6
FARM WORKERS	2.0	0.52	0.71	0.26	0.23	7.1	9.0	12.3	0.75
SERVICE AND PRIVATE HOUSEHOLD WORKERS	13.0	11.7	12.7	13.0	9.5	0.51	12.7	14.9	19.8
TOTAL OF BLUE-COLLAR WORKERS	33.0	34.3	27.7	26.8	22.4	34.2	35.5	82.7	35.1
% OF HOUSING OWNER-OCCUPIED	55.0	68.8	66.4	55.6	63.2	75.7	60.4	60.5	77.2
% OF HOUSING STOCK BUILT BEFORE 1939	23.0	15.9	21.6	17.6	47.1	5.7	67.9	19.9	5.6
% OF HOUSEHOLDS WITHOUT AUTOMOBILES	1.6	5.1	11.7	8.0	12.5	9.3	5.2	24.2	9.1
MEDIAN NUMBER OF SCHOOL YEARS COMPLETED	12.4	12.2	12.5	12.3	12.8	12.1	12.05	11.8	12.15
MEDIAN ANNUAL INCOME OF FAMILIES & UNRELATED INDIV.	8,279	9,200	9,130	9,277	9,140	8,782	5,950	6,741	9,708
MEDIAN NUMBER OF ROOMS PER HOUSE	4.7	4.9	4.7	4.95	5.0	5.0	4.45	4.6	3.35
MEDIAN VALUE OF OWNER-OCCUPIED HOUSING	23,100	21,200	29,500	22,700	34,200	18,300	18,850	13,200	14,350
MEDIAN CONTRACT RENT	173	122	127	121	104	101	93	77	82

TABLE 1 (cont.)

VARIABLE % OF THE POPULATION	STATE OF CALIF	SAN ANDREAS SO.S.F. LOS GATOS	SOUTH HAYWARD FAULT	NORTH HAYWARD FAULT	CALAVERAS FAULT	GREEN VALLEY FAULT	ANTIOCH FAULT	ROGERS CREEK HEALDSBURG	COMPOSITE FOR THE SSZ median
BLACK	7.0	1.2	5.6	5.6	0.2	1.7	0.1	0.4	0.57
SPANISH-SPEAKING	7.9	8.0	20.2	17.1	NA ¹	9.7	14.0	7.8	8.2
OVER 65 YEARS	6.0	5.8	5.1	12.4	12.4	5.5	6.9	13.6	9.0
OVER 75 YEARS	4.0	2.0	1.9	4.2	5.2	4.7	2.6	4.0	2.0
HUSBAND/WIFE HOUSEHOLDS WITH CHILDREN UNDER 18	47.0	54.0	56.9	41.6	NA	59.3	55.8	48.2	48.2
FEMALE HEAD OF HOUSEHOLD	11.0	8.6	8.5	9.1	2.9	7.7	8.4	6.8	7.3
FEMALE HEAD OF HOUSEHOLD WITH CHILDREN UNDER 18	7.0	33.6	4.8	4.7	NA	10.5	5.5	4.6	4.2
MOVED WITHIN 5 YEARS	57.0	44.9	41.0	48.7	57.0	81.8	51.1	57.0	51.6
LESS THAN 8 YEARS OF SCHOOL	19.8	7.1	17.3	9.1	13.0	8.3	19.9	21.0	19.0
OPERATORS, TRANSPORT WORKERS AND LABORERS	18.0	10.1	22.9	17.0	24.0	11.0	24.0	18.0	15.0
FARM WORKERS	2.0	2.3	1.8	1.3	11.0	2.0	0.5	5.6	0.38
SERVICE AND PRIVATE HOUSEHOLD WORKERS	13.0	7.2	33.7	12.7	14.0	14.4	10.5	13.9	10.5
TOTAL OF BLUE-COLLAR WORKERS	33.0	19.6	58.4	30.0	49.0	27.4	34.5	37.5	27.7
% OF HOUSING OWNER-OCCUPIED	55.0	82.1	73.9	60.9	51.7	67.5	65.6	57.8	70.9
% OF HOUSING STOCK BUILT BEFORE 1939	23.0	10.4	9.5	24.0	52.9	2.9	17.5	20.9	9.6
% OF HOUSEHOLDS WITHOUT AUTOMOBILES	1.6	1.5	3.6	7.9	15.1	2.2	8.2	6.8	5.4
MEDIAN NUMBER OF SCHOOL YEARS COMPLETED	12.4	12.7	12.3	12.4	10.7	12.8	12.25	12.3	12.4
MEDIAN ANNUAL INCOME OF FAMILIES & UNRELATED INDIV.	8,279	14,298	11,07	9,399	9,142	13,805	10,384	7,747	9,708
MEDIAN NUMBER OF ROOMS PER HOUSE	4.7	6.0	5.55	5.1	4.7	6.9	5.15	4.8	5.0
MEDIAN VALUE OF OWNER-OCCUPIED HOUSING	23,100	37,900	25,100	24,650	19,100	32,500	18,500	20,500	24,000
MEDIAN CONTRACT RENT	173	192	161	136	93	183	107.50	101	130

¹Information for these variables was not available for the city of Hollister on the Calaveras Fault.

The special studies zones in six standard metropolitan statistical areas (SMSAs) were broken down into 14 regions on the basis of geographic location and population concentrations. For example, the San Andreas Fault stretches approximately 300 miles from the northern tip of Los Angeles County to the southern border of Riverside County. For the purposes of this study, it was divided into two regions, San Bernardino and the desert communities of North Palm Springs, Desert Hot Springs and Morongo Valley (Figure 1). The SMSAs included in the study were Los Angeles, Anaheim-Santa Ana-Garden Grove, San Bernardino-Riverside, San Francisco-Oakland, San Jose and Santa Rosa. They were chosen on the basis of their population concentrations within the special studies zones.

In addition to the data which were gathered from the Bureau of the Census, the study was supplemented by field work which consisted of photographing housing that lay directly upon the faults. Thirteen of the zones were photographed and an effort was made to include as wide a range of housing types as possible.

Descriptions of the Fault Rupture Regions

Southern California: Outside of Los Angeles

San Andreas (San Bernardino)

This area is the major population center in the San Andreas fault zone in southern California and includes the cities of San Bernardino, Muscoy and Devore. Although Muscoy lies in the San Jacinto fault zone, its proximity to San Bernardino

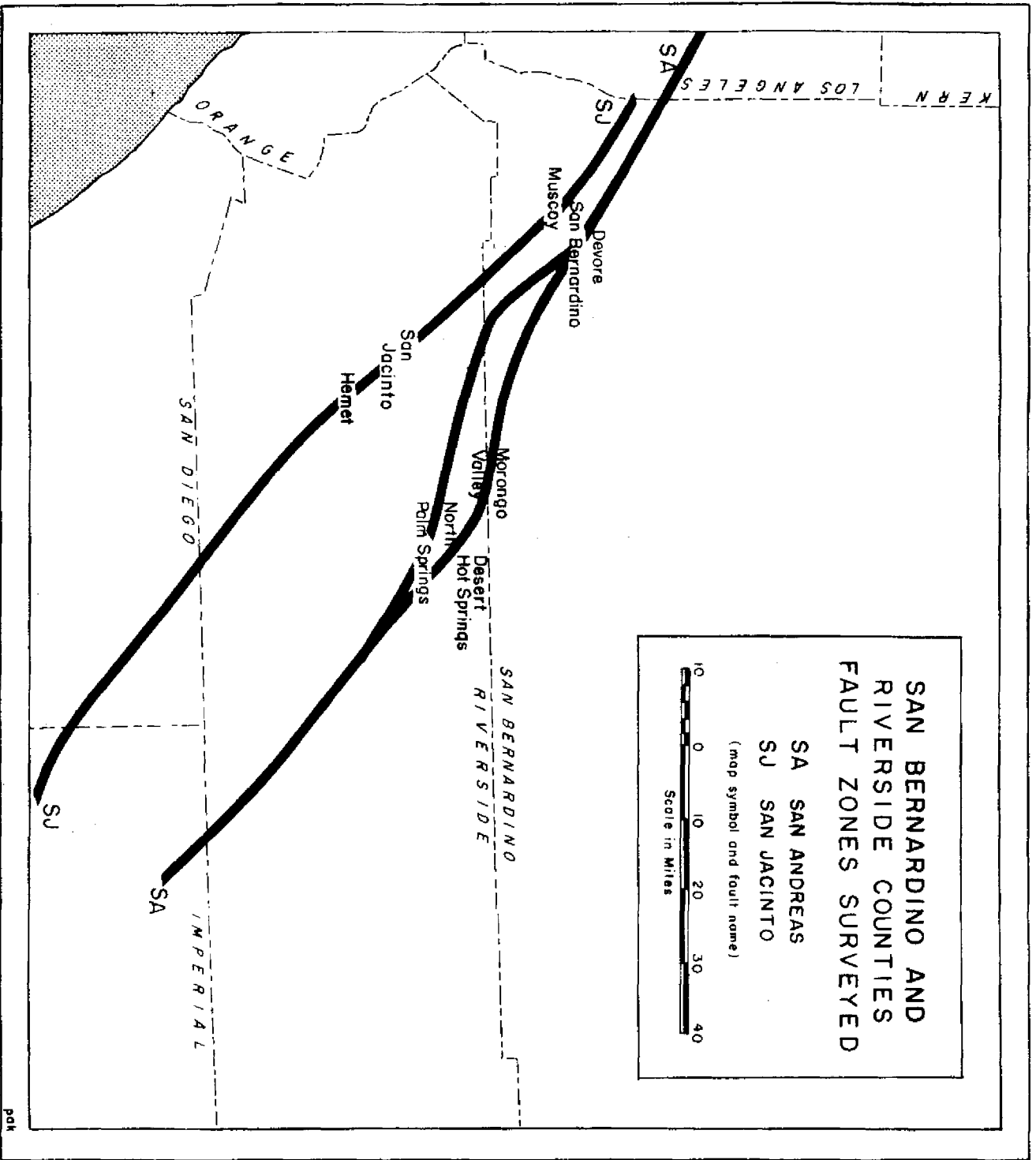


FIGURE 1

pat

warrants its inclusion in this region. The area includes middle-class developments as well as lower-income neighborhoods such as Muscoy. Within this zone, the black population in the tracts varies from 14% to 52.7%; one tract is 92.7% Spanish-speaking, while the lowest Hispanic concentration is 5%.

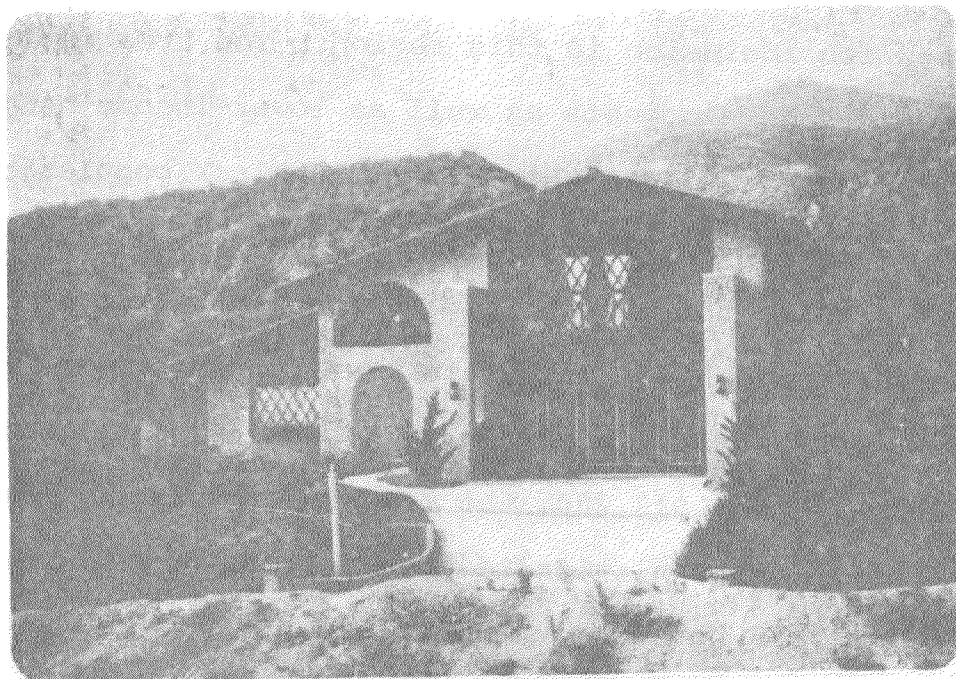
This area is below the state level in income and housing values. The median income in 1970, was \$6,741 and the median housing value was \$13,200, the lowest for all the zones. Yet a more affluent population resides in some of the tracts, particularly in housing currently being built at the base of the San Bernardino Mountains (Photographs 1 and 2). Current (1981) values for single-family housing for this area are between \$75,000 and \$200,000.

Muscoy (Photographs 3 and 4) is an enclave of small, older houses in which reside a mixture of black, white, young and elderly persons. Current housing values are between \$45,000 and \$88,000. Photograph 4 shows extensive damage to a house in this community.

Devore, north of San Bernardino, is an area which has small older houses and larger ranch-like homes. Current prices run from \$65,000 to \$300,000.

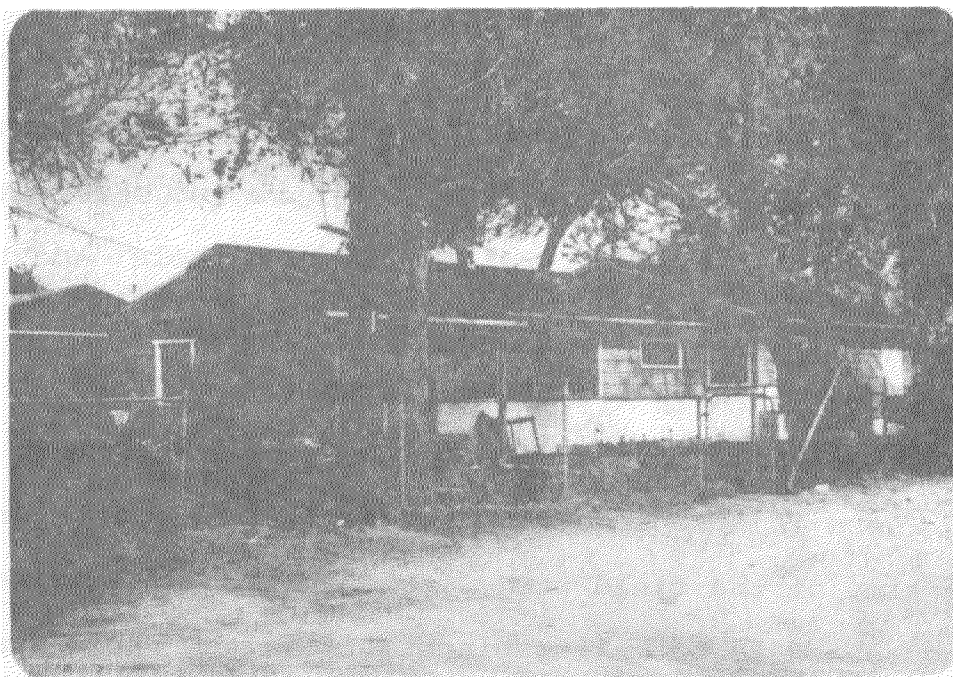
San Jacinto

The cities of Hemet and San Jacinto lie in the San Jacinto fault zone in Riverside County. The two cities are small, isolated from the rest of the metropolitan area, and are inhabited by a middle-class white population. Only a small

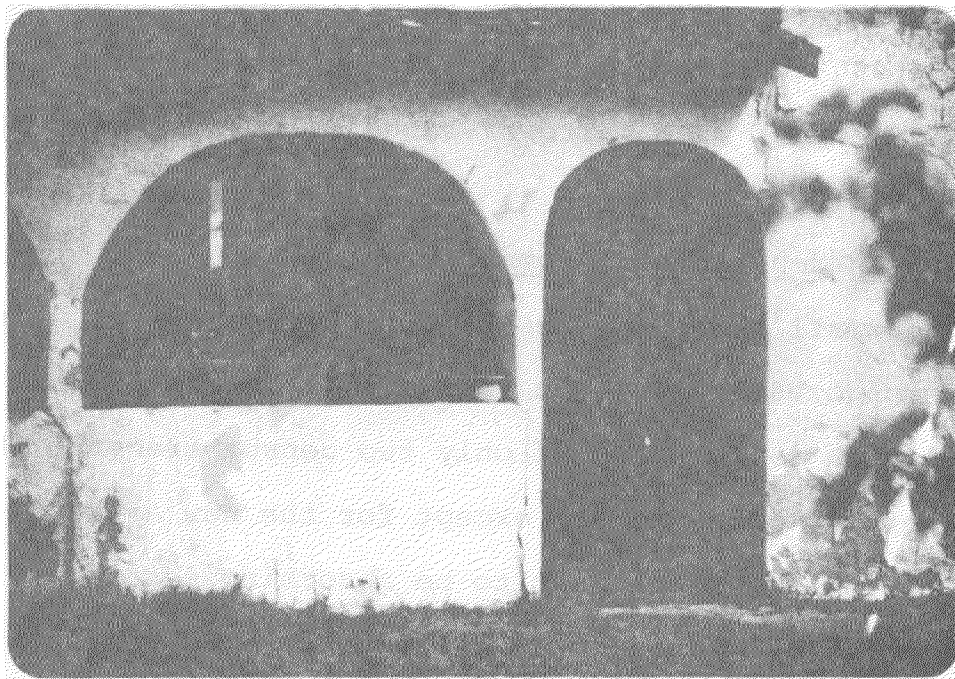


Large tract housing is common in the special studies zones adjacent to the San Bernardino Mountains (Photographs 1 and 2).





Muscoy, located northwest of San Bernardino, is an enclave of small, older housing in an ethnically diverse community (Photograph 3).



Photograph 4 shows structural damage to the stucco of a house in Muscoy.

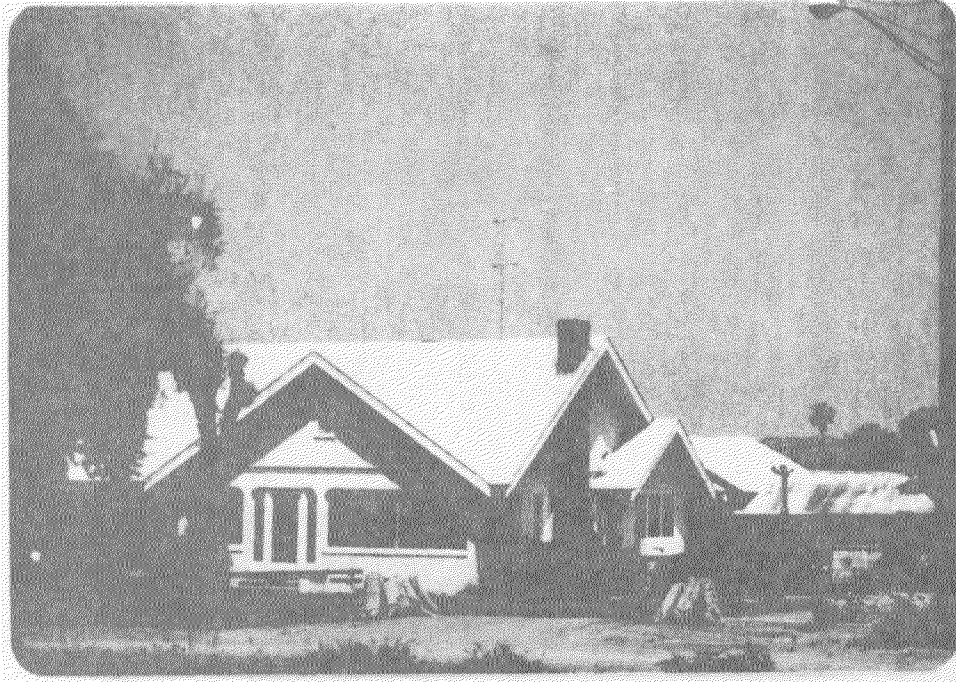
black population resides here; 2.5% is the maximum concentration of blacks in any tract. The distinctive characteristic of this zone is the large elderly population. The mean tract percentage in the age category of 65 years and older is 23%, well over the 6% level for California as a whole and the composite median of 9%.

Photographs 5 and 6 show housing commonly found in Hemet. This city contains mostly an older housing stock built before 1939. There is also some new, large housing in the zone and at the time of the field study, construction of multifamily housing seemed to be taking place astride the fault trace itself. Estimated 1981 housing prices range from \$62,000 to \$70,000.

Mobile homes comprise a large part of housing in San Jacinto (Photograph 7). Such housing is estimated to range in price from \$4,000 to \$100,000. However, standard housing in San Jacinto shows a much narrower range of prices, from \$45,000 to \$85,000.

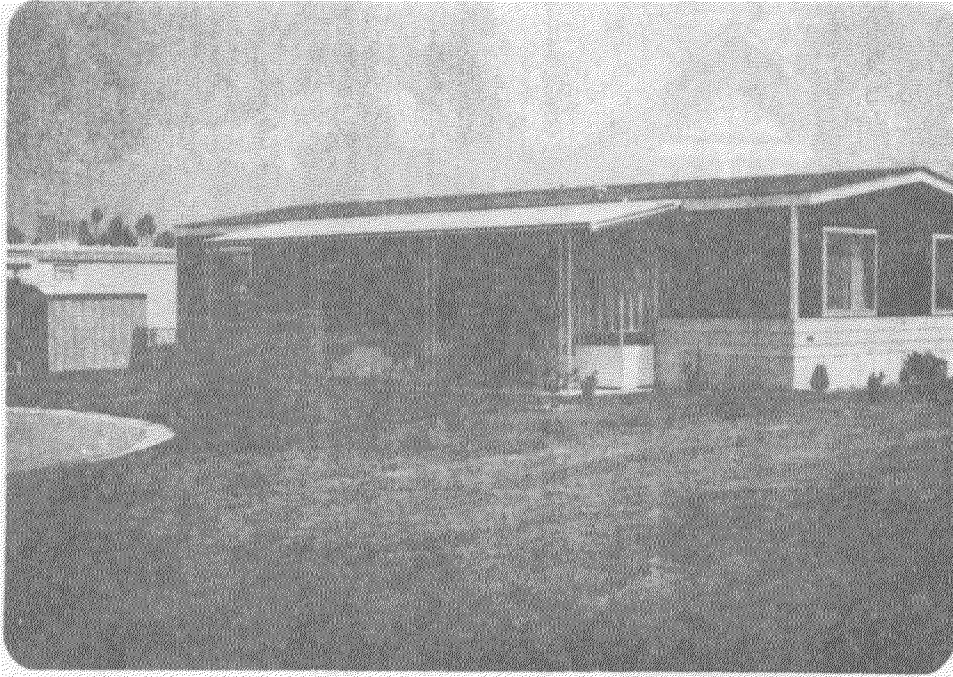
San Andreas (Desert Communities)

The small towns of Desert Hot Springs, North Palm Springs and Morongo Valley are the population centers of this study zone, which is composed of only two census tracts. The area is generally homogeneous, except for the new areas of North Palm Springs, which appear to be absorbing some overflow from nearby Palm Springs and represent a more affluent section of the zone.



The older homes in Photographs 5 and 6 are characteristic of housing found in Hemet.





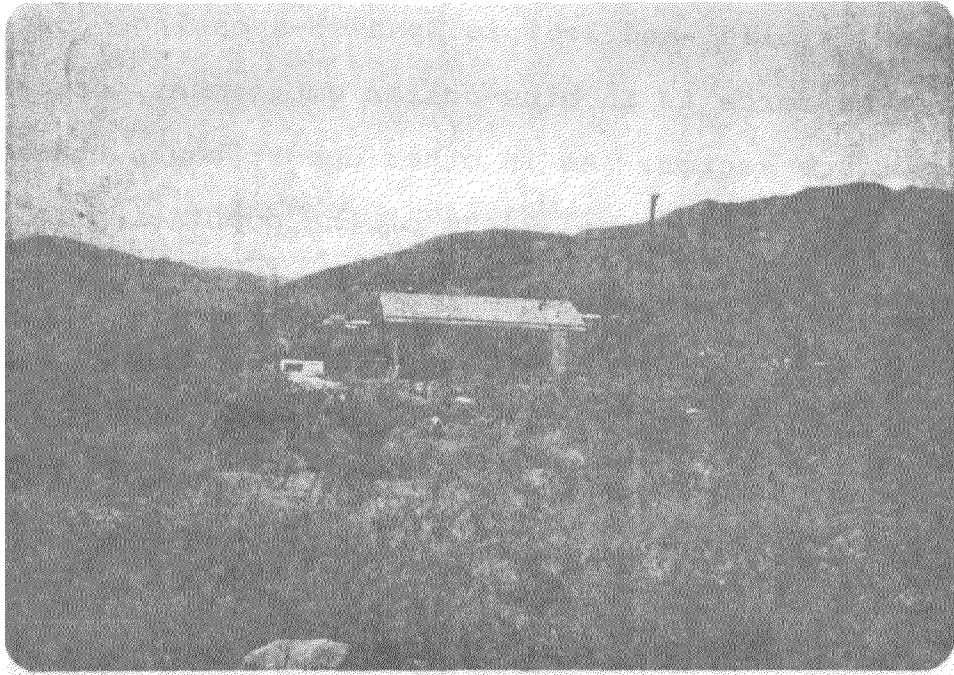
The mobile home is popular in San Jacinto, where a large elderly population resides (Photograph 7).

The zone is predominantly white: only 0.8% of the population is black and 2.6% is Spanish-speaking. One-third of the labor force is in blue-collar employment, concentrated in the service sector. As in other desert towns, there is a large elderly population: 34.9% of the population is over 65. The average annual income for this zone in 1970 was \$9,270, above the California median of \$8,277.

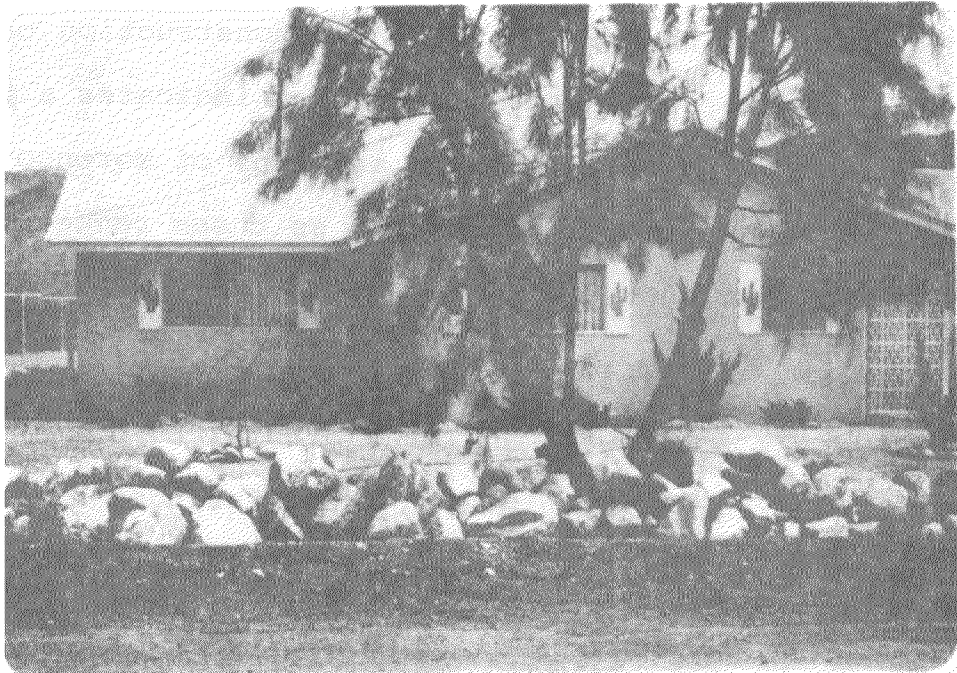
The housing varies little, and is mostly single-family and of small or moderate size. In Morongo Valley (Photographs 8 and 9), houses are set back on large tracts of land, in rugged terrain. These residential roads are often unpaved and the housing reflects a rural, poor to middle-class constituency. Current (1981) housing values for Morongo Valley range from \$20,500 to \$170,000. In Desert Hot Springs, the values range from \$60,000 to \$350,000 which includes some ranches. North Palm Springs (Photograph 10) contains construction occurring within this zone. The new construction indicates a population that is a bit more affluent than sections of Morongo Valley and Desert Hot Springs. Homes such as these range between \$45,000 and \$100,000.

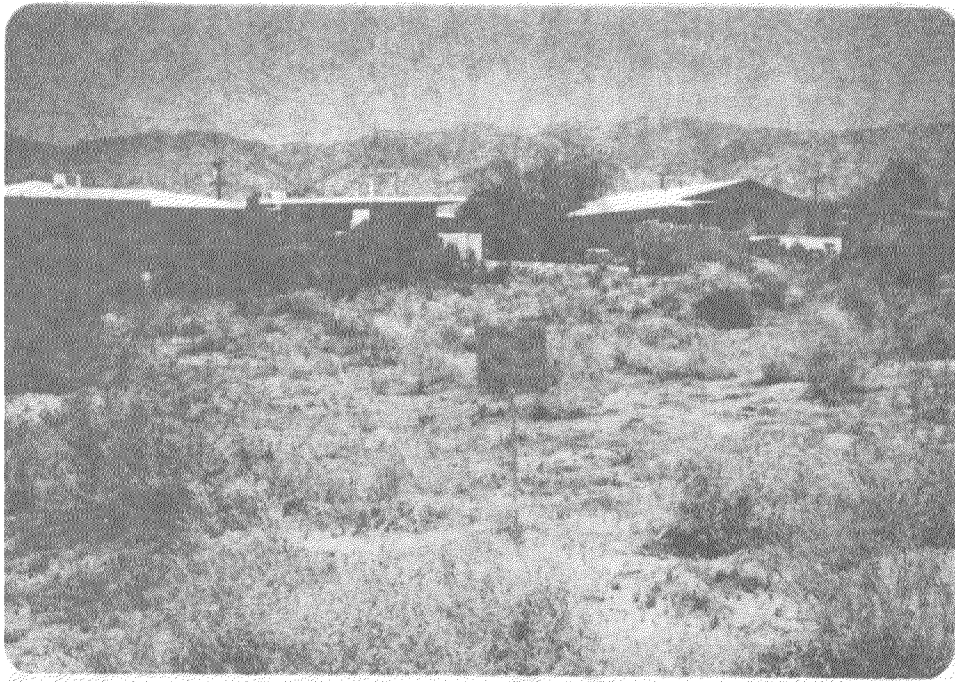
Southern California: Within Los Angeles Region

Five study zones were analyzed within the Los Angeles metropolitan region (Figure 2). These included an especially wide range of population and housing characteristics.



Housing in Morongo Valley is generally small and located off the main highway on rough dirt roads (Photographs 8 and 9).





This sign indicates that building is still taking place in the study zones. This housing in North Palm Beach is larger than that found in Morongo Valley (Photograph 10).

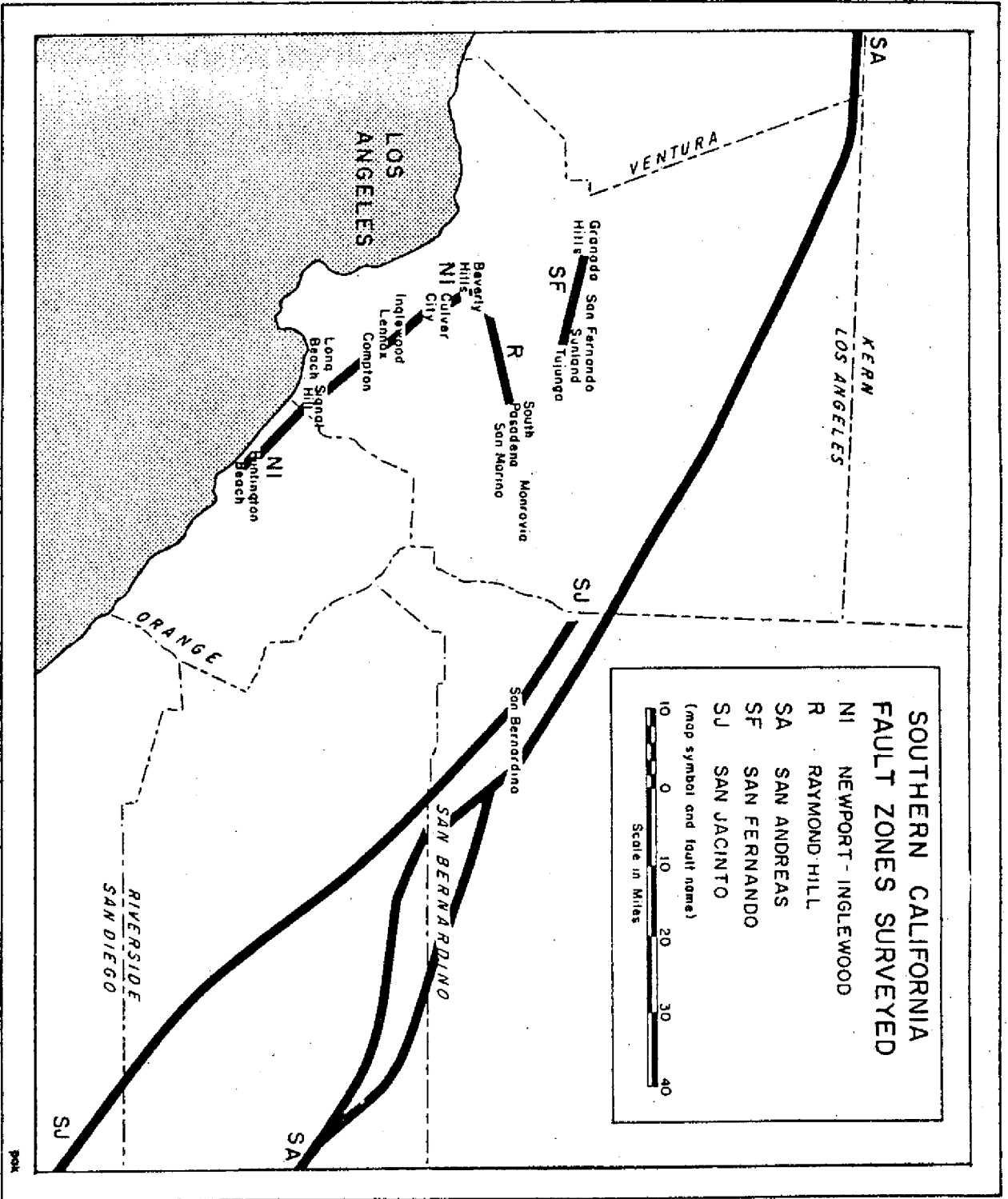


FIGURE 2

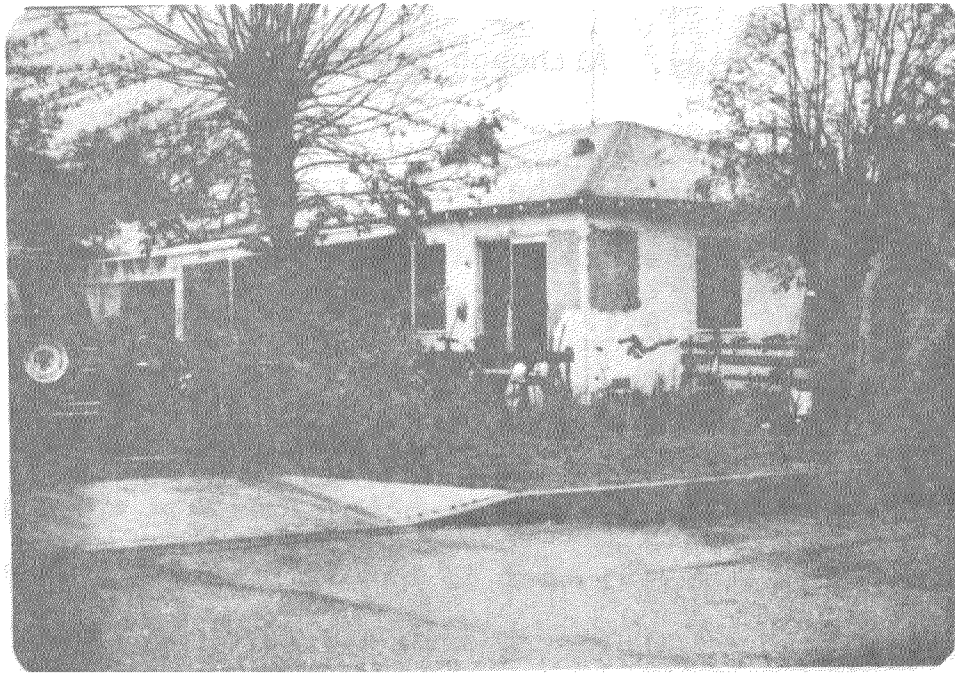
San Fernando

This zone runs through a variety of neighborhoods in the San Fernando Valley. Although the aggregate and median values of the variables correlate closely with the state, the ranges in this zone illustrate the diversity. Median 1970 housing values in the tracts ranged from \$17,800 to \$43,000 and incomes from \$7,250 to \$18,844. 1981 housing values range between \$74,000 and \$350,000.

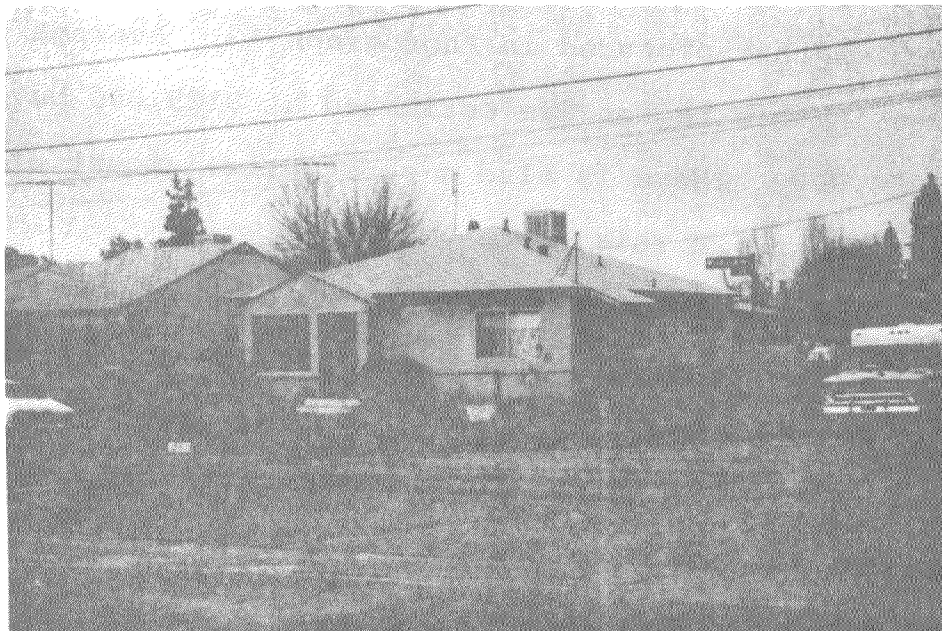
The low-income area, Sylmar, is a neighborhood of older housing that shows signs of structural damage and repair in the stucco, a material that is highly prone to damage from seismic activity (Photographs 11 and 12). In Sylmar, 1981 estimates of housing values ranged between \$74,000 and \$100,000.

In contrast to Sylmar is Granada Hills, an affluent community adjacent to the Santa Sussanna Mountains. The housing resembles that pictured in Photograph 13. Average 1981 housing values in this region are estimated at \$125,000 but range up to \$900,000. There is also a substantial amount of middle-class housing in this zone.

Photograph 14 was taken in the city of San Fernando, where current housing prices range from \$80,000 to \$125,000. Photograph 15 shows older, poorly maintained Kagel Canyon, a mountainous region northeast of Tujunga. Housing values here average \$135,000, but run as low as \$80,000.

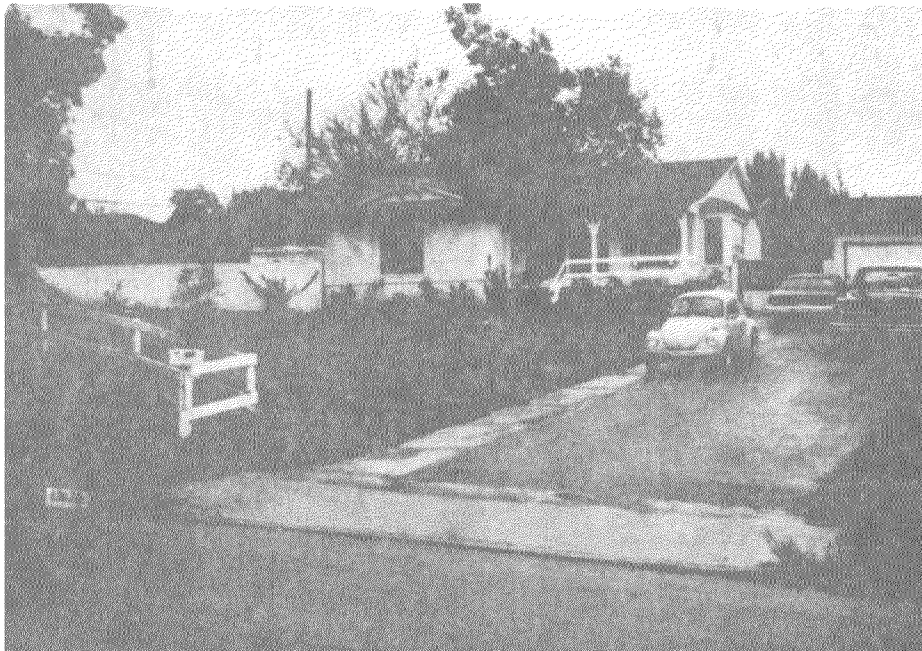


Sylmar is a low-income neighborhood in the San Fernando Valley where the houses resemble those in Photographs 11 and 12. They are stucco and show signs of structural damage or repair.

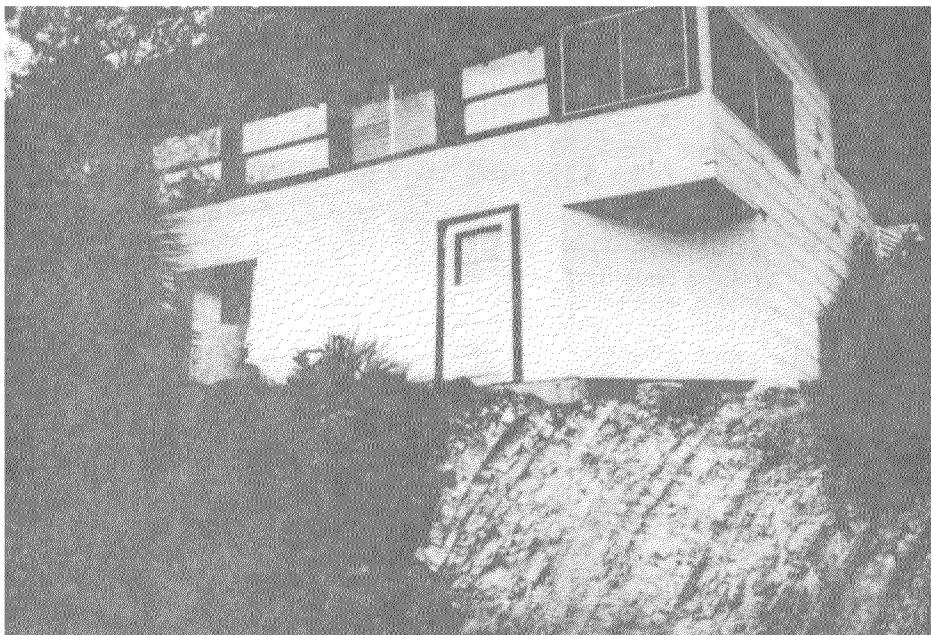




Photograph 13 shows housing in affluent Granada Hills where values range from \$125,000 to \$900,000.



Photograph 14 shows middle-class housing in the City of San Fernando.



A delicately balanced home in Kagel Canyon is shown in Photograph 15.

The zone is socially and ethnically mixed. The black population ranges from 0% in some tracts to 16.2% in others. The Spanish-speaking population is large compared to other zones, with individual tracts ranging from 4.2% to 30.8%. The median education level is 12.2 years of school, but sections of the zone are more well-educated, with a median of fifteen years. Few other zones have tracts with as wide an educational range as this one.

Raymond Hill

The Raymond Hill zone runs through South Pasadena, a low-income, predominantly Hispanic area; Monrovia, an upper middle-class region; and San Marino, an area of large, expensive housing. The data show that great tract contrasts exist in the percentage of Spanish-speaking, blue-collar workers and education levels in this zone. The proportion of Spanish-speaking persons ranges from 3.1% to 33.9%; for blue-collar workers, it is 8.4% to 59.8%. The median education ranges from 11.7 to 15.4 years of school completed.

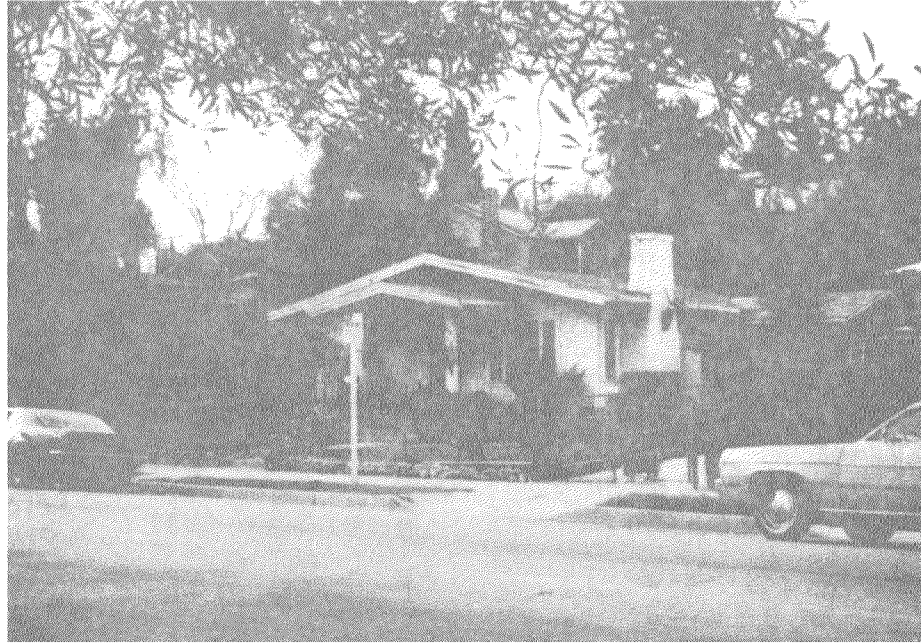
The median income in 1970 was slightly higher than the state median of \$8,277, with a range of \$4,318 to \$21,612. 1970 housing values were high: between \$18,300 and \$49,000. 1981 estimates place this range as \$55,000 to \$429,000. Sixty-three percent of the housing is owner-occupied, close to the composite median of 70.9%. For renters, the 1970 median contact rent began at \$90 in one tract and ranged to a high of \$290 in another.

Photographs 16 and 17 depict housing that is typical of South Pasadena where values range from \$100,000 to \$159,000. Photograph 16 shows structural damage occurring to the stucco. Photograph 18 shows a house in San Marino, an area of high-priced housing.

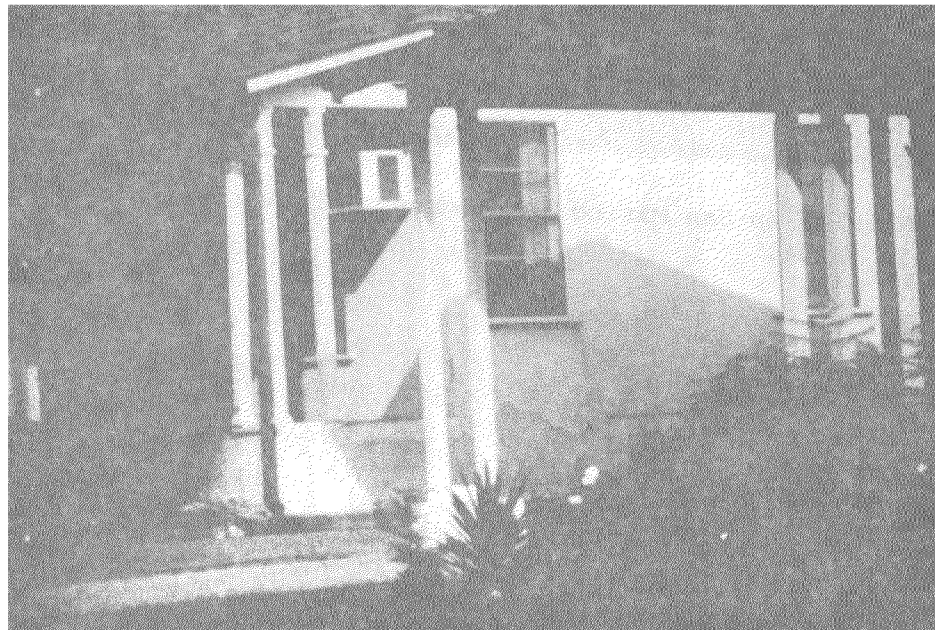
Northern Newport-Inglewood (Beverly Hills/West Los Angeles/Inglewood)

This zone extends approximately 45 miles through the most densely populated sections of Los Angeles. In order to more easily interpret the data, this zone was divided into three regions. The northern section encompasses Beverly Hills, Inglewood and West Los Angeles and is the most diverse area studied. The mean black population is 17.4%, but tracts range from 0.8% to 74.9%. The Spanish-speaking population makes up 7.5%, with little intertract variation. The range of blue-collar workers is 2.9% to 48.6%, and the proportion of persons who have completed fewer than eight years of school ranges from 7% to 27.6%.

The range of median housing values in 1970 was from \$19,500 to more than \$50,000, one of the highest of all zones, as was the median value of \$29,000. Current estimates range from \$45,000 in Inglewood to over \$1 million for housing in West Los Angeles. The zone barely scrapes the southern tip of Beverly Hills, where the current range is between \$295,000 and \$750,000. A great deal of the housing observed



Photographs 16 and 17, taken in a South Pasadena neighborhood, represent a range of values between \$100,000 and \$159,000.





Housing in San Marino (Photograph 18) averages \$450,000 in value.

was well-maintained and lavish multifamily accommodations. Photographs 19 and 20 show housing in West Los Angeles where the range of values was from \$200,000 to over \$1 million. Photograph 21 is of precariously situated condominiums in Baldwin Hills where the prices range from \$150,000 to \$300,000.

Newport-Inglewood (Compton)

Compton is located on a branch of the Newport-Inglewood fault zone, and is isolated from the main section of the zone. It is represented as an independent zone on the official topographic map of the special studies zones, printed by the California Division of Mines and Geology.

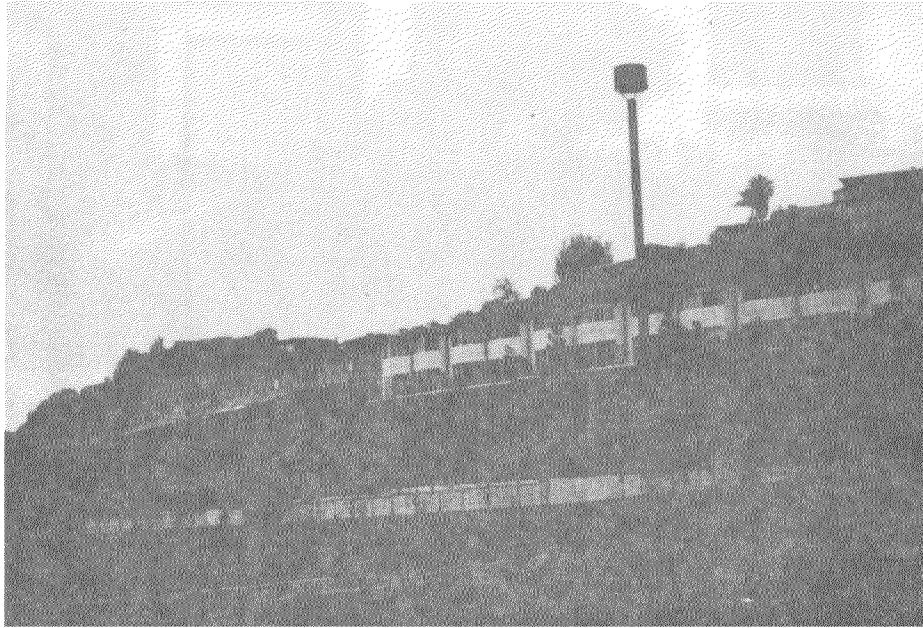
This lower-income and predominantly black area was the most homogeneous of all the zones surveyed. Compton is 95.8% black; tracts ranged from 87.9% to 96.1% black. The area is also uniform in socioeconomic and housing characteristics. 1970 income levels varied between \$7,725 and \$9,172. Educational levels range from 12.0 to 12.2 years of schooling completed and the owner-occupancy rate is 75.7%, the highest of all the study zones. About one-half of the labor force is employed in blue-collar occupations.

Photographs 22 and 23 and 24 show the dominant housing type found in Compton. Although the data revealed that most of the housing stock was built after 1939, the homes are older, single-family detached tract housing on small lots. 1981 housing values for this zone run from \$60,000 to \$125,000. As in Sylmar and other poorer neighborhoods, the houses were constructed with stucco.

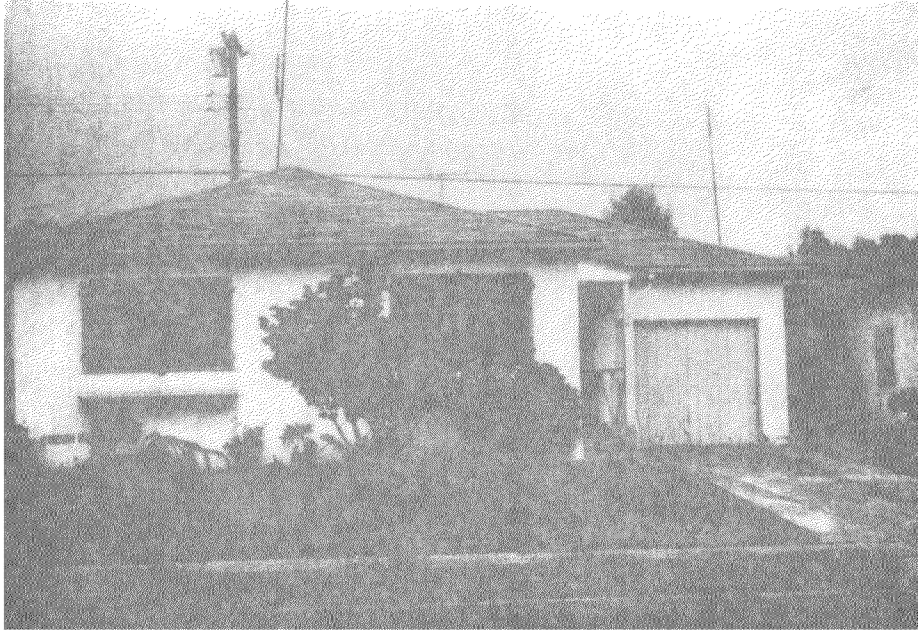


Well-maintained, expensive housing is depicted in Photographs 19 and 20. Average housing costs here are \$250,000 and range to over \$1 million.





Photograph 21 shows condominiums perched directly on the fault.



Housing in the Compton study zone was quite homogeneous as shown by Photographs 22, 23, and 24. With a 95.8% black population, Compton was one of the few study zones with a high concentration of minority population. Housing values ranged between \$60,000 and \$125,000.





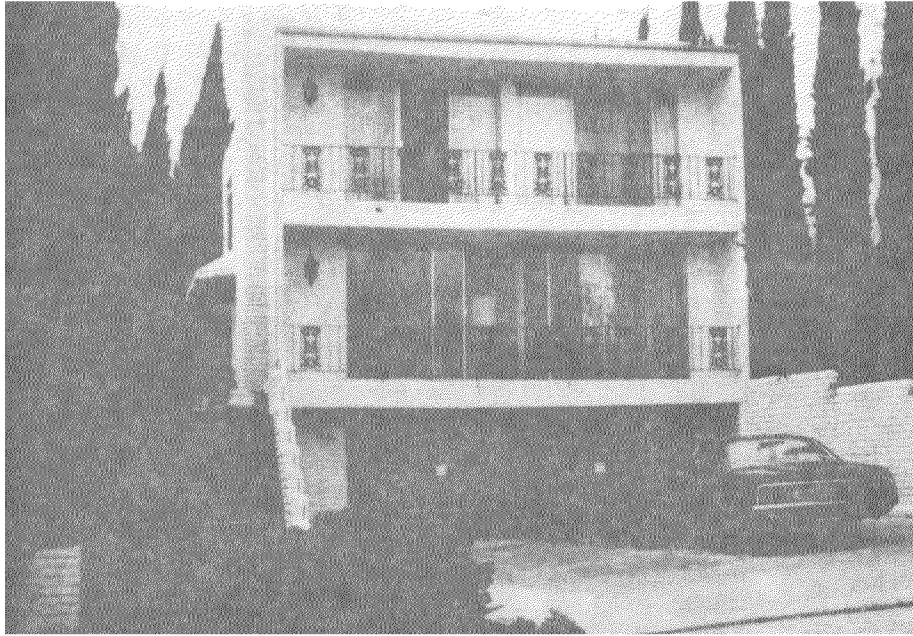
Housing in Compton is depicted in Photograph 24.

Southern Newport-Inglewood (Signal Hill/Long Beach/
Huntington Beach)

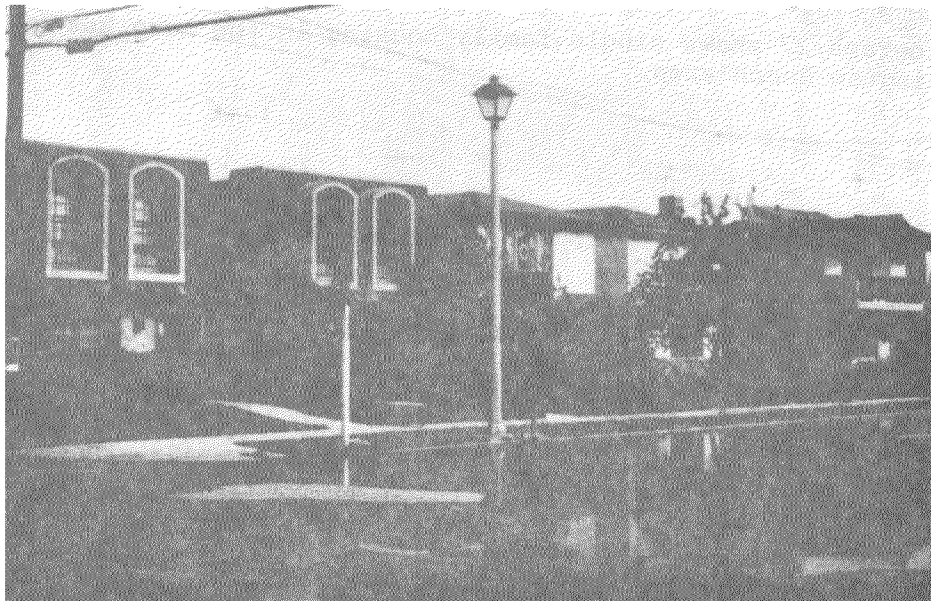
This is the southern section of the Newport-Inglewood zone which runs through a myriad of neighborhoods. Photographs 25 and 26 indicate that a middle and upper middle-class population is common, but there are tracts which exhibit a very low median income. The lowest median income in 1970 was \$2,115, the second lowest among the study zones. 1970 median housing values were between \$16,400 and \$46,200. The 1981 estimated range is \$80,000 to \$350,000. The percentage of owner-occupied housing ranges widely, from 22.7 to 94.9%. Multifamily housing is most common in the Signal Hill/Long Beach region (Photograph 25).

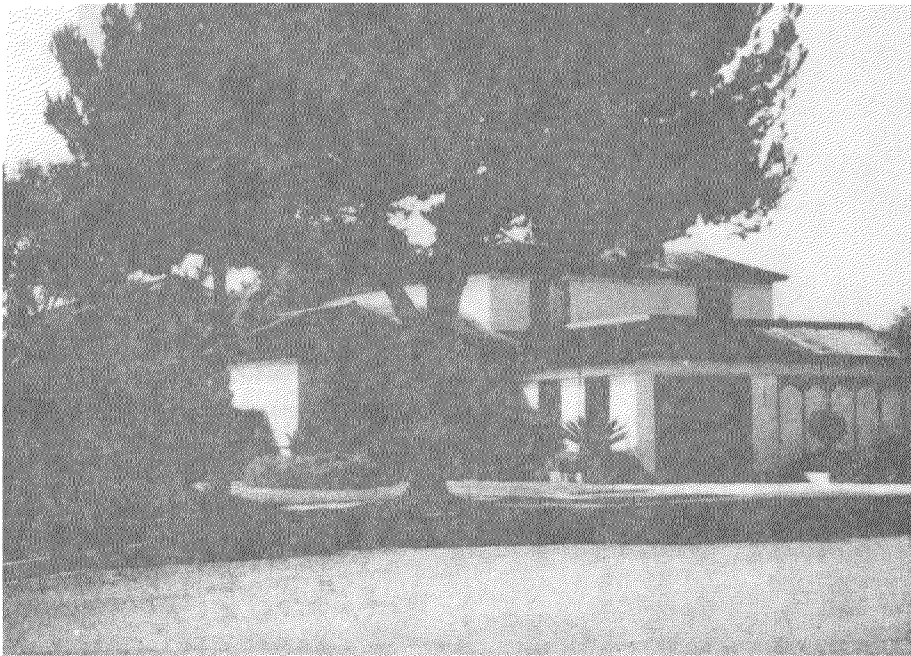
There are many large apartment complexes interspersed among the oil derricks on Signal Hill. Huntington Beach is a more affluent area (Photographs 26 and 27). Current housing prices in this region are \$130,000 to \$225,000 in comparison to prices in Signal Hill from \$80,000 to \$200,000. Blue-collar employment ranges from 15.5 % to 66.6%.

This zone does not have a large minority concentration. The maximum tract percentage of the black population is 7.2%, and the maximum Spanish-speaking population is 6.1%, 1.8% below California's mean. Most persons have a high school education: the median number of school years completed is 12.3.



Housing in the Long Beach and Huntington Beach area is primarily middle to upper-middle class, although some tracts do have a very low median annual income. 1981 housing values range from \$80,000 to \$350,000, and both multifamily and single-family housing exists. (Photographs 25 and 26).





Photograph 27 shows single-family housing in the Long Beach-Huntington Beach area.

Northern California

The seven northern California zones surveyed are illustrated in Figure 3. Most are within the San Francisco Bay region.

San Andreas (South San Francisco to Los Gatos)

The population in this zone varies from middle-class to extremely wealthy. It is a more diverse area than the census data show. Housing values are currently between \$115,000 and over \$1 million. The median housing value for 1970 was \$37,900, the highest for all the study zones. Daly City (Photograph 28) contains small tract housing and current housing values run from \$115,000 to \$150,000. Multifamily housing (Photograph 29) ranges from \$155,000 to \$185,000. The southern end of this zone is populated by very affluent residents. Woodside and Portola Valley have housing that is valued at over \$1 million: there are many estates in the region. Residential construction is taking place on or near the fault rupture area in Portola Valley (Photograph 30). Relatively moderately priced housing is found in Millbrae, where the range is from \$260,000 to \$400,000 and southwest of Los Gatos, with a range of \$125,000 to \$210,000 (Photograph 31).

The 8% concentration of Spanish-speaking persons is very close to the state level of 8.2%, but the black population average of 1.2% is well below the state figure. The highest

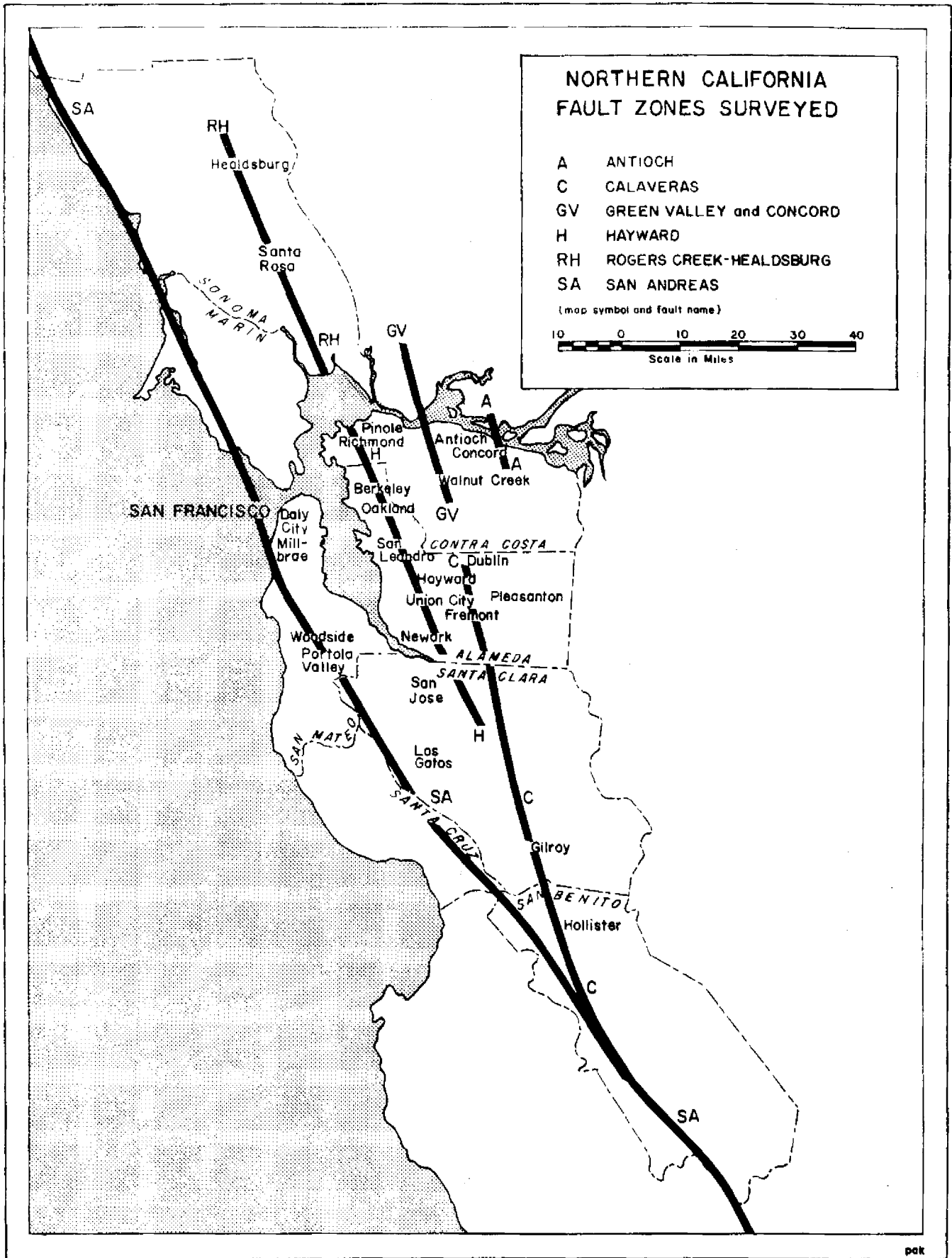
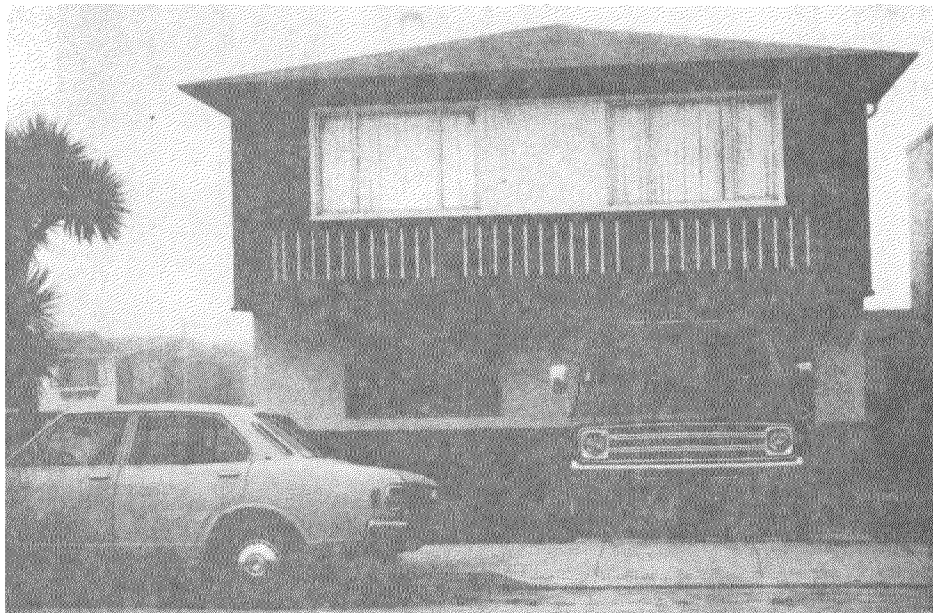
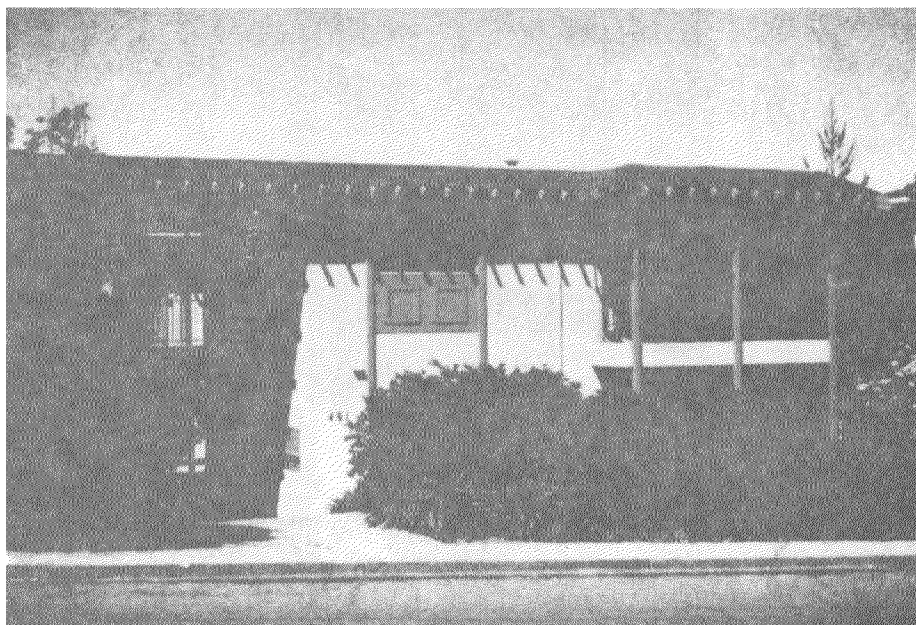


FIGURE 3

pak

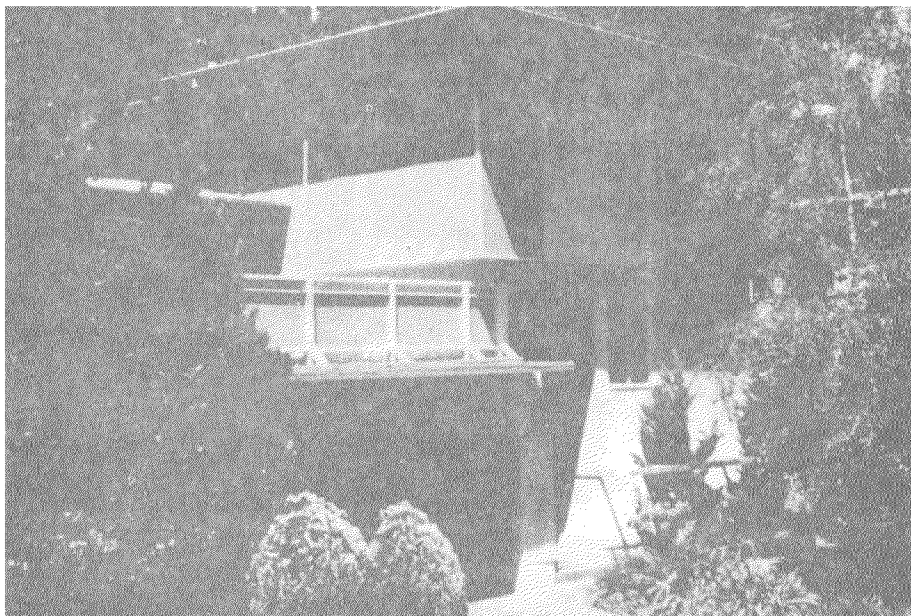


Photograph 28 shows small, single-family detached housing which is the dominant type found in South San Francisco, although some multifamily dwellings do exist (Photograph 29).





In Portola Valley, new housing is being constructed upon the San Andreas fault (Photograph 30). Housing costs in this region range to over \$1 million.



Housing southwest of Los Gatos ranges from \$125,000 to \$210,000 (Photograph 31).

concentration of blacks in the zone is only 9.5% and Hispanics account for 15.8% in one tract. These populations are centered around South San Francisco.

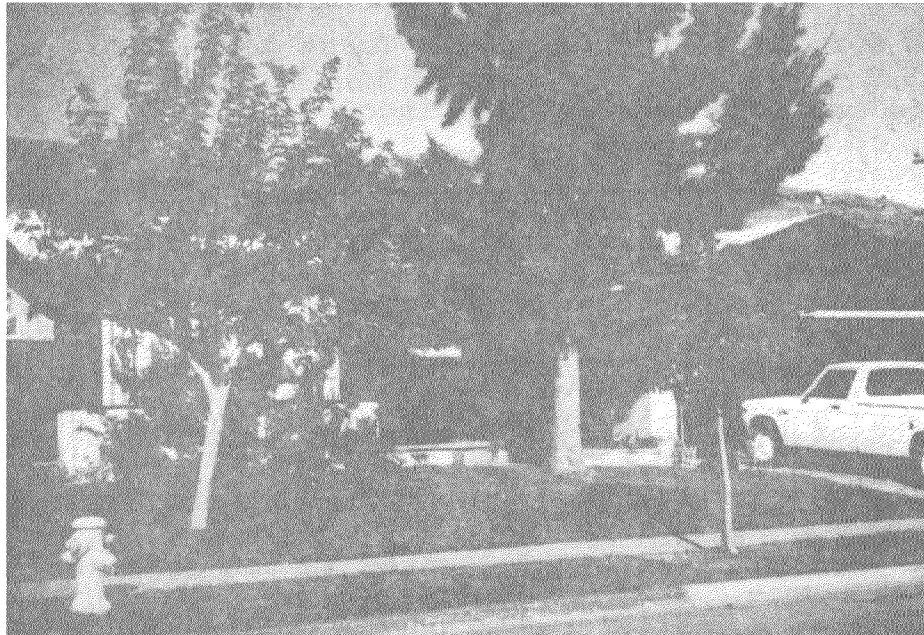
Hayward Fault (San Jose to Fremont)

In order to simplify the data and to distinguish urban from suburban areas, the Hayward fault has been divided into two contiguous zones. The southern section runs through the community of Alum Rock, a middle-class suburb east of San Jose, to the city limits dividing Fremont and Union City.

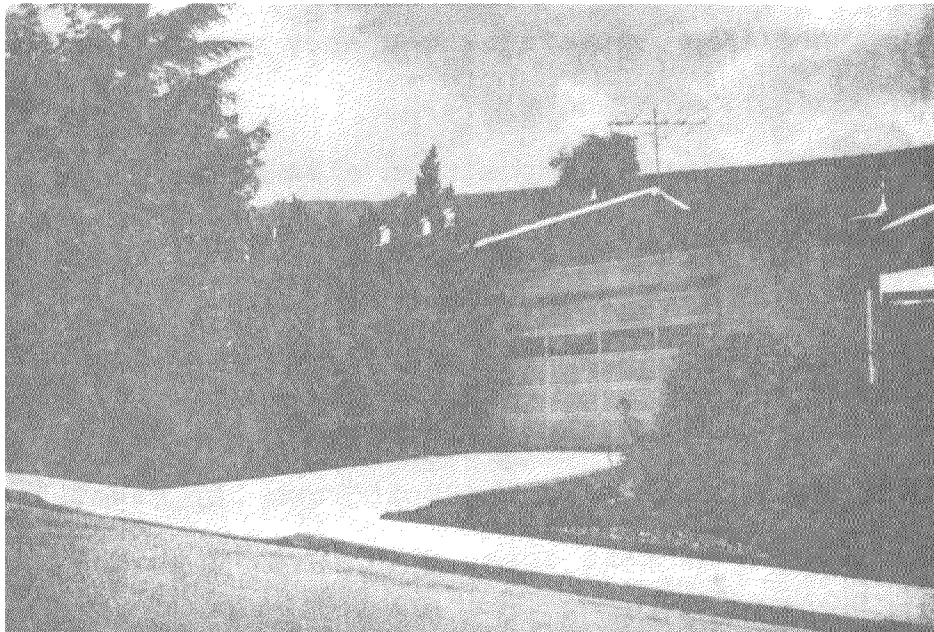
Although the tracts represented in the zone are quite diverse, the region is predominantly middle-class. Housing costs range from \$60,000 to \$525,000. In 1970, these figures were \$18,000 and \$42,300 and income ranged from \$8,889 to \$16,888. Several of the tracts are composed largely of rental units, as the range of owner-occupancy was the widest in the study, between zero and 91.7%.

Racial and ethnic composition also shows diversity in this zone. The Hispanic population ranges from 2.0% to 47.2%, and the black population from zero to 48.4%.

Milpitas (Photographs 32 and 33) is representative of the zone. Here, housing values are between \$81,000 and \$385,000. The hills east of Alum Rock (Photograph 34) make up the wealthy section of this zone, with housing prices averaging \$200,000.



The southern section of the Hayward fault is dominated by middle to upper-middle class housing (Photographs 32 and 33). The house depicted in Photograph 32 is part of a tract development of one-half acre lots.



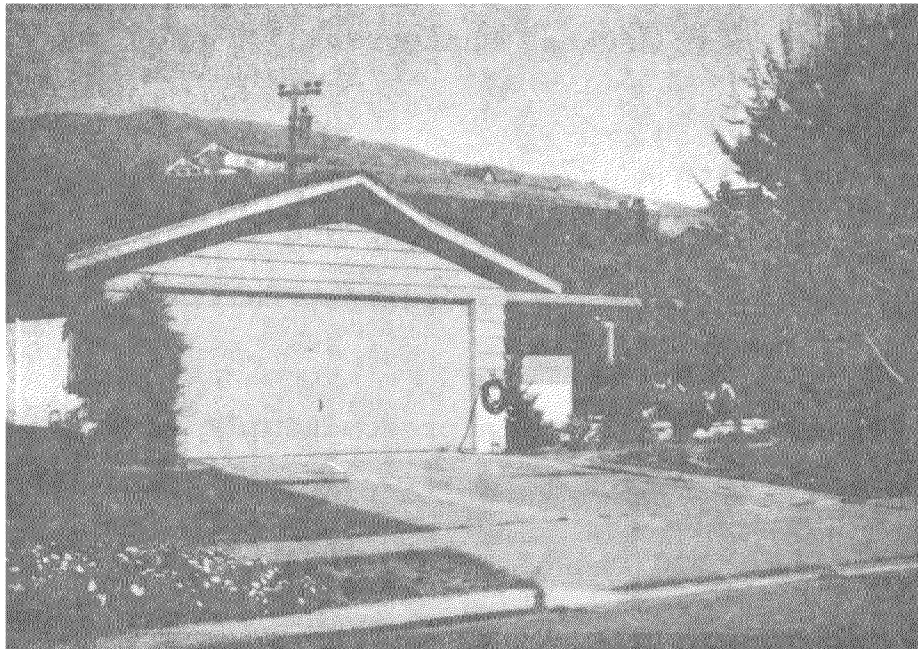


Housing in the hills east of Alum Rock averages \$200,000 in value.(Photograph 34).

Hayward (Union City to Pinole)

The northern section of the Hayward fault zone runs through densely populated and diverse sections of the East Bay. The zone includes parts of Hayward, Union City, Oakland, Berkeley and Pinole. Hayward and Union City house a middle-class population that lives adjacent to the East Bay Hills. Oakland contains a low-income neighborhood with a large minority population. Pinole is an industrial city, physically separated from the other East Bay cities, and is dominated by working-class residents. Berkeley is the most diverse city in this zone and the variance in the data may be due in part to the influence of the student population at the University of California. Housing prices throughout the zone range from a low of \$50,000 in East Oakland to \$500,000 in the Berkeley Hills. Educational levels in the zone range from a low of 10.3 to 17 years, the highest category reported by the Bureau of Census. 1970 income levels reveal a similar range: \$1,078 to \$17,426. The employment characteristics showed that the proportion of blue-collar workers varies between 0.9% to 46.9% in the tracts.

There was an assortment of housing types in the zone. Older, single-family housing and duplexes are found in a deteriorating section of East Oakland. Housing in Union City (Photograph 35) is similar to housing found in Hayward, where 1981 prices average \$110,000 and range between \$60,000 and \$300,000.



Photograph 35 shows housing found in the eastern portions of Union City.

Berkeley also shows the greatest intrazone diversity in housing characteristics, as older, well-maintained homes (Photographs 36 and 37) are mixed with high-density, multi-family housing located near the university (Photographs 38 and 39). Some of these houses (Photograph 36) are suffering from the stress of fault creep. There is also structural damage to apartment houses (Photographs 38 and 39).

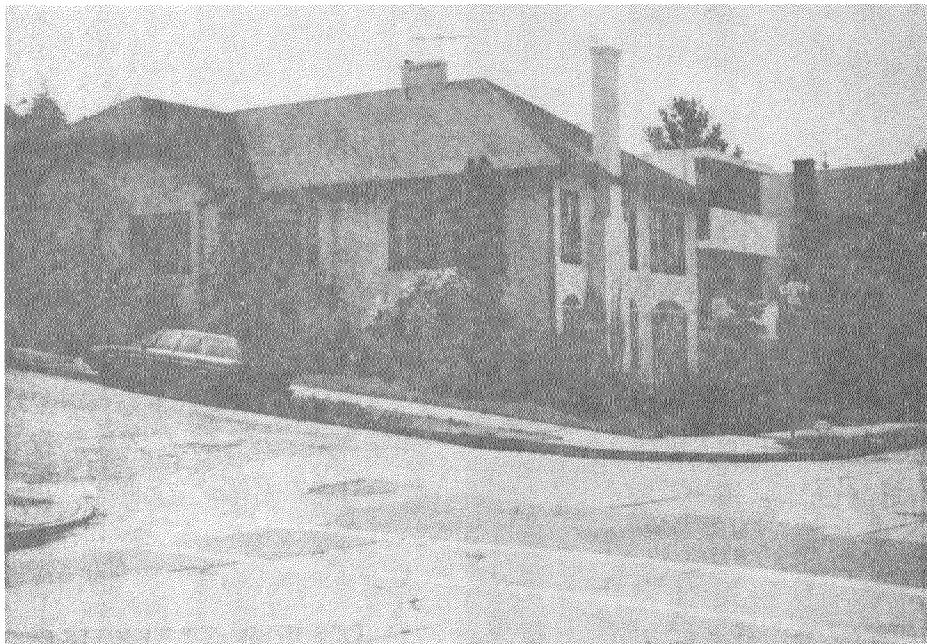
Calaveras

Hollister, with a 1970 population of 7,663, is located 90 miles southeast of San Francisco and is not contained in an SMSA. Due to its small population, Hollister is not divided into tracts.

Hollister's population is predominantly lower-middle and middle-class. The total nonwhite proportion of the population was 3.5% in 1970 and blacks made up 2.9% of the residents. Figures for the Spanish-speaking population were not available from census data, although a large number of Hispanics were observed in the city. Farm workers comprise 11% of the labor force and blue-collar workers account for 49% of employed adults. This is the third largest percentage of blue-collar workers in the zones. The median income in 1970 was \$9,142 which is above the state mean, but the median level of education is only 10.7 school years completed, the lowest of all the zones.



The northern section of the Hayward Fault runs through older sections of the East Bay (Photographs 36 and 37).





Much multifamily housing is located on the faults, especially in Berkeley, where the fault runs adjacent to and through the University of California campus (Photographs 38 and 39).

Photographs 40 to 42 depict the small houses found on the fault. The 1981 average value for housing was \$57,000.

Rogers Creek/Healdsburg

Santa Rosa and Healdsburg are the main cities in this zone. The area has but a small black population with a maximum tract percentage of 1.5%. The Hispanic community ranges from 3.0% to 17.1% of the population. Labor force characteristics closely resemble those of the state as a whole with 37.5% concentrated in the operative, transport worker and labor sectors. There are no affluent tracts in the zone. The median income in 1970 ranged from \$4,674 to \$10,924. Current (1981) housing values fall between \$100,000 and \$159,000.

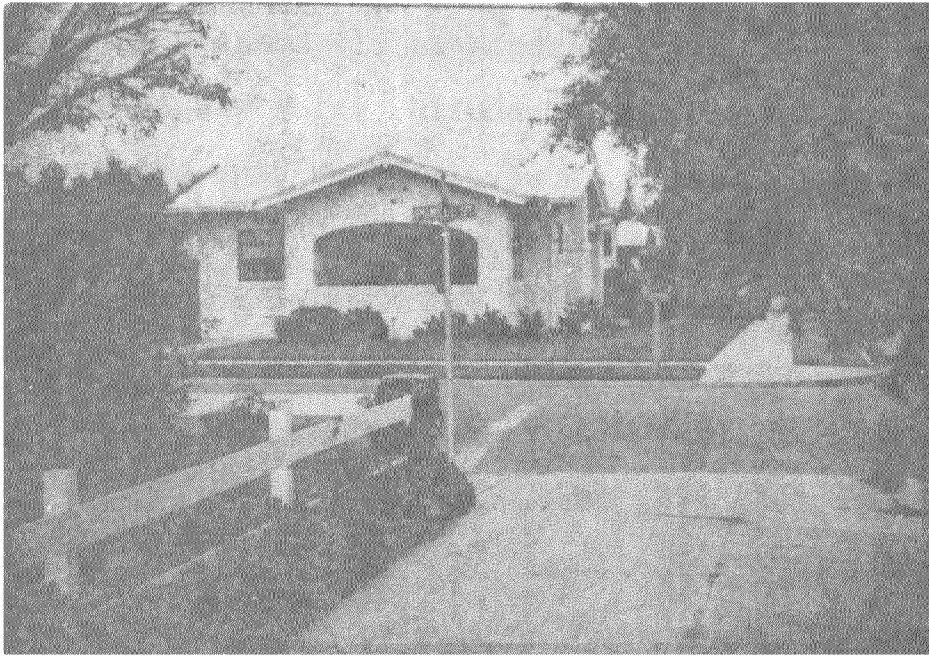
Green Valley

This zone runs from Pleasanton to the Carquinez Strait and continues into Solano County. The significant population centers are Dublin, Pleasanton and Concord. It is a rapidly growing suburban region with a high percentage of white-collar workers. Tract data shows that between 56.1% and 91.2% of the population had moved between 1965 and 1970. This new population is mixing with the older residents and provides the diversity found in the data. The proportion of blacks in the tracts is 1.7%, well below the state level of 7%. The Hispanic population accounts for 9.7% of the population, above the state level of 7.9%. Husband and wife families with children under eighteen years old make up 59.3% of the families. This is consistent with the predominance of single-family homes found



Small, well-maintained homes are representative of the housing in the special studies zones in Hollister (Photographs 40 and 41). Photograph 40, however, shows extensive structural damage to the walls and sidewalks.





Photograph 42 shows housing in Hollister.

in the zone. The total proportion of blue-collar workers is 27%, below the state level of 33%. The median income of \$13,805 is well above the state median. 1970 housing values were likewise much higher than the state's median of \$23,100 and the median number of rooms per home is 6.9, the highest for all the surveyed zones.

In contrast to this picture of affluence, Martinez is characterized by a working-class population and an older supply of well-maintained single-family homes. This area is similar to the older area of Dublin, which was associated with the fault. Concord, however, has a high proportion of multifamily housing on the faults.

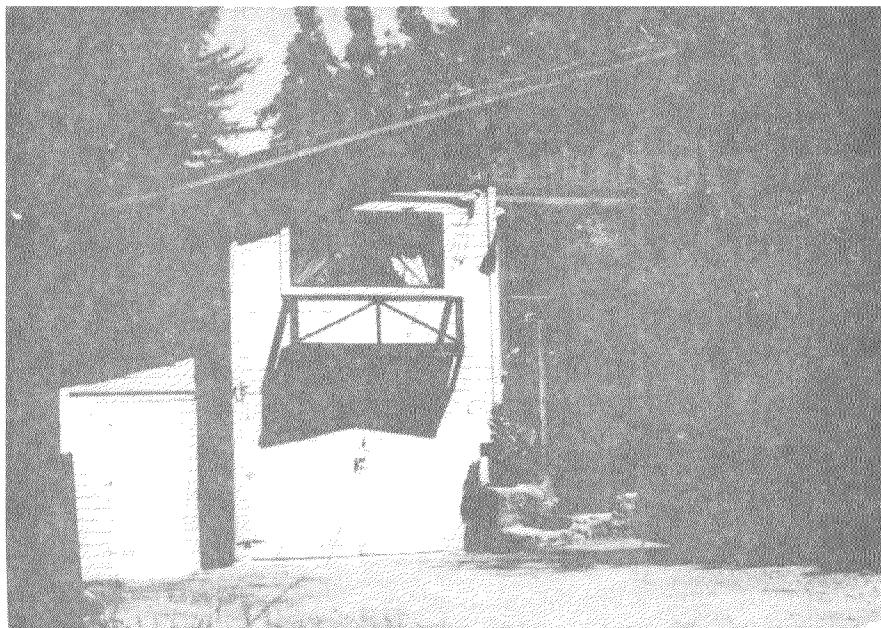
Examples of both old and new housing on the fault are shown in Photographs 43 and 44. These houses are found in Dublin, where the 1981 housing prices range from \$148,000 to \$189,000. For the zone as a whole, the housing values range from \$85,000 to \$225,000.

Antioch

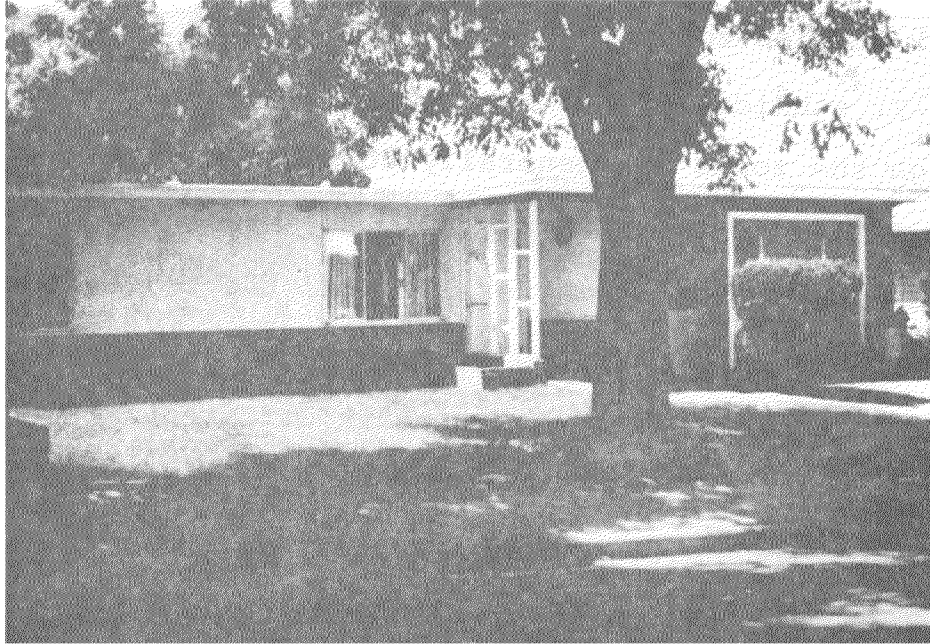
Antioch is the only population center in this zone. It is an older middle-class community with a small minority population. Within the zone, the tract with the highest percentage of blacks contains only 0.2% nonwhites. The Spanish-speaking population averages 14%, above the state's 7.9% average, with tracts ranging from 1.3% to 15.9% Hispanic. The mean percentage of blue-collar workers is 34.5% ranging between 13.6% and 46.2%. Median educational level is 12.25 years of school completed.



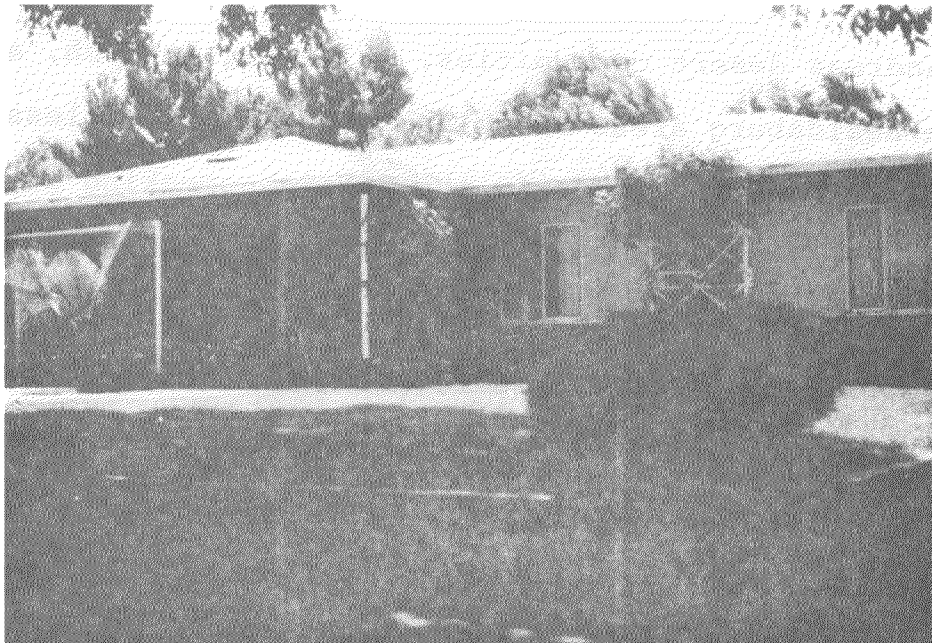
Photographs 43 and 44 show old and new housing on the Green Valley Fault in Dublin. Housing prices here range from \$148,000 to \$189,000.



In 1970, the annual median income for the zone was \$10,384, above the median of \$8,279 for California, yet the median housing value was \$18,500, below the state median of \$23,100. This may be due to the older nature of the housing in the zone, approximately one-sixth of which was built before 1939. Single-family detached housing is the main type found here (Photographs 45 and 46). Current (1981) values range between \$60,000 and \$100,000. As the photographs illustrate, fault creep has caused a great deal of damage to the structures surrounding the houses. Garden walls are splitting and the sidewalks are creeping up trees. The houses themselves, however, most of which have wood or aluminum exteriors, do not reveal such damage.



Most housing in Antioch is similar to that illustrated by Photographs 45 and 46. Photograph 46 reveals the damage occurring to the structures surrounding the houses.



Summary

The 1970 Census data, 1981 housing price data and the field study provide evidence of three characteristics of special studies zones residence. First, the zones are racially, ethnically, and economically diverse. Second, although the zones are generally comparable in make-up to the state of California, they are slightly wealthier, and contain a higher proportion of whites. Third, the zones are composed of newer and larger housing units. These findings have important implications for a geologically differentiated lending policy.

The heterogeneity of special studies zones occupance can be supported by the range of values for each of the variables investigated (Table 1). Composite percentages for zones displayed wide variation. For example, while the population of Compton was 95.8% black, the Raymond Hill, San Jacinto, San Andreas desert communities, Calveras, Antioch, and Rogers Creek-Healdsburg areas had black populations of less than 1% of their totals. Similarly the Spanish-speaking population ranged from 30.3% of the total in the San Andreas-San Bernardino region to less than 1% on the Calaveras fault. The percentage of persons over age 65 ranged from a high of 34.9% for the San Andreas desert communities to a low of just over 1% along the Compton section of the Newport-Inglewood special studies zone. Finally, even the most stereotypical

of California characteristics--possession of an automobile--varied widely among the zones, from a high of over 99% in the San Andreas-South San Francisco-Los Gatos region to a low of 75.8% in the San Andreas-San Bernardino areas. It simply cannot be argued that a particular segment of the California population is concentrated within the special studies zones. Rather, the zones are representative of the diverse population which makes up the whole state.

It must be noted, however, that the composite averages for zone residents do differ from the state figures in a few categories. The percentage of black population is lower within the zones than for the state: the zones had a median value of 0.6% blacks for 1970, while comparable state figures were 7.0%. Similarly, in the special studies zones, 7.3% of the households were headed by women, while 11% of state households were so organized. Only 10.5% of zone residents were employed as service or private household workers, while the state figure was 18.0%. Special studies zones housing was newer: only about 10% was build before 1939. In addition, there was a larger percentage of owner-occupancy in the zones--almost 71% compared to 55% for the state. In short, residents of the zones were more likely to be white, owner-occupiers, have higher incomes, higher-status jobs, and reside in newer housing. It is clear that the zones do not contain a disproportionate concentration of poor or minority households. See Table 2.

TABLE 2

COMPARISON OF CALIFORNIA PERCENTAGES AND THE
COMPOSITE MEDIANS OF THE SPECIAL STUDIES ZONES

VARIABLE	CALIFORNIA*	SSZ**
<u>Percentage of the population:</u>		
BLACK	7.0	0.6
SPANISH-SPEAKING	7.9	8.2
OVER 65 YEARS	6.0	9.0
OVER 75 YEARS	4.0	3.0
HUSBAND/WIFE FAMILY WITH CHILDREN UNDER EIGHTEEN	47.0	48.2
FEMALE HEAD OF HOUSEHOLD	11.0	7.3
FEMALE HEAD OF HOUSEHOLD WITH CHILDREN UNDER EIGHTEEN	7.0	4.2
MOVED WITHIN FIVE YEARS	57.0	51.6
FEWER THAN EIGHT YEARS OF SCHOOL COMPLETED	19.8	19.0
OPERATORS, TRANSPORT WORKERS, LABORERS	13.0	15.0
FARM WORKERS	2.0	0.4
SERVICE AND PRIVATE HOUSEHOLD WORKERS	18.0	10.5
HOUSEHOLDS WITHOUT AUTOMOBILES	1.6	5.4
<u>Percentage of the housing:</u>		
OWNER-OCCUPIED	55.0	70.9
BUILT BEFORE 1939	23.0	9.6
<u>Median:</u>		
SCHOOL YEARS COMPLETED	12.4	12.4
INCOME OF FAMILIES AND UNRELATED INDIVIDUALS	\$8,277	\$9,708
NUMBER OF ROOMS PER HOUSE	4.7	5.0
VALUE OF OWNER-OCCUPIED HOUSING	\$23,100	\$24,000
CONTRACT RENT	\$173	\$130

*Values for the state of California are based on percentages and medians for the total population, based on the 1970 Census of Population.

**Composite values for the special studies zones are medians for the percentages and median values for the 15 special studies zones regions identified in Table 1.

These empirical findings have important implications for a geographically differentiated lending policy. Although anti-redlining policies were devised to protect minority, low-income or disadvantaged households from possible lack of access to mortgage funds, it has been argued that such policies could be used to prevent lenders from any policy discriminating on the basis of location or area. Since there is no systematic concentration of low-income or minority population in the special studies zones any lending policy which might discriminate against these areas on the basis of geologic risk would not result in discrimination against low-income or minority households. On the contrary, it is more likely that middle-income households would be most affected by a policy of spatially differentiated lending. It is precisely these households which could best afford an additional charge for a separate earthquake insurance policy, or mandatory structural reinforcements. If financial institutions were to adopt a spatially differentiated mortgage lending policy, based on geologic or seismic characteristics associated with the special studies zones, this type of policy would not, on its face, discriminate against any already disadvantaged sector of the population.

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