METRANS Transportation Center
USC / CSULB

Highway Oriented Transit System: A Comprehensive Land Use/Transportation Strategy to Improve Transit Service Delivery

A Case Study of (I-110) Harbor Transitway Stations

Project Group:

Tridib Banerjee
Deepak Bahl
Shahab Rabbani
Anupama Mann
Murtaza Baxamusa
Duan Zhuang
Qiang Zu

School of Policy, Planning, and Development
University of Southern California

April 30, 2001

Disclaimer

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated under the sponsorship of the Department of Transportation, University Transportation Centers Program, and California Department of Transportation in the interest of information exchange. The U.S. Government and California Department of Transportation assume no liability for the contents or use thereof. The contents do not necessarily reflect the official views or policies of the State of California or the Department of Transportation. This report does not constitute a standard, specification, or regulation.

Abstract

This research presents a new methodology for transit-oriented development of a regional Highway Oriented Transportation System (HOTS). The study explores the possibilities of development of transit centers around freeway bus stations that will accommodate future growth and density while reducing automobile trips and improving air quality of Southern California. The system operates express buses on the existing freeway system without exiting the freeway for stops. Transfers to other transit or non-transit modes take place at these transit centers or stations. We have reviewed literature on bus rapid transit and as a case study examined stations on the (I-110) Harbor Transitway.

Upon review, we find that the Harbor Transitway or the Study Area is predominantly Hispanic; relatively young, blue collar, less educated, low income, and transit dependent. The public's reliance on bus is three times higher compared to Los Angeles County as a whole. However, ridership forecasts on Harbor Transitway are not commensurate with the capital infrastructure investment made on the transit stations. With more than one-quarter of all households in the area without automobile, there is strong demand for transit. Our analysis suggests that ridership would be significantly higher if the amenity mix and land use surrounding the transit stations accommodated higher densities and allowed for a greater mix of uses. Hence, we propose market-oriented design and development strategies that promote joint development opportunities in the Harbor Transitway. These strategies augment the mixed-use fabric of existing and emerging employment and retail centers, with additional commercial, office and residential uses. Two-station neighborhoods – 37th Street near USC, and Manchester – are used as illustrative examples to show the nature of such transit-oriented development. Our methodology not only emphasizes higher transit ridership and more efficient transit system, but also establishes identifiable centers of local and regional significance in the Southern California area.

Table of Contents

Table of Contents (continued)

List of Figures and Tables

List of Figures and Tables (continued)

Disclosure

“Project was funded in entirety under this contract by California Department of Transportation.”

Acknowledgments

The project team would like to gratefully acknowledge contributions of the following individuals:

Cleave Govan
Senior Environmental Planner
Caltrans

Randolph W. Hall
Director, METRANS
Professor, Industrial & Systems Engineering
University of Southern California

Kang Hu
Transportation Engineer
Department of Transportation
City of Los Angeles

Simon S. Kuo
Senior Transportation Engineer
Caltrans

Christine Lavoie
Administrator
Industrial & Systems Engineering
University of Southern California

1.0 Introduction

There is a general agreement that existing patterns of urban and suburban development in Southern California have had detrimental effects on the environment and continue to be inefficient. Low-density urban and suburban development patterns induce longer vehicle trips and increase reliance on the automobile. Today more than 15 million persons live in the Southern California region, and residents own about 10 million motor vehicles. According to the California Energy Commission, between 1970 and 1990, the number of miles traveled grew from 115 billion to more than 250 billion miles per year. During the same period, the state's population grew by 50 percent. Southern California Association of Government's (SCAG's) Regional Comprehensive Plan and Guide estimates that by 2010, based on 1990 base year, population and employment will increase by 40% and 37% percent, respectively. Given the anticipated growth in population and employment, we can expect further increase in traffic congestion, and worsening air quality. According to *2001 Long Range Transportation Plan for Los Angeles County* (Draft), 40% of Los Angeles County's freeway and major arterials experience heavy congestion during morning and evening commute periods.[1] Without improvements to the current transportation system or change in travel behavior, average current (1998) countywide travel speed of approximately 30 miles per hour will decline to less than 20 miles per hour by 2025. According to a recent study conducted by Caltrans, the number of average daily hours that people sit in congestion in Los Angeles has increased by 60% over the last 10 years, from 88,000 in 1988 to 143,000 in 1998. This amounts to approximately half a million dollars per day in the cost of time lost and fuel wasted.[2] These trends suggest undesirable economic, social, and environmental costs. Although, these costs are not always visible or commensurable, they are nevertheless exacted on the general population in the form of poorer health due to poor air quality and traffic congestion, which contributes to loss of employee hours, impaired productivity, and monetary loss. This situation is exacerbated by development patterns that waste energy, generate air pollution, require more public infrastructure, and consume more open space.

In the past four decades, the expanded freeway system has shaped the development of Southern California more than any other factor. Today, Southern California is a highway-oriented region with more lane miles than any other metropolitan area in the country. Any residential neighborhood or activity center in this region is either few minutes drive or walk away from a major highway route.

With the expected increase in population, and a land use system, which caters to and increases dependency on the automobile, the question arises as to how we

[1] Refer *2001 Long Range Transportation Plan for Los Angeles County* (Draft) prepared by Los Angeles County Metropolitan Transportation Authority, February, 2001.
[2] Ibid.

would accommodate future growth, while at the same time reduce vehicle miles traveled, and improve air quality. Here we want to focus on the concept of Highway Oriented Transit System (HOTS) and address concerted land use–transportation strategies that utilize existing freeway to operate express buses as part of a regional mass transit.

Undeniably, Southern California boasts one of the most extensive networks of freeways in the world. This elaborate network of freeways is the lifeline of this region and has ultimately shaped the urban form. It is therefore not surprising to see a higher density of housing, concentration of employment, and regional shopping malls located along these freeway corridors. These freeway corridors have effectively defined the "metropolitan corridors" of the Los Angeles region. Most of the regional commuter trips are made on these freeways and the vast majority of commuters drive alone along these freeways. But these freeways are an urban reality, and as we would argue, an asset that present a major opportunity to be used as a means for a regional network of highway-oriented transit. Furthermore most of these freeways have already been retrofitted with high occupancy vehicle (HOV) lanes (See plate 1).

Plate 1: MTA's HOV Development Status
Source: Los Angeles County Metropolitan Transportation Authority, [www.mta.net].

Highway oriented transit means special buses that travel on the freeways utilizing the HOV lanes in tandem with local transportation feeder systems. This is not a new idea. In the early eighties, the Southern California Transportation Action Committee proposed "Freeway Express Transit" – a concept of energy-saving, comfortable and convenient fleet of modern, streamlined buses operating "24 hours daily," and servicing all points in the region. Even in the early eighties, as the Committee report pointed out, the idea of bus on freeway was not all that new. Already Southern California Rapid Transit District (SCRTD), Orange County Transportation Authority (OCTA), and Santa Monica Municipal Bus Lines were operating some 590 "freeway fliers" providing over 62,000 daily rides. These services were offered in conjunction with local bus lines and park and ride lots. Despite the successful operation of such a system, and its intuitive appeal notwithstanding, the idea had not caught on as a region-wide possibility.

We have now reached a critical moment in the history of transit development in Southern California, requiring serious rethinking of the future of rail transit and other alternatives. Individual cities such as Los Angeles have responded by planning and funding transit priority arterial streets and rail corridors to alleviate traffic concerns (See plates 2 and 3). However, little has been done to reduce auto dependency in a regional framework.

The time is extremely propitious to revisit the HOTS program in a more systematic way. But this by no means is an easy task. No such system could be fully effective without concomitant investments in effective and complimentary land use strategies. This requires innovative ideas for transit station design that include park and ride lots, appropriate interface with feeder systems, telecommuting, ride-share, and car-share facilities that encourage people to use public transit.

Besides the transit station design, our approach utilizes a combination of strategies including transit oriented development that facilitates access to neighborhood housing, employment, and activity centers, and facilitates transit (van shuttles, taxis, jitneys) connections to neighborhoods that ultimately encourage people to use bus as a mode of transportation. The application of these strategies is likely induce a switch in mode choice, integrate different modes (bus, bike, taxi, walking etc.) and result in fewer people driving alone, fewer vehicle miles traveled, and less pollution. The changes in land use and transportation through the implementation of HOTS and bus station design possibly mean changes in the way we live and design our lives that must be implemented to ensure clean air for the future.

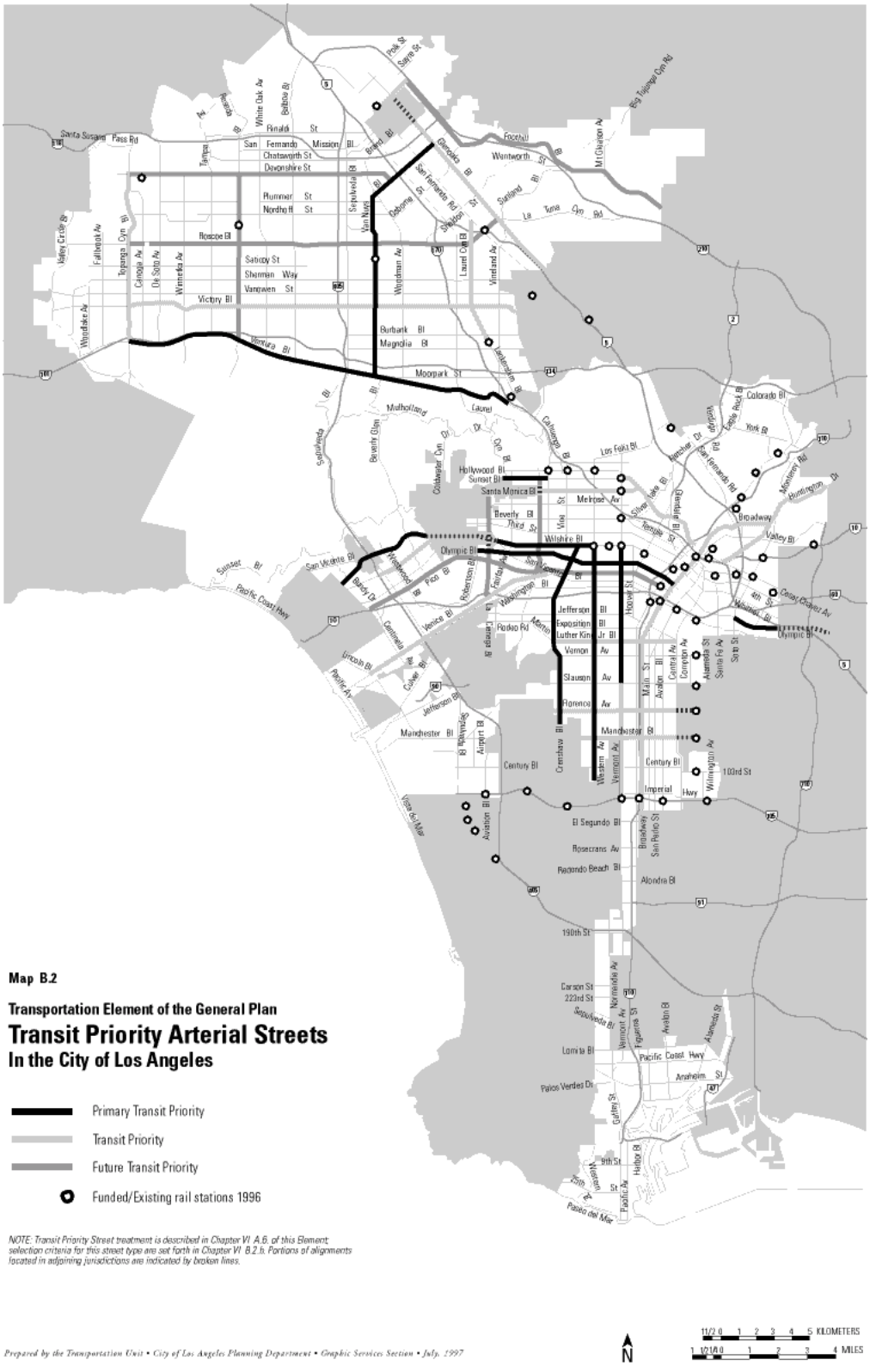


Plate 2: Transit Priority Arterial Streets, City of Los Angeles

Source: Transportation Element, City of Los Angeles General Plan, [http://www.cityofla.org/PLN/index.htm]

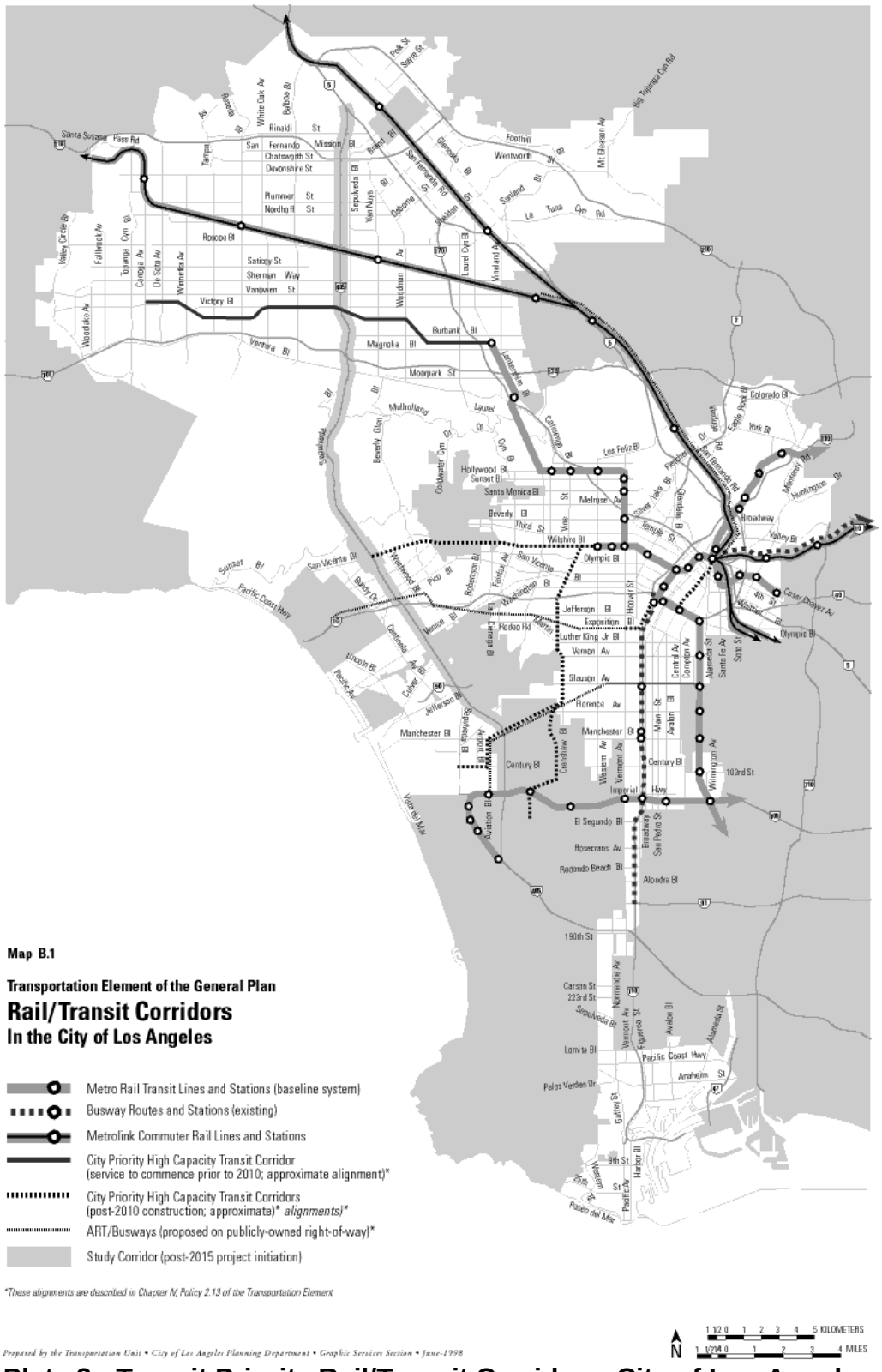


Plate 3: Transit Priority Rail/Transit Corridors, City of Los Angeles

Source: Transportation Element, City of Los Angeles General Plan, [http://www.cityofla.org/PLN/index.htm]

Harbor Transitway, linking the Port of Los Angeles to downtown, serves as the basis for our case study. It allows us to examine highway-oriented transit and analyze station area development. Based on the analysis, we recommend design and land use strategies that promote a highway-oriented transit system.

2.0 Project Objectives

Following are the main objectives of this study:

a) To focus on **Harbor (I-110) Transitway or the Study Area** as a case study segment, since the freeway has been recently retrofitted with dedicated bus lane and transit stations designed to service local neighborhoods.
b) To propose specific land use design strategies to maximize development potential and intensification of land use within the freeway corridors.
c) To propose new strategies for transit oriented development adjacent to freeway stations, which support the proposed transit system and assist the region in achieving air quality goals through trip and emission reduction.

This report is organized into four sections:

- The first section presents literature review of existing research on transit centers and transit-oriented development. We also present information on bus rapid transit and examples of similar developments in other cities and countries.

- In the next section, we focus on the Harbor Transitway market area characteristics with detailed analysis of demographic and socio-economic indicators, and travel patterns. Here, we present trend analysis at two geographic levels: macro- and micro-level. Macro-level analysis refers to comparison of trends between the Harbor Transitway and Los Angeles County while micro-level analyzes individual transit centers with respect to trends within the larger Los Angeles County. Harbor Transitway, a distance of 22 miles, between San Pedro and the Convention Center in the City of Los Angeles, is the freeway improvements environmental study area identified by Caltrans[3]. Trends around the transit center and Study Area have been compared with Los Angeles County to understand peculiarities underlying this market area. There are six transitway stations in operation along the Harbor Transitway. In addition, there are two more stations that are under construction but will be completed shortly. The names of the stations are as follows:

[3] Refer to Final Environmental Impact Statement: Interstate 110 Freeway Transit by Caltrans, 1985.

Currently in operation:

1. 37th Street Transitway Station
2. Slauson Transitway Station
3. Manchester Transitway Station
4. Harbor Freeway/I-105 Transitway Station
5. Rosecrans Transitway Station
6. Artesia Transitway Station

Under construction:

1. Carson Street Transitway Station
2. Pacific Coast Highway Transitway Station

Refer Appendix 9.1 for a listing of bus lines running on the Harbor Transitway and route map for a typical bus line 445 (Appendix 9.2).

- In the following section, we have considered the current land use in place for various localities through which the Harbor Transitway traverses and identified barriers to pedestrian circulation and access to the stations, and other profound physical obstacles that hinder transit-oriented development.

- In response, illustrative proposal showing new design ideas and recommendations that are supportive or consistent with transit station design and development are proposed and discussed in the last section. We present a typology of design and development proposals for transit centers, including TOD strategies, transit center prototypes and services provided in each transit center, and detailed study of adjacent land use near transit centers. We have prepared urban design strategies, site plans, sketch designs, drawings, and design analogs for Manchester and 37th Street Transitway Station. Pedestrian friendly linkages between transit center and surrounding land use and services has been demonstrated along with a restructuring of parking areas to better serve transit center and proposed activities. Location of new services such as park and ride, ride share programs, telecommuting centers, facilities for surface transportation and transit have also been fully identified and designed. New strategies have been developed to enhance pedestrian friendliness and linkage of transit center to existing or proposed land uses such as shopping centers, housing complexes, and commercial retail or office centers.

3.0 Literature Review

3.1 Buses on Freeways

Freeway buses have been used in the past for long-distance commuters providing peak-time service to a few routes. They have been hitherto very minimal in impacting either transit-usage or in reducing freeway congestion. Moreover, these services suffer from various drawbacks. First, there is no provision made for intermediate stops between residential collection and CBD distribution. Second, peak period traffic congestion can make service slow and unpredictable. Third, the freeway bus-system is not linked to other modes, neither at a local nor at a regional scale.

The seminal report, *Bus Use of Highways* (NCHRP reports 143 and 155) by Herbert Levinson and colleagues, covers a broad range of design and operational issues with regard to taking maximum advantage of expressways to improve public transit service. The 1998 NCHRP report, *HOV Systems Design Manual*, updates this work. Some of the techniques used to speed expressway bus service include the following:

- bus-only or HOV lanes at toll plazas on those urban expressways which charge tolls;
- queue by-pass lanes where ramp metering has been introduced;
- bus-only lanes on expressways;
- HOV lanes, typically open to all vehicles with a minimum of either two or three occupants.

Bus on expressway service is generally more suitable for express operations, that is, where a bus accumulates passengers and then enters the expressway to operate non-stop to downtown CBD. Currently, the lack of on-line stations makes it difficult to offer intermediate stops. However, this problem can be resolved by better utilizing the existing freeway stops and using them as a model to build other bus stops. An efficient transit system would be comprehensive in the formulation of the transit modes and routes. It would involve an express bus system using the HOV lanes as the central spine of its operation, and a combination of local transportation modes that would branch out from its nodes: buses, shuttle services, vanpools, carpools, taxis, and even non-vehicular modes such as bicycles.

3.2 Vehicle Design Issues

There are some issues that need to be addressed in the design of the buses so that they can effectively and efficiently handle a large number of commuters:

(i) Doors on both sides: Doors on both sides would make offloading of passengers on either side possible. This would also ease the design-constraints on bus-stations, which are usually located in constricted

situations. Left-sided doors would access bus lane or busway stations with central platforms without having to engage in complicated and time consuming crossing maneuvers.

(ii) Low-floor vehicles: European fleets adopted the low-floor bus technology in the 1980s. Early models had only a partial section of low-floor access with the rear of the vehicle raised. But today, full-section low floor vehicles are available and are extremely convenient for the elderly and the handicapped. With low floor buses, one concern is the ability to move the bus close enough to the raised station platform to permit level boarding without damaging the vehicle's tires or structure. One solution to this problem is automatic control of vehicles to provide precision docking. In August 1997, New York City Transit successfully demonstrated low-floor buses with full automatic control. The buses were equipped with vision and radar sensors to control the bus in both lateral and longitudinal directions. Such technology could also be used to steer a bus close to a raised platform (see TCRP Report 41). The use of mechanical systems to guide the vehicle, particularly at stations, is also an option.

(iii) Internal circulation: A well-designed internal vehicle can reduce crowding, facilitate rapid passenger boarding and alighting, and can minimize the bypassing of waiting passengers because the bus is perceived by the operator to be at full capacity due to poor passenger distribution. The increase in the number of doors and the on-boarding/off-boarding time plays a critical role in alleviating crowding at the doors.

(iv) Eliminating on-board fare collection: Moving all fare collection off the bus offers the greatest potential for reducing dwell time. Not only is fare payment time reduced to zero, but also all doors of the bus can be used for both loading and unloading. Ticket dispenser machines at the loading platforms are a feasible option that should be explored in greater detail. In the bus-tubes in Curitiba (Brazil), passengers enter the tubes by paying a fare at the turnstile. Once inside the tube commuters can transfer to neighborhood and circumferential routes. In Toronto, terminals are used for barrier free transfers between bus and rail.

(v) Marketing and public Image: The buses and the stations need to have an easily identifiable distinct color theme, and/or logos in order to draw more patronage. The fleet has to be well maintained, free from graffiti, and cause minimum pollution. Compressed natural gas (CNG) and hybrid electric-diesel buses have emerged as viable alternatively fueled vehicles.

3.3 Case Study: The B-Line Rapid Bus in Vancouver

The 99 B-Line, the first test of the Rapid Bus concept in Vancouver, has 14 stops along its 11-mile route.[4] The cross-town route traverses the Broadway-Lougheed corridor and connects the central business district with the University

[4] BRT Reference Guide, [http://brt.volpe.dot.gov/guide/vancouver.html], April 2001.

of British Columbia (UBC) and SkyTrain. This "Rapid Bus" line started in 1996, and has become one of the most significant new services in Vancouver since the introduction of SkyTrain a decade earlier. The 99 B-Line is well liked and ridership has increased from 8,000 per day at the start of service to 20,000 per day in 1999. Travel times were reduced by 5 to 15 minutes (20% to 40%) compared to local bus. A 1997 on-board survey found that about 20% of B-Line customers previously used private car or truck. A second Rapid Bus route is slated to start service in September 2000. Two more routes are being planned.

3.4 Case Study: Lymmo in Orlando

The Central Florida Regional Transportation Authority, commonly known as Lynx, started providing service on an improved downtown circulator called Lymmo, in 1997.[5] The service offered the following features:

- exclusive lanes for the entire 2.3 mile route
- signal pre-emption
- stations with large shelters and route information
- automatic vehicle location (AVL)
- next bus arrival information at kiosks
- new low-floor CNG buses
- marketing and image development through vehicle graphics, stations, advertisements, and business tie-ins
- free fare, so no fare collection delay

In the year following the opening of Lymmo, transit ridership along the route doubled. Although the route was made shorter than previous services by 25%, average boardings per trip increased by 33%.

[5] BRT Reference Guide, [http://brt.volpe.dot.gov/guide/lymmo.html], April 2001.

Figure 3.1: Lymmo Right of Way and Station at Turn Around Area
Source: http://brt.volpe.dot.gov/guide/lymmo.html

Figure 3.2: Lymmo Station with Next Bus LED Display
Source: http://brt.volpe.dot.gov/guide/lymmo.html

3.5 Case Study: Ligeirinhos, Curitiba (Brazil)

Curitiba, an avant-garde city is a reference worldwide in mass transportation issues. The "Ligeirinhos" (or "very fast buses") are part of an integrated transport network, and run very frequently (sometimes at intervals of 90 seconds). The system is quite popular and caters to 70 percent of the city's commuters.

Curitiba's bus-system evolved in phases linked to land-use patterns over the years.[6] The backbone of the bus system is composed of express buses operating on five main arteries leading into the center of the city. Small minibuses routed through residential neighborhoods feed passengers to conventional buses on circumferential routes around the central city and on inter-district routes. The express buses or Ligeirinhos have several features that enable Curitiba's bus-service to approach the speed, efficiency, and reliability of a subway system:

- Integrated planning with transit and land-use
- Exclusive bus-lanes
- Signal priority for buses
- Pre-boarding fare collection
- Level bus boarding from raised platforms in tube stations
- Free transfers between lines (single entry)

Curitiba's Master Plan integrated transportation with land-use planning. It encouraged commercial growth along the transportation arteries radiating out from the city center. The Master Plan also provided for economic development along the arteries through the establishment of industrial and commercial zones and mixed-use zoning, and encouraged local community self-sufficiency by providing each district with education, health care, and park-areas. Land within two blocks of the transit arteries has been zoned for mixed commercial-residential uses. Higher densities are permitted for office space, since it traditionally generates more transit ridership per square foot than residential space. Beyond these two blocks, zoned residential densities taper with distance from transitways. Land near transit arteries is encouraged to be developed with community-assisted housing. Public parking in the downtown area is limited and restricted, and auto-oriented shopping centers are discouraged. Finally, most employers offer transportation subsidies to workers, making them the primary purchasers of tokens.

The popularity of Curitiba's Bus Rapid Transit system has affected a modal shift from automobile travel to bus travel. Residential patterns have changed to afford bus access on the major arteries by a larger proportion of the population.

[6] BRT Reference Guide, [http://brt.volpe.dot.gov/guide/curitiba.html], April 2001.

Figure 3.3: Tube Station, Curitiba
Source: http://brt.volpe.dot.gov/guide/curitiba.html

Figure 3.4: Boarding tube in a lower density area providing a feeder route to express terminals
Source: http://www2.rudi.net/ej/udq/57/csd.html

4.0 Study Area: Harbor Transitway

4.1 History

In 1975, the SCRTD conducted a "Starter Line" study with the goal of determining a starter project for a regional rail system. The study recommended alternatives with options for both rail and bus in selected regional transportation corridors. Subsequently in 1976, a Task Force Study recommended a fully integrated transit plan for Los Angeles County. This Regional Transportation Development Plan (RTDP) included state, regional, and city transportation proposals. Freeway Transit, Transportation System Management (TSM) Program, Downtown People Mover, and Metro Rail were major elements of this plan. The U.S. Department of Transportation (US DOT) approved $11.08 million for studying the RTDP in December 1976. Of this amount, approximately $7.8 million was allocated to California Department of Transportation (Caltrans) to study freeway transit and highway related aspects of TSM element. In 1978, Caltrans and SCRTD selected two high priority corridors, the Harbor Freeway and Santa Ana, for the next study phase and project development. In July 1979, Caltrans completed a study comparing capital costs and patronage projections for freeway transit rail and bus/HOV modes on the Harbor Freeway, Santa Ana Freeway, and Century Freeway. In 1980, Caltrans completed a Draft Initial Study/Environmental Assessment for the Harbor Freeway Corridor in conformance with federal and state guidelines. The Final Environmental Impact Statement was completed in 1985. This transportation/environmental planning process produced a coordinated plan to provide public transit to serve the Los Angeles region.

The Harbor Transitway is an integral part of this system and is designed to provide a vital link between downtown Los Angeles and the Los Angeles Harbor, as well as between the Century Freeway (I-105) Transitway and downtown Los Angeles (see plate 4).

4.2 Objectives

The primary objectives of Harbor Transitway are to

1. Improve existing transportation facilities by making the existing freeway system more efficient in moving people.
2. Increase mobility for all people by providing a high speed and easily accessible transit system.
3. Promote energy conservation in transportation by emphasizing mass transit and encouraging carpooling and vanpooling.
4. Minimize the potential for adverse environmental impacts by developing a transitway within the boundaries of existing transportation right of way, eliminating new extensive right of way requirements, and by providing alternatives to the single occupancy vehicle.
5. Improve the urban economy by attracting jobs and facilitating "joint development" at corridor stations.[7]

[7] Final Environmental Impact Statement: Interstate 110 Freeway Transit, Caltrans, 1985.

4.3 Market Area Characteristics: Macro-Level Analysis

The Study Area is similar to the freeway improvements environmental study area identified by Caltrans (1985) in its *Final Environmental Impact Statement: Interstate 110 Freeway Transit* bounded by I-101 to the north, Avalon Boulevard to the east, Los Angeles Harbor to the south, and Western Avenue to the west (See Plate 4). Data for the Project Area was provided by Claritas, a private data and information marketing company. To better understand market area characteristics, we have compared Harbor Transitway with Los Angeles County.

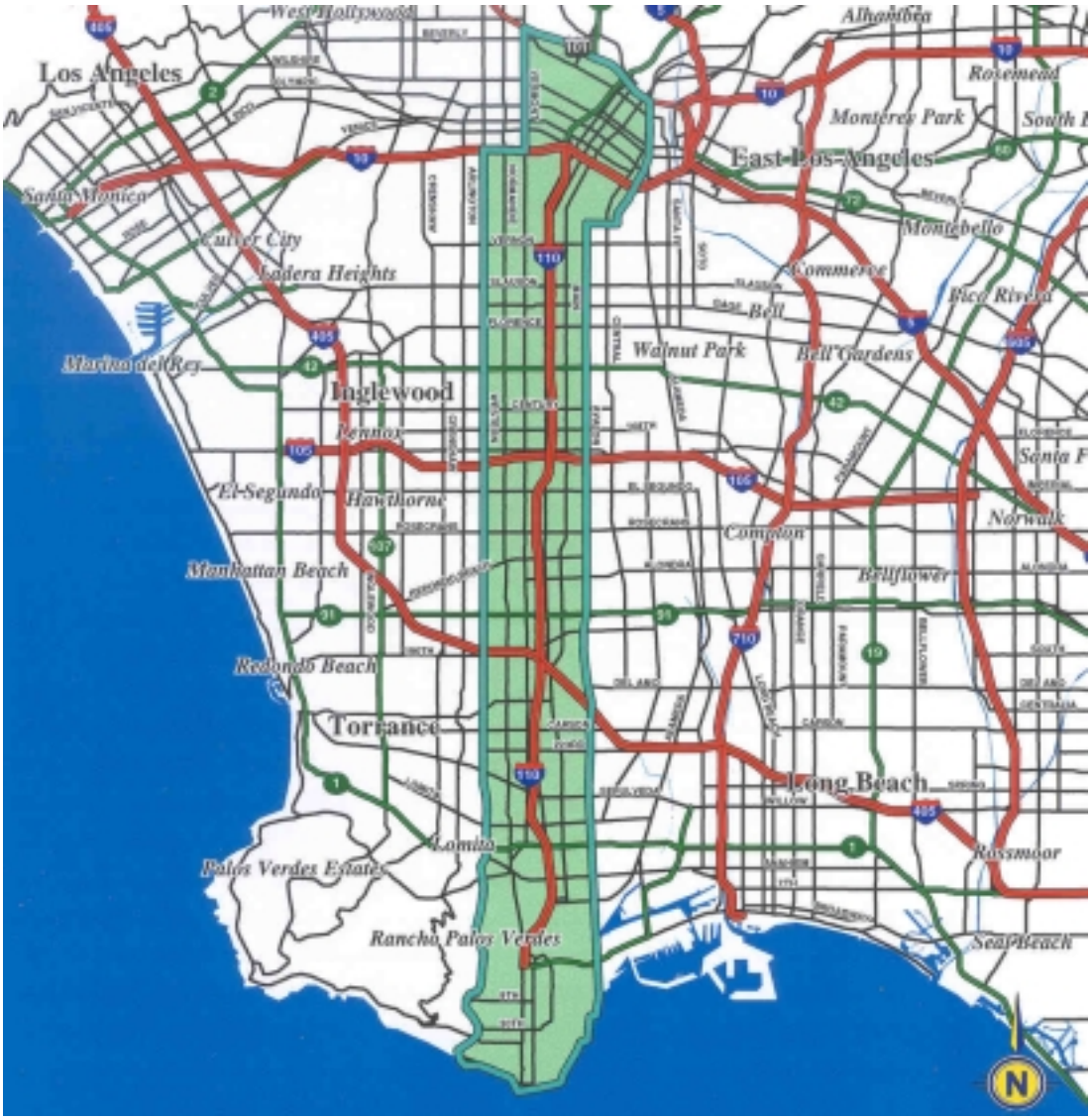


Plate 4: Harbor Transitway
Source: Claritas, Inc.

4.3.1 Population: Population in the Harbor Transitway grew at a slower pace during the 1980s and 1990s, and is also projected to grow at lower rate over the next five years when compared with Los Angeles County. The population in the Study Area grew by 1.3% between 1990 and 2000; from 776,193 to 786,568, compared to 7.5% for Los Angeles County (Refer figure 4.1). Over the next five years, population of the Study Area is expected to grow by 3.4%, from 786,568 to 813,531, compared to 5.5% for Los Angeles County.

4.3.2 Race/Ethnicity: The majority of the Study Area's 2000 population is composed of minorities. The racial breakdown for Harbor Transitway is as follows: 27.4% are White, 22.4% are Black, 12.0% are Asian and Pacific Islanders, and 38.2% belong to Other Races. In contrast, for Los Angeles County Whites account for 51.5%, while Blacks (10.4%), Asian and Pacific Islanders (13.1%), and Other Races account for 25.0% of the total population (Refer figure 4.2).

The Harbor Transitway is composed predominantly of people of Hispanic origin. According to 2000 Claritas estimates, approximately 60% of the population in Harbor Transitway is of Hispanic origin compared to 45% in Los Angeles County. However, the growth rate of people of Hispanic origin was faster in Los Angeles County than the Study Area. During 1990 to 2000, people of Hispanic origin in the Study Area grew by 18.2% compared to 27.8% for Los Angeles County. According to 1990 Census, in Harbor Transitway, this predominantly Hispanic base is composed of Mexicans (34.3%), Puerto Ricans (0.5%), Cubans (0.4%), and Other Hispanics (16.2%).

4.3.3 Household Growth: Household growth rate, similar to population growth rate, is slower in Harbor Transitway when compared with Los Angeles County. The number of households in Harbor Transitway increased by 0.6% between 1990 and 2000, from 234,369 to 235,882, compared to 6.2% for Los Angeles County. Over the next five years, the number of households in the Study Area is expected to increase by 3.9%, compared to 5.8% for Los Angeles County (Refer figure 4.3). The number of persons per household is higher in the Study Area. In 1990, there were 3.3 persons per household in the Study Area compared to 3.0 persons for Los Angeles County.

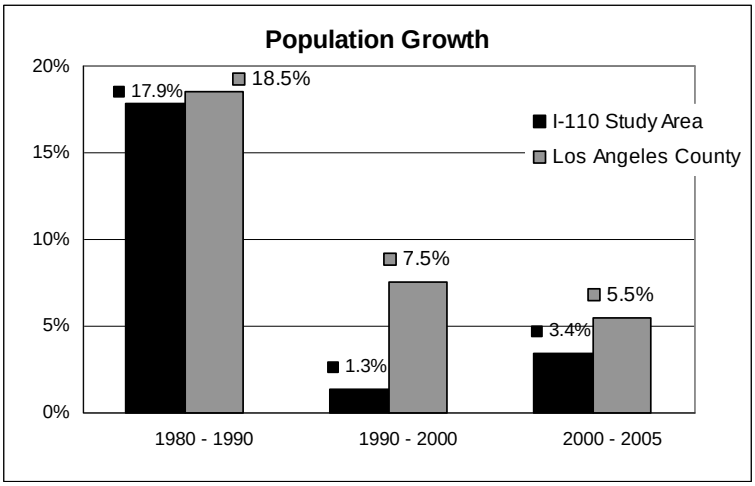


Figure 4.1

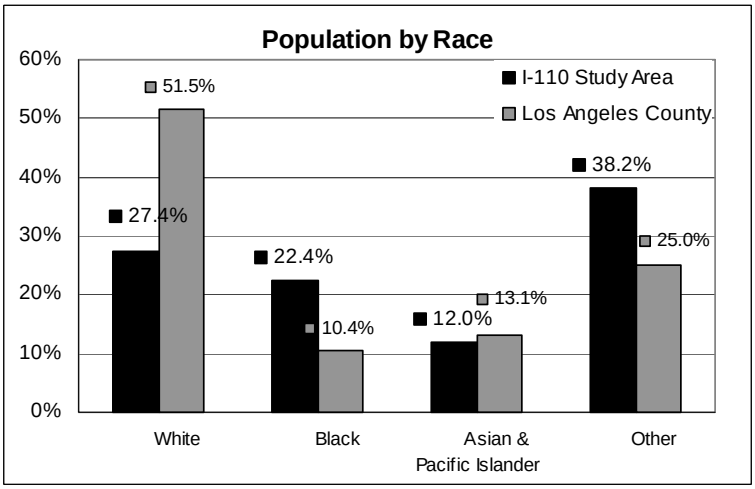


Figure 4.2

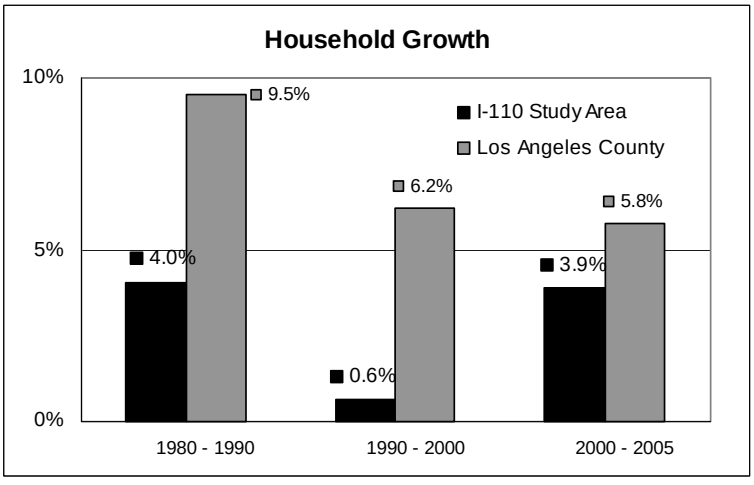


Figure 4.3

4.3.4 Age: Harbor Transitway has a relatively younger population when compared with Los Angeles County. According to 2000 Claritas estimates, 42.9% of the population in the Study Area is below 24 years of age compared to 36.5% for Los Angeles County. Similarly, 17.9% of the population in the Study Area is in the age group of 50 and above compared to 24.0% for Los Angeles County (Refer figure 4.4). The median age for the Study Area is 29.5 years compared to 33.8 years for Los Angeles County.

4.3.5 Income: The income level of a majority of people in the Study Area is substantially below Los Angeles County level. More than two-fifth of all households in the Study Area earn under $25,000 compared to 27.3% for Los Angeles County. Similarly, less than 30% of the households in the Study Area earn more than $50,000; whereas, 45.5% of households earn more than $50,000 in Los Angeles County (Refer figure 4.5).

The median household income for the Study Area is 33.2% below Los Angeles County, another indicator of the disproportionately low-income level of the residents (Refer figure 4.6).

4.3.6 Poverty: We observe higher level of poverty in the Study Area relative to Los Angeles County. In the Study Area, there are fewer households above poverty under age 65 compared to Los Angeles County. Similarly, there are more households below poverty under age 65 in the Study Area. For instance, proportionately there are twice as many households that are below poverty under age 65 in Harbor Transitway relative to Los Angeles County (Refer figure 4.7).

4.3.7 Occupation: The 1990 Census occupational profile suggests that the Study Area is predominantly blue collar and service sector oriented. Approximately 38.3% of the population (16 years and above) in Harbor Transitway was engaged in blue-collar jobs compared to 26.5% for Los Angeles County (Refer figure 4.8). In the Study Area, most of the jobs were in the machine operator, precision production, and craft professions. Service sector accounted for 17.6% of jobs in the Study Area compared to 12.3% for Los Angeles County. The Study Area trailed behind Los Angeles County in white-collar jobs; 42.5% to 59.9%.

Labor force participation rate is lower in the Study Area (0.47) relative to Los Angeles County (0.51). Furthermore, according to 1990 Census, the unemployment rate for Harbor Transitway (7.15%) was significantly higher than Los Angeles County (4.94%).

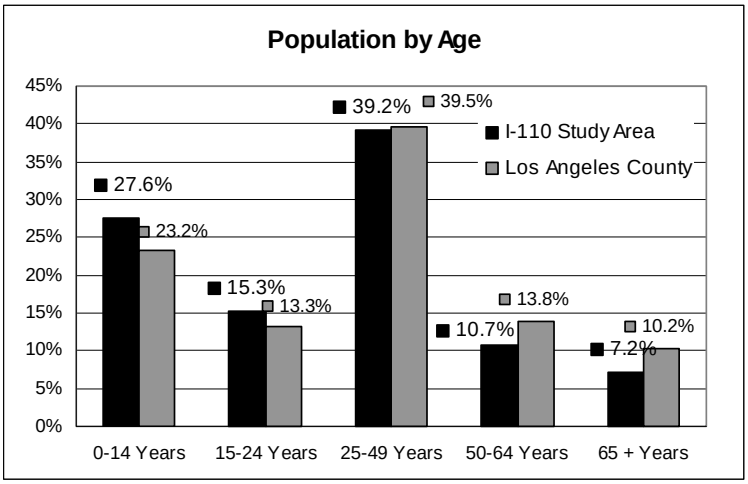


Figure 4.4

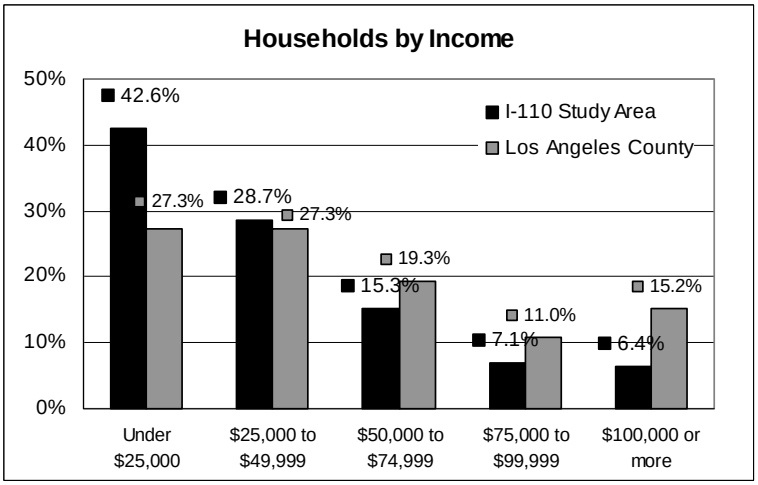


Figure 4.5

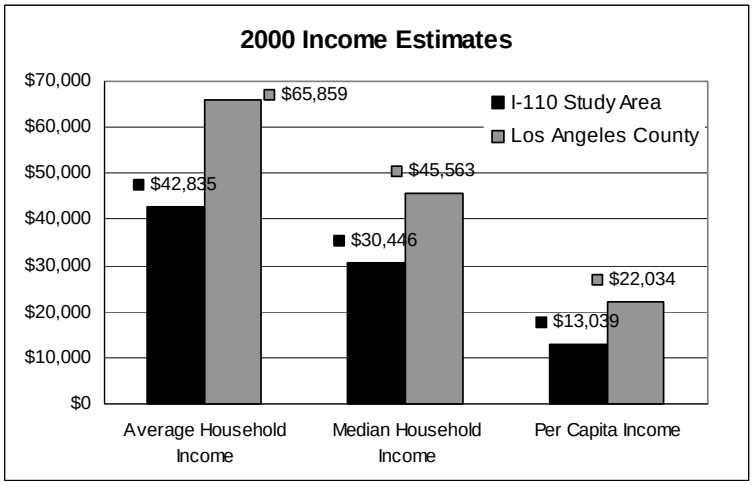


Figure 4.6

4.3.8 Education: Higher rates of unemployment, low labor force participation rate, and low-income are strongly correlated with low educational attainment level for the Study Area. We observe that approximately half of the population (25 years and above) has less than High School education (Refer figure 4.9). Only 10.7% of the population has education Bachelor's degree or above in the Study Area compared to 22.3% for Los Angeles County.

4.3.9 Transportation: In the Harbor Transitway, people rely heavily on public transportation to work, roughly thrice the rate, relative to Los Angeles County. We observe that 17.0% of the population used public transportation to work within the Study Area compared to 6.5% for Los Angeles County (Refer figure 4.10). In addition, fewer people drive alone in the Study Area compared to Los Angeles County. Relatively low vehicle ownership by households in the Project Area substantiates the aforementioned transportation to work trends.

4.3.10 Vehicle Ownership: Roughly one-quarter of the households do not own a vehicle in the Harbor Transitway (Refer figure 4.11). This share is more than twice the share of households without a vehicle in Los Angeles County. Approximately 36.9% of households have two or more vehicles in the Study Area compared to more than half of all households within Los Angeles County.

4.3.11 Property Values: The majority of dwelling units in the Study Area (68.2%) were renter occupied as of 1990. In comparison, 51.8% of housing units in Los Angeles County were renter occupied. Property values of owner occupied units in the Study Area are disproportionately below County level. According to 2000 Claritas estimates, Los Angeles County has approximately 20% of owner occupied units with property values below $150,000; in contrast the Study Area has twice the number of owner occupied units within the same range (Refer figure 4.12). The median property value of owner-occupied unit was $172,553 in Harbor Transitway, 27.6% below county median.

4.3.12 Age of Housing Stock: The majority of housing stock in the Study Area is more than 50 years old (Refer figure 4.13). It appears that depressed property values and old housing stock translates into lower rents. The median rent for the Study Area is $467 compared to $570 for Los Angeles County. There are more multiple unit structures in the Study Area. The ratio of single to multiple units is 0.81 in the Study Area versus 1.32 for Los Angeles County. Vacancy rate for housing units is low in Los Angeles County as well as the Study Area, which may have implications for future housing development in order to accommodate future population growth.[8]

[8] Source: Claritas, Inc., 2000.

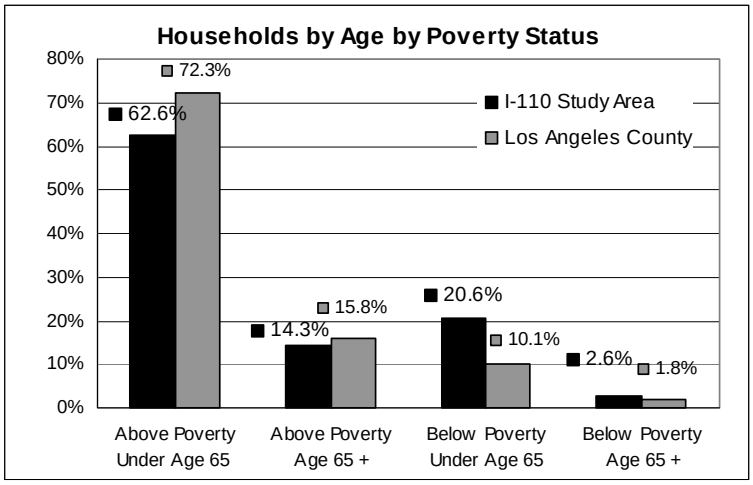


Figure 4.7

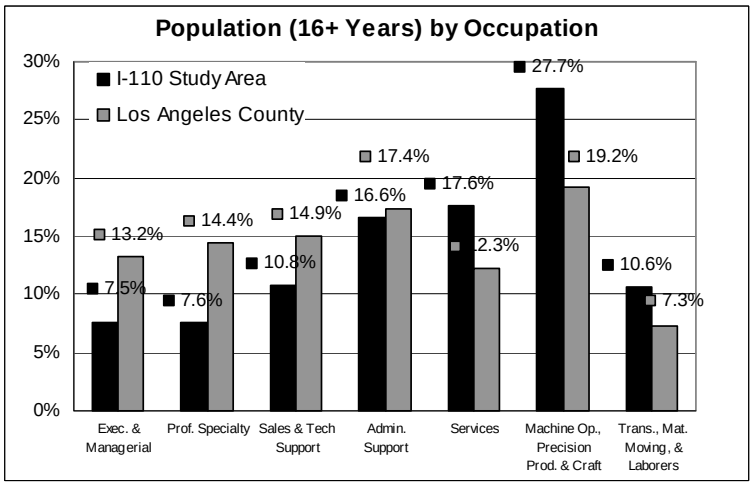


Figure 4.8

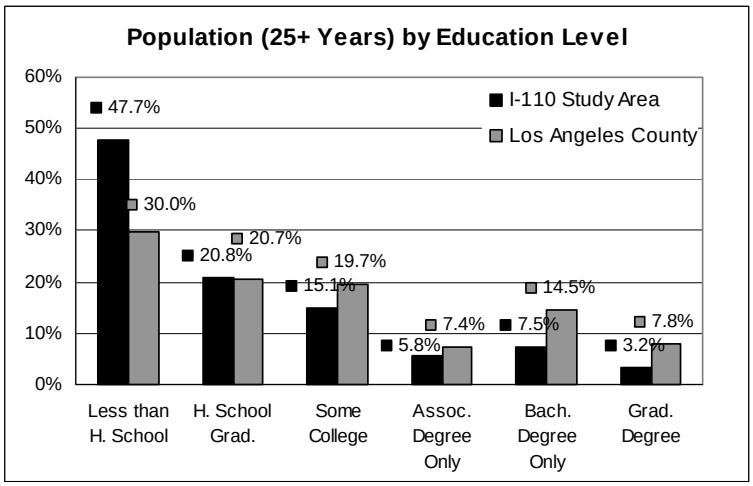


Figure 4.9

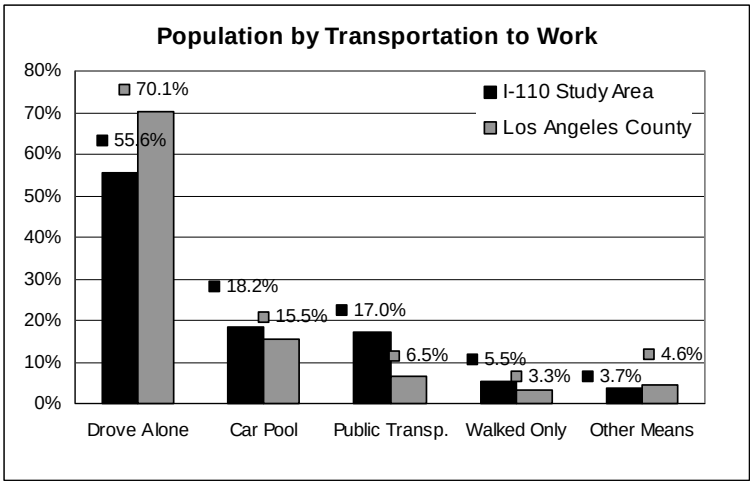


Figure 4.10

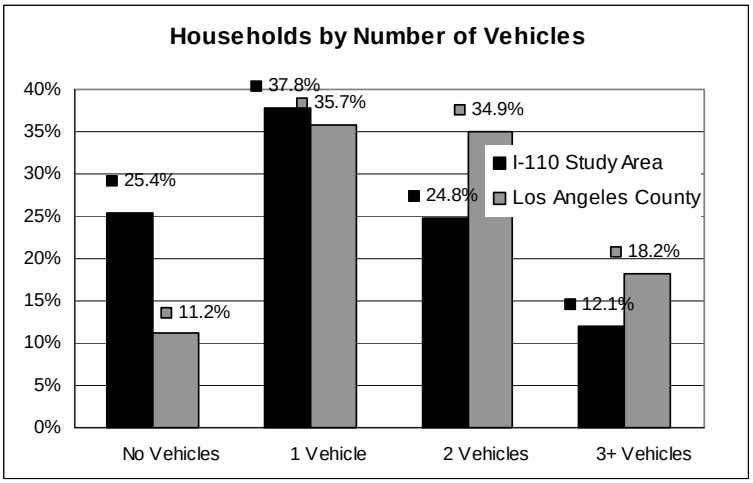


Figure 4.11

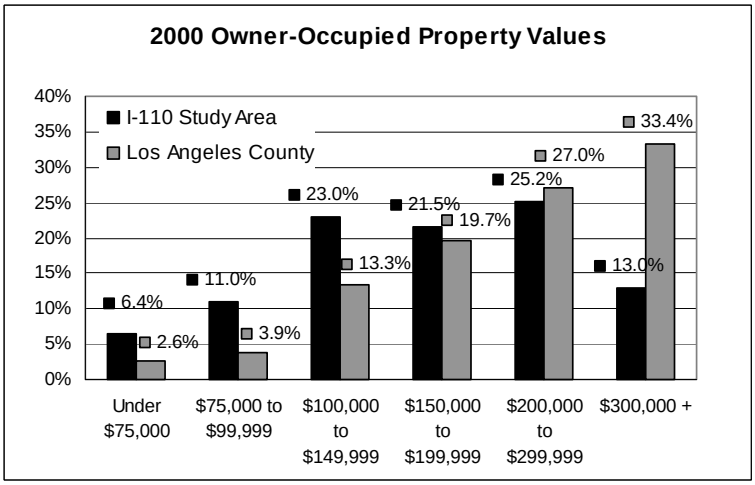


Figure 4.12

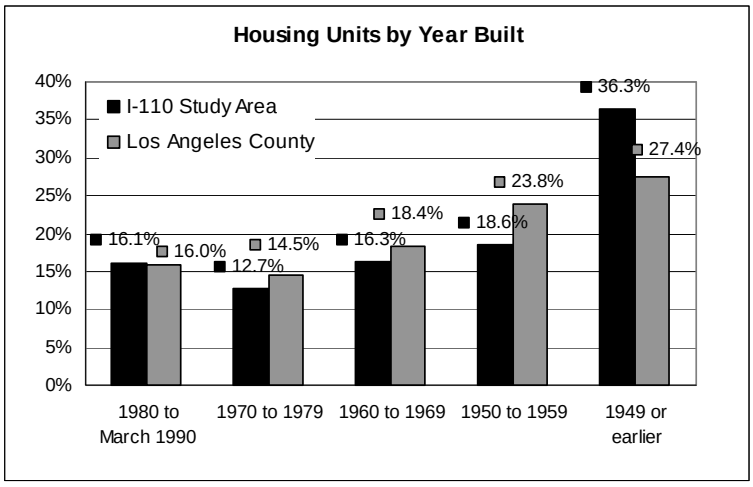

Housing Units by Year Built
40%
35%
30%
25%
20%
15%
10%
5%
0%
I-110 Study Area
Los Angeles County
16.1%
16.0%
12.7%
14.5%
16.3%
18.4%
18.6%
23.8%
36.3%
27.4%
1980 to March 1990
1970 to 1979
1960 to 1969
1950 to 1959
1949 or earlier

Figure 4.13

4.4 Market Area Characteristics: Micro-Level Analysis

The following analysis is based on one-mile and three-mile radii service areas around each of the eight stations[9].

4.4.1 Transit Dependency: In order to judge the development potential around transit centers, it is important to know the number of people who potentially may use public transit.

Among all households in Los Angeles County, 14.7% do not have automobile. It is apparent from figure 4.14 that three transit centers on the north end of Harbor Transitway – 37th Street, Slauson, and Manchester – have census tracts with highest percentage of households around them without vehicles, exceeding 20 percent respectively. In case of the 3-mile diameter area round 37th Street station, this number is close to 30 percent, which is more than double the county average.

Transit use is moderately high in the north part of our Study Area, with close to 12,000 people in the 3-mile diameter area around 37th Street Transitway station using public transportation to work (Refer figure 4.15). Transit users are fewer in the south end of the corridor. The main transportation mode here is private cars.[10] An extreme case is the 1-mile diameter area near Artesia, where there are fewer than 100 public transit users.

The comparison of actual numbers of bus users from 3-mile and 1-mile diameter areas along the Study Area shows that bus ridership decreases from north to south, which corresponds to the trend of vehicle ownership data from the previous paragraphs (Refer figures 4.16 and 4.17).

The area around 37th Street transit center stands out as the one with the highest number of bike-users possibly because there is a large number of student bike riders near the USC campus (Refer figure 4.18). Bike-lanes should be taken into consideration in the transportation improvements and urban design of the area.

[9] Analysis at the micro-level relies on 1990 Census data for both transit stations and Los Angeles County. The macro-level analysis presented in the previous section relies entirely on Claritas, Inc. 2000 estimates. Any variation in data for Los Angeles County is due to different sources and separate time periods.

[10] Private car means car, truck or van, including carpooling and driving alone; Public transport means bus, streetcar, subway, taxi, etc; Other means motorcycle, bicycle, walked worked at home or other means.

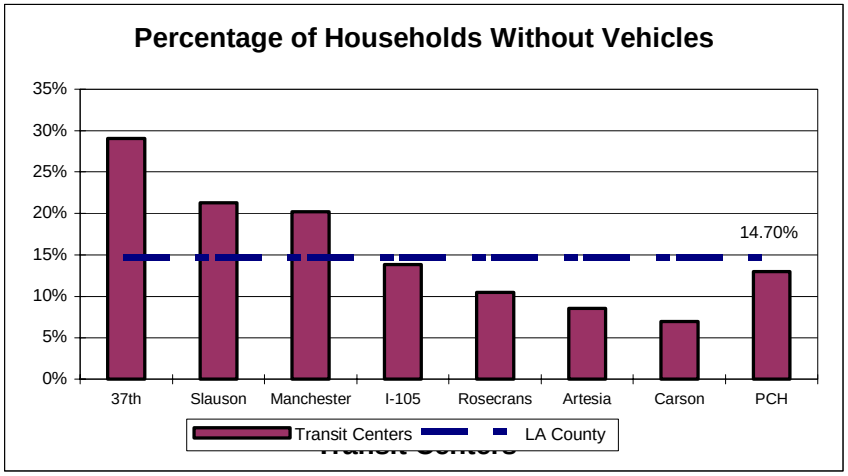


Figure 4.14

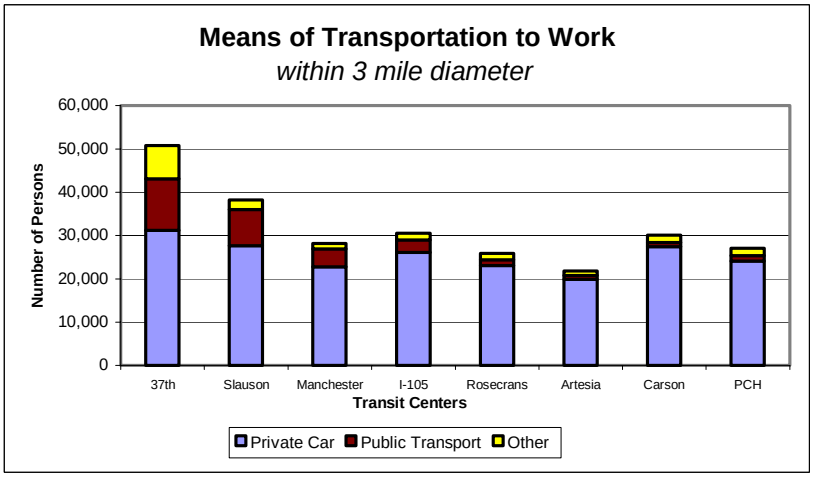


Figure 4.15

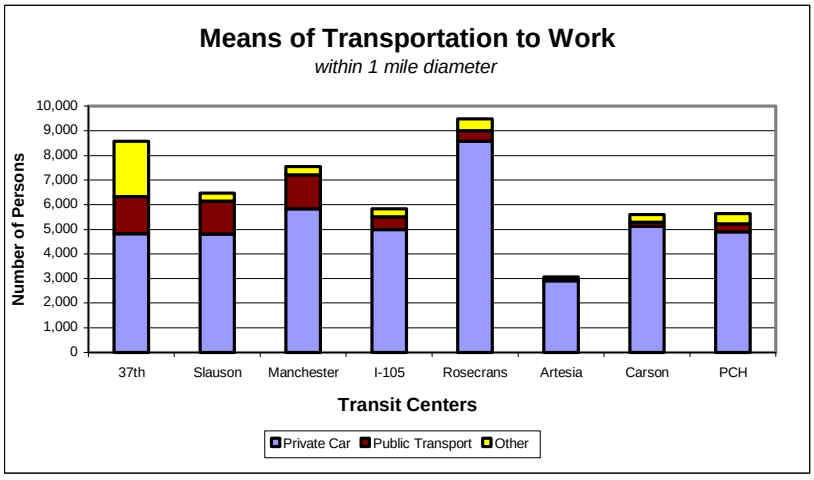


Figure 4.16

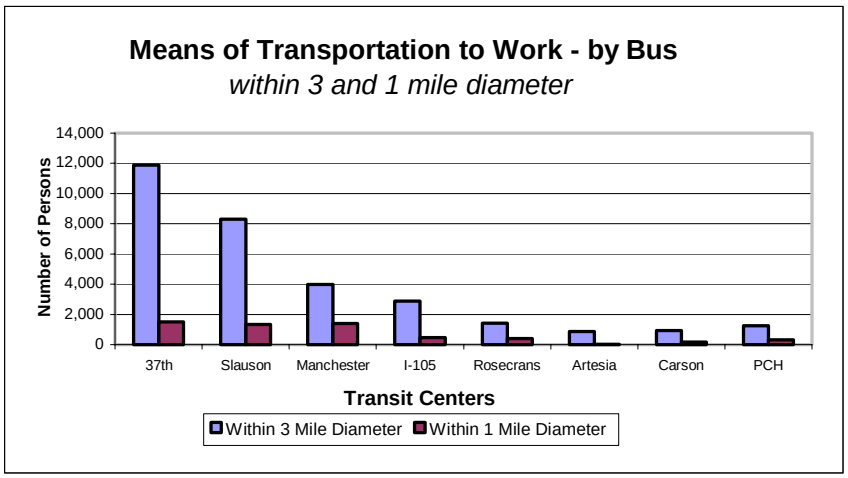


Figure 4.17

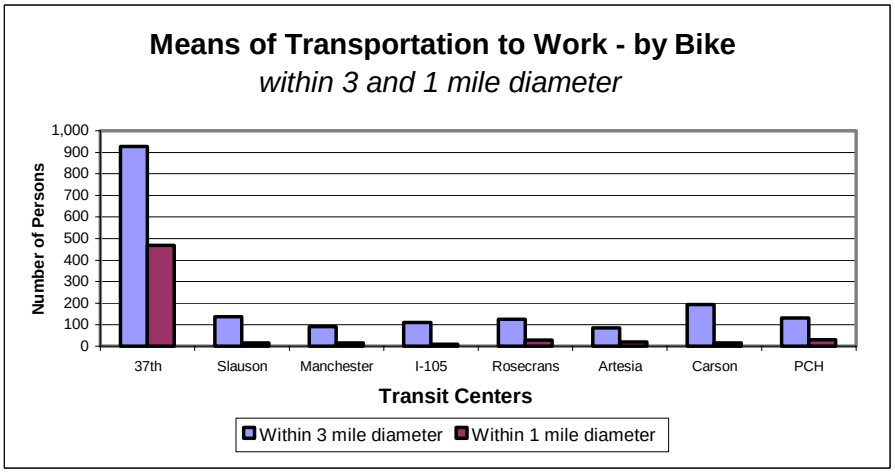


Figure 4.18

The Study Area along I-110 Freeway is not a simple monolithic entity. In terms of population characteristics, it is considerably diversified. The following paragraphs explain the variations in three categories: income, ethnicity, and education.

4.4.2 Income: The Study Area covers some of the poorest neighborhoods of Los Angeles County. According to 1990 Census data, the average household income of the county is $34,965, while in our Study Area, only the areas near Carson and Pacific Coastal Highway are above this income level. The overall incidence of poverty is highest in northern segments of the Harbor Transitway, with median household income below $20,000 around 37th Street, Slauson, and Manchester. This pattern is closely related to transit dependency; census tracts with the lowest median income exhibit the largest percentage of bus riders (Refer figures 4.19 and 4.20).

None of the areas near transit centers have higher per capita income than the county average. The per capita income near 37th Street, Slauson, and Manchester Transitway stations is below $6,000, which is not even half of the county average of $16,149. This is possibly the result of low median household income indicated in the previous paragraph and large average family size in the Study Area.

4.4.3 Ethnicity: In the upper middle segments of the study area, the dominant ethnic group is Black, which comprises more than 60 percent of the population in the areas around Manchester and I-105 transit centers (Refer figure 4.21). In the southern segments near Carson and Pacific Coast Highway, Whites represent more than 50 percent of the population, which is close to the county average of 57 percent.

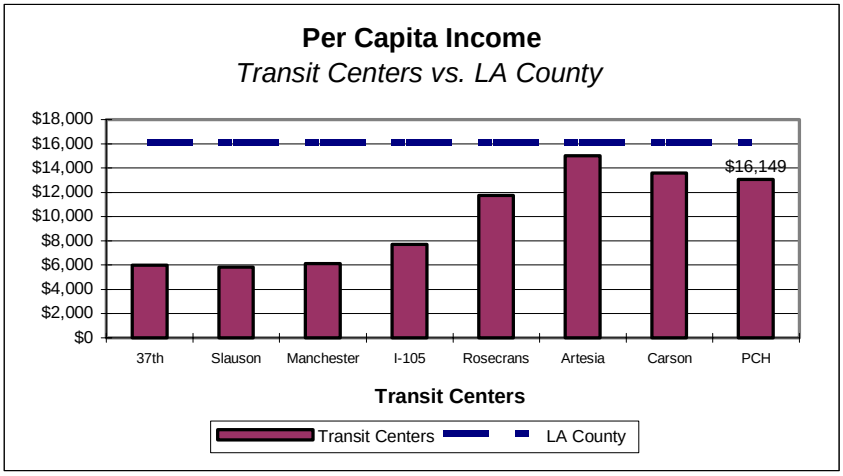


Figure 4.19

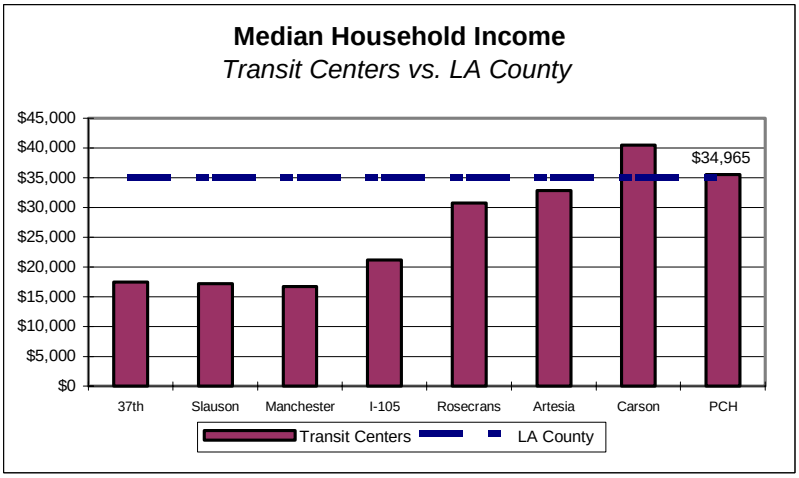


Figure 4.20

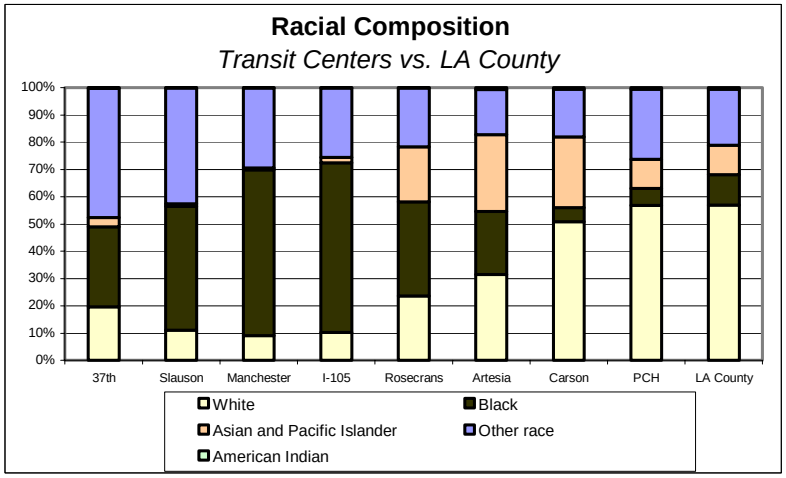


Figure 4.21

As mentioned before, Hispanic population is significant in the Study Area. In the 3-mile diameter area around the eight transit centers, three of them, namely 37th Street, Slauson, and Pacific Coast Highway, have more than 50 percent Hispanic residents, which is well above of the county average of 37.3 percent (Refer figure 4.22). Hispanic influx reflects dynamics of population change typical of this region. One implication of this trend is transit dependency because of higher public transit demand from immigrants.

4.4.4 Educational Attainment: Educational attainment level (less than or equal to high school) around station areas is below the county average. More than 70 percent of the residents in northern segments of the Study Area do not have any kind of education above high school, which is significant compared to county average (Refer figure 4.23).

4.4.5 Housing: Except for Carson and Artesia, all Study Areas near the eight transit centers have lower median gross rent than the county average of $626 per housing unit. Areas near 37th Street and Slauson have the lowest median gross rents of $464 and $482 (Refer figure 4.24). In part, this is a reflection of the low median household income explained previously.

The median housing unit value is lower in all areas near the transit stations than the county average of $223,800, according to 1990 Census data (Refer figure 4.25). The four north 3-mile diameter areas near 37th Street, Slauson, Manchester and I-105 have median housing unit value close to $100,000, which is less than half the county average.

From the above analysis, it is evident that the Study Area has a large share of population that is transit dependent. Many residents throughout the Study Area are in lower income brackets, or on fixed incomes, or do not own cars. Inspite of the implicit need, actual ridership has not kept pace with the projected demand of 65,200 daily transit ridership (2005 estimate) between San Pedro and Los Angeles Convention Center.[11] In fact, current ridership on Harbor Transitway is significantly below the projected level.

What could be the possible reasons for low ridership? Why has Harbor Transitway not experienced enhanced activity despite new station area infrastructure and design? What are some of the factors influencing ridership? To answer these questions, we have closely examined the physical context of Harbor Transitway and more specifically transitway stations in terms of land use, station access, and circulation. The next section discusses these issues in greater detail.

[11] Final Environmental Impact Statement: Interstate 110 Freeway Transit, Caltrans, 1985.

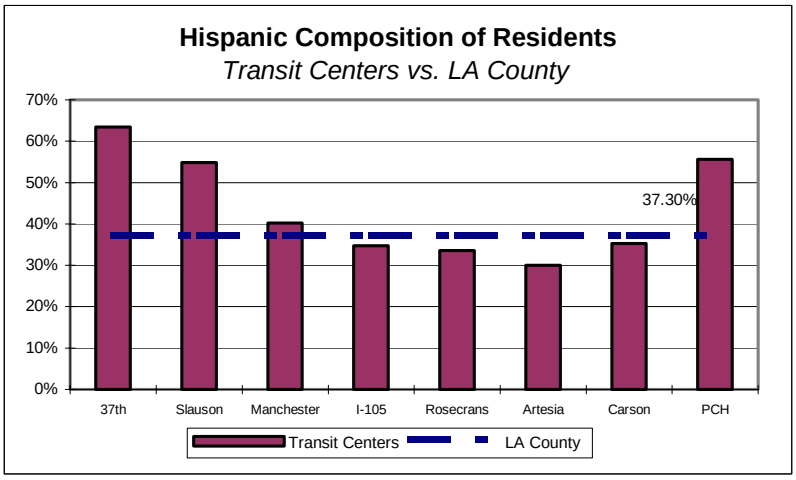


Figure 4.22

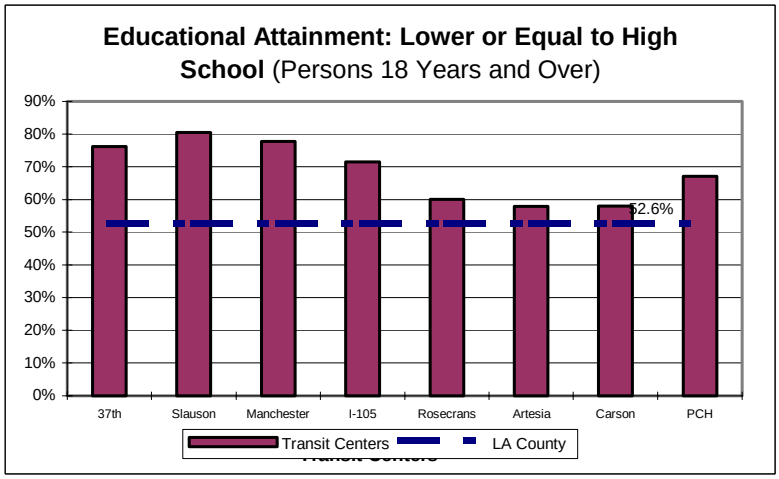


Figure 4.23

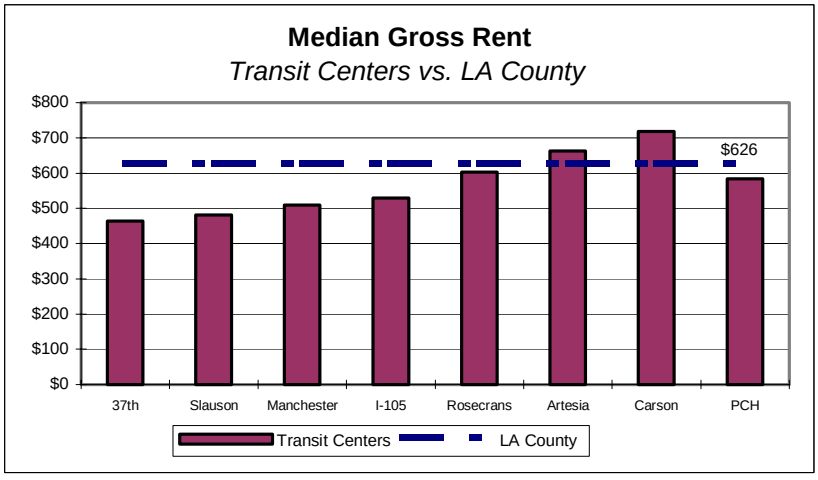


Figure 4.24

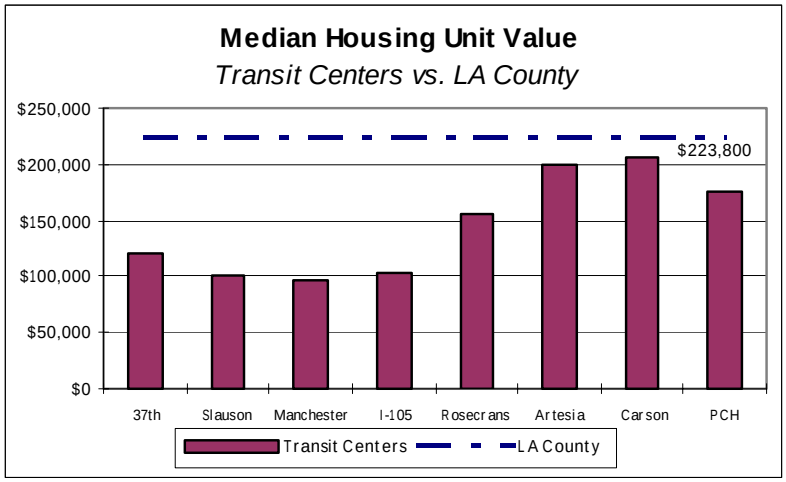

Median Housing Unit Value
Transit Centers vs. LA County
$250,000
$200,000
$150,000
$100,000
$50,000
$0
$223,800
37th
Slauson
Manchester
I-105
Rosecrans
Artesia
Carson
PCH
Transit Centers
LA County

Figure 4.25

5.0 Physical Context of the Bus Stations

5.1 Aerial Photos

The following aerial photos (see plates 5 through 12) show the immediate physical context and the urban fabric surrounding the bus stations. In all instances the bus stations are located in or near major arterial intersection, and typically with several freeway on- and off-ramps merging into the surrounding arterial grid. In two instances – 110/Artesia and 110/105 – the stations are located right in the cross-eye of major freeway intersections. These location characteristics, as we will further demonstrate in accompanying street level photographs, make the bus stations totally unfriendly, and indeed extremely unsafe for pedestrian access and circulation. As we have established in the demographic analysis presented in the previous section many of these station areas are inhabited by a large number of transit-dependent population. Unfortunately, the physical context of these station neighborhoods does little to facilitate the mobility of captive transit dependent population, much less appeal to new users.

On each of these aerial photos we have identified a square area defined by five minutes (or ¼ mile) walking distance in each direction. These aerial photos also show, rather poignantly, the large amount of surface area devoted to circulation and storage of automobiles, and related uses. At the same time many of the stations show considerable amount of homes and apartments within walking distance of the stations.

Plate 5: Bus Stop on Harbor Freeway
I-110 and 37th Street

Plate 6: Bus Stop on Harbor Freeway
I-110 and Slauson Avenue

Plate 7: Bus Stop on Harbor Freeway
I-110 and Manchester Avenue

Plate 8: Bus Stop on Harbor Freeway
I-110 and I-105

Plate 9: Bus Stop on Harbor Freeway
I-110 and Rosecrans Avenue

Plate 10: Bus Stop on Harbor Freeway
I-110 and Artesia Boulevard

Plate 11: Bus Stop on Harbor Freeway
I-110 and Carson Street

Plate 12: Bus Stop on Harbor Freeway
I-110 and Pacific Coast Highway

5.2 Land Use

The land use maps (see plates 13 through 19) show the variable land use portfolios of different stations. These land use profiles also suggest that not all of them are candidates for transit village type development. Stations such as the 37th Street, Artesia, and Slauson have more industrial and institutional uses that may call for a different combination of land use, than those with more commercial and residential land use mix. Clearly each station requires a unique approach, based on its situational characteristics, opportunities and potentials. Our two case examples – 37th Street and Manchester Transitway station areas -- presented in the following section represent two very different circumstances.

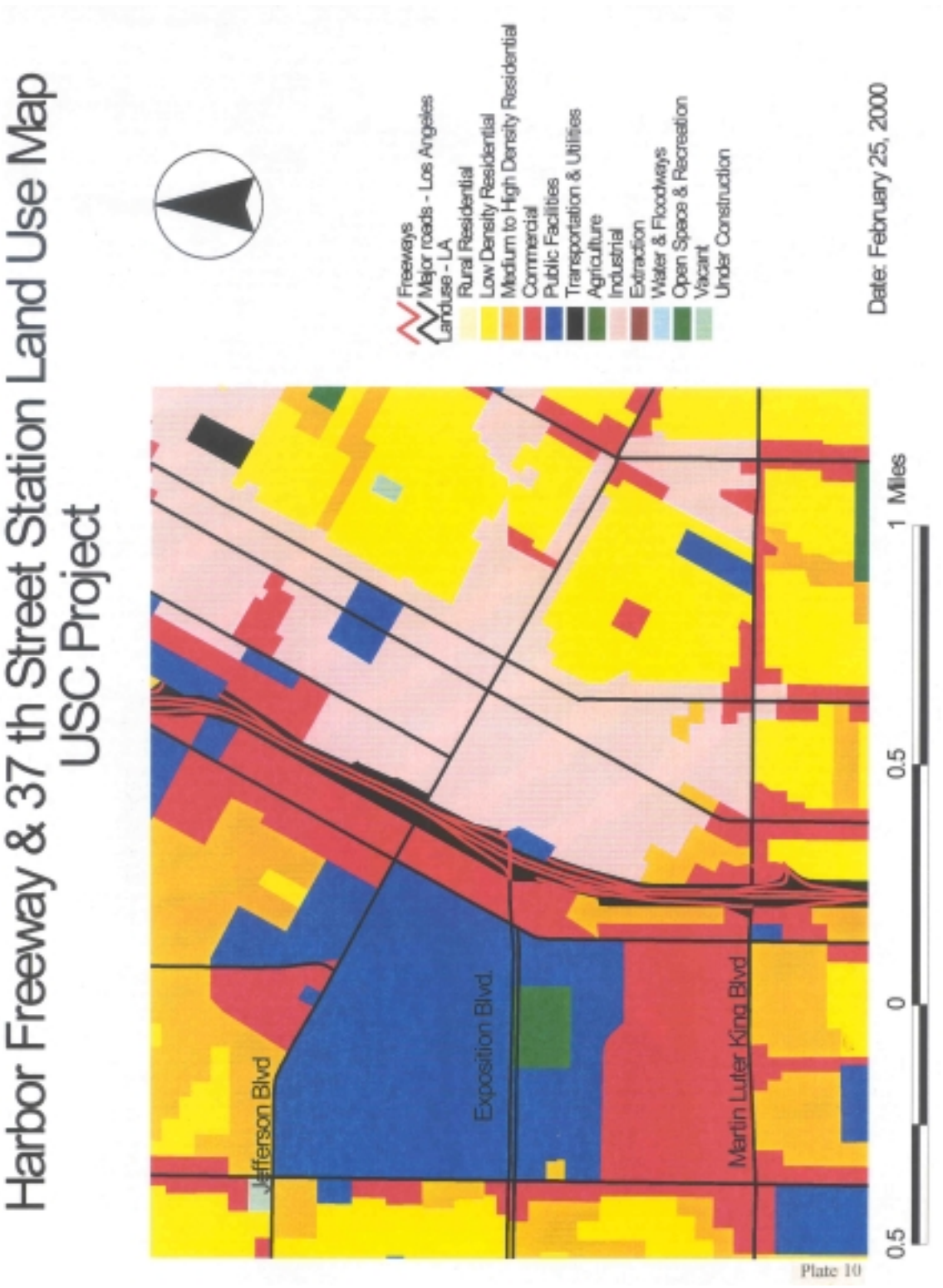

Harbor Freeway & 37 th Street Station Land Use Map
USC Project
Freeways
Major roads - Los Angeles
Landuse - LA
Rural Residential
Low Density Residential
Medium to High Density Residential
Commercial
Public Facilities
Transportation & Utilities
Agriculture
Industrial
Extraction
Water & Floodways
Open Space & Recreation
Vacant
Under Construction
Date: February 25, 2000
Jefferson Blvd
Exposition Blvd
Martin Luter King Blvd
0.5
0
0.5
1 Miles
Plate 10

Plate 13

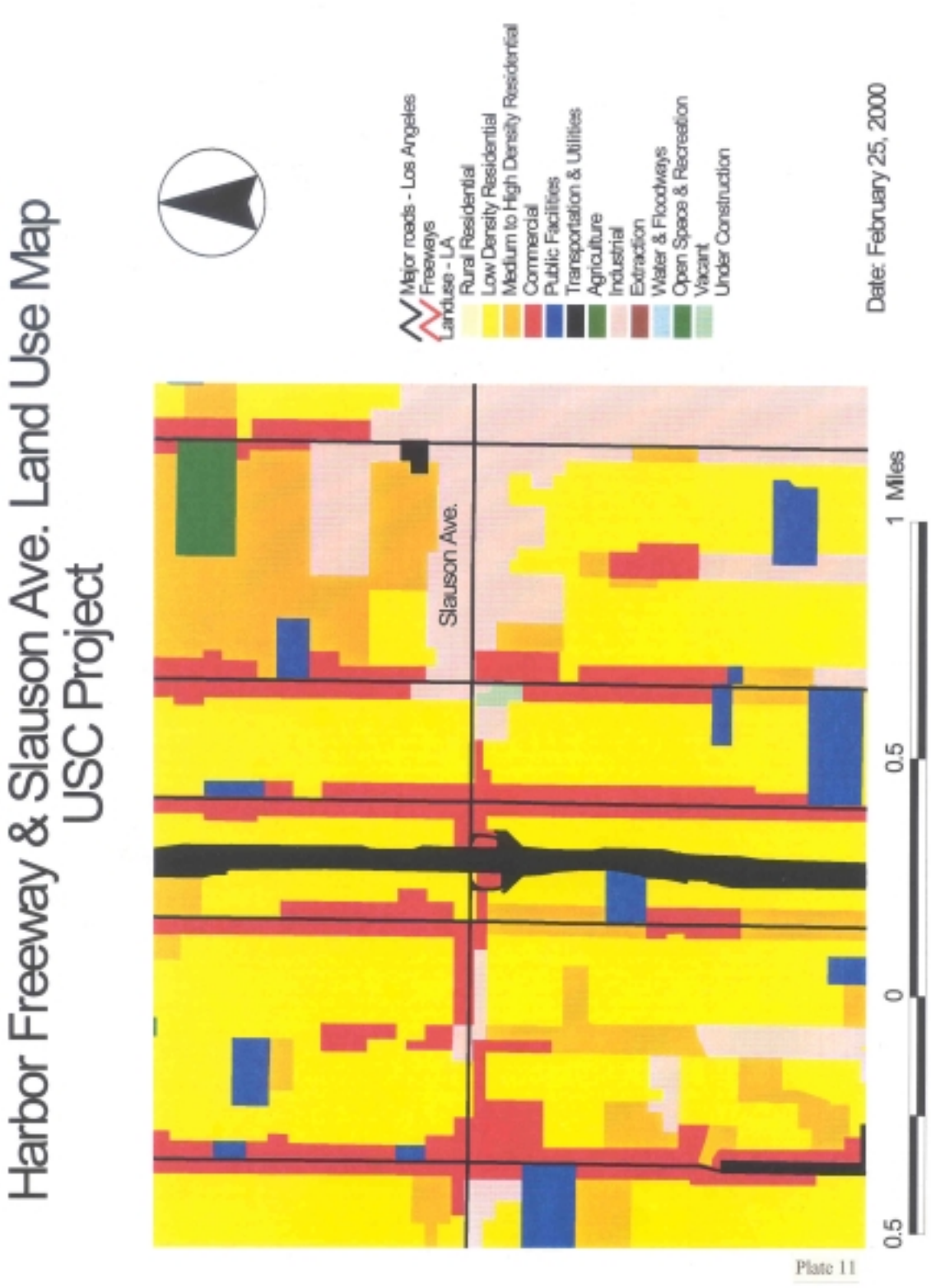

Harbor Freeway & Slauson Ave. Land Use Map
USC Project
Major roads - Los Angeles
Freeways
Landuse - LA
Rural Residential
Low Density Residential
Medium to High Density Residential
Commercial
Public Facilities
Transportation & Utilities
Agriculture
Industrial
Extraction
Water & Floodways
Open Space & Recreation
Vacant
Under Construction
Date: February 25, 2000
Slauson Ave.
0.5
0
0.5
1 Miles
Plate 11

Plate 14

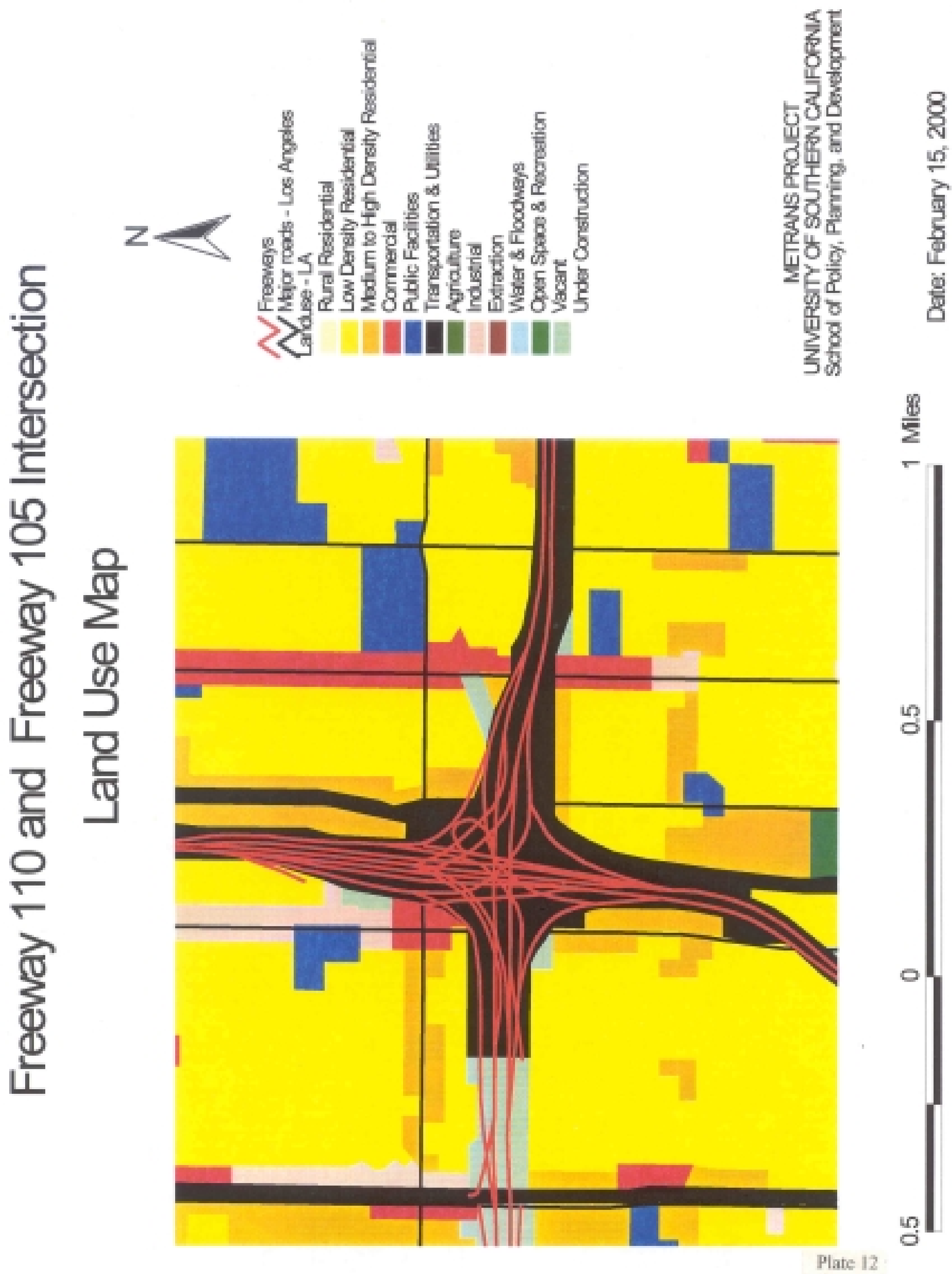

Freeway 110 and Freeway 105 Intersection
Land Use Map
N
Freeways
Major roads - Los Angeles
Landuse - LA
Rural Residential
Low Density Residential
Medium to High Density Residential
Commercial
Public Facilities
Transportation & Utilities
Agriculture
Industrial
Extraction
Water & Floodways
Open Space & Recreation
Vacant
Under Construction
METRANS PROJECT
UNIVERSITY OF SOUTHERN CALIFORNIA
School of Policy, Planning, and Development
Date: February 15, 2000
0.5
0
0.5
1 Miles
Plate 12

Plate 15

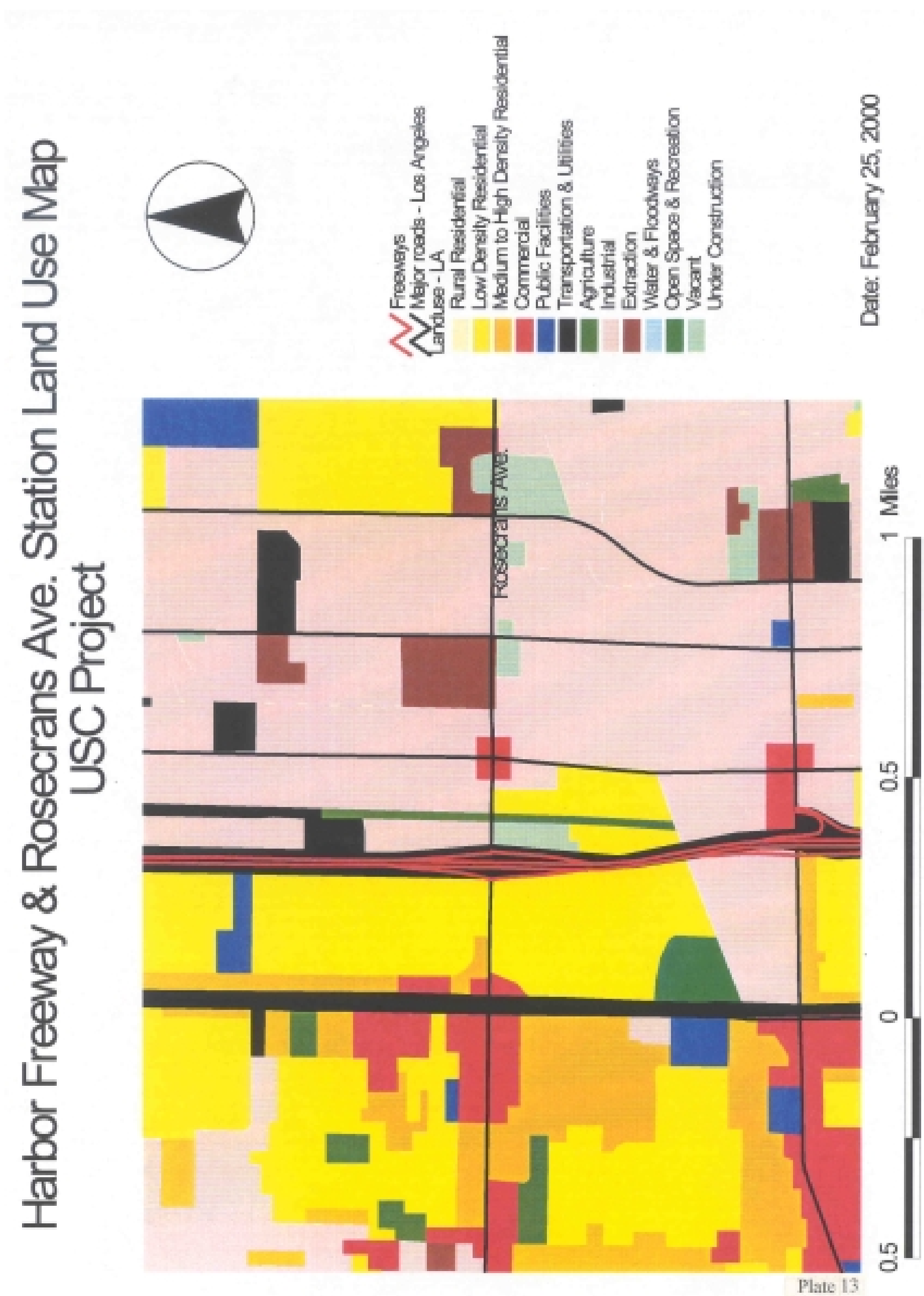

Harbor Freeway & Rosecrans Ave. Station Land Use Map
USC Project
Freeways
Major roads - Los Angeles
Landuse - LA
Rural Residential
Low Density Residential
Medium to High Density Residential
Commercial
Public Facilities
Transportation & Utilities
Agriculture
Industrial
Extraction
Water & Floodways
Open Space & Recreation
Vacant
Under Construction
Date: February 25, 2000
Rosecrans Ave.
0.5
0
0.5
1 Miles
Plate 13

Plate 16

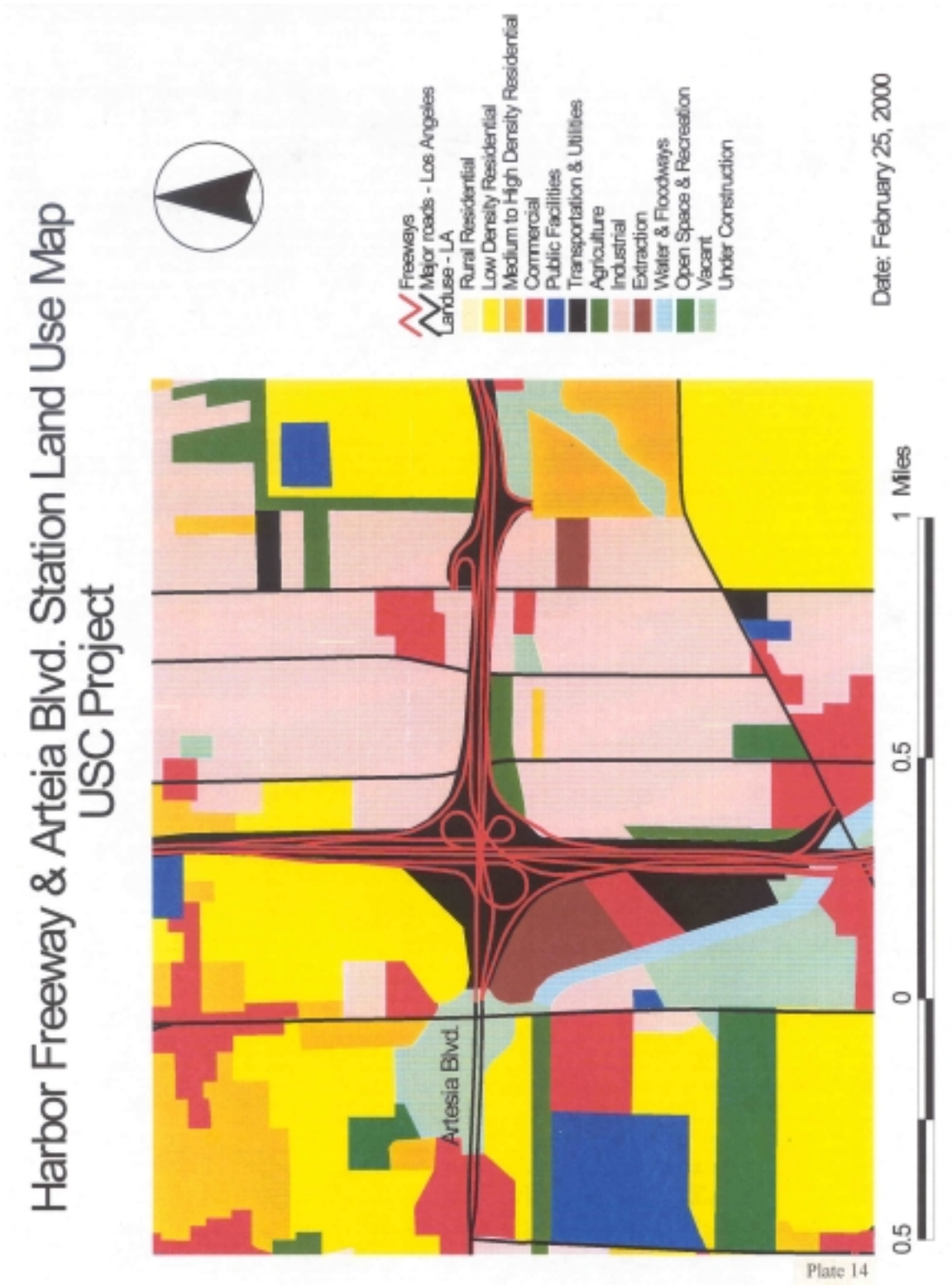

Harbor Freeway & Arteia Blvd. Station Land Use Map
USC Project
Freeways
Major roads - Los Angeles
Landuse - LA
Rural Residential
Low Density Residential
Medium to High Density Residential
Commercial
Public Facilities
Transportation & Utilities
Agriculture
Industrial
Extraction
Water & Floodways
Open Space & Recreation
Vacant
Under Construction
Date: February 25, 2000
Artesia Blvd.
0.5
0
0.5
1 Miles
Plate 14

Plate 17

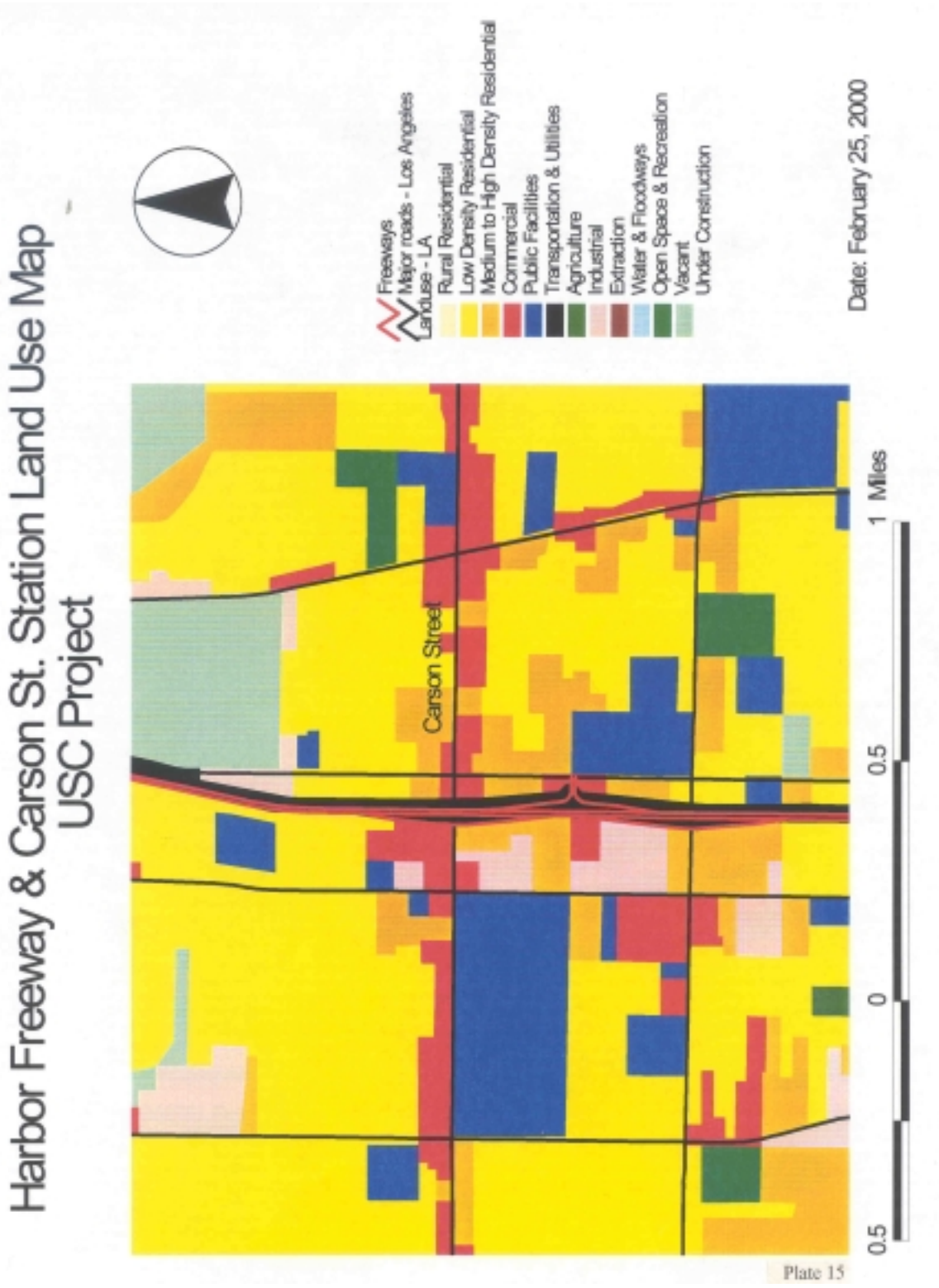

Harbor Freeway & Carson St. Station Land Use Map
USC Project
Freeways
Major roads - Los Angeles
Landuse - LA
Rural Residential
Low Density Residential
Medium to High Density Residential
Commercial
Public Facilities
Transportation & Utilities
Agriculture
Industrial
Extraction
Water & Floodways
Open Space & Recreation
Vacant
Under Construction
Date: February 25, 2000
Carson Street
0.5
0
0.5
1 Miles
Plate 15

Plate 18

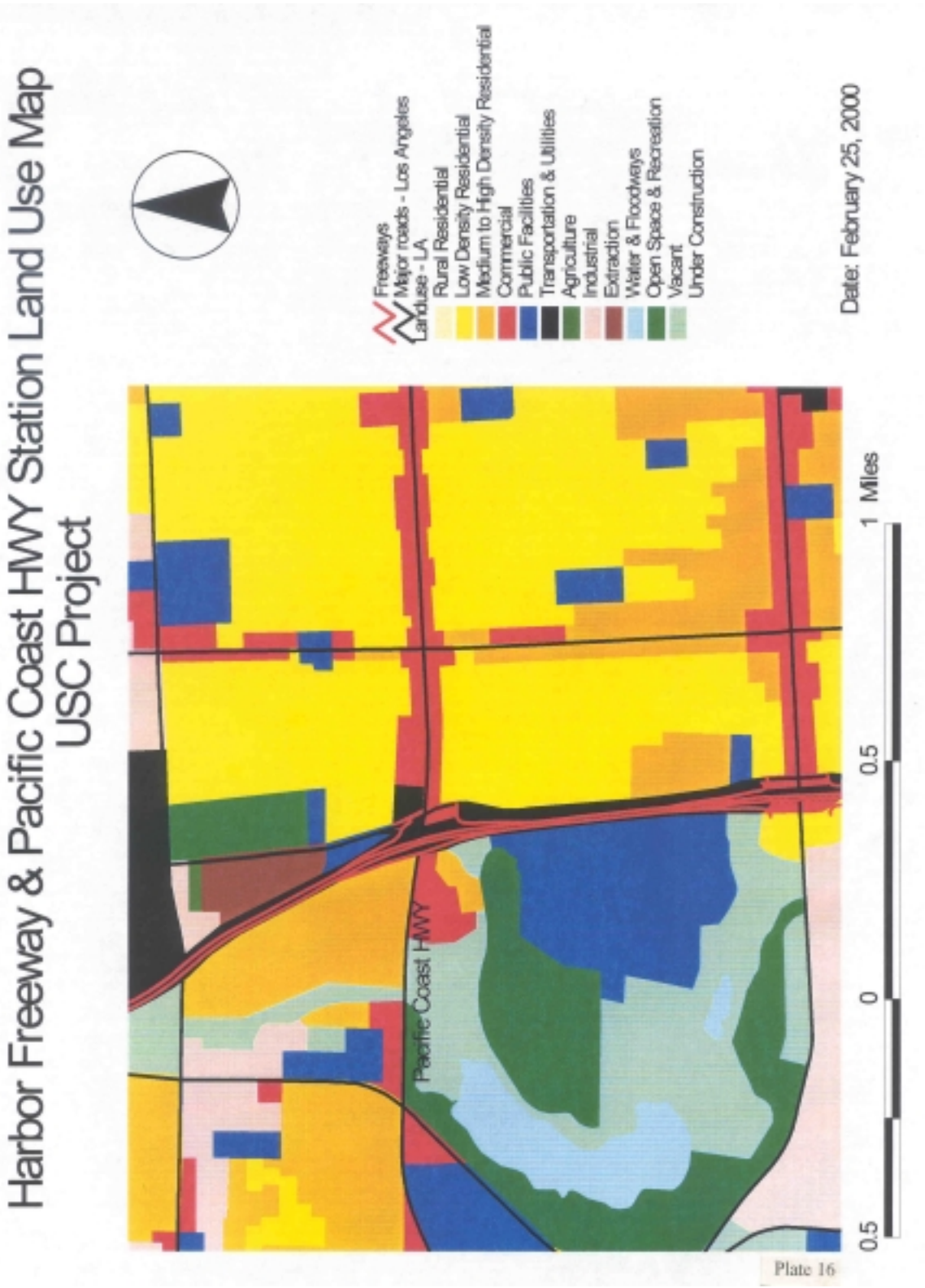

Harbor Freeway & Pacific Coast HWY Station Land Use Map
USC Project
Freeways
Major roads - Los Angeles
Landuse - LA
Rural Residential
Low Density Residential
Medium to High Density Residential
Commercial
Public Facilities
Transportation & Utilities
Agriculture
Industrial
Extraction
Water & Floodways
Open Space & Recreation
Vacant
Under Construction
Date: February 25, 2000
Pacific Coast HWY
0.5
0
0.5
1 Miles
Plate 16

Plate 19

5.3 Transit Stations

The following photos (see plates 20 and 21) are taken at the platform level on the freeway, as freeway transit users experience them today. These stations are all well designed, in modern architectural style, reflecting certain consistency in design throughout the system even though their relationships with their immediate urban contexts are significantly different. The stations are clean, well maintained, but usually empty and forlorn, and very noisy. The experience of vehicles driving by at very high speed with a noise level of 90 db or higher could indeed be quite disconcerting, if not intimidating. They are examples of what can be considered classic "undermanned" settings. They are public spaces, yet there is very little opportunity for human interaction. Some of the access stairs and bridges are physically intimidating, and at least in one case, appropriate by a homeless person and his vagrant animals.

Plate 20: Platform Level Views of the 37th Street Station

Plate 21: Platform Level Views of the 37th Street Station

5.4 Transit Station Access

As the following pictures (see plates 22 through 24) indicate the sidewalks and crosswalks near the station are partially blocked by signs for freeway ramps. Installed on sidewalks at the pedestrian height level, the signs are a major hazard, and quite unsafe for the pedestrians. In some instances, as in the 37th Street station, the street grid and location of pedestrian signs make the access to the station very difficult. There is no adequate pedestrian access to the station site. It takes a determined or transit-dependent person to reach these bus-stations. While the station structures are carefully designed, very little effort has been given to make the station accessible, or pedestrian-friendly.

Plate 22: View of the 37th Street Transit Station

Plate 23: Neighborhood around 37th Street Transit Station

Plate 24: Neighborhood around Manchester Transit Station

6.0 Design Concepts

It should be apparent from the evidence presented in the narratives and graphic documentation of the I-110 transitway stations and their neighborhoods, that while the stations are well-designed and well-constructed their interfaces with the immediate urban space have yet to adequately addressed or defined. In particular, the question remains whether these station neighborhoods could be developed as transit villages or as transit oriented destinations. While there have been studies that explored such possibilities and design proposals advanced suggesting how such transformations can be achieved, relatively little has been done in the context of bus transitways.

In this section we will present proposals for transit station area development at two station locations – the 37th Street station near USC and Exposition Park, and Manchester Boulevard station, also known as the Broadway- Manchester redevelopment area. In both cases we will present several alternatives that combine different mix of land use, and assumptions about future growth and market demand. In both locations specific design proposals are dictated by the situational characteristics. Thus the 37th Street station area was seen as having many different types of development possibilities, because of the proximity to the University, and its impact on surrounding areas. The Broadway-Manchester site has been shown as a mixed-use transit village that combines residential use with commercial uses, but in a radical departure from the plan prepared for the Los Angeles Community Redevelopment Agency, which proposes a very conventional shopping mall surrounded by large parking lots. More specific descriptions of these alternatives will follow elsewhere in this section.

6.1 General Principles

The following characteristics, however, can be seen as the general principles for the station area development, although specific land use configurations presented in these design proposals may vary. (see plate 25)

- Mixed use development
    - Integration of retail, commercial, and housing
    - Medium to high density development
- Courtyard-based development
    - Extension of public space that lends control and safety for the residents
    - Transitional space /semi-public and private
- Use of pedestrian alleys to facilitate connectivity – from parking and within building complexes
- Shared parking facility for multiple uses
- Extension of living quarters in public space to define entry into a semi-private environment
- Roof garden
- Continuity of façade/edge
- Sense of identity through repetition of elements/motifs

- Integration of public facilities such as schools, multi-media, library/training center within the existing residential and commercial fabric

Plate 25: Possible Main Street Façade
Examples of Mixed Use Development

6.2 Transit Oriented Development

Following are general design concepts applicable to all transit stations in our Study Area.

- Pedestrian friendly
- Park and ride facilities
    - Availability of handicap parking adjacent to transit stop
- Landscaping – street lined landscaping to create a soft edge
- Wide sidewalks
- Wide and safe crosswalks
- Texture - both horizontal and vertical
- Enhancing social interaction through a mix of uses and higher densities
- On-ramp off-ramp modifications to accommodate pedestrians and redirect traffic flow away from the center
- Use of public amenities such as benches, street lighting, public art (murals/sculptures) to support a pedestrian environment
- Signage – leading to the transit center
- Transit center structure identifier
- Use of marginal space adjacent to freeway for parking and/or light industrial uses
- Traffic calming strategies
- Crosswalks with texture/pattern

(see plates 26 to 30)

Pedestrian streets and alleys that can be created through street closure in a medium density residential development

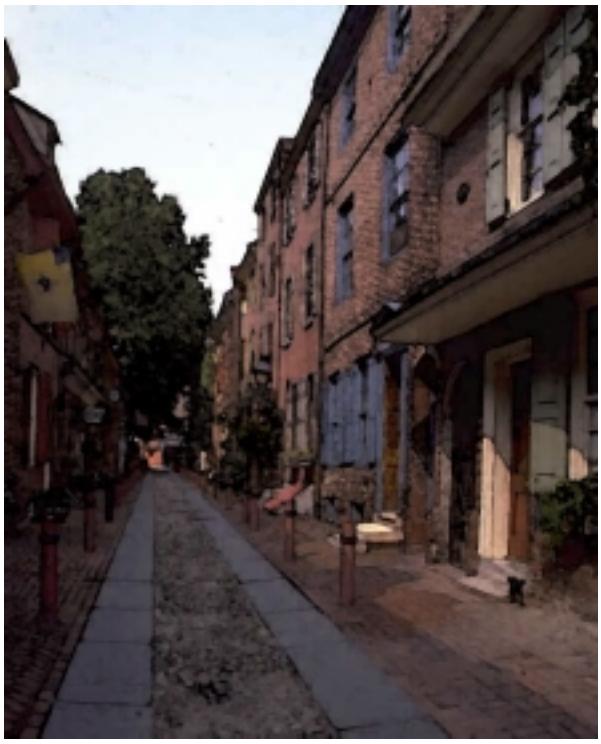


Plate 26: Neighborhood Alleys

Plate 27: Pedestrian Alleys and Streets in Apartment Complexes

Mixed Use: First Floor Retail, Second Floor Parking

Mixed Use: First Floor Retail, Second Floor Apartment

Plate 28: Examples of Mixed Use

Plate 29: Mixed Use Development with Street Enhancements

Plate 30: Outdoor Dining/Sidewalk Enhancement

6.3 Design Concepts for 37th Street Transitway Station

The 37th Street station is unique in that it is close to the University of Southern California (USC), and has a significant proportion of industrial land within proximity. The current circulation of the traffic and movement on and off ramps strangles the pedestrian flow. In fact the Exposition Boulevard/Figueroa Street intersection has a high incidence of accidents involving pedestrians. Students rarely go east of Flower, and the high volume of traffic moving in and out of Department of Motor Vehicles (DMV) creates islands of isolation.

6.3.1 **Option 1** (see plate 31):

This plan suggests a residential development within walking distance of the freeway bus stop. The intent is to create students' housing to the east of the USC campus coupled with a satellite University Village that could have various kinds of retail establishments such as stationery, books and music, personal services such as barber shops, laundry or high-tech equipment retail such as electronics and computers, and restaurants/eating places.

The scheme is centered on a pedestrian path going from Flower Street parallel to 37th Street all the way east to the Mercado de Paloma food-court. Exposition Boulevard terminates at Figueroa Street and the traffic continues along a wider (with added median) 37th Street. The traffic heading towards the 110-North freeway has been diverted through Grand Street. This creates a safe pedestrian walkway and an agglomeration of street-side shops that would infuse life into the area surrounding the bus station, making it safe, pedestrian-friendly and amenable.

Option 1: Station Area Development for 37th Street Transit Center[12]

Plate 31: Option 1 – 37th Street Transit Center

[12] Refer Appendix 9.3 for Land Use Legend

6.3.2 Option 2: Station Area Development for 37th Street Transit Center[13]

This plan (plate 32) proposes the creation of a commercial and business district around the bus station. Capitalizing on the demand for high-quality office and industrial space in the South Bay area, this scheme would also offer opportunity for residents to use alternative modes of transport. A local shuttle would frequently pick up the commuters from their offices and drop them to the transit center, from which they could access the HOT buses, the Blue Line, or other transit modes. A network of taxis, bicycle-lanes, and pedestrian walkways would connect the business and commercial centers to the bus station. The scheme includes the creation of a health-care center and ancillary retail facilities for University students. The traffic diversion works in a similar way as in Option 1.

Plate 32: Option 2 – 37th Street Transit Center

[13] Refer Appendix 9.3 for Land Use Legend

6.3.3 Option 3: Station Area Development for 37th Street Transit Center[14]

The Blue Line goes down Figueroa Street, and turns into Exposition Park. The housing south of campus is maintained in its current configuration, and an additional university extension building is made on the corner of 37th Street and Figueroa (see plate 33).

Plate 33: Option 3 – 37th Street Transit Center

[14] Refer Appendix 9.3 for Land Use Legend

6.3.4 Option 4: Station Area Development for 37th Street Transit Center[15]

In this option, the Blue Line goes all the way down Flower Street, and turns into Exposition Park. There is an office-cum-retail plaza at the corner of 37th Street and Figueroa (see plate 34).

Plate 34: Option 4 – 37th Street Transit Center

[15] Refer Appendix 9.3 for Land Use Legend

6.4 Design Concepts for Manchester Transitway Station

6.4.1 Option 1: Station Area Development for Manchester Transit Center

This scheme includes a high-density mixed-used development within walking distance of the transit station. The development is predominantly multifamily residential with retail and commercial on the first story. The intent is to create walkable streets and a main-street pedestrian life on major roads such as Broadway, Manchester, and Figueroa (see plate 36).

The residential units are arranged around internal courtyards that serve as semi-public transitory spaces between the hustle on the main-street and the security and privacy of the residential units. The public-private transition is further defined with alleys and covered walkways. These covered walkways, which define the entry to residential complexes, would also function as landscaped terraces connecting two higher-level units. The pattern of development is thus a well-knit and integrated neighborhood with safe places where children can play within sight of their parents. This eyes-on-the-street approach enhances security as well. As a result, the hierarchy of space from public to private is monitored by neighborhood control.

One of the main themes in this scheme is shared parking not only in the commercial areas but also in the residential areas. The alleys lead to single-lane paths around the courtyard, that in turn lead to covered garages. Not all buildings would have parking lots, nor would there be on street parking in the alleys. The intent is to create pedestrian traffic as people move through courtyards and alleys and interact with the community. Parking for transit centers is separate and does not intrude upon the privacy of residents.

This approach at a neighborhood level integrates the commercial aspect of retail and office space into the social fabric of residential life. The recommended retail establishments are small stores selling household goods, food, apparel, and stationery; personal services such as hairdressers; and local destination points such as coffee shops and bookstores. These activity areas would be clustered around a small library and a two-screen cinema, which would cater more to local needs and also host local events. The purpose is to create a multi-purpose cultural center that institutionalizes public life within the community.

In comparison, the proposed CRA design (see plate 35) for the area has given an incommensurate proportion of space to roads and parking. This disrupts community life and gives no incentive for people to walk. The pedestrian connectivity is disrupted by large parking lots and unfriendly intersections. The significance of street life and walkable communities is undermined by the priority of designing efficient automobile flow.

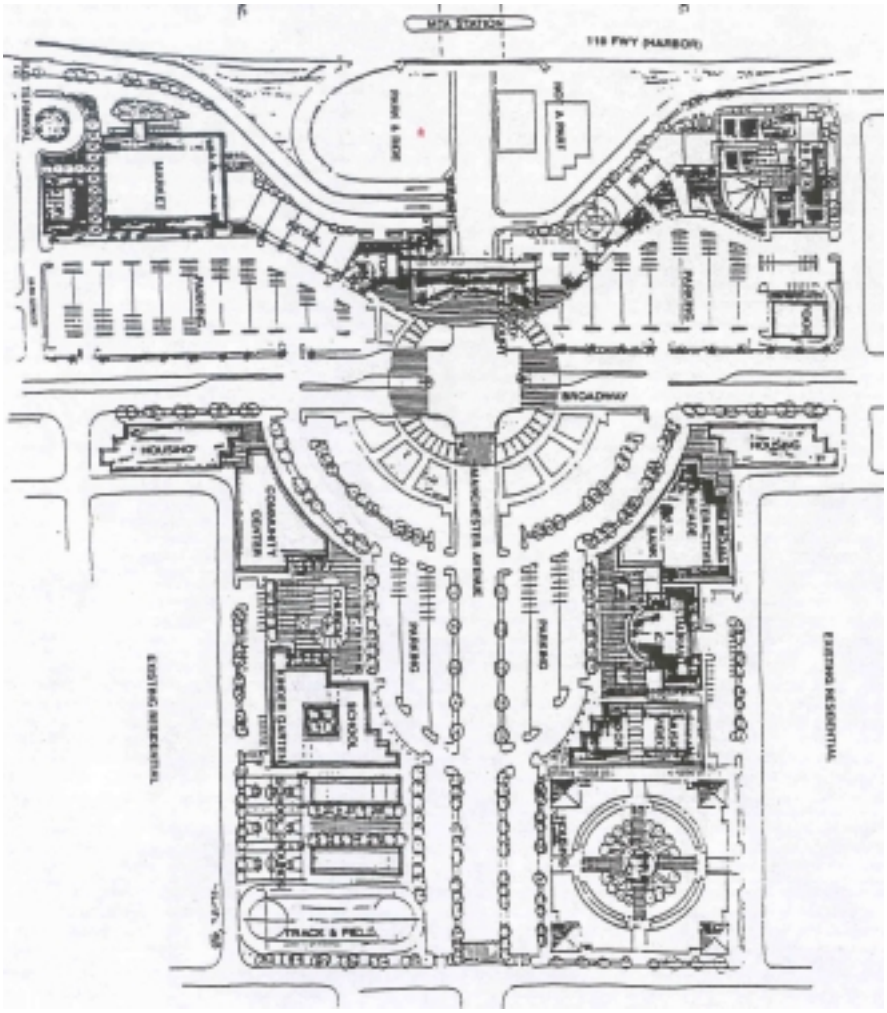


Plate 35: CRA's Design for Manchester Transit Center

Option 1: Station Area Development for Manchester Transit Center[16]

Plate 36: Option 1 – Manchester Transit Center

[16] Refer Appendix 9.3 for Land Use Legend

6.4.2 Option 2: Station Area Development for Manchester Transit Center[17]

This alternative proposes lower densities than the previous option, including a neighborhood park in the development. Lower residential densities west of Figueroa, and a network of green walkable spaces makes this park an ideal amenity for residents within the neighborhood (plate 37).

Plate 37: Option 2 – Manchester Transit Center

[17] Refer Appendix 9.3 for Land Use Legend

7.0 Conclusions

In this study we have examined the development potential for the Harbor Transitway station areas. Our demographic and market analyses suggest that there is a considerable concentration of transit dependent population in these neighborhoods and considerable potential for future development exists in these station neighborhoods. However, the current land use and physical infrastructure make these sites unattractive and unsafe. Studies of station area development around light rail transit stations have argued that without appropriate antecedents (see Loukaitu-Sideris and Banerjee, 2000) stations area development is not likely to occur. While we are well aware of the caveats, we believe that specific circumstances around certain stations could serve as missing antecedents.

The two stations we have chosen -- the 37th Street Transitway station near USC, and the Manchester Transitway station -- are cases in point. Given the future expansion and the demand for affordable housing for the growing staff and students of USC, a mixed-use transit center village is quite likely within the next decade or so. Here, the antecedents of development are provided by the Figueroa Corridor improvements and the recently created Business Improvement District, USC's future space needs, and the possibility of Blue Line or a rapid bus connection to the Westside through the Exposition Corridor. Similarly, the antecedents of development for the Broadway/Manchester site has already been created by designating the area as a redevelopment area by CRA. The Empowerment Zone designation of the larger urban context further supports such possibilities.

8.0 Implementation

The Community Redevelopment Agency of the City of Los Angeles is currently engaged in station design and joint development efforts to revitalize the Manchester Transitway station area. We are abreast of these developments and are communicating with the Agency our recommendations for the said project. Station design is a priority and a key ingredient in increasing ridership, promoting new uses, intensifying development, and inducing new auto drivers to switch mode.

We are currently exploring design improvements necessary in station design and development to encourage higher level of transit ridership for the local communities. Our research approach is evaluative in nature serving two purposes: (1) assessing "place-based" qualities of station design, and (2) identifying transit user needs and/or gaps in services. As a methodology, we have adopted visual reconnaissance, surveys, and interviews to develop broad performance measures of station area interface with the neighborhood and transit user needs.

9.0 Appendix

Bus Lines Running ON the 110 Freeway	Bus Lines Running Parallel to the 110 Freeway
401	45
402	46
442	81
444	345
445	
446	
447	
550	

Bus Lines Intersecting the 110 Freeway (starting from Pasadena, north of Downtown)

46	255
83	256
84	394
85	410
96	483
176	

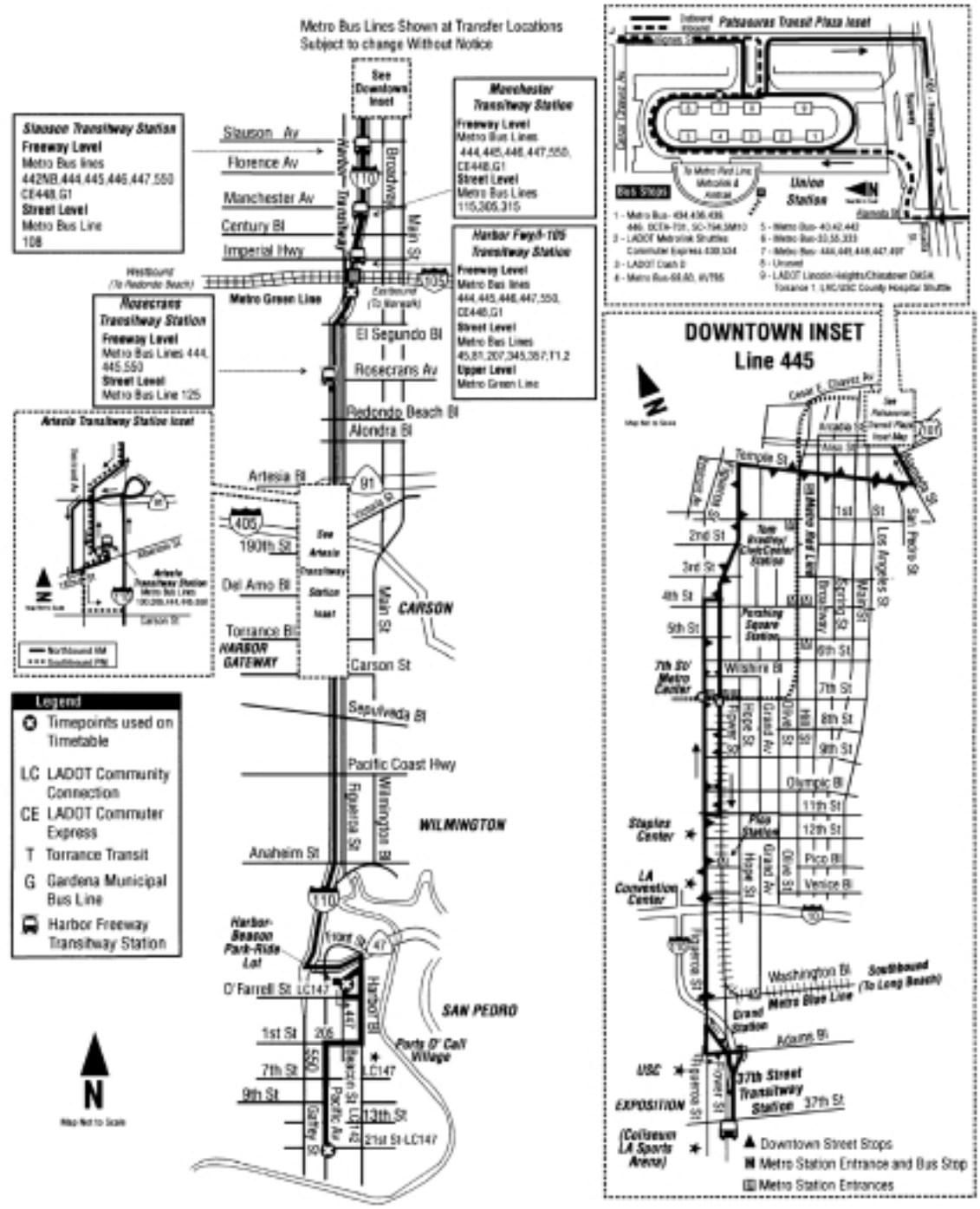
Bus Lines Intersecting the 110 Freeway (Downtown)

1	21	53	302	436
2	22	56	304	439
3	26	65	316	487
4	27	66	318	489
10	28	68	328	491
11	30	70	333	497
14	31	92	362	522
16	33	93	427	603
18	37	104	429	
20	51	11	434	

Bus Lines Intersecting the 110 Freeway (South of Downtown)

38	115	311
40	117	315
42	119	357
102	120	576
105	124	
107	125	
108	130	
110	205	
111	207	
112	232	

9.1: Bus Lines



9.2: Harbor Freeway Transit Station Locations and a Typical Metro Bus Line Line 445: San Pedro/Artesia Transit Center/Patsaouras Transit Plaza/Union Station Express

Source: Los Angeles County Metropolitan Transportation Authority, [http://www.mta.net/metro/System_Map/slaclb.htm].

9.3: Land Use Legend

10.0 References

American Public Transit Association. Building Better Communities: Coordinating Land Use and Transit Planning: Sourcebook. Washington, DC (1994).

Andrle, Stephen J. et al. "Security Considerations in the Design and Operation of Rapid Transit Stations." *Transportation Research Record 760*, TRB, National Research Council, Washington, DC (1980).

Banerjee, Tridib and Anastasia Loukaitou-Sideris, "Form Follows Transit? The Blue Line Corridor's Development Potentials," UCTC No. 259 (1994).

Banerjee, Tridib and Anastasia Loukaitou-Sideris, "There's No There There Or Why Neighborhoods Don't Readily Develop Near Light-Rail Stations," Access No. 9 (Fall 1996).

Bernick, Michael et al., *Transit-Based Development in the United States: A Review of Recent Experiences*. University of California at Berkeley, Institute of Urban and Regional Development, Berkeley, California (March 1994).

Bernick, Michael and Thomas J. Kerk, *Transit Villages: Opportunities and Strategies*. University of California at Berkeley, Institute of Urban and Regional Development, Berkeley, California (January 1994).

Bernick, Michael and Robert Cervero, *Transit Villages for the 21st Century*. New York, McGraw Hill (1996).

Box, Paul C., *The Location and Design of Bus Transfer Facilities*. Institute of Transportation Engineers, Technical Council Committee 5C-1A, Washington, DC (February 1992).

Bradley, Richard and Laura Briggs, *Transportation for Livable Communities: A Powerful New Approach to Transportation Policy.* Business Transportation Council, Washington, DC (1993).

Cervero, Robert, "Transit Villages: From Idea to Implementation," Access No. 5 (Fall 1994).

Cervero, Robert, *Ridership Impacts of Transit Focused Development.* Berkeley, University of California (1993).

Cervero, Robert and Mark Dunzo, *An Assessment of Suburban Targeted Transit Service Strategies in the United States*. University of California, Transportation Center, Berkeley, California (October 1993).

City of Los Angeles Planning Department, Land Use/Transportation Policy for the City of Los Angeles and the Los Angeles Metropolitan Transportation Authority, 1993.

First Year Report San Bernardino Freeway Express Bus Evaluation, Prepared for the Southern California Association of Governments by Crain & Associates (February 1974).

Fisher, Kimberly M., *Transit-Oriented Design*. ULI Research Working Paper Series No. 635. The Urban Land Institute, Washington, DC (June 1994).

Freeway Express Bus Study, Prepared for the Southern California Association of Governments, Tom Whittle Planning and Development Consulting, April 30, 1990.

Freeway Transit Element of the Regional Transit Development Plan for Los Angeles County, Executive Summary, Caltrans –District 07, Transit Branch, August 1978.

Fruin, John J., *Pedestrian Planning and Design*. Metropolitan Association of Urban Designers and Environmental Planners, New York, New York, 1971.

Holtzclaw, John, "Using Residential Patterns and Transit to Decrease Auto Dependence and Costs." Natural Resource Defense Council, San Francisco, California, June 1994.

Lamont, Juliet et al. *Metropolitan profiles: development patterns, socioeconomic characteristics and transit use, 1960-1995*. Berkeley: University of California at Berkeley, Institute of Urban and Regional Development, 1997.

Long Range Transit Plan, LACMTA, 1995.

Los Angeles County Master Plan, *Working Paper No. 2, Inventory of Existing, Planned, and Potential Park-and-Ride Facilities*, Prepared for Los Angeles County Transportation Commission, Kaku Associates, Inc, July 1991.

Los Angeles Metro Rapid Bus Demonstration Program: Implementation Plan, Prepared for LACMTA, Transportation Management and Design, Inc. in association with Suisman Urban Design, March 1999.

Loukaitou-Sideris, Anastasia. Retrofit of Urban Corridors: Land Use Policies and Design Guidelines for Transit-Friendly Environments. University of California, Transportation Center, Berkeley, California, 1993.

McQueen, James T. et al., The *Evaluation of the Shirley Highway-Express-Bus-On-Freeway Demonstration Project*, Prepared for Urban Mass Transportation Administration, August 1975.

Newsom, T.J., F.J. Wegmann, and A. Chatterjee, *Suburban Mobility: A Challenge for Public Transportation*, Transportation Center, The University of Tennessee, Knoxville, January 1992.

Parsons Brinckerhoff Quade and Douglas, Inc., Robert Cervero, Howard/Stein-Hudson Associates, Inc. and Jeffrey Zupan. *Influence of Land Use Mix and Neighborhood Design on Transit Demand.* Washington, D.C., Transportation Research Board, 1996.

Parsons Brinckerhoff Quade and Douglas, Inc., Robert Cervero, Howard/Stein-Hudson Associates, Inc. and Jeffrey Zupan. *Public Policy and Transit Oriented Development: Six International Case Studies.* Washington, D.C., Transportation Research Board, 1996.

Parsons Brinckerhoff Quade and Douglas, Inc., Robert Cervero, Howard/Stein-Hudson Associates, Inc. and Jeffrey Zupan. *Transit, Urban Form, and the Built Environment: A Summary of Knowledge.* Washington, D.C., Transportation Research Board, 1996.

Rabinovitch, J. and J. Hoehn. *A Sustainable Urban Transportation System: The Surface Metro System in Curatiba, Brazil*. New York: EPAT/MUCIA, draft report, 1993.

San Diego Metropolitan Transit Development Board, *Designing for Transit: A Manual for Integrating Public Transportation and Land Development in the San Diego Metropolitan Area*. San Diego, California, July 1993.

Schneider, J.B. *Locating, Sizing, and Designing Transit Centers: A Bibliography*. Chicago, Illinois, CPL Bibliographies, 1984.

Transitway Feasibility Study, Prepared for Los Angeles Metropolitan Transportation Authority, Regional Transportation Planning and Development with the assistance of City of Los Angeles Department of Transportation, August 1998.

Transportation for the 21st Century: A Plan for Los Angeles County, LACMTA, February 15, 1995.

U.S. Department of Transportation, *Developing Community-Sensitive Transit*. The Federal Transit Administration Livable Communities Initiative, Washington, DC, 1996.

_____, *Guidelines for Transit-Sensitive Suburban Land Use Design*. Urban Mass Transportation Administration, Office of Technical Assistance and Safety, Washington, DC, July 1991.

_____, *The Impact of Various Land Use Strategies on Suburban Mobility*. Federal Transit Administration, Office of Technical Assistance and Safety, Washington, DC, December 1992.

_____, *Transit Station Area Joint Development: Strategies for Implementation*. Urban Mass Transportation, National Technical Information Service, Washington, DC, February 1976.

_____, *Transit-Supportive Development in the United States: Experiences and Prospects*. Federal Transit Administration, Washington, DC, December 1993.

Wilson, Richard and Jeffrey Anderson, "Planning for Transit Oriented Development in San Diego and Vancouver, British Columbia," 35th Annual Meeting of Association of Collegiate Schools of Planning, Philadelphia, PA, (October 28-31, 1993).