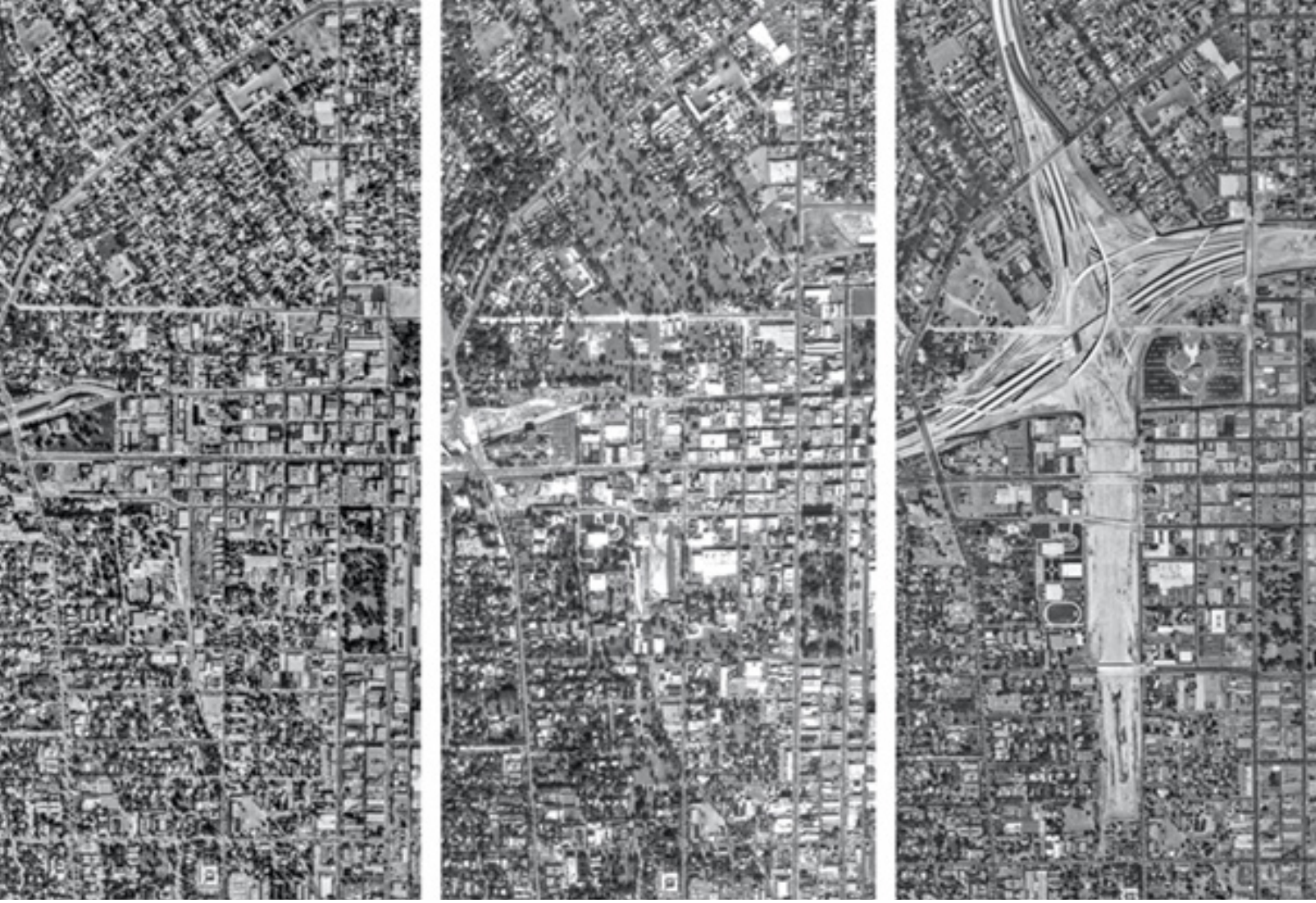

RESEARCH REPORT

Racial Segregation in Pasadena: The Role of Freeway Development and Institutional Mechanisms

May 2025

UCLA Institute of Transportation Studies

Abstract

This study documents the historical and current patterns of racial/ethnic residential segregation in Pasadena, examining the role of freeways and other mechanisms in shaping these outcomes. Using quantitative data, this project compares racial segregation in Pasadena with that in the rest of Los Angeles County and analyzes demographic changes in the neighborhoods containing Interstate 210 and State Route 710 before and after their construction. Additionally, the study investigates other institutional policies, practices, and projects that contributed to segregation. The findings offer insights to support Pasadena's efforts to redress the historical impacts of freeway development.

Pasadena and the wider Los Angeles County have become more racially diverse over time. Despite these broader changes, neighborhoods along the built and unbuilt freeway corridor have grown increasingly segregated and economically polarized. From 1960 to 1970, tracts affected by freeway construction lost almost 1,800 units of housing (-28%), while the city overall and the South tract, not directly impacted by freeway construction, experienced steady growth. Home values, rents, and income generally fell north of SR-710 but rose around it and south of it. Pasadena mirrored national trends in housing discrimination, including redlining, racially restrictive covenants, school integration resistance, and anti-integration ballot measures. In the face of these barriers, residents of color successfully organized protests and pursued legal remedies. Urban renewal projects, particularly around the SR-710 stub, disproportionately displaced communities of color under the guise of eliminating urban blight. Freeway development in Pasadena left a lasting legacy of environmental and social inequality.

About the UCLA Institute of Transportation Studies

The UCLA Institute of Transportation Studies supports and advances cutting-edge research, the highest-quality education, and meaningful and influential civic engagement on the many pressing transportation issues facing our cities, state, nation and world today. The institute is part of the University of California Institute of Transportation Studies, a four-campus consortium that includes UC Berkeley, UC Davis and UC Irvine. UCLA ITS is also a proud partner of the Pacific Southwest Region 9 University of Transportation Center, a federally funded research network with seven other universities.

About the UCLA Center for Neighborhood Knowledge

The UCLA Center for Neighborhood Knowledge conducts basic and applied research on the socioeconomic formation and internal dynamics of neighborhoods and how these collective spatial units are positioned and embedded within regions. The Center for Neighborhood Knowledge works with a broad set of data and employs a range of analytical skills to examine neighborhood phenomena across time and space.

Acknowledgments

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The UCLA Institute of Transportation Studies and UCLA Center for Neighborhood Knowledge acknowledge the Gabrielino/Tongva peoples as the traditional land caretakers of Tovaangar (the Los Angeles basin and So. Channel Islands) and that their displacement has enabled the flourishing of UCLA. As a land grant institution, we pay our respects to the Honuukvetam (Ancestors), ‘Ahiihirom (Elders) and ‘Eyoohiinkem (our relatives/relations) past, present and emerging.

The research team acknowledges the presence of the study area on the traditional, ancestral and unceded territory of the indigenous peoples who today use the names Tongva, Gabrielino, Kizh, and Chumash.

Disclaimer

Racial Segregation in Pasadena: The Role of Freeway Development and Institutional Mechanisms

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EXECUTIVE SUMMARY

Executive Summary

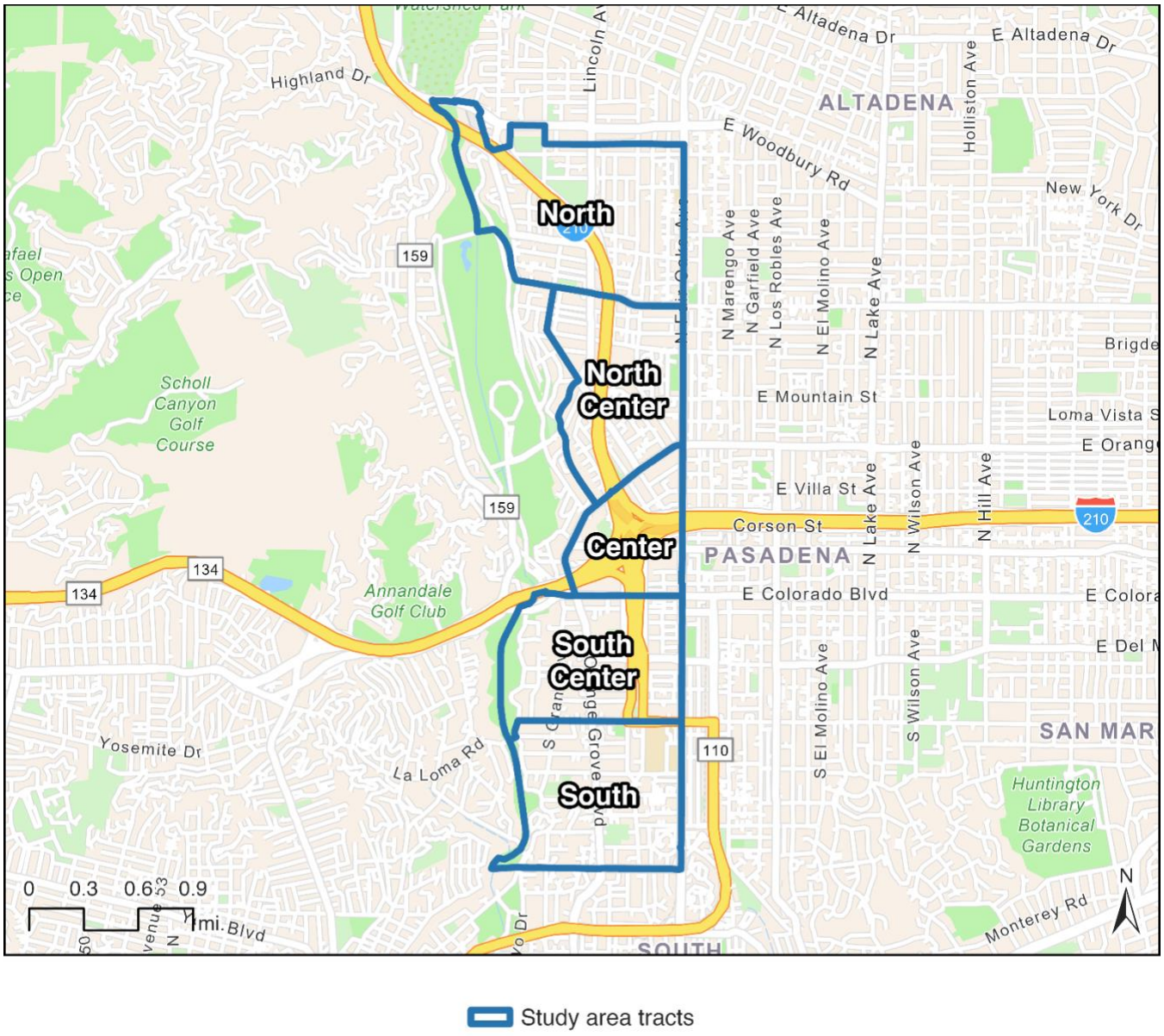
This study documents the historical and current patterns of racial and ethnic residential segregation in Pasadena, examining the role of freeways and other mechanisms in shaping these outcomes. Using quantitative data, this project compares racial segregation in Pasadena with that in the rest of Los Angeles County and analyzes demographic changes in the neighborhoods containing Interstate 210 and State Route 710 before and after their construction. Additionally, the study investigates other institutional policies, practices, and projects that contributed to segregation, including housing discrimination, redlining, and the redevelopment of the central business district and adjacent areas. The findings offer insights to support Pasadena's efforts to redress the historical impacts of freeway development and its related historical processes.

Pasadena and the wider Los Angeles County have become more racially diverse over time. During the quarter-century after the Second World War, both Pasadena and the broader county were predominantly non-Hispanic white, but by the last quarter of the century, both the region and the city had become "majority-minority." Despite the influx of people of color moving into the area, the City of Pasadena continued to remain segregated, as people of color remained disproportionately concentrated in the northwestern section of the city, just east of the Arroyo Seco valley, due to restrictive covenants written into property titles and enforced by the government (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020); Rose, 2016; Cole, 2021; Loukaitou-Sideris et al., 2023; and A. Ramirez et al., 2025).

Segregation levels began to decrease around the 1960s, with Pasadena showing lower levels of segregation than the rest of the county, as calculated using a number of measures of segregation and diversity. Nonetheless, the northwest section remained predominantly Black, with newer Asian areas in the southeast and Latino/a populations spread out across the city (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)).

Despite these broader changes, neighborhoods along the built and unbuilt freeway corridor have grown increasingly segregated and economically polarized. The study area's population remained stable through the 1950s, then declined sharply in the 1960s, remained low over the next decade, and partially recovered during the post-freeway period. Subareas within the study area (See **Figure E-1**) became increasingly racially polarized and segregated over time, more so than the rest of Pasadena. Especially in the North tract but generally along I-210, shares of residents of color increased, while south of the interchange along the SR-710 stub and unbuilt sections, areas lost residents of color or saw little demographic change (See **Figure E-2**). From 1960 to 1970, tracts affected by freeway construction lost almost 1,800 units of housing (a 28% reduction), while the city overall and the South tract, not directly impacted by freeway construction, experienced steady growth. Home values, rents, and income generally fell north of SR-710 but rose around it and south of it (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)). Together, these findings paint a picture of economic stratification within Pasadena's western neighborhoods.

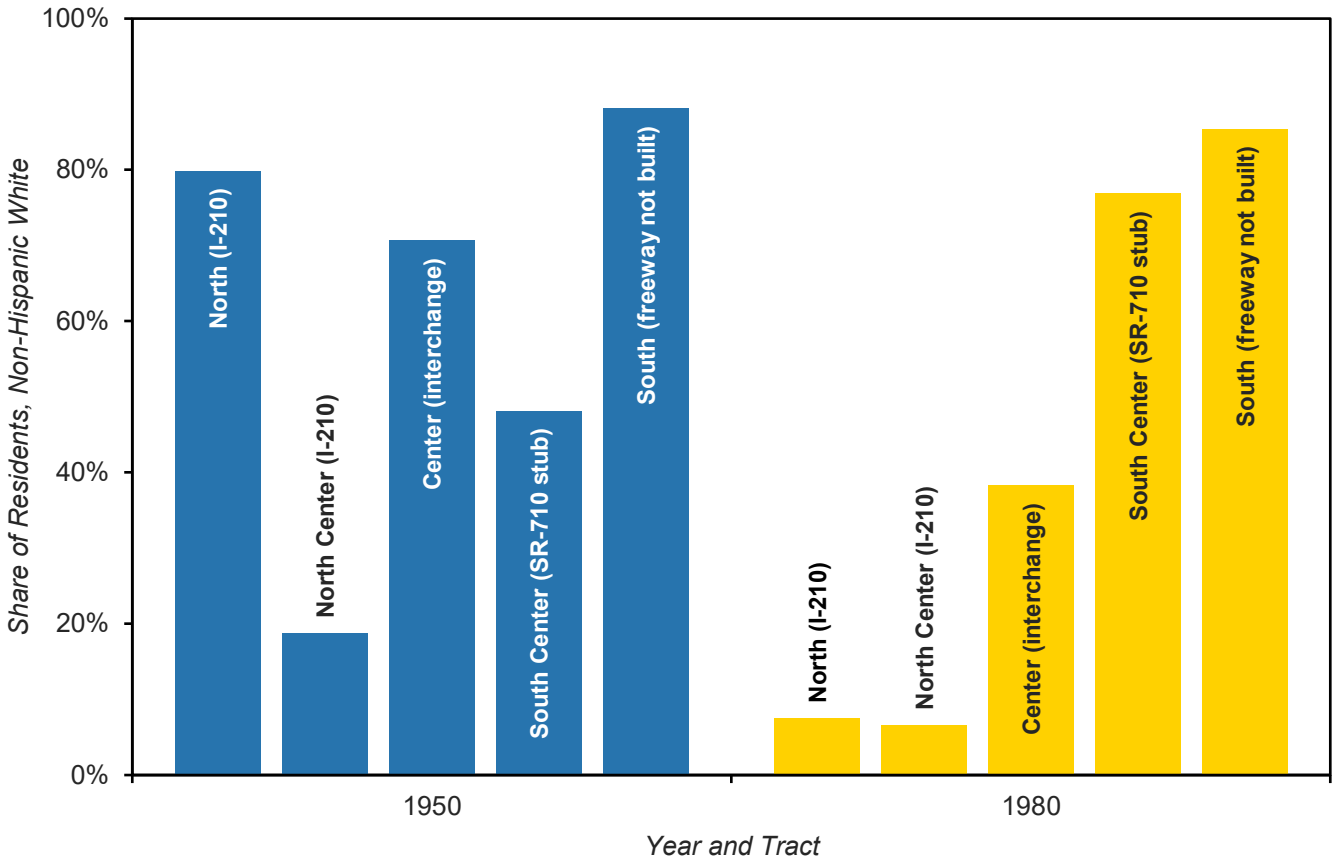
Figure E-1. Pasadena Study Area Tracts



Data source: 1960 U.S. Census (U.S. Census Bureau, 1960); base map: Esri, 2024b

Turning to historical policy research, we find that Pasadena mirrored national trends in housing discrimination during the freeway-development era. Pasadena implemented land-use regulations that, while not overtly racist, had a disproportionate impact on people of color and reinforced segregation. Likewise, around 60 percent of Pasadena properties had a restrictive covenant—clauses in property deeds that prohibited sales based on race/ethnicity—in 1942 (Shook, 2020; Gotham, 2000; Rose and Brooks, 2015; and Cole, 2021). Federal redlining maps that helped preclude people of color from obtaining home loans labeled Pasadena neighborhoods of color

Figure E-2. Share Non-Hispanic White in the Study Area Tracts, 1950-1980



Data source: calculated by authors from 1950 and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1980)

as being affected by "infiltration" of a "...Mexican and Negro population," a "real menace" (quoted in Nelson et al., 2023). The enforcement of residential segregation in Pasadena led to both limited economic opportunities and subjection to poorer living conditions for communities of color, restricting upward mobility and significantly impacting their quality of life and standard of living (Swope, Hernández, and Cushing, 2022 and Nardone et al., 2020). But Pasadena was also a site of resistance against housing discrimination, including the *Fairchild v. Raines* (1944) case that presaged the invalidating of restrictive covenants nationwide (*Shelley v. Kraemer*, 1948 and Cole, 2021).

These anti-discrimination efforts met with backlash. For instance, school desegregation and busing efforts in Pasadena faltered amidst local opposition. And Proposition 14 in 1964—which temporarily overturned the anti-housing-discrimination Rumford Act before itself being invalidated by the courts—passed overwhelmingly in Pasadena and surrounding segregated towns, with northwest Pasadena a lone island of opposition (Lee, 1970; Blumberg, 1964; Oppenheimer, 2010; *Maryland Law Review*, 1967; Vyas, 2014; Anderson and Lee, 1965; and Jordan, 1964).

Both public and private urban renewal projects, particularly around the SR-710 stub, disproportionately displaced communities of color under the guise of eliminating urban blight. Along with the City's 1962 General Plan, major developments near the freeways reinforced the isolation of people of color. Four major sites—the Norton Simon Museum, Parsons headquarters, Ambassador College, and Old Pasadena (See **Figure E-3**)—significantly influenced neighborhood demographics and urban dynamics beyond the freeway's immediate impact. From 1960 to 1980, housing units across these areas declined sharply (See **Table E-1**). In 1960, non-white residents occupied over half of the housing units across the sites; by 1980, this figure had fallen to just 17 percent,[1] highlighting the profound displacement of people of color as a result of these projects. Meanwhile, the Pepper Project redevelopment north of the interchange, meant to include mixed uses and some integrated affordable housing, was not completed and ended up displacing existing Black residents and businesses (calculated by authors from 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1961b and Manson et al., 2024); Pasadena Planning Commission, 1962; Loukaitou-Sideris et al., 2023; A. Ramirez et al., 2025; Norton Simon Museum, 2024a, 2024b; Coplans, 1975; *Los Angeles Times*, 1975; Vincent, 2011; Los Angeles Conservancy, 2024; Erdman, 2013; Baker, 2023; Old Pasadena Management District, 2024; Marshall, 2013; Shigley, 2005; Mann, 1978; Pincetl, 1992; B. Ramirez, 2021; Nicolaides, 2024; Frieden and Sagalyn, 1991; and Blumberg, 1964).

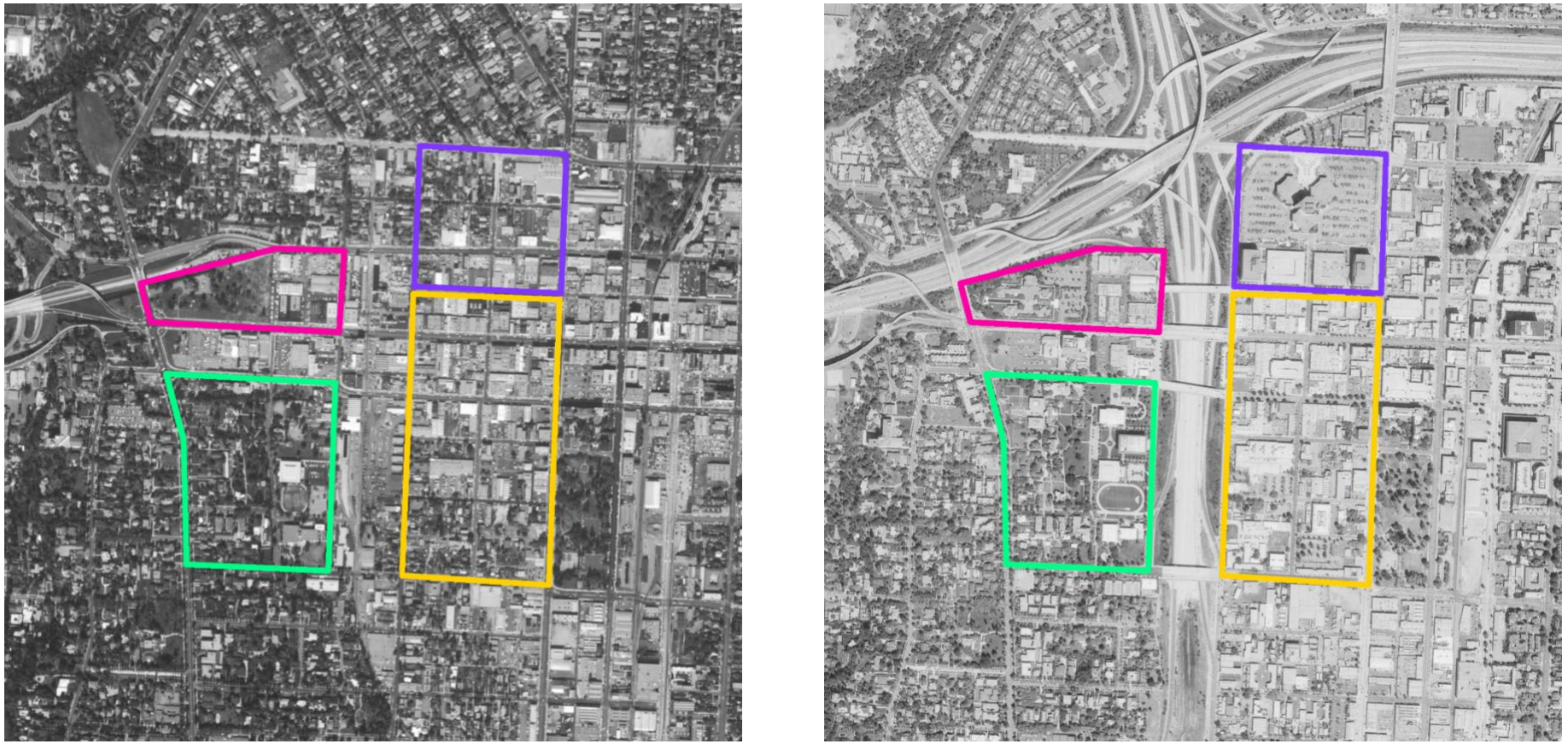
All told, the developments of I-210 and SR-710, along with several city improvement projects in Pasadena during this time period, were marked by controversial and discriminatory practices that exacerbated racial segregation. The construction of the I-210 and the I-210/SR-710/SR-134 interchange resulted in the displacement of numerous households and contributed to a demographic shift marked by white flight, which increased the relative proportion of residents of color. Similarly, the development of the 710 stub to the south disproportionately displaced households of color. Under the policy of addressing urban blight—particularly in the downtown areas—the city and private developers, whether intentionally or unintentionally, engaged in practices that perpetuated racial erasure in and around renewal areas. The displacement of communities of color became an inherent consequence of these urban improvement initiatives. Of course, there were larger societal dynamics and institutional practices perpetuating racial segregation; nonetheless the evidence in this report reveals that freeway construction and related urban restructuring exacerbated racial segregation, deepening demographic and economic polarization in neighborhoods along I-210 and SR-710.

The impacts are not just historical. Mid-20th century freeway development in Pasadena left a lasting legacy of environmental and social inequality, particularly when comparing neighborhoods along different freeway segments. Data on air pollution, traffic density, and access to opportunities reveal stark disparities across the study area, with neighborhoods of color north of the interchange bearing a significantly higher environmental burden and having limited access (California Office of Environmental Health Hazard Assessment, 2023 and CTCAC, 2024a). The consequences of freeway development and urban restructuring continue to manifest today, leaving an economic and environmental legacy of racial and spatial inequality.

In deciding the future of the SR-710 stub after Caltrans relinquished the route to the City (Pasadena Department of Transportation, 2024), one major challenge facing the city's 710 Revisioning Project is how to address and redress the past and legacy harms caused by freeway development. The report's analyses broadly identify the nature, magnitude, and causes of the impacts, providing critical information that could inform discussions on

1. The 1960 figure represents "non-white households" and excludes Hispanics, while the 1980 figure reflects people of color in the population, not households. This discrepancy makes a direct comparison challenging.

Figure E-3. Major Development Sites near SR-710 Stub, 1967 and 1989



Note: 1967 aerial image at left; 1989 aerial image at right; Norton Simon Museum outlined in pink; Parsons headquarters outlined in purple; Ambassador College outlined in green; Old Pasadena sub-area for analysis outlined in yellow

Sources: UC Santa Barbara Library, 2012 and 1960 U.S. Census (U.S. Census Bureau, 1961a)

Table E-1. Housing and Demographic Changes in Major Projects near the SR-710 Corridor, 1960-1980

Statistic	Parsons Headquarters			Ambassador College			Part of Old Pasadena in Study Area		
	1960	1970	1980	1960	1970	1980	1960	1970	1980
Housing units	166	43	0	137	18	24	250	187	63
Occupied housing units	147	37	0	126	18	16	223	161	54
Owner households	22	5	0	39	3	3	48	15	5
Renter households	125	32	0	87	15	13	175	146	49
Non-white (excluding Latino/a) households	36	19	no data	32	0	no data	131	46	no data
Share, non-white (excluding Latino/a) households	24%	51%	no data	25%	0%	no data	59%	29%	no data
Share, households of color	no data	no data	N/A	no data	no data	5%	no data	no data	39%

Note: The Norton Simon Museum site did not contain any housing units from 1960 to 1980; the project replaced historic Carmelita Park for the museum's expansion.

Data sources: calculated by authors from 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1961 and Manson et al., 2024); Norton Simon Museum, 2024b; and Coplans, 1975

potential remedies. Any proposed actions should be directly linked to specific damages and should reflect the values and priorities of stakeholders, especially those from communities that have been disproportionately harmed.

CONTENTS

Introduction

This study documents the historical and current patterns of racial and ethnic residential segregation in Pasadena, examining the role of freeways and other mechanisms in shaping these outcomes. Using quantitative data, this project compares racial segregation in Pasadena with that in the rest of Los Angeles County and analyzes demographic changes in the neighborhoods containing Interstate 210 and State Route 710 before and after their construction.[2] Additionally, the study investigates other institutional policies, practices, and projects that contributed to segregation, including housing discrimination, redlining, and the redevelopment of the central business district and adjacent areas. The findings offer insights to support Pasadena's efforts to redress the historical impacts of freeway development and its related historical processes.

The study draws on decennial enumeration data from the U.S. Census, analyzing data by census tract (small areas of a few thousand residents defined by the U.S. Census Bureau (U.S. Census Bureau, 2022b)) as proxies for neighborhoods (See Appendix). Commonly accepted methods are used to measure residential patterns and housing segregation, with further details on data and methodology provided in an appendix. We first review historical and contemporary segregation in Pasadena and the rest of the county from 1940 to 2020. A more focused analysis then examines segregation and demographic change from the late 1950s to the 1970s specifically within the primary study area in Pasadena: the census tracts along the I-210 corridor in northwest Pasadena and those along the SR-710 stub in central/southwest Pasadena (the constructed and partially constructed segments of that freeway before it was ultimately canceled). Next, we conduct a qualitative analysis of broader institutional discriminatory factors, reviewing and synthesizing existing literature and documents from national sources, local archives, and other locations. Where relevant, we also conduct some quantitative assessments of these practices.

The study's major quantitative findings reveal that 1) Pasadena and the wider Los Angeles County have become more racially diverse over time, 2) segregation levels began to decrease around the 1960s, with Pasadena showing lower levels of segregation than the rest of the county, and 3) despite these broader changes, neighborhoods along the built and unbuilt freeway corridor have grown increasingly segregated and economically polarized. Freeway developments contributed significantly to this latter outcome.

Our qualitative research also sheds light on racialized housing and transportation patterns. We find that 1) Pasadena mirrored national trends in housing discrimination during the freeway-development era, 2) both public and private urban renewal projects, particularly around the SR-710 stub, disproportionately displaced communities of color under the guise of eliminating urban blight, and 3) major developments near the freeways reinforced the isolation of people of color. These actions pushed non-white residents out of the city, deepening long-term racial divides. The consequences of freeway development and urban restructuring continue to manifest today, leaving an economic and environmental legacy of racial and spatial inequality.

The rest of the report is organized into four main sections. First, we discuss racial diversification and segregation in Pasadena and Los Angeles County from 1940 to 2020. After, we focus on the impact of the developments of the SR-710 and I-210 freeways from 1950- to 1980. We then review institutional discriminatory practices in housing. We provide an analysis of urban renewal and restructuring projects in the area. The report concludes

2. As in Loukaitou-Sideris et al. (2023), we abbreviate Interstates with "I-" and California State Routes with "SR-."

with reflections on the role of past and legacy harms in guiding Pasadena's restorative-justice efforts. An appendix provides further details on the data and methods used in the study.

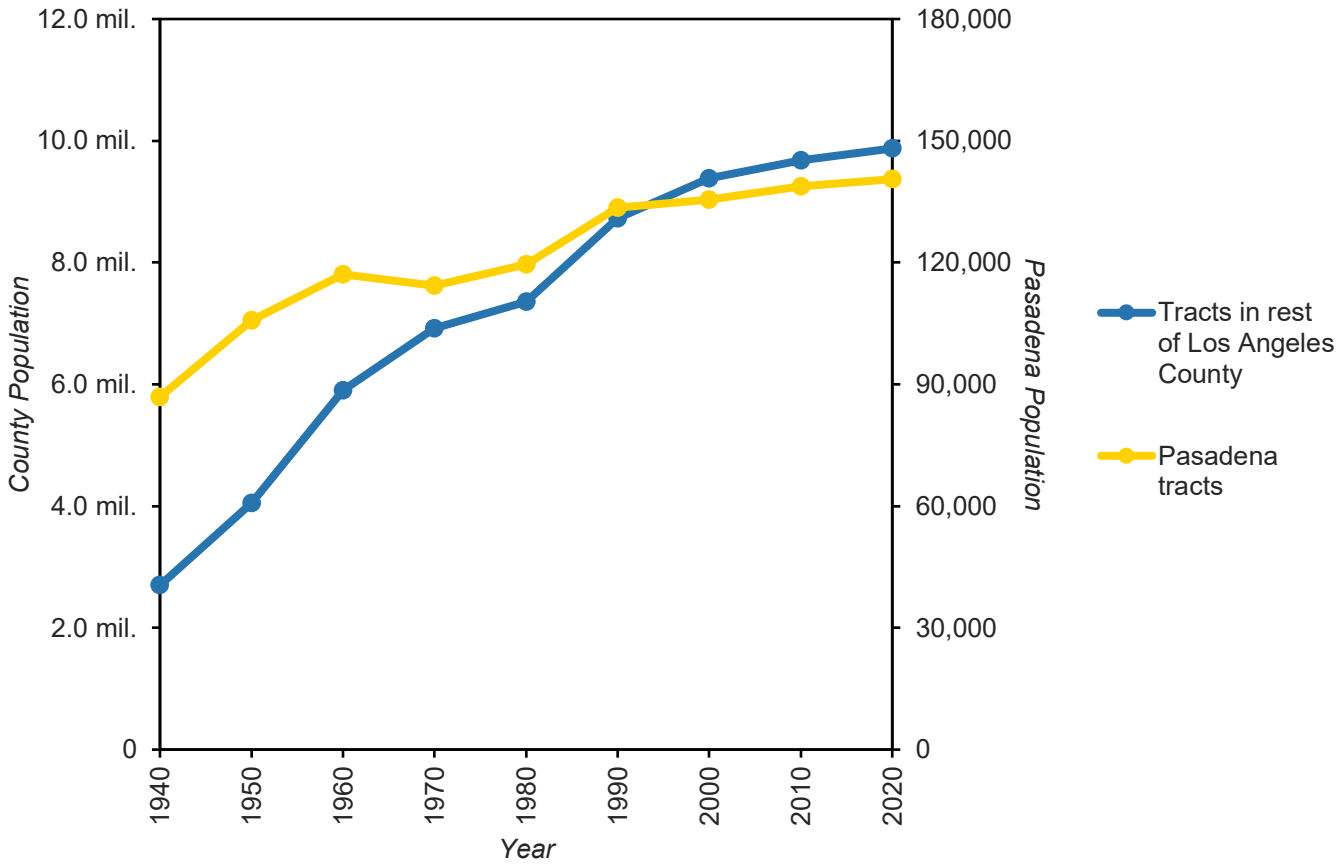
Although this report covers some aspects of the I-210, a fuller account of the history of that freeway can be found in a previous publication. This report builds on the work the UCLA research team conducted for the California Department of Transportation (Caltrans) and the Pacific Southwest Region University Transportation Center on the construction and legacy of I-210 in northwest Pasadena. That report documents the full context of national, state, and regional freeway development plans; their ties to urban restructuring and systemic racism; and how these forces played out in Pasadena in the era of freeway construction. That report calculates the demographic differences between the route ultimately chosen for I-210 north of the central Pasadena interchange (and the SR-710 stub to the south as a result) and a less destructive route not chosen. Over the segment north of the interchange on we could conduct an apples-to-apples comparison, the former displaced over 1,700 people (not counting the interchange itself), three quarters residents of color, compared to just over 200 people, half residents of color, for the latter route. That report also describes how state and local planners built I-210 through Black northwest Pasadena but how communities in the path of the planned I-710—some now Hispanic, others suburbs with a deep history of racial exclusion—successfully stopped the completion of that freeway as late as 2017, with only the SR-710 stub having been built (Loukaitou-Sideris et al., 2023). This report extends the analysis from there, offering further quantitative analysis of regional and local segregation as it relates to the freeway and exploring the policies and programs that influenced and followed from the construction of SR-710.

Part 1. Racial Diversification and Segregation in Pasadena and Los Angeles County, 1940-2020

Population Trends and Composition

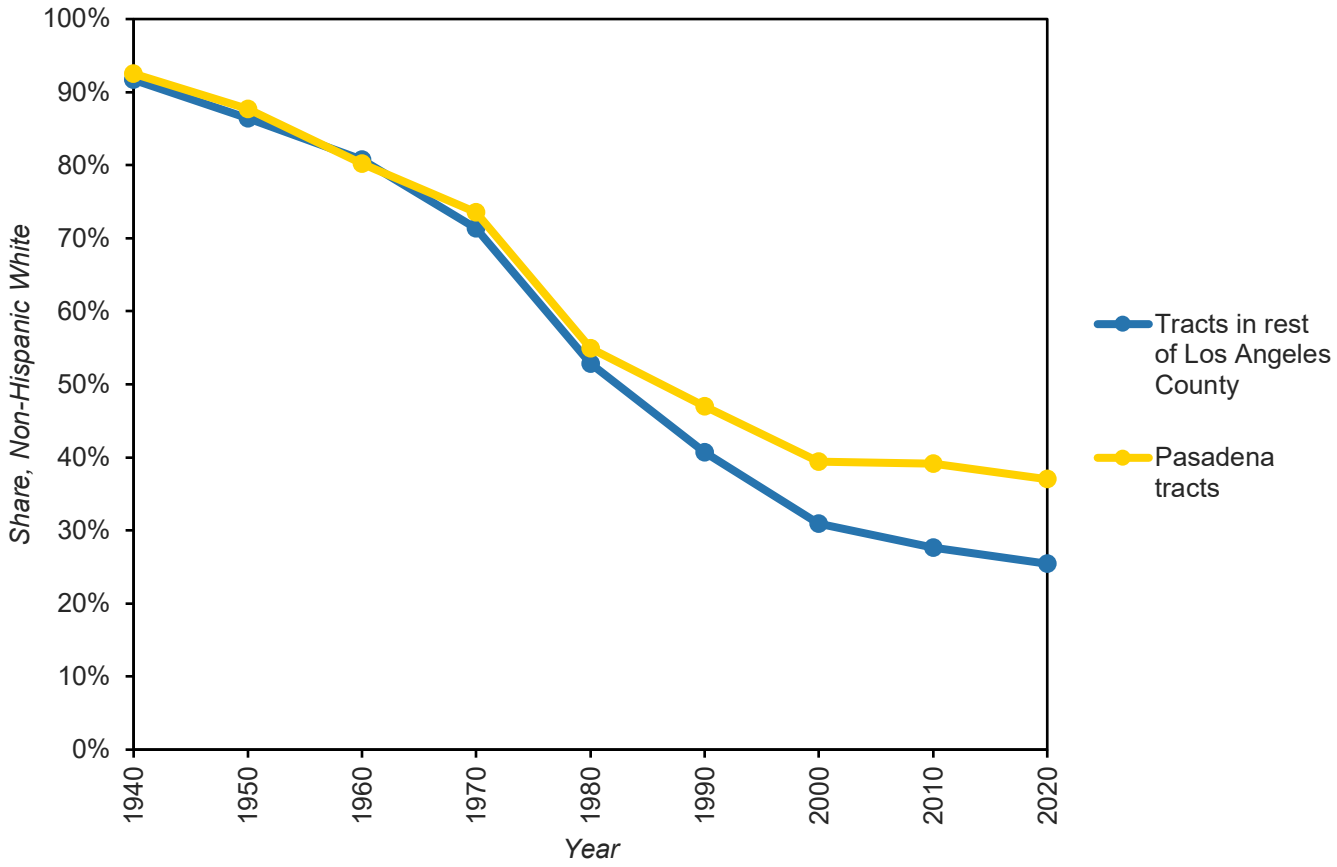
Pasadena, a medium-sized city incorporated in 1886 and located in the San Gabriel Valley about 11 miles northeast of downtown Los Angeles (City of Pasadena, 2024), experienced modest population growth in the period after the Second World War. During the quarter-century after the war, both Pasadena and the broader county were predominantly non-Hispanic white. From 1950 to 1980, Pasadena's average decennial growth rate was only about one-sixth of that of the rest of the county. However, there was a gradual decline in the non-

Figure 1-1. Los Angeles County Population in Pasadena and Beyond, 1940-2020



Data source: calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)

Figure 1-2. Los Angeles County Non-Hispanic White Population in Pasadena and Beyond, 1940-2020

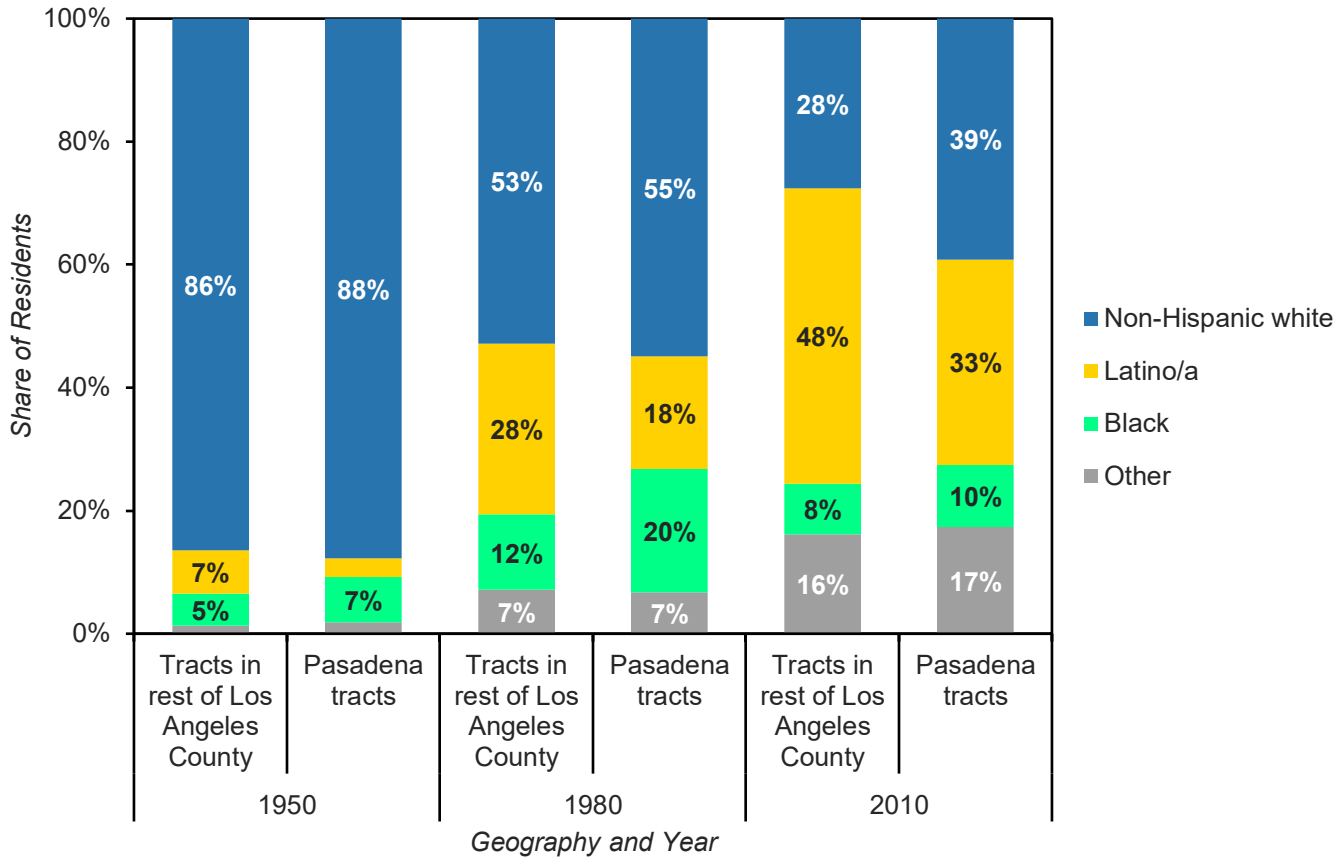


Data source: calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)

Hispanic white population share beginning in this period, which only accelerated in the 1970s and continued throughout the rest of the 20th century. By the last quarter of the century, both the region and the city had become "majority-minority" (See **Figures 1-1** and **1-2**) (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)).

The rapid ethnic diversification of Pasadena in the 1960s and 1970s (calculated by authors from 1960 and 1970 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1970)) reflected the same trends in the rest of the United States, with populations of color flocking to commercial centers, seeking better economic opportunities and living conditions. Pasadena saw substantial increases in its Black, Latino/a, and Asian populations, driven by both internal and international migration. Although the city's demographic landscape was becoming increasingly more diverse over time (See **Figure 1-3**) (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)), specific laws and regulations were established with the intention of upholding systemic barriers and fostering *de facto* segregation (discussed below). Unequal distribution of both resources and opportunities continued to exist across the city.

Figure 1-3. Los Angeles County Demographics in Pasadena and Beyond, 1940-2020



Data source: calculated by authors from 1950, 1980, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1980, 2010)

Despite the influx of people of color moving into the area, the City of Pasadena continued to remain segregated, as people of color remained disproportionately concentrated in the northwestern section of the city, just east of the Arroyo Seco valley, due to restrictive covenants written into property titles and enforced by the government (Rose, 2016; Cole, 2021; Loukaitou-Sideris et al., 2023; and A. Ramirez et al., 2025). The concentration of residents of color in specific, designated areas of Pasadena led to the exacerbation of residential segregation, which in turn, made way for the development and cultivation of other types of racial disparities.

Segregation and Diversity Metrics, 1950-2020

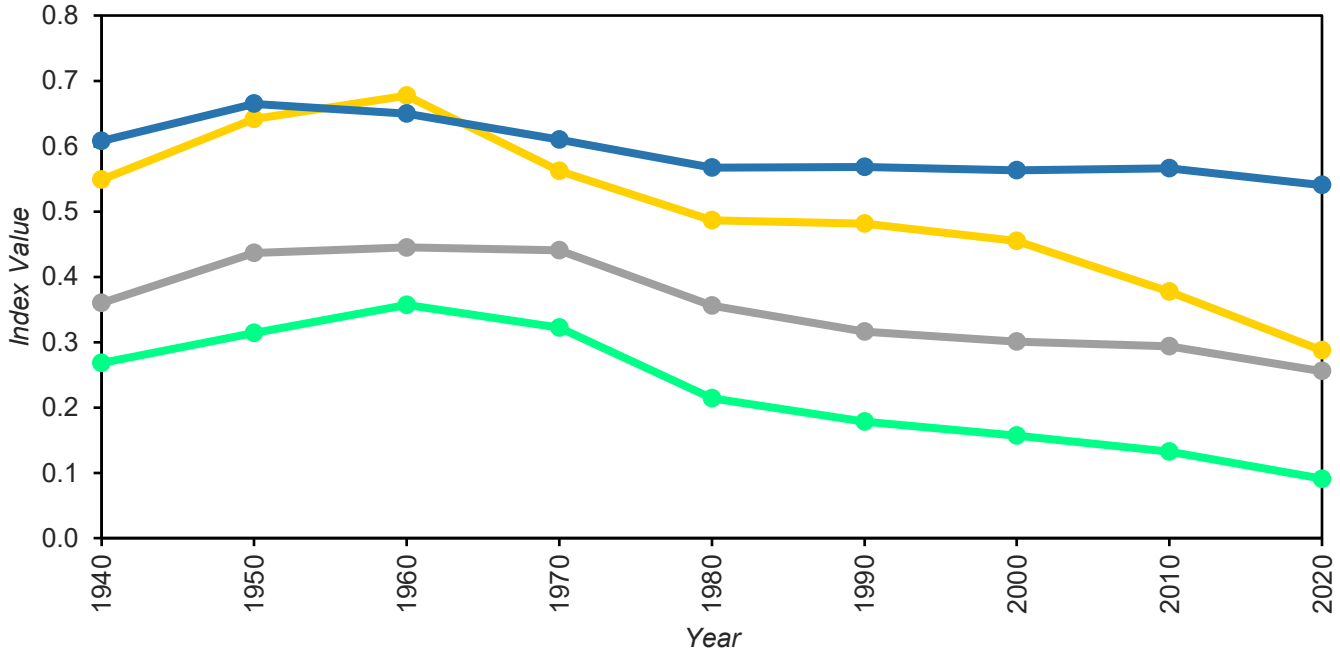
Various metrics of segregation uncover important patterns in the racial dynamics of both Pasadena and the rest of Los Angeles County. We examined three primary metrics: the dissimilarity index, the entropy index, and the entropy score. The first two measure segregation; the last measures diversity (See the Appendix for detailed descriptions of these metrics.).

The dissimilarity index measures the degree of residential segregation between two groups. A higher value in the dissimilarity index indicates greater segregation and spatial separation between groups within a geographical

area. Values closer to 1 (100%) indicate maximum segregation and values near 0 indicating minimal segregation. The dissimilarity index can be interpreted as the percent of a group that would have to move from neighborhoods where they are overrepresented to neighborhoods where they are underrepresented in order to achieve complete integration. In examining Los Angeles County and Pasadena, we calculated the dissimilarity index between two groups, non-Hispanic white residents and residents of color.

The entropy index offers an alternative measure of segregation, capturing the level of segregation across multiple populations. We calculated the entropy index for four groups: non-Hispanic white residents, Black residents, Latino/a residents, and a residual group labeled “Other” (encompassing Asians and all remaining racial and ethnic groups). Unlike the dissimilarity index, the entropy index is nonlinear and less intuitive, making comparisons between the two metrics challenging. However, the entropy index still provides valuable insights into changes in the levels of multi-racial segregation. Lower entropy index values indicate lower segregation levels, while higher values suggest greater segregation. Additionally, rather than comparing their absolute levels, we can assess

Figure 1-4. Los Angeles County Dissimilarity and Entropy Indices in Pasadena and Beyond, 1940-2020



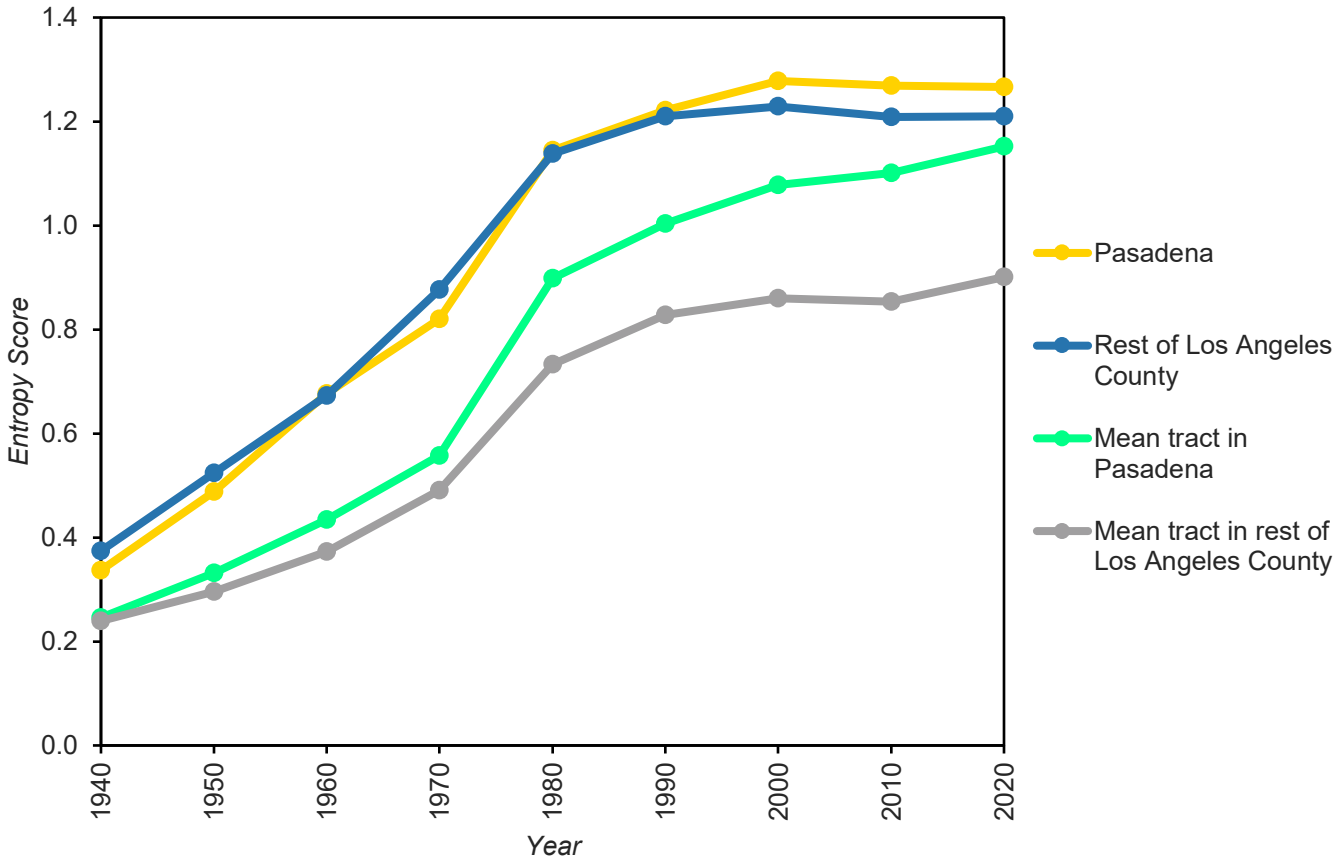
Data source: calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)

overall segregation trends over time by examining the temporal direction of change in both the dissimilarity and entropy indices. If both metrics are trending upward, segregation is increasing, and vice versa.

Both Los Angeles County and Pasadena exhibited high levels of racial segregation in the early decades of the study period, followed by a steady decline after the 1960s (See **Figure 1-4**).This trend aligns with the passage of several significant anti-housing discrimination laws, including the Civil Rights Act of 1968 (the Fair Housing Act) (1968), the Rumford Fair Housing Act (1963), the nullification of Proposition 14 (Oppenheimer, 2010; *Maryland Law Review*, 1967; *Mulkey v. Reitman*, 1966; and *Reitman v. Mulkey*, 1967), and the landmark decision in *Shelley v. Kraemer* (1948) (See Part 4 for more details on these.). Even sharper declines in the dissimilarity index were observed in Pasadena than the rest of Los Angeles County, partly due to regional-level place segregation and differences in racial/ethnic composition (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)).

The entropy index calculations reveal similar trends: values increased in the early decades of the study period and then decreased later on for both Pasadena and the county. Pasadena has consistently shown lower tract-

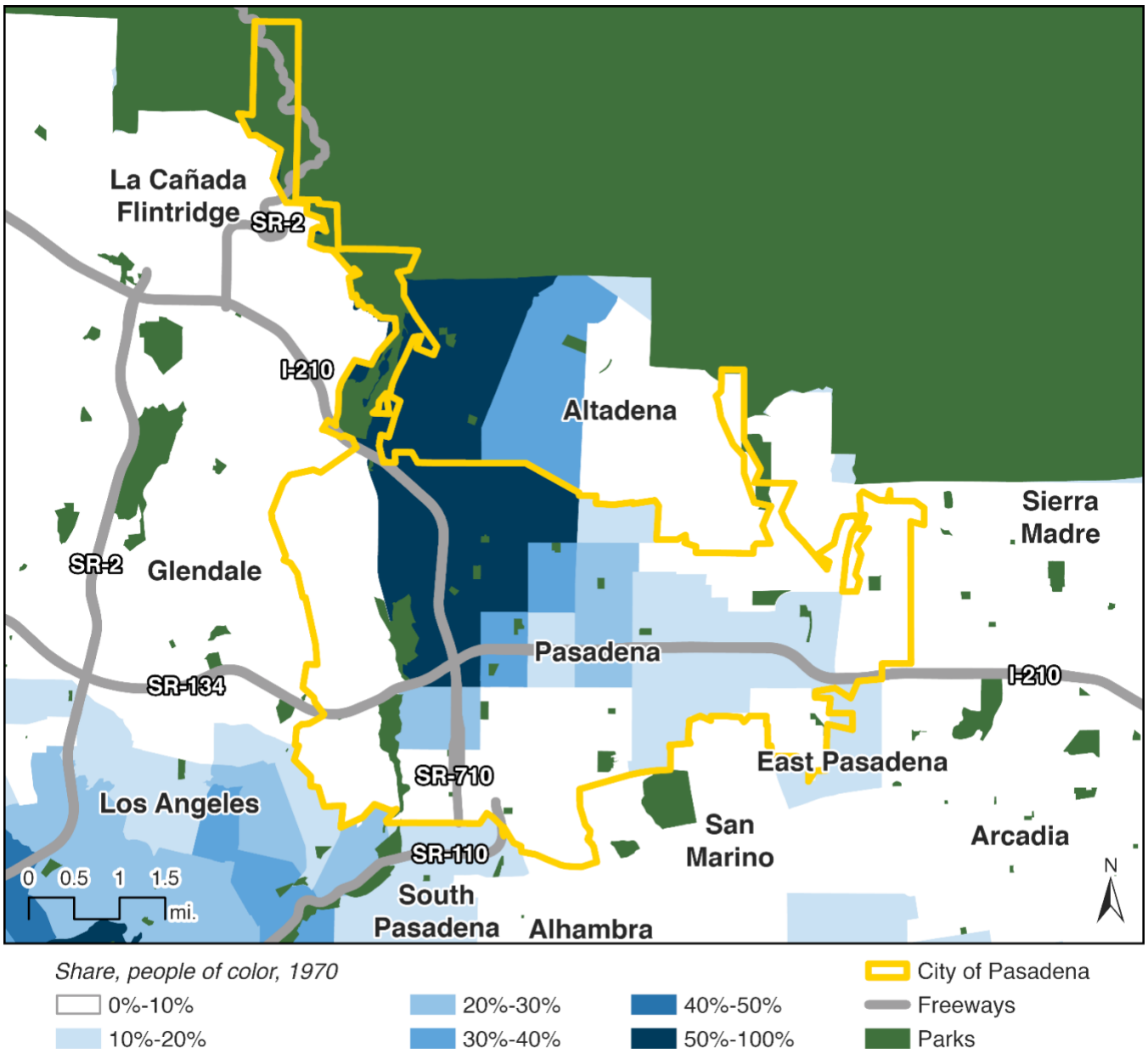
Figure 1-5. Los Angeles County Entropy Scores in Pasadena and Beyond, 1940-2020



Data source: calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)

level segregation than the county under both indexes (See **Figure 1-4**) (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)).

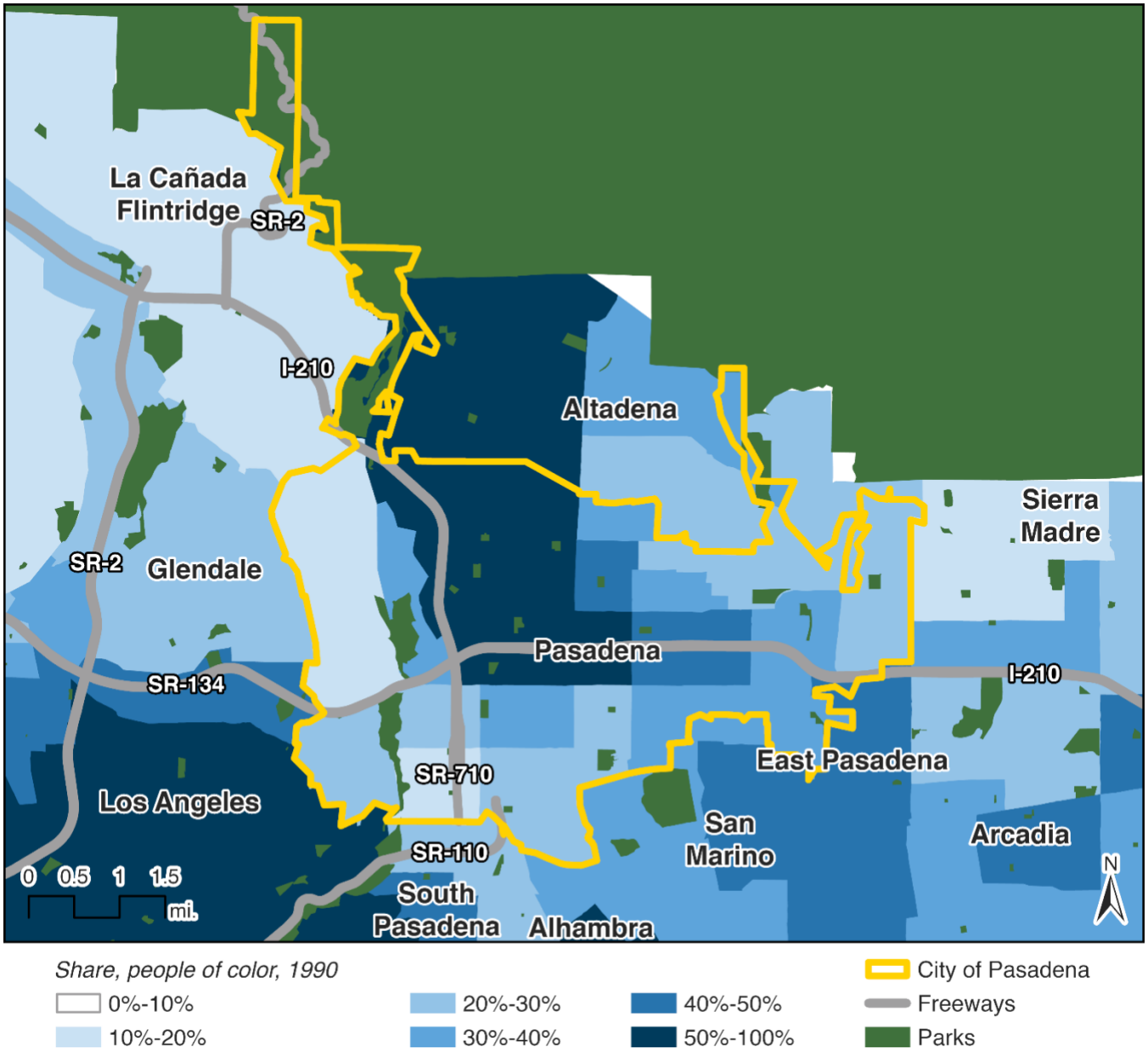
Figure 1-6. Race/Ethnicity in Pasadena by Census Tract, 1970



Data sources: calculated by authors from 1970 U.S. Census (U.S. Census Bureau, 1970); U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

To effectively measure the diversity of a place (Pasadena, the rest of Los Angeles County, and individual census tracts therein) we used the entropy score, which indicates how evenly or unevenly racial and ethnic groups are present within an area. Similar to the entropy index, we calculated the entropy score for non-Hispanic white, Black, Latino/a, and other residents. If only one racial/ethnic group is present while others are absent, the score would be 0. With all four groups present, the maximum possible entropy score is 1.4 (for reasons discussed in the

Figure 1-7. Race/Ethnicity in Pasadena by Census Tract, 1990

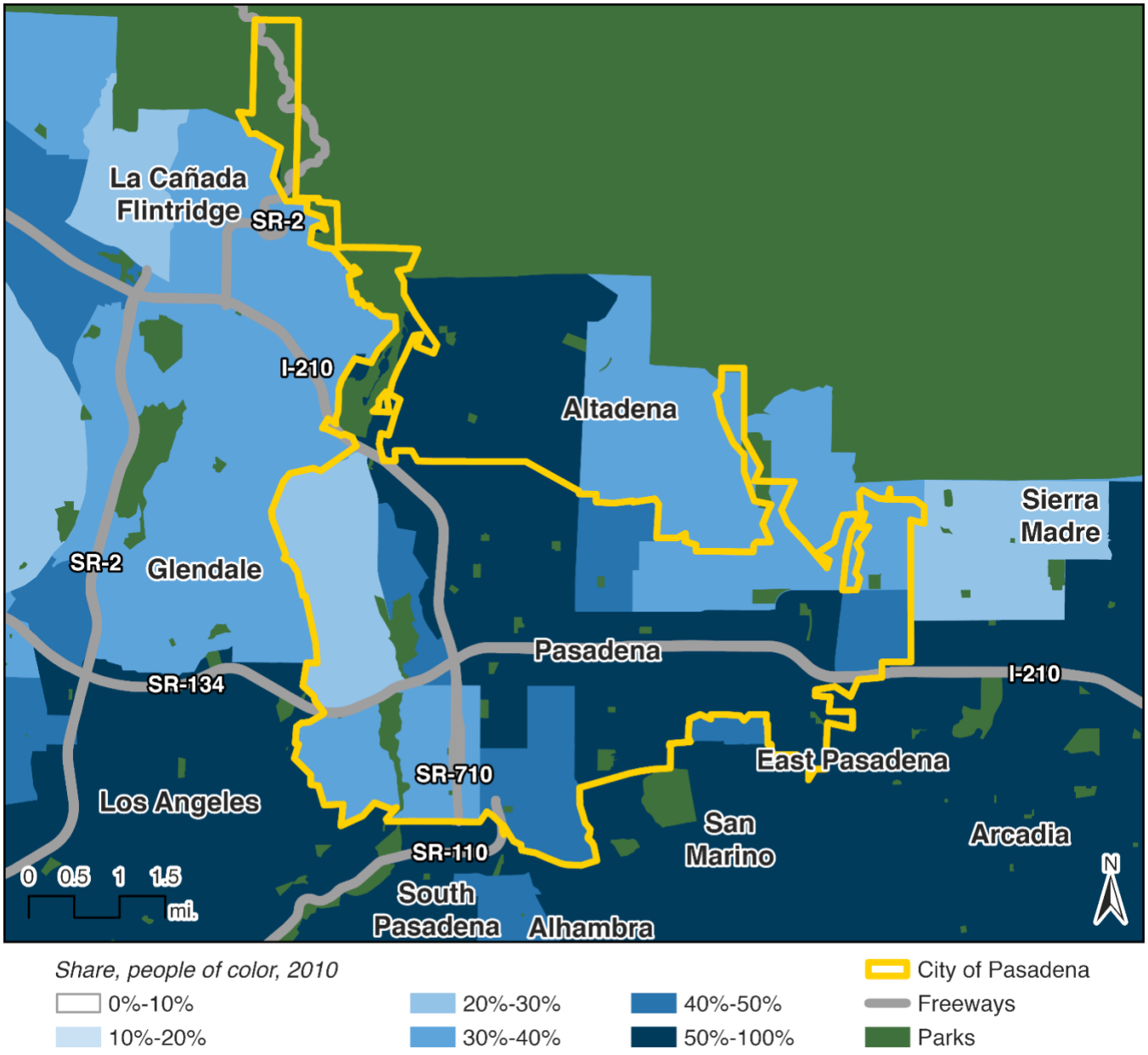


Data sources: calculated by authors from 1990 U.S. Census (U.S. Census Bureau, 1990); U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

Appendix). A higher entropy score reflects a more balanced and diverse population. It is also important to note that this score is nonlinear.

With the racial/ethnic recomposition of Pasadena and Los Angeles County's populations, the entropy score has risen for the city and the rest of the county in parallel (See **Figure 1-5**). The sharp increase in the entropy score

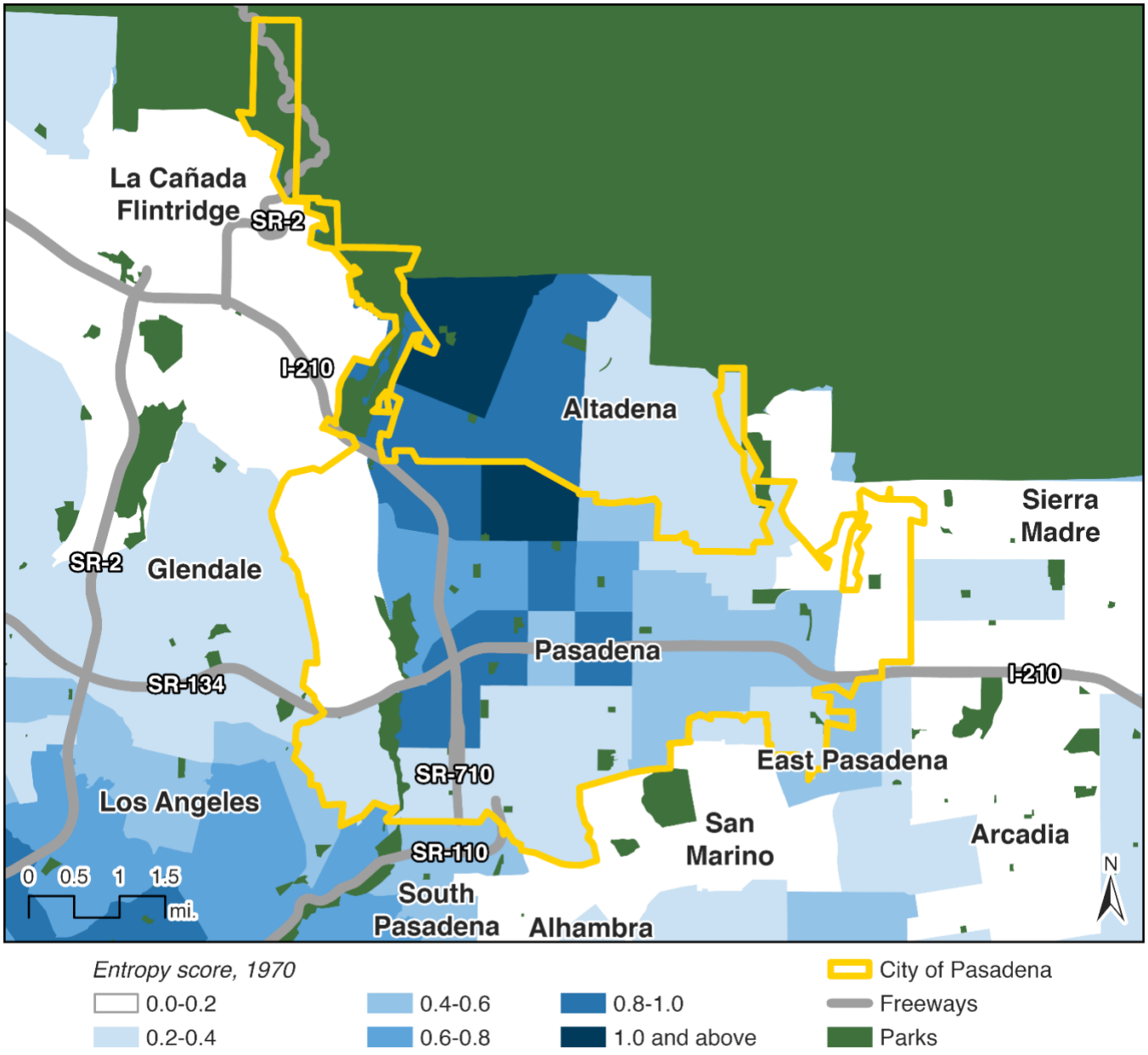
Figure 1-8. Race/Ethnicity in Pasadena by Census Tract, 2010



Data sources: calculated by authors from 2010 U.S. Census (U.S. Census Bureau, 2010); U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

from 1970 to 1980 is particularly notable, aligning with the substantial increase in populations of color during the 1970s discussed above (See **Figure 1-2**). The average entropy scores at the tract level are lower than those for the city and region as a whole, indicating that racial/ethnic groups are not equally distributed across smaller geographies. However, the average tract-level scores for Pasadena are higher than those in the rest of the county, suggesting greater diversity within Pasadena—a difference that has continued to grow over time

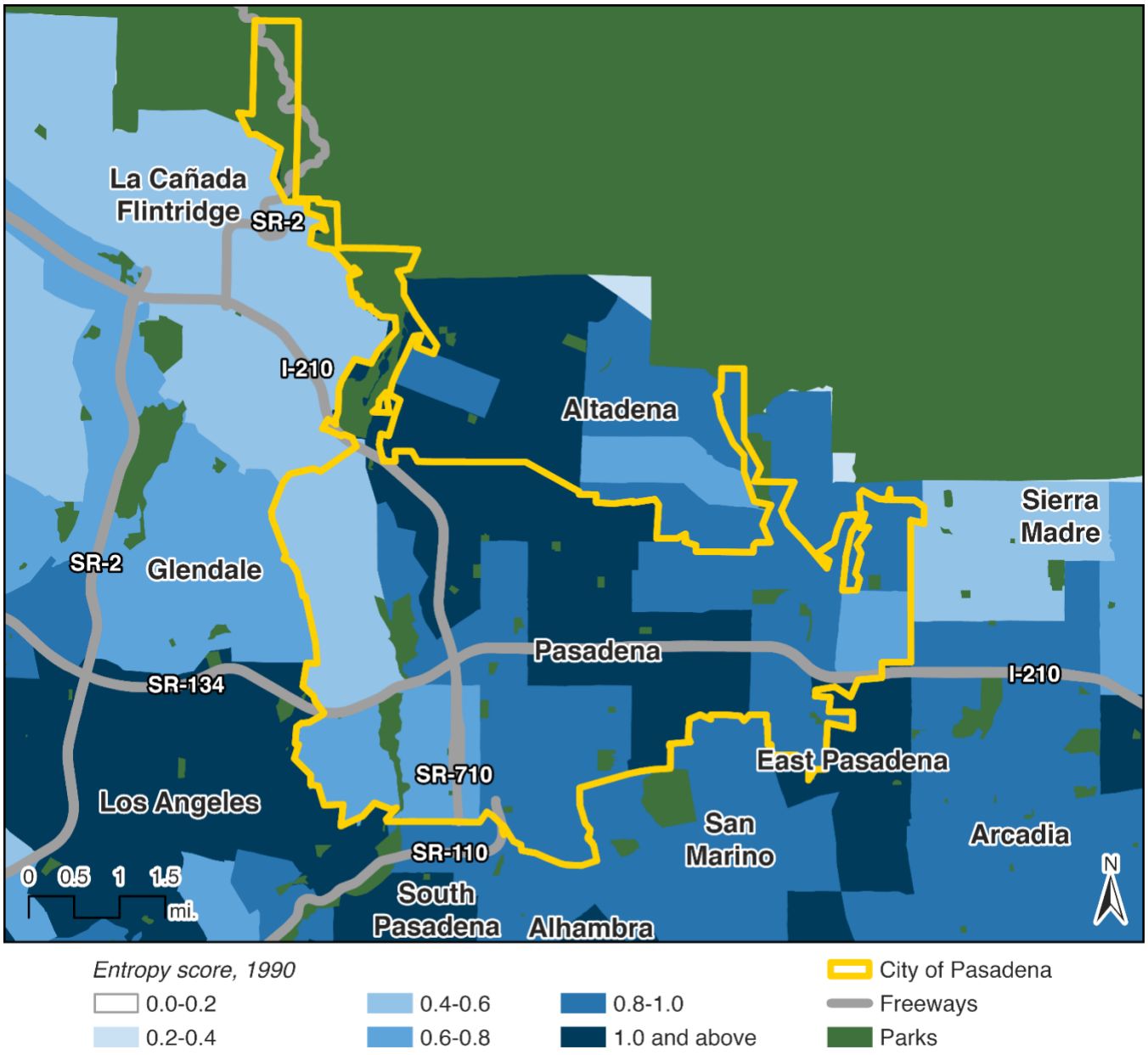
Figure 1-9. Diversity, as Measured by the Entropy Score, in Pasadena by Census Tract, 1970



Data sources: calculated by authors from 1970 U.S. Census (U.S. Census Bureau, 1970); U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

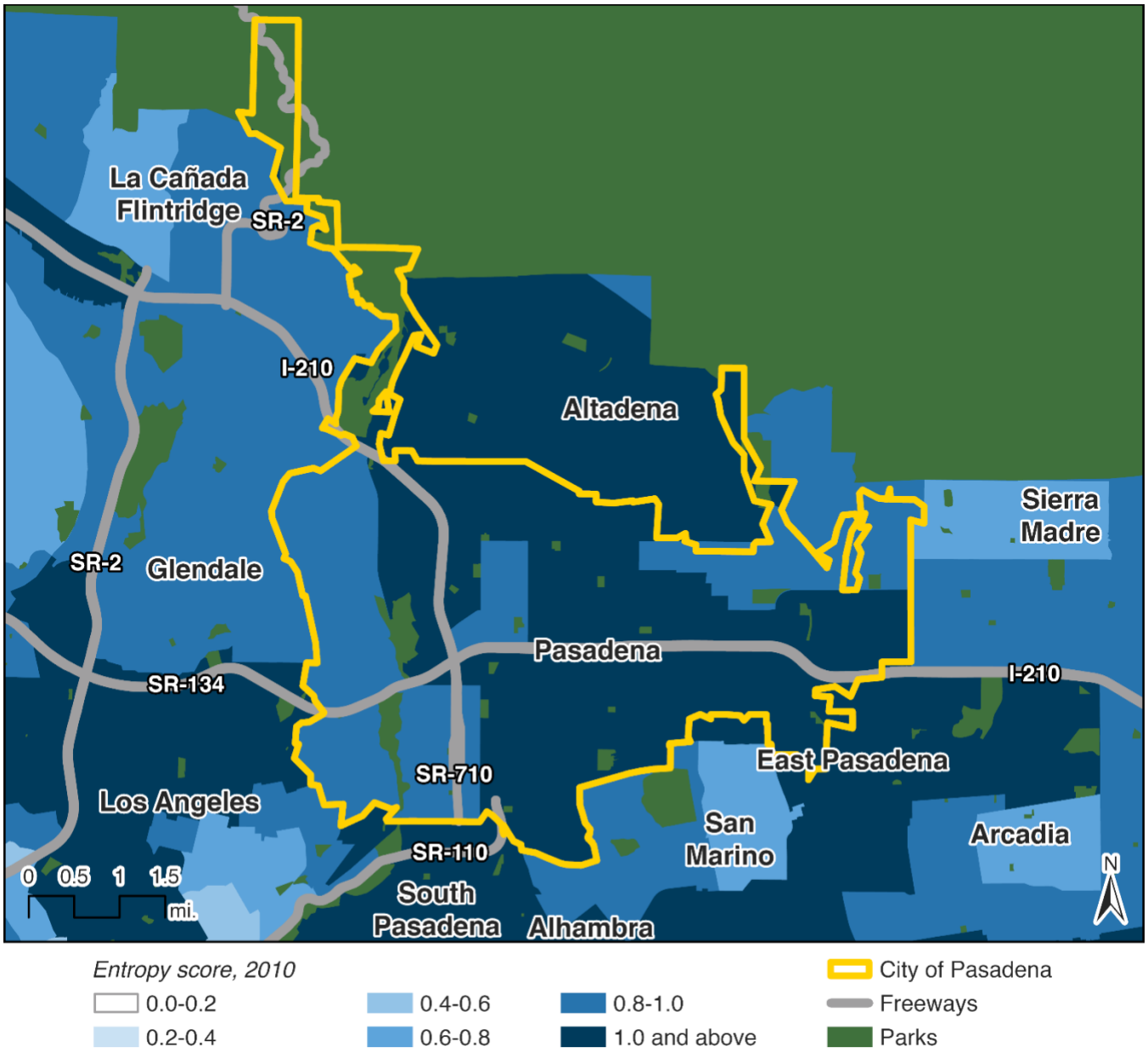
(calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)).

Figure 1-10. Diversity, as Measured by the Entropy Score, in Pasadena by Census Tract, 1990



Data sources: calculated by authors from 1990 U.S. Census (U.S. Census Bureau, 1990); U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

Figure 1-11. Diversity, as Measured by the Entropy Score, in Pasadena by Census Tract, 2010



Data sources: calculated by authors from 2010 U.S. Census (U.S. Census Bureau, 2010); U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

To analyze the specific spatial patterns of segregation within Pasadena across select decades from 1970 to 2010,[3] a period that includes freeway development (Loukaitou-Sideris et al., 2023), the project uses geographic

3. 2020 patterns are very similar to 2010 patterns, and thus we exclude them for brevity (calculated by authors from 2010 and 2020 U.S. Censuses (U.S. Census Bureau, 2010, 2020)).

information system software mapping to visualize racial/ethnic distribution and entropy scores. These maps help identify neighborhoods where racial/ethnic populations were concentrated and isolated, assess the relative diversity within census tracts, and understand the spatial relationship between diverse and homogenous areas.

We begin by examining maps of the percentage of residents of color by census tract (See **Figures 1-6**, **1-7**, and **1-8**). In 1970, populations of color were primarily concentrated in northwest Pasadena, with the exception of the neighborhoods along the Arroyo Seco. The I-210 and I-210/SR-710/SR-134 interchange cut through the center of this racially segregated corridor, reinforcing geographic and social divisions within the city (calculated by authors from 1970 U.S. Census (U.S. Census Bureau, 1970); Loukaitou-Sideris et al., 2023; and A. Ramirez et al., 2025).

By 1990, the area with a high percentage of residents of color had expanded eastward in a contiguous pattern, reflecting both an absolute increase in populations of color and a growing relative presence in the city. By 2010, areas with a high concentration of residents of color had extended into much of southeast Pasadena, signifying continued demographic shifts over time (calculated by authors from 1990 and 2010 U.S. Censuses (U.S. Census Bureau, 1990, 2010)).

However, the 2010 map does not capture the diversity within the broader category of residents of color. The northwest section remained predominantly Black, while the newer areas of color in the southeast section had a higher proportion of Asian residents. The Latino/a population, which grew significantly over these decades, also contributed to the overall increase in representation of residents of color. Latino/a residents were more spread out than Asian and Black Pasadenans, with a noticeable presence in both the northwest and southeast (calculated by authors from 2010 U.S. Census (U.S. Census Bureau, 2010)). These trends highlight the evolving racial composition of Pasadena's neighborhoods, shaped by decades of demographic growth and migration patterns.

The entropy score maps illustrate increasing diversity across most parts of Pasadena over time (See **Figures 1-9**, **1-10**, and **1-11**)., consistent with the previous figures showing overall diversity trends for the city (See **Figures 1-6**, **1-7**, and **1-8**). Visually, this is evident as tracts within Pasadena have darkened, indicating higher diversity as measured in entropy scores. Similar diversification can be observed in tracts surrounding Pasadena, aligning with trends across the county as a whole. The areas with a noticeable but not overwhelming population of color were generally more diverse. It is notable that the area south of the I-210/SR-710/SR-134 interchange shifted from approximately average diversity relative to the city in 1970 to relatively lower diversity in the following decades (calculated by authors from 1970, 1990, and 2010 U.S. Censuses (U.S. Census Bureau, 1970, 1990, 2010)). The lower entropy score here reflects reduced racial and ethnic integration.

Part 2. Impacts of Freeway Developments: I-210 and SR-710, 1950-1980

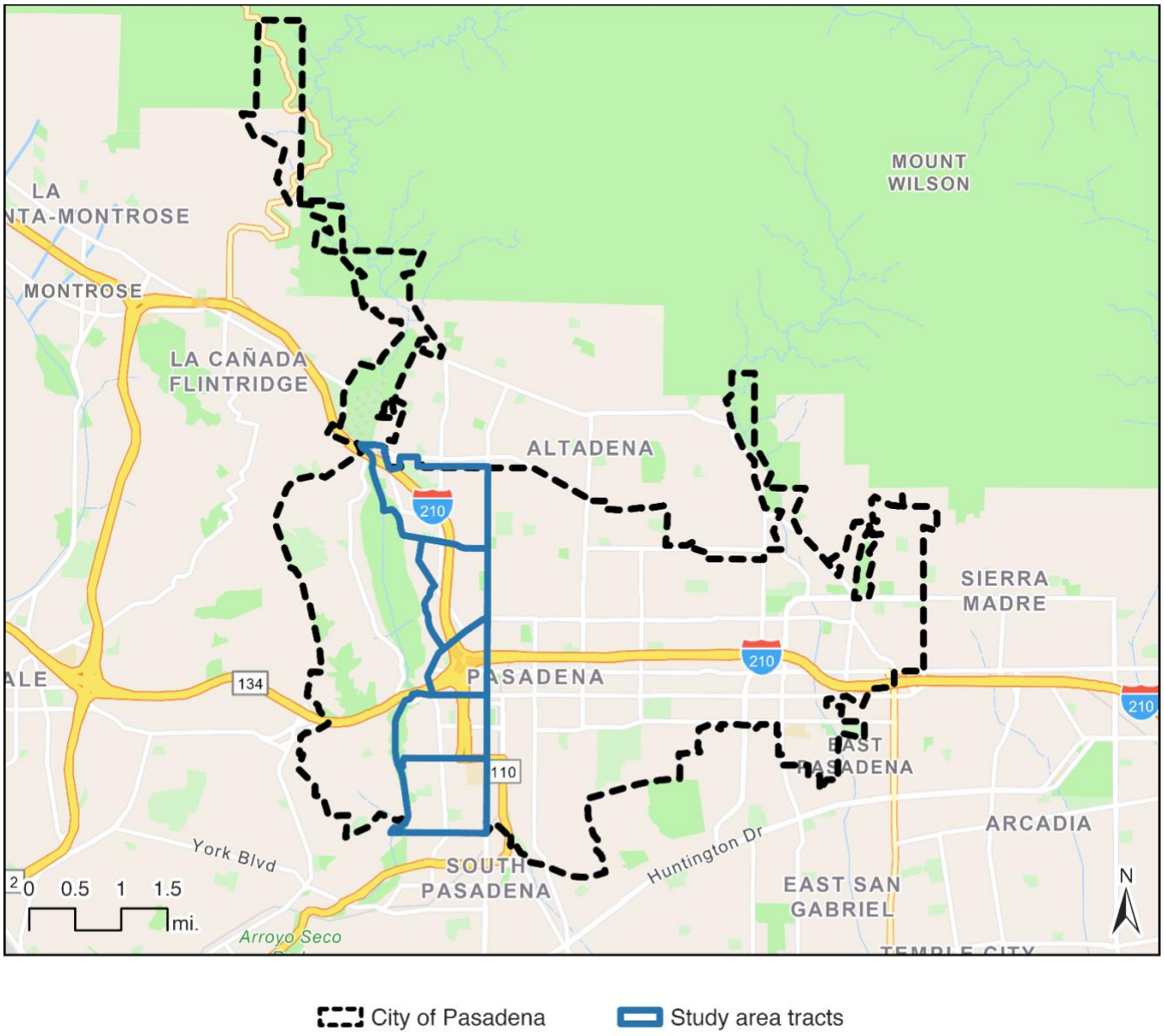
Analytical Study Area and Population Trends

As shown in **Figure 2-1**, the analytical study area encompasses much of the western half of Pasadena and is defined by five census tracts that contain I-210 north of the interchange ("North" and "North Center"), the interchange itself ("Center"), and the area along with the unbuilt segment of the SR-710 ("South Center" and "South") (See **Figure 2-2**). The study-area boundaries are roughly defined by Woodbury Road to the north, Fair Oaks Avenue to the east, Columbia Street to the south, and the Arroyo Seco to the west. These were based on 1950-1970 census tract boundaries, with adjustments to 1980 boundaries for consistency purposes.

Organizing the study area by these freeway segments allows us to analyze the varying impacts of each section of infrastructure on nearby population characteristics, racial and ethnic composition, levels of segregation, home values and rent trends, and income distribution. This analytical structure—from the I-210 in the north, through the central interchange, and down to the SR-710 stub in the south—helps us trace the influence of each segment on Pasadena's urban landscape.

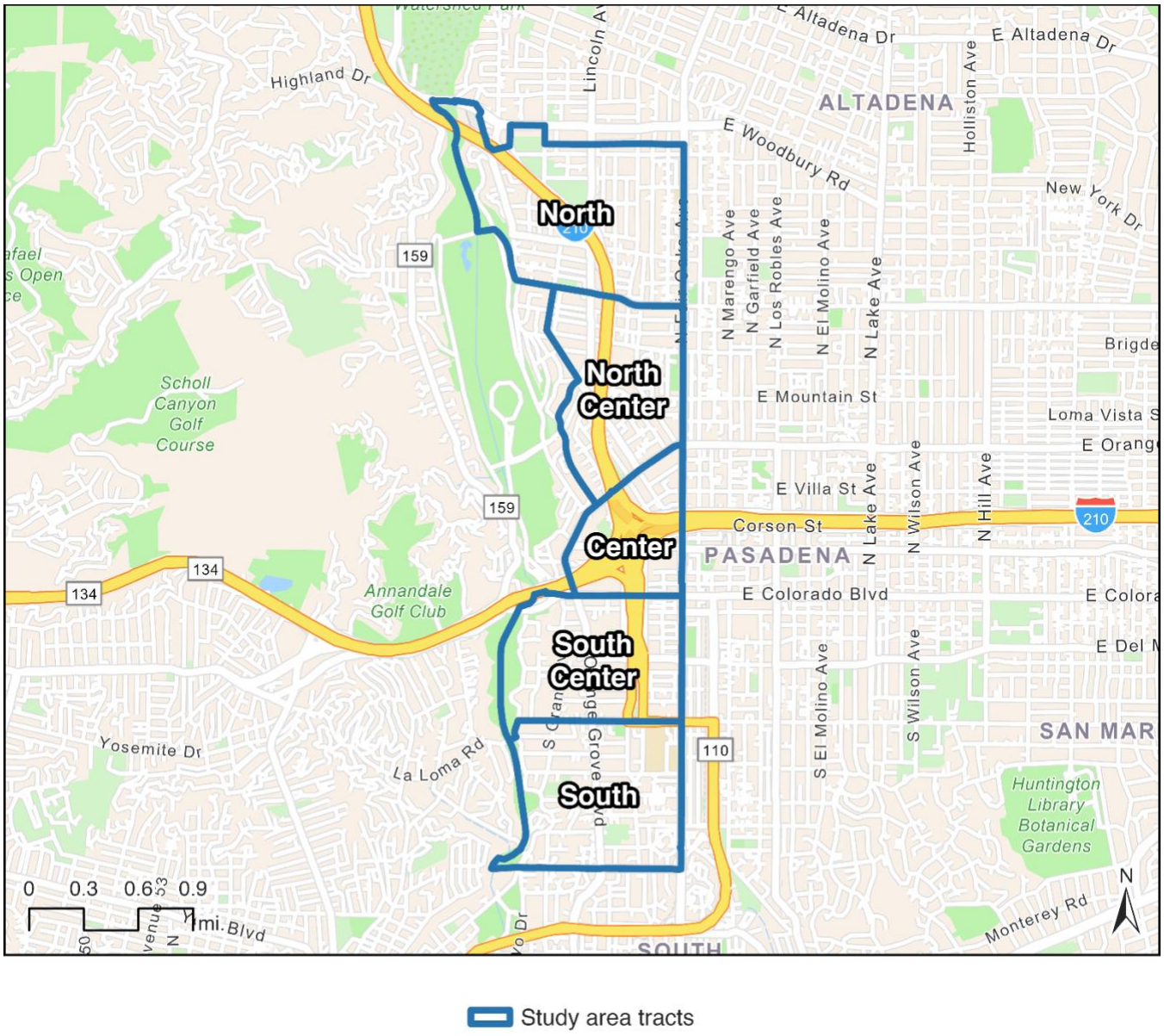
Based on the population trends, we categorized the development of the study area into two time periods: 1) the freeway period (1950-1980) and 2) the period of post-freeway effects (1980-2010). **Figure 2-3** illustrates that the study area's population remained stable through the 1950s, then declined sharply in the 1960s, remained low over the next decade, and partially recovered during the post-freeway period. As a percentage of the city's population, the study area's share dropped significantly during the freeway period before stabilizing in the subsequent years (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)).

Figure 2-1. Pasadena Study Area in Context



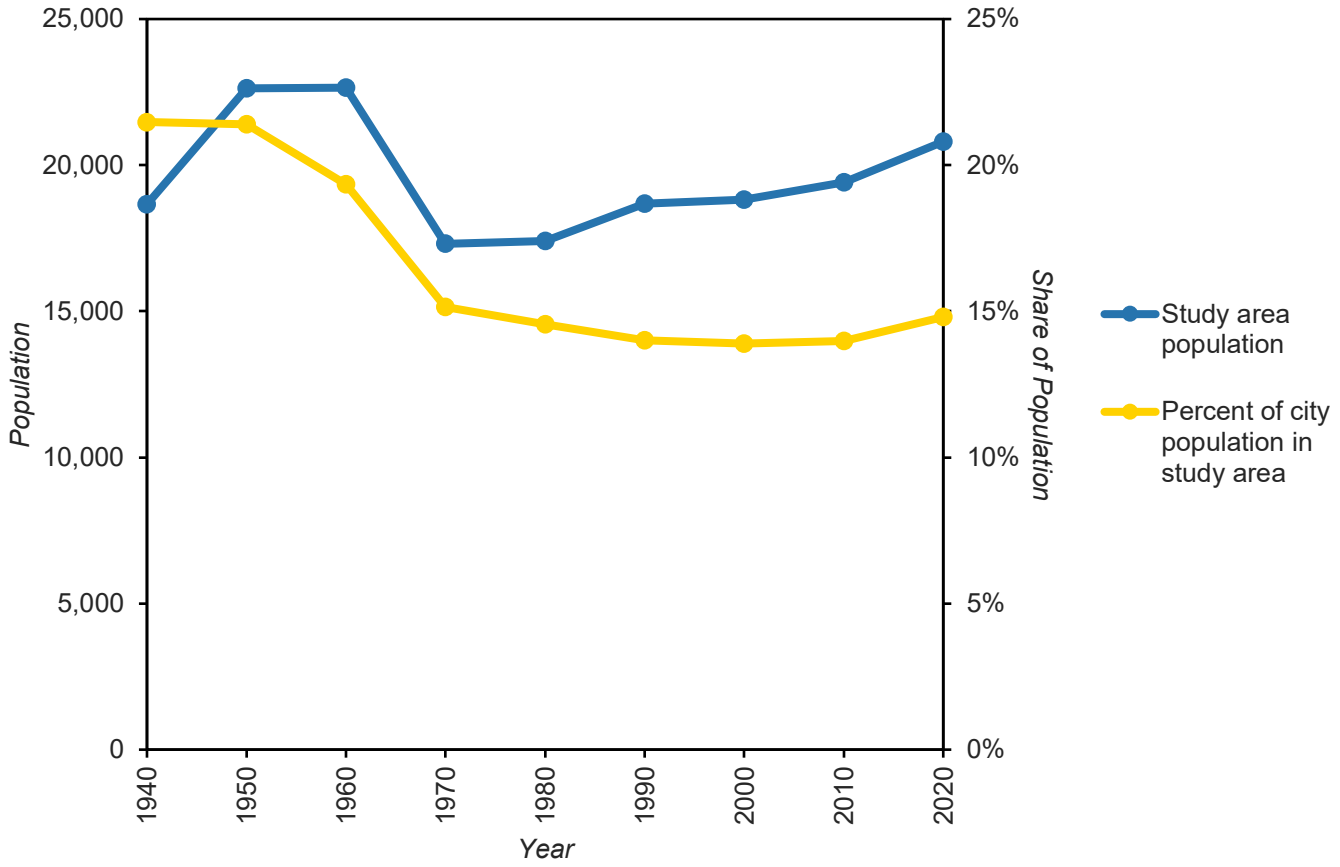
Data sources: 1960 U.S. Census (U.S. Census Bureau, 1960) and U.S. Census Bureau, 2018; base map: Esri, 2024b

Figure 2-2. Pasadena Study Area Tracts



Data source: 1960 U.S. Census (U.S. Census Bureau, 1960); base map: Esri, 2024b

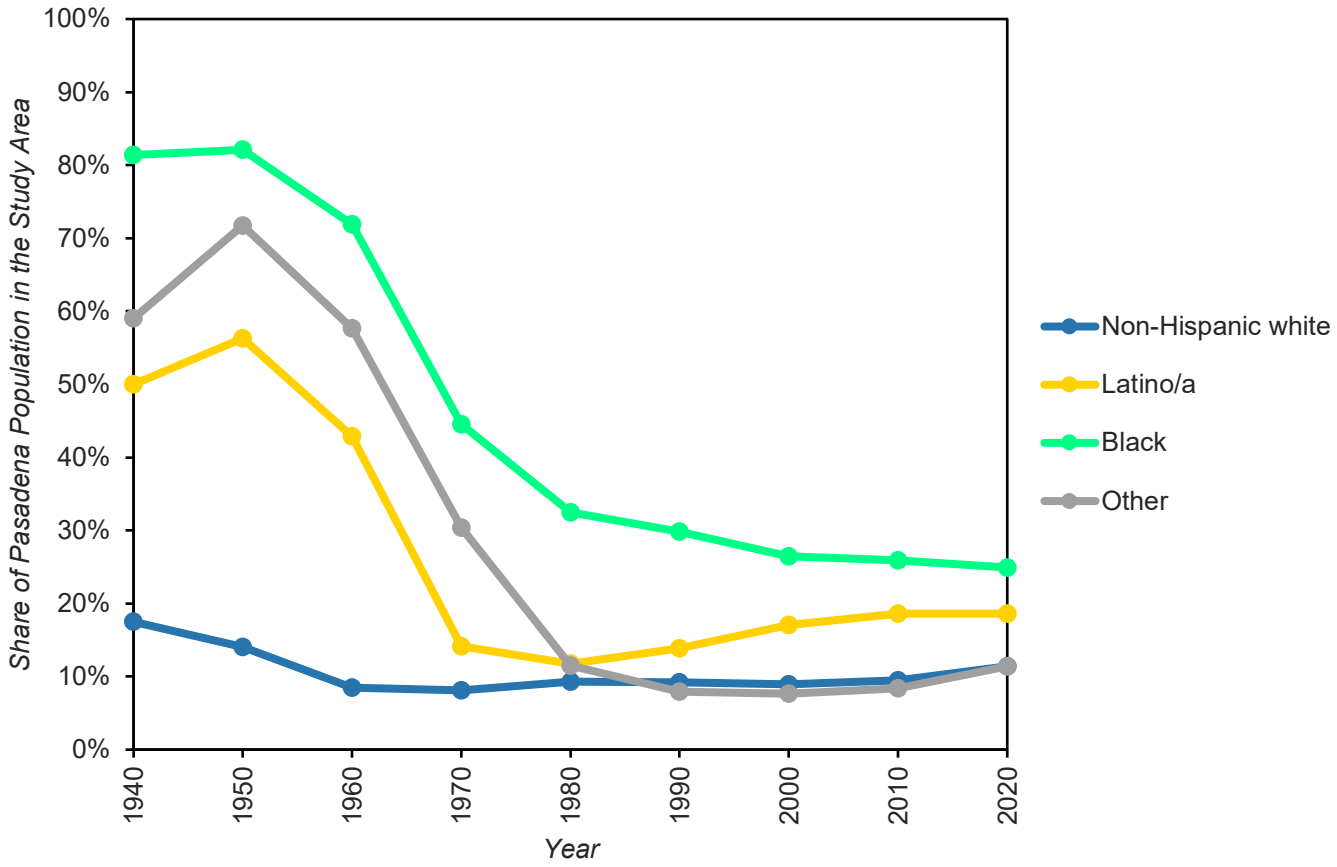
Figure 2-3. Study Area Population, 1940-2020



Data source: calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)

Initially, the study area held a disproportionately high share of Pasadena's population of color before and during much of the freeway development period; however, this share decreased over time (See **Figure 2-4**). This relative decline was inevitable given the absolute increase in the city's population of color over the decades, resulting in an expansion of the area housing people of color. In contrast, the study area consistently had a disproportionately smaller share of the non-Hispanic white population throughout the entire time period (calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020))

Figure 2-4. Study Area's Share of Pasadena's Population by Race/Ethnicity, 1940-2020

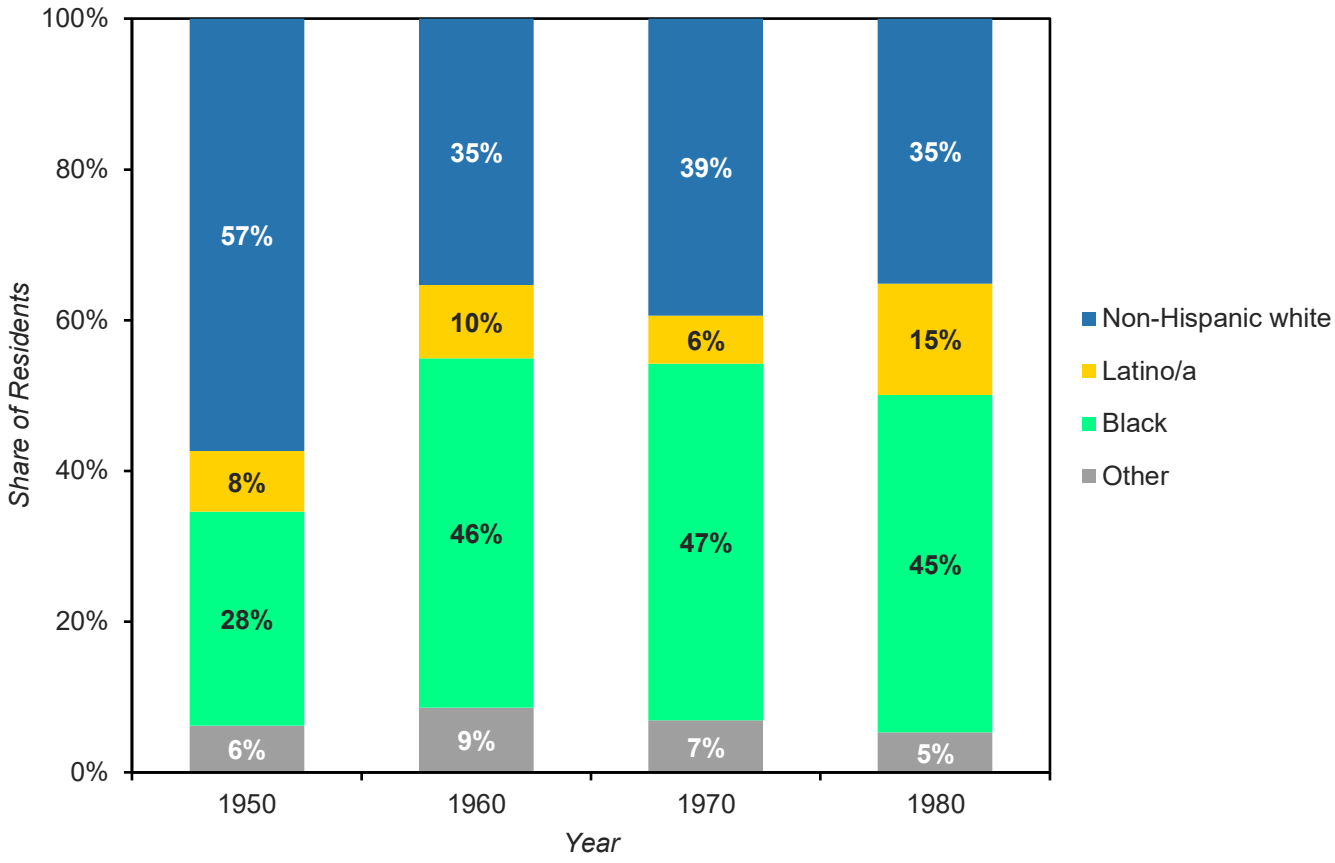


Data source: calculated by authors from 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980, 1990, 2000, 2010, 2020)

Increased Segregation in the Study Area

As shown in **Figure 2-5**, the racial/ethnic composition of the study area experienced noticeable shifts between 1950 and 1980. The non-Hispanic white population declined dramatically in the 1950s and remained low in subsequent years. Meanwhile, the Black population grew significantly during this period and held a plurality for the next two decades. Notably, the shares of Latino/a residents and people in the "other" group (encompassing Asians and all remaining racial and ethnic groups) remained relatively small throughout the freeway period, although the "other" race population fluctuated over time (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)).

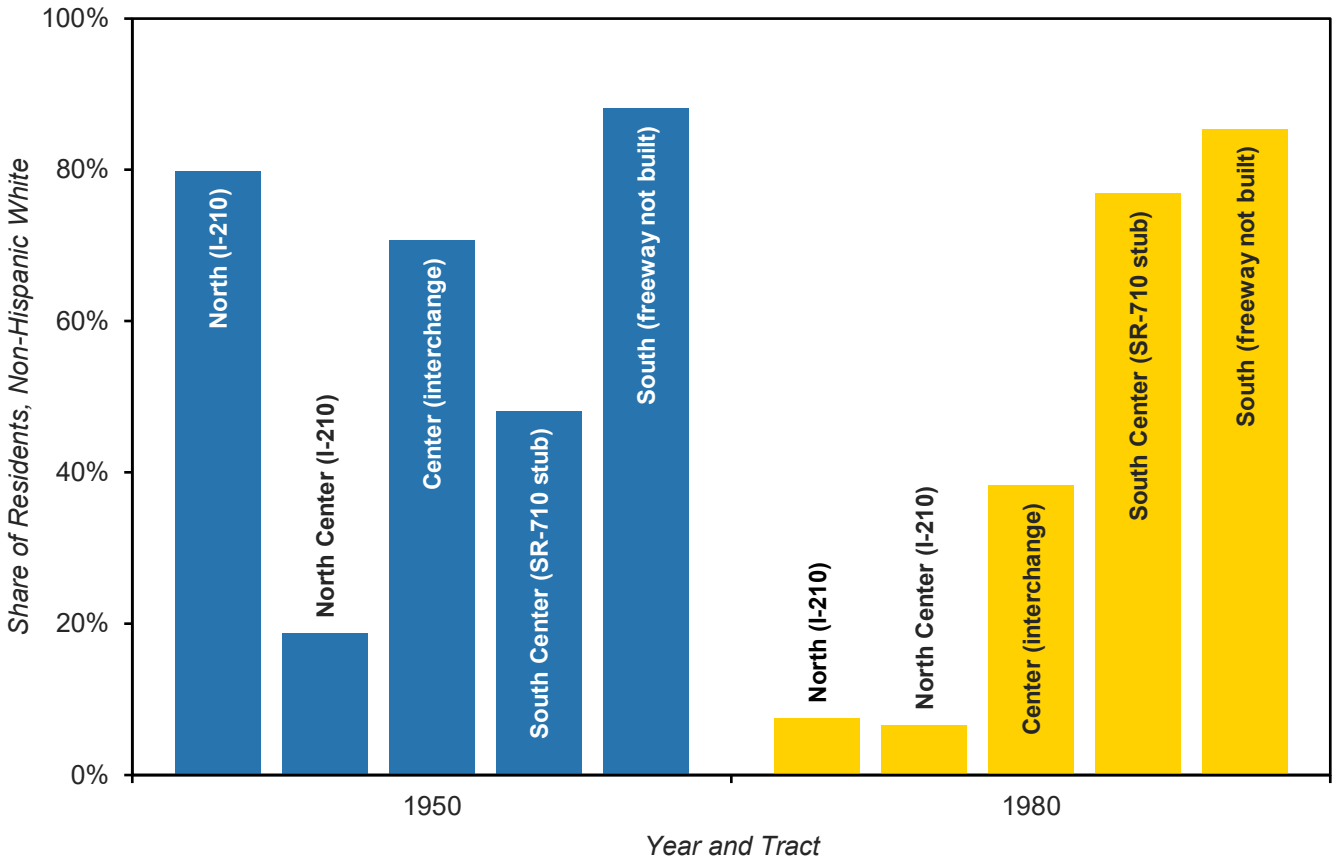
Figure 2-5. Racial/Ethnic Distribution of the Study Area, 1950-1980



Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)

Figure 2-6 illustrates that the subareas (See **Figure 2-2**) became increasingly racially polarized and segregated over time (more so than the rest of Pasadena (See **Figure 2-7**)). The Center tract shifted from majority non-Hispanic white to majority residents of color. In the two southern subareas, the South Center tract began with a majority of people of color and transitioned to majority non-Hispanic white, and the South tract, which started as with a large majority of non-Hispanic white residents, remained so. These tracts became disproportionately non-Hispanic white compared to Pasadena tracts outside of the study area. Meanwhile, the North tract passed a racial tipping point and experienced dramatic demographic change, discussed further at the end of Part 3 (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)).

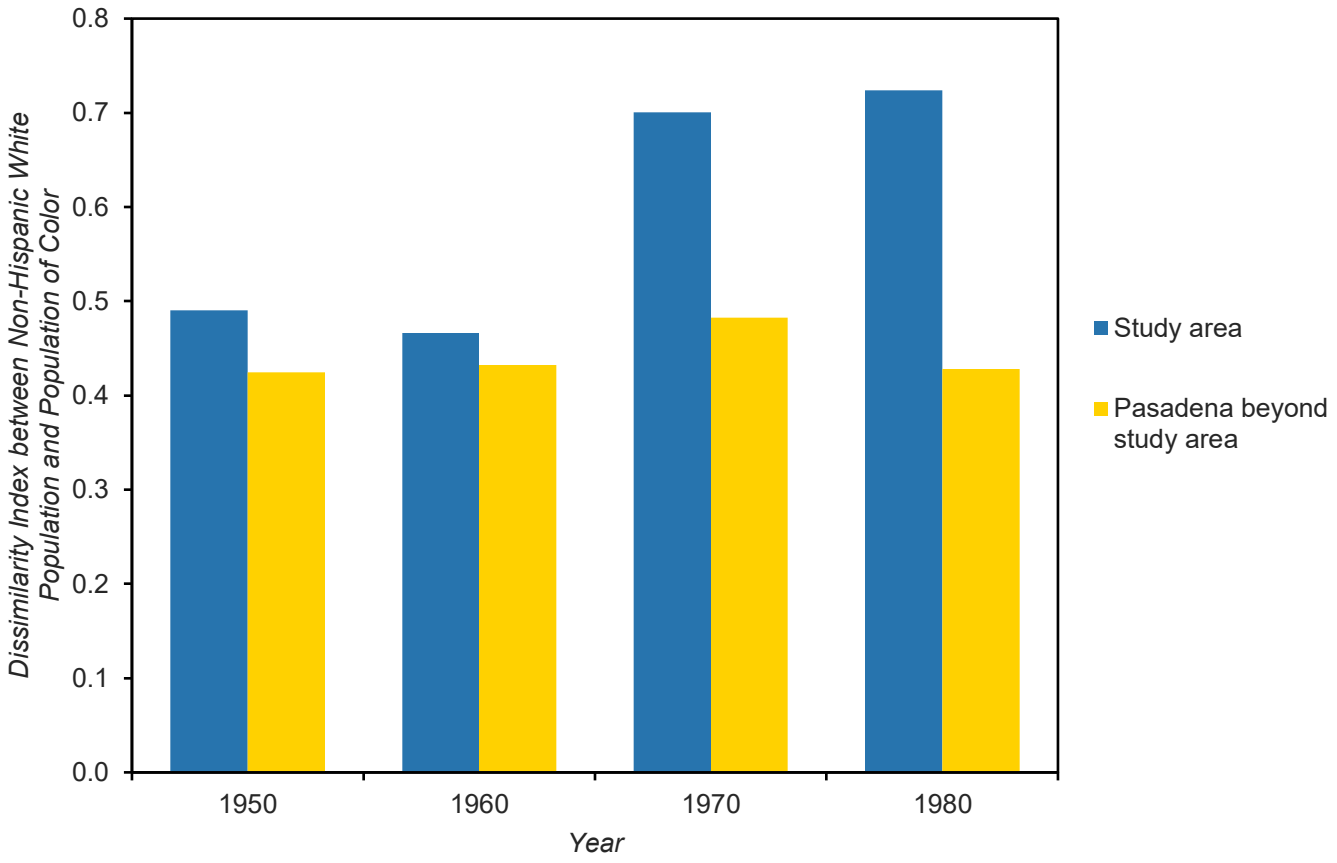
Figure 2-6. Share Non-Hispanic White in the Study Area Tracts, 1950-1980



Data source: calculated by authors from 1950 and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1980)

The dramatic changes in racial/ethnic composition within the study subareas contributed to increased segregation within the study area. As shown in **Figure 2-7**, the dissimilarity index values indicate that non-Hispanic white population and populations of color were already exhibiting slight segregation before freeway development compared to the rest of Pasadena. However, the study area became significantly more segregated during and after freeway construction, with the dissimilarity index increasing from under 0.50 in 1950 to over 0.70 in 1980. The rest of Pasadena did not show a long-term increase (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)).

Figure 2-7. Segregation, as Measured by the Dissimilarity Index, in Pasadena, 1950-1980



Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)

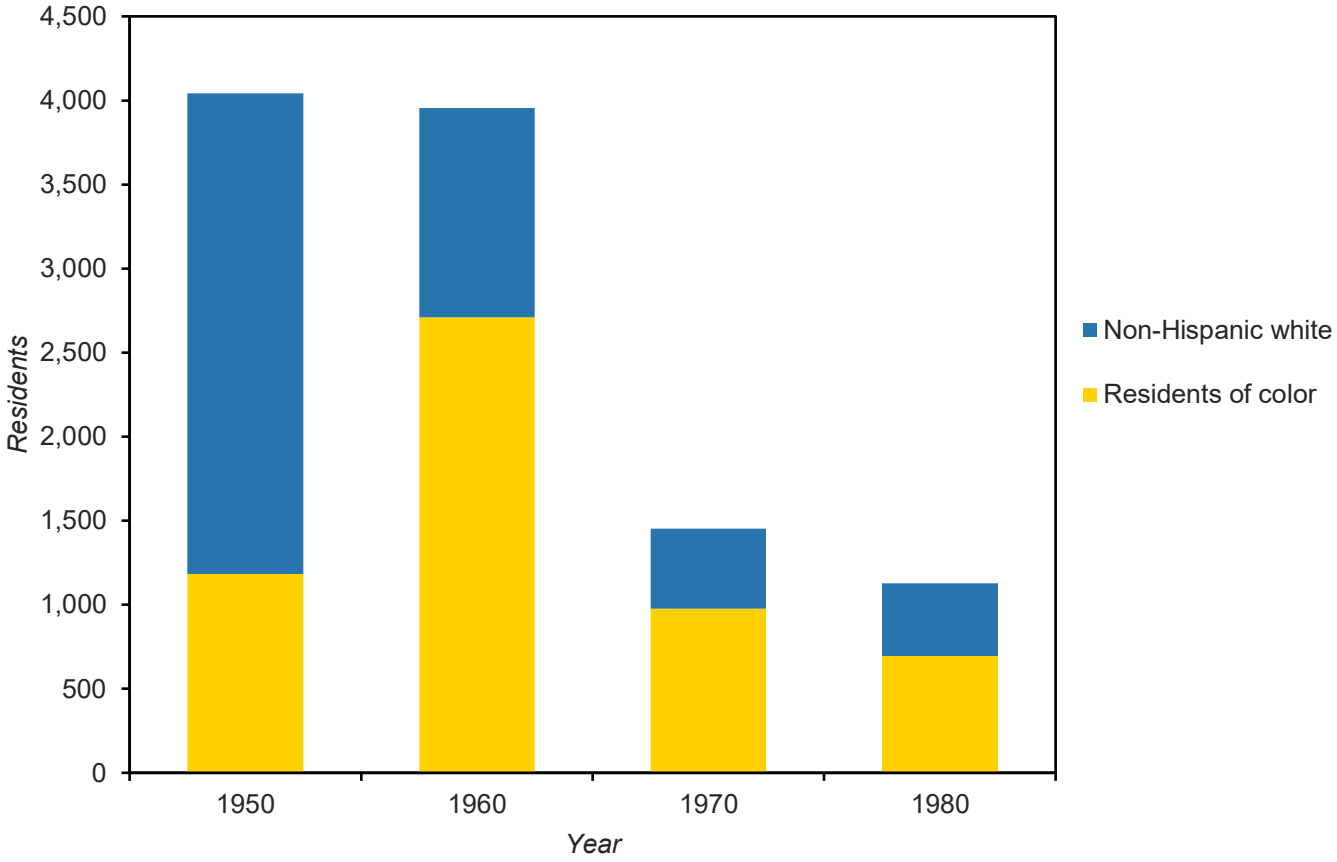
The tracts most impacted by the SR-710 stub were the Center (where the stub connects from the interchange) and the South Center (where the majority of the stub is located) (See **Figure 2-2**). As previously noted, these two tracts experienced vastly different trajectories in population and racial composition (See **Figure 2-6**).

The population decline in the Center tract (See **Figure 2-8**) coincided with Caltrans' property acquisitions, which displaced both non-Hispanic white residents and residents of color. Available data suggests that the tract became more internally segregated during this period, although the level of segregation was low to moderate. Block-level data shows that the dissimilarity index between white and non-white households was 0.32 in 1960, while the dissimilarity index between white and non-white households was 0.49 in 1970.[4] The South Center tract (See **Figure 2-9**), meanwhile, experienced a steady population decline over the entire time period. People of color—particularly Black residents—initially represented a slight majority there (52%) and became a small minority (23%) by 1980. The neighborhood was also characterized by high internal segregation. The dissimilarity index between white and non-white households was 0.70 in 1960, while the dissimilarity index between white and non-white

4. We focus on white and non-white households because those are the categories consistently available at the census block level for both decades (Manson et al., 2024 and U.S. Census Bureau, 1970).

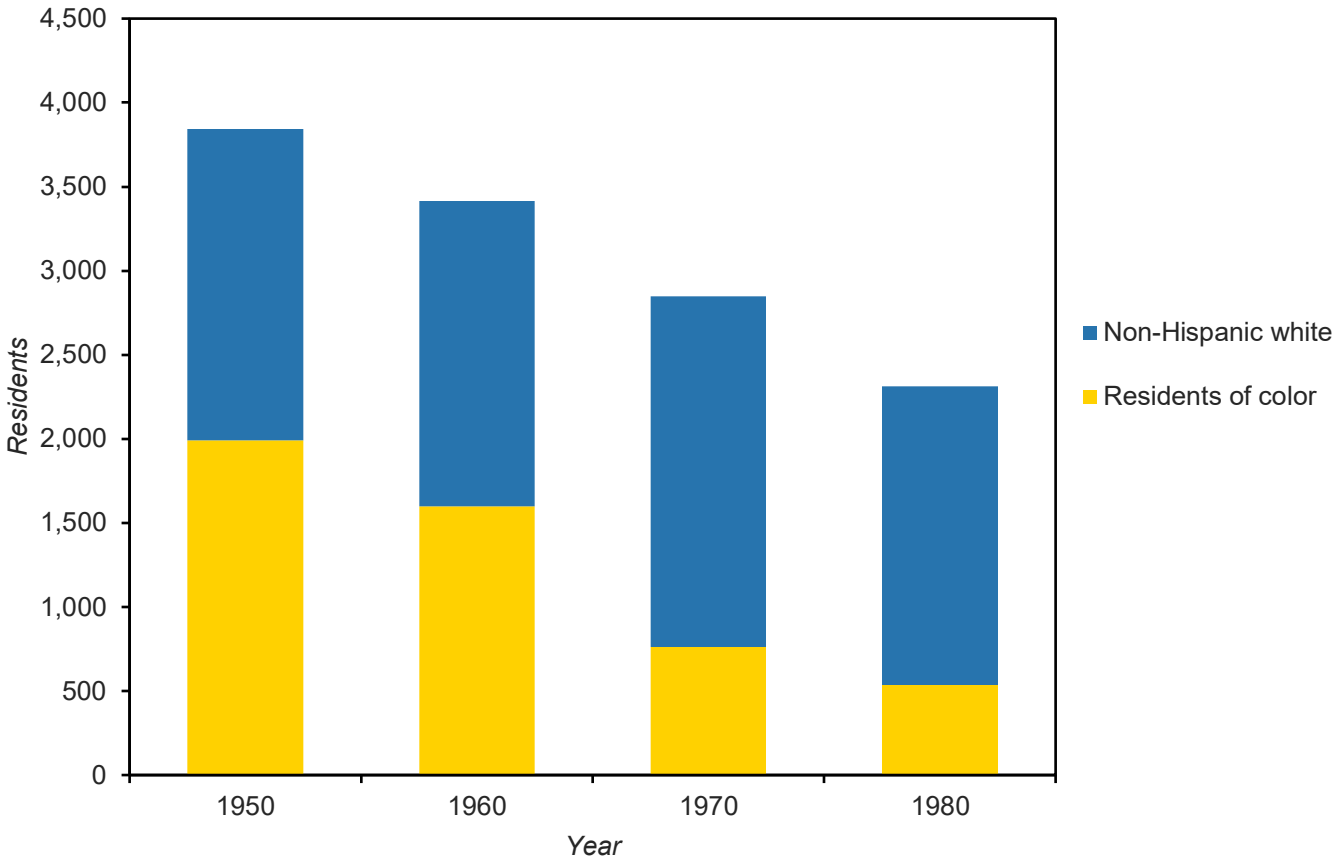
households was 0.69 by 1970. This shows that the level of segregation started high and remained so (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)). In the South tract, Caltrans purchased properties, but no freeway construction occurred (California Division of Highways, 1965–1969 and UC Santa Barbara Library, 2012). The absence of direct destruction may have contributed to these areas maintaining and even increasing their non-Hispanic white population share (See **Figure 2-10**) (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980); California Division of Highways, 1965–1969; and Loukaitou-Sideris et al., 2023).

Figure 2-8. Center Tract Population, 1950-1980



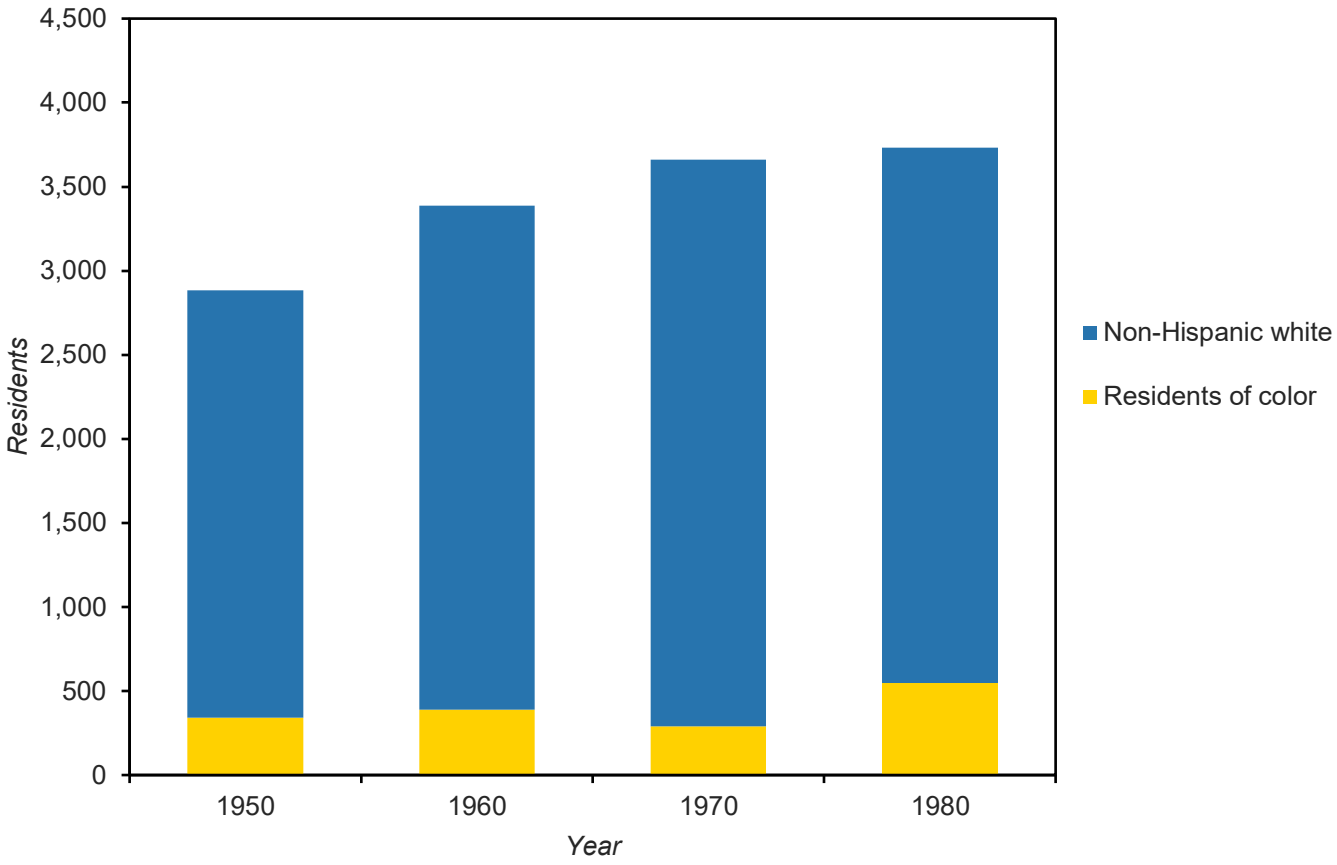
Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)

Figure 2-9. South Center Tract Population, 1950-1980



Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)

Figure 2-10. South Tract Population, 1950-1980



Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)

Changes in Housing Units Across Study Area Tracts

Similar to the data on the population, the data on housing units across the tracts in the study area from 1950 to 1980 show distinct patterns of growth and decline, reflecting the impacts of freeway development and other urban changes. While Pasadena overall saw an increase in housing units—from 37,943 in 1950 to 49,732 in 1980, a growth of 31 percent—individual tracts within the study area experienced varied changes, as shown in both the absolute counts and percentage changes (See **Tables 2-1** and **2-2**) (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)).

In the Center tract, which includes the interchange and was heavily affected by freeway development (See **Figure 2-2**), the number of housing units declined drastically over the decades. From 1,470 units in 1950, the count dropped to only 433 units by 1980. This represents a cumulative decrease of 71 percent, with the most significant drop of 59 percent occurring between 1960 and 1970, coinciding with the construction of the interchange (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census

Table 2-1. Housing Units in Pasadena and Los Angeles County, 1950-1980

Geography		1950	1960	1970	1980
Study area census tracts	North	1,841	2,001	1,828	1,913
	North Center	1,703	1,826	1,329	1,566
	Center	1,470	1,482	603	433
	South Center	1,153	1,173	935	865
	South	947	1,356	1,582	1,737
Pasadena		37,943	46,687	47,093	49,732
Los Angeles County		1,442,691	2,142,139	2,538,910	2,855,578

Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)

Table 2-2. Changes in Housing Units in Pasadena and Los Angeles County, 1950-1980

Geography		Change, 1950-1960	Change, 1960-1970	Change, 1970-1980
Study area census tracts	North	+9%	-9%	+5%
	North Center	+7%	-27%	+18%
	Center	+1%	-59%	-28%
	South Center	+2%	-20%	-7%
	South	+43%	+17%	+10%
Pasadena		+23%	+1%	+6%
Los Angeles County		+48%	+19%	+12%

Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)

Bureau, 1950, 1952b, 1970, 1980) and Loukaitou-Sideris et al., 2023). This substantial reduction highlights the displacement of residential structures due to infrastructure expansion.

The South Center tract, containing the SR-710 stub (See **Figure 2-2**), also saw a steady decline in housing units, although less extreme than in the Center tract. Housing units in this area decreased from 1,153 in 1950 to 865 by 1980, an overall reduction of 25 percent. Units fell 20 percent between 1960 and 1970 and a further seven percent from 1970 to 1980, indicating the continued influence of the freeway on residential availability (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)).

The South tract, which was not impacted by freeway construction (See **Figure 2-2**), experienced steady growth over the decades. Starting with 947 units in 1950, this tract grew to 1,737 units by 1980, reflecting a total increase

of 83 percent. Each decade showed positive growth, with the most significant increase of 43 percent occurring between 1950 and 1960, followed by smaller but steady increases in subsequent decades (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)). The consistent rise in housing units suggests that the South tract remained a stable and desirable residential area, likely benefiting from the absence of disruptive infrastructure projects.

In the North and North Center tracts (See **Figure 2-2**), the trends were more mixed. The North tract saw an overall slight increase, from 1,841 units in 1950 to 1,913 in 1980, marking a four percent increase across the period. However, this tract experienced fluctuations, with a notable nine percent decrease between 1960 and 1970, followed by a recovery in the next decade. In the North Center tract, housing units grew by seven percent from 1950 to 1960 but then dropped by 27 percent between 1960 and 1970, before rebounding with an 18 percent increase from 1970 to 1980 (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)). These changes may reflect shifting demand and the impact of nearby developments on housing stability.

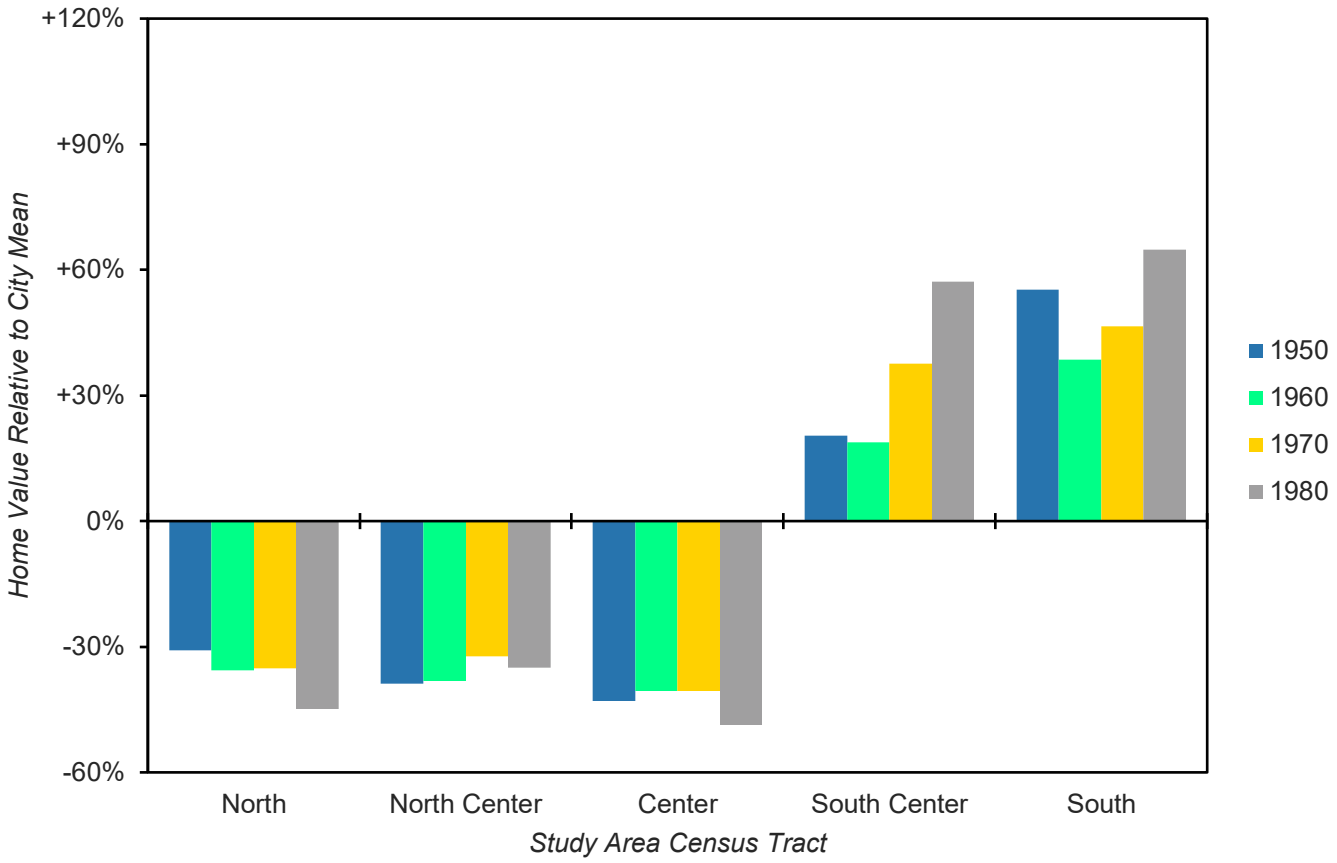
Compared to Los Angeles County as a whole, which experienced a near-doubling of housing units between 1950 and 1980, the study area shows a mix of growth and decline, heavily influenced by proximity to freeway development. Los Angeles County saw substantial growth, with the most significant jump of 48 percent occurring from 1950 to 1960, followed by slower growth in subsequent decades (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)).

Economic Polarization in the Study Area

Along with increased racial segregation, the study area experienced economic polarization, as reflected in housing-market characteristics and dynamics and ultimately in income levels. Observations from home prices, rent levels, and income data from the 1950 and 1980 U.S. Censuses reveal distinct economic and housing patterns across the study area. These patterns vary between neighborhoods along the I-210 corridor (the North and North Center tracts), the central interchange (Center tract), and the SR-710 stub and unbuilt segment (South Center and South tracts) (See **Figure 2-2**) (calculated by authors from 1950 and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952a, 1980)).

In the North, North Center, and Center areas, home values remained consistently below the citywide average across the decades. As shown in **Figure 2-11**, these values generally hovered around 50 to 60 percent of Pasadena's average, indicating lower relative property values in these neighborhoods. Rent trends followed a similar pattern, with contract rents in these areas staying between 50 and 75 percent of the city average (See **Figure 2-12**) (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952a, 1960, 1961b, 1970, 1980 and U.S. Census Bureau et al., 1972)). This consistent undervaluation suggests that these neighborhoods experienced lower demand and economic growth compared to other parts of Pasadena, along with other factors such as housing and mortgage discrimination as discussed later in this report. Additionally, median income in the North area declined relative to the city average from 1950 to 1980, as shown in **Figure 2-13**, while income levels in the North Center and Center areas consistently remained below the city average through this period (calculated by authors from 1950 and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952b, 1980)). Together, these trends indicate that the North, North Center, and Center areas did not experience the same level of economic uplift that occurred in other sections of the study area.

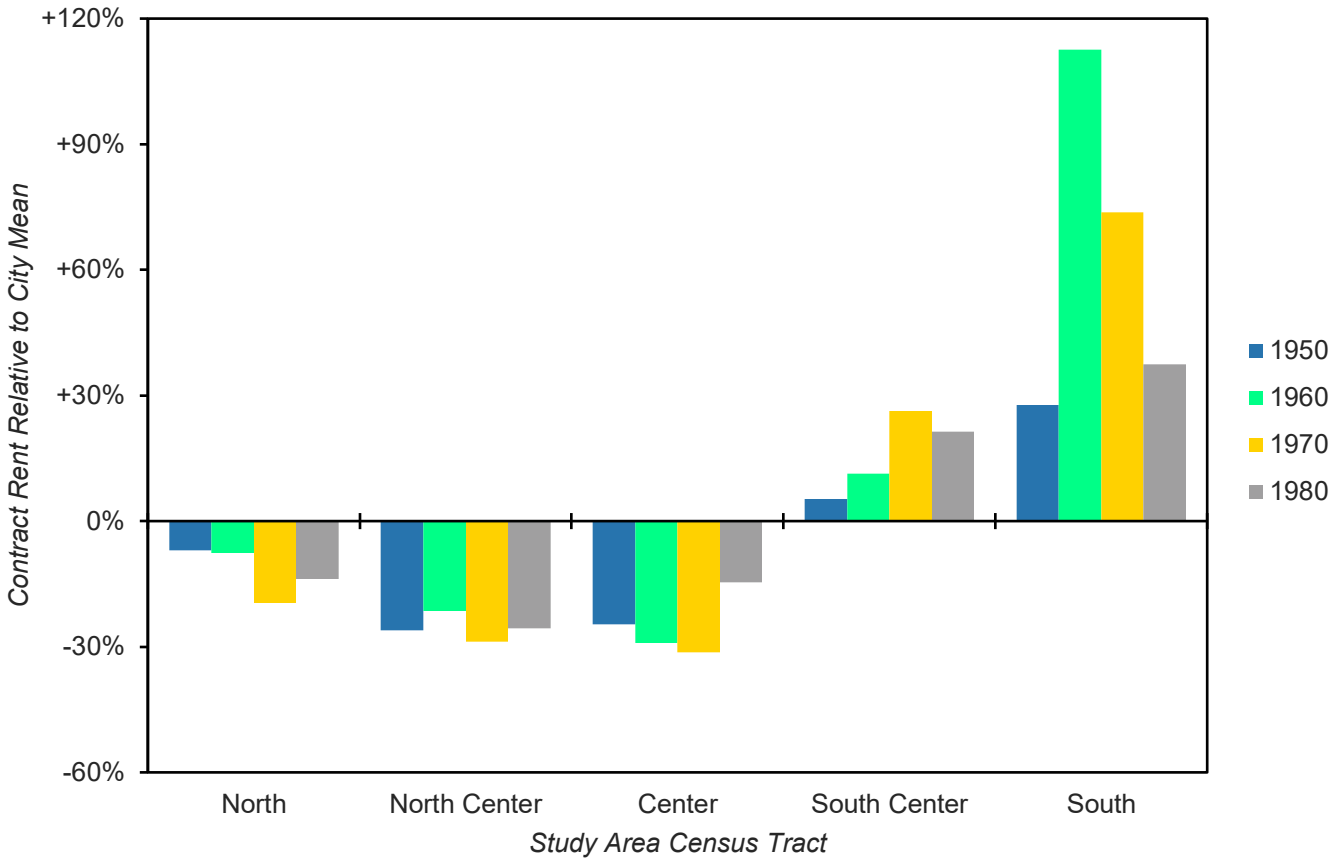
Figure 2-11. Average Home Value Relative to the City of Pasadena



Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952a, 1960, 1961b, 1970, 1980 and U.S. Census Bureau et al., 1972)

In contrast, the South Center and South areas saw substantial increases in home values, rent, and income levels over the same period (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952a, 1952b, 1960, 1961b, 1970, 1980 and U.S. Census Bureau et al., 1972)). In 1950 and 1980, the South area had the highest relative home values in the study area, surpassing 1.5 times the city average by 1980. The South Center area also exhibited a significant rise, with home values peaking almost as far above the city average by 1980 (See **Figure 2-11**). Rent trends aligned with these increases, particularly in the South area, where rents spiked to over double the city average in 1960 before moderating somewhat in subsequent decades, as highlighted in **Figure 2-12** (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952a, 1960, 1961b, 1970, 1980 and U.S. Census Bureau et al., 1972)). This high relative rent indicates increased demand for housing in these areas, likely driven by shifts in neighborhood desirability.

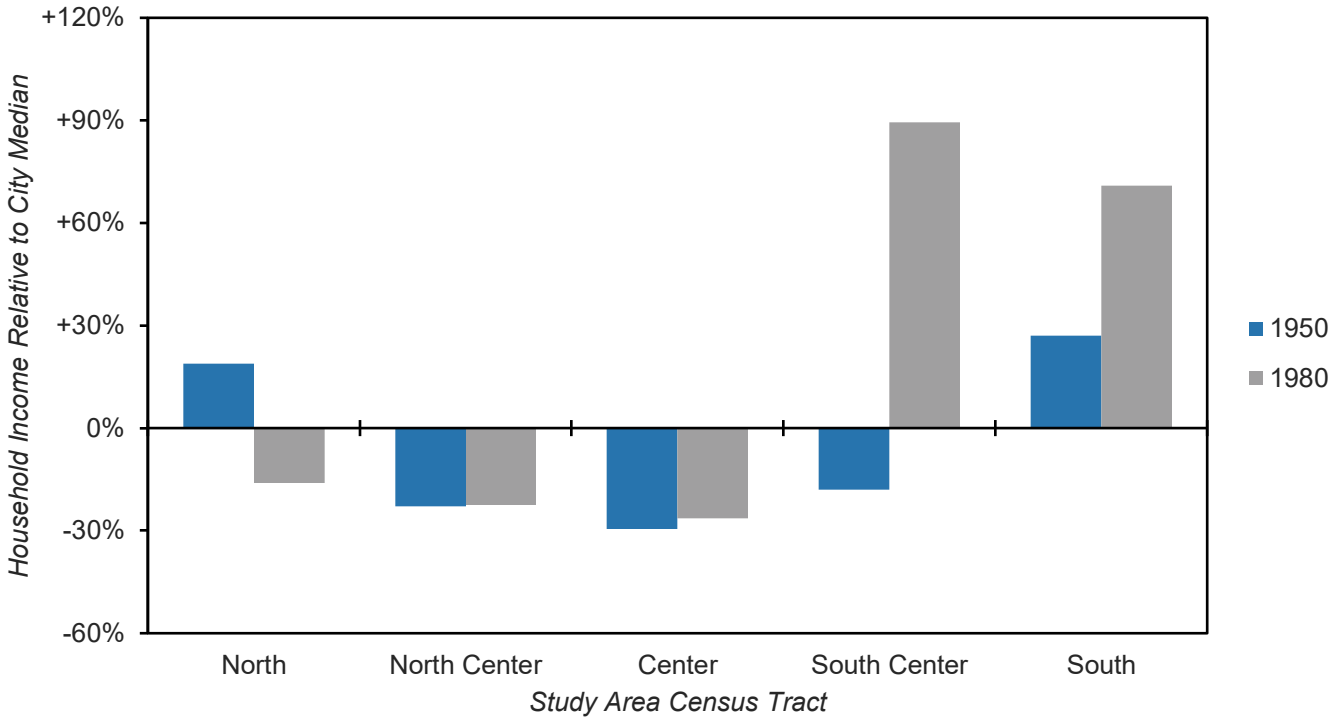
Figure 2-12. Average Rent Relative to the City of Pasadena



Data source: calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952a, 1960, 1961b, 1970, 1980 and U.S. Census Bureau et al., 1972)

Median household income data further underscores the economic transformation in the South Center and South areas. As illustrated in **Figure 2-13**, these areas saw substantial income growth, with the South Center tract reaching nearly double the city's median income by 1980. The South area also experienced a significant rise in relative income (calculated by authors from 1950 and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952b, 1980)), reflecting a demographic shift toward more affluent residents. These increases in home values, rent, and income suggest that the South Center and South areas became increasingly desirable, contributing to a demographic change marked by higher-income residents and reduced presence of lower-income populations and populations of color over time.

Figure 2-13. Median Income Relative to the City of Pasadena



Data source: calculated by authors from 1950 and 1980 U.S. Censuses (U.S. Census Bureau, 1950, 1952b, 1980)

Together, these findings paint a picture of economic stratification within Pasadena's western neighborhoods. While the North, North Center, and Center areas maintained relatively lower property values, rents, and incomes, the South Center and South areas experienced considerable appreciation, indicative of rising demand and affluence. This dynamic underscores the broader socioeconomic changes that took place as freeway development and selective urban projects reshaped the area.

Part 3. Institutional Discriminatory Practices in Housing

Freeway development was not the only factor influencing segregation in Pasadena. To better interpret the quantitative analyses of residential patterns, it is essential to consider the broader institutional forces and dynamics of the early to mid-20th century that contributed to housing segregation. Our analysis examines several factors before, during, and after freeway construction that collectively fostered racial inequality. These include preexisting racialized policies and practices, such as redlining, biased zoning, and restrictive covenants (each defined and described further below), as well as resistance to these practices, exemplified by cases like *Fairchild v. Raines* (1944) that challenged restrictive racial covenants. The qualitative analysis for this section, as well as the next part of the report, draws heavily on a review and synthesis of existing literature and historical documents on these societal forces and dynamics, both nationally and in other contexts. Where relevant, we also conduct quantitative assessments to support our findings.

Housing Discrimination, National Context, and Pasadena

The nation, including Pasadena, has a long history of racial housing discrimination, enforced by both private and public actors. For instance, a city councilmember and later Pasadena mayor and state senator argued that the "only sensible solution" to "the Negro problem" was strictly enforced residential segregation (quoted in Cole, 2021). Challenging this form of racism was a primary focus of the civil rights movement, fought in courts, legislative bodies, and at the ballot box. While some progress was made in dismantling housing discrimination during the first three quarters of the 20th century, these efforts remained slow and incomplete (Loukaitou-Sideris et al., 2023).

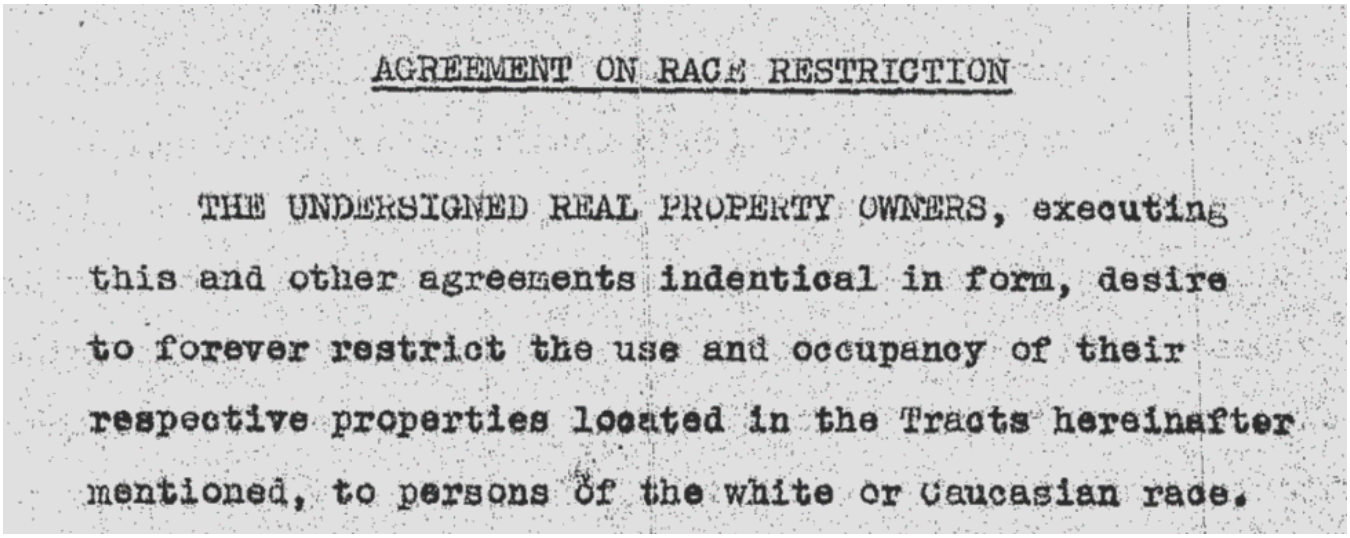
One significant agent in producing racial housing segregation was the government, particularly through land-use control and zoning. While local regulations like these can serve legitimate purposes, such as separating hazardous industrial activities from residential areas, the use of spatial control by public authorities has historically been rooted in racism. Some of the earliest examples include efforts across California in the latter half of the nineteenth century to restrict where Chinese residents could live, purchase property, and work (Ong, 1981; Chou, 2013–2014; and Ong, Ong, and Pech, 2024). Later, racial zoning became a common practice in cities nationwide, especially in the South (Rice, 1968 and Silver, 1991, 1997).

The courts initially permitted racial zoning practices in the early 20th century. For example, in 1915, the Virginia Supreme Court ruled in *Hopkins et al. v. City of Richmond* (1915) that it was legal under the state's constitution for the city to restrict Black residents from occupying homes in white-majority neighborhoods. However, just two years later, in 1917, the U.S. Supreme Court reached a different conclusion in *Buchanan v. Warley* (1917), ruling that it was unconstitutional under the 14th Amendment to prevent property owners—whether white or "colored"—from selling to "constitutionally qualified" buyers. This landmark decision effectively voided *explicitly* racial zoning practices (*Buchanan v. Warley*, 1917 and Ely, 1998, 2018).

However, this ruling did not prevent private parties from using restrictive covenants—clauses in property deeds that prohibited sales based on race/ethnicity—which became a primary mechanism for perpetuating housing

segregation.[5] Around 60 percent of Pasadena properties had such a restriction in their deeds in 1942 (See **Figure 3-1**), and salespeople knocked doors to get white homeowners to add these clauses (Cole, 2021). This form of discrimination was eventually outlawed. In 1948, the U.S. Supreme Court ruled in *Shelley v. Kraemer* (1948) that racially restrictive covenants were unconstitutional under the 14th Amendment and that the government could not enforce such restrictions. While the overt practice of restricting sales based on race could no longer be enforced (Tushnet, 1988, 1994), more subtle forms of discrimination persisted in the housing market. Addressing this required laws that specifically prohibited and penalized such actions (Loukaitou-Sideris et al., 2023).

Figure 3-1. Restrictive Clause in a Pasadena Deed



AGREEMENT ON RACE RESTRICTION

THE UNDERSIGNED REAL PROPERTY OWNERS, executing this and other agreements indentical in form, desire to forever restrict the use and occupancy of their respective properties located in the Tracts hereinafter mentioned, to persons of the white or Caucasian race.

Source: Agreement on Race Restriction [(1612 Glen Avenue, Pasadena, California)]*, 1947*

The fight against private housing discrimination culminated in the passage of the federal Fair Housing Act of 1968, part of the Civil Rights Act (1968). The law declared, “it shall be unlawful...to refuse to sell or rent after the making of a bona fide offer, or to refuse to negotiate for the sale or rental of, or otherwise make unavailable or deny, a dwelling to any person because of race, color, religion, sex, familial status, or national origin” (Civil Rights Act of 1968, 1968, p. 21). The Act also led to the establishment of federal agencies to enforce these protections (Civil Rights Act of 1968, 1968 and Pollak, 2000), which appears to have had some positive impact (Massey, 2015 and Squires, 2017). Nonetheless, housing discrimination—such as steering—continued to persist for decades after the law’s enactment (Galster, 1990 and Turner and Mikelsons, 1992).

Pasadena was very much a part of the contentious history around housing discrimination. While there is no evidence that the city engaged in *explicit* racial zoning, it appears Pasadena implemented land-use regulations that, while not overtly racist, had a disproportionate impact on people of color and reinforced segregation (Shook, 2020). These zoning ordinances were designed to limit and prevent certain groups—typically low-income residents and people of color—from residing in particular areas (Whittemore, 2021 and Goetz, 2021). For example, high minimum lot size requirements for single-family housing and the prohibition of multifamily housing

5. Some cities found ways to circumvent the 1917 ruling by enacting zoning that reinforced existing land-use patterns with disparate impacts on people of color and that reinforced racial segregation (Silver, 1997 and Shertzer, Twinam, and Walsh, 2016).

limited the supply of affordable housing, making it difficult for lower-income families and/or families of color to find housing (Marcus, 1970).

Housing discrimination had negative impacts on housing costs for people of color. Artificially limiting the supply of available housing units by excluding people of color from predominantly non-Hispanic white neighborhoods tends to push up market prices; consequently, segregation imposed a cost on people of color in terms of higher prices for a given quantity and quality (Kain and Quigley, 1970, 1972 and King and Mieszkowski, 1973). Combined with practices like redlining and racial covenants, these regulations created substantial barriers that hindered people of color from improving their living conditions and socioeconomic outcomes.

Discriminatory practices by non-governmental actors were also readily evident in Pasadena. A 1927 article in the local realtors' magazine reveals the prevailing prejudicial attitudes: "Pasadena has a large number of [N]egroes who are recently trying to move into desirable sections of the city. Through subdivision restrictions and owners agreements[,] it [(the realtors association)] is attempting to hold them in check" (quoted in Cole, 2021). In 1939, the Pasadena Improvement Association, supported by other organizations, pushed for "race restrictions on all of the Pasadena residential districts now occupied by Caucasians" (quoted in Cole, 2021). Additional examples of such private-sector racism, particularly the use of racial restrictive covenants, are discussed later.

Pasadena was also a site of resistance against housing discrimination. Notably, in 1944, a Black family attempting to move into a neighborhood bordering Arroyo Seco launched a court case, represented by journalist and civil rights lawyer Loren Miller (*Fairchild v. Raines*, 1944 and Cole, 2021). The area had restrictive covenants stating that "each and every parcel of land within said area shall be limited and restricted to occupancy by, and that the same shall be occupied exclusively by persons of the [w]hite or Caucasian race" (*Fairchild v. Raines*, 1944). The California Supreme Court ruled in favor of the Black family (*Fairchild v. Raines*, 1944), marking an important victory that predated the U.S. Supreme Court's *Shelley v. Kraemer* (1948) decision to outlaw racially restrictive covenants nationwide (Cole, 2021).

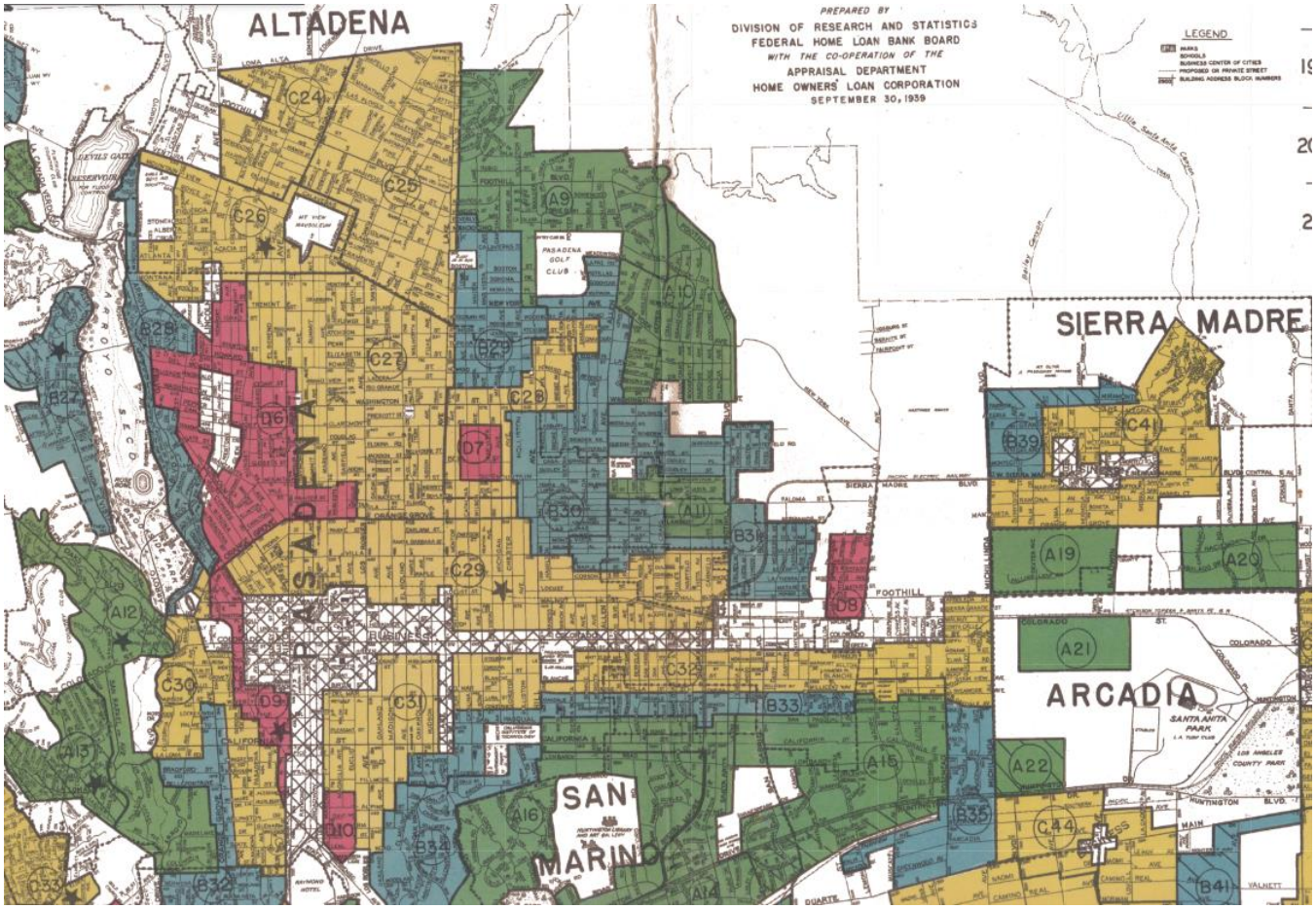
Redlining

Redlining was a form of racial discrimination present in housing that involved banks and insurance companies limiting or denying individual access to credit and other services—such as mortgages and insurance—based solely on where they lived or sought to live, even if they were otherwise qualified. Nationally, the Federal Housing Administration (FHA) and Home Owners' Loan Corporation (HOLC) each assessed neighborhoods in major American cities in terms of mortgage risk. HOLC color-coded areas in the 1930s into four hierarchical categories from least to most risky: green, blue, yellow, and red. One of the products of this system was a series of maps used by loan officers, appraisers, and real estate professionals in their lending practices. Neighborhoods deemed high risk or "hazardous" were typically "redlined" by lending institutions, denying residents access to capital investment. Recent scholarship has complicated the history of redlining, as FHA's maps, which they destroyed, likely contributed more to discrimination in lending than HOLC's. Regardless, federal entities established criteria for racially coding neighborhoods, lowering homeownership rates and hindering wealth accumulation in these communities (Aaronson, Hartley, and Mazumder, 2020; Fishback et al., 2021, 2024; Hernandez, 2009; An, Orlando, and Rodnyansky, 2019; Park and Quercia, 2020; and Loukaitou-Sideris et al., 2023).

Figure 3-2 shows how HOLC graded Pasadena. This practice of rating risk was inherently racist, as areas labeled "risky" and "undesirable" were predominantly those where communities of color lived. Race was explicitly tied to these classifications, as seen in descriptions assigned to different neighborhoods (Nelson et al., 2023).

Areas safeguarded against residents of color were often graded more favorably. For example, the blue-colored area just east of the Rose Bowl was described as “protected from the subversive elements by deed restrictions,” which, according to HOLC, made the neighborhood safer for mortgage lending (quoted in Nelson et al., 2023).

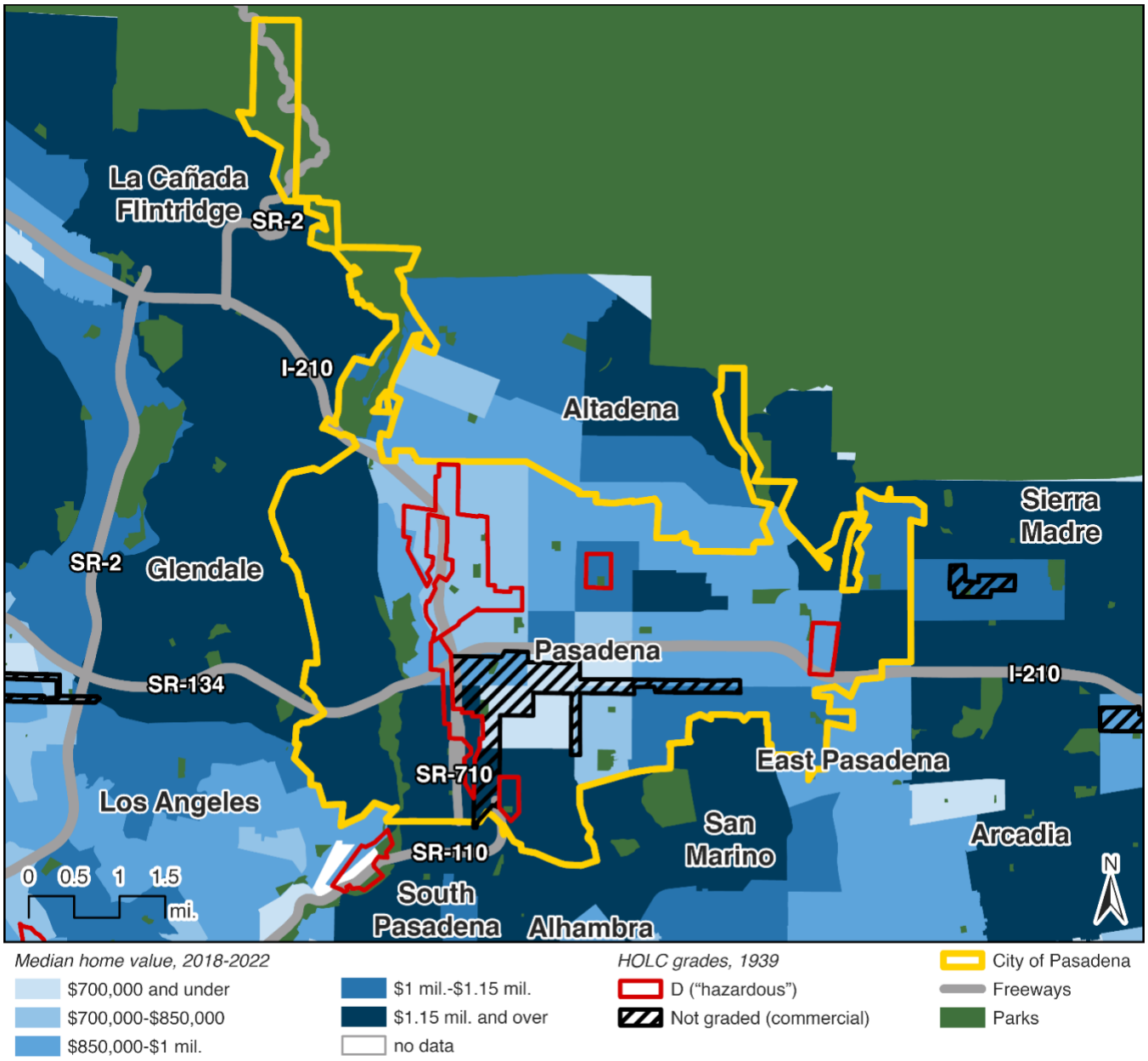
Figure 3-2. 1939 HOLC Redlining Map of Pasadena and Surrounding Areas



Source: Nelson et al., 2023

In contrast, the red-colored area north of downtown, about half people of color—primarily Black, Mexican and Japanese residents (Nelson et al., 2023)—was labeled as being affected by “infiltration” of a “...Mexican and Negro population” (quoted in Nelson et al., 2023). HOLC described this as a “real menace” that alarmed property owners, particularly as deed restrictions expired (quoted in Nelson et al., 2023). The importance of these racially restrictive deeds is further highlighted in HOLC’s description of an area north of this redlined neighborhood: “Deed restrictions have expired on approximately 50% of [the] area[,] but active efforts are being made to re-restrict owing to threat of subversive racial infiltration” (quoted in Nelson et al., 2023).

Figure 3-3. Current Home Values and Historic Redlining, Pasadena



Data sources: calculated by authors from 2018-2022 American Community Survey five-year average (U.S. Census Bureau, 2022a); Nelson et al., 2023; U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

The enforcement of residential segregation in Pasadena led to both limited economic opportunities and subjection to poorer living conditions for communities of color, restricting upward mobility and significantly impacting their quality of life and standard of living (Swope, Hernández, and Cushing, 2022 and Nardone et al., 2020). Although the Fair Housing Act (1968) outlawed redlining, its lasting effects are still evident today. The redlined section of northwestern Pasadena, for example, continues to have higher concentrations of people of color and lower home

values (See **Figure 3-3**) (calculated by authors from 2018-2022 American Community Survey five-year average (U.S. Census Bureau, 2022a); Nelson et al., 2023; and Joshi, Horn, and Berrens, 2024).

Intersection of Housing and School Segregation

As discussed above, racial segregation, discrimination, and redlining have shaped the social fabric of Pasadena, and their effects continue to impact residents' lives today (Blumberg, 1964). *De facto* segregation occurred not only in housing but also in schools, part of a project of maintaining "racially pure" neighborhoods (Nicolaides, 2024, p. 144) through exclusionary practices (Cohen, 1967 and Nicolaides, 2024). Pasadena's history of school desegregation is complex, with some residents actively advocating for integration and others pushing back against it. The intensification of civil rights activism, coupled with the enforcement of *Brown v. Board of Education* (1954) through the Civil Rights Act (1968), led to widespread white flight. This included "internal white flight," in which remaining affluent white residents distanced themselves from public institutions and segregated themselves within their own neighborhoods (Nicolaides, 2024; Wicker, 1973; and Berg, 1974). Internal white flight manifested as enrollment in private schools, while contemporaneous external white flight involved moving out of the district or transferring enrollment to another district (Li, 2009).

As more people of color, particularly Black and Latino/a residents, began moving into Pasadena, especially in the northwestern areas, certain neighborhoods appeared to "tip" (See below for a discussion of "neighborhood tipping"). However, many of these communities were later displaced to make way for highways, industrial areas, commercial zones, and public housing (also discussed further below) (Nicolaides, 2024). This was often justified as removing perceived "blight" and by the argued benefits of "urban renewal," facilitated through practices like blockbusting and other predatory real estate tactics (Hartley and Rose, 2023).

As mentioned earlier, Pasadena witnessed a fervent fight for fair housing, with activists and community leaders organizing against discriminatory practices like redlining and restrictive covenants that upheld racial segregation in the city's neighborhoods (Cole, 2021). These efforts coincided with the civil rights movement of the 1950s and 1960s, and with the development of the I-210 and SR-710 freeways, which further shaped the city's racial landscape (Loukaitou-Sideris et al., 2023).

The struggle for school desegregation also escalated following the landmark *Brown v. Board of Education* (1954) decision, as efforts to implement integration in schools faced significant opposition from both educational lawsuits and resistance when people of color attempted to move into white neighborhoods or enroll in white-majority schools (Lozano, 2007). This tension is best exemplified by the complexities surrounding the Pepper Project, Pasadena's first major urban renewal project (See Part 4 for additional details on this project) (B. Ramirez, 2021; Mann, 1971; C. Wilson, 1966; Turpin, 1970; Nicolaides, 2024; and Blumberg, 1964).

Despite the City's self-claimed efforts to promote residential desegregation by encouraging white residents to move into neighborhoods of color and fostering integrated housing developments, these attempts largely proved unsuccessful (Blumberg, 1964 and Marugg, 1968). Along with residential desegregation, another equally contentious challenge arose: the proposition of busing Black children from the Pepper Project area to predominantly white schools, due to overcrowding in schools nearby the project. This initiative met strong resistance from Parent Teacher Association leaders in these whiter schools, opposed to integration efforts (Lee, 1970). Although the project aimed to foster integrated housing, no enforcement mechanisms were put in place to ensure this outcome.

Opposition to Fair Housing

The existence and enforcement of racial covenants perpetuated residential segregation and limited economic mobility for communities of color in Pasadena. Prior to *Shelley v. Kraemer* (1948), these legally binding agreements were explicitly embedded into property deeds, prohibiting the sale, lease, or transfer of property to individuals based on race, ethnicity, or religion (Gotham, 2000 and Rose and Brooks, 2015). Preserving and increasing property value took precedence over integration, making these covenants a tool—used alongside redlining—to prevent people of color from owning property and to maintain predominantly white neighborhoods. This is evident in Pasadena's past and present landscape, where people of color were historically confined to the northwestern part of the city due to redlining and racial covenants (Pincetl, 1992), leaving a lasting impact on residential patterns and racial dynamics.

To better understand the stance of Pasadena residents on housing discrimination during the 1960s—particularly among the majority population of non-Hispanic white residents—it is useful to examine the politics surrounding anti-discrimination laws. California elected officials pioneered state-level anti-discrimination laws. Initially, the state's civil-rights legislation focused on the labor market and public spaces (Gelb and Frankfurt, 1983 and Noel and Cheng, 2009). In 1959, the California Fair Employment Practices Act (1959) safeguarded "the right...of all persons to seek, obtain and hold employment without discrimination." That same year, the Unruh Civil Rights Act restricted discrimination in public spaces (specifically in business establishments), and the Hawkins Act aimed at prohibiting discrimination in publicly subsidized housing (Noel and Cheng, 2009 and Oppenheimer, 2010).

Four years later, in 1963, Assemblyman William Rumford introduced a statewide housing bill to address widespread discrimination in California's private housing market (Oppenheimer, 2010 and *TIME*, 1964).[6] Despite opposition from the real estate industry (Rumford, 1970–1973), the Rumford Fair Housing Act (1963, p. 2) was enacted, banning "the practice of discrimination because of race, color, religion, national origin, or ancestry in housing accommodations" with at least four rental units.

The Rumford Act continued to face strong opposition, particularly from the housing and real estate industries, which saw the law as a threat to their right to operate as they chose (Rumford, 1970–1973 and Historical Research Center, CSU Bakersfield, 2024). A builders' association attacked the law as an "extremely dangerous to the freedom of all people" and "a move toward a police state" (quoted in Radkowski, 2006, p. 56). The California Real Estate Association echoed this rhetoric, accusing the state of infringing on individual rights (W. Brown, 1972). These groups played a major role in opposing the law, with an implicit assertion of their desire to continue discriminatory practices against people of color.

Evidence from Wolfinger and Greenstein (1968) showed that white voters' support for the Rumford Act varied based on attitudes towards interracial contact. White voters who were opposed to interracial interaction strongly opposed the Rumford Act, while those who claimed they "would not move if many" Black residents "moved into their neighborhood," were "split" in their support for the legislation (Wolfinger and Greenstein, 1968, p. 766).

Opponents of the Rumford Act sought to overturn the law by placing Proposition 14 on the 1964 ballot. They helped to reframe the political debate around individual property rights and limiting state power, rather than

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6. The Rumford Fair Housing Act was a part of a package of civil rights legislation that addressed fair practices in the labor and housing market in California (Oppenheimer, 2010). Originally, the 1959 Hawkins Act prohibited discrimination in "publicly assisted housing" (quoted in Oppenheimer, 2010, p. 120). It was not until 1963 that Rumford proposed extending it into the private real estate industry (Oppenheimer, 2010).

directly challenging the state's anti-discrimination intent. Supporters of Proposition 14 argued that it would "prevent such tyranny" (L. Wilson, Schrade, and Snell, 1964, p. 19) from "State-appointed bureaucrats" (L. Wilson, Schrade, and Snell, 1964, p. 18), "restore...freedom to sell or rent," and "abolish the Rumford Forced Housing Act that deprives you of the right to choose" (Committee for Yes on Proposition #14 to Abolish Rumford Forced Housing Act, 1964). The ballot initiative was labeled as "Sales and Rentals of Residential Real Property" (1964, p. 18), with wording that focused only on individual property rights:

> *"Prohibits State, subdivision, or agency thereof from denying, limiting, or abridging the right of any person to decline to sell, lease, or rent residential real property to any person as he chooses. Prohibition not applicable to property owned by State or its subdivisions; property acquired by eminent domain; or transient lodging accommodations by hotels, motels, and similar public places"* (*Sales and Rentals of Residential Real Property*, 1964, p. 18)

Proponents of Proposition 14 sought to nullify the Rumford Act, which they argued was equivalent to government tyranny and the "seizure of private property" (L. Wilson, Schrade, and Snell, 1964, p. 18). On the other hand, opponents of the initiative, primarily civil rights organizations and organizations of people of color, emphasized Proposition 14's devastating racial implications, warning that it would effectively "write hate and bigotry into the [California] Constitution" (Californians against Proposition 14, 1963).

Opinions on Proposition 14 were starkly divided along racial lines, with pre-election polls showing that a large majority of white voters supported the referendum, while an even greater majority of Black voters opposed it (Wolfinger and Greenstein, 1968; Hahn, 1968; and Chen, Mickey, and Van Houweling, 2008).[7] However, not all people of color were opposed to the proposition's passage (Felker-Kantor, 2013 and Brilliant, 2010), as many were likely influenced by the political narrative surrounding individual property rights. This narrative also resonated across party lines, with about half of Democrats supporting the proposition (Historical Research Center, CSU Bakersfield, 2024 and Anderson and Lee, 1965).

Despite the majority opposition from voters of color, the initiative passed by a significant margin—65 percent of voters cast their ballots in favor. The disorganized campaign strategies of liberal oppositionist groups contributed to Proposition 14's success. Additionally, the outcome can largely be attributed to the fact that non-Hispanic white Californians comprised a supermajority of the voting population (Ballotpedia, n.d.-b; Vyas, 2014; and Anderson and Lee, 1965). While the referendum was an exercise in direct democracy, it also represented a tyranny of the majority effectively enshrining the right to discriminate in the housing market.

Pasadena's voting patterns closely mirrored those of the state and county, with nearly two thirds of voters supporting the passage of Proposition 14 (See **Table 3-1**). Many surrounding cities showed even higher levels of support. Two of these cities, South Pasadena and Glendale, were "sundown towns", where people of color other than servants were banned from not just living but visiting at night (History and Social Justice, n.d.; Loewen, 2005; Vargas, 2020; *Colorado Boulevard*, 2022; and South Pasadena City Council, 2022). Additionally, these three nearby cities were overwhelmingly white, with white residents making up over 99 percent of the population in 1960 (calculated by authors from 1960 U.S. Census (U.S. Census Bureau, 1963)). In Pasadena, opposition primarily came from voters of color, especially those residing along what would later become the I-210 corridor. **Figure 3-4** shows an island of votes against the proposition in northwest Pasadena, amidst a sea of suburban

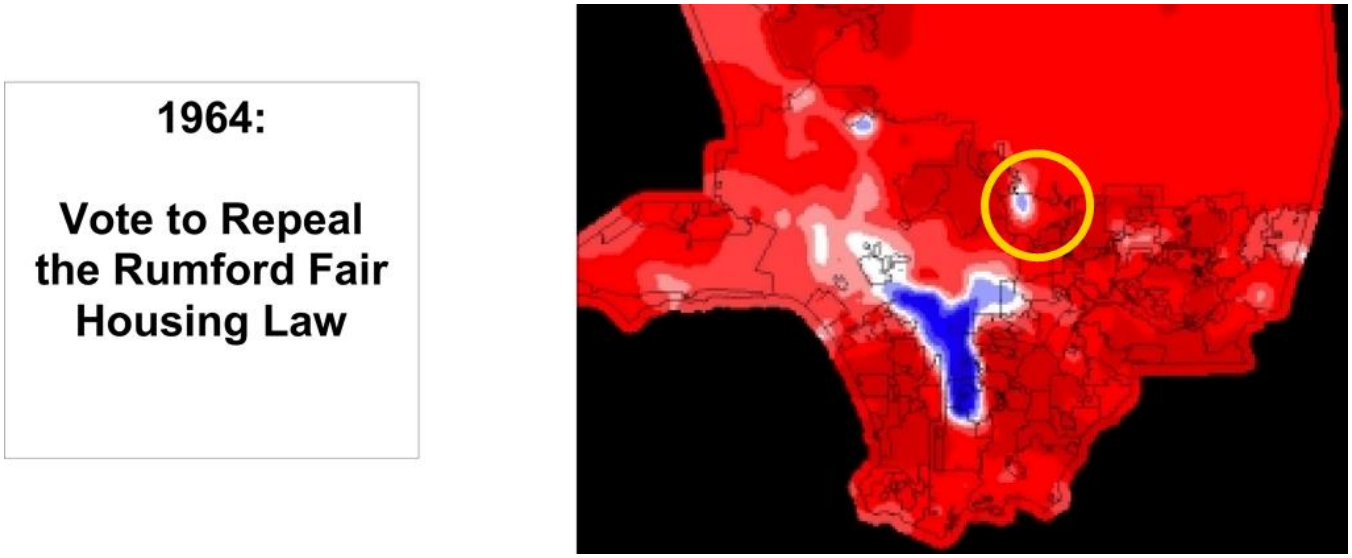
7. Besides race, there were other divisions: less-educated voters, Republicans, and Southern Californians were more likely to vote in support of Proposition 14 (Wolfinger and Greenstein, 1968; Hahn, 1968; and Chen, Mickey, and Van Houweling, 2008).

Table 3-1. Proposition 14 (1964) Results

Geography	In Favor		Opposed	
	Votes	Share	Votes	Share
California	4,526,460	65.4%	2,395,747	34.6%
Los Angeles County	1,802,620	67.4%	870,342	32.6%
Pasadena	35,444	65.9%	18,374	34.1%
South Pasadena	8,405	78.7%	2,278	21.3%
Glendale	50,598	83.5%	10,018	16.5%
San Marino	6,715	86.5%	1,051	13.5%

Data source: Jordan, 1964

Figure 3-4. Map of Voting Patterns on Proposition 14, 1964



Note: Red areas had more votes for the proposition; blue areas had more votes against the proposition; Pasadena circled in yellow.

Source: Ethington, 2000, with annotation by authors

votes for it.[8] In contrast, the rest of Pasadena, including the area south of the eventual I-210 and SR-710, voted overwhelmingly in favor of the proposition (Ethington, 2000).

8. The other pocket of opposition in the suburbs, shown in **Figure 3-4** (Ethington, 2000), was Pacoima, the region's other suburban exclave of color, which we studied in a prior report (Loukaitou-Sideris et al., 2023).

The passage of Proposition 14 in November 1964 stalled progress on desegregation efforts in Pasadena and halted the development of the Pepper Project (discussed further below), as it amended the state constitution to overturn the Rumford Act (Tucker, 1966 and *Independent Star-News*, 1965). Though these efforts were ultimately short-lived, Proposition 14 allowed property sellers and landlords to openly discriminate based on ethnicity for the two years it remained in effect.

While voters supported Proposition 14, the courts eventually overturned the results (Oppenheimer, 2010 and *Maryland Law Review*, 1967). In 1966, the California Supreme Court declared the initiative unconstitutional (*Mulkey v. Reitman*, 1966), and a year later, the U.S. Supreme Court reached the same conclusion in *Reitman v. Mulkey* (1967).[9] Thurgood Marshall, then U.S. Solicitor General, argued that the proposition was "an exercise of state power in support of discrimination" (quoted in *TIME*, 1967). Despite these rulings, racial discrimination in the housing market persisted in more covert forms as noted earlier in this section (Black, 1967).

Neighborhood Tipping and White Flight

Despite persistent housing discrimination and racial segregation, neighborhoods in Pasadena did transform to accommodate the growing population of color—but in ways that often perpetuated their isolation. This shift often followed a process in which predominantly non-Hispanic white neighborhoods rapidly transitioned to areas of color, as seen in the North tract of the I-210/SR-710 study area (quantified in Part 2) (See **Figures 2-2** and **2-6**) (calculated by authors from 1950 and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1980)). Under the "tipping-point" model of neighborhood change, Schelling (1971) argues that once a predominantly white area surpasses a certain percentage of a particular non-white racial/ethnic group (often Black), white residents leave in large numbers, resulting in a relatively racially homogeneous community of color (Grodzins, 1958; Cohen, 1967; and Wolf, 1963).

This dynamic is driven by both social and economic factors: some prejudicial white residents may refuse to live near neighbors of color, while others may fear declining property values when people of color move into the area. Both groups relocate, often to predominantly white neighborhoods, perpetuating racial segregation despite broader demographic changes at the city or regional level.

There is no precise, consistent tipping point, but studies indicate that white residents become unlikely to recommend the neighborhood to a white friend when the population of color reaches around 20 percent, with white flight becoming apparent at around 30 percent (Wolf, 1963; Spiegel, 1960; and Meyerson and Banfield, 1955) The lack of a consistent tipping threshold is due to various factors, such as local amenities, proximity to existing neighborhoods of color, and the composition of the particular population of color (Easterly, 2009; Durlauf, 2011; and Schelling, 1971). While 30 percent serves as an average, the tipping point for each neighborhood varies; generally, it must exceed the mean of the normal distribution of white preferences for an area's racial composition (Easterly, 2003). This sensitivity highlights how residential patterns are shaped by shifting social dynamics.

A number of different factors play an important role in understanding how neighborhood tipping works and why it occurs. Schelling's (1971) work utilizes both the spatial proximity model and the bounded-neighborhood Model to explore why a neighborhood might "tip." Key contributing factors include speculation, tolerance dynamics,

9. Proposition 7 in 1974 ultimately removed Proposition 14's language from the state constitution (Post, 1974 and Ballotpedia, n.d.-a).

capacity limitations, concerted action, and empirical evidence. People's preferences for integration, along with patterns of movement, also help explain why this might occur. Each of these factors is elaborated upon below, to provide a clearer understanding on the concept of neighborhood tipping.

Speculation occurs when white residents expect an increase in the population of color in a given area, which often prompts many to move out—a process known as "out-tipping." *Tolerance dynamics*, on the other hand, examines the satisfaction and tolerance levels among white residents and Black residents/residents of color. Those who are most dissatisfied or less tolerant of living in a mixed community tend to leave first. Within this dynamic, understanding *integrationist preferences*—the desire for either integration and separation—helps to establish the limits on the majority's tolerance toward minority populations (Schelling, 1971).

Capacity limitations also play a role, as "tipping-in" might occur when there is excess housing or high population growth, influenced by the dynamics observed between white populations and Black populations/populations of color. However, this can also be limited by natural turnover and evacuation rates. Finally, *concerted action* among residents—whether intentional or reactive—can influence the establishment of a tipping point. This collective behavior can significantly affect the stability of a mixed community, depending on initial conditions or the rate at which residents move (Schelling, 1971).

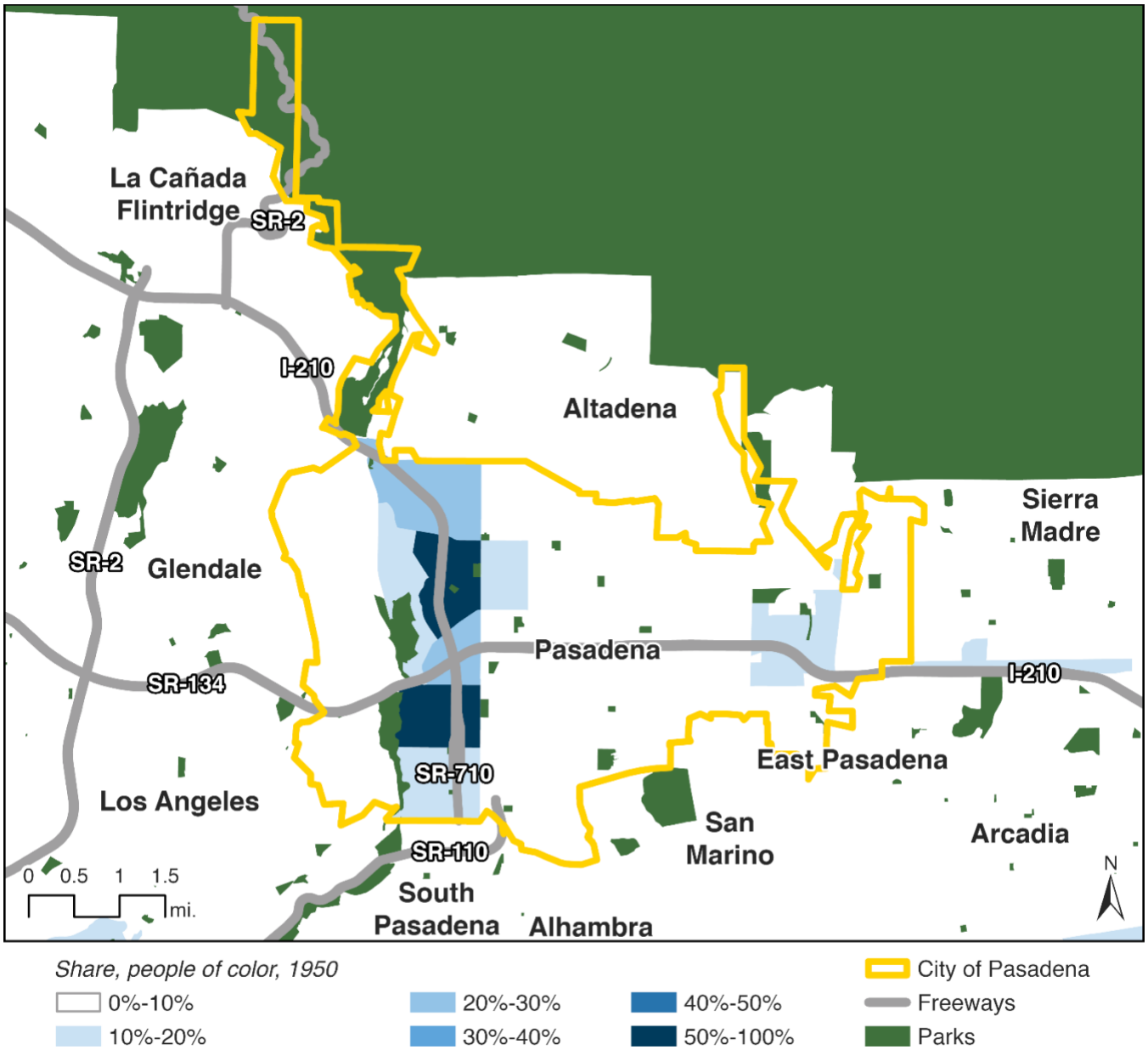
All of the factors described above serve as forms of empirical evidence, as illustrated through Schelling's (1971) two models. He also drew upon previous studies by researchers such as Grodzins (1958), Duncan and Duncan (1957), and Mayer (1960) to reinforce these empirical generalizations. Findings from these studies suggest that once neighborhoods tip, the changes tend to be irreversible. Moreover, these tipping scenarios appear more commonly—or are readily observed—in well-defined neighborhoods.

The dramatic changes during and after the construction of the North section of I-210 in the study area (See **Figure 2-2**) illustrate the tipping phenomenon in Pasadena. This area, which was predominantly white in 1950, became predominantly home to people of color by the 1970s (See **Figure 2-6**). The most significant shift occurred around the time the freeway path was selected (calculated by authors from 1950 and 1970 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970)). The planning and construction of the freeway likely started the exodus, which then sped up through tipping. This same process occurred in other neighborhoods in California, such as City Heights in San Diego (Ong et al., 2025).

However, this was not the only neighborhood to undergo such a transformation. As documented earlier, populations of color also moved into adjacent areas east of their historical concentration in northwest Pasadena (See **Figures 3-5** and **3-6**) (calculated by authors from 1950 and 1970 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970)).

Unlike the neighborhoods immediately along the freeway, these adjacent areas were not directly affected by freeway construction, making it difficult to conclude definitively that freeway development caused the demographic change. Nonetheless, the (prospective and actual) demographic shift made the area more vulnerable to placing the freeway through it during the planning stage, and the prospect of having a freeway made

Figure 3-5. Race/Ethnicity in Pasadena by Census Tract, 1950

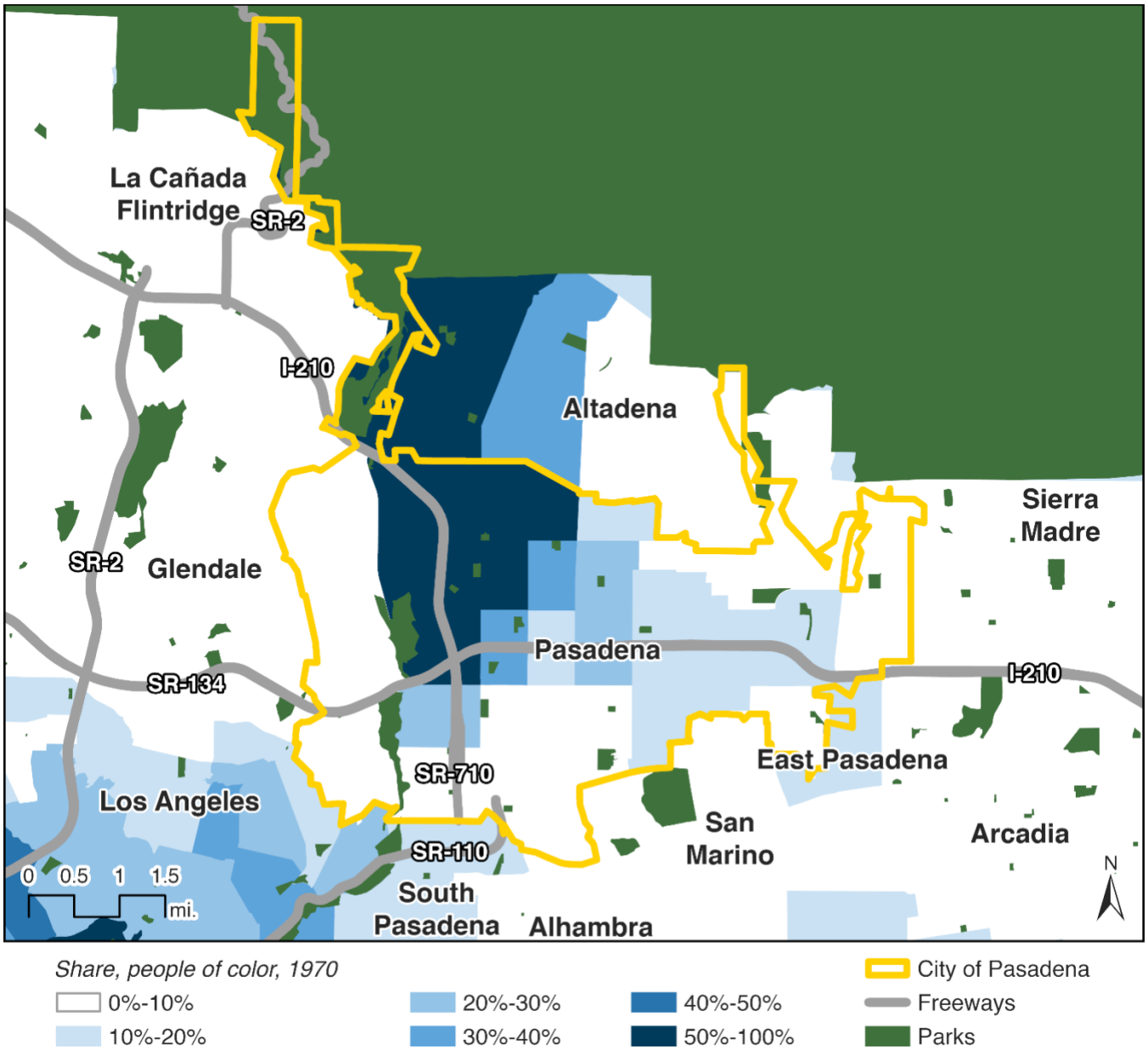


Data sources: calculated by authors from 1950 U.S. Census (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b)*;* U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

the surrounding area less desirable, cyclically contributing to the departure of white residents. By the time construction started, the neighborhood had tipped.

Another interesting change occurred in the South Center tract south of the eventual I-210/SR-710/SR-134 interchange (See **Figure 2-2**), which went from majority people of color to majority non-Hispanic white (See

Figure 3-6. Race/Ethnicity in Pasadena by Census Tract, 1970



Data sources: calculated by authors from 1970 U.S. Census (U.S. Census Bureau, 1970)*;* U.S. Census Bureau, 2018; Caltrans, 2023; and Esri, 2024a

Figure 2-6) (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (Manson et al., 2024 and U.S. Census Bureau, 1950, 1952b, 1970, 1980)), a process associated with gentrification. Some of the causes for this are discussed in Part 4.

Part 4. Urban Renewal and Restructuring Projects

Freeway Construction and Urban Restructuring

The second part of the qualitative analysis of societal factors contributing to racial segregation focuses on redevelopment efforts in parts of the study area. There are four sites of interest in the area south of the I-210/SR-710/SR-134 interchange, which involved both public and private actions. These developments displaced a large number of households, particularly households of color, and consequently directly contributed to the increased racial segregation of the study area, as quantified earlier. The analysis also examines a major project north of the interchange, one that contributed to a continued concentration of people of color in that part of Pasadena. These cases provide concrete examples of how public and private development efforts reshaped Pasadena's demographic geography.

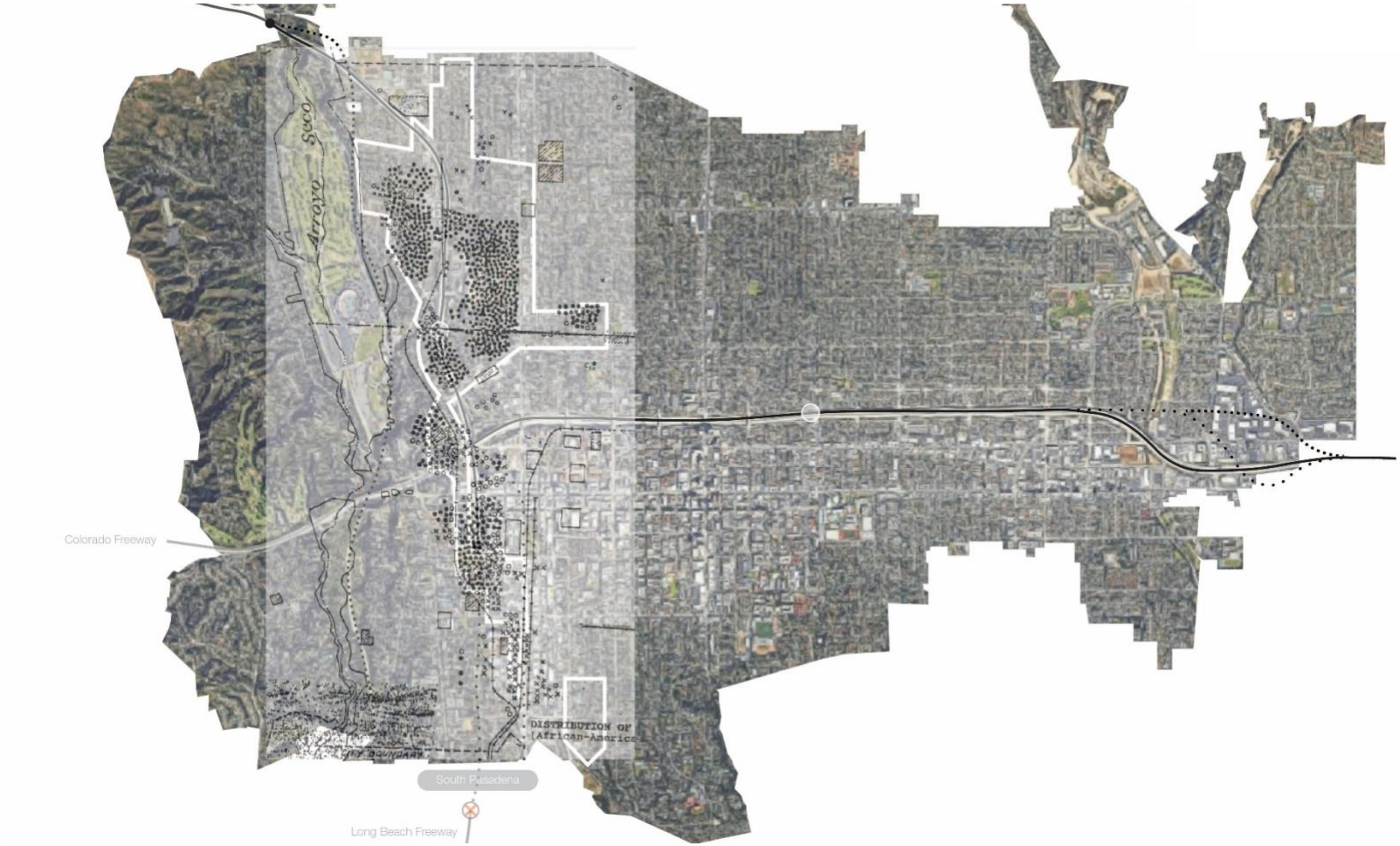
The development of the modern-day freeway system began in the mid-20th century, following a popular desire for more efficient transportation systems, the post-Second-World-War economic boom, and the establishment of the Federal-aid Highway Act of 1956 (Loukaitou-Sideris et al., 2023). Not only did the creation and development of the SR-710 and I-210 freeways in particular facilitate suburban white flight thereafter but also led to the disproportionate displacement and continued segregation of the racial/ethnic groups that originally resided there.

As documented in this report, residential and school segregation catalyzed a wide range of racial disparities in Pasadena, which then exacerbated the preexisting factors behind segregation. In turn, freeways disproportionately impacted the city's marginalized communities, as suburban migration that followed highway expansion heavily contributed to the ongoing economic decline of central business districts. Although urban renewal efforts were intended to combat the "urban decay" that followed both freeway construction and white flight to the suburbs, they often inequitably targeted and displaced communities of color originally residing near these core business districts, only to replace them with commercial developments or freeways. This "war against blight" that aimed to clear "slums" only ended up reinforcing segregation (Baum-Snow, 2007; Mieszkowski and Mills, 1993; von Hoffman, 2008; Collins and Shester, 2013; Manvel, 1968; Carriere, 2011; Hanlon, 2011; and J. Brown, Morris, and Taylor, 2009).

The City of Pasadena saw the overlap between race and freeway construction, as the freeway timeline aligns closely with events such as racial tipping, white flight, and the passage of Proposition 14, as discussed earlier. Urban renewal efforts reinforced this process. The perceived need to revitalize and promote growth in allegedly "dilapidated" commercial areas often came at the cost of demolishing neighborhoods of color. Specious justifications for excluding certain racial groups or social classes were—and often still are—hidden behind the pretense of community improvement.

The City's 1962 General Plan mapped areas deemed "blighted" for redevelopment. **Figure 4-1** maps the distribution of residents of color in 1935 and its overlap with redlined areas and freeway routes, and **Figure 4-2** depicts how all of those overlap with the General Plan's "blighted" areas (Pasadena Planning Commission, 1962;

Figure 4-1. Population Distribution of Pasadena Residents of Color, 1935, and Future Freeway Routes



Note: 1939 redlined areas demarcated by white lines; built freeways marked with solid black lines; unbuilt freeways marked with dotted black lines

Source: Loukaitou-Sideris et al., 2023, p. 101; data sources: Ethnic History Research Project, 1995 and Nelson et al., 2023; base imagery: Google, 2024

Figure 4-2. Pasadena Redlined Areas, Redevelopment Areas, and Freeway Routes

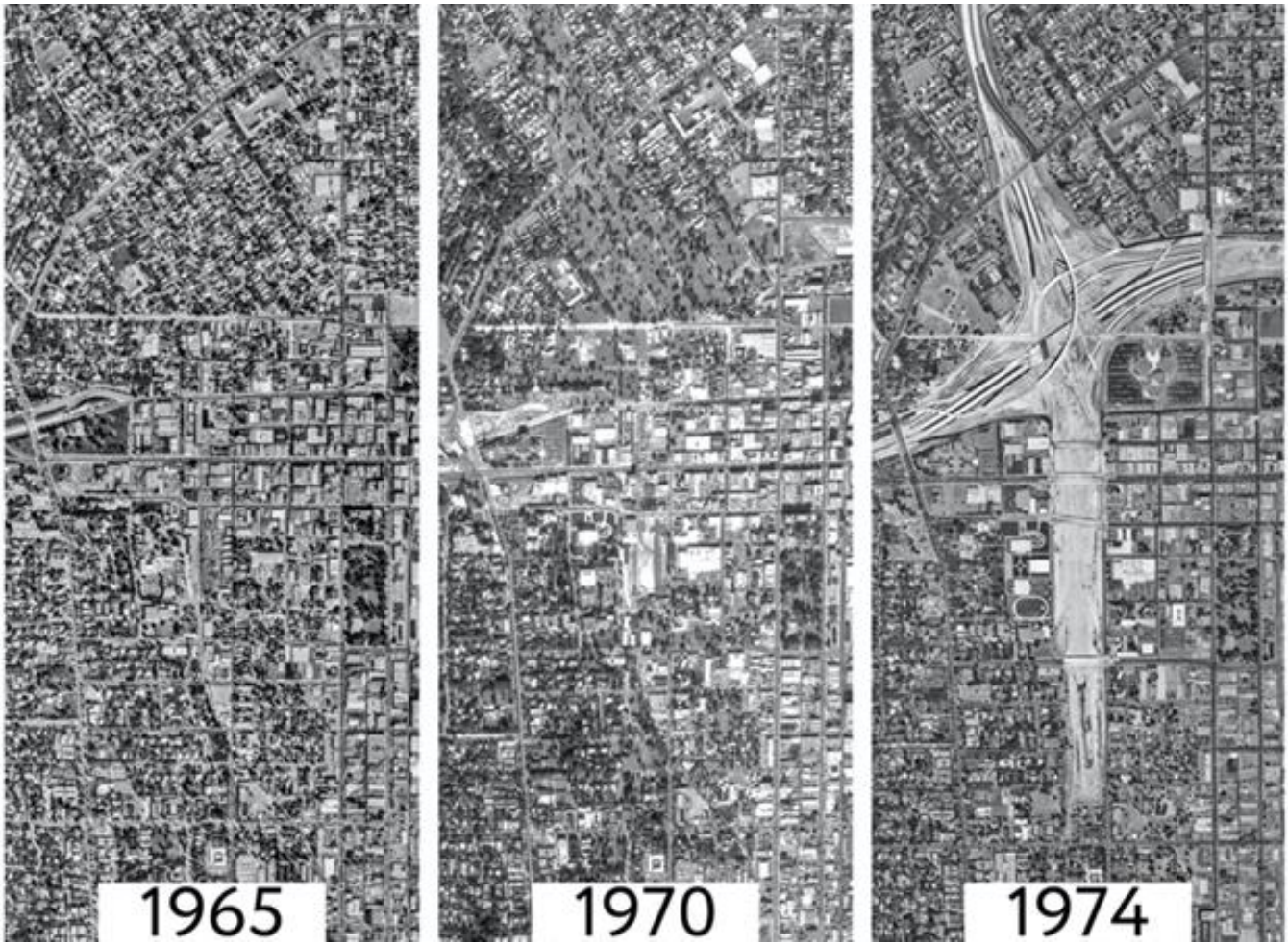
Note: 1939 redlined areas demarcated by white lines; redevelopment areas shaded; built freeways marked with solid black lines; unbuilt freeways marked with dotted black lines

Source: Loukaitou-Sideris et al., 2023, p. 103; data sources: Pasadena Planning Commission, 1962 and Nelson et al., 2023; base imagery: Google, 2024

Ethnic History Research Project, 1995; Nelson et al., 2023; Loukaitou-Sideris et al., 2023; and A. Ramirez et al., 2025).

The construction of the SR-710 stub had a profound impact on Pasadena, displacing over a hundred households (See **Figure 4-3**).[10] Additional large-scale developments along this corridor further shaped the area's housing landscape and racial demographics. Four major sites—the Norton Simon Museum, Parsons headquarters, Ambassador College, and Old Pasadena—significantly influenced neighborhood demographics and urban dynamics beyond the freeway's immediate impact. These redevelopments, driven by both public and private investments, reinforced patterns of racial segregation and contributed to broader urban restructuring.

Figure 4-3. Aerial Photographs of Changes in Land-use Patterns at the Central Pasadena Interchange

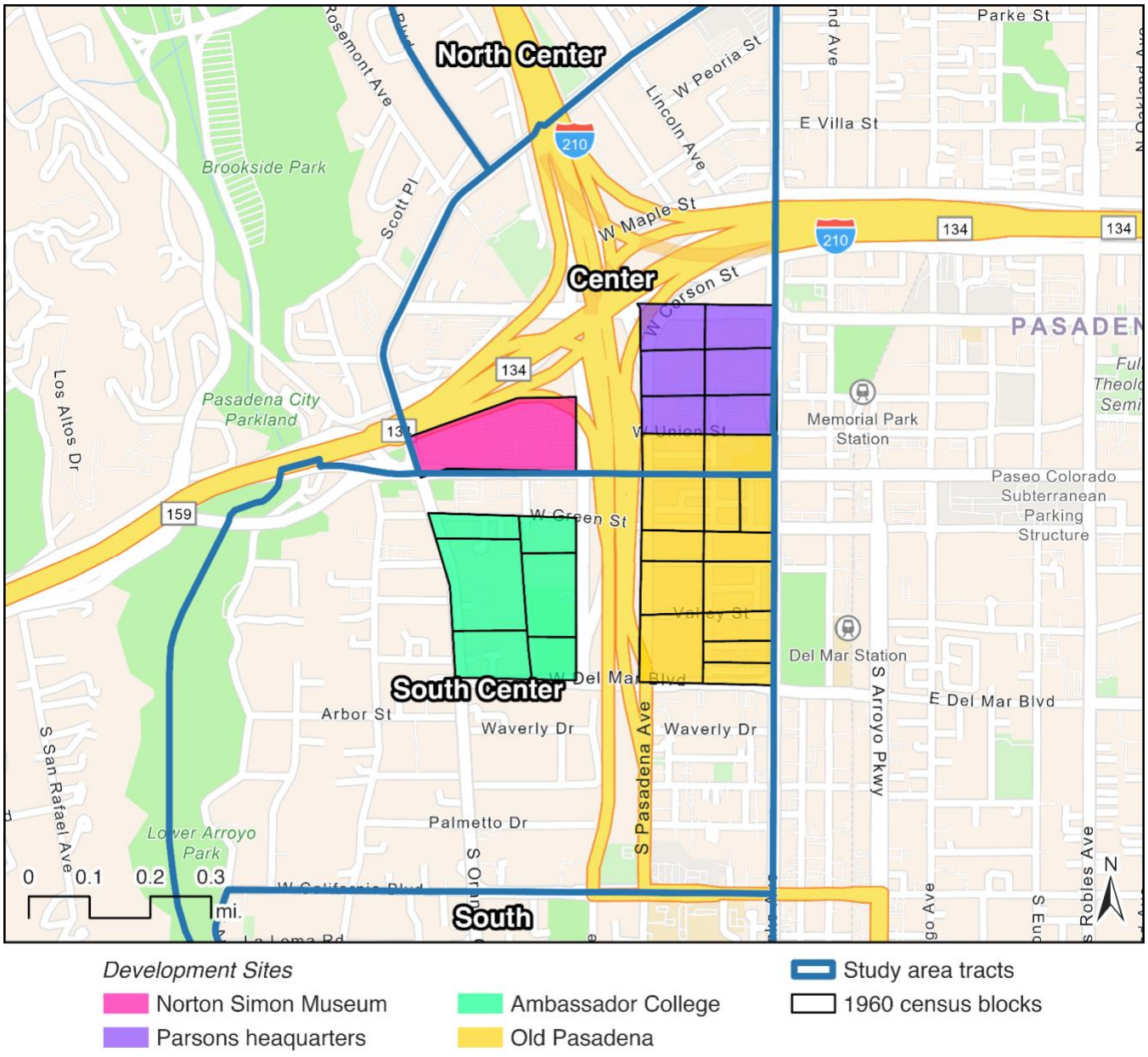


Source: Pasadena Office of the City Manager, 2024

10. This rough estimate is calculated from U.S. Census block-level data (U.S. Census Bureau, 1961b), excluding the southern tip of the SR-710 stub, as the census blocks there did not align with the stub's footprint. This estimate is considerably lower than the number reported by the City of Pasadena (2023).

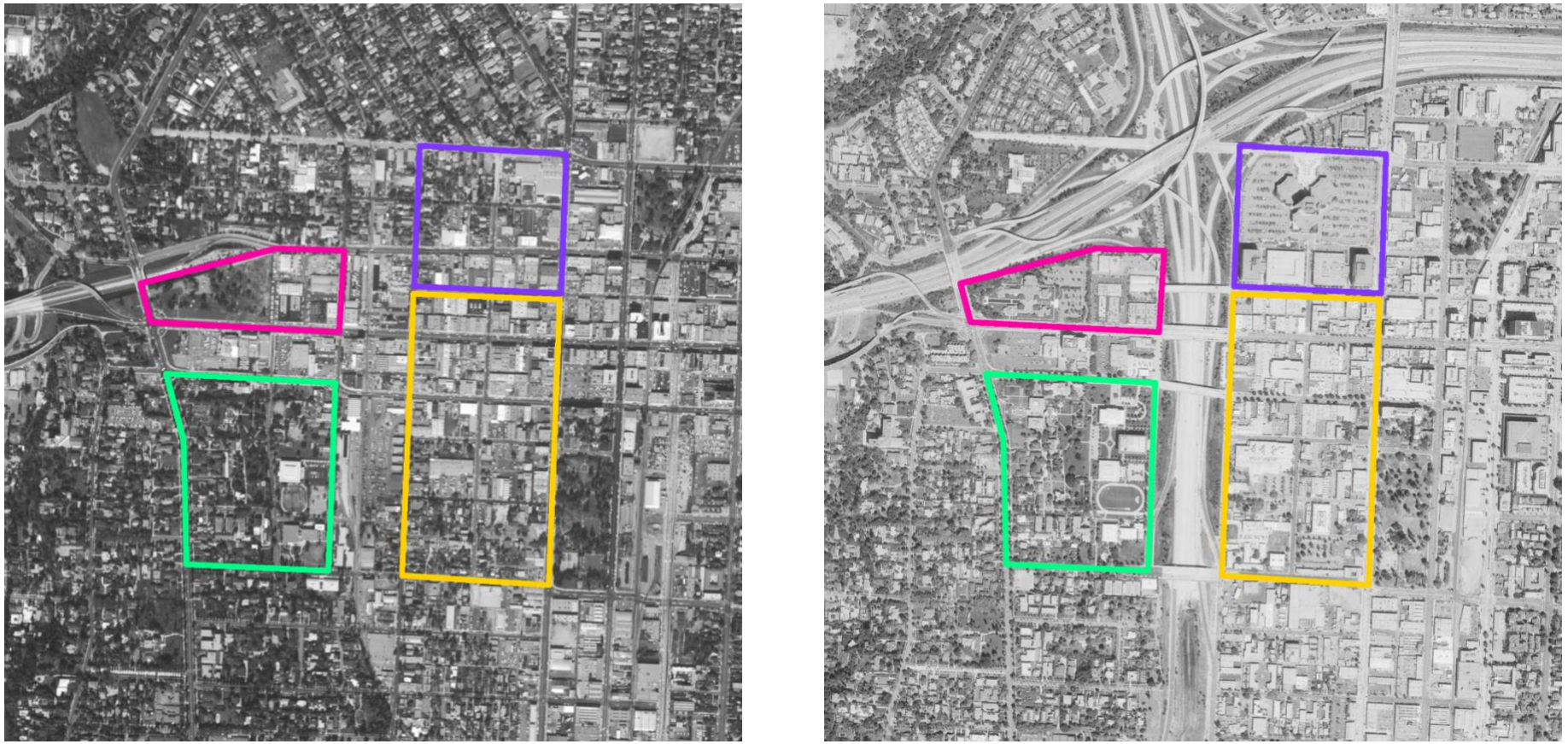
Figures 4-4 and **4-5** approximate the locations of these four sites based on 1960 census blocks (U.S. Census Bureau, 1961a). Positioned along the eastern and western edges of the freeway corridor, these sites offer a lens into how specific developments affected housing trends and racial composition, reflecting broader shifts in the community.

Figure 4-4. Major Development Sites near SR-710 Stub



Data source: 1960 U.S. Census (U.S. Census Bureau, 1960, 1961a); base map: Esri, 2024b

Figure 4-5. Major Development Sites near SR-710 Stub, 1967 and 1989



Note: 1967 aerial image at left; 1989 aerial image at right; Norton Simon Museum outlined in pink; Parsons headquarters outlined in purple; Ambassador College outlined in green; Old Pasadena sub-area for analysis outlined in yellow

Sources: UC Santa Barbara Library, 2012 and 1960 U.S. Census (U.S. Census Bureau, 1961a)

We can get a sense of the impacts by estimating demographic and housing changes based on census-block data.[11] The four sites reveal a consistent pattern of housing displacement and demographic shifts, with communities of color particularly affected. While each site experienced a unique trajectory of change, the combined data underscores a broader trend: from 1960 to 1980, housing units across these areas declined sharply, largely due to freeway development and urban renewal initiatives. In 1960, non-white residents occupied over half of the housing units across the sites; by 1980, this figure had fallen to just 17 percent,[12] highlighting the profound displacement of people of color as a result of these projects. The residents in the Pepper Project to the north, on the other hand, were predominantly people of color. Each site is discussed in detail below.

Norton Simon Museum

The Norton Simon Museum is located in the southwestern corner of the Center tract, near I-210/SR-134/SR-710 freeway interchange (See **Figure 4-4**). The museum's site is situated just north of the Ambassador College area and is bounded by SR-134 to the north, Orange Grove Boulevard to the west, Colorado Boulevard to the south, and Saint John Avenue/SR-710 to the east.

Originally established as a private art collection, the museum grew to house an extensive selection of European and Asian works of art after industrialist Norton Simon stepped in to rescue the former Pasadena Art Museum (previously Pasadena Art Institute) from financial collapse in the late 1960s. At that time, the museum was facing substantial debts due to ambitious remodeling efforts. In redesigning the museum, architects leveled Carmelita Park—a historic site that was once inhabited by the Pasadena Indians—to make way for the new facility (Norton Simon Museum, 2024a, 2024b and Coplans, 1975).

From 1950 to 1980, the census block containing the museum had no housing units or population (calculated by authors from 1950, 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1952a, 1961b and Manson et al., 2024)), meaning the development had no impact on housing availability or population displacement in Pasadena. While the museum did not affect the city's residential landscape, it contributed significantly to the neighborhood's redevelopment and cultural revitalization, transforming a historic site into a prominent artistic and cultural landmark.

Parsons Headquarters

The site containing Parsons headquarters is located in the southeastern part of the Center tract, positioned in the southeast corner of the I-210/SR-710/SR-134 interchange (See **Figure 4-4**). It is in an area bounded by Walnut Street to the north, Fair Oaks Avenue to the east, Union Street to the South, and Pasadena Avenue and SR-710 to the west. Parsons (known as Ralph M. Parsons prior to the mid-1970s) is a major global engineering and construction company, and its relocation from Los Angeles to Pasadena was considered a significant achievement for the city's urban renewal efforts. Developed in the early 1970s, the project occupied approximately a four-block area, with the company headquarters situated on the eastern half and other uses on

11. Census blocks are not always the same as physical city blocks (See Appendix for details) (U.S. Census Bureau, 2022b).

12. The 1960 figure represents "non-white households" and excludes Hispanics, while the 1980 figure reflects people of color in the population, not households. This discrepancy makes a direct comparison challenging.

the western half. Additional development extended to the north, with multi-story parking structures to the south (*Los Angeles Times*, 1975 and Vincent, 2011).

In 1960, the area affected by the development (approximated by census blocks) had 147 occupied housing units, nearly a quarter occupied by non-white residents (including Black and other non-white groups, though Hispanic residents were not captured in this data). A decade later, only 37 occupied housing units remained, likely due to spillover impacts from the construction of the interchange and the City's desire to promote economic development near the central business district. Of these remaining units, over half (51%) were occupied by non-white residents. While the share of people of color increased, their absolute numbers decreased. By 1980, the U.S. Census reported no housing units in the area (See **Table 4-1**) (calculated by authors from 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1961b and Manson et al., 2024)). These statistics are consistent with the interpretation that the removal of housing due to freeway externalities and the development of the Parsons project contributed to demographic shifts in the Center tract. Unfortunately, we lack data on the occupants of newly constructed housing units, though it is evident that new construction did not sufficiently offset the overall housing decline.

Table 4-1. Housing and Demographic Changes in the Parsons Headquarters Area, 1960-1980

Statistic	1960	1970	1980
Housing units	166	43	0
Occupied housing units	147	37	0
Owner households	22	5	0
Renter households	125	32	0
Non-white (excluding Latino/a) households	36	19	no data
Share, non-white (excluding Latino/a) households	24%	51%	no data
Share, households of color	no data	no data	N/A

Data source: calculated by authors from 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1961b and Manson et al., 2024)

Ambassador College/Worldwide Church of God

The site of the former Ambassador College, which operated from 1947 to 1990, is located in the South Center tract, situated just west of the SR-710 stub (See **Figure 4-4**). The site is bounded by Green Street to the north, Saint John Avenue to the east, Del Mar Boulevard to the south, and Orange Grove Boulevard to the west. Established by Herbert W. Armstrong and the Worldwide Church of God, the college aimed to prepare youth for service in the church by offering a more formal education in religious studies. Over the years, the college expanded its campus by acquiring several mansions along South Orange Grove Boulevard (part of Pasadena's historic "Millionaires' Row"). These estates, including the Fowler, Sprague/Mayfair, Hulett Merritt, Lewis Meritt, and Jamieson/Terrace Villa properties, were converted into college facilities in the late 1940s and 1950s (Los Angeles Conservancy, 2024; Erdman, 2013; and Baker, 2023).

In the 1960s and 1970s, Caltrans purchased a number of parcels from Ambassador College to accommodate freeway construction, prompting the institution to expand in other directions within Pasadena (California Division of Highways, 1965–1969; U.S. Census Bureau, n.d., 1961c; and U.S. Census Bureau et al., 1972). As a result, the presently defined campus does not does not fully encompass the property once owned by the college and the Worldwide Church of God.

In 1960, the six census blocks encompassing the Ambassador College site contained 126 occupied housing units, with 25 percent occupied by non-white residents (again, including Black and other non-white groups, but not Hispanic residents). A decade later, in 1970, only 18 occupied housing units remained, likely due to the expansion of Ambassador College and property acquisitions by the state. By this time, non-white residents no longer occupied any of the remaining units. By 1980, the U.S. Census recorded just 16 occupied housing units in the area, almost all of which were rentals (See **Table 4-2**) (calculated by authors from 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1961b and Manson et al., 2024)). This shift reflects a significant demographic change and a transition from a once-residential neighborhood to primarily institutional land use due to the college's expansion.

Table 4-2. Housing and Demographic Changes in the Ambassador College Area, 1960-1980

Statistic	1960	1970	1980
Housing units	137	18	24
Occupied housing units	126	18	16
Owner households	39	3	3
Renter households	87	15	13
Non-white (excluding Latino/a) households	32	0	no data
Share, non-white (excluding Latino/a) households	25%	0%	no data
Share, households of color	no data	no data	5%

Data source: calculated by authors from 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1961b and Manson et al., 2024)

Ambassador College closed its Pasadena campus in 1997, leaving some buildings abandoned, others demolished, others sold to churches and schools, and others redeveloped into housing and commercial space (Los Angeles Conservancy, 2024; Erdman, 2013; Blankstein and Pierson, 2006; Sandez, 2016; and Ayala, 2013).

Old Pasadena

This study examines the portion of Old Pasadena adjacent to the SR-710 stub. This area has been an integral part of the central business district and original commercial center since Pasadena's establishment in 1874. Located mostly in the northeastern part of the South Center tract, the area is generally bounded by Union Street to the north, Fair Oaks Avenue to the east, Del Mar Boulevard to the south, and Pasadena Avenue to the South (See **Figure 4-4**) (Old Pasadena Management District, 2024).

By the late 1940s, downtown Pasadena began showing signs of commercial decline, and by the 1970s, it had further fallen into a state of neglect (Marshall, 2013), prompting the City in 1971 to create and adopt a Central District Improvement Plan (Shigley, 2005). This plan is aimed to revitalize the area through redevelopment and eminent domain, assembling small lots for large corporate office buildings, such as the Parsons building. Over $400 million in public and private funds were invested in redeveloping and revitalizing Old Pasadena (Mann, 1978).

Urban renewal efforts in the late 1970s led to significant demographic shifts and housing challenges in Old Pasadena. Prior to the enforcement of eminent domain in the 1970s, the area included residential sections (City of Pasadena, 1975; Loukaitou-Sideris et al., 2023; and A. Ramirez et al., 2025). However, the Central District Improvement Plan and related construction, including the nearby freeways, resulted in the relocation of many downtown residents and transformed the area. Despite efforts to preserve historic buildings and revitalize the district, these redevelopment projects displaced residents and contributed to demographic changes and housing instability in the area (Pincetl, 1992).

In 1960, the 13 census blocks in Old Pasadena positioned along the eastern edges of the SR-710 freeway corridor (as distinct from the entirety of Old Pasadena) contained 223 occupied housing units, with 59 percent occupied by non-white residents (again, including Black and other non-white groups, but not Hispanic residents). By 1970, the number of occupied housing units had decreased to 161, accompanied by a notable demographic shift: only 29 percent of these units were occupied by non-white residents. By 1980, the census recorded just 54 occupied housing units in this area, almost all rentals (See **Table 4-3**) (calculated by authors from 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1961b and Manson et al., 2024)). This transformation reflects the significant impact of redevelopment initiatives and the shift from a once-diverse residential neighborhood to a primarily commercial and institutional area.

Table 4-3. Housing and Demographic Changes in the Part of Old Pasadena to the East of the SR-710 Corridor, 1960-1980

Statistic	1960	1970	1980
Housing units	250	187	63
Occupied housing units	223	161	54
Owner households	48	15	5
Renter households	175	146	49
Non-white (excluding Latino/a) households	131	46	no data
Share, non-white (excluding Latino/a) households	59%	29%	no data
Share, households of color	no data	no data	39%

Data source: calculated by authors from 1960, 1970, and 1980 U.S. Censuses (U.S. Census Bureau, 1961b and Manson et al., 2024)

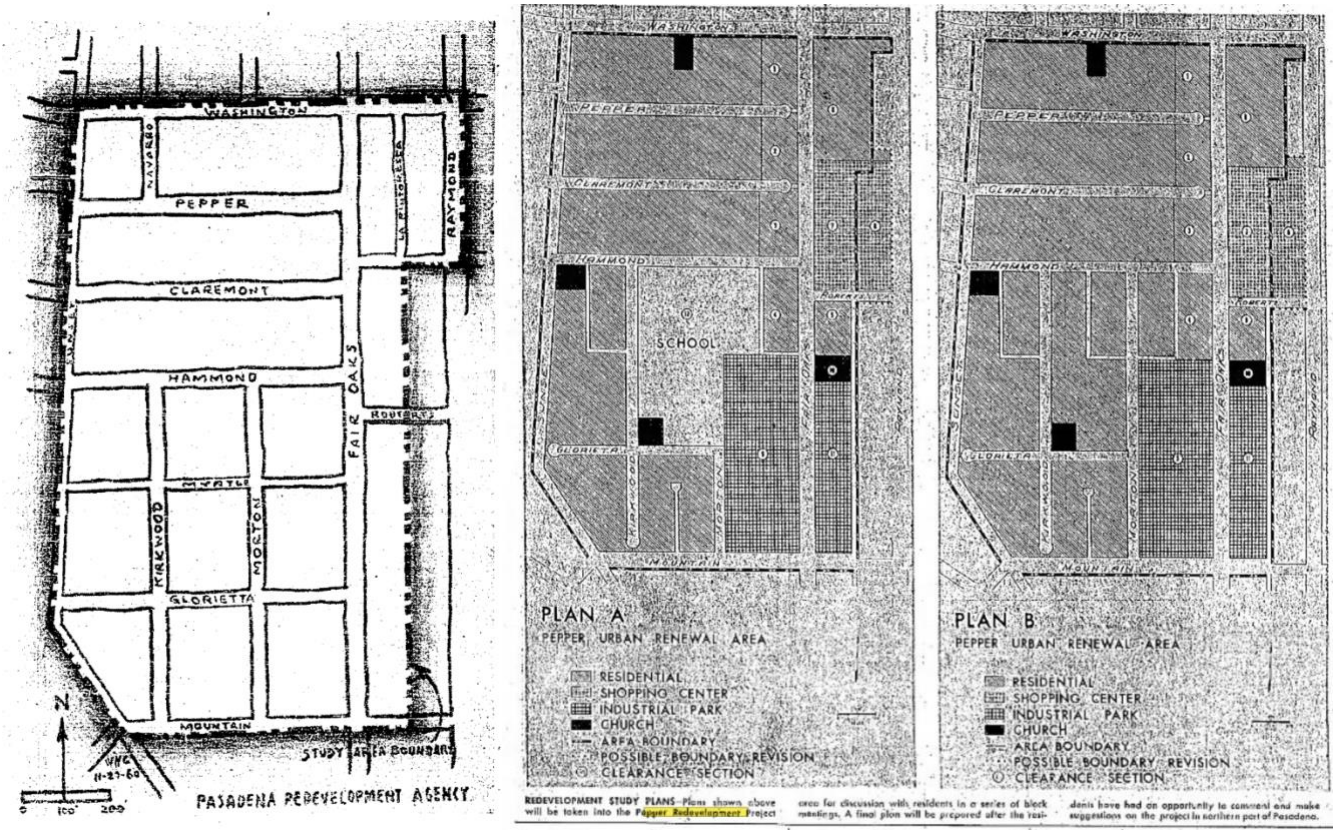
Ordinarily, state law required cities to dedicate a fifth of the tax increment generated from public redevelopment projects to subsidized low-income housing. However, a 1987 bill exempted downtown Pasadena, near our Old Pasadena study area, from this requirement, allowing the City to instead use the funds for police and fire

retirement funds (though the City promised at the time to backfill the affordable housing funds with other sources) (City of Pasadena, 2022; Shook, 2020; Mermell and Hawkesworth, 2017; Dunn, 1987; and Weiss, 1987).

Pepper Project

The Pepper Street Redevelopment Project, located north of the I-210/SR-710/SR-134 interchange, stands in contrast to the four developments along the SR-710 stub. Spanning 17 city blocks, the project was generally bordered by Washington Boulevard to the north, an eastern boundary composed of roughly Raymond Avenue and Wheeler Lane, Mountain Street to the south, and Sunset Avenue to the west (See **Figure 4-6**). This 102-acre site, situated about a mile north of the interchange and east of I-210, was Pasadena's first urban renewal project and first rent-supplemented housing project in Los Angeles County. Included in the area was the street on which Jackie Robinson, the first modern Black professional baseball player, grew up (B. Ramirez, 2021; Mann, 1971; C. Wilson, 1966; Turpin, 1970; and Nicolaides, 2024).

Figure 4-6. Pepper Project Urban Renewal Area Plans



Sources: Birkinshaw, 1960, p. G1 and Kreidt, 1962, p. 3

The original plans for the Pepper Project included a five-acre, cooperatively-owned commercial complex on the east side of Fair Oaks Avenue, north of Roberts Street, along a 15-acre industrial site adjacent to the residential developments. However, the project faced significant opposition due to the displacement of lower-income people of color and their businesses in Pasadena's predominantly black northwest area and shoddy construction of the

units themselves. The city classified this area, as well as other communities of color, as “blighted” and in need of redevelopment. As discussed in Part 3, the Pepper Project, located in the tract containing the I-210, offers insight into the challenges around housing and school integration/segregation (Kreidt, 1961; *Los Angeles Times*, 1964; Mann, 1969, 1972; Lee, 1970; Frieden and Sagalyn, 1991; B. Ramirez, 2021; and Blumberg, 1964).

Despite revitalization efforts, white Pasadena residents were uncomfortable moving into an area with a historically Black population, and thus, integration efforts for the housing project ultimately failed (B. Ramirez, 2021; Blumberg, 1964; and Pincetl, 1992). Additionally, white residents protested against the potential integration of Black Pepper Project schoolchildren into nearby predominantly white schools (Don Benito, San Rafael, and Sierra Mesa Elementary Schools), preferring to reserve vacant spaces in the school buildings for activities like audiovisual studies rather than accommodating Pepper Project area students. This exposed deep-seated resistance to integration efforts within the city’s educational system (Lee, 1970 and Blumberg, 1964).

The Pepper Project area included an estimated 524 families and individual households—94% of whom were non-white—when redevelopment plans were being formalized. By the time construction began in 1968, 299 of these families had been displaced, with the vast majority (91%) of those displaced being families of color and/or low-income families (Blumberg, 1964). Prior to redevelopment, the area was predominantly low-density residential (zoned as R2) and included many Black-owned homes. However, the redevelopment project led to the removal of residents and a decrease Black homeownership, as single-family homes were demolished to make way for multifamily, apartment-style complexes.

Due to funding limitations, the project ultimately produced only residential developments, through two separately sponsored projects: Washington West, with 163 housing units, and King’s Manor, with 255 housing units. By 1975, these developments were reported to be poorly constructed, under-occupied, and plagued by burglaries and vandalism. The project was never fully completed, as the U.S. Department of Housing and Urban Development foreclosed on both developments due insufficient bids. The land now contains four parcels from the 1960s and 135 parcels from the 1970s (Mann, 1975).

Conclusion

The developments of I-210 and SR-710, along with several city improvement projects in Pasadena during this time period, were marked by controversial and discriminatory practices that exacerbated racial segregation. The construction of the I-210 and the I-210/SR-710/SR-134 interchange resulted in the displacement of numerous households and contributed to a demographic shift marked by white flight, which increased the relative proportion of residents of color. Similarly, the development of the 710 stub to the south disproportionately displaced households of color. Under the policy of addressing urban blight—particularly in the downtown areas—the city and private developers, whether intentionally or unintentionally, engaged in practices that perpetuated racial erasure in and around renewal areas. The displacement of communities of color became an inherent consequence of these urban improvement initiatives. Of course, there were larger societal dynamics and institutional practices perpetuating racial segregation; nonetheless the evidence in this report reveals that freeway construction and related urban restructuring exacerbated racial segregation, deepening demographic and economic polarization in neighborhoods along I-210 and SR-710.

The impacts are not just historical. Mid-20th century freeway development in Pasadena left a lasting legacy of environmental and social inequality, particularly when comparing neighborhoods along different freeway segments. Data on air pollution and traffic density reveal stark disparities across the study area (See **Table A-1** in the Appendix for further details). Neighborhoods of color in the North and North Center tracts—through which the I-210 cuts (See **Figure 2-2**)—bear a significant higher environmental burden. These areas experience elevated levels of diesel particulate matter, traffic density, and pollution burden, according to CalEnviroScreen 4.0 (California Office of Environmental Health Hazard Assessment, 2023) (described in the Appendix), leading to ongoing exposure to transportation-related air pollution.

In contrast, the South Center tract, which includes the SR-710 stub, and the South tract, where the unbuilt segment of the 710 was planned (See **Figure 2-2**), show somewhat lower pollution levels overall, though they still exceed city averages in some categories (California Office of Environmental Health Hazard Assessment, 2023). These southern tracts, with a higher proportion of white residents, face less environmental stress compared to the northern tracts.[13]

This disparity highlights the uneven impact of freeway infrastructure: while neighborhoods directly bisected by I-210 in the northern part of the study area continue to bear the brunt of pollution and environmental hazards, southern areas near the unbuilt 710 segment have been spared some of these negative externalities. While both sets of areas lie near freeways and suffer from consequences such as pollution and traffic, this ongoing imbalance reflects the enduring effects of past infrastructure decisions on neighborhood health, quality of life, and environmental justice across Pasadena.

In addition to environmental disparities, there are also clear differences in access to opportunities across these tracts. Maps from the California Tax Credit Allocation Committee (CTCAC) and the California Department of Housing and Community Development (HCD) categorize the North and North Center tracts as “Moderate Resource” areas, indicating limited access to resources and opportunities. Meanwhile, the South Center and South tracts are designated as High Resource and Highest Resource areas, respectively (See Appendix for

13. We do not report data here for the Center tract at the interchange because of significant boundary changes since 1960.

further details). This contrast further underscores the legacy of unequal development, with southern tracts benefiting from better access to resources compared to the resource-limited northern tracts.

In deciding the future of the SR-710 stub after Caltrans relinquished the route to the City (Pasadena Department of Transportation, 2024), one major challenge facing the city's 710 Revisioning Project is how to address and redress the past and legacy harms caused by freeway development. The report's analyses broadly identify the nature, magnitude, and causes of the impacts, providing critical information that could inform discussions on potential remedies. Any proposed actions should be directly linked to specific damages and should reflect the values and priorities of stakeholders, especially those from communities that have been disproportionately harmed.

Appendix: Data and Methods

We used multiple quantitative and spatial data sources to study the geographic and temporal patterns of residential segregation. Some of the data are available in digitized form, while others require digitizing. Because definitions and boundaries for the information change over time, we reconcile and harmonize the data when feasible and necessary. Because of the enormous amount of time and resources required, we prioritized adjusting data for Pasadena and developing estimates of Hispanics, which are not available for early decades. We utilize several measures of residential patterns to examine segregation and diversity: the dissimilarity index, entropy score, and entropy index. Each of these metrics have advantages and disadvantages. Finally, we consulted metrics from two sources to assess the legacy of the freeways.

Census Data

The main source of population data is the decennial enumeration conducted by the U.S. Census Bureau and its predecessors. The once-every-ten-year count, conducted since 1790, is a constitutional requirement (U.S. Census Bureau, 2021c, 2023 and National Archives, 2015), as stated in Article I, Section 2: “The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct” (National Archives, 2015). The counts are used to assign seats for the House of Representatives to account for population changes—i.e. to reapportion congressional seats among the states and to allow for redrawing of congressional boundaries (redistricting). Along with collecting basic demographic information (the data required for reapportionment and redistricting), the decennial census also collects information on housing and economic characteristics. The amount of non-basic information and method of collecting that information varied from decade to decade. Over time, definitions for key characteristics changed to reflect the evolving social and economic context of the times. This is particularly true in the categories of racial and ethnic groups. The U.S. Census Bureau stopped collecting non-basic information in 2010, replacing it with the American Community Survey (a continuous sampling and collection effort that produces annual demographic, housing, and economic data). One problem with the U.S. Census is differential undercount—that is, the enumeration and survey tends to disproportionately miss disadvantaged groups (U.S. Census Bureau, 2021c, 2021d, 2024b; Pratt, Hixson, and Jones, 2015; and Kennel, 2021). Unfortunately, it is impossible to make adjustments for this within the project’s scope and resources. One of the consequences is the potential of underestimating the number of people of color impacted by the freeway and related developments.

Census Geographies

The primary geographic units used in our analysis are census tracts and census blocks. These small-area geographies, designed and maintained by the U.S. Census Bureau (U.S. Census Bureau, 2022b), provide critical demographic and spatial data that can reveal neighborhood-level impacts.

Census tracts are the most widely used small-area geography used by the U.S. Census Bureau, average about 4,000 residents. Their boundaries are typically defined by prominent physical features, such as major streets, waterways, and legal borders. Developed initially for major cities in the 1940 Census, coverage expanded in subsequent decades, with tracts covering the entire nation by 1990. Boundaries are adjusted each decade to

account for population changes. Census tracts generally have relatively homogeneous populations and are often used as proxies for neighborhoods by researchers (U.S. Census Bureau, 2022b, 2024a; National Archives, 2021; and Snow, 2011). Consequently, tract data is useful in examining how the freeway and urban renewal impacted within and near the developments.

Census blocks are the smallest geographic area used by the U.S. Census Bureau and exist as subdivisions within tracts. Defined by features such as streets, railways, and natural boundaries, blocks allow for detailed analysis and are particularly useful in studying population displacement resulting from infrastructure projects. Block data also facilitates tracking changes in tract boundaries (and the road network) over time, providing further precision in neighborhood-level analysis. However, due to privacy concerns, fewer variables are available at the block level in published census data than at the tract level (U.S. Census Bureau, 2022b, 2024a and Snow, 2011).

Digitizing Data

While historical census-tract data are available in electronic format from the U.S. Census Bureau or data redistributor (e.g., the National Historical Geographic Information System (Manson et al., 2024), Social Explorer (2024)), block data are not readily available. To conduct analyses, it is necessary to transcribe printed reports into digital files. **Figure A-1** provides an example of a page from a 1960 census publication for Pasadena (U.S. Census Bureau, 1961b). We verify the entries by comparing the totals of the blocks in a tract against the numbers reported for the tract.

Figure A-1. Page of 1960 U.S. Census Data from Pasadena

Table 2.—CHARACTERISTICS OF HOUSING UNITS, BY BLOCKS: 1960

["Total population" contains no persons in group quarters unless preceded by asterisk: one asterisk (*) denotes less than 10 percent; two asterisks (**), 10 percent or more]

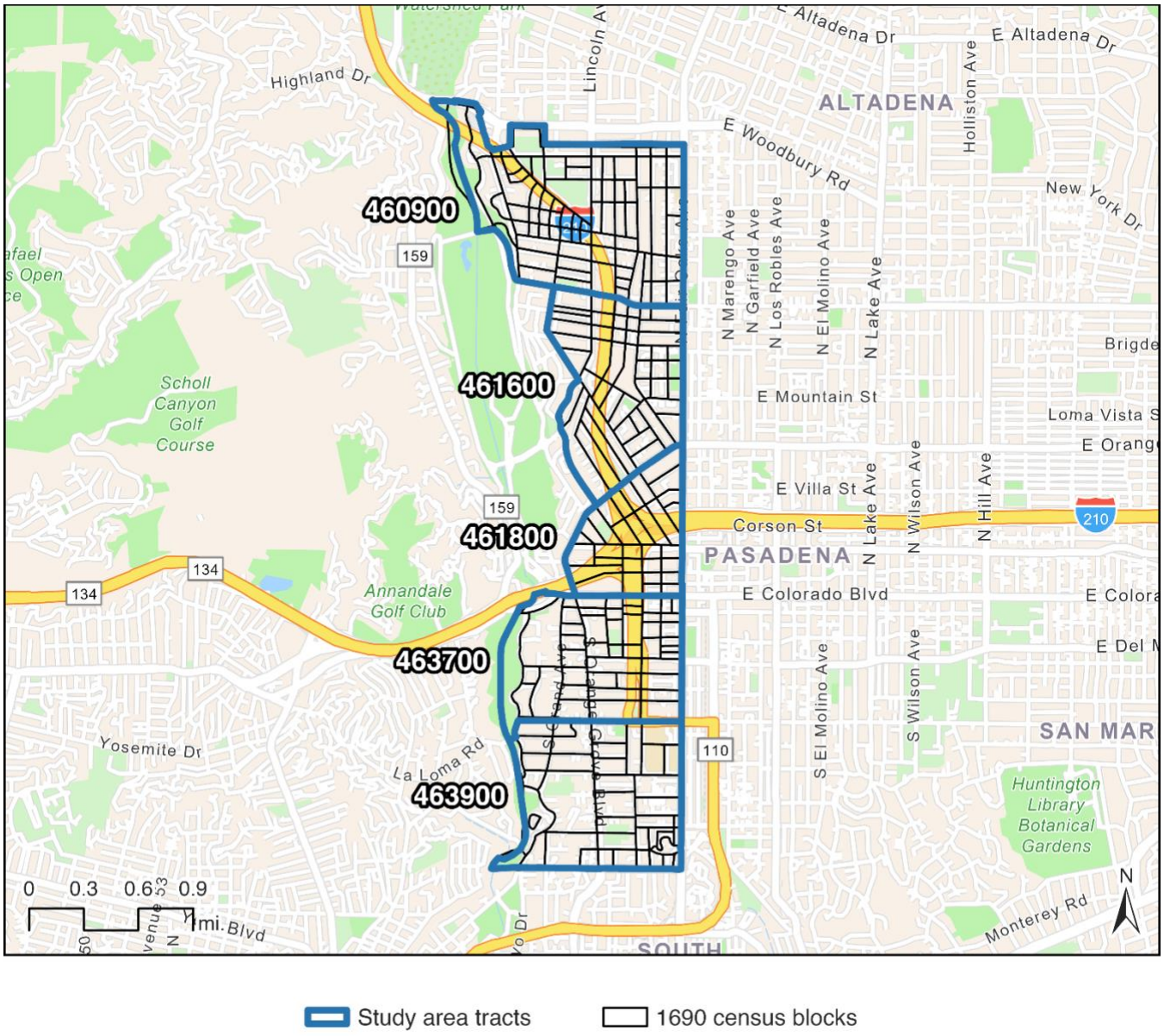
Blocks within census tracts	Total population	All housing units by condition and plumbing									Occupied housing units							
		Total	Sound			Deteriorating				Dilapidated	Owner occupied			Renter occupied			Occupied by nonwhite	1.01 or more persons per room
			Total	With all plumbing facilities	Lacking some or all facilities	Total	With all plumbing facilities	Lacking some or all facilities			Total	Average value (dollars)	Average number of rooms	Total	Average contract rent (dollars)	Average number of rooms		
								With flush toilet	No flush toilet									
4600	4249	1087	1086	1086	***	1	1	***	***	***	1052	27000	5.9	25	168	5.3	2	38
1	146	42	42	42	***	***	***	***	***	***	40	39000	6.3	***	***	***	***	***
3	101	32	32	32	***	***	***	***	***	***	32	41000	6.3	***	***	***	***	***
4	58	14	14	14	***	***	***	***	***	***	14	39000	6.7	***	***	***	***	1
5	76	20	20	20	***	***	***	***	***	***	19	41000	6.6	1	***	***	***	***
6	89	25	25	25	***	***	***	***	***	***	25	31000	6.1	***	***	***	***	***
7	58	13	13	13	***	***	***	***	***	***	13	28000	5.8	***	***	***	***	1
8	32	9	9	9	***	***	***	***	***	***	9	39000	6.2	***	***	***	***	***
9	219	60	60	60	***	***	***	***	***	***	59	29000	5.8	1	***	***	***	3
10	179	47	47	47	***	***	***	***	***	***	47	40000	7.0	***	***	***	***	***
11	23	6	6	6	***	***	***	***	***	***	5	37000	7.2	1	***	***	***	***
12	166	42	42	42	***	***	***	***	***	***	42	38000	6.8	***	***	***	***	1
13	146	35	35	35	***	***	***	***	***	***	35	22000	5.6	***	***	***	***	3
14	69	17	17	17	***	***	***	***	***	***	17	22000	5.5	***	***	***	***	***
15	182	44	44	44	***	***	***	***	***	***	42	22000	5.8	2	***	***	***	2
16	159	36	36	36	***	***	***	***	***	***	36	22000	5.8	***	***	***	***	2
17	210	58	58	58	***	***	***	***	***	***	56	23000	5.6	1	***	***	***	2
18	95	24	24	24	***	***	***	***	***	***	23	22000	5.4	***	***	***	***	1
19	159	40	40	40	***	***	***	***	***	***	40	22000	5.6	***	***	***	***	2
20	69	22	22	22	***	***	***	***	***	***	20	22000	5.4	1	***	***	***	***
21	115	28	28	28	***	***	***	***	***	***	27	22000	5.9	1	***	***	***	***
22	141	34	34	34	***	***	***	***	***	***	31	22000	5.6	3	***	***	***	1
23	162	40	40	40	***	***	***	***	***	***	38	22000	5.7	1	***	***	1	1
24	148	39	39	39	***	***	***	***	***	***	36	22000	5.6	***	***	***	***	2
25	106	26	25	25	***	1	1	***	***	***	24	23000	5.5	2	***	***	***	***
26	192	47	47	47	***	***	***	***	***	***	47	22000	5.8	***	***	***	***	1
27	143	34	34	34	***	***	***	***	***	***	32	23000	5.9	2	***	***	***	2
28	121	31	31	31	***	***	***	***	***	***	31	25000	5.8	***	***	***	***	1
29	99	24	24	24	***	***	***	***	***	***	24	30000	5.9	***	***	***	***	1
30	97	23	23	23	***	***	***	***	***	***	23	28000	5.7	***	***	***	***	2
32	58	15	15	15	***	***	***	***	***	***	14	26000	5.9	1	***	***	***	***
33	206	50	50	50	***	***	***	***	***	***	47	25000	5.7	2	***	***	***	5
34	67	17	17	17	***	***	***	***	***	***	17	22000	5.9	***	***	***	1	***
35	103	27	27	27	***	***	***	***	***	***	25	23000	5.8	2	***	***	***	1
36	127	30	30	30	***	***	***	***	***	***	28	23000	5.6	2	***	***	***	2
37	60	19	19	19	***	***	***	***	***	***	18	22000	5.5	1	***	***	***	***
38	29	7	7	7	***	***	***	***	***	***	7	23000	5.4	***	***	***	***	1
39	39	10	10	10	***	***	***	***	***	***	9	21000	5.7	1	***	***	***	***

Source: U.S. Census Bureau, 1961b, p. 1

Digitizing Maps

While there are shapefiles for historical tracts, no shapefiles for historical blocks (before 1990) are readily available. To conduct spatial analyses, it is necessary to digitize and georeference map files. **Figure A-2** provides an example of the map containing the blocks in the project's study area in the 1960 U.S. Census. We verify the boundaries by comparing tract boundaries against the block boundaries that should coincide (that is, the relevant segments of the blocks along the edge of the tracts).

Figure A-2. 1960 Census Blocks for Pasadena Study Area



Data source: 1960 U.S. Census (U.S. Census Bureau, 1960, 1961c); base map: Esri, 2024b

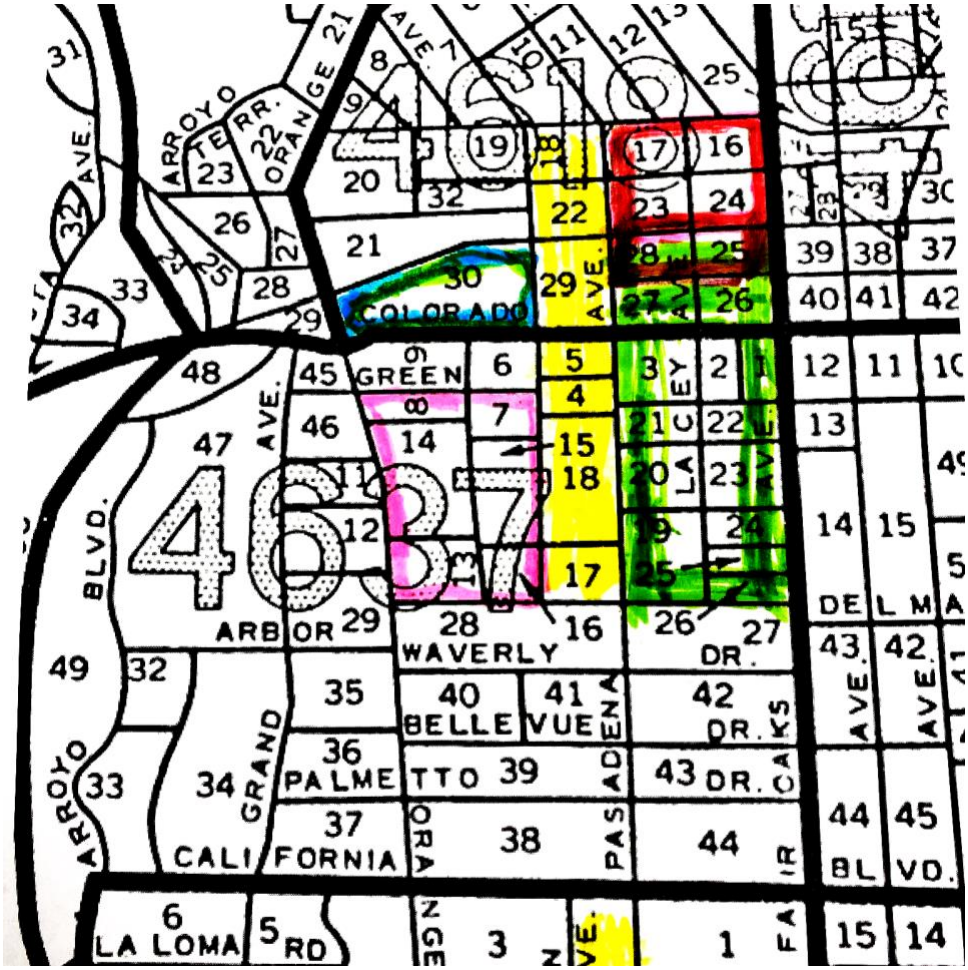
Spatial Assignment and Allocation

Spatial allocation is the assignment of data from one geographic area to another, such as assigning demographic information from the census to a project area, such as the footprint of a freeway or a redevelopment area. For example, we can examine the population and its characteristics for the 710 stub by first identifying the relevant

blocks and then aggregating. This is not a problem if the source geographies data are entirely within the target geography; however, this is often not the case, because source geographies can be only partially in the target geography. There are several ways to address these cross-boundary inputs, depending on the geographic scale and the desired degree of precision. When the number of inputs is very large, the simplest approach is to determine if a block is included based on whether its centroid is within the larger geography. While this is not highly precise, it is reasonable and takes advantage of the law of large numbers. A second alternative is to allocate the input by the proportion that is in the target. For example, if a third of a block is in the final geography, then a third of the population is assigned. This assumes that the population is randomly distributed in the block, but this is often not true. A third method is assigning based on population weights observed from information available below the input geographies. For a block, this can be based on parcel data. Unfortunately, this is difficult or impossible because of the lack of historical data for such micro-level geographies.

Figure A-3 shows the block assignments to major areas of interest. The map is from our initial manual step in assigning blocks, using a combination of information from multiple sources. When we developed reasonable

Figure A-3. 1960 Census Block Map, with Four Development Sites Highlighted



Sources: 1960 U.S. Census (U.S. Census Bureau, 1961c) and authors

assignments, we then digitized and georeferenced the map. We do not spatially divide up blocks but instead assign whole blocks that best approximate the major features. The yellow are the blocks along the stub based on examining georeferenced images. We do not highlight further down the stub because the blocks south of Del Mar Boulevard were not well-aligned. The four major developments of interest—the Norton Simon Museum, Parsons headquarters, Ambassador College, and Old Pasadena—are clustered along the eastern and western edges of the stub. We have selected census blocks that most closely align with these development sites based on aerial images, historical maps, and historical documents. For our analysis, Old Pasadena is the section that is adjacent to the stub, although there are additional blocks beyond that were included in the redevelopment of the central business district. The central question is how these developments impacted housing and the racial composition of residents between 1960 and 1980. The accompanying map illustrates the initial effort to define development sites with 1960 census blocks.

Data Estimates of Hispanic and Non-Hispanic White Residents

The classification of Hispanics in U.S. Census data has varied across decades, as outlined below.[14] For this project, we defined Hispanics based on the available U.S. Census classifications, adjusting methods as needed to maintain consistency as best we could across time periods (Pratt, Hixson, and Jones, 2015):

- 1940: Defined by IPUMS
- 1950: White, Spanish surname (estimated for some tracts using foreign-born population from Mexico or other Latin American countries)
- 1960: White, Spanish surname
- 1970: White: count of persons: number of persons classified in any of the five Spanish categories of the question on “origin or descent”
    - Project-specific approach: For 1970, we first used the count of persons classified in any of the five Spanish categories from the “origin or descent” question if the resulting non-Hispanic white count, described below, was greater than or equal to zero. If non-Hispanic white count was negative, we used “Spanish origin or descent” data to ensure a non-negative non-Hispanic white count. In cases where both calculations yielded a negative non-Hispanic white count, we set the non-Hispanic white population to zero. This approach was only applied at the tract level, not for larger geographies like city or county.
- 1980-1990: Persons of Spanish origin
- 2000-2010: Hispanic or Latino (of any race)

Beginning in 1980, the U.S. Census reported the non-Hispanic white population directly (Pratt, Hixson, and Jones, 2015). For the earlier decades, we estimated non-Hispanic white populations by subtracting those classified as white Hispanic (or white Spanish) from total white counts. In some tracts, however, the U.S. Census did not report Hispanic (or Spanish surname/origin) populations directly, necessitating estimates using place-of-birth

14. For details, see Pratt, Hixson, and Jones (2015). There are also other ways the U.S. Census Bureau defined Hispanic in earlier decades, including mother tongue.

information. To improve accuracy, we matched the sum of Hispanic populations (both reported and estimated) at the tract level to county totals reported by the U.S. Census.

Dissimilarity Index

The dissimilarity index is a widely used measure of residential segregation. It compares the percentage of one group's regional (or city's) population residing in each neighborhood (e.g., census tract) with the percentage of another group's regional (city's) population residing in the same neighborhood (Massey and Denton, 1988 and U.S. Census Bureau, 2021b). If both groups are present in each neighborhood in equal proportions (e.g., 10% of each group resides in a tract), that neighborhood is considered fully integrated. If this balance holds all neighborhoods in a region, then the entire region is deemed fully integrated.

At the other extreme, if each neighborhood is exclusively occupied by one group—such that half the neighborhoods house only members of one group and the other half only members of the other group—the region is fully segregated. The following is the formula used to calculate the dissimilarity index value, quantifying the degree of residential segregation across the region:

$$\mathbf{DI} = 0.5\left(\sum_{j=1}^{n}\left|p_{1,j} - p_{2,j}\right|\right)$$

Where:

- $p_{1,j}$ is the proportion of the first group residing in tract "j" divided by the group's total regional population
- $p_{2,j}$ is the proportion of the second group residing in tract "j" divided by the group's total regional population

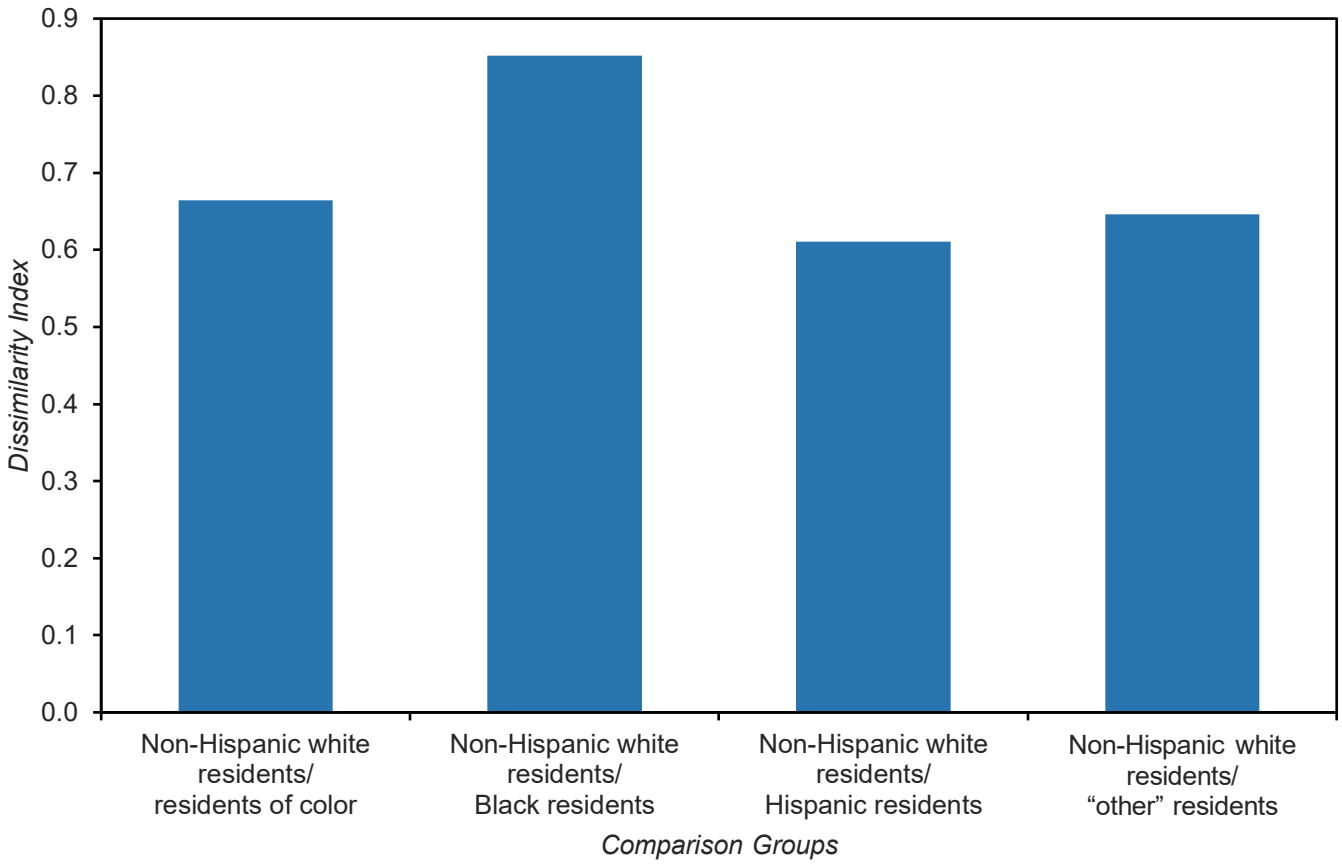
The formula takes the absolute difference between $p_{1,j}$ and $p_{2,j}$ for each tract to ensure positive values. These absolute differences are summed across all tracts in the region, from j = 1 to j = n. The sum is multiplied by 0.5 (or divided by 2) to normalize the index, yielding values between 0 and 1:

- A value of 0 indicates complete integration, with both groups proportionally represented across neighborhoods.
- A value of 1 indicates full segregation, where each neighborhood is exclusively occupied by one group.

The value is often scaled from 0 to 100, which represents the percentage of one group (usually the smaller group) that would need to move from areas where they are overrepresented to areas where they are underrepresented to achieve full integration.

The dissimilarity index has two limitations. First, it only compares two groups at a time. This is adequate for regions with only two racial groups, but it does not capture the complexity when there are three or more groups. In such cases, the analysis can be simplified by combining minority groups into a single category, allowing a comparison between the majority group with all minority groups collectively. However, this approach may mask differences in segregation levels among minority groups. For example, as shown in **Figure A-4**, Black residents are generally more segregated from non-Hispanic white residents than Hispanic residents or other groups (predominantly Asians) (calculated by authors from 1950 U.S. Census (U.S. Census Bureau, 1950, 1952b and Manson et al., 2024)).

Figure A-4. Dissimilarity Indices, Los Angeles County, 1950



Data source: calculated by authors from 1950 U.S. Census (U.S. Census Bureau, 1950, 1952b and Manson et al., 2024)

The second limitation of the dissimilarity index is that it does not account for differences in the relative sizes of the groups within a region. Two regions can have the same dissimilarity index value, even if one has relatively few minorities and the other has a much larger minority population. However, the challenges of integration are different in each case. Similarly, this issue can arise when comparing the dissimilarity index for the same region over different years, especially when the racial composition has shifted significantly.

Entropy Score

The entropy score is commonly used to measure the diversity of a place. Based on information theory, it calculates the degree of randomness (entropy) within a population. This metric is especially useful in multiracial regions, as it captures the level of diversity in each place (e.g., in a tract) (Massey and Denton, 1988 and U.S. Census Bureau, 2021b). A low entropy score indicates a lack of diversity, as seen when one group is highly concentrated in a neighborhood. For example, in a region with four population groups, a neighborhood housing only one group would have low diversity and a high concentration of that group. In contrast, a neighborhood with a more equal distribution across all groups would have a higher entropy score, reflecting greater diversity.

The following formula is used to calculate an entropy score for a neighborhood (or tract):

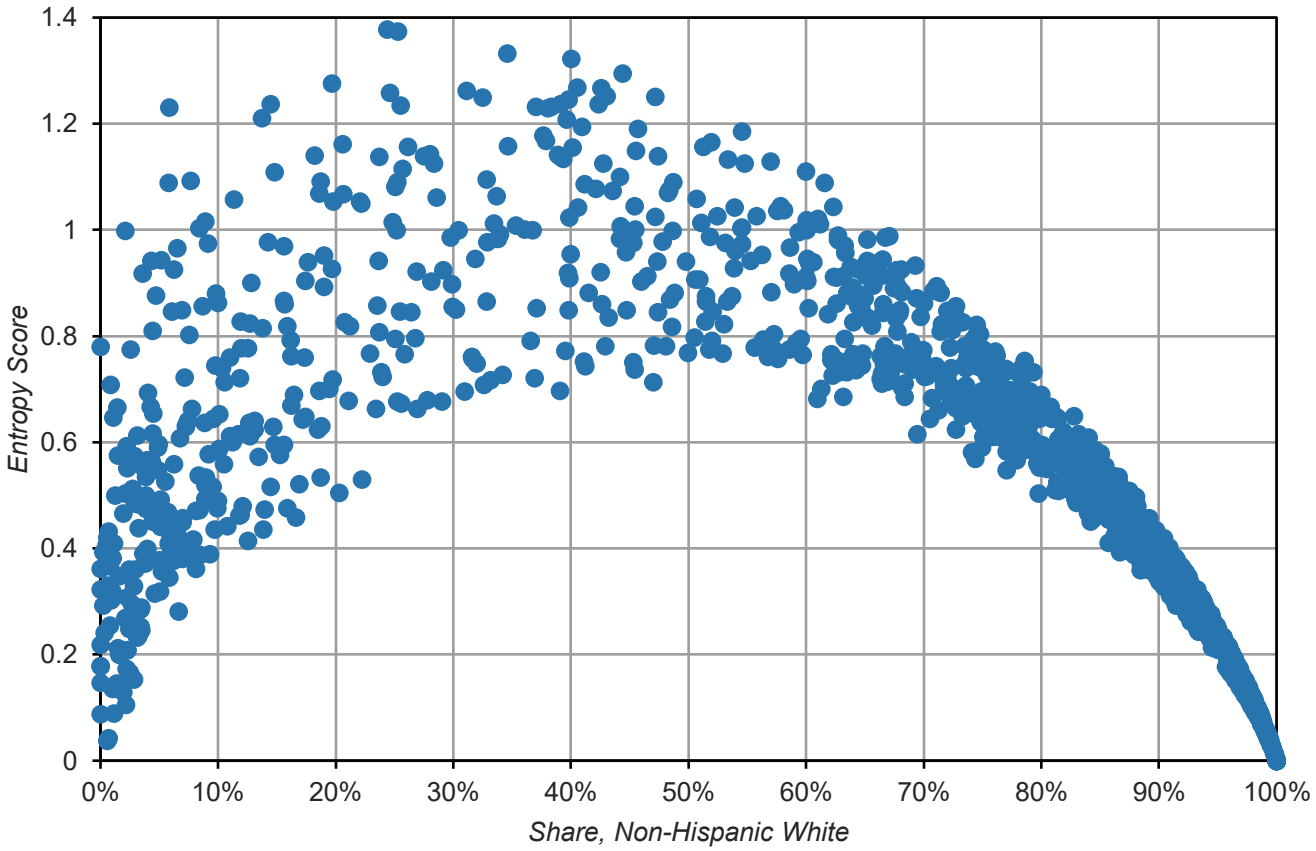
$$\mathbf{E} = \sum_{k=1}^{m} p_k \left(\ln \left(\frac{1}{p_k} \right) \right)$$

Where:

- p_k represents the proportion of group k's population relative to the total population in the tract
- ln is the natural log function. For any group with zero population, its value is set to zero to avoid the issue of an undefined $1/p_k$ value.

The entropy score is calculated by summing for all groups in the tract, from k = 1 to k = m. A score of zero indicates a perfectly homogenous area, with residents from only one group. As the score increases, so does the level of diversity or heterogeneity. The maximum possible score depends on the number of groups present; for example, in a neighborhood with four groups, the upper bound is 1.38, achieved when each group is equally represented.

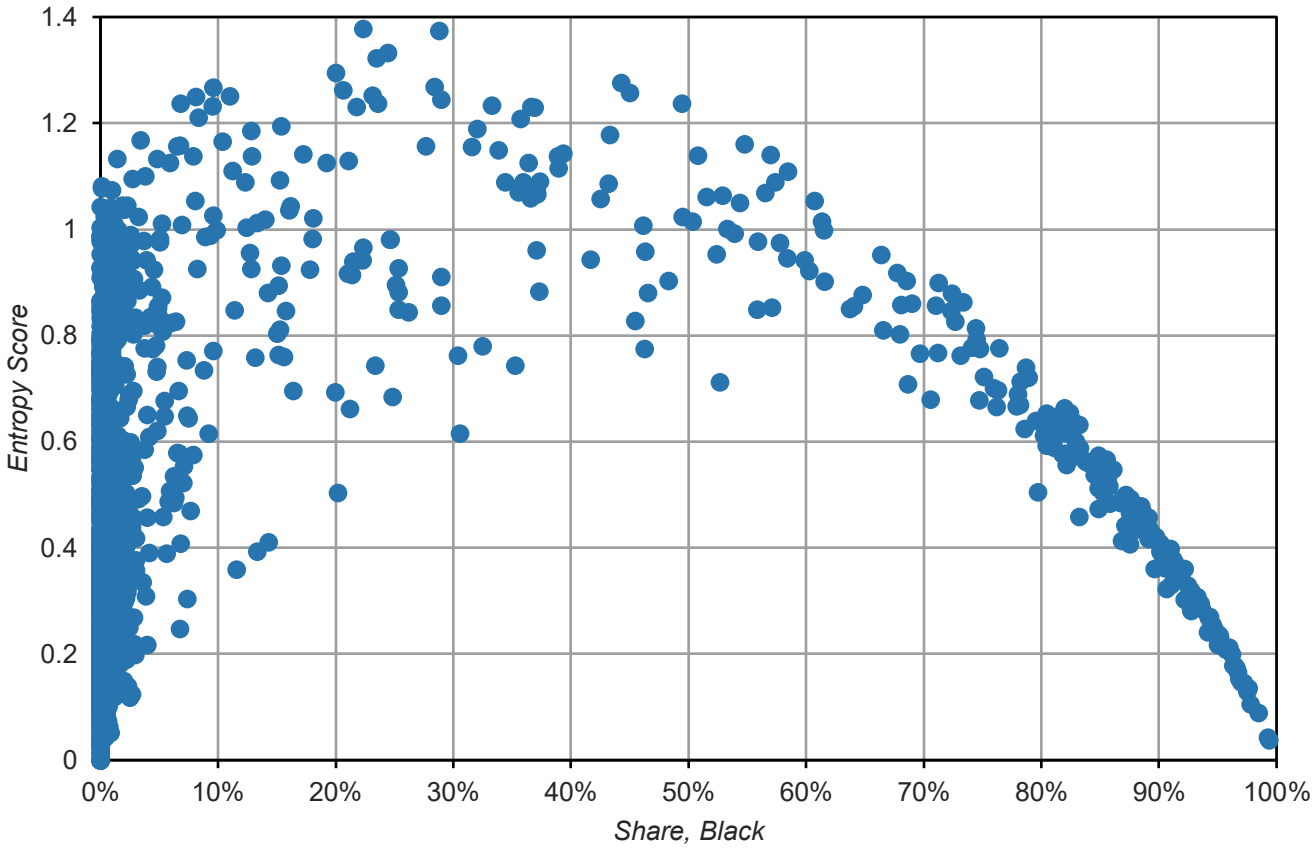
Figure A-5. Entropy Score and Percent Non-Hispanic White, Los Angeles County Census Tracts, 1970



Data source: calculated by authors from 1970 U.S. Census (U.S. Census Bureau, 1970)

Figure A-5 illustrates the relationship between the tract-level entropy scores and the percentage of the non-Hispanic white population, using 1970 data for Los Angeles County. When a tract is predominantly non-Hispanic white, the entropy score is very low, indicating low diversity. As the non-Hispanic white percent decreases and shares of populations of color increase, entropy rises, reflecting greater diversity. However, as the non-Hispanic white percentage approaches zero, the relative absence of this group lowers the entropy score again. A similar pattern emerges when comparing the entropy score to the percentage of the Black population (See **Figure A-6**), although many tracts show a substantial clustering with very few Black residents (calculated by authors from 1970 U.S. Census (U.S. Census Bureau, 1970)).

Figure A-6. Entropy Score and Percent Black, Los Angeles County Census Tracts, 1970



Data source: calculated by authors from 1970 U.S. Census (U.S. Census Bureau, 1970)

There are two limitations of the entropy score worth noting. First, it does not reveal the specific composition of a population within a place. This means that two neighborhoods with identical entropy scores can have very different population makeup. For example, a tract that is half Black and half Hispanic would yield the same score as a tract that is half non-Hispanic White and half Asian.

The second limitation is that the entropy score does not indicate how integrated a neighborhood is relative to the broader population distribution in a region. While a score of 0 clearly indicates a segregated neighborhood, a high entropy score might still signify segregation if people of color are a small minority in the overall population. In such

cases, a high score could indicate an overconcentration of people of color relative to their relative presence, suggesting that the neighborhood, while diverse, is still segregated relative to the region's demographic composition.

Entropy Index

The entropy index, also known as Theil's H, measures the degree of segregation in a region with three or more groups. This metric is based on the information theory index, which evaluates "evenness" across tracts. The entropy index calculates the weighted average deviation of each tract's entropy score from the overall regional entropy score (Massey and Denton, 1988 and U.S. Census Bureau, 2021b). If every tract has the same group composition as the region, their scores will match the region's score, indicating no deviation. This scenario reflects a fully integrated region. However, when a tract's score differs from the regional score, the deviation signifies a degree of segregation, indicating that the region is not fully integrated.

The following formula is used to calculate the entropy index:

$$\mathbf{H} = \sum_{j=1}^{n} \frac{t_j(E - E_j)}{E(T)}$$

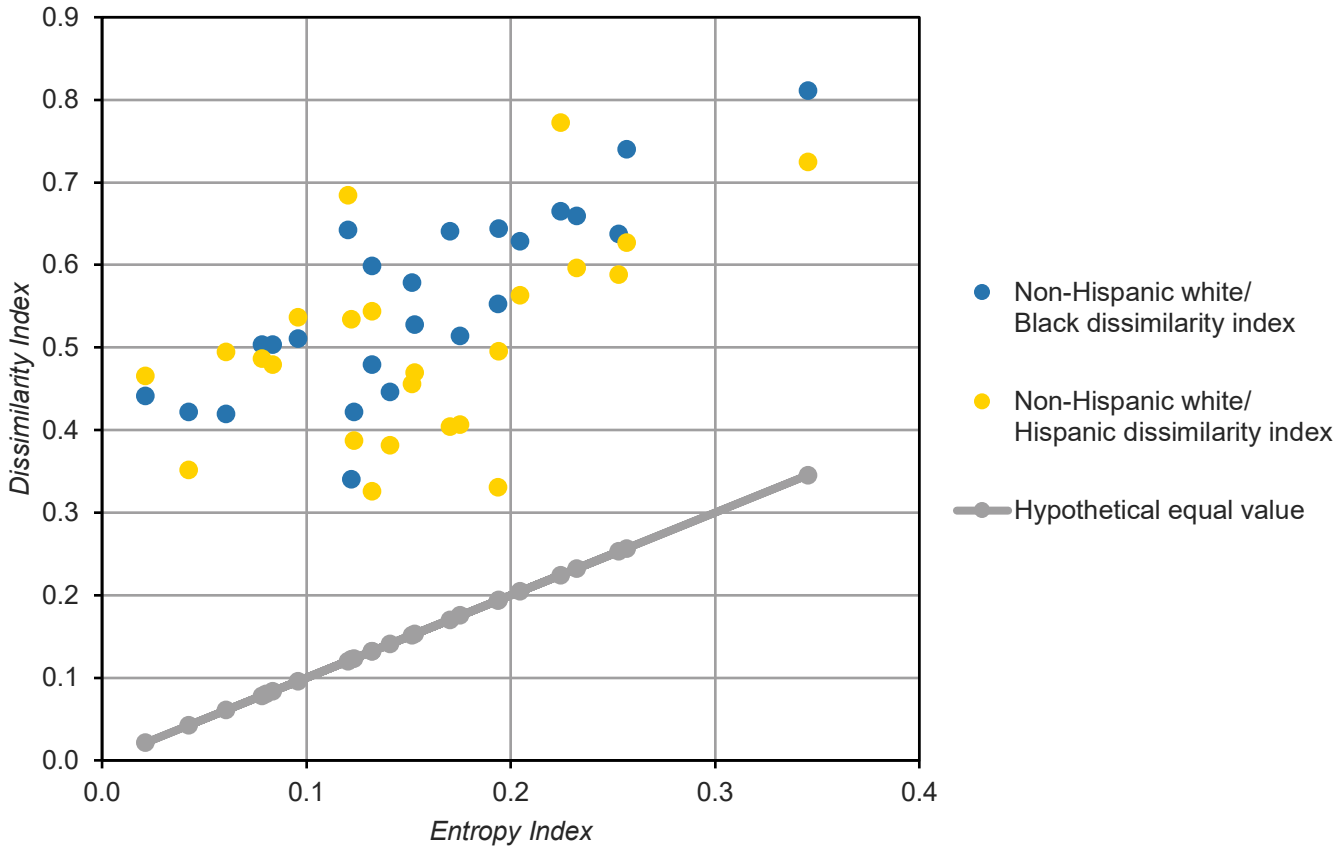
Where:

- E is the entropy score for the whole region
- E_j is the entropy score for tract j
- t_j is the population in that tract
- T is the total population of the region

The entropy index is calculated by summing the values for each tract (from j = 1 to j = n). An index value of zero indicates maximum integration, while a high value of one represents maximum segregation, where all tracts contain only one group (i.e., all $E_j = 0$).

A key feature of the entropy index is that it is unaffected by the relative size of each group, as it measures the evenness of group distribution across tracts. However, similar index values can arise even when tracts differ in their specific compositions. Additionally, the entropy index values tend to be lower than those of the dissimilarity index, as shown in **Figure A-7**, which compares the 1980 entropy index with the non-Hispanic white/Black and non-Hispanic white/Hispanic dissimilarity indices for California's metropolitan areas. All dissimilarity index values exceed the corresponding entropy scores, with observed values above the gray line, which represents hypothetical equal values (calculated by authors from 1980 U.S. Census (Brown University Spatial Structures in the Social Sciences, n.d. and U.S. Census Bureau, 2021a)). Although the two indices are not directly comparable, their trends can indicate whether segregation has increased or decreased over time.

Figure A-7. Comparison of Dissimilarity and Entropy Indices California's Metropolitan Areas



Data source: calculated by authors from 1980 U.S. Census (Brown University Spatial Structures in the Social Sciences, n.d.)

Legacy Assessment

In the conclusion section of this report, we assess the current environmental status and access to opportunities within the study area using two key datasets.

The first is CalEnviroScreen 4.0, developed by the California Environmental Protection Agency Office of Environmental Health Hazard Assessment (2023). This tool identifies and ranks census tracts across California based on pollution burden and population vulnerability and is widely adopted in state legislation, policies, and programs. CalEnviroScreen provides a composite metric that measures the relative environmental, health, and socioeconomic disadvantages of neighborhoods (California Office of Environmental Health Hazard Assessment, 2023 and August et al., 2021). Among the indicators we analyze from CalEnviroScreen 4.0 (California Office of Environmental Health Hazard Assessment, 2023) are:

- Particulate matter ($PM_{2.5}$): $PM_{2.5}$ refers to tiny airborne particles with a diameter of 2.5 micrometers or smaller, about one-thirtieth the width of a human hair. These particles are a blend of organic compounds, dust, soot, and metals and originate from sources like vehicles, industrial activity, and wood burning. Due to their small

size, $PM_{2.5}$ particles can penetrate deep into the lungs, posing significant health risks (California Air Resources Board, 2024; U.S. Environmental Protection Agency, 2024; and August et al., 2021).

- Diesel particulate matter: Diesel particulate matter consists of solid particles released from diesel engines, such as those in trucks, buses, ships, and trains. This exhaust contains a complex mix of harmful chemicals. Areas close to ports, rail yards, and highways typically have the highest concentrations of diesel particulate matter, which can have serious health impacts on nearby communities (August et al., 2021).
- Traffic density: Traffic density measures the concentration of vehicles on roads within an area. California's extensive freeway network and high urban traffic levels often mean higher vehicle emissions, particularly in areas where communities of color, low-income residents, and non-English-speaking populations frequently live (Wasserman et al., 2022).
- Pollution burden score: This score reflects the cumulative impact of multiple pollution sources in an area, summarizing exposure to pollutants such as particulate matter, ozone, and toxic chemicals (California Office of Environmental Health Hazard Assessment, 2023 and August et al., 2021). It helps identify areas facing high environmental challenges.
- CalEnviroScreen 4.0 composite score: This overall score combines the pollution burden score with population vulnerability metrics (such as socioeconomic factors and health risks) to assess the relative disadvantage of each neighborhood (California Office of Environmental Health Hazard Assessment, 2023 and August et al., 2021). A higher CalEnviroScreen composite score indicates greater environmental and health-related challenges for residents.

Table A-1 documents these values for the study area tracts and the City of Pasadena.

Table A-1. CalEnviroScreen 4.0 Pollution Burden Indicators by Study Area Tracts in Pasadena

Geography		$PM_{2.5}$ Emissions ($\mu g/m^3$)	Diesel Particulate Matter (Tons per year)	Traffic Volume per Road Kilometer	Pollution Burden Score	CalEnviroScreen Composite Score
Study area census tracts[15]	North	11.44	0.38	1,099.47	5.89	34.16
	North Center	11.45	0.50	1,460.27	6.33	39.13
	South Center	11.30	0.43	1,413.08	6.59	20.85
	South	11.22	0.32	1,029.79	6.66	21.30
Pasadena		11.25	0.30	1,155.32	5.86	23.57

Data source: California Office of Environmental Health Hazard Assessment, 2023

The second data source is the opportunity area maps from the California Tax Credit Allocation Committee and the California Department of Housing and Community Development (CTCAC, 2024a). These maps identify areas in

15. We do not report data here for the Center tract at the interchange because of significant boundary changes since 1960.

California with characteristics linked to positive outcomes for low-income families, including access to economic opportunities, educational resources, and health benefits. Neighborhoods are categorized into five primary resource levels:

- Highest-resource: Areas with the strongest indicators of economic stability, quality education, and health resources, offering the greatest opportunities for positive outcomes.
- High-resource: Areas that provide good access to resources and opportunities but may have slightly lower indicators than highest-resource neighborhoods.
- Moderate-resource: Areas with a moderate level of resources, offering some support but not as many benefits as high-resource areas.
- Low-resource: Areas with fewer economic, educational, and health opportunities for residents.
- High segregation and poverty: Areas characterized by high levels of racial segregation and concentrated poverty, indicating significant social and economic challenges.

These classifications are based on various indicators, including economic, educational, and environmental factors, to assess the level of opportunity available in each area. The methodology and criteria for these classifications are detailed in CTCAC and HCD's methodology document (CTCAC, 2024b).

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