Appendix A- Baseline Conditions

1

CAMBRIDGE SYSTEMATICS

I-405 Comprehensive Multimodal Corridor Plan

Baseline Conditions Assessment

prepared for

LA Metro

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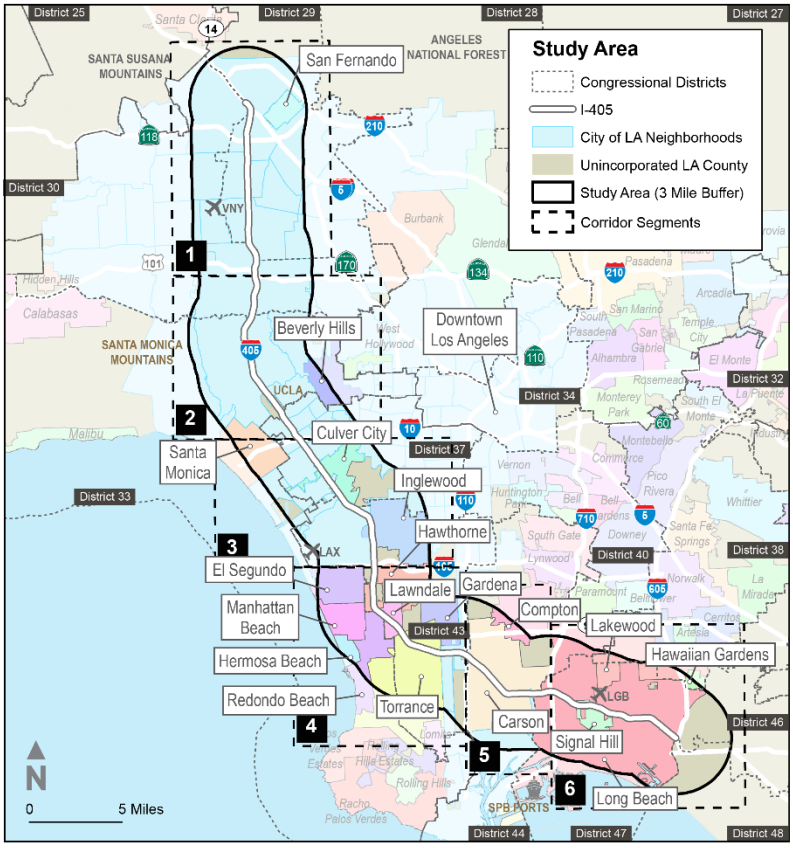


I-405 is more than just a freeway. It is a "system of systems" that collectively represents a corridor of local, regional, and national significance. It simultaneously serves some of the wealthiest and some of the most disadvantaged communities in the US, with cities and neighborhoods as varied as Inglewood and Brentwood, Carson and Culver City, Mission Hills and Beverly Hills, and San Fernando and Santa Monica. More than a quarter of LA County's population (nearly 2.8 million residents) live within three miles of the corridor and about 28 percent of jobs in LA County (1.4 million) are located within those boundaries.[1] The corridor connects critical gateways and trade hubs, including the Ports of Los Angeles and Long Beach (the San Pedro Bay Ports or SPB Ports) (via I-710), Los Angeles International Airport (LAX), California's Central Valley, the Mexican border, and the rest of the continent. The I-405 is also a critical corridor for commuters, residents, and visitors across the region, handling volumes of nearly 390,000 vehicles per day between I-710 (Long Beach) and I--605 (Santa Ana)—the fourth highest volume of any freeway segment in the nation.

While the I-405 freeway functions as the primary travel locus, the highway is just one element of an integrated network that facilitates a disproportionate share of the daily trips within the County. For this reason, the I-405 CMCP's study area includes the full extent of the I-405 freeway in LA County— a total of 48.5 miles—as well as a travel "catchment area"[2] of three miles on both sides of the freeway. In its entirety, the freeway spans a total of 72.4 miles in California from I-5 in the San Fernando Valley in LA County to Irvine in Orange County, where it reconnects with I-5 at its southern terminus. Running a total of 48.5 miles in LA County- from I-5 in the north to I-605 in the south- the I-405 highway corridor is bisected by more than 50 major arterial interchanges and eight other freeway systems (I-605, I-710, I-110, I-105, I-10, U.S.-101, SR-118, and I-5). Together, this network of facilities connects and serves a staggering number of trips. The freeway itself carries only 25 percent of vehicle miles traveled (VMT) in the study area.[3] The other 75 percent

[1] Population estimates are from the U.S. Census Bureau; American Community Survey; 2018. Employment estimates are from the U.S. Census Bureau; Longitudinal Employer-Household Dynamics Survey; 2018

[2] Three miles is the standard catchment area at which trips are attracted to a freeway.

[3] Caltrans Highway Performance Monitoring System, 2017.

occurs on more than 50 arterial interchanges along the corridor and the eight freeway systems that intersect the I-405).[4] VMT in the corridor study area accounts for 6.5 percent of all the VMT in California.[5]

Los Angeles County Metropolitan Transportation Authority (Metro), its partners and LA County residents have long recognized that the I-405 Corridor must be a cornerstone of the future transportation network. Los Angeles County voters signaled their desire for multimodal mobility improvements for the I-405 corridor area by approving significant targeted investment through Measures M and R, passed by substantial margins in 2008 and 2016 respectively. These measures included funding for things like the Crenshaw/LAX and Airport Metro Connector Projects as well as various highway operational improvements including interchange and ramp improvements and intelligent transportation system (ITS) enhancements. The Measure M funded I-405 ExpressLanes project is one leg of the Tier 1 ExpressLanes segments identified in the 2017 Countywide ExpressLanes Strategic Plan, which designated the I-405 as a “strategic ExpressLane corridor” that will ultimately connect to the I--605, I--105, and I-110 ExpressLanes. Other major corridor projects such as the Sepulveda Transit Corridor, C (Green) Line Extension to Torrance, G Line (Orange) Bus Rapid Transit (BRT) Improvements, East San Fernando Valley Transit Corridor, and LA River Bikepath were prioritized through these sales taxes for their ability to provide better alternatives to the travel options available today.

While each of these investments will provide unique benefits to corridor travelers and the surrounding communities, no one project can transform the corridor’s overall performance and condition by itself. Further, as no one trip is like another, a menu of mobility options is needed if we want to present travelers with choices for traveling to, through and from the I-405 corridor area. This comprehensive planning effort ties together the different types of modal projects planned to meet and connect the collective community, transportation, economic, and environmental goals. This new approach will provide a multimodal, system-level “big picture” analysis of the entire transportation system within the I-405 Corridor. It will reflect the future of mobility on and beyond the freeway to include high quality transit, active transportation, and services provided by both public and private operators, address the interplay among transportation investments and strategies, land use policies, and technology applications in achieving regional goals, and be driven by and responsive to community needs and priorities.

[4] Ibid.

[5] Ibid.

Introduction & Background

Los Angeles (LA) County is home to one of the most complex, interconnected, and congested highway systems in the world. There may be no LA County freeway corridor more iconic than Interstate 405 (I-405), which plays a critical role in the overall performance of this system. It serves some of the wealthiest and some of the most disadvantaged communities in the country, with cities and neighborhoods as varied as Inglewood and Brentwood, Mission Hills and Beverly Hills, Carson and Culver City, and San Fernando and Santa Monica. More than a quarter of LA County's population (nearly 2.8 million residents) live within three miles of the corridor and about 28 percent of jobs in LA County (1.4 million) are located within those boundaries.[6] The corridor connects critical gateways and trade hubs, including the SPB Ports (via I-710), Los Angeles International Airport (LAX), California's Central Valley, the Mexican border, and the rest of the continent. The I-405 is also a critical corridor for commuters, residents, and visitors across the region, handling volumes of nearly 390,000 vehicles per day between I-710 (Long Beach) and I-605 (Santa Ana)—the fourth highest volume of any freeway segment in the nation.[7]

Los Angeles County Metropolitan Transportation Authority (Metro), its partners and LA County residents have long recognized that the I-405 Corridor must be a cornerstone of the future transportation network. Los Angeles County voters signaled their desire for multimodal mobility improvements for the I-405 corridor area by approving significant targeted investment through Measures M and R, passed by substantial margins in 2008 and 2016 respectively. These measures included funding for things like the Crenshaw/LAX and Airport Metro Connector Projects as well as various highway operational improvements including interchange and ramp improvements and intelligent transportation system (ITS) enhancements. The Measure M funded I-405 ExpressLanes project is one leg of the Tier 1 ExpressLanes segments identified in the 2017 Countywide ExpressLanes Strategic Plan, which designated the I-405 as a "strategic ExpressLane corridor" that will ultimately connect to the I--605, I--105, and I-110 ExpressLanes. Other major corridor projects such as the Sepulveda Transit Corridor, C (Green) Line Extension to Torrance, G Line (Orange) Bus Rapid Transit (BRT) Improvements, East San Fernando Valley Transit Corridor, and LA River Bikepath were prioritized through these sales taxes for their ability to provide better alternatives to the travel options available today.

Development and adoption of this I--405 Comprehensive Multimodal Corridor Plan (CMCP) (see sidebar) will complement and enhance existing efforts by Metro and its partners in pursuit of solutions that address mobility challenges and needs in the corridor area. The CMCP will be vital in positioning improvement projects and strategies for implementation through the California Transportation Commission's (CTC) Solutions for Congested Corridors Program (SCCP) and assisting LA County's progress on meeting the collective state, regional and county

What is a CMCP?

Senate Bill (SB) 1, the Road Repair and Accountability Act of 2017, created and provided annual funding for the Solutions for Congested Corridors Program (SCCP). Funds from this program are allocated by the California Transportation Commission (CTC) to projects that balance transportation, environmental, and community access improvements within highly congested corridors throughout the state.

*SCCP funding is only available for projects that are part of a Comprehensive Multimodal Corridor Plan (CMCP) that employs a **holistic and multimodal approach** to reducing congestion, expanding travel options, preserving local character, and creating opportunities for local residents.*

[6] Population estimates are from the U.S. Census Bureau; American Community Survey; 2018. Employment estimates are from the U.S. Census Bureau; Longitudinal Employer-Household Dynamics Survey; 2018

[7] Federal Highway Administration, Highway Performance Monitoring System; 2019.

mobility, air quality and equity goals. In order to identify appropriate strategies and necessary improvements through engagement with stakeholders, we must first establish an understanding of current corridor conditions around mobility, accessibility, socioeconomic, environmental, land use, safety, and other factors. This baseline assessment is designed to document the condition and performance of the corridor and its individual modal elements, understand the users of the system and their mobility needs, and identify potential gaps. The analysis presented here builds upon prior studies, plans and data sources with insights from recent developments and trends to present a clear picture of existing corridor conditions.

The following sections describe baseline conditions along the I-405 Corridor starting with a brief summary of the existing infrastructure and its condition, the people and land uses along the corridor, travel patterns and trip-making characteristics (how people use the infrastructure), and the key gaps and challenges facing the Corridor. Considerations for improvement strategies to address challenges, as well as potential evaluation criteria (for state funding programs like the SCCP) are also called out intermittently throughout this report. Taken together, this information helps paint a picture of the current state of the I--405 Corridor in LA County and will be used to inform subsequent phases of the CMCP.

I-405: More than Just a Freeway Corridor

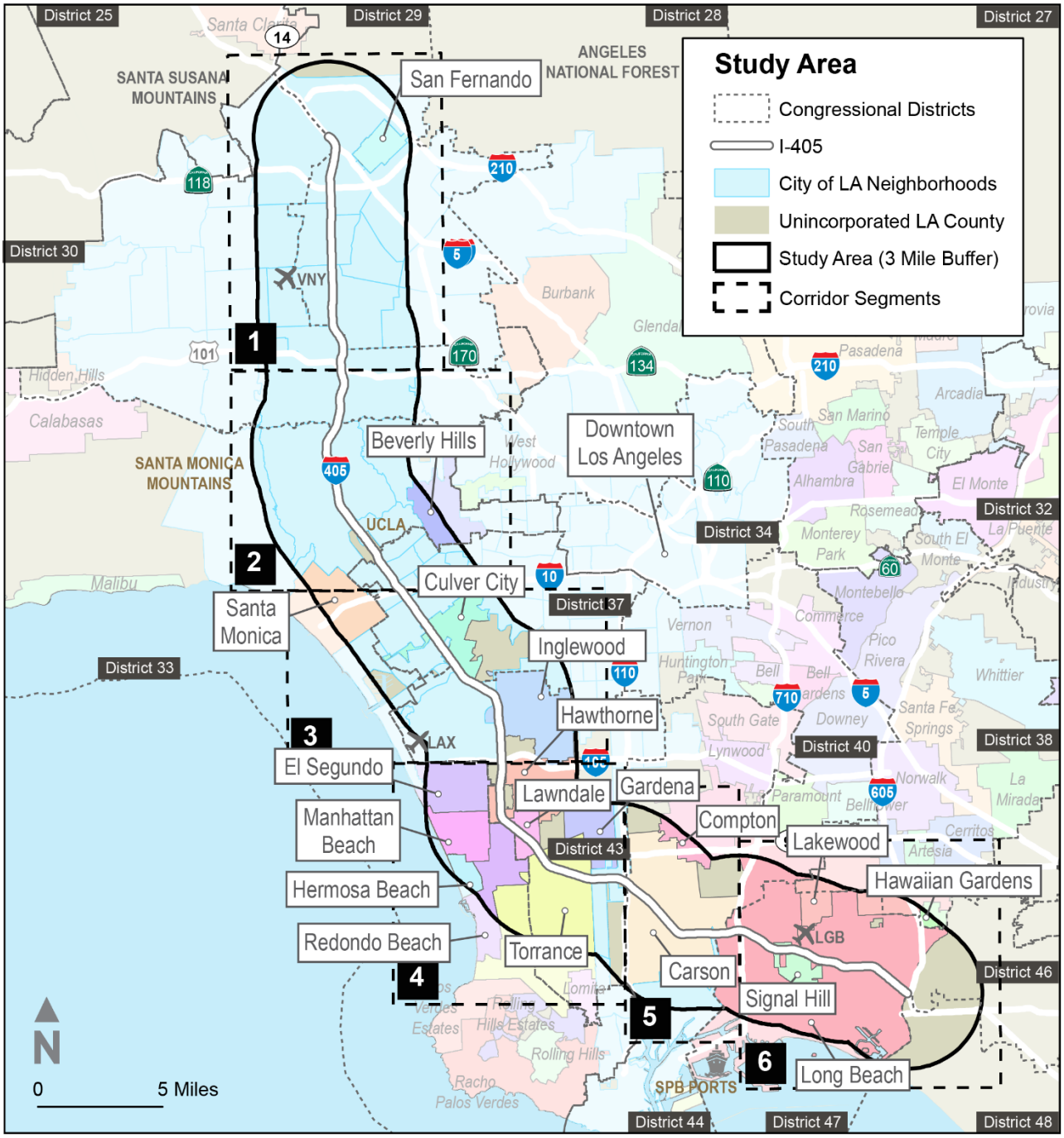
I-405 is more than just a freeway. It is a "system of systems" that collectively represents a corridor of local, regional, and national significance by providing access to important international gateways, major tourist attractions and employment, retail, and education hubs for the 10.5 million people that live, work, and play in LA County.[8]

-- The freeway in its entirety spans a total of 72.4 miles from I-5 in the San Fernando Valley in LA County to Irvine in Orange County, where it reconnects with I-5 at its southern terminus. The I-405 CMCP study area includes the full extent of the I-405 freeway within LA County, from I--5 in the north to I--605 in the south—a total of 48.5 miles. Recognizing the freeway is just one node in a larger transportation network that includes the surrounding arterials, adjacent transit and commuter rail services as well as bike and pedestrian facilities, the I-405 CMCP's study area extends beyond the freeway to include a three mile travel "catchment area"[9] of three miles on either side of the I-405. This results in a study area of approximately 319 square miles (Figure 0-1) including 11 congressional districts, four councils of government (COG), 20 individual cities, and over 40 neighborhoods in the City of Los Angeles. All maps following Figure 0-1 display only a small selection of these cities and landmarks for orientation purposes.

[8] U.S. Census Bureau; American Community Survey; 2018

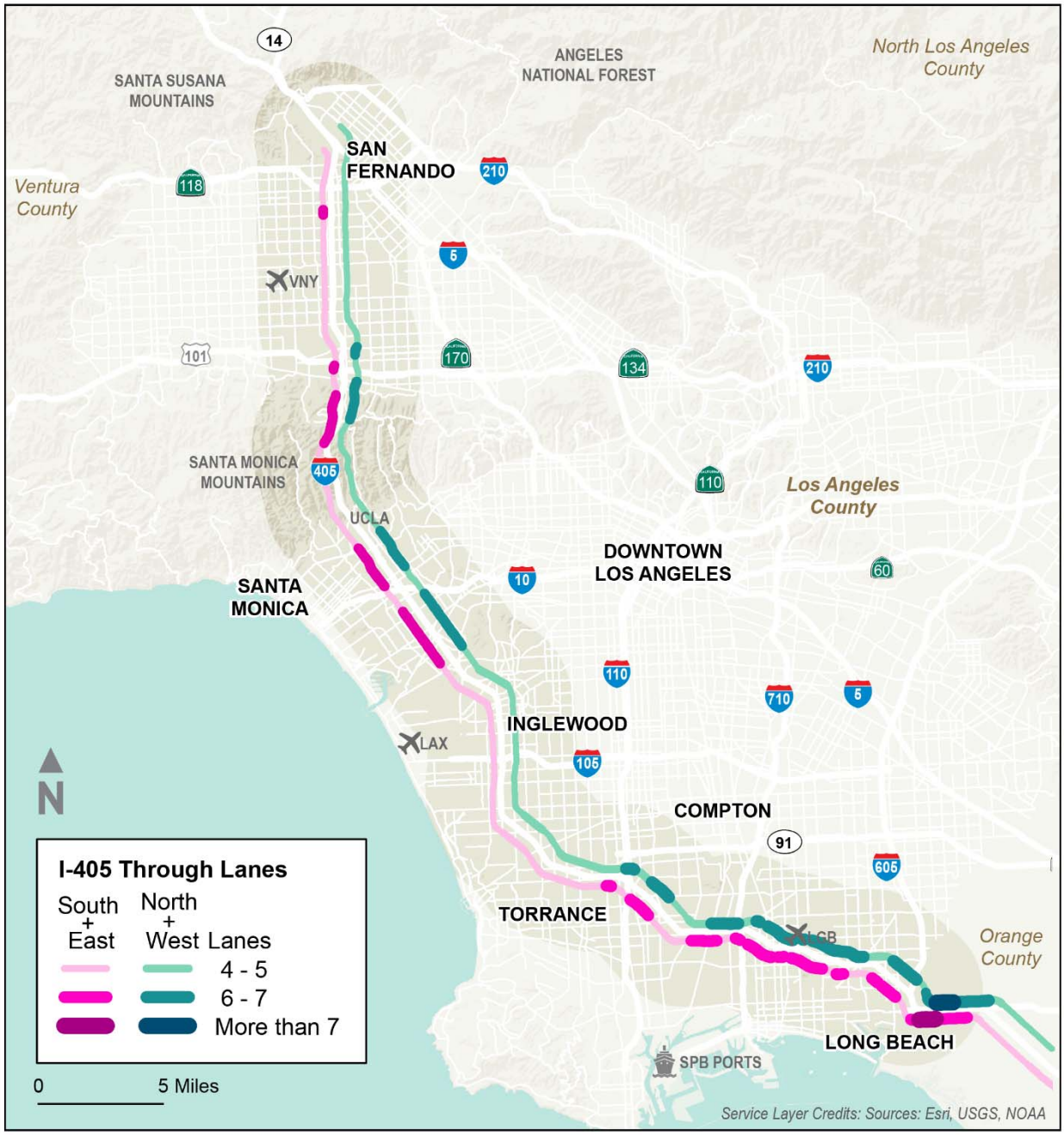
[9] Three miles is the standard catchment area at which trips are attracted to a freeway.

Figure 0-1 Study Area Overview



The freeway segments within the study area include anywhere from four to six general purpose lanes in each direction, one High Occupancy Vehicle (HOV) lane in each direction, and auxiliary lanes in various locations (Figure 0-2). The natural topography around I-405, which includes the Santa Monica Mountains, Santa Susana Mountains, and Pacific Ocean, physically constrain the corridor, especially in the Sepulveda Pass.

Figure 0-2 I-405 Through Lanes



Source: Highways Performance Monitoring System, 2017.

The I-405 freeway is the backbone of a larger, interconnected system. The freeway itself carries only 25 percent of vehicle miles traveled (VMT) in the study area.[10] The other 75 percent occurs on the more than 50 arterial interchanges along the corridor, the eight freeway systems that intersect the I-405 (I--605, I--710,

[10] Highway Performance Monitoring System, 2017.

I--110, I--105, I--10, US-101, SR-118, and I--5), and the portions of Metro's Countywide Significant Arterial Network (CSAN) and Countywide Strategic Truck Arterial Network (CSTAN) that intersect the freeway.

The freeway and much of the surrounding arterial network are managed by different traffic management systems. Caltrans operates its Advanced Traffic Management System (ATMS) for the freeway system, while cities typically will operate signals and Intelligent Transportation Systems (ITS) components through a central Traffic Control System (TCS). Several jurisdictions operate their own TCS systems, independent of one another including the Cities of Beverly Hills, Culver City, Los Angeles, Inglewood, Santa Monica, Long Beach, Redondo Beach, and Torrance, while Los Angeles County Public Works operates and/or maintains a system that serves the cities of El Segundo, Manhattan Beach, Hermosa Beach, Carson, and Hawthorne.[11] Most of these arterials include traffic signals, traffic controllers, closed circuit television (CCTV) cameras, vehicle detection, and communications to manage traffic along the corridor. Also, the freeway facilities have ramp metering, changeable message signs (CMS), CCTV cameras, and vehicle detection to manage and monitor traffic along the freeway. For a corridor as large and complex as the I-405 study area, the coordination and integration across the various traffic systems is limited and impacts the ability to manage corridor traffic on the arterials and the freeway. There have been efforts for signal synchronization on some arterials in the study area to help manage traffic between local jurisdictions. However, integration of systems between arterials and the freeway have not been initiated at this time. Efforts are underway in Los Angeles County that will integrate systems between local arterials and freeways using Integrated Corridor Management (ICM) concepts.

For ease of analysis, this study identifies six segments at major freeway system interchanges as shown in Figure 0-3. The segments are as follows:

Segment 1: I-5 to US-101
Segment 2: US-101 to I-10
Segment 3: I-10 to I-105
Segment 4: I-105 to I-110
Segment 5: I-110 to I-710
Segment 6: I-710 to I-605

[11] https://laconnect-it.com/wp-content/uploads/2019/01/LA-County-ITS-Architecture-FINAL-REPORT.pdf

Figure 0-3 I-405 Corridor Segments and Intersecting Freeways and Arterials

Source: SCAG and California State Geodata.

The study area is served by Metro Rail, Metrolink, and Amtrak. Three of Metro's rail lines have stations in the I-405 CMCP study area and all three intersect with I-405. The Metro A Line (former Blue Line) runs from Downtown Long Beach in the south to Downtown Los Angeles (7th St/Metro Center Station) with seven of its 22 stations falling within the study area. The Metro C Line (former Green Line) connects the City of Redondo Beach to the City of Norwalk and includes seven (of 14) stations within the study area. Lastly, the Metro E Line (former Expo Line) runs from Santa Monica to Downtown Los Angeles and eight (of 19) stations are within the study area.

Metrolink, the region's commuter rail operator, serves two stations in the I-405 study area, both located in the northern part of the Corridor (within Segment 1). The Van Nuys Metrolink station serves the Ventura County

Line, and Sylmar/San Fernando Metrolink station serves the Antelope Valley Line- both connecting to LA Union Station in Downtown LA. The Amtrak Pacific Surfliner, which operates along the Los Angeles—San Diego—San Luis Obispo (LOSSAN) rail corridor, provides interregional passenger service along the Pacific Coast, with a station located at the Van Nuys Metrolink Station (Figure 0-4). As will be discussed in subsequent sections, **these existing rail services, while extensive, do not currently offer competitive alternatives for many of the vehicle trips taken in the study area**.

Figure 0-4 Existing Rail Network within the Study Area

Source: LA Metro and Metrolink.

Metro operates bus service throughout LA County, including 70 routes that have at least one stop in the study area. As shown in Figure 0-5, a range of Metro service offerings operate within the study area, including local and circulator buses, Metro Rapid Lines (700 series), freeway express bus lines (500 series), the Metro J Line (Route 910 of former Silver Line) bus rapid transit with fixed guideway stations along I-110, and the Metro G Line (Orange), one of two Metro bus routes that operate along dedicated lanes on freeways and surface streets. **This extensive Metro service is complemented by several local and municipal transit operators that operate in the region**, including:

LADOT (City of Los Angeles)

Big Blue Bus (City of Santa Monica)

Long Beach Transit (City of Long Beach)

GTrans (City of Gardena)

Beach Cities Transit (City of Redondo Beach)

Torrance Transit (City of Torrance)

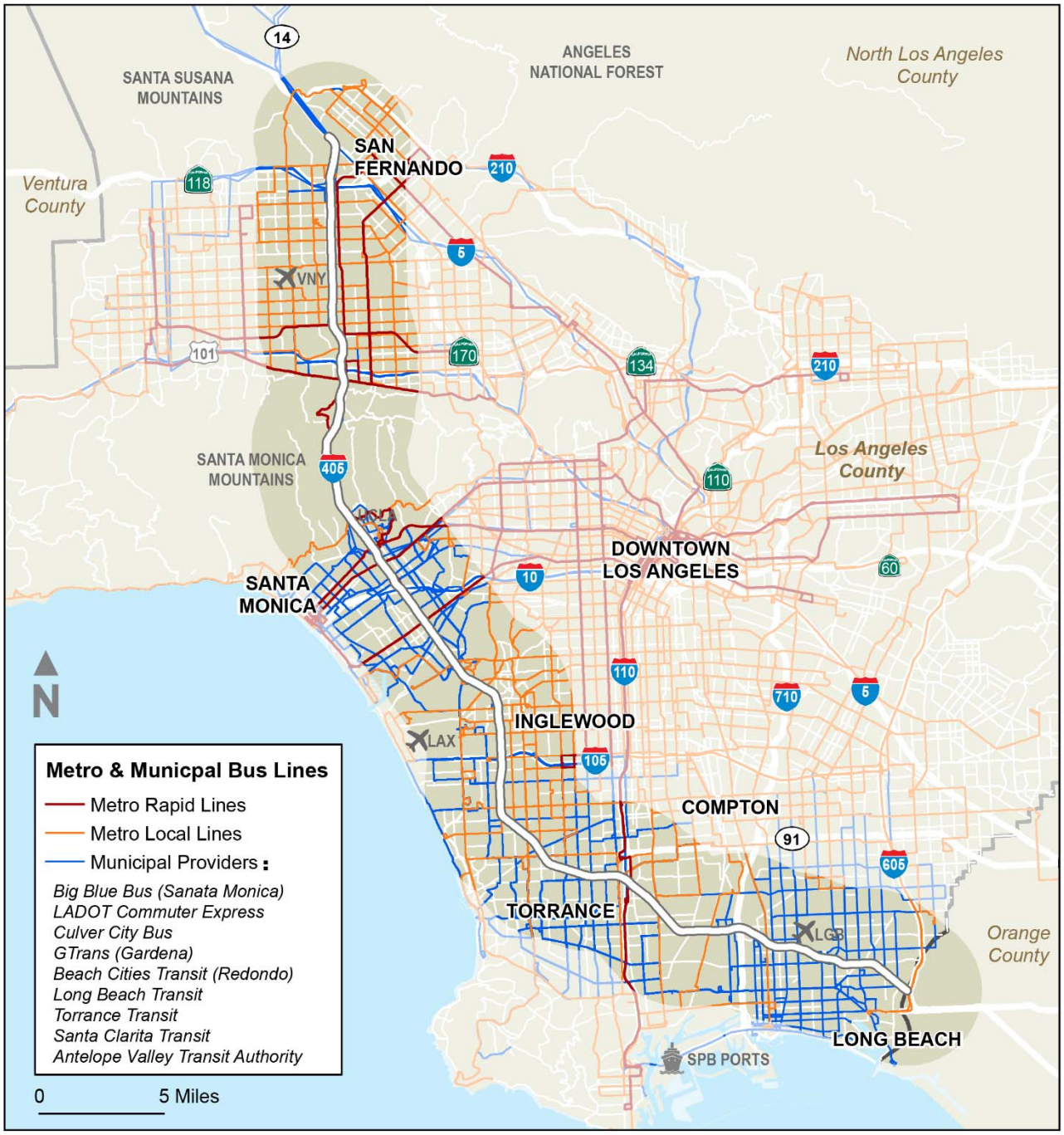
Antelope Valley Transit Authority (AVTA)

Santa Clarita Transit

Culver City Bus (City of Culver City)

As illustrated, many of these routes generally parallel the corridor, with the potential of serving the major share of the travel activity discussed in Section 6.0. However, as will be discussed in subsequent sections, **transit is carrying a small portion of the trips occurring in the corridor area.**

Figure 0-5 Existing Bus Network



Source: LA Metro, GTFS data from Municipal Providers.

Finally, there are nearly 600 miles of bicycle infrastructure in the study area, predominantly concentrated in Santa Monica, Long Beach, and around University of California, Los Angeles (UCLA). More than half of these bike facilities are on-street bike lanes (Class 2), about a quarter are “sharrow lanes,” with pavement markings that indicate a shared road between vehicles and people biking (Class 3), and about 20 percent are separated bike facilities (Class 1) or cycle-tracks (Class 4), which provide people biking with a greater level of

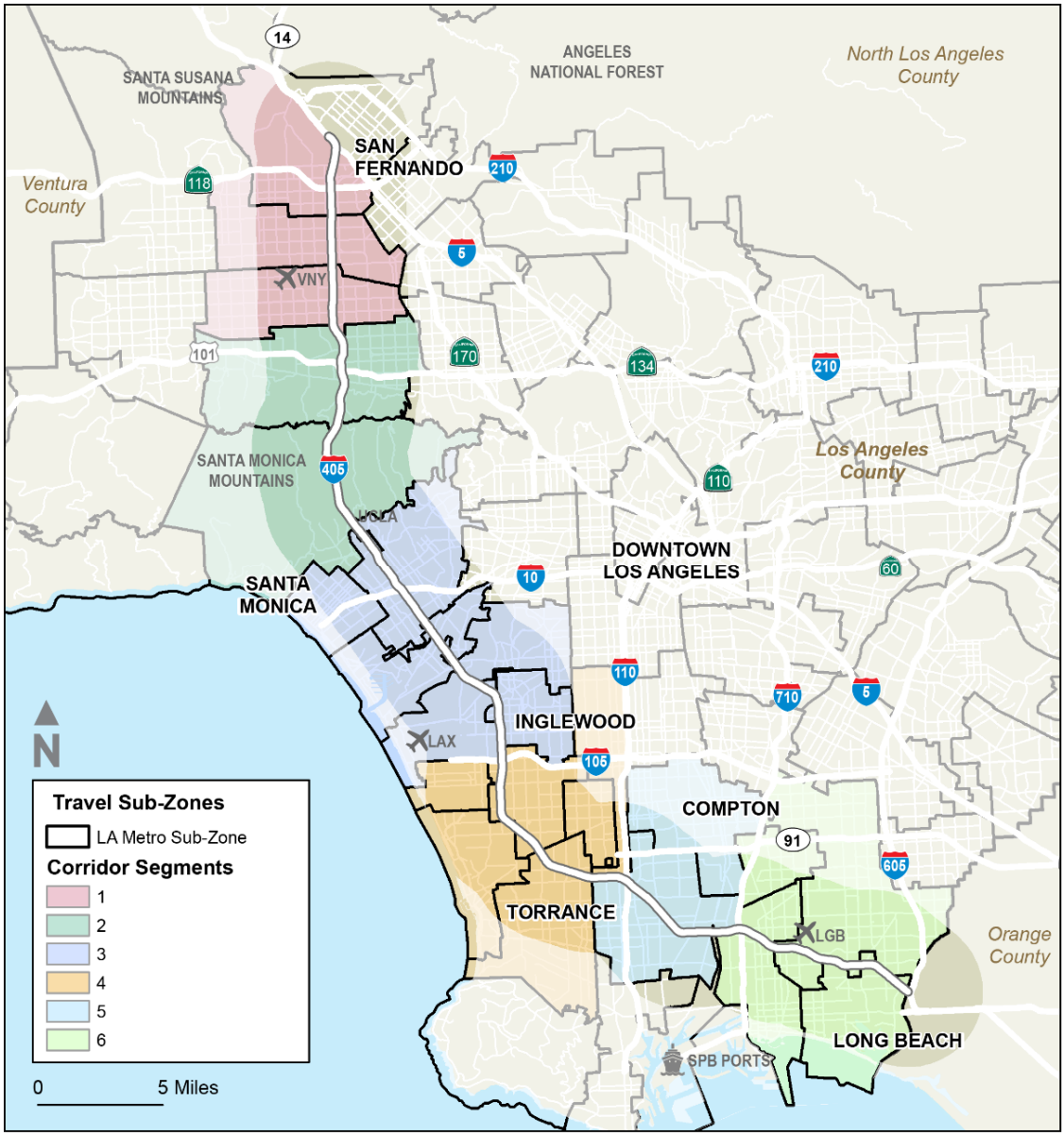
physical protection from cars. Previous studies have highlighted significant gaps in this system (as indicated by the orange circles in Figure 0-6) that hinder the ability of the bike network to offer realistic alternatives to driving. In particular, useful north/south connections are lacking. These gaps are most pronounced in the San Fernando Valley, over the Sepulveda Pass and throughout the South Bay. Many of the east/west barriers to bicycling in the study area are caused by the I-405 freeway, as on- and off- ramps cause breaks in otherwise connected bicycle infrastructure. The large number of conflicts that occur at these locations is discussed in Section 7.2.

Figure 0-6 Existing Bike Network

Source: SCAG Bikeways, 2020.

Together, these mobility options—the I-405 "system of systems"—serve a staggering number of trips. Travel to, from, and within the Corridor's three-mile catchment area (the study area) was analyzed by dividing LA County into 78 "subzones",[12] and identifying the subzones that are within the study's overall catchment area. There are a total of 26 subzones within the study area (Figure 0-7 highlights the subzones in the study area by segment). **More than 40 percent of LA County's 25.6 million weekday trips occur within the study area (a total of 10.6 million).** Of these, more than 80 percent (7.2 million trips) remain in the study area for the entirety of the trip (see Figure 0-1).

Figure 0-7 Metro Travel "Sub Zones"



[12] Metro "subzones" are nested within the 20 travel districts used in previous analyses and are consistent with the Regional Ridership Growth Action Plan (RGAP) and NextGen Bus Study.

Source: Subzones from LA Metro Next Gen Transit Study.

The I-405 Corridor is Home to a Large and Diverse Population

Nearly 2.8 million people live within the I-405 study area—more than a quarter of LA County's population.[13] As such, the study area presents a fairly representative cross section of the LA County population. Despite its diverse population, the corridor is segregated by race, household income, language spoken, and education level, all of which are important factors in constituents' mobility options and preferences.

Key Challenge: *Racial disparities in transportation benefits & burdens*

Considerations for Improvement Strategies:

How do solutions balance transportation, environment, and community?
How will communities benefit?

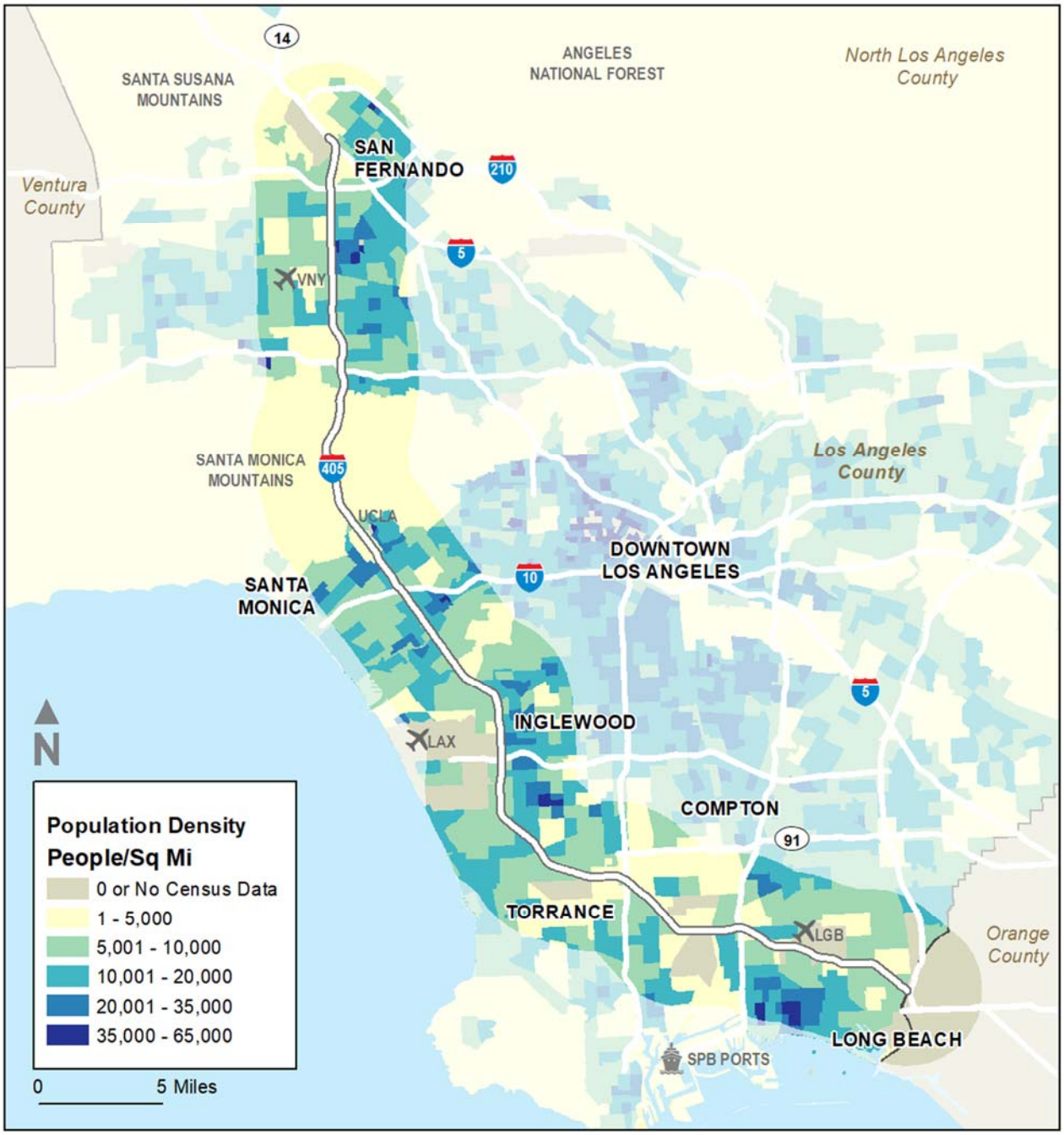
Potential Evaluation Criteria: *Equity*

Most of the study area is highly urbanized. The overall population density in the study area—approximately 7,300 residents per square mile—is roughly similar to LA County as a whole. However, some neighborhoods, including North Hills, Westwood, Culver City, Inglewood, Hawthorne, and Long Beach average between 35,000 and 65,000 residents per square mile—denser than New York City—which has an average density of about 27,000 people per square mile (Figure 0-1).[14] These high-density areas suffer from some of the worst congestion along the corridor due to higher volumes of travel demand, yet are also some of the most conducive to trips that can be taken on foot, by bike, or by transit since destinations are closer together.

[13] There are currently Metro efforts underway that characterize population and travel behavior within LA County and along parts of the I-405 corridor, including the recent Sepulveda Feasibility Study, which cites a population of 7.7 million served by the Sepulveda Pass segment of the I-405 corridor. The 2.8 million population within the I-405 CMCP corridor includes only those who live within the 3-mile catchment area surrounding the freeway corridor.

[14] U.S. Census Bureau; 2018

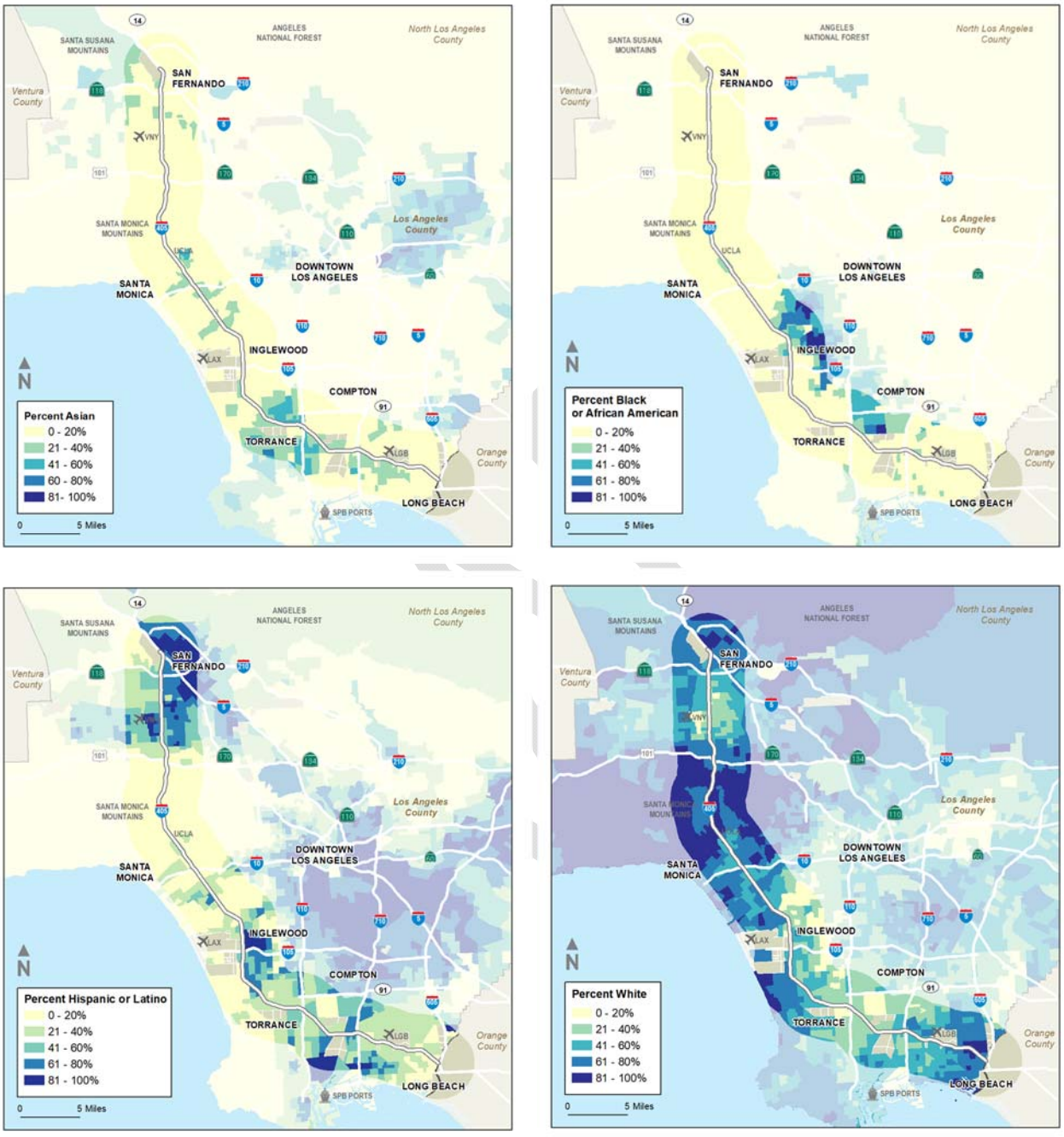
Figure 0-1 Population Density by Census Tract



Source: 2019 ACS 5-year Estimates.

Like most metropolitan areas across the U.S., **communities along the I-405 Corridor are highly racially segregated**, as shown in Figure 0-2. This is primarily due to land use and transportation policies from the post-war era such as redlining, restrictive covenants, and exclusionary zoning that put up barriers to housing for Black and Brown residents, as well as major highway and development projects that caused widespread displacement. The legacy of those policies is apparent today in the disparities that communities of color face with respect to health, housing, services, education, and access to safe, affordable, and reliable mobility.

Figure 0-2 Race and Ethnicity by Tract



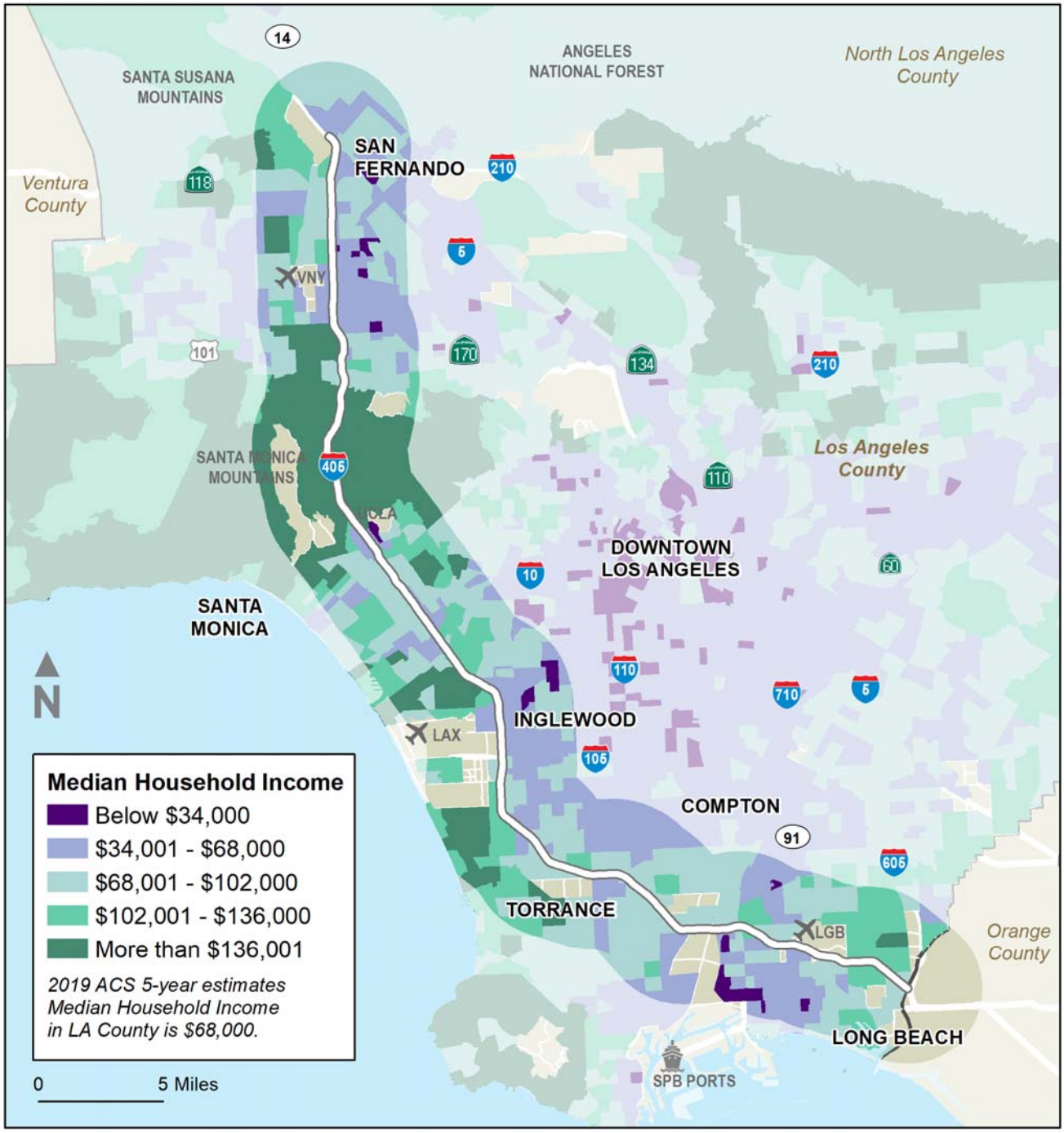
Source: 2019 ACS 5-Year Estimates.

Just over 13 percent of people in the study area are living below the poverty line, which is about the same as LA County as a whole, but higher than the statewide poverty rate of nearly 12 percent.[15] The Federal poverty line in 2019 is defined by the U.S. Department of Health & Human Services as less than $16,910 in household income for a two-person household, less than $25,750 for a four-person household,

[15] American Community Survey.

and less than $43,430 for an eight-person household.[16] As shown in Figure 0-3, areas with the lowest median household incomes include portions of the San Fernando Valley, Inglewood, Carson, and parts of Long Beach. In contrast, the corridor is also home to some of the most affluent areas in LA County, including Bel Air, Beverly Hills, Santa Monica, and Pacific Palisades where median household incomes exceed $136,000.

Figure 0-3 Median Household Income by Census Tract



[16] U.S. Department of Health & Human Services; 2018.

Source: 2019 ACS 5-year Estimates.

Key Challenge: *Limited mobility options in low- income communities/communities of color*

Considerations for Improvement Strategies:

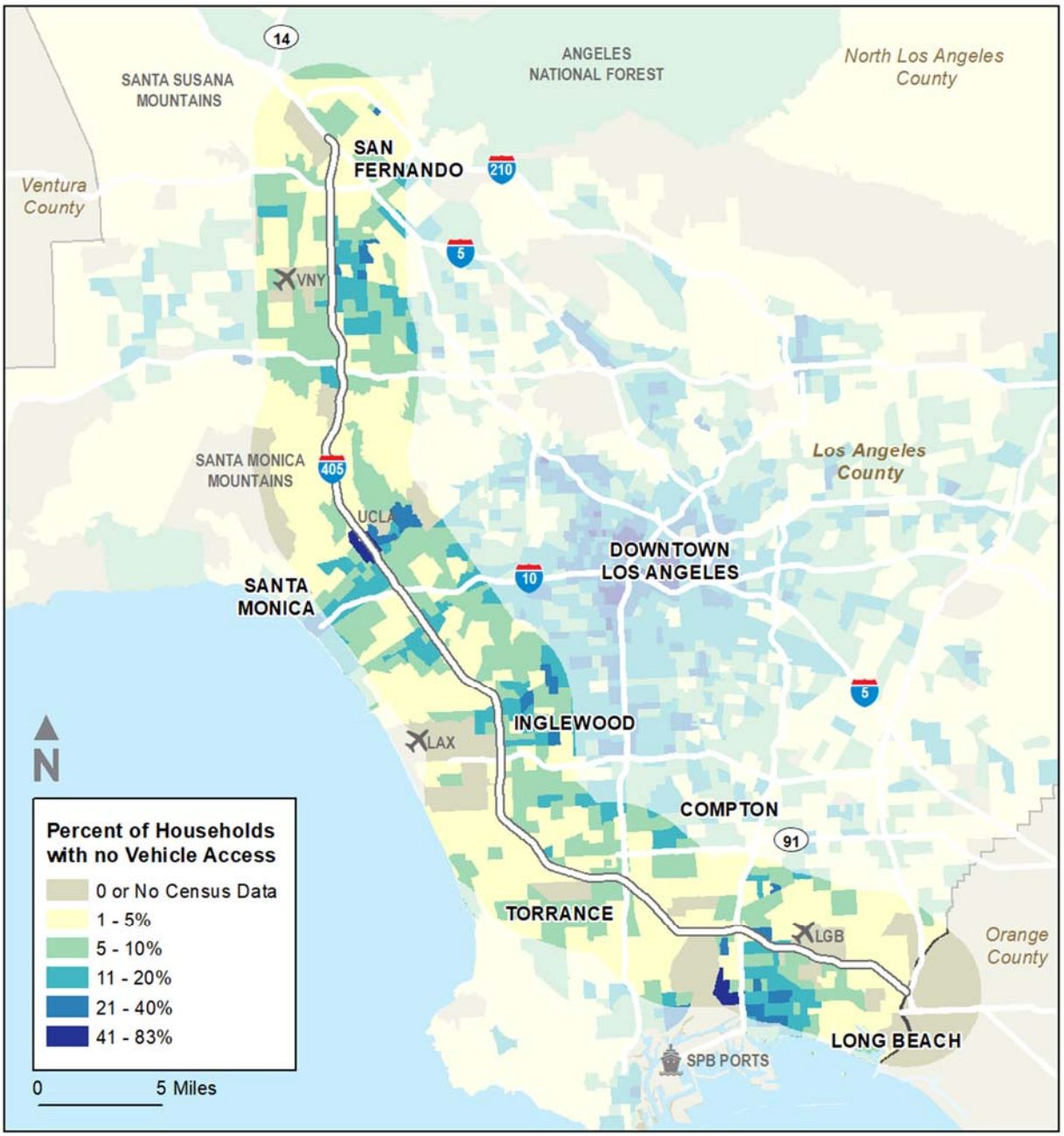
How will solutions reduce single-occupancy vehicle travel?
How many key destinations will be served/jobs accessed?
How many residents will be within ½ mile of mobility options?

Potential Evaluation Criteria: *Congestion Reduction, Equity & Accessibility*

Vehicle ownership is higher in the Corridor study area than in LA County as a whole, with 93 percent of households having access to a vehicle compared to 91 percent countywide.[17] As shown in Figure 0-4, there are pockets of the study area with a relatively large share of zero-car households (above 20 percent), including UCLA, Inglewood, Long Beach, and in the San Fernando Valley east of I-405—which are areas with large student populations and/or a high concentration of low-income residents. However, it is important to note that mobility needs of students (especially at UCLA) are different than the mobility needs of low-income residents. Restrictions on car-ownership and parking—common on most campuses—coupled with more walkable land use and development patterns enable and encourage college students to be car-free. For low-income residents, not owning a car is more likely tied to the fact that car-ownership is expensive. Moreover, low-income residents have less discretion to choose to live and work in areas where there are robust non-auto mobility options, creating a greater transportation burden on low-income residents and especially those with limited to no vehicle access.

[17] U.S. Census Bureau; American Community Survey; 2019.

Figure 0-4 Zero-Vehicle Households in the Corridor

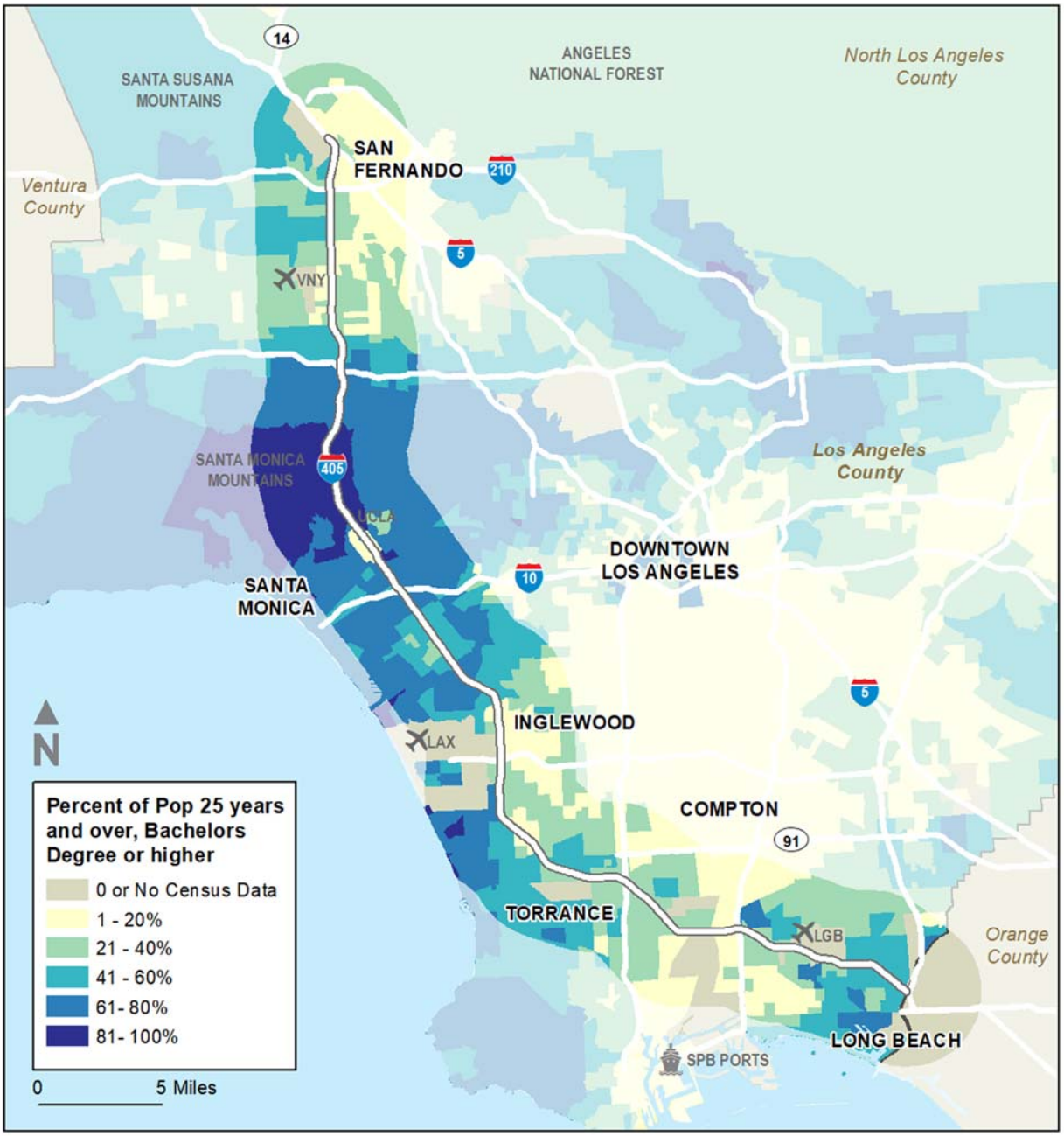


Source: 2019 ACS 5-year Estimates.

While approximately 80 percent of LA County residents and residents in the I-405 Corridor have high school diplomas, slightly less than the statewide and national rates (84 and 89 percent, respectively), **there are vast differences in the percent of residents within the study area with a bachelor degree or higher** (Figure 0-5). Areas with lower levels of educational attainment correspond almost directly to areas with large populations of people of color, who have lower household incomes and higher levels of poverty.

Differences in education levels also closely correspond to differences in occupation; therefore, in commuting patterns. This was particularly evident during and in the immediate aftermath of the COVID-19 pandemic, where “essential workers” in commercial and service industries were required to commute, while most office-based workers who typically have more formal education and higher salaries were able to work from home.

Figure 0-5 Percent of Population 25 Years and Above with a Bachelor Degree or Higher



Source: 2019 ACS 5-year Estimates.

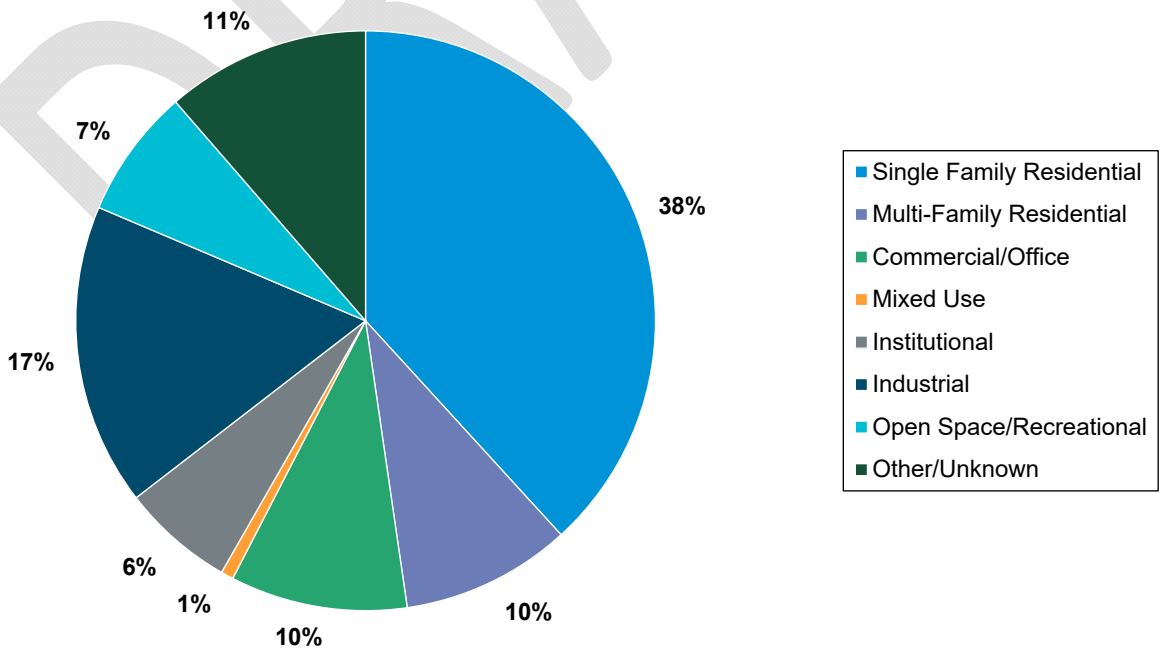
Land Use is Mixed Throughout the Corridor

The study area is home to a diverse set of land use types, but **nearly half of the land within the corridor is residential.** Of this residential land, nearly 80 percent is single-family homes (Figure 0-1 and Figure 0-2). This highlights the difference in land use types across the corridor, with the southern part including significantly more industrial land, particularly in Segment 5 which includes large industrial centers in Carson, Torrance, and El Segundo, while the northern part in Segment 1 includes the largest share of residential land. The I-405 freeway itself is a backbone for regional employment, with pockets of commercial and office development clustered around off-ramps The study area is predominantly planned for commercial, industrial, and/or mixed-use centers along key corridors, surrounded by single- and multi-family housing, mirroring the Corridor's existing land use patterns (Figure 0-3).

Housing Affordability, Gentrification & Displacement

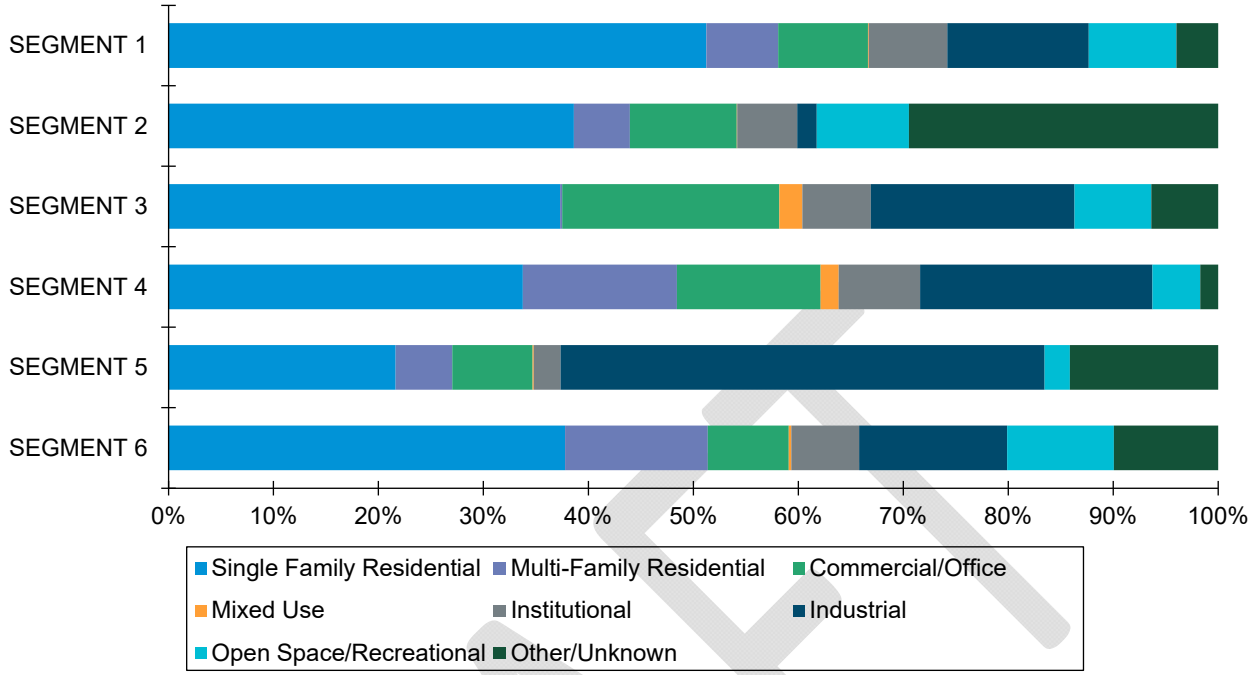
California's housing shortage is impacting where people can afford to live and what housing is available to them, including in LA County and in communities along the I-405 Corridor. Growing demand for housing in urban areas has led to widespread gentrification and displacement, forcing many low-income residents and communities of color to move to more affordable areas that are often further from jobs, retail, services, and high-quality affordable mobility options. In 2018 the Urban Displacement Project highlighted Hawthorne, Gardena, and coastal areas in Long Beach as places experiencing "advanced gentrification," and Compton, Inglewood, and inland parts of Long Beach (south of I-405) as places that are susceptible and/or experiencing ongoing displacement. These patterns of gentrification and displacement can lead to a mismatch in jobs and housing, which impacts travel demand. However, the overall level of jobs and housing along the I-405 Corridor are generally balanced.

Figure 0-1 Land Use Within the Corridor



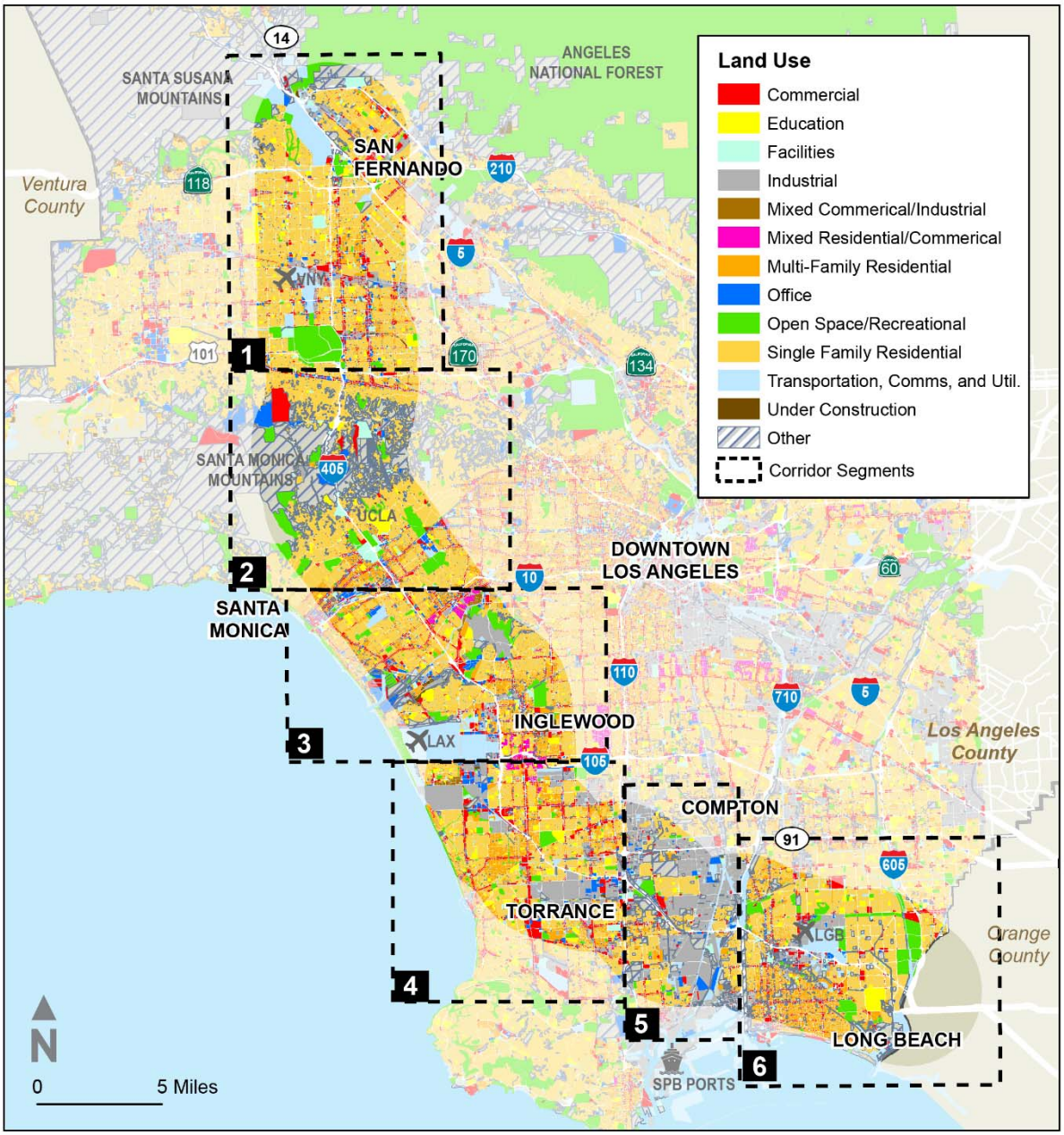
Source: SCAG, 2018.

Figure 0-2 Land Use Type by Segment



Source: SCAG, 2018.

Figure 0-3 Existing Land Use in the Corridor Study Area



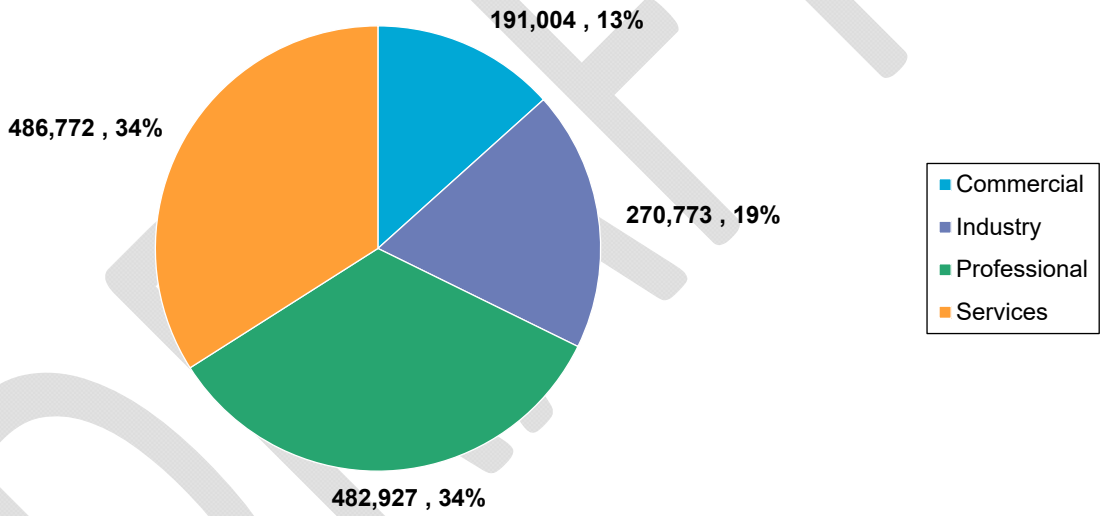
Source: SCAG, 2018.

The Corridor is home to many large employers, schools, businesses, and entertainment venues. **Some of LA County's largest international gateways and attractions are along the I-405 Corridor.** From north to south, key attractions include the Sepulveda Basin Recreation Area, the Getty Museum and Skirball Cultural Center in the Sepulveda Pass, UCLA campus in Westwood, Kenneth Hahn State Recreation Area and Baldwin Hills Scenic Overlook near Culver City, Beverly Hills/Rodeo Drive, the Santa Monica Pier, the new SoFi Stadium in Inglewood, Los Angeles International Airport (88 million arrivals and departures in 2019), the Aquarium of the Pacific, Terminal Island (with ferry service to Catalina Island), Long Beach Airport (nearly

two million enplanements in 2018[18]), and many malls, universities, golf courses, parks, and medical centers throughout the Corridor. Just beyond the three-mile travel shed boundary is the Pacific Ocean, whose beaches run parallel to the corridor and similarly attract many residents and visitors.

Finally, there are **approximately 1.4 million jobs in the study area—**an estimated 28 percent of the jobs in LA County.[19] About a third of these jobs are in "professional" sectors, which includes finance and management, real estate, information technology, and other professional services (typically higher paying jobs). Another third is in the service sector, which includes health care, education, retail, and food and accommodation services (typically lower paying jobs). This distinction is important as these sectors have different commuting and travel patterns. Furthermore, in addition to serving the jobs located within the study area, the I-405 Corridor provides access to an additional two million jobs across the entire region.[20]

Figure 0-4 Employment by Sector Within the Corridor



Source: U.S. Census Bureau; Longitudinal Employer-Household Dynamics; 2018

Note: Commercial includes wholesale and retail trade; industry includes agriculture, forestry, fishing, and hunting, mining, quarrying, oil and gas extraction, utilities, construction, manufacturing, and transportation and warehousing; professional includes information, finance and insurance, real estate and rental leasing, professional, scientific and technical services, management of companies and enterprises, administrative support and waste management, arts, entertainment and recreation, and public administration; and services includes educational services, health care and social assistance, accommodation and food services, and other services.

These jobs are fairly well-distributed throughout the corridor (Figure 0-5); however, industrial jobs, which make up 20 percent of the corridor's employment, tend to be concentrated in the southern half of the corridor where there are more port and industrial land uses. These areas include Long Beach, LAX, Rancho

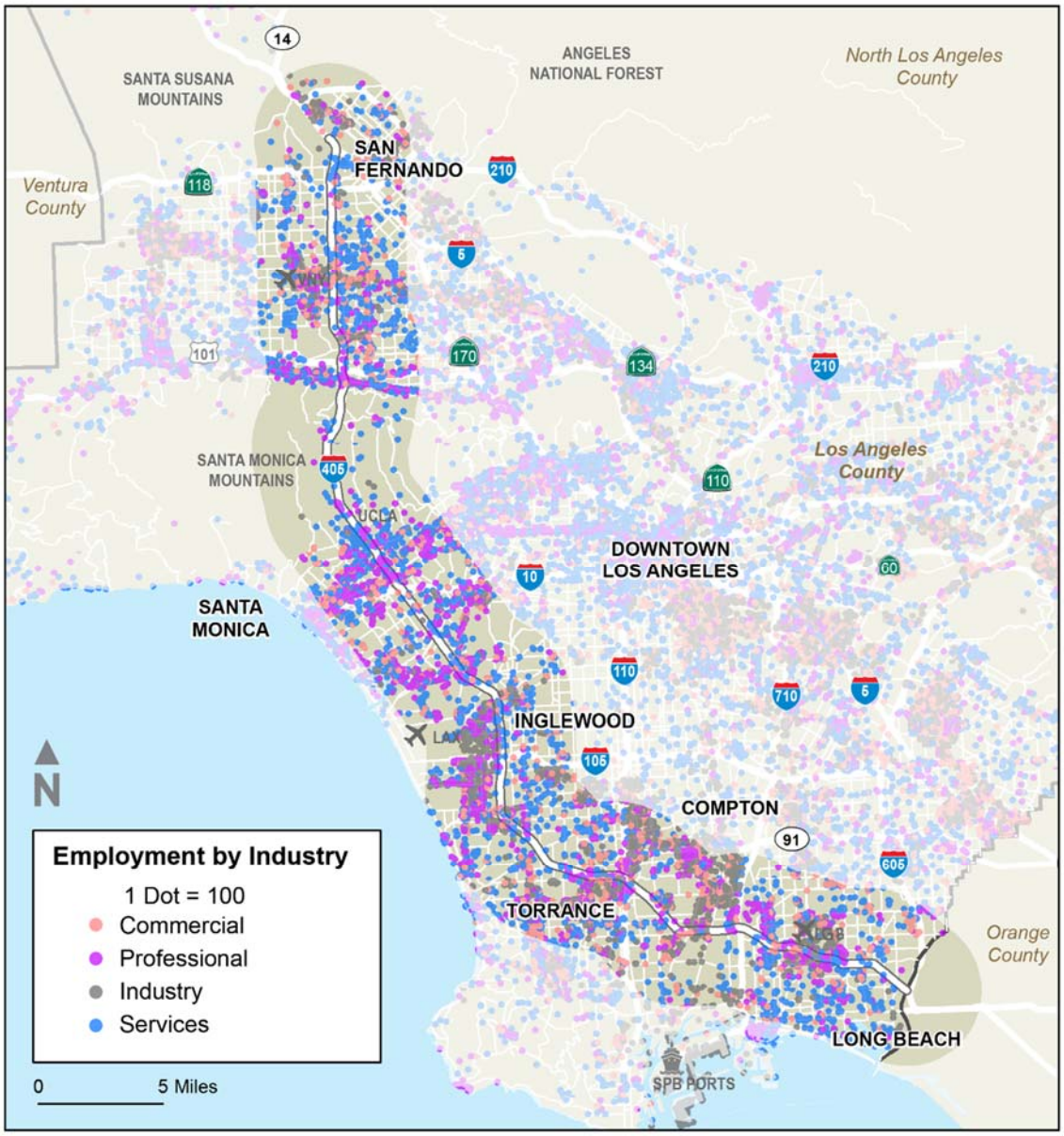
[18] Air Carrier Activity Information Systems (ACAIS) Enplanement Data, CY2018 Federal Aviation Administration (FAA)

[19] Corridor job estimate from the Longitudinal Employer-Household Dynamics Survey; 2018. LA County jobs from the California Employment Development Department (https://www.labormarketinfo.edd.ca.gov/file/lfmonth/la$pds.pdf).

[20] The Final Feasibility Report of the Sepulveda Transit Corridor Project (LA Metro 2019) indicates that approximately 3.37M jobs are served by the I-405 corridor; our analysis indicates that 1.4M of those are located within boundaries of this study.

Dominguez, Carson, and Lakewood. These correspond to the areas in the corridor with lower income populations, higher rates of poverty, and lower rates of vehicle access, as discussed in Section 3.0. Since many industrial areas are difficult to access by transit due to more sparse land uses, commuting to these jobs can be an extra burden for the Corridor's industrial sector workers who are often low-income.

Figure 0-5 Employment Sector Distribution

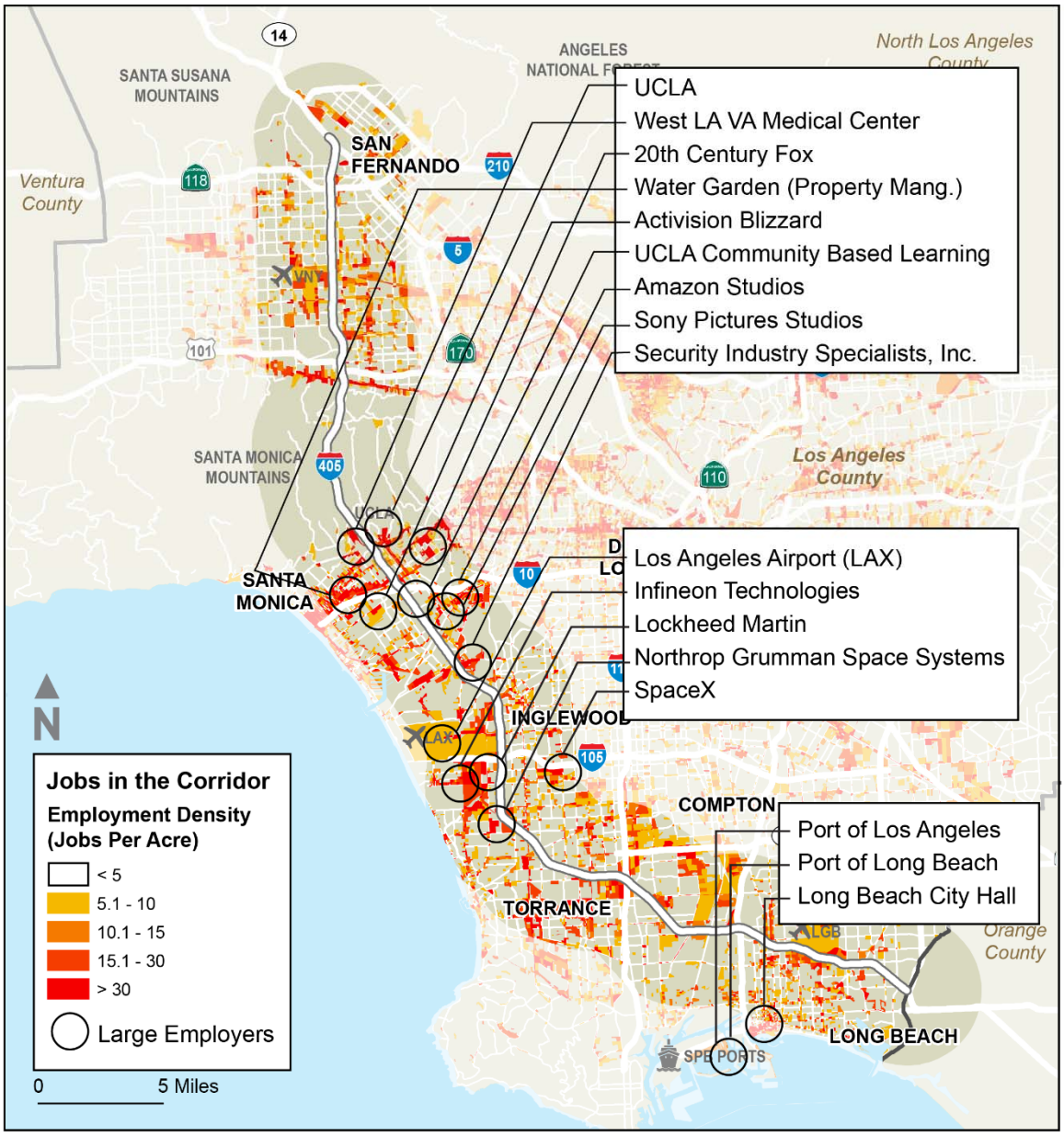


Source: U.S. Census Bureau; Longitudinal Employer-Household Dynamics; 2018

Employment density is primarily concentrated along corridors in the San Fernando Valley and in the West Los Angeles/ Santa Monica/ Venice/ Mar Vista areas. Employment centers are also located in Culver City, Hawthorne, El Segundo, Torrance, Gardena, Carson, and Long Beach, with some census tracts in these areas having more than 30 jobs per acre. Figure 0-6 highlights these areas and identifies large employers in the study area. These businesses rely on safe and reliable infrastructure so that employees can

access their jobs, residents and visitors can shop, eat, and access services, and goods can be delivered in a timely and efficient manner.

Figure 0-6 Large Employers Within Corridor Study Area



Source: Employment Density from Longitudinal Employer-Household Dynamics 2018; Large Employers from State of California Employment Development Department List of Major Employers Los Angeles County from America's Labor Market Information Systems 2021.

Different Land Uses & Destinations Combine to Influence Mobility Needs

Equally important in analyzing existing and future land uses is the ability to assess how those land uses may impact current and future mobility. Recognizing this, Caltrans adopted the **"Smart Mobility Framework"** (SMF), a planning guide intended to further integrate smart mobility concepts into transportation planning in California. The SMF includes seven classifications (place types) of towns, cities, and larger areas to be used as a basis for making investment, planning, and management decisions that advance Smart Mobility (see sidebar). Moving forward, it will be important to identify improvement projects that support and align with the objectives of the SMF.

Smart Mobility Concepts

Smart Mobility moves people and freight while enhancing California's economic, environmental, and human resources by emphasizing:

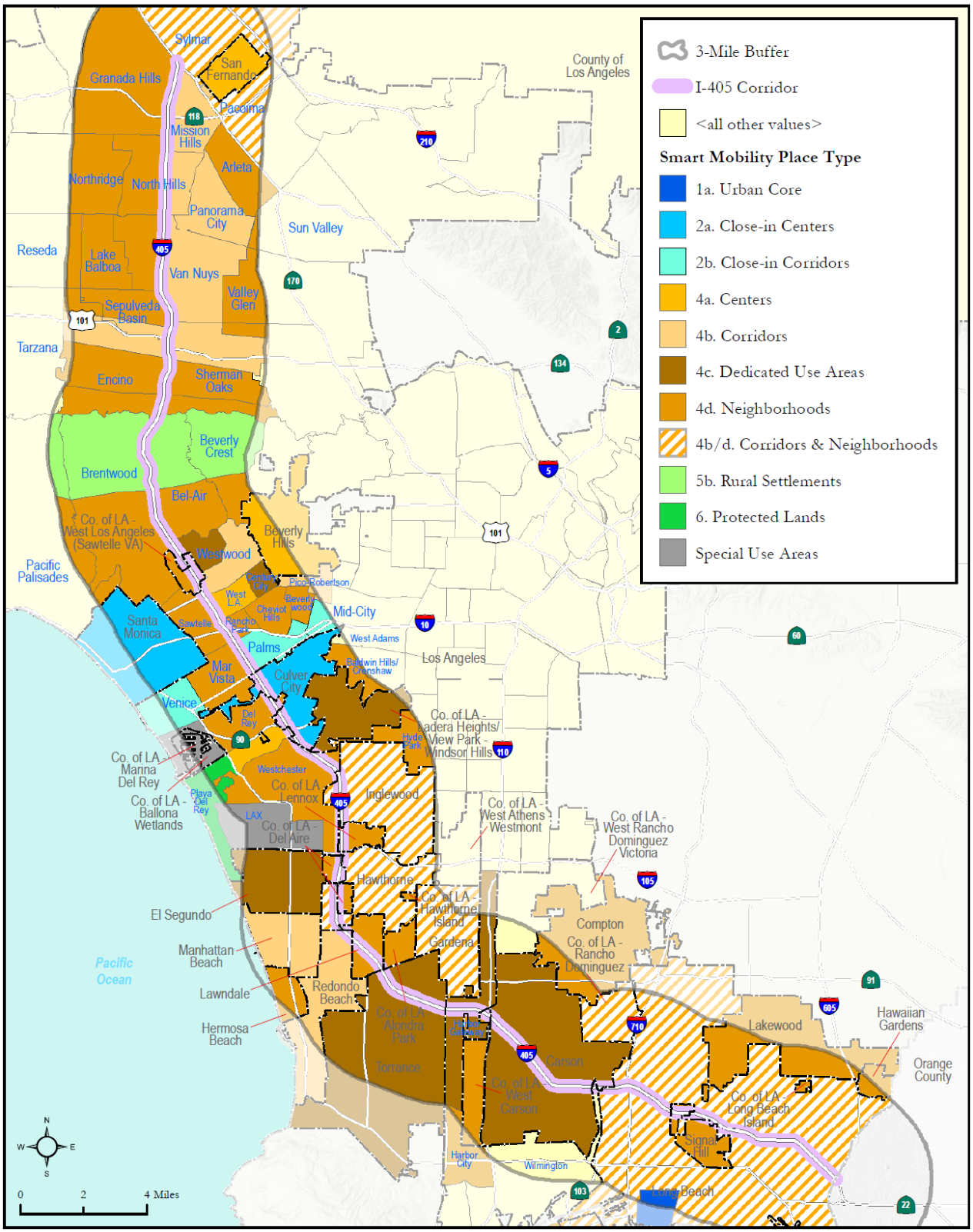
Convenient and safe multimodal travel
Speed suitability
Accessibility
Management of the circulation network
Efficient use of land

Smart Mobility responds to the transportation needs of the State's people and businesses, addresses climate change, advances social equity and environmental justice, supports economic and community development, and reduces per capita vehicle miles traveled.

The "place types" identified in the SMF are purposefully broad. Detailed mapping would show that place types often co-exist in small areas. The place types are intended to be applied at a generalized level of detail, with the understanding that detailed planning for specific places will provide greater differentiation of locations. In fact, within any large area designated as one of the place types, there typically will be subareas with the character of other places. The study area's size and complexity makes this variation inevitable.

Figure 0-1 shows, at a high level, the predominant SMF place types throughout various parts of the I-405 Corridor. Starting on the northern end is the Mission Hills neighborhood, which is a predominately suburban place type within the San Fernando Valley. Heading south through the San Fernando Valley and over the Sepulveda Pass, the place type moves from suburban to approximately four miles of rural and protected lands. From the rural lands the development pattern transitions back to close-in urban centers as the I-405 Corridor passes through neighborhoods in the City of Los Angeles and other cities in the Corridor's southern terminus. Understanding these place types will be critical in helping develop mobility improvements that meet existing and future community and business needs.

Figure 0-1 Caltrans Smart Mobility Framework Place Types

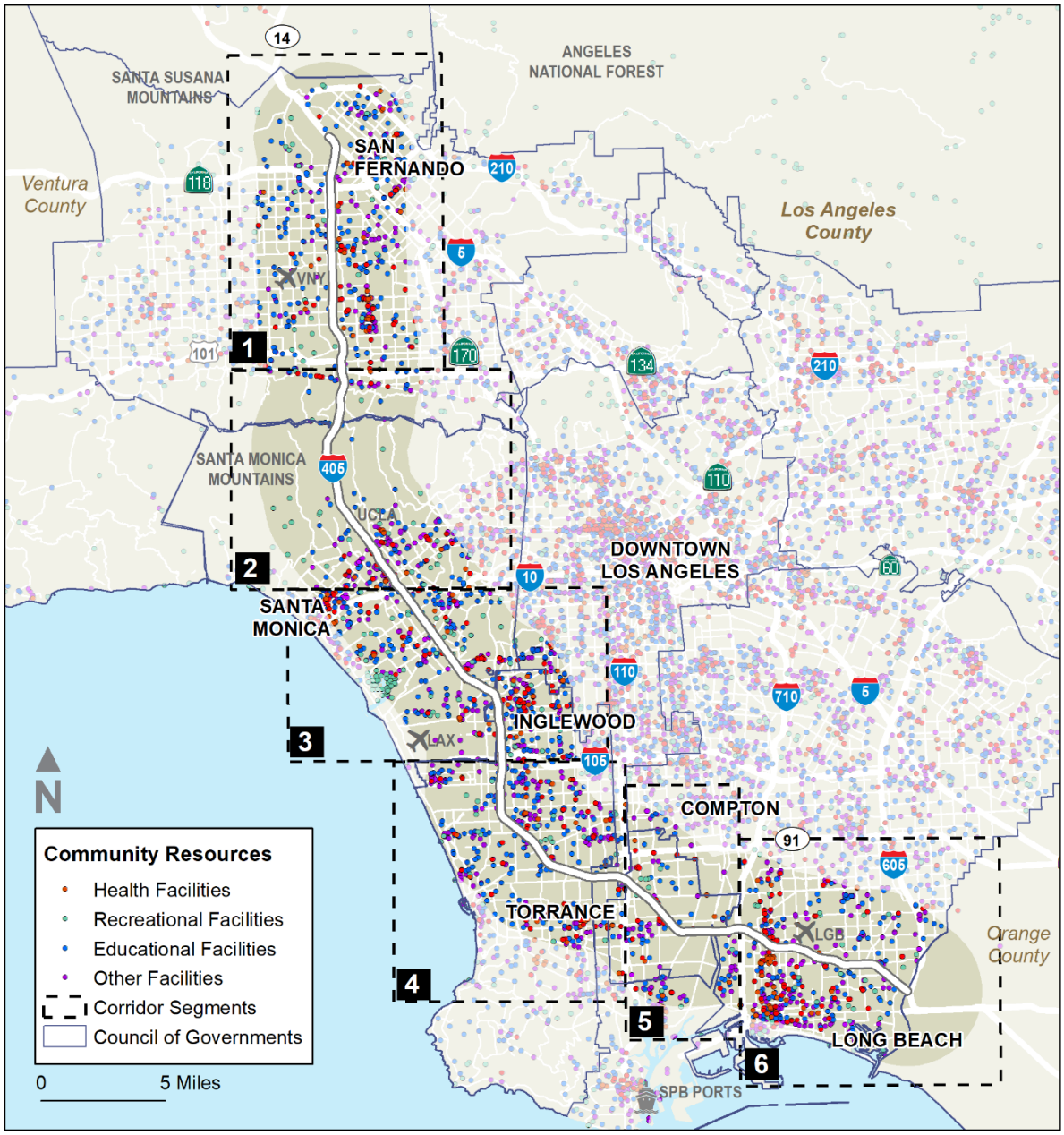


Source: SCAG (2021).

There are a range of community resources (healthcare, recreation, education, and other facilities) distributed throughout the study area, regardless of an area's SMF place type. These community resources are just one of many factors that influence travel, but are a strong indicator of where multimodal mobility solutions play a critical role in ensuring that residents and visitors can access their destinations. Figure 0-2 shows areas along the Corridor where community resources are most concentrated.

A high-level description of land use and mobility characteristics within different segments of the I-405 Corridor, as well as key destinations that significantly influence travel demand and behavior, is provided below.

Figure 0-2 Community Resources



Source: LA County Location Management System (2021).

Segment 1 is bounded by I-5 and U.S. 101 and includes San Fernando and many neighborhoods of Los Angeles including Sylmar, Granada Hills, Mission Hills, Northridge, North Hills, Arleta, Panorama City, Van Nuys, Valley Glen, Lake Balboa, and Sepulveda Basin. This area is predominantly Hispanic and Latino, is home to many disadvantaged communities (as defined by CalEnviroScreen, the Healthy Places Index, and Metro's Equity Focus Communities[21] (EFC)), and is made up primarily of neighborhood-style (4d) SMF place types. Areas east of the I-405 Corridor generally have a low to medium concentration of health, recreation, and educational facilities compared to other neighborhoods. Ventura Boulevard, a significant employment corridor characterized as SMF place type 4b (suburban corridor), runs along the southern edge of this segment. There are LA Metro bus services throughout the segment, including the G-line (Orange) BRT service. Sidewalks are present throughout the corridor while bike facilities are limited in most places and absent in many.

Segment 2 is bounded by U.S. 101 and I-10 and includes Beverly Hills and many neighborhoods of Los Angeles including Encino, Sherman Oaks, Brentwood, Beverly Crest, Bel-Air, Sawtelle, and Westwood. This area is primarily made up of SMF place types 5b and 4d (rural settlements and neighborhoods, respectively). This area is much more affluent and less diverse than LA County as a whole and is home to a number of significant destinations and attractions, including the Getty Museum, the UCLA campus, the Ronald Reagan UCLA Medical Center[22], a VA medical complex, and outdoor recreation areas in the Santa Monica Mountains. This segment includes the Sepulveda Pass, where the Santa Monica Mountains constrain both sides of I-405 for approximately six miles. There are few existing alternative routes over the mountains, making it hard to travel between the north and south parts of this segment. This area also has the highest wildfire risk in the corridor, with wealthier neighborhoods in the hills most at risk.

Segment 3 is bounded by I-10 and I-105 and includes the cities of Santa Monica, Culver City, Inglewood, unincorporated areas such as Ladera Heights, and the Mar Vista, Venice, Palms, Del Rey, and Westchester neighborhoods of Los Angeles. This segment is made up of a mix of land use types, including SMF place types 2a and 2b (close-in centers and close-in corridors), SMF place type 4d (neighborhoods), and special use areas. There are a wide range of significant destinations in this segment. Santa Monica and Venice are beachside towns that draw more than eight million visitors each year[23] to attractions such as the Santa Monica Pier (amusement park), the Venice Canals, and beach areas. In contrast, Inglewood has major commercial corridors with high concentrations of healthcare and education facilities but low concentrations of parks and recreation. Transit in this area is provided by a combination of the Santa Monica Big Blue Bus, Culver City Bus, and LA Metro, suggesting that while riders have access to transit services, many may have to transfer services when making trips that cross jurisdictions.

Many areas within Inglewood are defined as EFCs, and while these areas are currently defined as neighborhoods (according to SMF place types) they may evolve into "close-in compact communities," which have more mixed-use centers and transit options aimed at connecting commuters to Downtown LA and nearby destinations. The evolution will be driven by large scale developments in the area. Inglewood is home to the new SoFi sports stadium (home of the Rams & Chargers), and proposed improvements would convert six parcels of vacant land into an arena, LA Clippers office space, parking garages, and a hotel adjacent to SoFi that would generate significantly more travel to the area.

[21] EFCs are defined as communities in census tracts that are predominantly low income, non-white, and have limited access to automobiles.

[22] "UCLA Transportation State of the Commute 2019" (UCLA, 2019).

[23] City of Santa Monica "About Us'.

Finally, the Los Angeles International Airport (LAX) is a "special use area" west of the I-405 freeway that draws people from the greater Los Angeles region for travel and employment. It is anticipated that the number of people who will access the airport via transit will increase after the construction of the Automated People Mover (APM) is completed in 2023, which will provide electric, automated passenger shuttle service along a 2.25--mile elevated guideway with six stations inside and outside airport terminals.[24]

Key Challenge: *Competing land uses*

Considerations for Improvement Strategies:

Ensuring mobility options are identified through a Smart Mobility Framework lens
What solutions can be targeted at low income communities & communities of color?

Potential Evaluation Criteria: *Equity, Accessibility, Efficient Land Use*

Segment 4 is bounded by I-105 and I-110 and includes the cities of Hawthorne, El Segundo, Manhattan Beach, Redondo Beach, Gardena, Torrance, and a small piece of southern Los Angeles. Land use in this segment primarily consists of SMF place types 4b and 4d (corridors and neighborhoods), with a number of dedicated use areas (SMF place type 4c), including large oil refineries in El Segundo and Torrance. Both of these cities are also significant employment centers, with a major aeronautical employment hub (Northrup-Grumman, Lockheed Martin, Raytheon, Space X) clustered just south of the I-105/LAX and west of the I-405 freeway. Both Torrance and El Segundo also are home to large and medium footprint industrial and office buildings that can be characterized as suburban dedicated use areas (SMF place type 4c).Transit in this area is provided by a combination of Beach Cities Transit, GTrans, Torrance Transit, and LA Metro, with less coverage on the west side of I-405. These routes provide transit connections to the Metro C line (Green) rail stations. There is limited bike infrastructure in this segment, with most mileage running north/south through the beach communities of Manhattan Beach and Redondo Beach.

Segment 5 is bounded by I-110 and I-710 and is home to the city of Carson, parts of Compton, and unincorporated areas such as Rancho Dominguez, portions of which are considered EFCs. Land use in this segment is primarily SMF place type 4c (dedicated use) due to the large number of warehouses and industrial centers in the area. Given its proximity to the SPB Ports, a major portion of these industrial uses are oil refineries, distribution centers, and intermodal freight facilities. Carson is also home to Dignity Health Sports Park, home stadium of the LA Galaxy of Major League Soccer (MLS), and California State University Dominguez Hills, both of which are significant trip generators. In fact, Cal State Dominguez Hills has an enrollment of more than 15,000, with only 18 percent of students living on-campus[25], meaning that the vast majority of students are commuters. Transit access in the area is provided by a combination of Torrance Transit, Long Beach Transit, and LA Metro. The Metro A line (Blue) rail line serves the northeastern portion of this segment.

Segment 6 is bounded by I-710 and I-605 and includes the cities of Long Beach, Signal Hill, Lakewood, and Hawaiian Gardens. Land use in this segment is primarily SMF place type 4b and 4d (corridors and neighborhoods), although Downtown Long Beach is an SMF place type 1a (urban core). Downtown Long Beach is a significant employment center, drawing people from across the I-405 Corridor, and has a mixture of residential and commercial properties on small and medium parcels. Like Santa Monica, Long Beach is a tourist destination with six million annual visitors.[26] Buildings vary from small footprint houses and commercial buildings to larger apartment buildings and medical facilities. Long Beach Transit provides

[24] Los Angeles World Airports (2021).

[25] Cal State University Dominguez Hills.

[26] Visit Long Beach "Long Beach Convention & Visitors Bureau."

relatively thorough coverage and connectivity within the segment, and LA Metro's A Line (Blue) rail service terminates in downtown Long Beach.

Clearly, **the Corridor study area greatly varies in land use character and related travel demand.** Future mobility improvements will not only have to align with existing and anticipated travel demand, but will need to be designed and scaled to complement current and planned land uses, and to provide high-quality multimodal mobility options to these varying destinations and land uses.

The Corridor Supports a Wide Variety of Trips & Travel Patterns

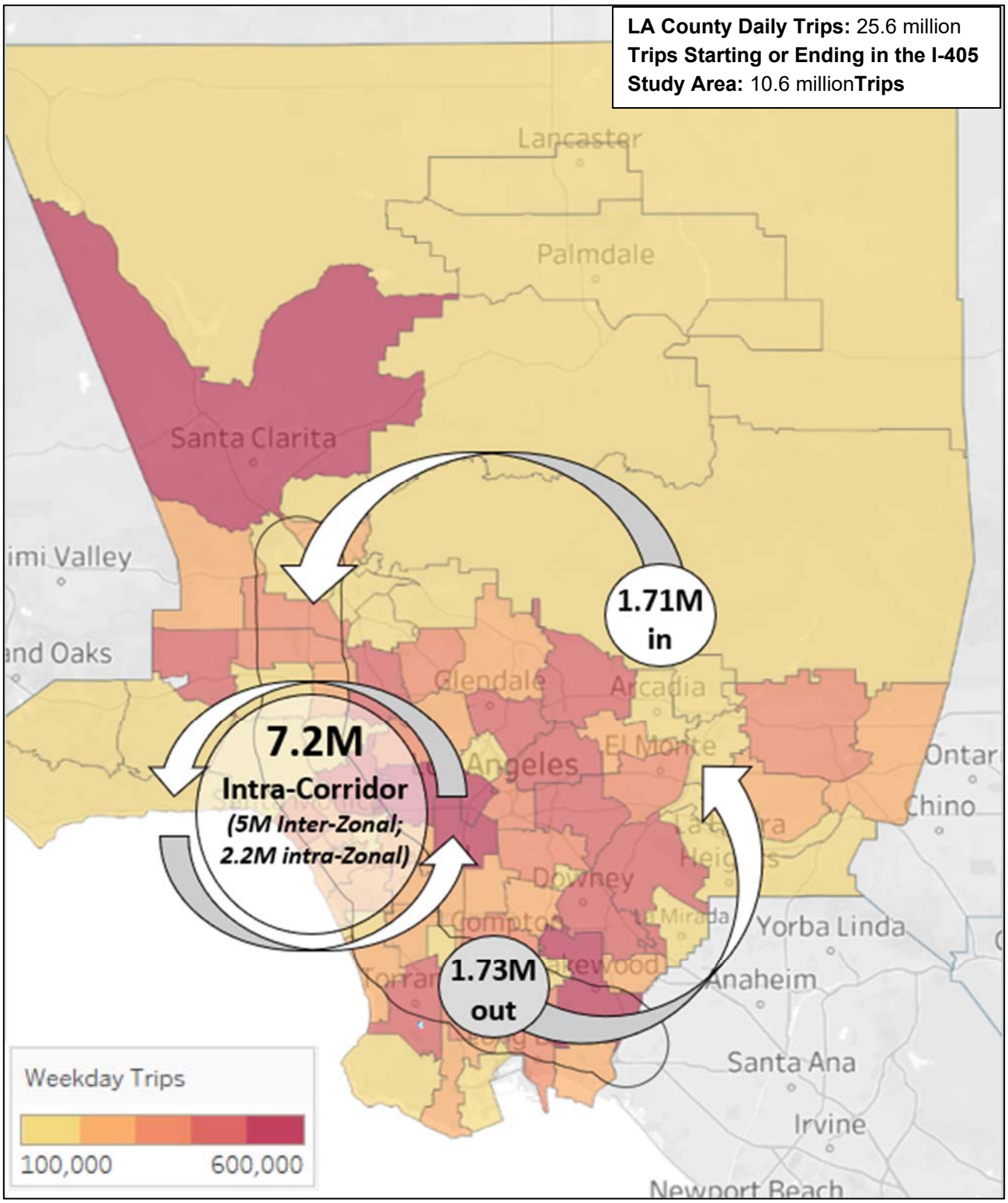
Corridor demographics, land use, and key destinations play an important role in trip making decisions. These factors combine to influence the staggering number of trips that occur in the study area daily. T**here are 10.6 million daily trips that start or end within the study area**, making up **41 percent of the 25.6 million daily trips taken throughout LA County**. To highlight just how concentrated trip-making is within the I-405 Corridor, the study area makes up only 6.7 percent of LA County by land area and has 29 percent of the County's lane miles. Moreover, of the 10.6 million trips that start or end in the Corridor, nearly 70 percent (7.2 million trips) stay within the Corridor (Figure 0-1).

A Note on Methods

Location-based-services (LBS) data that aggregate anonymized cell-phone data were used to perform the corridor user analysis. Data sources include the 2017 Travel Market Intelligence Dashboard (LOCUS and TAPCARD), the APC transit Dashboard, and the 2020 LOCUS Travel Tracker and LOCUS Traffic Footfall Tracker. Together, these data can be used to summarize travel (origins and destinations) at a high degree of accuracy across customizable geographic levels, but cannot (at this time) be used to describe travel by mode (walk, bike, auto, transit), identify fleet mix (trucks, EVs, passenger cars), segment travel by facility type (highways vs. arterials), or link demographic characteristics (income, education levels) to trip making.

To examine trip origins and destinations along the corridor for the I-405 CMCP, LA County was split into 78 "sub-zones" that are nested within the 20 travel districts used in previous analyses and consistent with the Regional Ridership Growth Action Plan (RGAP). These sub-zones, first shown in Figure 2.7, are used to identify where the most trip-making activity is happening along the Corridor.

Figure 0-1 All Trips in LA County



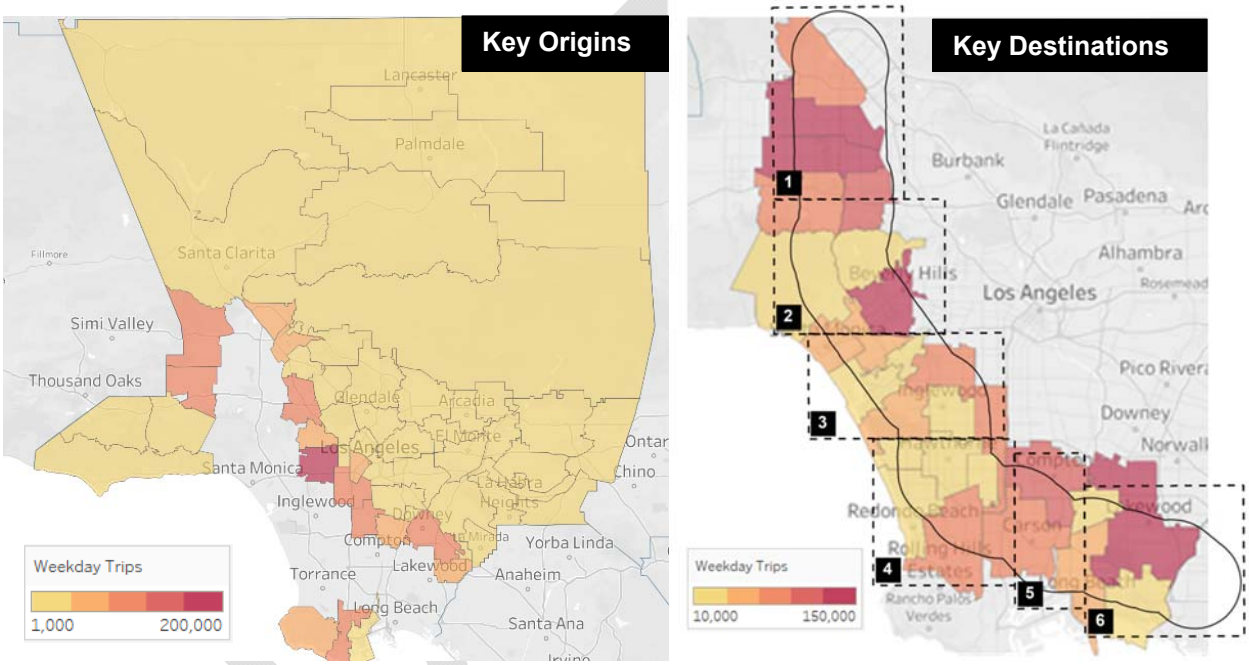
Source: Cambridge Systematics; LOCUS dataset; 2019.

Different types of trips in the corridor—inbound, outbound, and intra-corridor—have different characteristics, as discussed below.

Inbound and Outbound Trips

Only about 30 percent of trips in the study area (3.4 million per day in total) originate or terminate outside the study area (inbound/outbound trips).[27] As shown in Figure 0-2, trips beginning outside the study area tend to originate from directly adjacent zones (particularly around the I-10 corridor, near the Mid-City, Hancock Park and Fairfax neighborhoods of Los Angeles) but terminate in a variety of locations within the study area, particularly in Segments 1, 5, and 6.

Figure 0-2 Trips Originating Outside the Corridor and Ending in the Corridor (1.71 M)

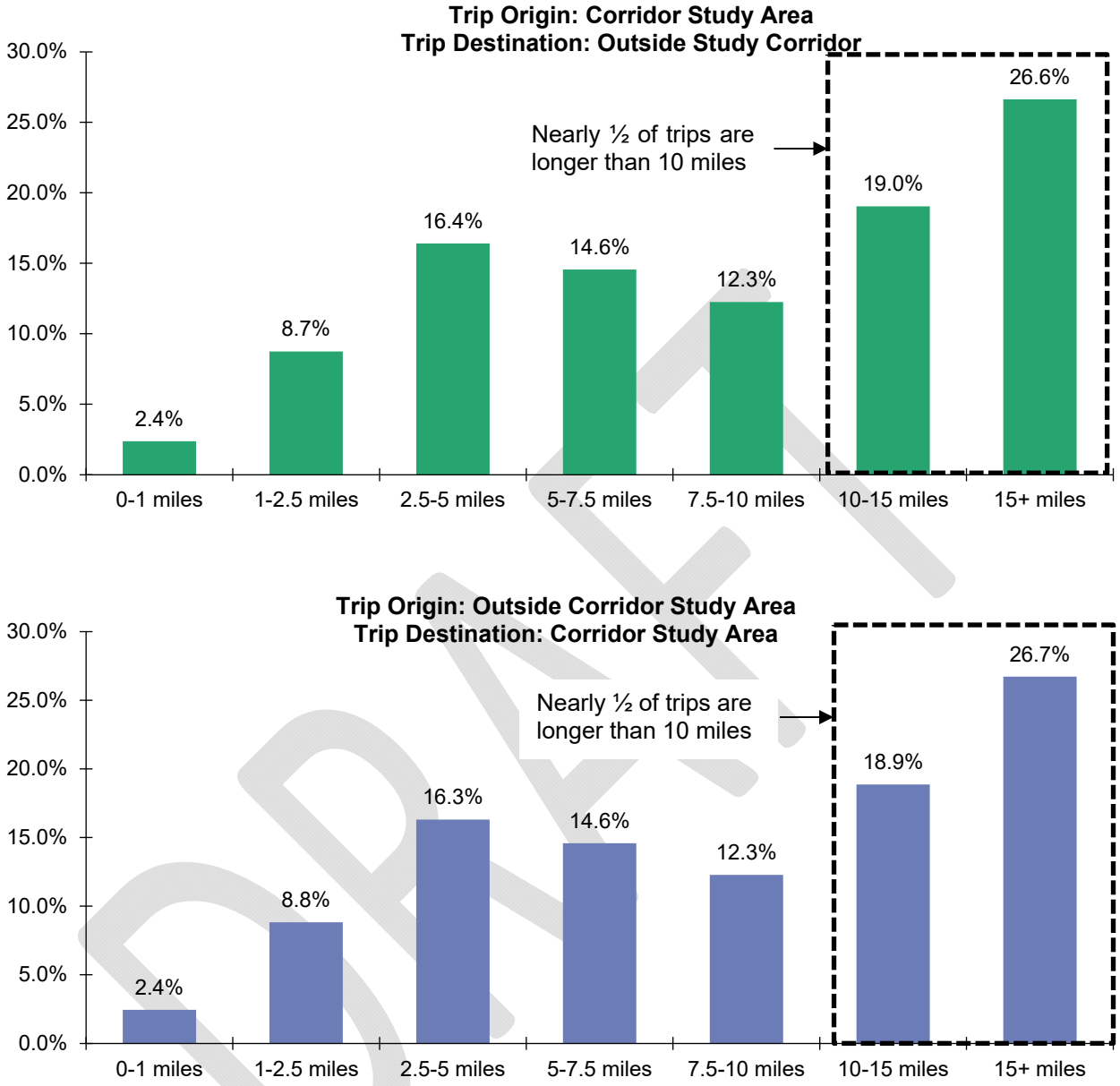


Source: Cambridge Systematics; LOCUS dataset; 2019.

As shown in Figure 0-3, trip lengths for inbound and outbound trips to/from the Corridor are similar. In both cases, more than a quarter of these trips are longer than 15 miles, and nearly half are more than 10 miles. At the County level, roughly 15 percent of trips are more than 10 miles. As will be discussed in the next section, **average lengths of inbound/outbound trips are significantly longer than those trips that both start and end within the study area**.

[27] This analysis only accounts for trips that start or end in LA County. It does not include trips that start or end in surrounding counties or other parts of the state.

Figure 0-3 Inbound and Outbound Trip Lengths



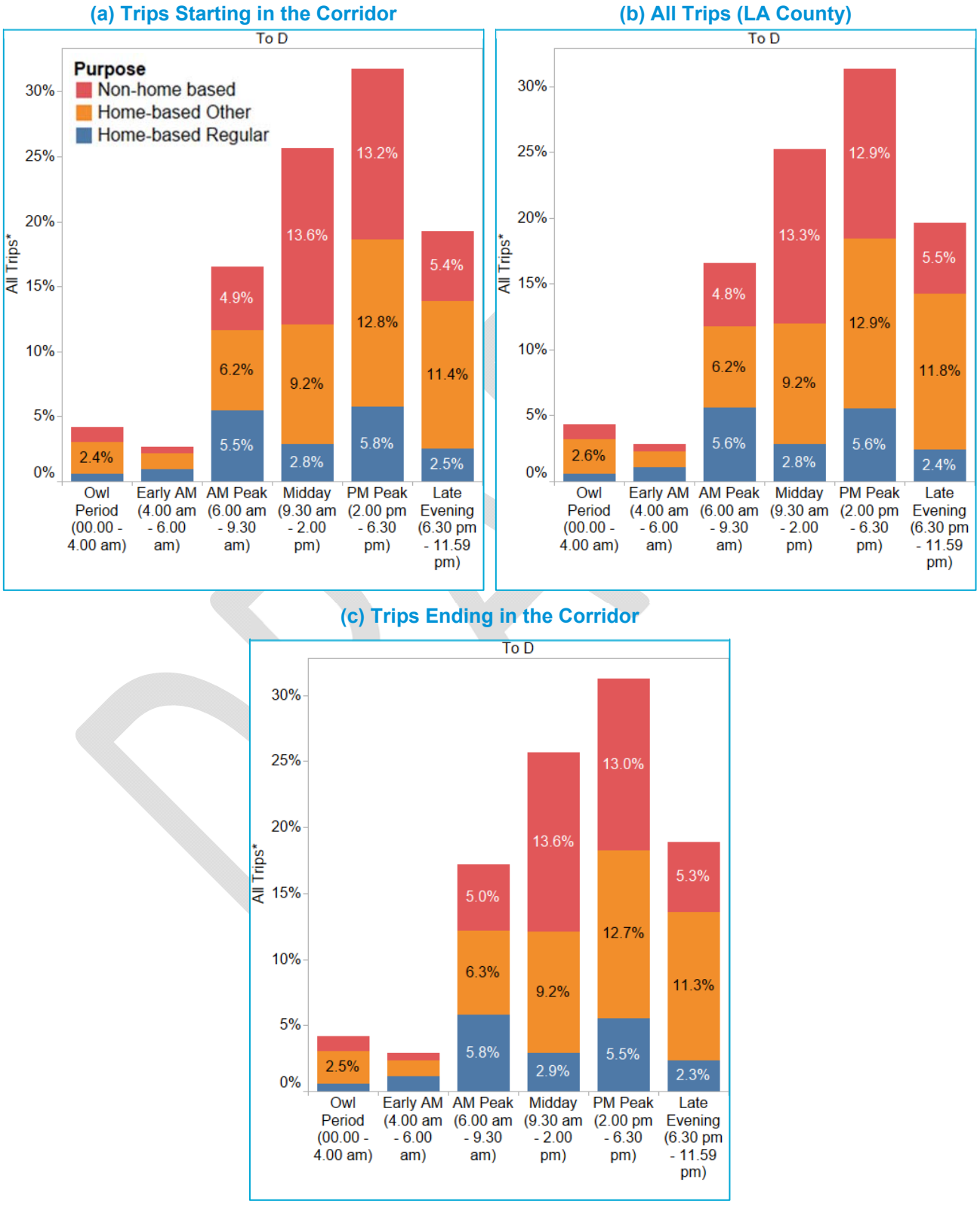
Why Does Trip Purpose Matter?

Understanding why these trips are occurring ("trip purpose") is important because different types of trips have different characteristics, different impacts on the system, and often require different mobility solutions. Expanding multimodal mobility options for commuters may require additional focus on travel demand management strategies such as ridesharing, vanpooling, express lanes, telework, and commuter-focused rail and transit improvements, whereas shorter non-work trips may be better served by investments in local bikeways, greenways, bike- and scooter-share programs, and other neighborhood-scale multimodal mobility services.

The purpose of these inbound and outbound trips- regular and/or commute trips ("home-based regular"), which include trips to shopping, recreation, or airport runs ("home based other"), or stopping off somewhere after work or school ("non-home based") closely mirror travel patterns in LA County as a whole (Figure 0-4), with "home-based regular" trips comprising about

17 percent of total in the study area and for all trips throughout LA County.

Figure 0-4 Trip Characteristics in the Corridor and LA County

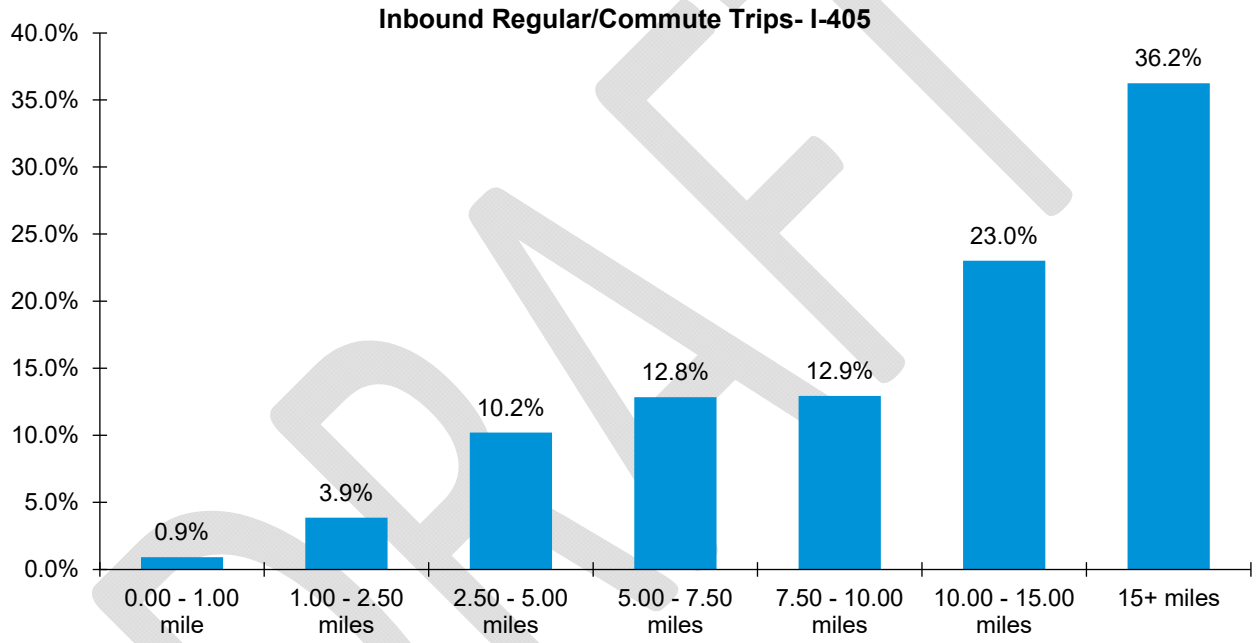


Source: Cambridge Systematics; LOCUS dataset; 2019.

* Includes only weekday travel

Although these regular/commute trips represent only a small percentage (17%) of overall travel, or 454,172 total daily trips, **they tend to be very long. More than a third are longer than 15 miles and well over half are longer than 10 miles** (Figure 0-5). These patterns are starkly different than countywide averages (as shown in Figure 0-6), where only 15 percent of regular/commute trips are more than 15 miles, and more than half are less than five miles. The average length of these regular/commute trips in the study area, coupled with the fact that they tend to occur during peak commute periods, combine to **exacerbate existing congestion on the I-405 freeway and surrounding arterials and are difficult to shift to non-auto modes**.

Figure 0-5 Regular/Commute Trip Lengths in the I-405 Corridor



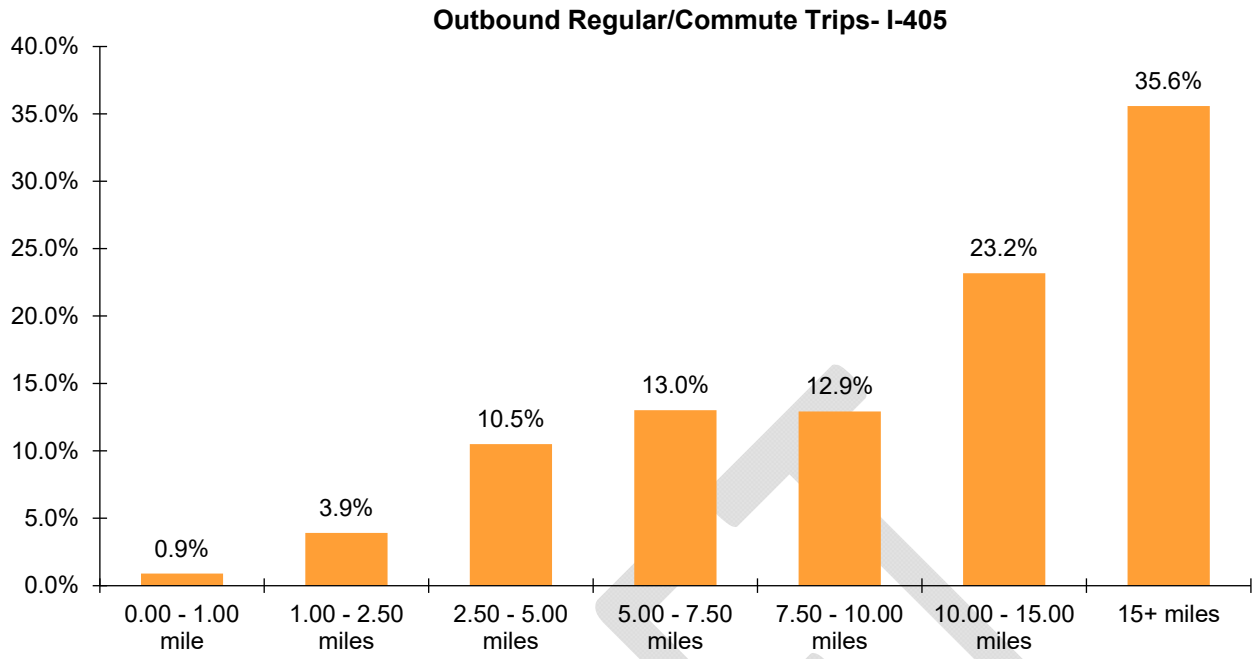
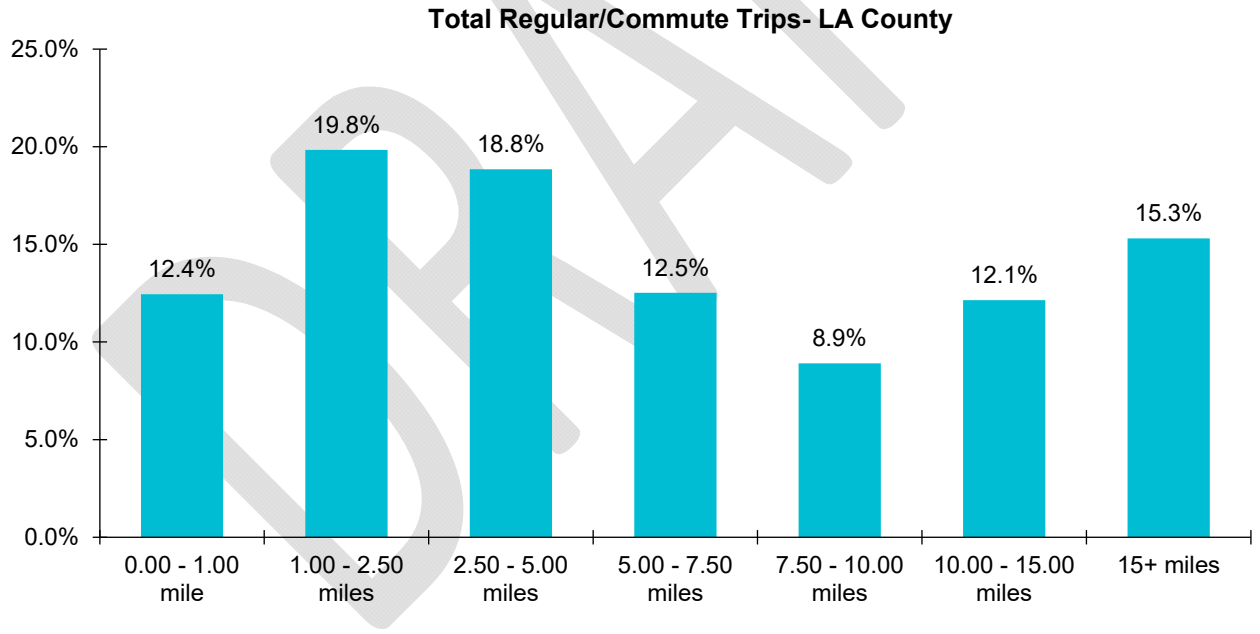


Figure 0-6 Regular/Commute Trip Lengths in LA County



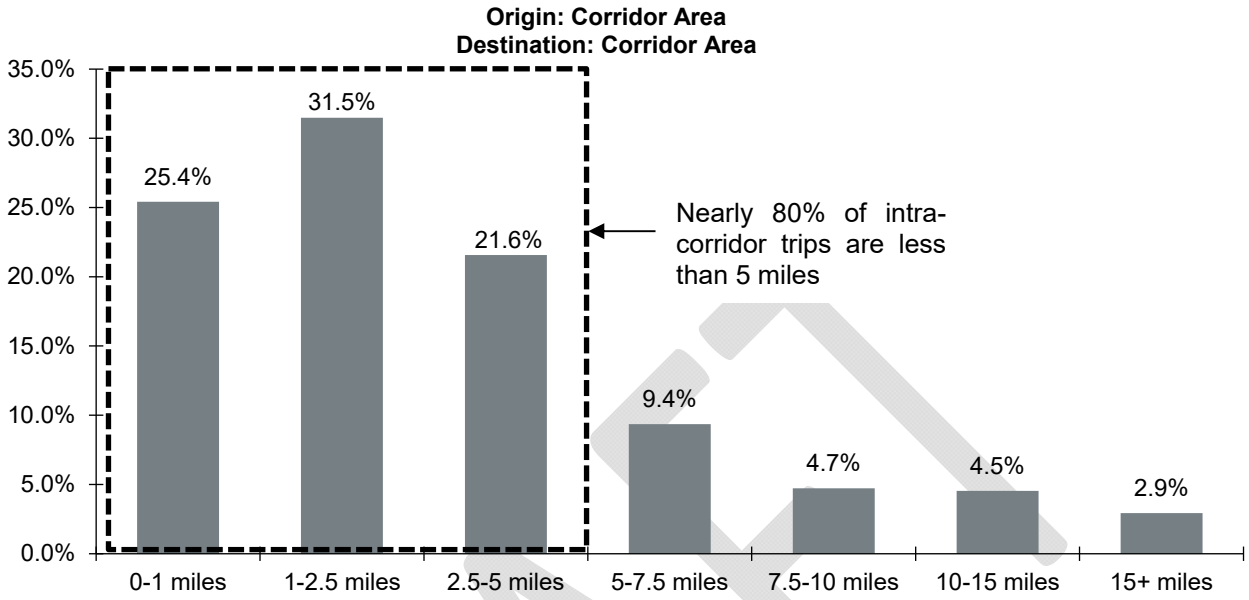
Source: Cambridge Systematics; LOCUS dataset; 2019.

Intra-Corridor Trips

More than 70 percent of trips in the study area (7.2 M) both start and end within the Corridor (intra-Corridor). Compared to the inbound-outbound trips described above, the intra-Corridor trips are much shorter in length. In fact, **1 in 4 trips is less than one mile and nearly 80 percent are less than five miles** (Figure 0-7). While it is unclear how many of these short trips occur on the I-405 freeway vs. surrounding arterials, the

magnitude of short trips highlights a critical opportunity to better serve many of the trips on the Corridor with non-auto modes.

Figure 0-7 Intra-Corridor Trips

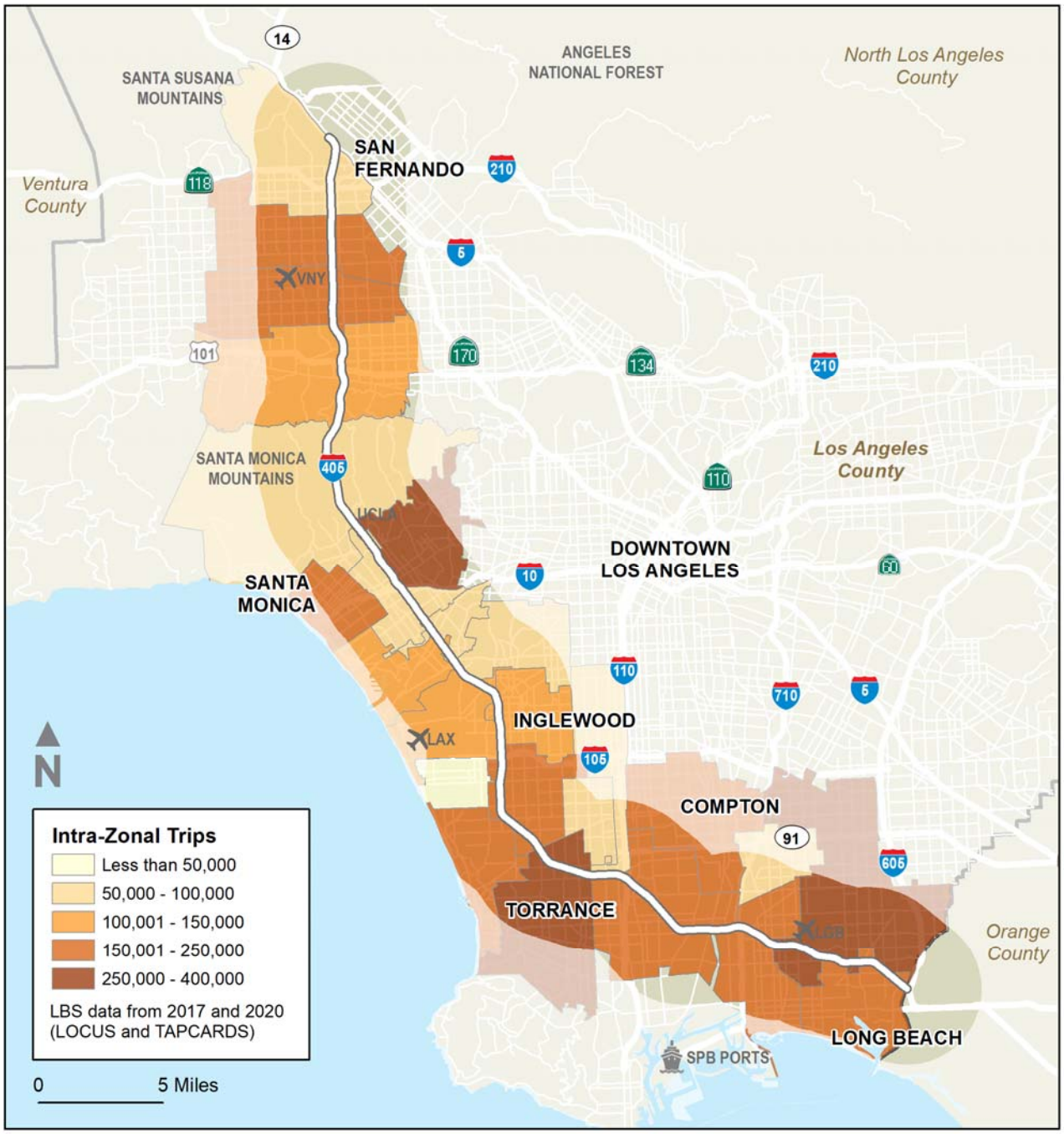


Source: Cambridge Systematics; LOCUS dataset; 2019.

About 30 percent of these intra-Corridor trips (2.2 million)—stay within the same subzone, supporting the finding that most trips within the Corridor are short (Figure 0-8). These intra-Corridor trips are greatest around Beverly Hills and the UCLA Campus area, in the Lawndale/Gardena/Torrance area, and in Long Beach east of I-405.

Figure 0-8 Intra-Zonal Trips

2.2 Million Total Weekday Trips



Source: Cambridge Systematics; LOCUS dataset; 2019.

The vast majority of trips that stay within the Corridor – about 70 percent (5 million)- are inter-zonal, that is they occur between subzones. Figure 0-9 shows travel volumes between subzone origin-destination pairs, with the thicker lines indicating increasingly higher origin-destination volumes. As shown in Figure 0-9, most inter-zonal travel occurs between neighboring subzones. There are four large clusters of travel listed from north to south:

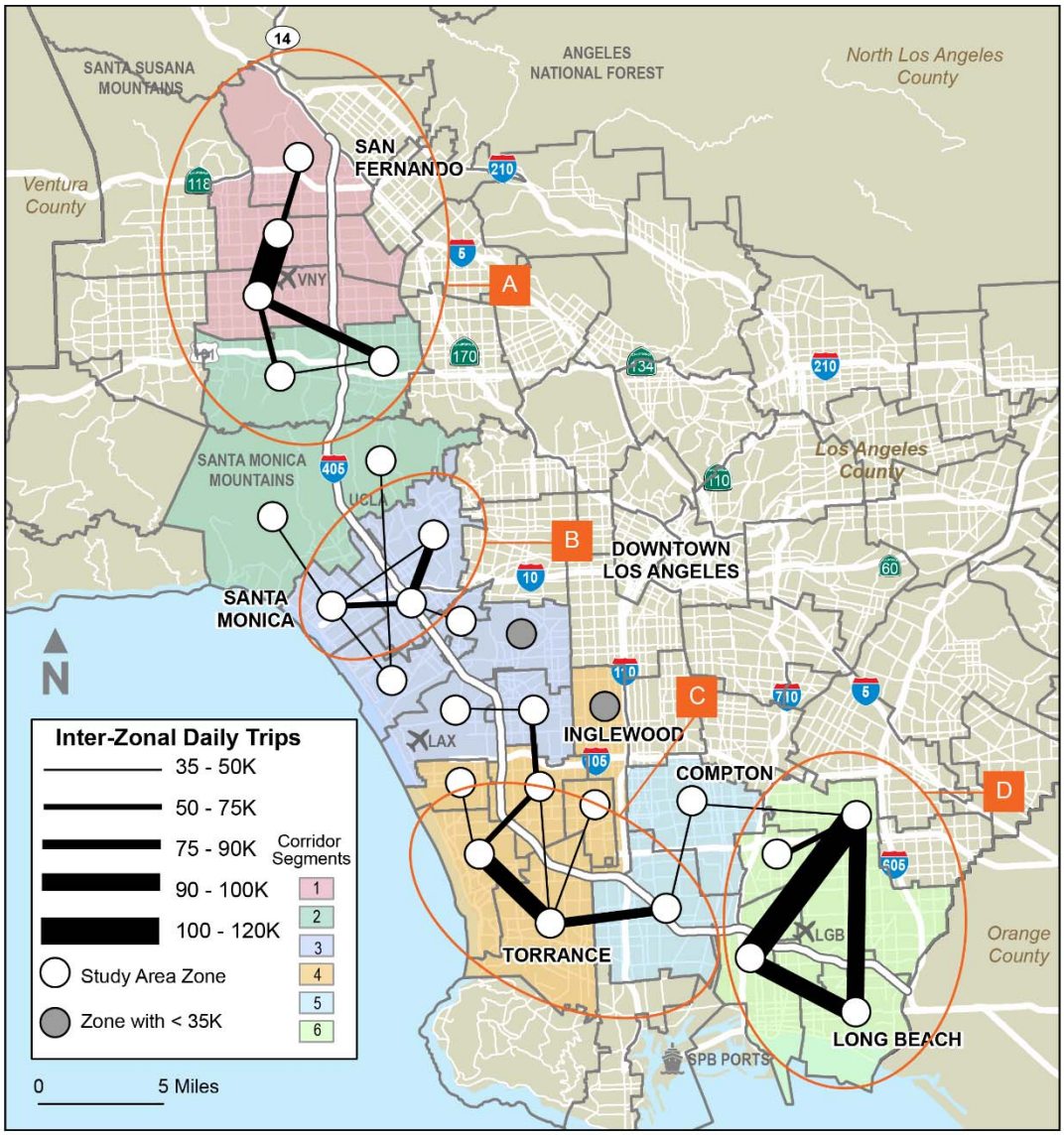
San Fernando Valley north of the Santa Monica Mountains (Segment 1) has one of the highest instances of inter-zonal trip-making, which occurs between the middle valley segments.

The Santa Monica/UCLA area (Segment 3) has moderate trip making between Santa Monica, Palms, and UCLA/Westwood areas.

Lawndale/Gardena/Torrance (Segment 4 and the southern part of Segment 5) has high trip making between Torrance and beachside cities.

Long Beach at the southern end of the study area (Segment 6) has the highest instances of inter-zonal trip-making in the corridor, with a significant number of trips that cross the I-405 freeway.

Figure 0-9 Inter-Zonal Daily Trips *5.0 M Total*



Source: Cambridge Systematics; LOCUS dataset; 2019.

Although the data used to conduct this analysis are not able to identify specific modal or facility usage (see "a Note on Methods" above), **the volume and length of these intra- and inter-zonal trips makes them prime targets for increased use of shared and active modes**, including the shared mobility options within the corridor study area described in Table 0.1 below.

Table 0.1 Mobility Options in the Study Area

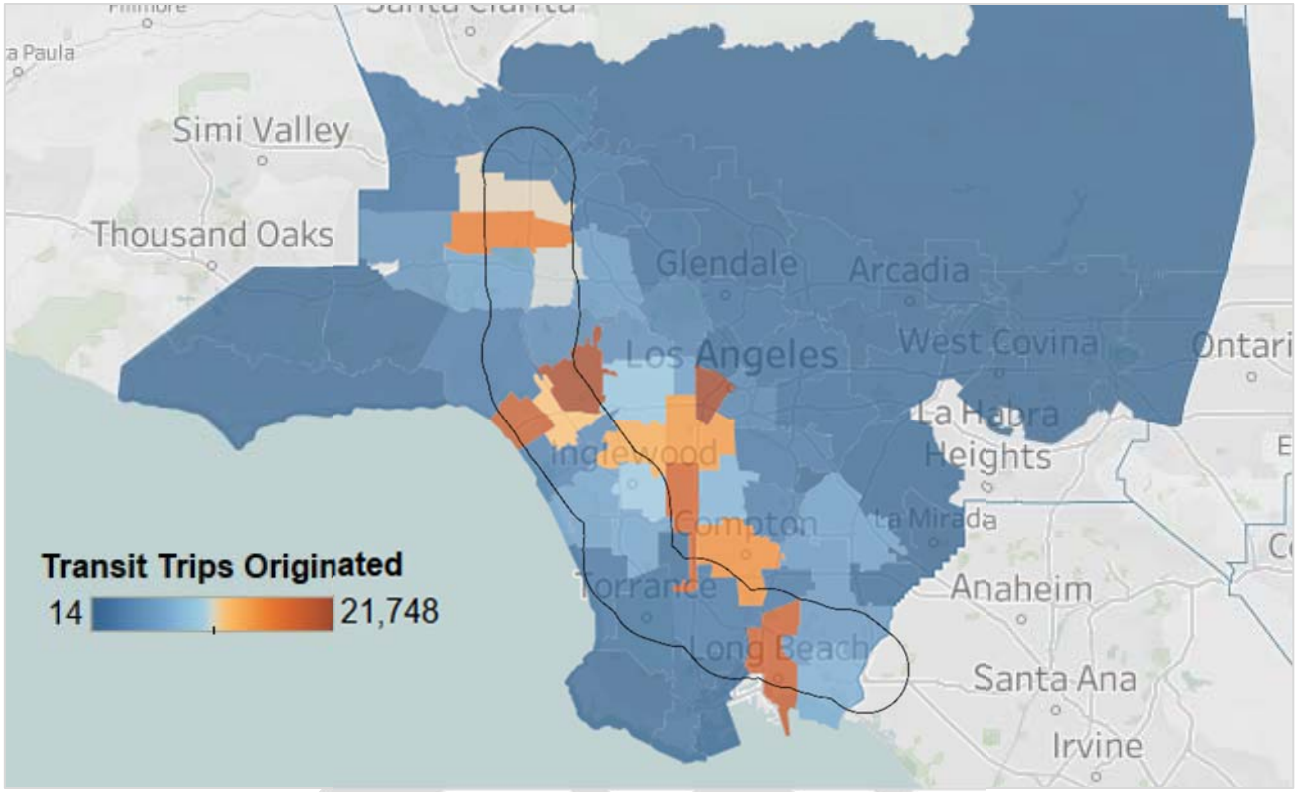
Mobility Option	Overview	Area of Operation
Electric Scooters	Pay-per-mile shared electric scooters hit the corridor in 2018 when Bird launched from Santa Monica.	While COVID-19 significantly reduced operations, scooters are still operating throughout the Corridor.
Bike Share	There are a few public operators in the corridor including Metro Bike Share and Long Beach Bike Share. Santa Monica, UCLA, West Hollywood, and Beverly Hills operated complimentary bikeshare systems, but stopped operation everywhere but Beverly Hills in 2020 with the onset of the COVID-19 pandemic. Lyft e-bikes now operate in just the Santa Monica area.	Metro Bike Share has stations near the E Line (Expo) and beach path in Los Angeles. The Long Beach system is concentrated in downtown Long Beach, while Lyft operates from the beach to the I-405 and from San Vicente to Washington Boulevard.
Rideshare / Mobility on Demand	Private TNC operators like Uber and Lyft provide rideshare in the region. In addition, there are several mobility pilots that provide on-demand mobility options in certain areas.	LANow (LADOT) operates in Del Rey, Venice, Mar Vista, and Palms The Free Ride (Santa Monica) operates within Santa Monica city limits. Metro Micro services Compton/Artesia and Inglewood/LAX.
Car Share	There are private car sharing operators in the corridor such as Zipcar and Getaround.	These operate in the entire region. Stations for BlueLA, the City of Los Angeles' car-sharing program, are not located in the Corridor, but people could use them here before parking them elsewhere.

Transit & Active Transportation Usage

Observed travel behavior in the study area—significant volumes of short trips within or between adjacent sub-zones—would seem to indicate that transit and active transportation modes would offer a competitive alternative to auto travel, particularly for the 7.2 million trips that stay within the study area. **But only about 2.5 percent of all trips in the corridor are taken on transit.**[28] This is below the Countywide transit market share of 3.4 percent, despite the fact that the study area includes some of the communities with the highest level of transit travel in LA County, such as Santa Monica, UCLA, Long Beach, and parts of the San Fernando Valley, as shown in Figure 0-10.

[28] Cambridge Systematics LOCUS Dataset, 2019. Note: Active transportation mode shares are not available through LOCUS at this time. American Community Survey data is used to estimate active transportation commute mode shares.

Figure 0-10 Transit Trip Origins



Source: Cambridge Systematics; LOCUS dataset; 2019.

Similar trends hold for commute trips in the study area, only five percent of which occur on transit. Comparatively, this is below the countywide transit commute share of six percent and below other corridors in LA County, such as I-105, which has a transit commute share of seven percent.[29] Again, this is despite the fact that some locations within the study area have a transit commute share that exceeds 10 percent. These locations include parts of Long Beach near the Metro A Line, parts of Inglewood east of I-405; Culver City near Venice Boulevard; Westside near Santa Monica Boulevard; and near Sepulveda Boulevard in the San Fernando Valley (Figure 0-11).

[29] U.S. Census Bureau; American Community Survey; 2019.

Figure 0-11 Transit Commuters in the Study Area

Source: 2018 ACS 5-year Estimates.

Low levels of transit usage are not unique to the I-405 Corridor. Transit ridership has declined nationally year over year between 2012 and 2018.[30] In recent years, **Metro has seen declines in ridership throughout the system**, including along the lines that serve or connect to the I-405 Corridor. Even before the COVID-19 pandemic, total Metro Rail system ridership declined significantly across the system and on each of the lines serving the study area (Figure 0-12).[31]

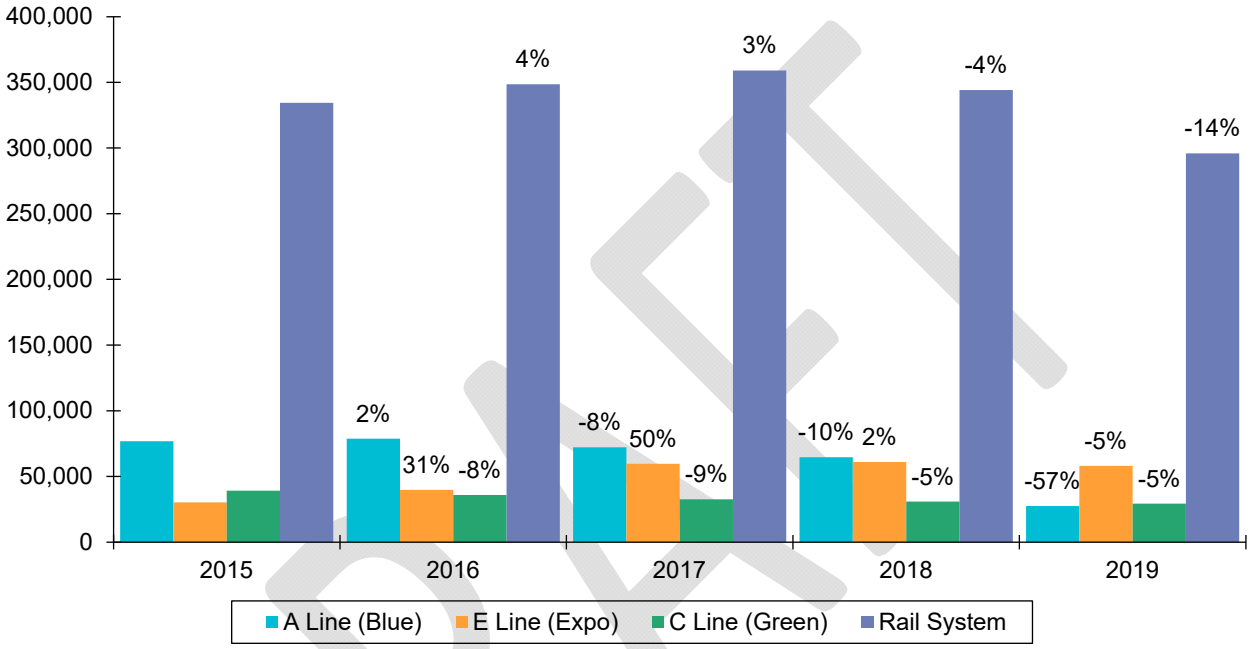
[30] National Transit Database; 2018

[31] Sharp decline in 2019 ridership is part due to construction along Metro A Line.

The Metro Bus system experienced similar declines, particularly on the G Line (Orange), which serves the San Fernando Valley from the North Hollywood Red Line station to Chatsworth, and whose ridership has declined by approximately five percent annually between 2015 and 2019.

Figure 0-12 Metro Rail Average Weekday Boardings

2015–2019



Source: LA Metro; Percentages show change from previous year.

There are a number of reasons why transit and active transportation options are not more frequently utilized in the study area (see sidebar below). These can be broken down into four core reasons: 1) uncompetitive transit travel times, 2) lack of viable alternatives, 3) demographic and displacement trends, and 4) network gaps and geographic constraints. Each of these is described in greater detail in the following paragraphs.

Why are People Not Riding Transit?

Despite the multiple rail and transit services provided in the corridor (reviewed in the opening section), transit mode share remains low. Multiple recent efforts have explored why, including Metro's NextGen Transit Strategy, Understanding How Women Travel report (LA Metro), and the Falling Transit Ridership Report (SCAG/UCLA ITS). These studies point to the following barriers to transit mode shift:

Uncompetitive Transit Travel Times (Metro NextGen Study)
- *Increased roadway congestion leading to slow speeds, poor reliability, and high transit travel times*

Lack of Viable Alternatives (Metro NextGen Transit Study and How Women Travel Report)
- *Service/demand mis-matches*
- *Burdensome transfers, long wait times, low frequency service*
- *Lack of fare integration*
- *Personal safety and security concerns*

Demographic & Displacement Trends (Falling Transit Ridership: California and Southern California, SCAG 2018)
- *Increases in car ownership*
- *Displacement of core ridership to the outskirts of the county*

Network Gaps & Geographic Constraints (Metro NextGen Study and SCAG Falling Transit Ridership Report)
- *Lack of first-last mile options*
- *Auto-oriented land use patterns*

1) Transit travel times are more competitive in the I-405 Corridor than in LA County as a whole, but only slightly (a 3.1 average ratio of transit to auto travel time vs. a 3.5 Countywide average). This indicates **that a typical trip takes more than 3 times longer to make by transit than by car**—a significant deterrent for those who may be interested in switching from auto to transit, and a significant additional burden for those who do not have access to a vehicle.[32] As described in the Metro NextGen Bus Study and SCAG/UCLA's Falling Transit Ridership Report, increases in roadway congestion are slowing down buses that operate in mixed-flow traffic conditions. In addition, lack of first-last mile access and long transfer times can also contribute to high transit travel times. Other design features such as bus stop spacing, location, and routing can also impact transit speed, reliability, and performance.

2) **Existing networks and services may not be seen as viable alternatives for many trips**. Metro's NextGen Bus Study identified a number of challenges pertaining to routes serving the study area including infrequent service (especially during non-commute hours) that make short distance transit trips less attractive; overlapping Local, Limited, and Rapid services that compete with rather than complement each other; and high traffic congestion on the most productive routes that leads to poor service and delay for the most frequent riders. Metrolink's Ventura County and Antelope Valley Lines both serve the study area with a commuter rail option that connect directly into LA Union Station, but by design have more widely dispersed stations and cater to trips primarily during commute hours. These commuter rail services serve fewer than 10,000 riders (combined) on an average weekday.[33]

3) **Demographic and displacement trends including increased immigration, rising car ownership patterns among immigrants and low-income residents, and gentrification of formerly high-transit usage neighborhoods are all contributing to falling transit ridership.**[34] As discussed in Section 4.0,

[32] Cambridge Systematics; LOCUS dataset; 2019.

[33] Metrolink Q3 '18-19 Fact Sheet.

[34] Falling Transit Ridership: California and Southern California (UCLA ITS/SCAG); 2018

gentrification and the rising cost of living are displacing many low-income residents within the study area—many of whom make up Metro's core ridership—to outlying areas with fewer transit services. This trend is requiring displaced residents to rely more heavily on a vehicle to access jobs, goods, and services (hence the increase in auto ownership), while more affluent residents moving into transit-oriented neighborhoods are using those transit services less frequently. These trends are compounded by relatively lower gas prices during the study period and subprime auto loans that made it easier for people to purchase vehicles, even after the 2008 Recession.

4) Finally, there are **network gaps and geographic constraints** that hinder the use of transit and active transportation modes. As noted earlier, there are significant gaps in the bike network that hinder its ability to offer realistic alternatives to driving, and that deter people from using active modes as a first-last mile connection to transit. In addition, some segments of the I-405 Corridor have geographical features (i.e., Santa Monica Mountains) and land use patterns (i.e., SMF Corridor or Dedicated Use Area place types) that make transit and active transportation options unrealistic for many potential users.

Key Challenge: *Low transit/active transportation mode share*

Considerations for Improvement Strategies:

What investments can improve interest in biking, walking, and transit options? What incentives and policies can most influence mode shift decisions?

Potential Evaluation Criteria: *Accessibility, Congestion Reduction, and Reliability*

Only about 6 percent of commuters in the corridor study area bike or walk to work, although in certain areas, particularly UCLA and Santa Monica, bike and pedestrian commuting can reach upwards of ten percent (the orange circles in **Error! Reference source not found.** indicate these areas). Most areas where bicycle and pedestrian commuting is highest—Santa Monica, UCLA, and the Westside Cities—correspond with locations of extensive bicycle infrastructure, large bike share availability, where there are travel demand management and parking demand management policies, and conducive land use types (e.g., SMF place types 1a Urban Core, 2a and 2b Close-in Centers and Corridors). However, these relationships are not universal. Van Nuys, a neighborhood in the San Fernando Valley (Segment 1), also has a relatively high share of active transportation commuting. In this area, however, there are clear gaps in the bicycle network (**Error! Reference source not found.**) and land use patterns primarily consist of SMF place type 4b (Corridors), which are characterized by "inadequate walk and bike environments, low land use efficiency, and poor aesthetics." Conversely, areas of Long Beach east of I-405 have a significant amount of bicycle infrastructure and generally supportive land uses, yet bicycle commuting in this area is low. **This suggests that there is potential to rebalance active transportation investments along the corridor to better serve areas where there is the greatest need and likelihood of users shifting to active modes**.

A major deterrent to biking in the region is safety. In the SCAG region, bicyclists make up a disproportionate share of traffic fatalities,[35] which will be discussed further in Section 7.2. LA County and many cities in the corridor have Vision Zero plans focused on enhancing bicycle and pedestrian safety on their high-injury networks, which target engineering solutions (gap closure, protected facilities, etc.) as well as education, enforcement, and equity (ensuring that active transportation investments and impacts are distributed equitably).[36]

[35] Connect SoCal: 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy, SCAG 2020

[36] LA County Vision Zero Plan (2020-2025)

Figure 0-13 Active Transportation Commute Share by Census Tract

Source: 2018 ACS 5-year Estimates.

Travel Patterns Shifted Significantly with the Onset of COVID-19

The COVID-19 pandemic drastically altered how people live, work, play, and travel. Social distancing and shelter-in-place policies required people (who have the option) to shift to virtual work, school, and

recreation almost overnight, nearly eliminating congestion and travel on roadways and devastating transit ridership. At the same time, there was a sharp uptick in active transportation, as many sought opportunities for outdoor recreation. Online shopping led to a surge in e-commerce and deliveries, placing additional stress on supply chains already overburdened with distributing medical equipment, personal protective equipment (PPE), and other emergency supplies.

Key Challenge: *COVID-19 recovery and rebuilding*

Considerations for Improvement Strategies:

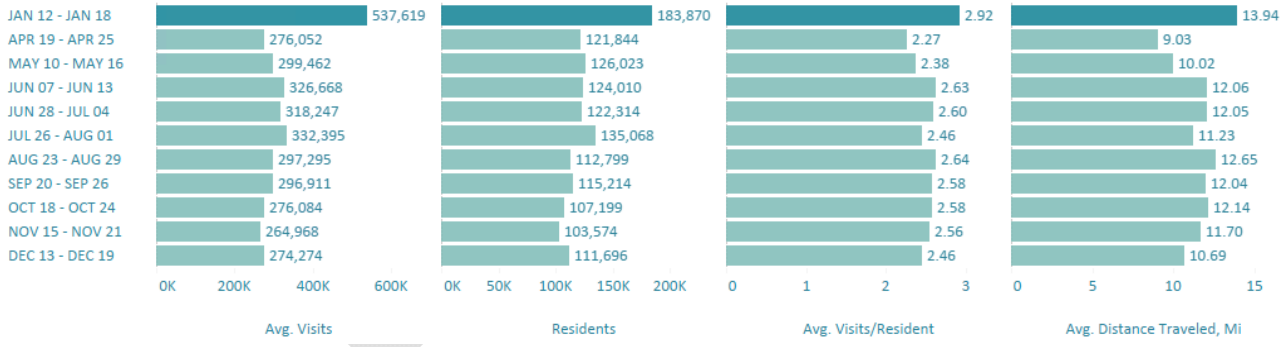
What projects, policies, and programs can retain interest in active transportation modes and help transit ridership recover?

Potential Evaluation Criteria: *Economy, Accessibility and Equity*

Although pandemic recovery is underway, the **long-term impacts of these trends are still highly uncertain**. Will people who are able continue to work from home do so? Will travelers continue to be apprehensive towards transit and shared modes? Will excitement about walking, biking, and slow streets improvements continue? These questions will be critical to the future mobility needs and performance of the I-405 Corridor, and will be explored as part of the scenario development process.

A "before and after" analysis was conducted to explore how travel patterns changed with the onset of the pandemic. Figure 0-14 shows a pre-COVID baseline week in January 2020 compared to select weeks from April to December 2020.[37] **Along the I-405 Corridor, overall travel volumes declined by about 33 percent among residents**, **and by about 40 percent for visitors** (people residing outside the Corridor). In addition, travel distances decreased by about 20 percent on average from nearly 14 miles pre-pandemic to 11.3 miles post-pandemic, likely reflecting the decline in longer commute trips, even though they made up only about 17 percent of pre-pandemic trips.

Figure 0-14 Weekly Travel Volumes Pre- and Post-COVID-19 Along the Corridor



Source: Cambridge Systematics; LOCUS dataset.

At the onset of the pandemic, **transit ridership fell drastically** as social distancing and shelter in place policies were implemented to prevent the spread of the virus. Metro's ridership dropped from 29.8 million monthly riders systemwide in February 2020 to 10 million in April 2020, and has hovered between 13 and

[37] For travel pattern analysis, total number of daily visits and daily distance traveled (or PMT) are normalized by the number of residents in the segments to obtain standardized metrics for comparison with a pre-COVID baseline week (Jan 12-18). These summaries use only visits which are within a 100 miles buffer from the home location (long distance travel is excluded).

15 million monthly riders since.[38] Transit ridership was already declining before the pandemic, as discussed previously.

Metro and transit agencies in the region are currently faced with making even more challenging tradeoffs between service levels, coverage, and equitable service delivery, all with significantly reduced budgets. Further, transit providers must now incorporate improved safety and sanitation measures for passengers and drivers, such as masks and hand sanitizers and frequent cleaning regimens, increasing overall operating costs.

Along the full length of the Corridor, **three major business sectors (dining, entertainment, and retail) saw large drops in visitations** during the peak of the COVID-19 crisis (as compared to a January 2020 baseline)[39], but the recovery has been uneven. In particular:

The dining sector had some of the least drastic declines, and by August had stabilized to what can be seen as the new normal (between five to ten percent lower than January levels).

The entertainment sector was hit the worst (around an 80 percent drop) and is the slowest sector to recover.

Similar to dining, the retail sector has rebounded (between five to ten percent lower than January levels). Automotive dealerships saw large increases in May and June 2020 as people shifted away from transit and shared modes to fulfill their mobility needs. Bike sales also soared during the pandemic as people turned to recreational biking and walking.

There is still a high degree of uncertainty around pandemic recovery, and it is unclear how the mobility landscape will shift over the long-term. The multimodal strategies developed as part of the CMCP will play a critical role in shaping how that future unfolds.

[38] Metro Interactive Estimated Ridership Stats (https://isotp.metro.net/MetroRidership).

[39] LOCUS Footfall Traffic analysis, 2021.

These Trends Result in a Heavily Auto-Oriented, Severely Congested Corridor

The I-405 Corridor is still heavily auto oriented. Nearly a century of auto-oriented investments have made driving alone the most viable option for most travelers. In fact, **nine out of the top 30 highest volume freeway segments in California are on I-405**[40] within the study area. There are daily vehicular volumes of over 350,000 near the Orange County Line, over 300,000 near LAX and I-10, and over 200,000 near U.S.- 101 in the San Fernando Valley area (Figure 0-1). In 2013, the I-405 was named the busiest interstate in any U.S. city.[41] According to INRIX, a nationwide provider of transportation data**, I-405 between I--105 and U.S.-101 is now the 9th most congested freeway segment in the U.S.**

The Corridor's arterials carry an even more significant volume of traffic—75 percent of total VMT within the study area.[42] La Cienega Boulevard, Sepulveda Boulevard, Burbank Boulevard, Santa Monica Boulevard, and Wilshire Boulevard each carry more than 60,000 daily vehicles. Many of these arterials, especially the ones that parallel the freeway, serve as alternative routes when the freeway is heavily congested. Similarly, traffic jams on the freeway can spill onto on- and off-ramps along these arterials, causing a "ripple effect" of traffic jams impacting retail, commercial, and residential areas. This highlights the critical importance of a holistic approach to congestion reduction that considers not just the I-405 freeway but the Corridor's heavily-traveled arterials as well.

Key Challenge: *Rising VMT*

Considerations for Improvement Strategies:

Can ExpressLanes, transit, & active transportation improvements help reduce VMT?
How does congestion pricing fit in?

Potential Evaluation Criteria:
Accessibility

The auto-oriented nature of the Corridor is linked to very high levels of VMT. Total daily VMT on the I-405 freeway itself is 14.4 million, and 55.5 million throughout the entire study area (which includes the I-405 freeway and other freeways and arterials within the 3-mile catchment area around the freeway). Daily VMT in California is about 856 million. This means that **about 6.5 percent of all miles driven in the state of California occur within the I-405 Corridor study area**.[43] For comparison, lane miles in the I-405 Corridor study area (7,600) are about two percent of total statewide lane miles (396,500), highlighting the disproportionately high volume of travel within the Corridor.[44]

[40] Caltrans Traffic Census; 2019.

[41] https://losangeles.cbslocal.com/2013/08/20/i-405-in-la-named-busiest-interstate-in-any-us-city/#:~:text=According%20to%20the%20U.S.%20Department,the%20busiest%20interstate%20in%20America.

[42] Highway Performance Monitoring System; 2017.

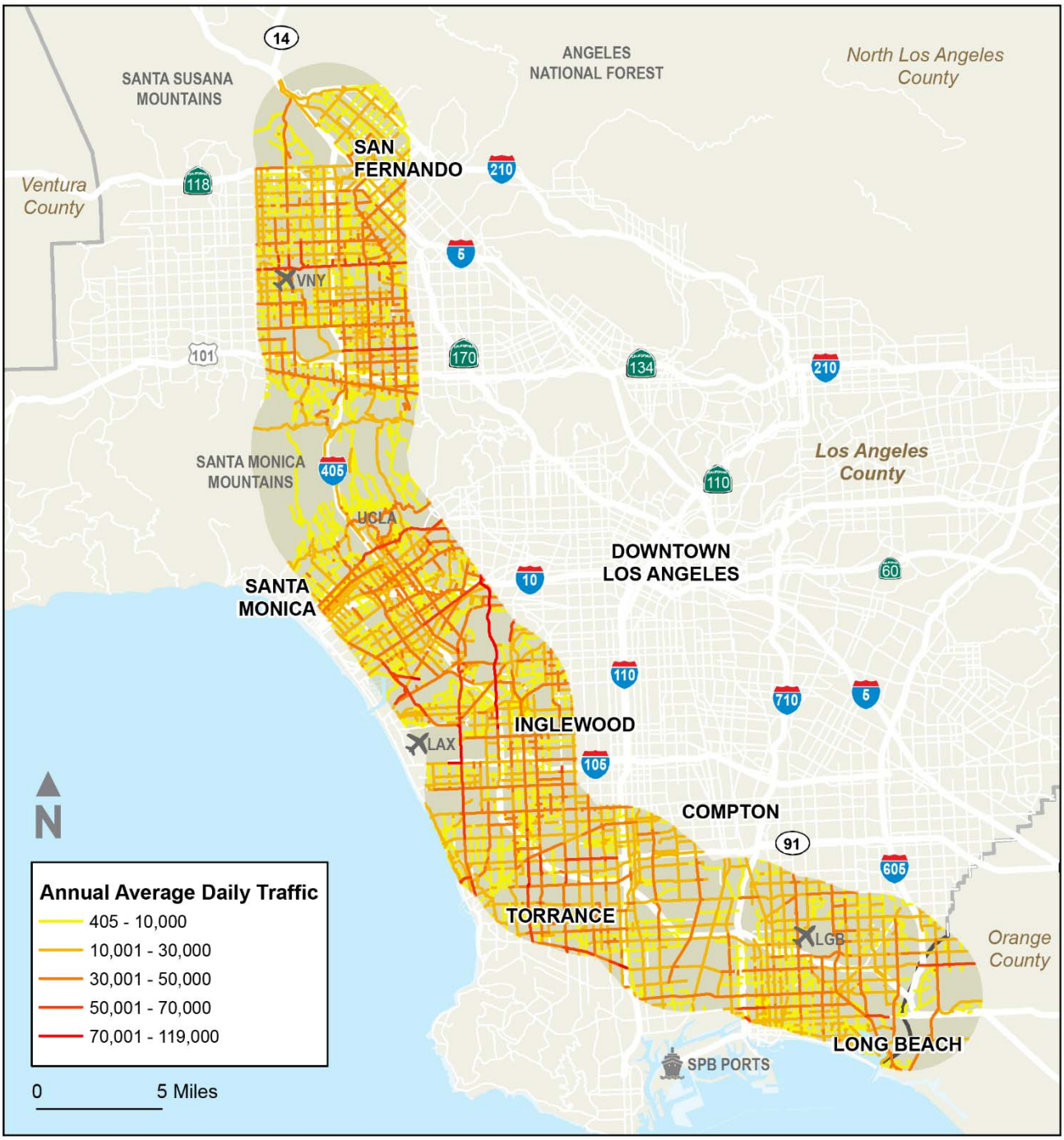
[43] This figure does not include local roads and streets.

[44] Highway Performance Monitoring System; 2017.

Figure 0-1 Annual Average Daily Traffic on I-405

Source: Highway Performance Monitoring System; 2017.

Figure 0-2 Annual Average Daily Traffic on Study Area Arterials



Source: Highway Performance Monitoring System; 2017.

The Corridor's auto-oriented nature and high travel volumes cause extreme levels of congestion, not just during peak travel period, but around the clock. This congestion causes travelers to spend a significant amount of additional time in their cars, thereby losing valuable time that could be spent with family, friends, working, or recreating. This congestion is also linked to a range of negative impacts, including safety hazards, environmental degradation, air pollution, and infrastructure deterioration, all of which place

additional burdens on the Corridor's 10.6 million daily users and other travelers from across the state and region who use the Corridor.

There are Several Bottleneck Locations Along the Freeway

The I-405 freeway has several recurring bottlenecks spread across peak hours (Table 0.1). The most severe bottleneck in terms of average delay in vehicle hours occurs in the southbound direction of the freeway at Howard Hughes Parkway. This bottleneck was active for 265 days in 2019 and caused average delay of 4,939 vehicle hours during the PM peak period. Together, these ten bottlenecks cause more than 22,500 hours of vehicle delay annually, the equivalent of 2.5 years.

Freight Movements on the I-405

Freight volumes on the I-405 Corridor are much lower than other freeways in the County, only making up between three and five percent of overall traffic, according to Caltrans. Although some truck movements from the SPB Ports use the Corridor, most of those trips occur on other routes as most of the key nodes in the Southern California supply and distribution chain are not along I-405.

While the Corridor is not typically used by port- and airport-related truck traffic, it is an important route for trucks serving the many restaurants, retail establishments, and local delivery needs in the study area.

Table 0.1 Top 10 Bottlenecks along the I-405 Freeway

Rank	Freeway Segment	Time Period	# Days Active	Average Extend (miles)	Average Delay (Vehicle-hrs)	Average Duration (hrs)
1	I-405 SB at Howard Hughes Parkway	PM	265	5.9	4,939	3.6
2	I-405 NB at Nordhoff Street	PM	278	6.2	4,077	4.1
3	I-405 NB near Wilshire Boulevard	PM	295	3.4	3,082	3.8
4	I-405 NB south of I-10	AM	280	5.6	2,584	2.5
5	I-405 SB at Getty / Sepulveda Boulevard	AM	234	5.5	2,034	2.2
6	I-405 NB at Sepulveda Boulevard (s/o of U.S. 101)	PM	198	3.1	1,603	2.3
7	I-405 SB south of Getty Center Drive	AM	194	6.6	1,302	1.1
8	I-405 SB at Jefferson Boulevard	PM	299	4.0	1,043	1.6
9	I-405 SB at I-105	PM	220	1.2	1,024	3.0
10	I-405 SB at Woodruff Avenue	PM	256	2.8	884	2.8

Source: Caltrans Performance Measurement System (PeMS), 2019.

Key Challenge: *Bottlenecks & delay*

Considerations for Improvement Strategies:

How can operational, technology, or policy improvements address these bottlenecks?

Potential Evaluation Criteria: *Accessibility, congestion reduction, travel times/speeds, throughput*

During peak periods, vehicle flows are consistently near the maximum lane capacity of 2,000 vehicles per lane per hour. Figure 0-3 and Figure 0-4 show the overlay of peak hour vehicle flows and speeds in the northbound and southbound directions, respectively. These figures also indicate where vehicle flows (shown in blue) are above the typical lane capacity of 2,000 vehicles per lane per hour and where speeds (shown in green) fall below 45 miles per hour, which is typically considered as degraded performance. Under highly congested conditions, both speeds and throughputs are reduced. **The segments with low throughput and low speeds (indicated in the red boxes) suggest locations of significant congestion and bottlenecks**. On the contrary, segments with low volumes and high speeds indicate areas with relatively lower demand. Key observations gleaned from Figure 0-3 and Figure 0-4 are as follows:

During the AM peak in the northbound direction, congestion is heaviest in the segments between I-110 and I-10, with speeds as low as 10 miles per hour between I-105 and I-10 and volumes as low as 1,000 vehicles per lane per hour.

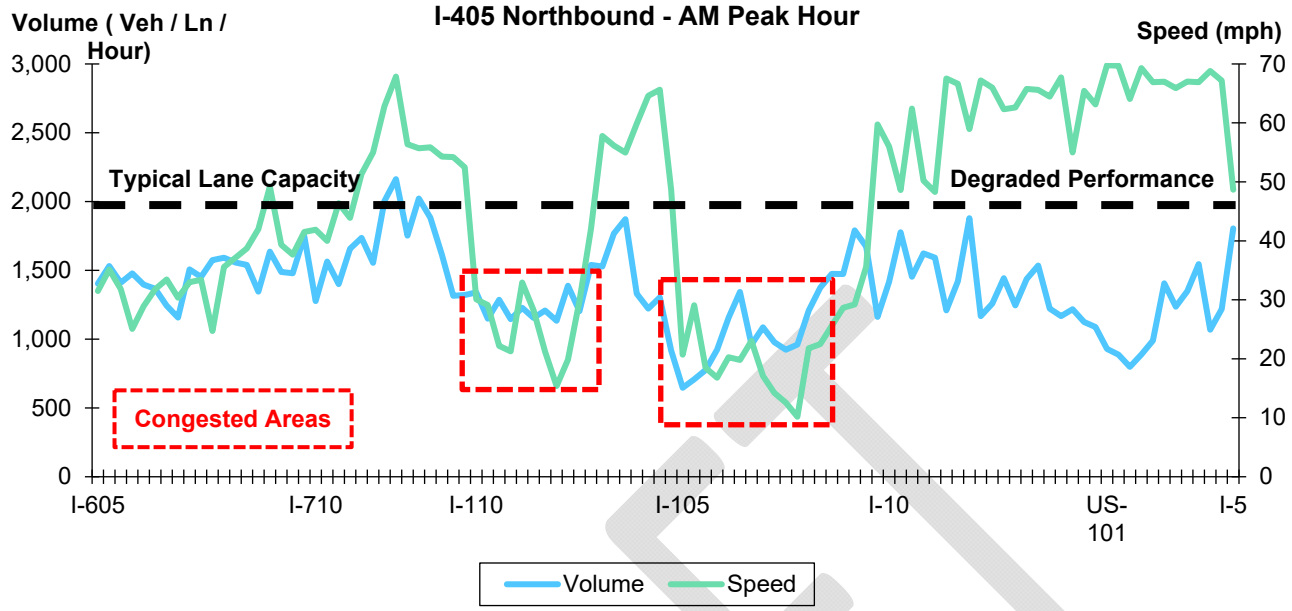
In the PM peak in the northbound direction, congestion is heaviest north of I-10, with speeds as low as nine miles per hour near the I-10 interchange (the 4th largest bottleneck as shown in Table 0.1) and volumes as low as 600 vehicles per lane per hour.

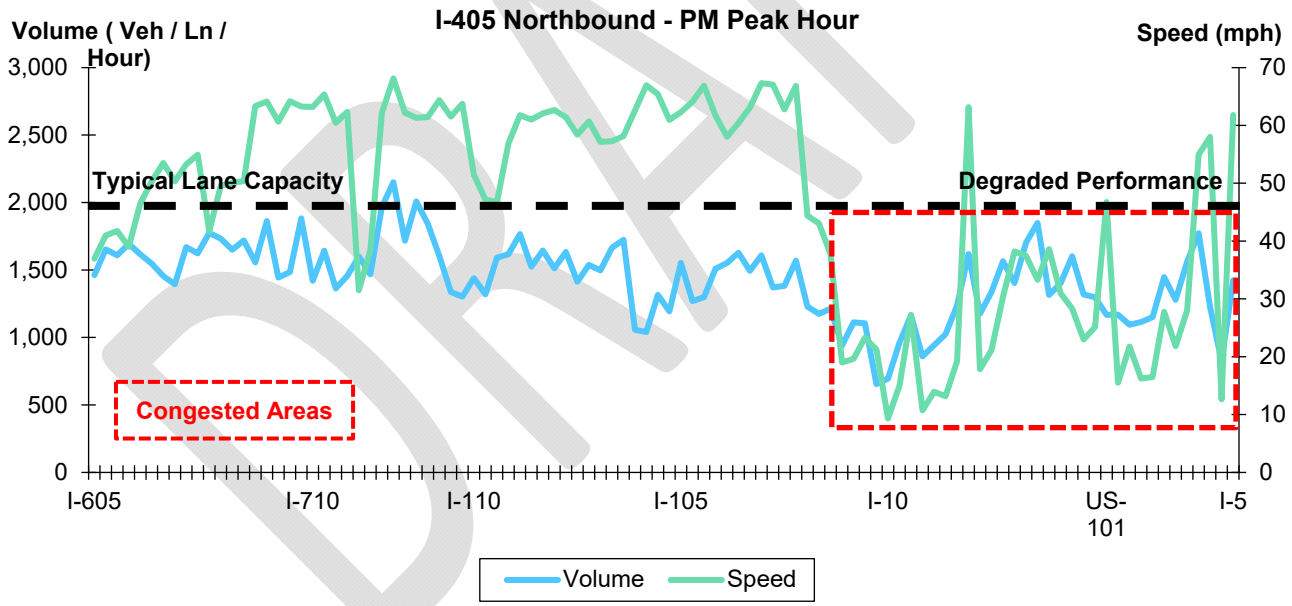
As expected, AM peak southbound congestion is also heaviest in the northern part of the Corridor (around the U.S. 101 interchange), which is likely the same commute traffic causing the northbound afternoon congestion in the northern segments of the Corridor.

Southbound PM peak congestion occurs in similar locations to the northbound AM peak. The central segments of the Corridor between I-110 and I-10 experience the worst congestion, with a small break about mid-way between the I-105 interchange and the I-10 interchange.

These findings are consistent with the bottlenecks reported in Table 0.1 and displayed in Figure 0-6, which shows that bottlenecks are predominantly concentrated in the central segments of the Corridor, with one large bottleneck occurring at Nordhoff Street in the northern-most segment of the Corridor.

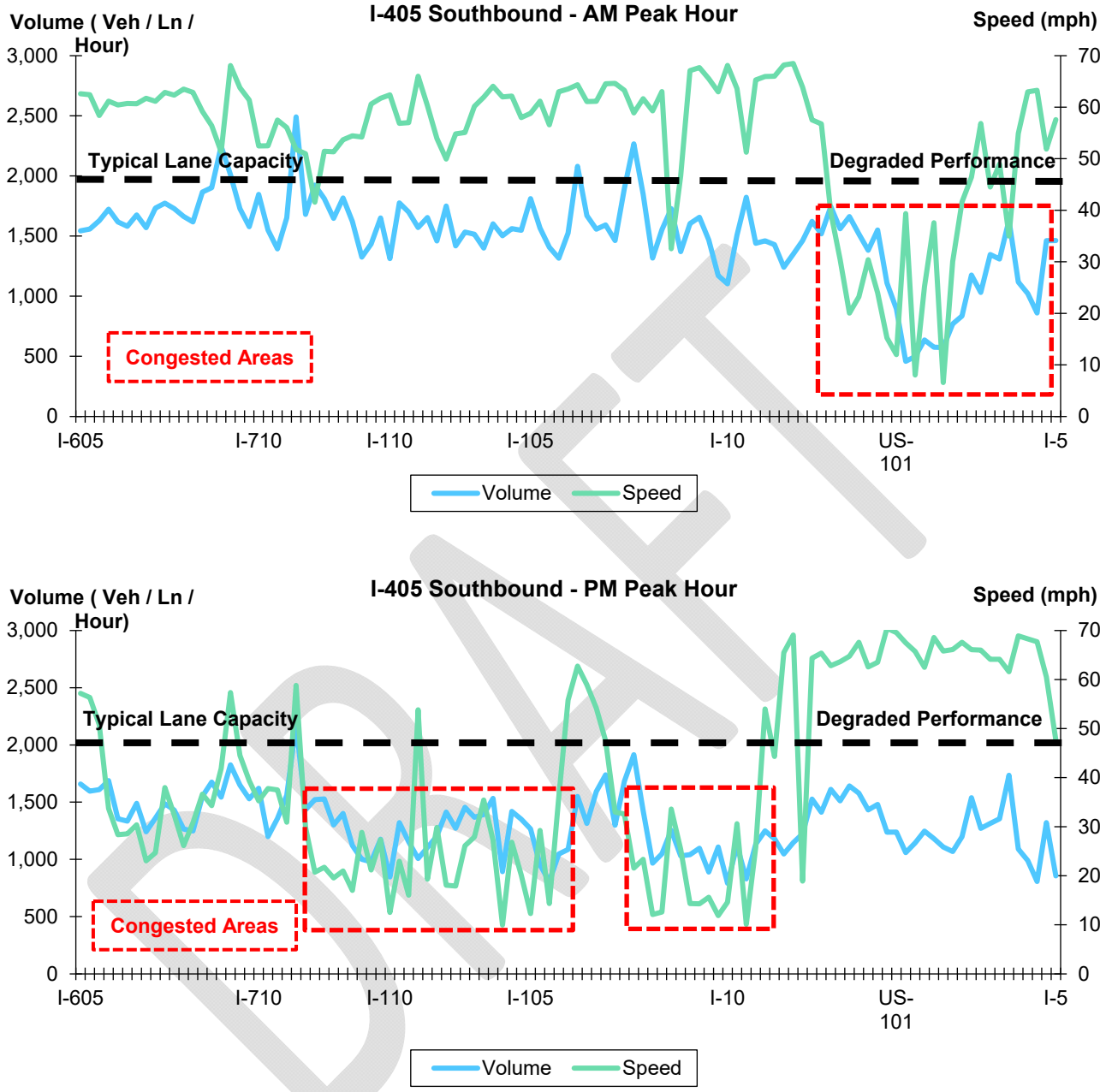
Figure 0-3 I-405 Northbound Peak Hour Speed & Flow





Source: California Performance Measurement System (PeMS), 2019.

Figure 0-4 I-405 Southbound Peak Hour Speed & Flow



Source: California Performance Measurement System (PeMS), 2019.

Many of the Corridor's arterials also suffer from significant delay. Delay is closely correlated with VMT, which is highest along many of the east-west arterials in the northern part of the corridor, including Roscoe, Victory, Burbank, and Ventura Boulevards, and Sherman Way. Sunset, Sepulveda, Crenshaw, Boulevards, Western and Cherry Avenues, and Willow Street also suffer from high levels of VMT and delay. Arterials in the Santa Monica/UCLA area experience some of the worst delay and poor travel time reliability. These include Santa Monica, Olympic, and Pico Boulevards. La Cienega Boulevard, which runs north-south through Inglewood, also experiences high levels of delay and poor travel time reliability (Figure 0-6).There are many efforts underway across LA County and the I-405 Corridor to reduce delay and improve travel

times within the existing roadway footprint, such as signal synchronization and other operational improvements that move more people in fewer vehicles.

Due to heavy traffic congestion in the Corridor, travel times are generally reliable… that is, reliably slow. Figure 7.5 shows the Travel Time Index (TTI) by hour along I-405 in northbound and southbound directions for the month of October 2019.[45] In both the northbound and southbound directions, congestion starts around 5 AM and goes until 9 PM. This congestion is recurrent and generally occurs in the same locations and at the same time of day. For example, at 8 AM in the northbound direction, the 95th percentile TTI is above 2.0, indicating that on the worst days, the trip will take over two times what it would take under free flow conditions. By comparison, the median travel time is just over 1.5, indicating that on most days the trip will take about 50 percent longer than under free flow conditions.

Mid-day there is more reliability, with the worst case (95th percentile) travel times closely matching the median travel times, and during these hours the traveler can more reliably predict the trip length. Even with more reliability, the TTI has a ratio greater than 1.0, indicating that these midday trips, while more predictable, are still congested and take longer than they would under free-flow conditions. Throughout most of the day, the 95th percentile travel time indexes (worst case) are above the median travel times, indicating that some days the travel times will be higher than typical. While the corridor does not have a typical peak and off-peak flow, there is a TTI of at or below 1.0 between the hours of 9 PM and 5 AM, when there is little to no congestion, vehicles are traveling at or above 60 miles per hour, and the travel time is much more predictable.

Arterials with the highest travel times, compared to free-flow conditions, are concentrated in the Westside Cities area between SR-90 and Sunset Boulevard, including Jefferson Boulevard, La Cienega Boulevard, Culver Boulevard, Slauson Avenue, Wilshire Boulevard, Santa Monica Boulevard, Olympic Boulevard, and Pico Boulevard (Figure 7.6).

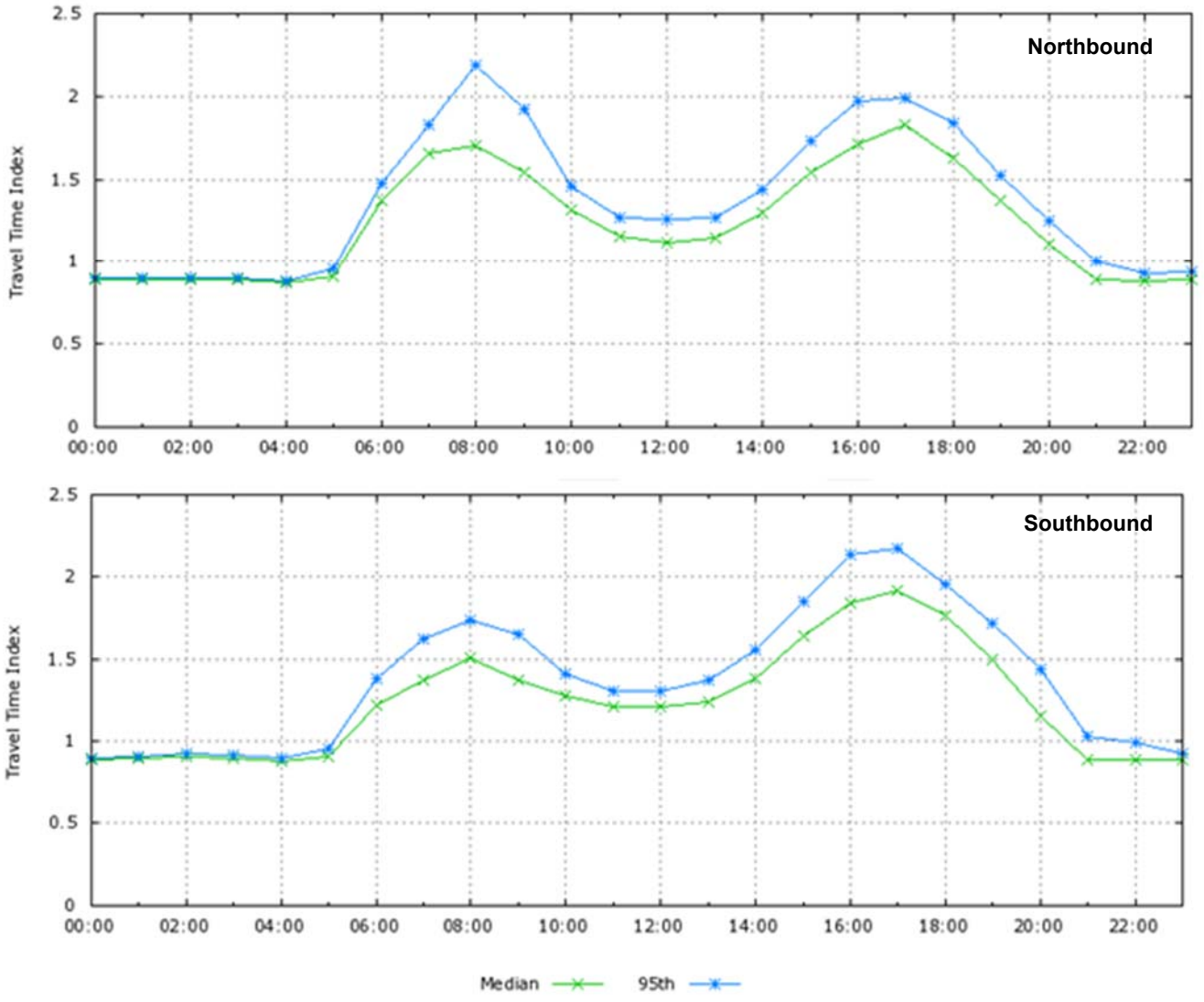
Understanding Travel Time Reliability

Travel time reliability data are derived from the Caltrans PeMS system. The Travel Time Reliability Index (TTI) measures travel times throughout the day as compared to the what the travel times would be under free flow conditions. The TTI represents a ratio of the average travel time to the free-flow travel time. In the case of the PeMS data, it defines free flow speed as 60 miles per hour. The data in Figure 7.5 shows both the travel time index profiles throughout the day as well as the reliability of travel time at each hour. A TTI of 1.0 means that vehicles are traveling at the free flow speed (in this case designated as 60 miles per hour). TTI's over 1.0 mean that vehicles are traveling below free flow speeds, and thus travel time will be longer than under free flow condition. A TTI of 2.0 means the trip will take twice as long as a trip taken under free flow conditions.

There are two ways to measure travel time; 1) the median travel time and 2) the 95th percentile travel time. The median travel time indicates the travel time for which half of the days measured the trip length is above this value and half of the days measures it is below this value. The 95th percentile travel time indicates a "worst case," where 95 percent of the days the trip will be at or below this travel time. Using the 95th percentile removes the outlier measurements that may be inaccurate or may not reflect what is happening in the corridor. When the 95th percentile travel time is close to the median travel time, the system is considered reliable. That is, the traveler will know that even on a congested corridor the travel time will be close to the median and they can plan around that length of time for the trip. Travel time reliability measures the consistency or dependability in travel times on across different times of day and different days.

[45] October 2019 was chosen as a typical month with no holidays and not during the summertime, thus it represents typical commute patterns during much of the year. More variability in travel times would be noted if the entire year was reviewed due to holidays and summertime conditions when schools are closed and more people are not working typical schedules. However, the October data provide an example of typical commute travel in a month with no outlier events such as holidays, bad weather, or vacation schedules.

Figure 0-5 Travel Time Index



Source: California Performance Measurement System (PeMS).

Figure 0-6 I-405 Bottlenecks, Arterial Congestion, Delay, and Travel Time Index

Source: Regional Integrated Transportation Information System (RITIS); 2018.

HOV lanes exist along the entirety of the I-405 freeway in the study area. In addition to vehicles with two or more occupants, some hybrid and zero-emission vehicles with clean air vehicle decals, motorcycles, and buses can also use the HOV lanes. Most vehicles using the I-405 HOV lanes are carpools and vanpools with

2+ people (82 percent), with decaled clean air vehicles making up about 11 percent, motorcycles and single-occupancy vehicles making up seven percent and buses making up less than one percent.[46]

Key Challenge: *HOV Lane degradation*

Considerations for Improvement Strategies:

Can we increase HOV lane vehicle occupancy requirements?
Will ExpressLanes impact performance?

Potential Evaluation Criteria:
Accessibility; Reliability

While these HOV lanes carry about twice the number of passengers per vehicle than general purpose lanes (Table 0.2), **the added person-throughput does little to alleviate congestion on the Corridor**. Table 0.2 shows the most recent 2017 data from Caltrans' "Managed Lane Annual Report" shows the vehicle volumes and average vehicle occupancy rates between the HOV and general purpose (GP) lanes at four locations along the I-405. These four locations are measured by Caltrans on an ongoing basis (from south to north); at Temple Avenue, Normandie Avenue, Skirball Drive, and Burbank Boulevard. As the table shows, the HOV lanes are very effective at increasing person throughput by carry twice as many people with roughly the same amount of vehicles compared to the GP lanes. During peak periods, HOVs make up about 23 percent of all vehicles on the freeway and carry about 34 percent of travelers on the corridor.[47] However, as of 2017, all segments of HOV lanes in both directions were classified as "extremely degraded," meaning that peak commute hour speeds regularly dropped below 45 miles per hour, which lessens the incentive for users to shift to carpooling, transit, clean air vehicles, or other modes that can utilize the HOV lanes.[48]

Metro's Countywide ExpressLanes Strategic Plan found through preliminary traffic and revenue forecasts for the year 2035 that degradation levels will likely worsen if the current HOV 2+ occupancy rate remains. Based on this forecast, a majority of the I-405 Corridor would experience degradation anywhere between 10 to 75 percent of PM peak periods, with areas around the Sepulveda Pass experiencing degradation more than 75 percent of the time.[49]

Information on the usage of the I-405 freeway by single occupant vehicles and high occupancy vehicles is obtained from Caltrans' "Managed Lane Annual Report." For the I-405 freeway, four locations are measured by Caltrans on an ongoing basis (from south to north); at Temple Avenue, Normandie Avenue, Skirball Drive, and Burbank Boulevard. Table 0.2 shows the most recent 2017 data collected at these four locations.

Table 0.2 I-405 General Purpose & HOV Lane Occupancy at Four Locations (2017)

Location	Direction	Time	Vehicles per HOV Lane	Avg Occupancy (HOV)	People per HOV Lane	Vehicle per GP Lane	Avg Occupancy (GP)	People per GP Lane
Temple Ave	NB	AM	1,565	1.92	3,008	1,550	1.04	1,612
Temple Ave	SB	PM	1,450	2.21	3,210	1,524	1.09	1,656

[46] Caltrans 2018 Managed Lanes Annual Report: District 7 Los Angeles and Ventura Counties (April 2019). Note: a recent update of this report suggests that EV decal vehicles have increased to around 20 percent of HOV lane users.

[47] Ibid.

[48] "2017 California High-Occupancy Vehicle Facilities Degradation Report and Action Plan." Caltrans Division of Traffic Operations Office of System Operations. 2018.

[49] "LA Metro Countywide Expresslanes Strategic Plan Final Report." LA Metro. 2017.

Normandie Ave	NB	AM	1,113	2.02	2,252	1,318	1.06	1,395
Normandie Ave	SB	PM	1,166	2.31	2,698	1,198	1.08	1,300
Skirball Center Dr	SB	AM	1,589	2.29	3,644	1,444	1.11	1,604
Skirball Center Dr	NB	PM	1,527	2.32	3,542	1,517	1.10	1,674
Burbank Blvd	SB	AM	902	1.98	1,788	621	1.17	728
Burbank Blvd	NB	PM	1,315	2.16	2,839	1,303	1.10	1,438

Source: Caltrans District 7 2017 Managed Lanes Annual Report.

There are Multiple Collision Hotspots Along the Corridor

Key Challenge: *Growing freeway and arterial collisions*

Considerations for Improvement Strategies:

How can we apply Vision Zero actions and policies to the Corridor? Are there strategies that can simultaneously reduce VMT, speed, and congestion?

Potential Evaluation Criteria: *Safety*

Collisions on the Corridor are both a source and a product of congestion. In 2018, there were nearly 2,000 fatal or injury collisions on the I-405 freeway and nearly 10,000 on the arterial network in the three-mile CMCP study area (Figure 0-7). Around five percent of both the collisions on the I-405 freeway and the arterial network resulted in a fatality or serious injury, and a disproportionate amount involved people biking or walking. Between 2014 and 2018, collisions on the I-405 freeway grew from 1,400 to nearly 2,000—an increase of about 25 percent, or about six percent per year. During this same period, VMT grew at about half that rate—ten percent between 2014 and 2018, or about three percent per year. This suggests a growing crash rate along the freeway despite sustained efforts at the statewide, regional, and local levels to improve safety.

Compared to the statewide collision rate, collision rates on I-405 are slightly higher (0.37 per million miles compared to 0.3 per million miles). The I-405 collision rate is lower than on I--110, SR-91 and I--710 and approximately the same as SR-22, SR-134, I--105 and I--605.

Table 0.3 Freeway Collision Rates

2014–2018

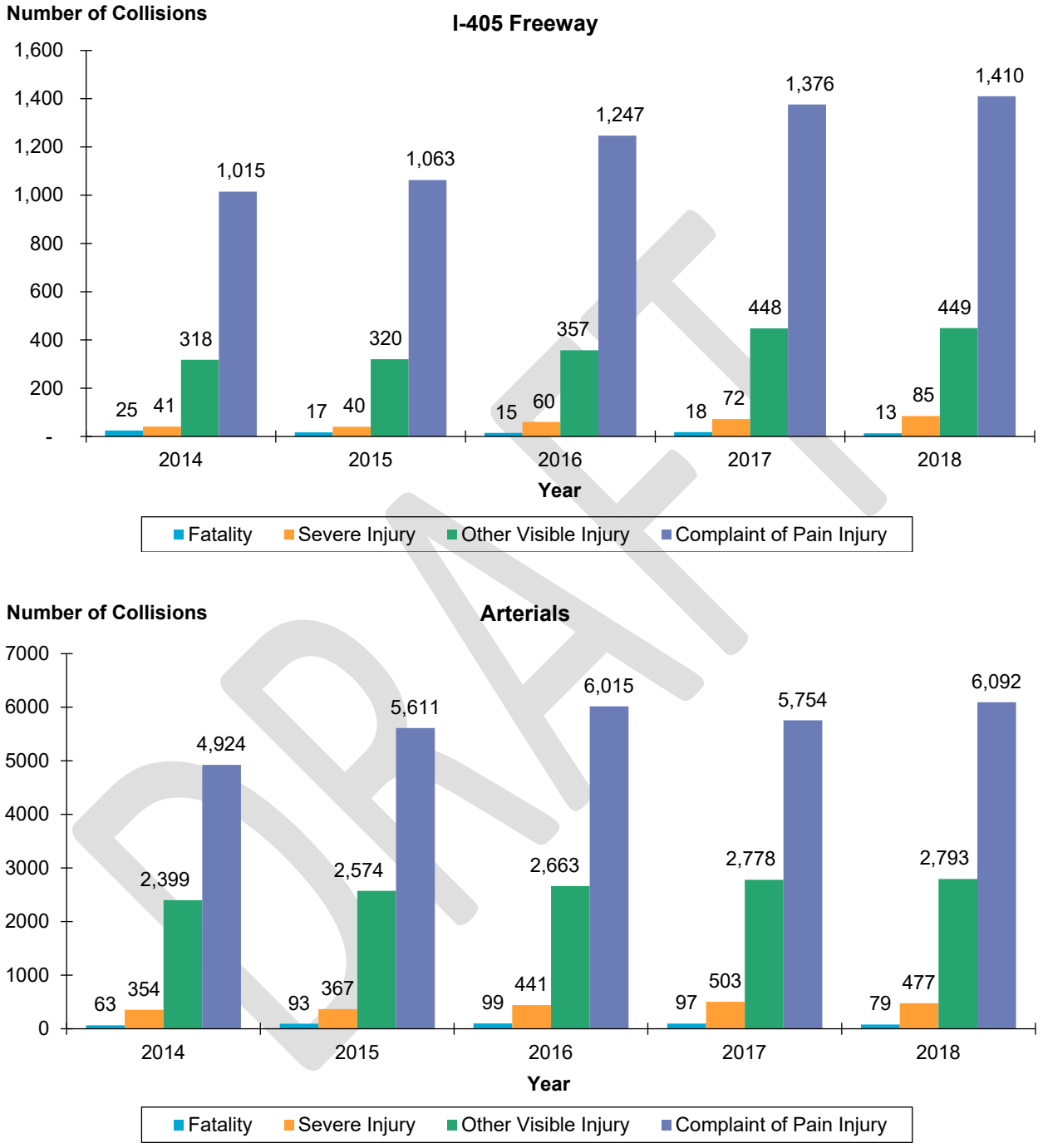
	I-405 Collision Rate (per million vehicle miles)		Statewide Average Collision Rate[1] (per million vehicle miles)	
Direction	**Fatalities**	**Fatalities + Injuries**	**Fatalities**	**Fatalities + Injuries**
Northbound	0.004	0.37	0.004	0.30
Southbound	0.004	0.38	0.004	0.30

[1] Statewide Average Collision Rate is calculated based on collision rates for similar facilities in urban areas. Data is from 2010–2015. Due to limitations in data availability, collision rates on the I-405 and statewide are measured during slightly different time periods.

Source: VMT data from California Performance Measurement System (PeMS). Collision data from Transportation Injury Mapping System (TIMS). Statewide data from California Department of Transportation. Traffic Accident Surveillance and Analysis System (TASAS) Table B—Selective Accident Rate Calculation Report.

Figure 0-7 Collisions by Severity

2014–2018

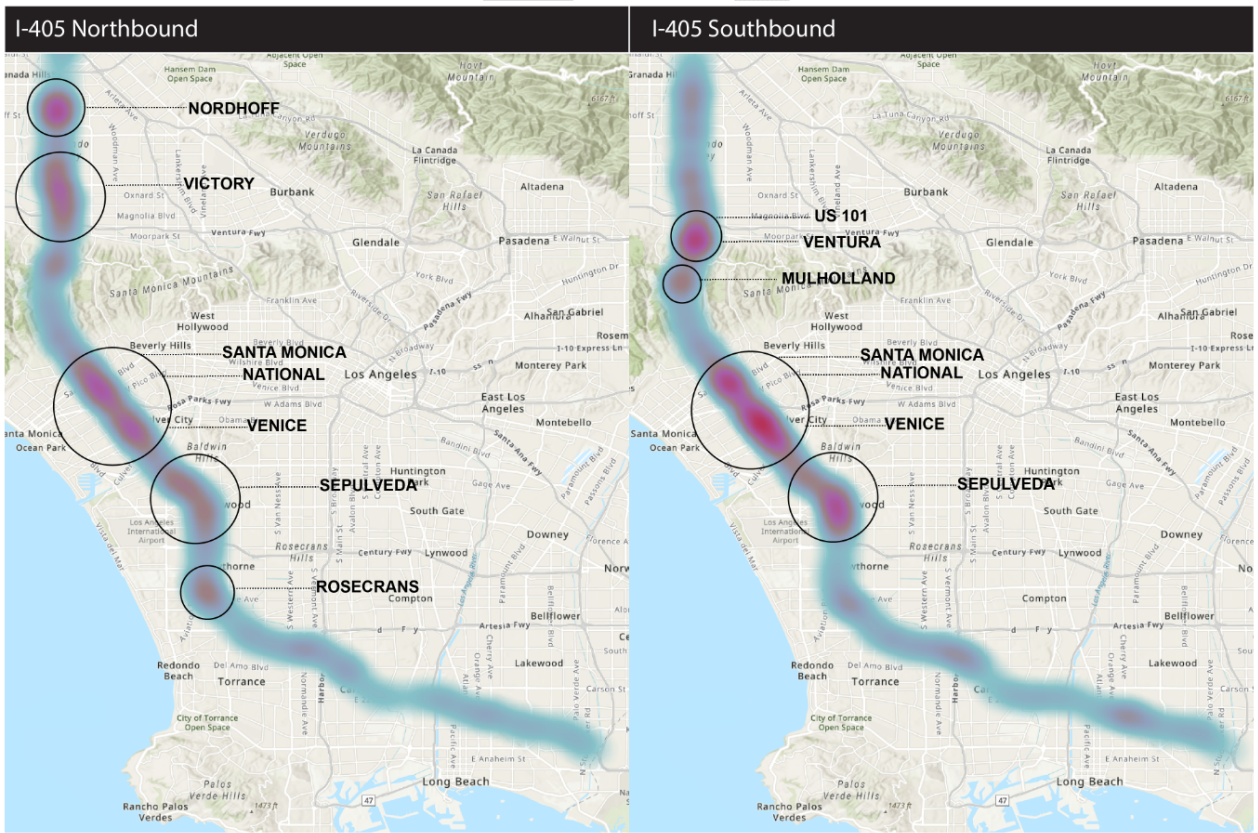


Source: Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2021.

The primary causes of collisions along the I-405 Corridor are related to the high levels of congestion. Specifically, rear-end collisions, which are associated with congestion, are predominant on I-405 freeway. Sideswipe incidents are also a regular occurrence. These occur when drivers attempt unsafe lane changes.[50] On the Corridor's arterials right-of-way (28 percent), unsafe speed (19 percent), and traffic signals and signs (12 percent) are the most common factors causing collisions.

Collision hotspots on I-405 are predominantly located at freeway and arterial interchanges. As seen in Figure 0-8, the highest concentrations of collisions in the northbound direction are the segments in West Los Angeles and Culver City (Santa Monica Boulevard, National Boulevard, and Venice Boulevard), Inglewood (Sepulveda Boulevard), Lennox, and Hawthorne (Rosecrans Avenue). Notably, 483 collisions occurred on the segment of I-405 bordering LAX between 2014 and 2018 (Figure 0-9), the most of any segment. The highest concentrations of injury and fatality collisions southbound are in West Los Angeles (Santa Monica Boulevard, National Boulevard, and Venice Boulevard) and north of the Sepulveda Pass (Ventura Boulevard). The segment of I-405 in West Los Angeles and Culver City totaled 644 injury collisions during the five-year period, while the segment north of the U.S.- 101 in the San Fernando Valley accounts for 455 injury collisions. These collision hotspots correspond with areas of high congestion and VMT shown in Figure 0-6, and bottlenecks occur at each of the locations highlighted below in Figure 0-8.

Figure 0-8 Collision Hotspots on I-405

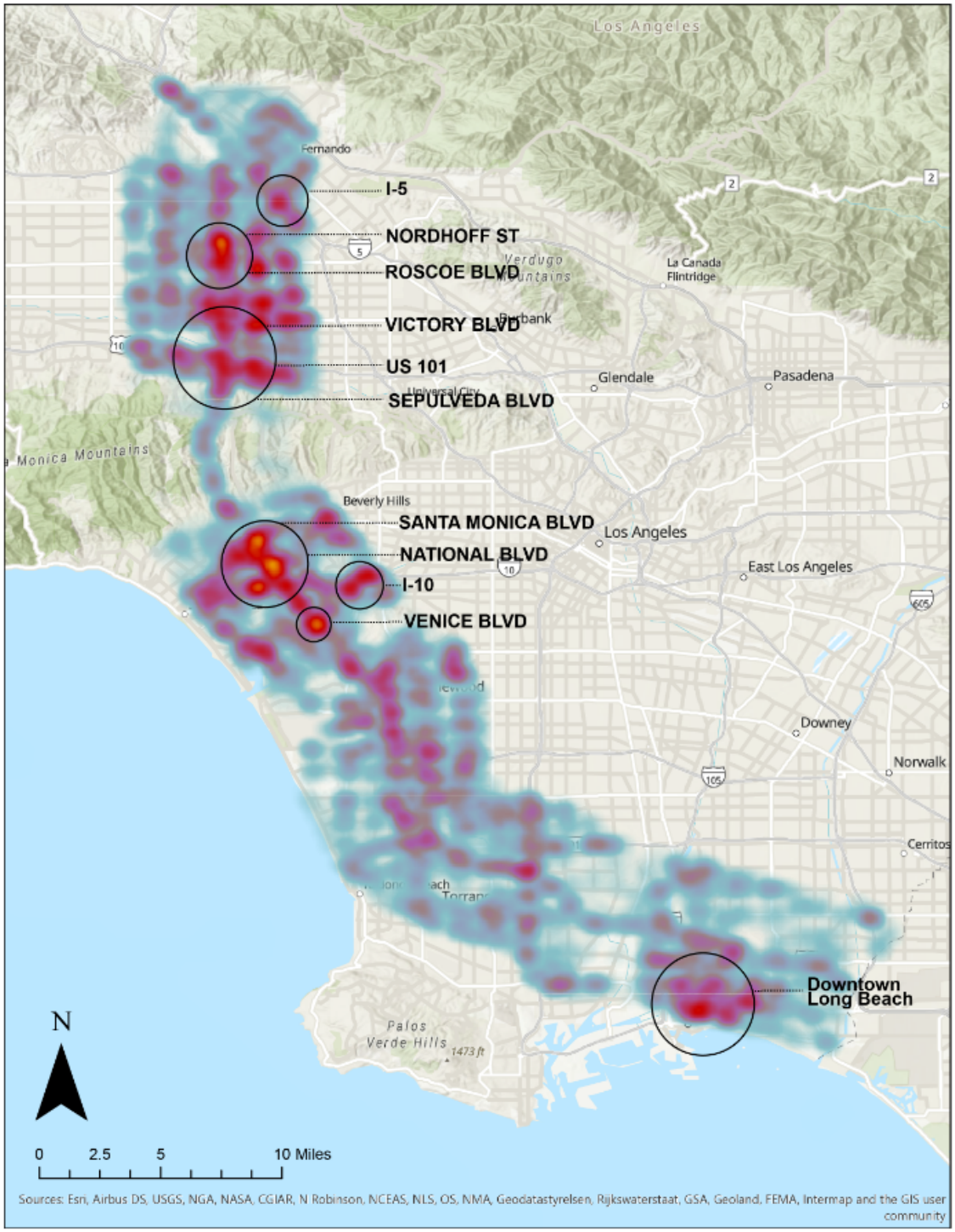


Source: Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2021.

[50] Interstate 405 (Sepulveda Pass) ExpressLanes Intermediate (Level II) Traffic & Revenue Study.

Figure 0-9 All Collisions in the Study Area

2014–2018



Source: Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2021.

Most collision hotspots shown in Figure 0-9 also correspond with areas of high VMT and delay, a notable exception being Downtown Long Beach.

Truck collisions are spread throughout the study area with slightly higher concentrations in the northern most segment in the San Fernando Valley and southern segment around the SPB Ports Complex. This is expected as the portion of I-405 south of the I-105 has heavier truck volumes to access the SPB Ports. Truck collision concentrations occur at the interchanges with Burbank Boulevard, Constitution Avenue, Hawthorne Boulevard, La Tijera Boulevard, Nordhoff Street, Santa Monica Boulevard, and Sepulveda Boulevard.

More than a hundred bicycle and pedestrian fatalities or serious injury collisions occurred directly along the I-405 freeway between 2014 and 2018. Presumably, most of the pedestrian collisions are motorists who have exited their vehicles, or are on on- and off-ramps. Bicycle collisions are mostly on ramps and at ramp terminus intersections. Further detailed analysis would be required to pinpoint the specific location and causes of these collisions. **Bicycle and pedestrian collisions are most concentrated in Long Beach, Santa Monica, Inglewood, and east of the I-405 in the San Fernando Valley** (Figure 0-10 Locations of Bicycle and Pedestrian Collisions *2014–2018*).

Key Challenge: *Bicycle & pedestrian collisions*

Considerations for Improvement Strategies:

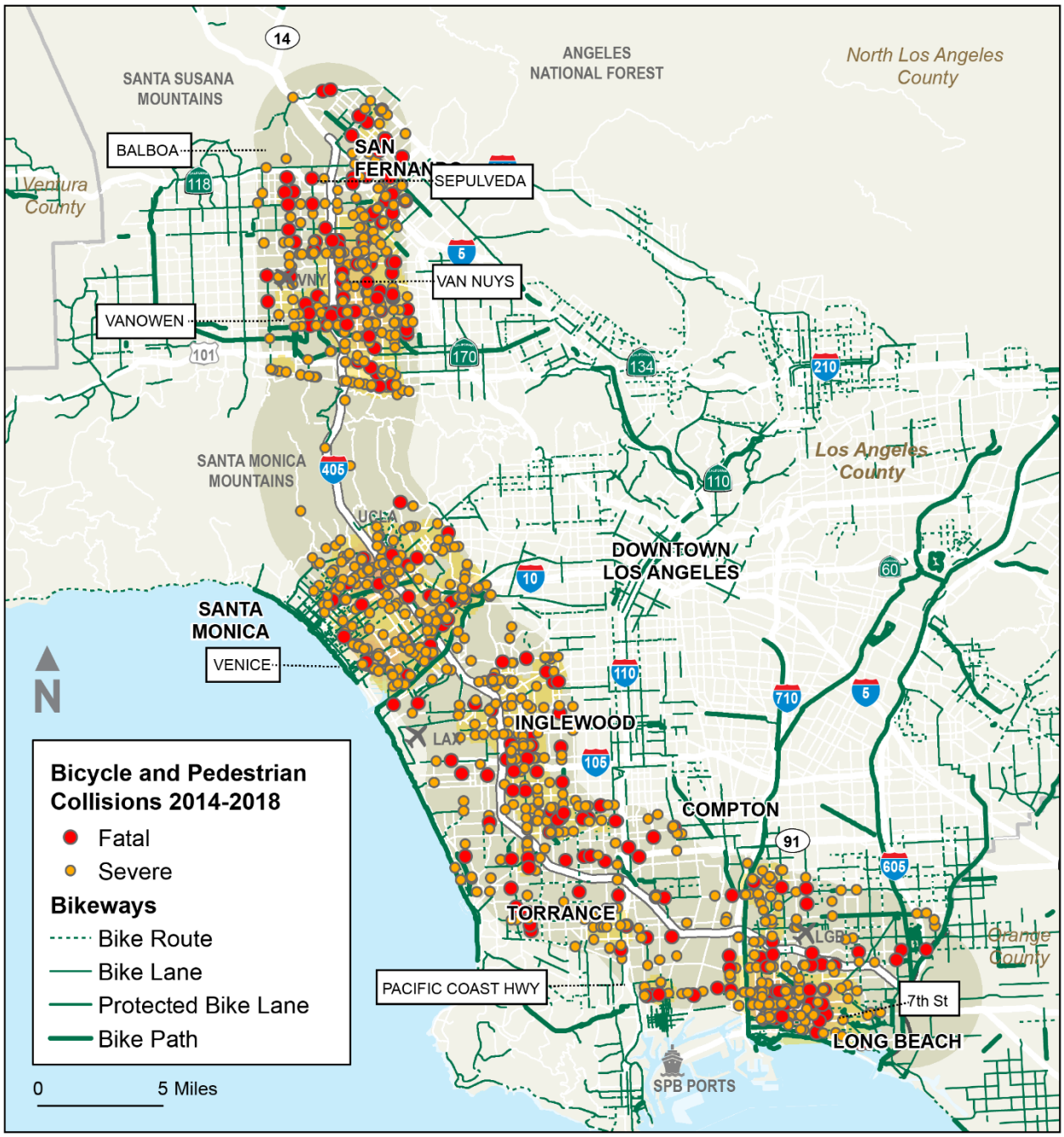
What are the best locations for protected bike and pedestrian infrastructure?
How can we reduce speed & VMT around safety hotspots?

Potential Evaluation Criteria: *Safety*

Arterials with high concentrations of pedestrian and bicycle collisions are Sepulveda Boulevard, Venice Boulevard, and Van Nuys Boulevard. Many of the fatality and injury collisions overlap with the Los Angeles High-Injury Network, which includes all of Venice Boulevard in the study area and Sepulveda Boulevard and Van Nuys Boulevard in the San Fernando Valley. Analysis of these collisions in relation to existing bike infrastructure shows that there are collision hotspots located next to more robust bike networks, such as near Santa Monica and Long Beach, where volumes may be higher. Hotspots also occur where there is little to no infrastructure (South Bay) and of note, very few collisions occurred on fully separated bike path facilities.

Figure 0-10 Locations of Bicycle and Pedestrian Collisions

2014–2018



Source: Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2021.

Air Quality and Climate Change Impacts Continue to Worsen

Poor air quality exists along much of the Corridor and is associated with exacerbating certain chronic conditions (including bronchitis, emphysema, and asthma), increased rates of cardiovascular disease, and higher mortality. It particularly affects people suffering from asthma, children, older adults, people active outdoors, and outdoor workers.[51] Both LA and Orange Counties are nonattainment areas for criteria pollutants regulated under the Clean Air Act's National Ambient Air Quality Standards (NAAQS), including the two pollutants (Ozone and PM 2.5) associated with the most adverse health effects (see sidebar below).[52] Figure 0-11 and Figure 0-12 show Ozone and PM2.5 levels in the study area.

Key Challenge: *Poor air quality*

Considerations for Improvement Strategies:

What can be done to support and accelerate the adoption of clean air vehicles?
What strategies are best to reduce overall VMT?

How can we better serve trips on more sustainable forms of transportation?

Air Pollutants Along the I-405

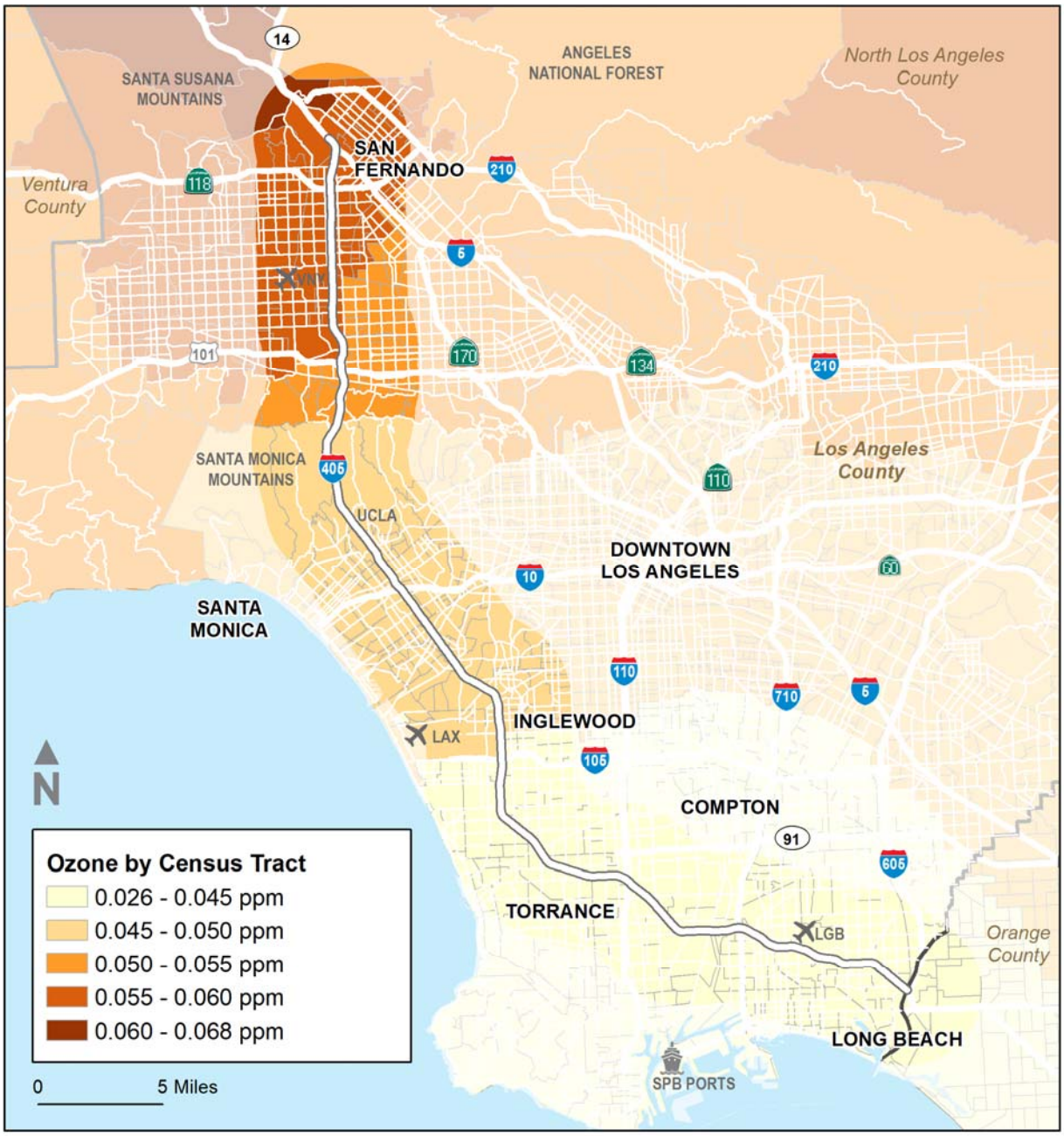
Ozone, *commonly referred to as smog, is one of the most widespread and significant air quality health threats. According to the US Environmental Protection Agency (EPA) Green Book, the I-405 Corridor is located in an extreme non-attainment area for 8-hour ozone (only one of two such areas in the country). In general, the least-affected areas are located in the vicinity of Long Beach (in the southernmost reaches of the corridor), while the most-affected areas are located at the northern terminus of the corridor, near San Fernando. The northernmost portion of Segment 1 overlaps areas of higher socioeconomic vulnerability.*

Particulate matter *has been associated with many adverse health effects, including heart and lung disease. Vehicular traffic generates particulate matter through brake wear, tire and road wear, and road-dust resuspension (i.e., stirring up dust on roadways). Both Los Angeles County and Orange County are designated as 'moderate' (one step down from a 'serious' designation) nonattainment area for PM 2.5. Much of the corridor exceeds the U.S. EPA's standard for PM 2.5, including almost all of Segments 2 and 3. Approximately two thirds of the corridor's land area falls in the top 80th percentile for particulate matter. Segment 2 and Segment 3 overlaps areas of higher socioeconomic vulnerability identified within the CalEnviroScreen 3.0 tool.*

[51] https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics.

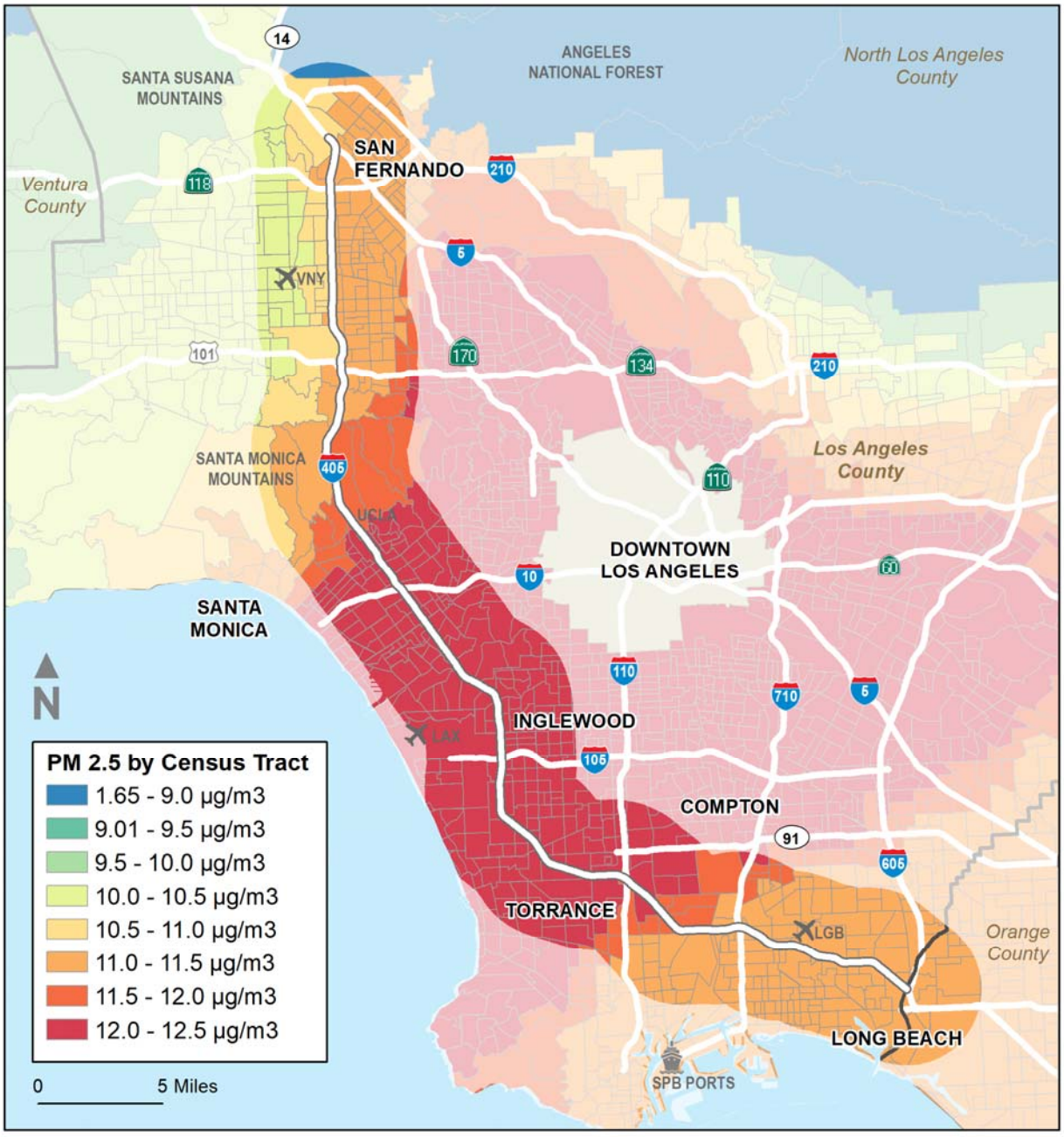
[52] https://www3.epa.gov/airquality/greenbook/mapnpoll.html.

Figure 0-11 Ozone Levels



Source: CalEnviroScreen 3.0.

Figure 0-12 PM 2.5 Levels



Source: CalEnviroScreen 3.0.

Key Challenge: *Sea level rise*

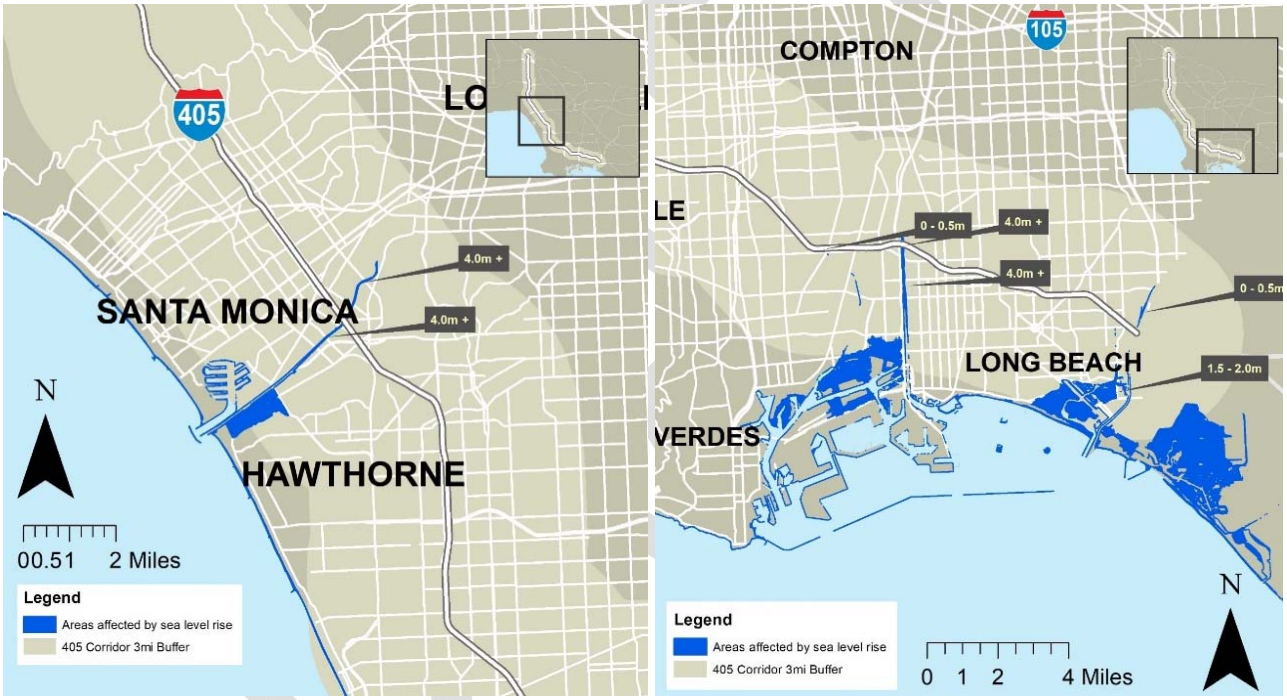
Considerations for Improvement Strategies:

What types of adaptation, mitigation, and resiliency strategies are most appropriate?

Potential Criteria: *Climate & Environment*

In addition to these air quality concerns, the study area is vulnerable to the impacts of climate change, particularly sea level rise and increased wildfire. **Several parts of the study area are located in coastal areas and are expected to be affected by sea level rise.** Areas of concern (Figure 0-13) are located in Santa Monica at the intersection of I-405 and the Los Angeles River, where the sea level is forecast to rise by more than four meters by 2100, and inundation is expected to exceed four meters; and in Long Beach, where inundation is expected to reach 0.5 meters. As described earlier, these are areas with large number of employers/commuters, high volumes of travel, and relatively high use of transit, bike, and walk modes, all of which would be impacted by this degree of sea level rise.

Figure 0-13 Areas in the Corridor Impacted by Sea Level Rise



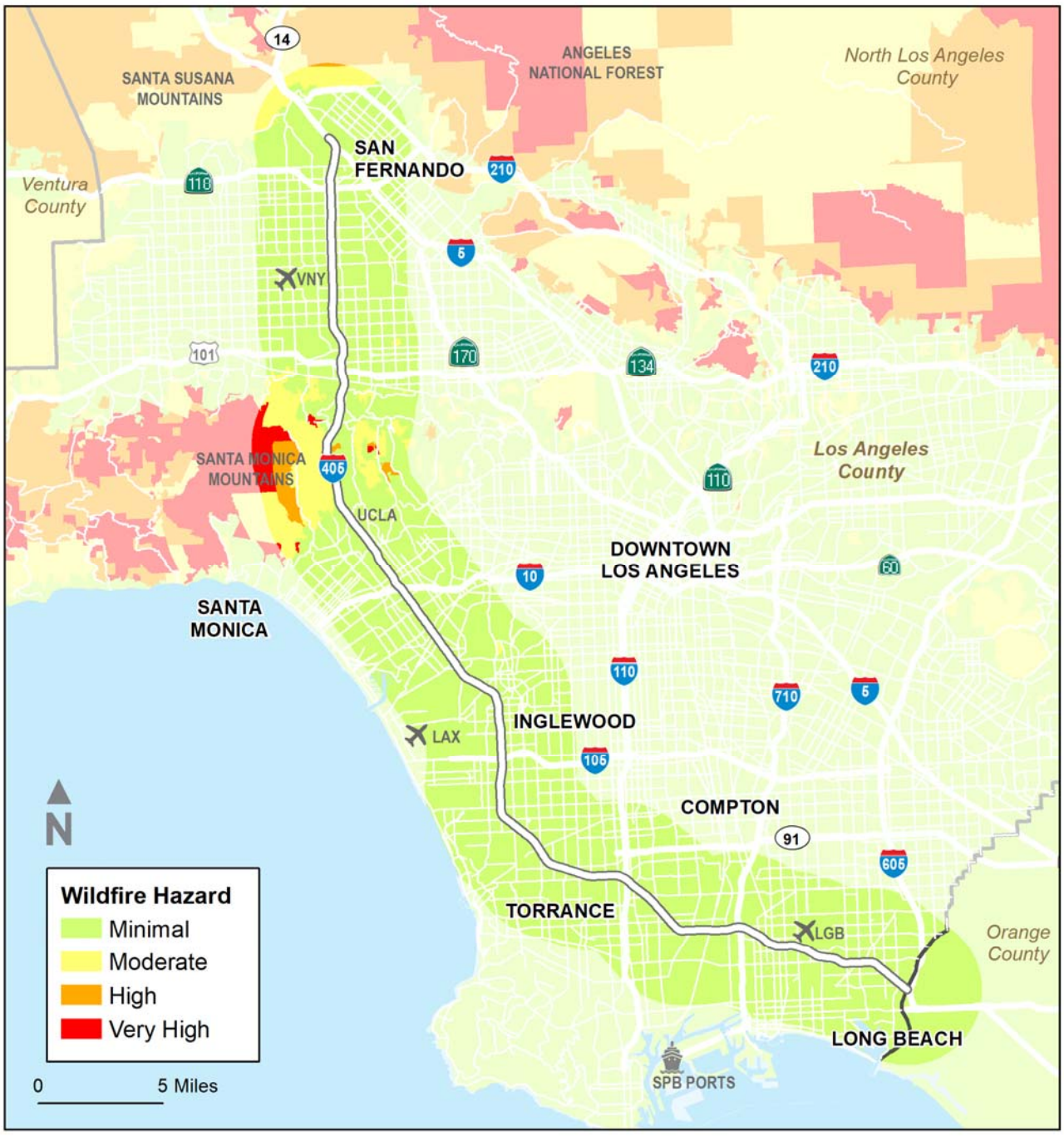
Source: U.S. Geological Survey; Coastal Storm Modeling System (CoSMoS).

Wildfire risk immediately within the I-405 Corridor is relatively low, but the study area is close to large high-risk areas north and west of the Corridor (Figure 0-14). Wildfire in California represents a significant and growing threat and will need to be increasingly incorporated into transportation planning efforts to support a resilient transportation system. The highest risk areas are located in the Sepulveda Pass and Beverly Hills, where I-405 passes through the Santa Monica Mountains and crosses the Westridge-Canyonback Wilderness Park. In 2017 the Skirball Fire burned 422 acres of land in the Sepulveda Pass parallel to I-405, forcing the freeway to close and severely constraining movement in the region.[53] Transportation system resiliency is a high priority in this area to ensure safe evacuation routes during wildfire

[53] Skirball Fire Update, Friday, December 15, 2017

season. In the northernmost part of the corridor, north of San Fernando, areas of moderate risk are located immediately south of the San Gabriel and Santa Susana Mountains.

Figure 0-14 Wildfire Hazard

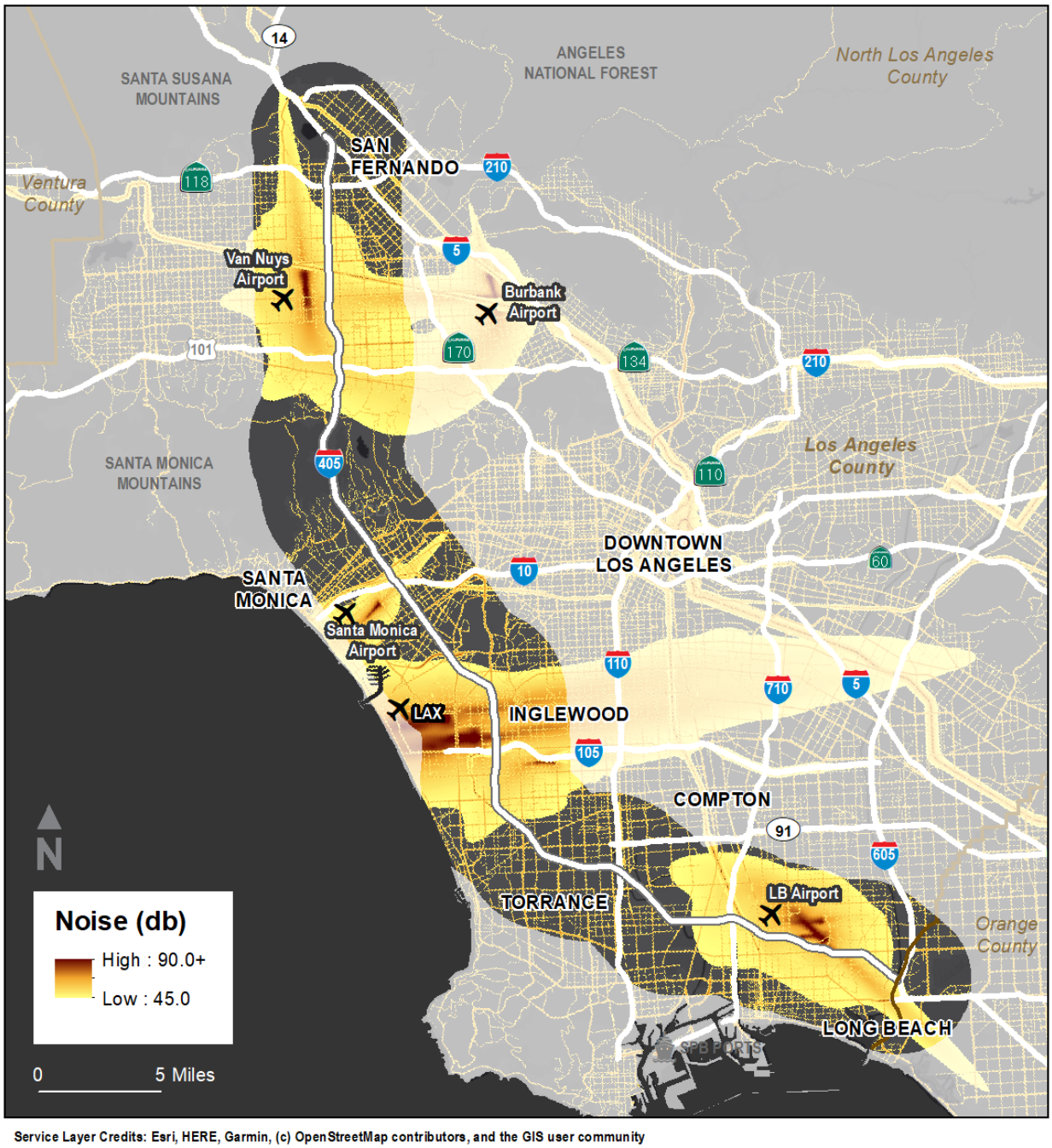


Source: SCAG Regional Climate Adaptation Framework Wildfire Risk Model (combination of CAL FIRE Fire Hazard Severity Zone data [2020] and U.S. Forest Service Wildfire Hazard Model [2018]).

Finally, some areas along the Corridor experience significant noise impacts (Figure 0-15). Noise is an important topic in transportation planning as increasing regulations seek to mitigate the negative impacts of

highway traffic noise and noise generated by other transportation modes. Unsurprisingly, the areas of highest transportation noise intensity in the I-405 Corridor are located near airports (LAX, LGB, and VNY are all located in the Corridor) and flight paths.[54] The highest noise levels occur in Inglewood (near LAX), the City of Signal Hill (near LGB), and the northern extent of the Corridor (Encino through San Fernando—near VNY).

Figure 0-15 Noise



Source: Bureau of Transportation Statistics; National Transportation Noise Map (2018).

[54] LAX = Los Angeles International Airport, LGB = Long Beach Airport, VNY = Van Nuys Airport.

Infrastructure Assets are Deteriorating

Many of the previously discussed factors —high traffic volumes, increased exposure to extreme weather, and a dependence on the single-occupant auto as the preferred method of travel in the study area—combine to negatively impact the condition of the study area's infrastructure, particularly its pavement condition. In fact, **only five out of 13 cities in the study area have "good" pavement condition,** according to the Pavement Condition Index (PCI).[55] Between 2016 and 2018, pavement conditions in Carson and Redondo Beach fell from "Good" to "At Lower Risk" classification (Table 0.4);[56] whereas, Long Beach and Lawndale are both classified as "At Higher Risk." Figure 0-16 shows where overall pavement condition along the Corridor changed between 2016 and 2018.

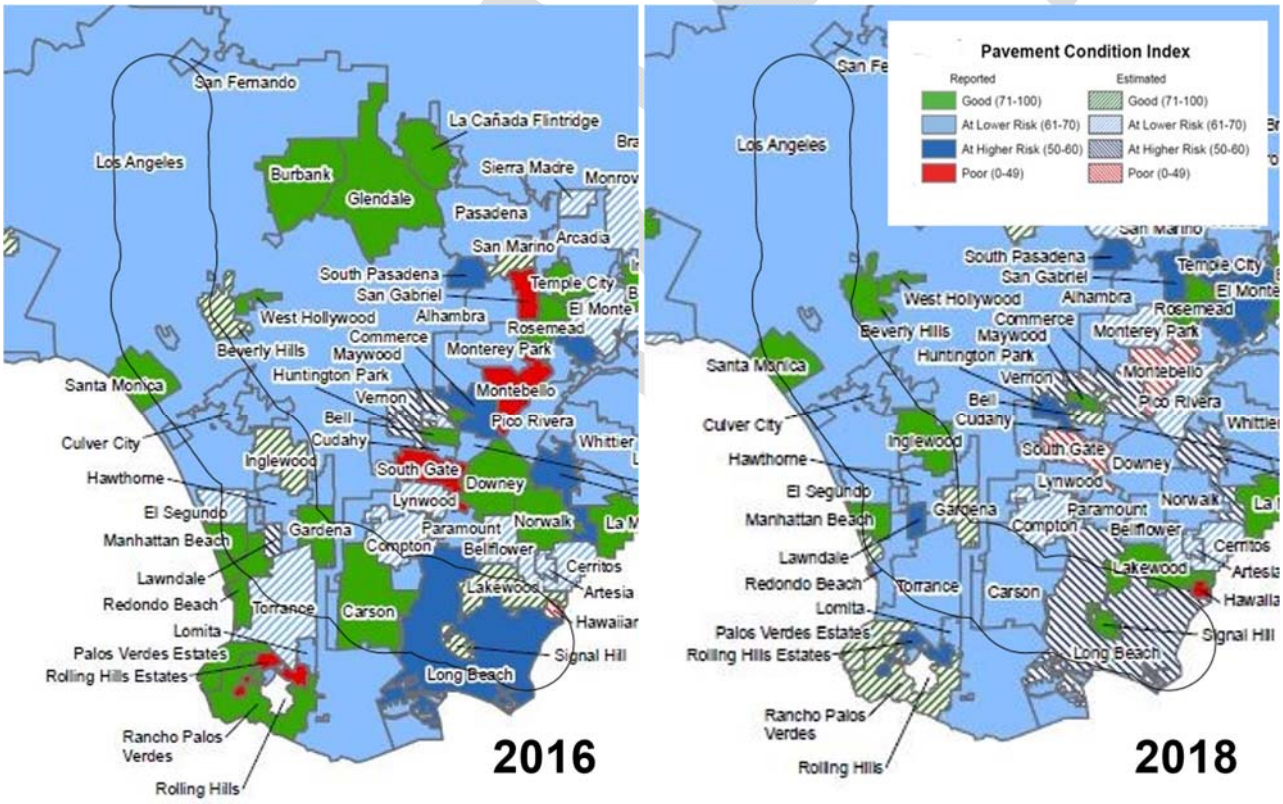
Key Challenge: *Deteriorating assets*

Considerations for Improvement Strategies:

How can asset management strategies be improved?
Can VMT be reduced to a level that supports longer pavement life?

Potential Evaluation Criteria: *State of Good Repair*

Figure 0-16 Pavement Condition Index in LA County



Source: California Statewide Local Streets and Roads Needs Assessment, 2016 & 2018.

[55] PCI provides an index of pavement distress based on levels of cracking, rutting, potholes, corrugations, and other signs of pavement deterioration.

[56] City-reported Pavement Condition Index (PCI); 2018.

Table 0.4 Pavement Condition Index Within I-405 Study Area
2015 and 2016

City	2016 PCI		2018 PCI	
Beverly Hills	71-100[1]	Good	71-100	Good
Carson	71-100	Good	61-70	At Lower Risk
Cerritos	61-70[1]	At Lower Risk	61-70[1]	At Lower Risk
Compton	61-70[1]	At Lower Risk	61-70[1]	At Lower Risk
Gardena	71-100	Good	71-100[1]	Good
Hawthorne	61-70	At Lower Risk	61-70	At Lower Risk
Inglewood	71-100[1]	Good	71-100	Good
Lawndale	50-60[1]	At Higher Risk	50-60	At Higher Risk
Long Beach	50-60	At Higher Risk	50-60[1]	At Higher Risk
Los Angeles	61-70	At Lower Risk	61-70	Good
Redondo Beach	71-100	Good	61-70	At Lower Risk
Santa Monica	71-100	Good	71-100	Good
Torrance	61-70[1]	At Lower Risk	61-70	At Lower Risk

[1] Indicates estimated PCI values. All others were reported.

Source: NCE. California Statewide Local Streets and Roads Needs Assessment, 2016 and 2018.

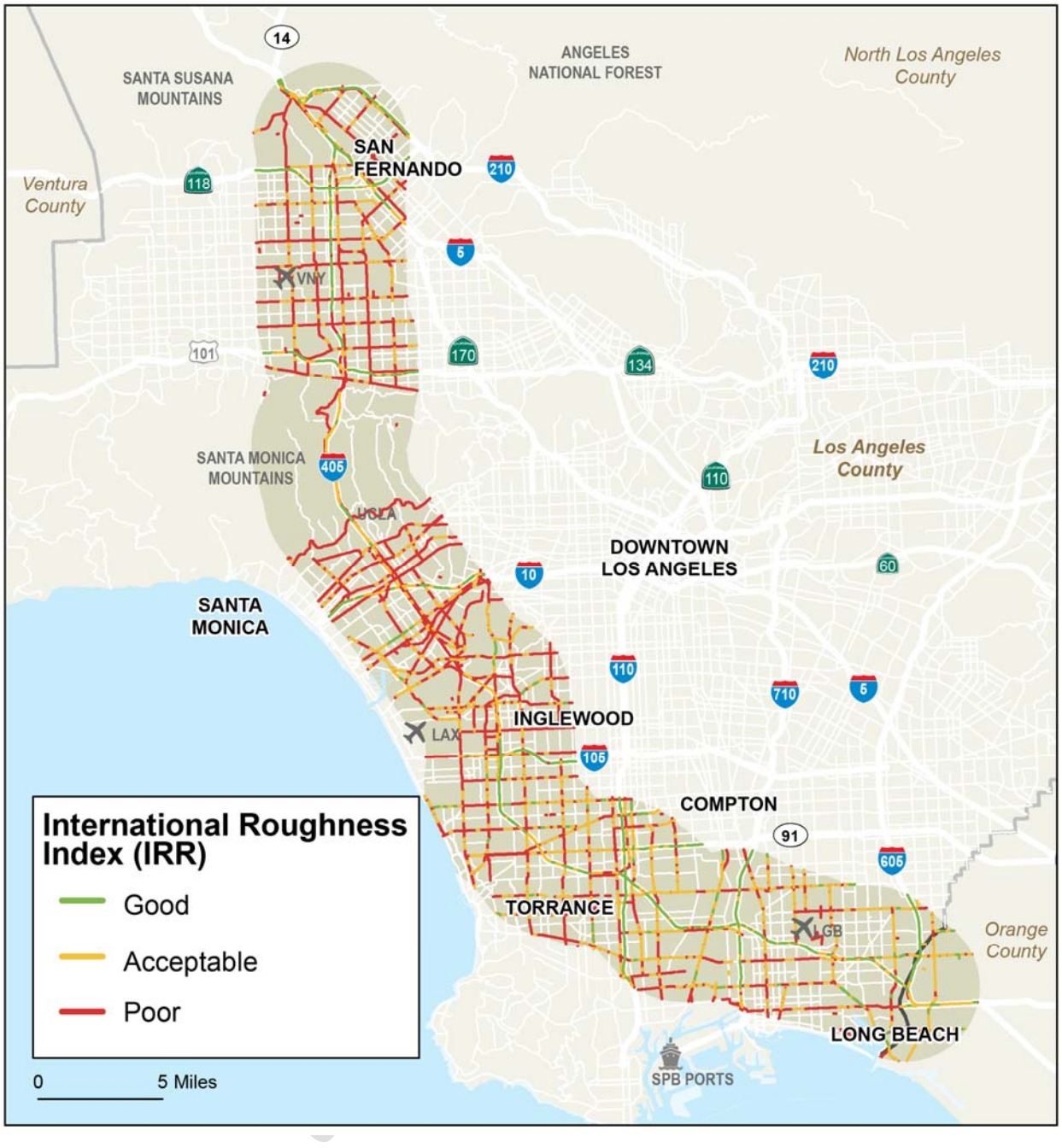
In general, the I-405 freeway has better pavement quality than the local arterial system. Figure 0-17 International Roughness Index (IRI) and Figure 0-18 show the bidirectional International Roughness Index (IRI)[57] for paved roadway segments included in the 2017 Highway Performance Monitoring System (HPMS). Segments along the I-405 freeway with poorer pavement quality include the Sepulveda Pass, near LAX, South Bay, and Gateway Cities, which generally corresponds to areas with the highest traffic volumes. Throughout the Corridor's arterial network, pavement quality tends to be worse in the Westside Cities areas and on many of the major arterials in the San Fernando Valley. Pavement quality in the southern part of the Corridor is mostly in "Acceptable" condition. Similar to pavement condition on the freeway, these arterials typically have lower travel volumes and therefore less wear-and-tear.

[57] IRI is a uniform, calibrated roughness measurement for paved roadways that is required by the FHWA in order to provide a measure of pavement surface condition that has nationwide consistency and comparability.

Figure 0-17 International Roughness Index (IRI) Along I-405

Source: Highway Performance Monitoring System; 2017.

Figure 0-18 International Roughness Index (IRI) Along Arterials



Source: Highway Performance Monitoring System; 2017.

The continued deterioration of pavement conditions in the study area has signficant implications on congestion (poor pavement condition corresponds to lower speeds), safety (avoiding potholes can induce sudden lane changes), and use of alternative modes, particularly biking (poor condition of on-street/class 2 bike lanes can inhibit mode shift).

The Impacts of These Issues Are Not Distributed Equitably

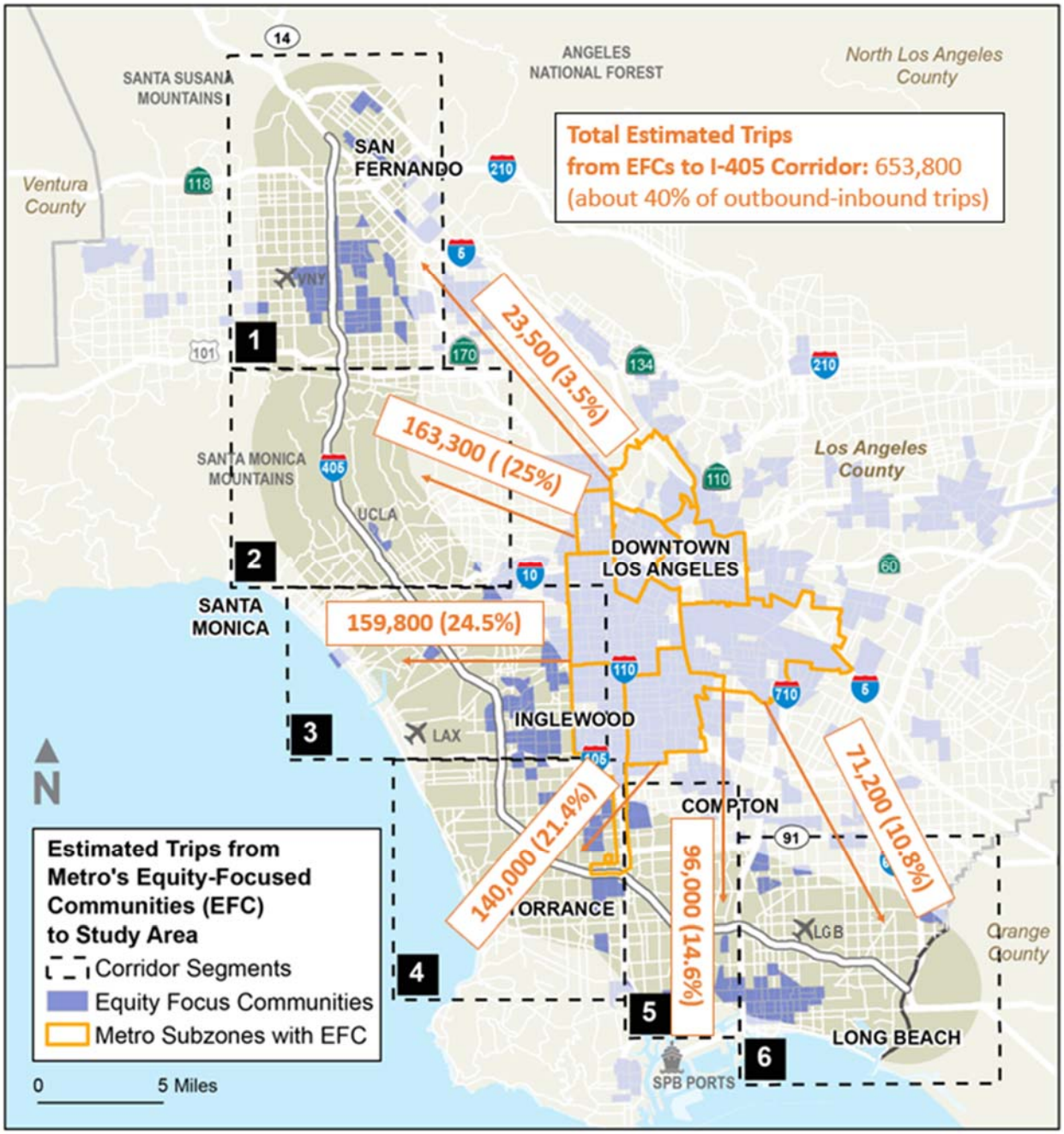
The negative impacts of transportation including congestion, poor air quality, safety risks, and infrastructure degradation fall hardest on low-income communities, communities of color, people with disabilities, and other marginalized groups. These communities also face the greatest barriers to accessing jobs, goods, services, recreation, and mobility options within the corridor, are inordinately impacted by air quality issues stemming from transportation, and often have not been targets for improvement projects. Climate impacts disproportionately harm underserved communities , with minorities making up 77 percent of Southern California residents residing in flood hazard zones.[58] These large-scale challenges are expected to exacerbate disparities in health, housing, and access to education, limit the effectiveness of transit, and catalyze further displacement of low-income residents throughout the region.

In recognition of the inequities that exist on a Countywide level, LA Metro adopted the Equity Platform and identified **Equity Focus Communities (EFCs)** to help define the *"need."* EFCs are defined as communities in census tracts that are predominantly low income, non-white, and have limited access to automobiles. Within the study area, EFCs are mainly clustered throughout the San Fernando Valley, South Bay Cities, and Long Beach (Figure 0-1). As shown in Figure 0-1, there are an estimated 653,800 daily trips that originate in EFCs outside the I-405 Corridor and end within the Corridor. **This makes up about 40 percent of the total inbound travel to the study area and contributes to existing air quality, noise, and safety issues in these communities**. About half of these trips are destined for areas within Segments 2 and 3.

> ***Metro's Definition of Equity***
>
> *As defined by the Metro Board as part of Metro's Equity Platform, equity is both an outcome and a process to address racial, socioeconomic and gender disparities, to ensure fair and just access—with respect to where you begin and your capacity to improve from that starting point—to opportunities, including jobs, housing, education, mobility options and healthier communities. It is achieved when one's outcomes in life are not predetermined, in a statistical or experiential sense, on their racial, economic or social identities. It requires community informed and needs-based provision, implementation and impact of services, programs and policies that reduce and ultimately prevent disparities.*

[58] "SCAG Connect SoCal 2020-2045 Regional Transportation Plan/ Sustainable Communities Strategy." SCAG. 2020.

Figure 0-1 Metro's Equity-Focused Communities



Source: Metro Equity Focused Communities; 2019 LOCUS data.

Note: Travel from EFCs was estimated by identifying sub-zones outside the study that overlap significantly with the location of EFCs

Key Challenge: *Environmental injustice*

Considerations for Improvement Strategies:

What targeted projects- emissions reduction, community health, safety initiatives- are most effective in EFCs? What mobility options exist that can improve access to jobs/ladders of opportunity?

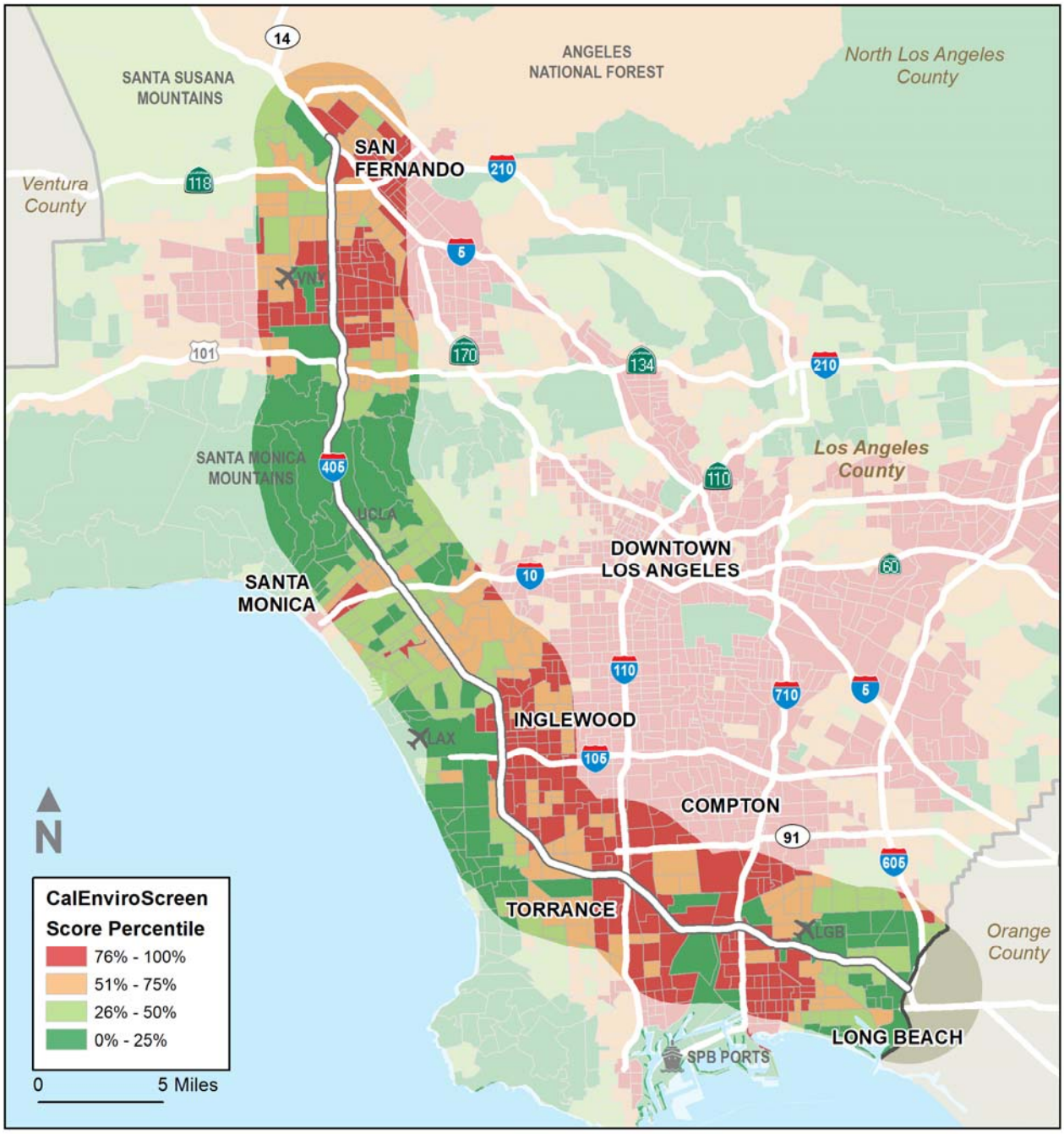
Potential Evaluation Criteria: *Equity, air quality, accessibility*

The impacts of poor air quality and other environmental burdens throughout LA County are also disproportionately placed on residents who live in EFCs. The CalEnviroScreen framework identifies these areas based on twenty indicators, including exposure to Ozone and Particulate Matter, drinking water contaminants, clean up sites, poverty, and cardiovascular disease.

The pronounced disparities within the corridor study area include vast differences in the prevalence of environmental, air quality and socioeconomic burdens experienced by corridor communities. Many census tracts within the study area fall within the 81st -100th percentile for CalEnviroScreen, the highest scores possible including in the San Fernando Valley, Inglewood, and parts of Long Beach. On the other hand, the corridor area includes numerous census tracts with the lowest scores—those are typically in and around the Gateway Cities COG and the San Fernando Valley COG, and cities in and around the I--105 corridor and LAX.

Areas with the highest CalEnviroScreen scores are the same as those that score poorly in the Healthy Places Index, which accounts for factors like employment, income, educational attainment, auto ownership, park access, homeownership, and other environmental stressors included in the CalEnviroScreen framework. These areas also have the highest asthma rates and other health issues related to environmental burdens, and the most linguistic isolation.

Figure 0-2 CalEnviroScreen Score Percentiles by Census Tract



Source: CalEnviroScreen 3.0.