STATE OF OC TRANSIT

OCTA

OC TransitVISION

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Prepared for the Orange County
Transportation Authority by:

In collaboration with:

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EXECUTIVE SUMMARY

The Orange County Transportation Authority (OCTA) is the primary provider of public transit service in Orange County. OCTA is developing the "OC Transit Vision," a transit master plan for Orange County, to define and articulate the future of transit in Orange County. The OC Transit Vision will identify the corridors countywide with the greatest demand and potential, both current and future, for rapid transit lines and stations. It will then assess which mode of high-capacity transit—such as streetcar or bus rapid transit (BRT)—would best fit each corridor. Finally, the OC Transit Vision will prioritize the most immediately needed projects for near-term development.

The OC Transit Vision is scheduled to be completed in late 2017. This "State of OC Transit" report is an important first step in that process. By providing an overview of transit in Orange County—including existing service, as well as the context in which it operates, the built environment, travel patterns, and Orange County demographics—the report establishes the starting place for the Transit Vision. It also summarizes important plans and policies, describes best practices in the development of rapid-transit corridors, and discusses emerging transportation trends and technologies. Finally, the State of OC Transit report includes the transit-related opinions, perceptions, and priorities of a broad range of local stakeholders, the first of many opportunities for the public to engage in this project.

REPORT OUTLINE

This State of OC Transit includes the following chapters:

- A history of transit in Orange County, including a timeline
- Analysis of the existing fixed-route transit system in Orange County, including OCTA buses as well as Metrolink commuter rail and other local operators
- A review of plans and policies that provide context for the OC Transit Vision
- An overview of recent trends in transit, including transit ridership, demographic and cultural developments relevant to transit, and emerging transit-related technologies
- A review of industry best practices in the design of high-capacity transit service, including high-capacity transit modes, transit access, integration of transit and land use, and sources of funding for transit expansion
- A market analysis of current and projected future travel patterns and demand for transit service in Orange County
- Initial findings from interviews with community stakeholders regarding their transit perceptions and future role of transit in Orange County
- A synthesis of findings from these preliminary analyses that helps to shape areas of focus for the development of the OC Transit Vision

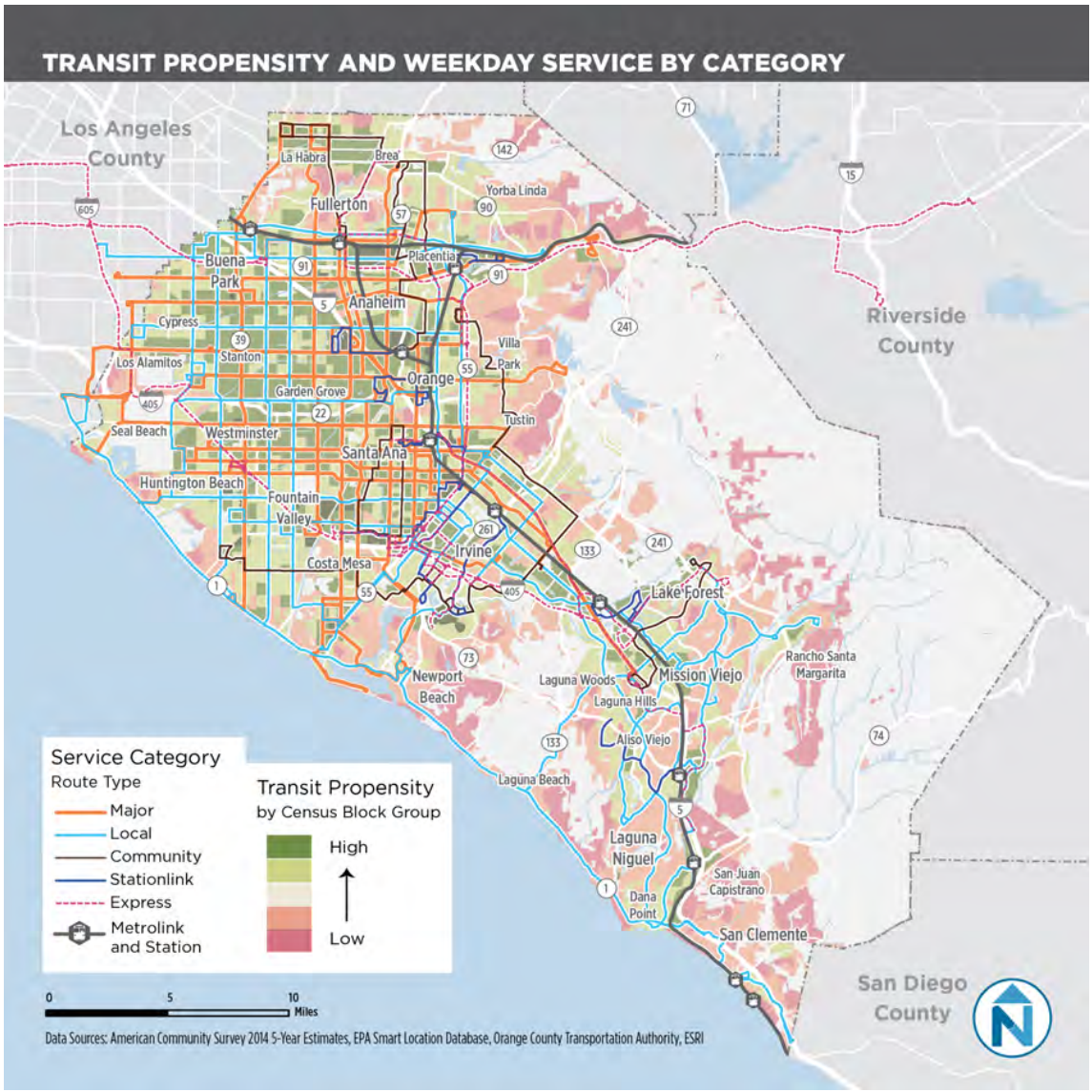
KEY FINDINGS

Following is a brief summary of the key findings of the State of OC Transit. These are based on the analysis in Chapters 2 through 8, and are described in greater detail in Chapter 9.

The majority of existing OC Bus ridership is concentrated in a few key corridors.

- Approximately 19 routes, out of a total of 65 in the system, carry 75 percent of riders. This fact explains both the rationale for the Transit Vision—improvements to the quality of transit service in a limited number of corridors would improve service for the vast majority of riders—as well as for the recent OC Bus 360° route reconfiguration that sought to improve ridership and cost-effectiveness by shifting resources from lower-demand areas to high-demand corridors.
- Most OC Bus service is in the northern part of the county, primarily north of the 55 Freeway, where most lower-income residents live. There are major job centers in South County that are predominately auto-oriented and have lower existing transit use.

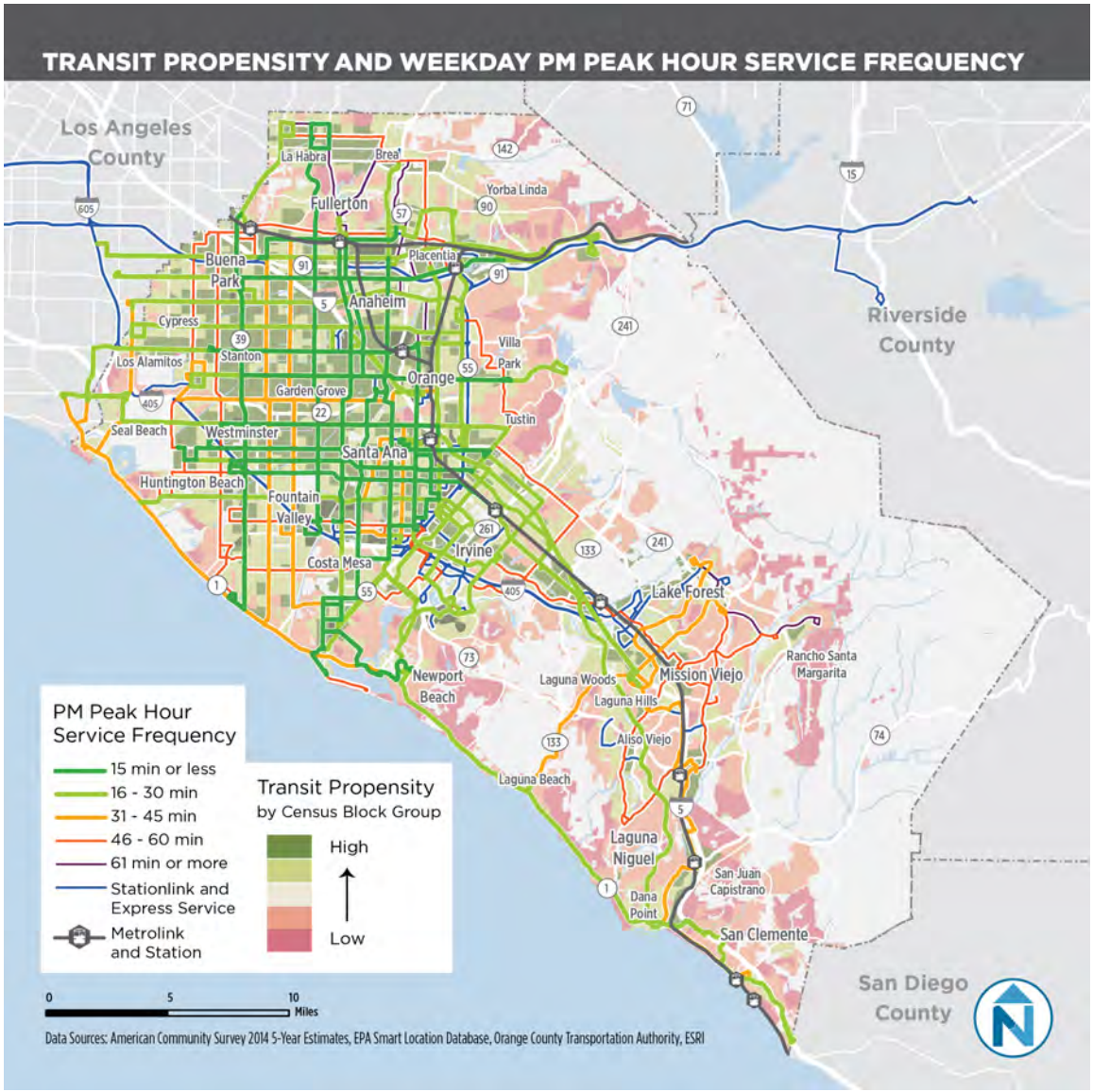
Figure ES-1 Transit Propensity and Weekday Service by Route Category



OC Bus service is focused on the weekday commuter market.

- The periods of highest demand in virtually any transit system are weekday peak commute periods, or rush hours, followed by late mornings and early afternoons on weekdays. Orange County is unique, however, as it has a number of destinations that generate high travel demand on weekends, from beaches to theme parks. Many employees also work weekends (as well as early and late on weekdays). OCTA provides greatly reduced service on weekends.
- OCTA also provides greatly reduced evening service, with deep reductions in service immediately following the evening peak period. This means that travel options are limited for any worker whose shift extends into the evening, as well as for those who may wish to live a car-free lifestyle.
- OCTA provides limited special event and holiday service. These types of services are typically used by people who don't regularly ride transit, and if provided effectively, can serve as a gateway to more regular transit use.

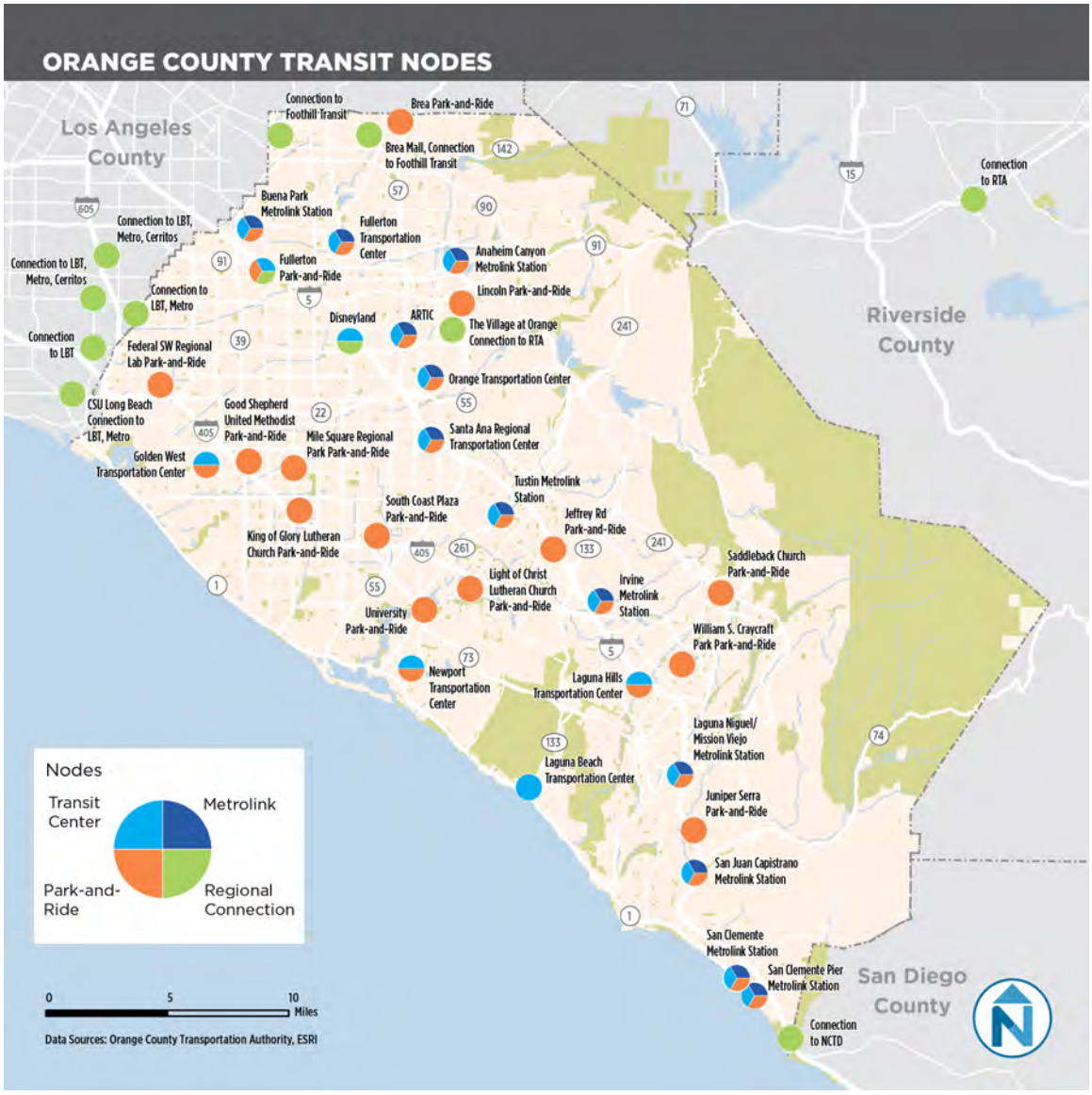
Figure ES-2 Transit Propensity and Weekday PM Peak Hour Service Frequency



OC Bus service is focused on a select number of hubs, including destinations and connection points.

- OCTA and Orange County cities operate more than 30 intermodal transfer facilities ranging from Metrolink stations to park-and-rides. While these facilities serve as transfer points between multiple transportation modes such as bus-to-train, auto-to-bus, and bus-to-bus trips, they are also important points of connection for people walking and biking, making multimodal access to these facilities an area for attention.

Figure ES-3 Orange County Transit Hubs



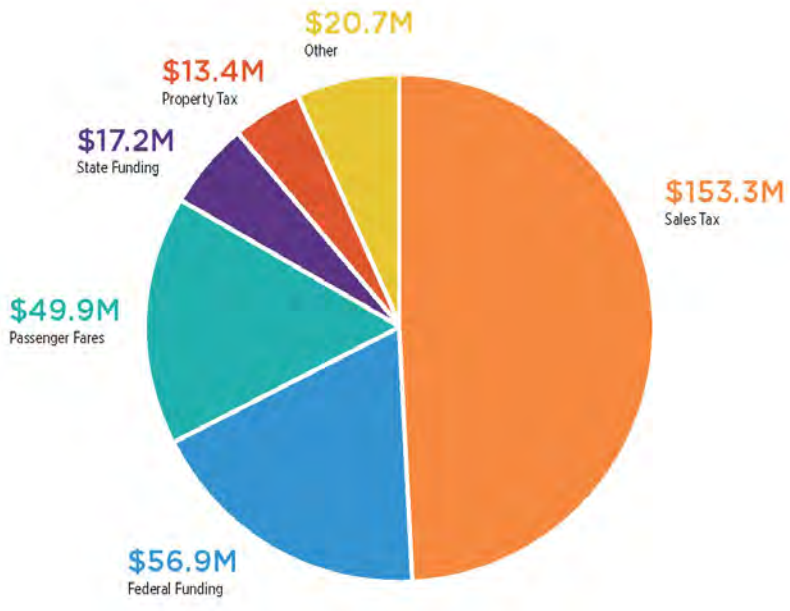
OCTA has begun taking steps to address recent ridership declines.

- The agency is tailoring service to context, focusing on fixed-route bus and rail service in its most productive and cost-effective corridors and exploring creative mobility solutions in other areas.
- OCTA has also emphasized connectivity, including connectivity between the bus system and the LOSSAN rail spine.

Limited funding has constrained ridership growth.

- OCTA and other agencies have gone to great lengths to understand and respond to the external factors driving OCTA's recent ridership decline, such as lower gas prices and an increase in the number of drivers licenses issued. However, ridership is largely a factor of the quality and level of service offered, and funding constraints have kept OCTA from offering more and better service, including more frequent service over longer hours and Bravo! limited-stop service in additional corridors.

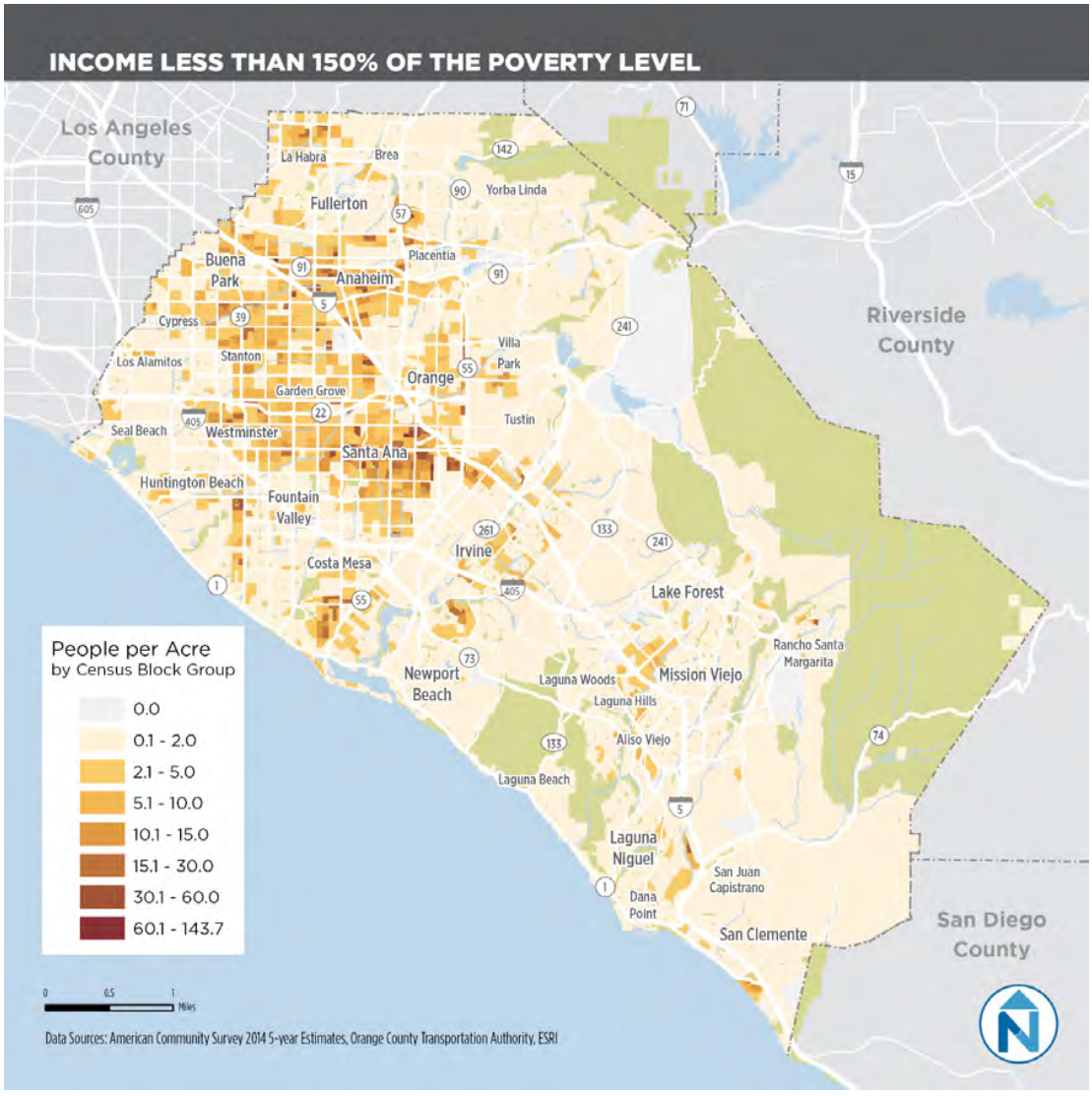
Figure ES-4 Bus and Paratransit Revenues



Land uses and demographics in Orange County present both challenges and opportunities for effective transit service.

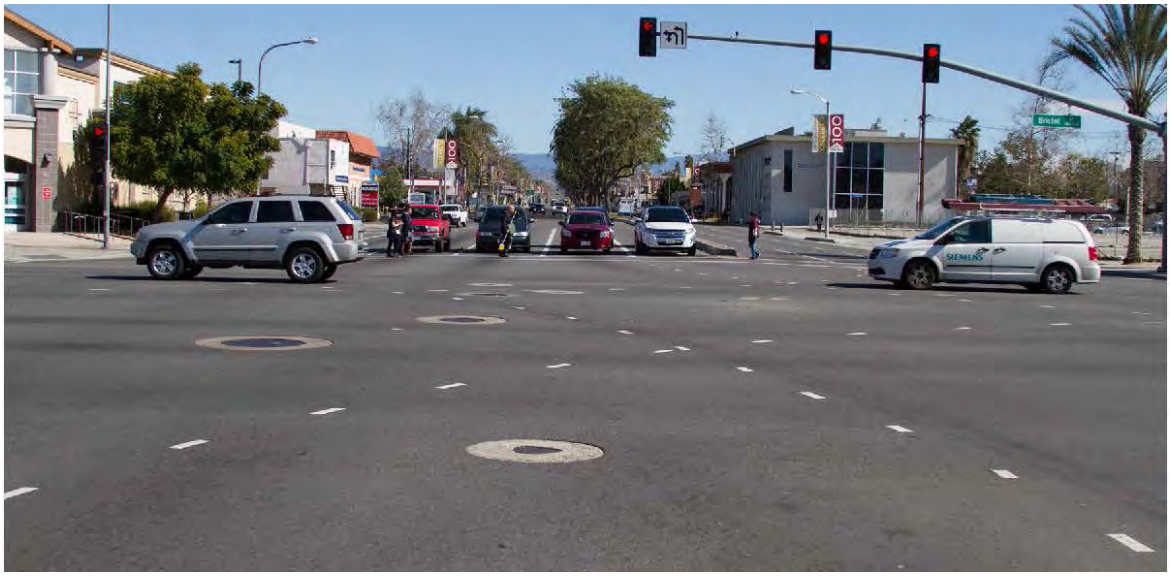
- While Orange County is a suburban area, it has attributes of urban areas, including a racially and economically diverse population (particularly in the north), pockets of relatively high population density, and major employment centers.
- The county also has major destinations including several large college campuses, major retail centers, and unique recreational attractions such as Disneyland and popular beaches. The latter are busiest on weekends, when there is traditionally less transit service available.
- Orange County's auto-oriented land use patterns are not especially conducive to effective transit service. In South County, land uses are highly segregated rather than mixed together, requiring longer trips.
- Finally, major destinations are dispersed across the county rather than concentrated as they would be in a traditional downtown area that may be easier to serve with transit.

Figure ES-5 Locations of Low-Income Individuals



The overall transportation network of Orange County presents both challenges and opportunities for effective transit service.

- In the northern part of the county, there is a well-connected street grid suited to both transit operations and walking. However, walking in the northern part of the county is challenging due to high-speed arterial streets with few crosswalks that are barriers to pedestrian travel.
- This is also true in South County, which has a more disconnected street network that creates out-of-direction pedestrian pathways. The irregular street network in South County is also hard to effectively serve with transit, as routes must follow indirect paths.



Long-term trends offer a mixed message.

- There are both positive and negative signs for future growth in Orange County transit ridership. Although cultural and demographic trends are pointing in the right direction for transit, ridership has been declining lately, in part because of the rise of new alternatives to transit service such as transportation network companies (Uber and Lyft) and reduced barriers to driving.
- New technologies may be both blessings and curses for transit: real-time arrival information on smartphone apps has made transit more attractive at the same time that services such as Uber and Lyft act as alternatives to transit.

Increased transit use can support greenhouse gas reduction targets.

- In California, the transportation sector is the primary source of greenhouse gas (GHG) emissions. For this reason, policy efforts at both the state and regional level have identified reduction in vehicle miles traveled as a primary means to achieve GHG reduction targets. Along with active transportation, transit has a key role to play in providing convenient alternatives to driving and reducing emissions from the transportation sector.

The future OC Streetcar and Bravo! lines provide a template for future ridership growth.

- OCTA has already made progress in identifying, developing, and implementing practical improvements to transit in the highest-demand corridors. This plan will consider a wide range of modes for other priority corridors, including streetcar, rapid streetcar (similar to the western segment of the OC Streetcar), various forms of bus rapid transit, as well as light rail transit and other modes.

Key stakeholder interviews indicate shifting trends.

- Demographic change (Baby Boomers and Millennials) is driving changing travel needs.
- A number of popular non-commute travel markets are not being served adequately with transit, including evening, weekend, and special-event travel.
- A number of high-capacity transit modes such as rail and higher-quality bus service may be appropriate.
- Improving connectivity is key to future success, including both first-/last-mile feeder connections as well as connections between longer distance destinations.
- Transportation network companies could play a vital role in improving connectivity, including providing an alternative to traditional fixed-route service to lower-demand areas.
- Similarly, autonomous vehicle technology could benefit transit by reducing operating costs.

1 INTRODUCTION

ABOUT ORANGE COUNTY

In 1950, a few years before Interstate 5 was completed and Disneyland opened near one of its off-ramps, citrus groves still covered much of Orange County and the population was just over 200,000 people. In the decades that followed, freeways, tract homes, and shopping centers famously spread across the coastal plain—from the Los Angeles County line into the rolling hills of South County—and "the O.C." became a prototypical suburban area (if one with world-famous beaches and theme parks).

Today's Orange County, however, is not your father's suburb. It is now nearly built-out: vacant sites for "greenfield" or "blank slate" development have almost disappeared. At the same time, the northern part of the county has become ever denser and more culturally diverse. In the 2010 census, the county's population surpassed 3 million, making it the sixth-largest county in the country. Just 44 percent of residents were non-Hispanic white.

The combined population of Anaheim, Santa Ana, Garden Grove, Orange, and Westminster the five cities that constitute the urbanized core of the county—is now nearly 1.1 million, in just 132 square miles. If they were a single city, it would be the 10th largest in the country and would have a population density greater than Baltimore, Pittsburgh, Detroit, or Cleveland.

That said, Orange County is still an auto-oriented place: in 2014, less than two percent of households had no car, and 79 percent of commuters drove to work alone. Despite significant transit investments, just over two percent commuted by bus or train. In Los Angeles County, by comparison, seven percent took transit, in San Diego County the figure was close to four percent, and the nationwide average was just over five percent. Even as freeways have continued to expand, Orange County has remained among the most traffic-congested places in America: survey after survey (such as those by the data firm Inrix and the Texas Transportation Institute) has found that the county and its northern neighbor, L.A., together compose the first- or second-most traffic-clogged region in the country. All signs point toward a need for increased travel choices, and for choices that can efficiently, cleanly, and safely move large volumes of people.

HISTORY OF TRANSIT IN ORANGE COUNTY

Transit has been a part of the Orange County landscape for 150 years. Figure 2-1 presents a timeline of transit in the county from 1904 to the present and beyond.

Before OCTA (Pre-1991)

In many ways, Orange County grew up around transit. In 1877, Santa Ana lured the Southern Pacific Railroad away from Tustin with an offer of free land and cash. Starting in 1904, lines of the Pacific Electric (PE) system were extended from Los Angeles into the county as far as the Balboa Peninsula, Santa Ana, Fullerton, and Stern (near Yorba Linda), with a branch line connecting Orange and Huntington Beach. The communities founded around PE stations included Huntington Beach, Stanton, Cypress, and Brea[1]; Newport Beach became a tourist destination. The PE's Red Car interurban lines were similar to light rail vehicles found today in L.A. County and San Diego.

By 1950, the Red Cars were gone, soon to be replaced by freeways and buses. The most notable transit-related event during the postwar period was the opening of the Disneyland Monorail in 1959, a tourist attraction that is not part of the public transit system. Still, for a generation of Southern Californians, "rapid transit" would mean monorails—even if the expected wave of urban monorails never materialized.

The Orange County Transit District, the precursor to today's Orange County Transportation Authority (OCTA), was established by county voters in 1972. The district unified a patchwork of municipal bus operators, assumed operation of some Southern California RTD routes, and set the stage for OCTA, which has a much broader, more multimodal mandate.

The year 1990 was a turning point in Orange County transit history, as voters approved the county's first "self-help" sales tax dedicated to transportation—the original Measure M. It was also the year the region's transit agencies jointly bought 175 miles of rail right-of-way from the Southern Pacific and ATSF railways, land that eventually formed the core of the Metrolink commuter rail system. And finally, in 1990 Amtrak launched the Orange County Commuter, providing a single daily round trip between San Juan Capistrano and Los Angeles. Transferred to Metrolink in 1994, the service is now known as the Orange County Line and provides up to 15 weekday roundtrips; this is in addition to 29 weekday roundtrips on Metrolink's 91/Perris Valley and Inland Empire-OC lines and Amtrak's Pacific Surfliner, all of which serve Orange County.

Early Days of OCTA (1991-2005)

In 1991 the Transit District merged with the Orange County Transportation Commission and other local agencies to form OCTA. Soon after, OCTA produced its first Long-Range Transit System Plan and Development Strategy. Effectively the agency's first transit master plan, it recommended development of an 87-mile urban rail network, new commuter rail stations with expanded service, and more than 40 freeway express bus routes.

Over the next few years, the initial urban rail network would become CenterLine—a proposed 28-mile light rail route running north-south through the core of the county from Fullerton to Irvine. However, CenterLine proved controversial, and the study was discontinued in 2005.

[1] https://www.kcet.org/shows/lost-la/photos-when-the-red-car-rolled-through-orange-county

Figure 1-1 Timeline of Transit in Orange County

OCTA TRANSIT HISTORY

1904 to 1950

Pacific Electric "Big Red Cars" run from L.A. to Yorba Linda, Fullerton, Santa Ana, and Newport Beach

1959

Disneyland Monorail opens

1972

Orange County Transit District is formed by county voters

1990

Orange County Commuter Amtrak line (today's Metrolink Orange County Line) begins service between San Juan Capistrano and Los Angeles

Original Measure M sales tax passed by voters, leading to formation of OCTA

1991

Formation of OCTA

87-mile "urban rail" system is proposed, including 47-mile initial network

1994

OCTA Board votes to proceed with studying 28-mile light rail line between Fullerton and Irvine – "CenterLine"

2000 to 2005

Due to local opposition, further study is discontinued on CenterLine

2006

Measure M2 is approved, including funding for "fixed-guideway" connections to Metrolink

2007 to 2008

69M Boardings

OCTA bus ridership peaks at 69 million annual boardings

2008 to 2010

Ridership begins to decline due to recession

2013

OCTA becomes manager of LOSSAN rail corridor between San Luis Obispo and San Diego

OCTA launches Bravo! rapid bus service

2015 to 2016

OCTA bus service becomes OC Bus and launches real-time arrival information

OC Streetcar receives federal environmental clearance to proceed with additional design and engineering

2016

As part of the OC Bus 360 program, the route network is updated and mobile ticketing is introduced

Harbor Boulevard corridor study begins

2020

OC Streetcar to begin service between Santa Ana Metrolink and Garden Grove

OC TransitVISION

Transit has been a part of the Orange County landscape for more than a century.

Source: Images from OCTA, Nelson\Nygaard, and Wikipedia (licensed for reuse)

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Recent Past and Present (2005-Today)

In 2006, county voters renewed Measure M, expanding funding for Metrolink service and fixed guideway (i.e., a rail line or bus rapid transit line in exclusive lanes) connections to Metrolink stations.

Initial plans called for dramatically expanded service on the Orange County Line, which runs roughly northwest-to-southeast through Fullerton, Anaheim, Santa Ana, Irvine, and into South County, and shares the LOSSAN (Los Angeles-San Diego) Rail Corridor with Amtrak's Pacific Surfliner and Metrolink's 91/Perris Valley and Inland Empire-OC lines. But the Great Recession reduced tax revenues and this plan, too, was scaled back for cost reasons. Today, there are a total of 74 weekday trains on the LOSSAN Corridor in Orange County. (Since 2013, OCTA has served as manager of the LOSSAN Corridor, which is owned by an intergovernmental joint powers authority.)

Two fixed-guideway connections were planned using Measure M2 funding. Unlike the CenterLine project, which OCTA managed, these efforts were led by local jurisdictions. They feature streetcars operating in mixed traffic rather than larger light rail trains operating in exclusive rights-of-way.

The first of these efforts to start was the Anaheim Rapid Connection between the Anaheim Regional Transit Intermodal Center (ARTIC) and Disneyland via the Platinum Triangle. This was a study led by the City of Anaheim to potentially build a streetcar project. In 2016, it was decided that any further planning efforts led by Anaheim should be discontinued and, instead, transition to OCTA's Central Harbor Boulevard Transit Corridor Study. The Harbor Study is currently evaluating various alternative routes and transit modes with the intent of improving transit connections along Harbor Boulevard between Fullerton and Santa Ana (the northern segment of the old CenterLine corridor) and on Katella Avenue between ARTIC and the Anaheim Resort.

The second planned fixed-guideway line, OC Streetcar between the Santa Ana Metrolink Station and Garden Grove, is now in final design, has secured funding, and is scheduled to open in 2020. The four-mile route uses the southernmost segment of the PE right-of-way and could serve as the first segment of a longer line running in either the PE right-of-way or on Harbor Boulevard.

Despite successful funding measures and advances in planning for new fixed-guideway services, OCTA's existing bus service has experienced ups-and-downs in recent years. In fiscal year 2007-2008, just before the recession, ridership peaked at nearly 69 million annual boardings. During the recession, service was cut by more than 20 percent and cash fares were raised by one-third; ridership has since fallen more than 30 percent.

At the same time, the agency has made great strides in modernizing.

- In 2013, the same year it took over LOSSAN service, OCTA introduced Bravo! rapid bus service, which makes fewer stops and offers faster and more reliable long-distance trips than traditional buses. Bravo! routes now serve both the Harbor and Westminster corridors.
- In 2014, ARTIC opened; the station has had low initial ridership, but is the planned terminus of Phase 1 of California High-Speed Rail service to San Francisco.
- In 2015, OCTA bus service was rebranded "OC Bus," and real-time bus arrival information became available through smartphone apps.

- In 2016 the agency updated its route network (through the OC Bus 360 program), and it introduced smartphone ticketing.

Each of these actions has taken OCTA another step along the path toward a transit system that is adjusting to the current needs of Orange County residents, workers, and visitors—one that provides attractive alternatives to sitting in traffic and that makes a greater contribution to larger community goals of economic development, environmental sustainability, and social equity. The OC Transit Vision represents the next step in that process, toward development of new higher-capacity rapid transit options in the county's busiest corridors.

2 EXISTING SYSTEM ANALYSIS

This chapter describes the characteristics and performance of existing transit service and infrastructure in Orange County. The system analysis covers the following topics:

- An overview of OCTA service, including OC Bus service, Bravo! rapid bus service, and the planned OC Streetcar
- An overview of Metrolink and Amtrak Pacific Surfliner regional rail service
- An overview of other transit operations in the county, including local shuttle services and ACCESS paratransit
- A description of major transit facilities, including Metrolink stations and park-and-rides
- A discussion of access to transit in Orange County
- A peer review comparing OCTA performance to that of other operators in neighboring and similar regions
- An analysis of OC Bus performance, including detailed descriptions of major routes

OVERVIEW OF EXISTING SERVICES

This section describes existing fixed-route transit services in Orange County, including service provided by OC Bus, Metrolink, Amtrak, and other operators.

OC Bus

OC Bus is OCTA's largest and most visible service, providing transit options throughout Orange County via 65 fixed-route bus services. Routes range from those geared toward connecting passengers to community and local destinations to those providing express services and connections to regional transit like Metrolink. In fiscal year 2015-2016, OC Bus service carried 43 million passengers. OC Bus service characteristics and performance are described in detail in the OC *Bus System Performance* section (Page 2-30). Special service categories and fares are described below.

Bravo!

OCTA's Bravo! service includes two limited-stop routes: Route 543 in the Harbor Boulevard corridor, running north-south between Fullerton and Costa Mesa; and Route 560 in the Westminster Boulevard/17th Street corridor, running east-west between Santa Ana and Cal State Long Beach. (These routes are described in detail later in this chapter.)

Bravo! is an example of partial or light bus rapid transit (BRT). The distinction between full and partial BRT or rapid bus as a transit mode is described in more detail in Chapter 5 of this document. The routes are faster and more reliable, convenient, and attractive than typical local bus service. The most notable feature is limited stop spacing, with stops as much as a mile apart serving only the busiest locations, such as transfer points and near major destinations.

Bravo! service runs relatively frequently all day on weekdays, and features *walk-up* headways, meaning buses arrive regularly enough that riders don't need to check a schedule before heading to their stop. Buses are specially branded to be more recognizable and visible. Bravo! is similar to the Metro Rapid service operated by LA Metro, with its highly recognizable red buses.

However, Bravo! service does not feature other elements of "full" BRT, such as transit priority at signalized intersections, exclusive transit lanes, or full stations (rather than stops) with more passenger amenities. The sbX Green Line in San Bernardino is a local example of full BRT.

In addition to existing Bravo! Routes 543 and 560, a third route is planned on the Route 29/Beach Boulevard corridor between Fullerton and Huntington Beach (Route 529). Additional corridors have also been considered for Bravo! service in the past, including the Route 57/Bristol Boulevard corridor between Brea and Irvine. As discussed below, existing Routes 543 and 560 intersect at the future OC Streetcar terminal in Garden Grove at the intersection of Harbor Boulevard and Westminster Avenue.

OC Streetcar

The OC Streetcar will be Orange County's first urban rail line. Scheduled to open in 2020, it will run more than four miles from the Santa Ana Regional Transportation Center, through Downtown Santa Ana, and terminate at the intersection of Harbor Boulevard and Westminster Avenue in Garden Grove. This intersection with Bravo! Routes 543 and 560 will become a key transit connection point.

The OC Streetcar is the first fixed-guideway feeder connection to the Metrolink rail spine funded through Project S ("Transit Extensions to Metrolink") as part of the 2006 Measure M sales tax renewal. The $298 million project was recently awarded a matching federal grant and is now in final design and engineering.

Figure 2-1 OC Streetcar Route

The OC Streetcar will be a modern streetcar line like those in Portland (Oregon), Seattle, and Tucson. Modern streetcars are larger, provide a smoother ride, and are typically more comfortable than buses; however, most are single cars and are significantly smaller than light rail trains. They also typically operate in mixed traffic, as the OC Streetcar will outside of the PE ROW, in its segment including Downtown Santa Ana. Outside of Downtown Santa Ana, stops will be spaced relatively far apart—more than a half-mile on average, compared to roughly a quarter-mile downtown—to allow greater speed and reliability than local bus service. Stops will include shelters and other amenities.

The OC Streetcar is envisioned as the possible first leg of a longer line or streetcar network. Another streetcar route has been studied between the ARTIC station in Anaheim and the Anaheim Resort district, including Disneyland. That and other possible transit improvements in the Harbor Boulevard corridor are currently under consideration as part of the Central Harbor Boulevard Transit Corridor Study.

Seasonal Service

In addition to regular fixed-route service, OC Bus provides seasonal service to major events and destinations, including the Orange County Fair, Angels baseball games, and Laguna Beach. This allows OCTA to explore discretionary rider markets. Provision of such service is dependent on funding availability.

In 2016, seasonal express service to the Orange County Fair connected to nine park-and-ride locations on Friday, Saturday, and Sunday in July and August during fair hours. In 2016, the OC Fair Express carried more than 94,000 riders, all of whom received a $9 discount on $12 admission.

In 2016, express service from the Golden West Transportation Center to Angels baseball games operated for weekday home games during the season. Angels Express bus riders were eligible to purchase tickets to select games at a 50 percent discount. The OC Fair and Angels Express service are examples of service funded by MSRC grants from the Air Quality Management District (AQMD).

During summer 2016 OC Bus operated the Laguna Beach Summer Breeze on July and August weekends, connecting the Laguna Canyon Road parking lot in Irvine to the Laguna Beach bus station. The service was funded by the City of Laguna Beach.

Figure 2-2 Examples of OCTA Seasonal Service

Fares

Current OCTA fares in major categories are shown in Figure 2-3. Like many other Southern California transit operators, OCTA does not provide free transfers to connecting buses. Instead, it sells discounted day passes that allow unlimited travel. Previously $5, OCTA's day pass was recently reduced to $4—equivalent to the cost of two trips—as part of a six-month promotion extending through April 2017.

Figure 2-3 Summary of OCTA Fares (Effective Feb 2017)

	Adult	Senior/Disabled
Local		
Cash Fare	$2	$0.75
Day Pass	$4*	$1.50
30-Day Pass	$69	$22.25
OC Express (intracounty)		
Cash Fare	$4	$3.50
Day Pass	$8	$7
30-Day Pass	$120	$105
Express (intercounty)		
Cash Fare	$7	$6
Day Pass	$14	$12
30-Day Pass	$210	$180

* Promotional fare through April 2017

In addition to discounted fares for those 60 or older, people with disabilities, and Medicare cardholders, OCTA offers discounted 30-day passes for youth ages 6 to 18 for $40. The agency also offers a variety of discounted College Passes for students at participating colleges and U-Passes for students and employees of Cal State Fullerton, UC Irvine, and Chapman University (rates vary by campus). Finally, OCTA offers discounted Perk Passes through employers good for $1.25 trips up to a maximum cost of $69 per month.

OCTA recently introduced mobile ticketing via an OC Bus smartphone app. Using the app, riders load a pass or one-way cash fare onto their phone, then activate their ticket or pass from within the app and show it to the bus operator upon boarding. Paper passes are still

Costs

OCTA fares have risen in recent years, from $1.25 for a basic cash fare to $1.50 in 2009 and to $2 in 2013. Compared to driving, the cost to ride transit in Orange County is a bargain, even with recent fare increases—between the cost of buying or leasing a car, gas, maintenance, insurance and fees, AAA estimates that driving costs between $7,540 and $9,520 per year, and that is a nationwide estimate that doesn't reflect the higher costs of driving in California. This 60 percent increase in the base fare over just four years has no doubt played a role in OCTA's declining ridership (see Chapter 4, Recent Trends in Transit).

sold online and at more than 100 retailers, including major supermarket chains. Installation of electronic readers is underway now.

OCTA maintains interagency agreements with Metro, Long Beach Transit, Omnitrans, Long Beach Transit, and the Riverside Transit Agency that provide free transfers for passengers traveling across county lines. The agreement also gives Metrolink/Amtrak riders free trips to and from Metrolink stations.

Passenger Information

Historically, U.S. transit agencies informed the public about their services by publishing printed maps, schedules, and rider guide brochures and booklets (such as the OCTA Bus Book shown here); by staffing phone hotlines; by providing limited information at stops on "flag signs" with route numbers and destinations; and, occasionally, by posting maps and schedules at stops. More recently, agencies have begun to use websites and social media to distribute additional information.

OCTA is currently updating its passenger information program to make use of new technologies. In 2016, the agency introduced the OC Bus smartphone app (available on both iOS and Android platforms), which features mobile ticketing. Through its open data initiative, the agency has made real-time arrival and other information available to app developers.

Additionally, OCTA service has been given a new look and identity, with the intent of making it more modern and attractive. In 2015, OCTA bus service was rebranded as "OC Bus"—this includes local bus, OC Express (intracounty express) and Express (intercounty express) routes, as well as the agency's "Bravo!" rapid bus service. The upcoming Santa Ana-Garden Grove streetcar project will be branded as "OC Streetcar."

Metrolink and Amtrak

Orange County is one of six coastal counties served by the 351-mile LOSSAN Rail Corridor linking San Diego, Los Angeles, and San Luis Obispo. The corridor is the second busiest intercity rail corridor in the U.S. (second only to the northeast corridor that connects Boston and Washington, D.C.), serving 7.2 million people annually with Metrolink, Coaster, and Amtrak services. The LOSSAN Rail Corridor Agency is a joint powers authority staffed by OCTA.

Both Amtrak and Metrolink serve Orange County along the LOSSAN Corridor. Amtrak's Pacific Surfliner connects the Southern California coast between San Luis Obispo and San Diego. Metrolink's commuter rail serves the Los Angeles metropolitan area, connecting Los Angeles, Orange, Riverside, and Ventura counties. The Orange Line runs along the LOSSAN Corridor. The 91 Line provide service to Riverside and Inland Empire-Orange County Line provide service to San Bernardino and Riverside, which is to the east of Orange County.

Orange County is home to 12 Metrolink stations, 11 of which are on the LOSSAN Corridor, and will be adding a station to the system in Placentia in 2019 that will serve the 91 Line. Of these stations, five are shared by Metrolink and Amtrak. The joint Rail 2 Rail program allows Metrolink Monthly Pass holders along the Orange Line to take advantage of overlapping services: pass

holders have access to Amtrak Pacific Surfliner trains at no additional cost between the station pairs identified on their pass. There were more than 2.8 million boardings at Orange County stations during the 2015-2016 fiscal year.

The Irvine and Santa Ana stations have the highest level of service among Orange County stations, with 69 daily trains. Service at the Irvine and Santa Ana stations runs from 4:15 a.m. to 11:09 p.m. and 4:27 a.m. to 11:01 p.m., respectively. Service averages two trains per hour in each direction and as many as three trains per hour during peak times. San Clemente Pier has the least service, with Amtrak providing two daily trips in each direction.

Figure 2-4 Train Service by Station (Weekday)

Station	Shared	Northbound Trips		Southbound Trips	
		Metrolink	Amtrak	Metrolink	Amtrak
Buena Park	No	14	-	14	-
Fullerton	Yes	19	12	19	12
Anaheim	Yes	15	12	14	12
Orange	No	23	-	22	-
Santa Ana	Yes	23	12	22	12
Tustin	No	23	-	22	-
Irvine	Yes	23	12	22	12
Laguna Niguel/Mission Viejo	No	21	-	20	-
San Juan Capistrano	Yes	8	12	8	12
San Clemente	No	8	-	8	-
San Clemente Pier	No	-	2	-	2
Anaheim Canyon	No	8		8	

Metrolink and Pacific Surfliner fares are distance-based, but generally higher than bus fares. A one-way fare between Fullerton and Irvine is currently $7.75 on Metrolink and $11 on the Surfliner[1]. Metrolink offers discounted passes.

Performance

The Irvine Station generates the most ridership in Orange County, with 583,345 boardings during fiscal year 2015-2016. Of these boardings, nearly two-thirds were on Metrolink. Fullerton's station also served more than half a million passengers, with nearly 30 percent of those riding Amtrak Pacific Surfliner. Ridership by station is shown in Figure 2-5.

As shown in Figure 2-6, Irvine is part of three of the highest-ridership station pairs in the county. Unsurprisingly, there is also significant travel to Los Angeles.

[1] As of September 2016, for a weekday trip purchased two weeks in advance.

Figure 2-5 Metrolink/Amtrak Station Boardings

Figure 2-6 Highest Ridership Station Pairs in Orange County (LOSSAN) – Third Quarter of 2016 Fiscal Year

Station Pair	Ridership
Irvine – Los Angeles	38,274
Irvine – San Diego	35,446
Fullerton – Los Angeles	32,306
Irvine – Solana Beach	30,374
Anaheim – Los Angeles	26,349

Anaheim Resort Transit

Anaheim Resort Transit (ART) serves the resort guests, employees, and residents of Anaheim, providing connections to major attractions such as Disneyland, The Outlets at Orange, ARTIC, South Coast Plaza, Knotts Berry Farm, and several area hotels. Routes are operated every day of the week. There were nearly 9 million ART boardings during the 2015 fiscal year.

Daily passes start at $5 for adults and $2 for children. Three-day ($12/$3), five-day ($20/$5), 15-day ($45/$10), and 30-day passes ($55/$20) are also available. Passes may be purchased on-board, via the ART app, at ARTIC or ticketing kiosks and at a variety of tourist locations around Anaheim. OCTA accepts transfers from ART bus routes 1-20 at any stop where OCTA and ART buses connect directly. ART accepts transfers from a total of 24 OC Bus routes at stops where buses connect directly.

Figure 2-7 ART Routes

Routes	Frequency (Minutes)*	Span
1/2 – Harbor Blvd. Line	20	6:14 a.m. – 11:30 p.m.
3/4/5 – Grand Plaza Line	20	6:14 a.m. – 11:30 p.m.
6/7/8 – Hotel Circle Clementine Line	20	6:13 a.m. – 11:30 p.m.
9 – Katella Line	20	6:15 a.m. – 11:30 p.m.
10 – Downtown Packing District Line	30	6:13 a.m. – 11:30 p.m.
11 – Ball Road Line	20	6:10 a.m. – 11:30 p.m.
12 – Manchester Ave Line	20	6:14 a.m. – 11:30 p.m.
14/15 – ARTIC Sports Complex Line	20	6:15 a.m. – 11:40 p.m.
16 – Orange Line	60	6:16 a.m. – 11:00 p.m.
17 – Canyon Line**	4 WB a.m. trips; 3 EB p.m. trips	5:55 a.m. – 5:48 p.m.
18 – Buena Park Line	60	9:00 a.m. – 9:00 p.m.
19 – Extension of Canyon Line	60	6:00 a.m. – 11:00 p.m.
19 – Santa Ana Line	120	10:00 a.m. – 10:30 p.m.
20 – Toy Story Line	10	6:20 a.m. – 11:30 p.m.
22 – Costa Mesa/South Coast Plaza Line***	1 SB and 2 NB a.m. trips; 1 SB and 3 NB p.m. trips (4 NB p.m. trips on weekends and Holidays)	7:45 a.m. – 10:30 p.m.

*ART routes operate at identified frequency daily. Only routes 17 and 22 have detailed stop tables with differing frequencies.

**Trips scheduled to sync with Metrolink services at Anaheim Canyon Station

***Only operates morning and evening services between Disneyland and South Coast Plaza

Community Shuttles and Circulators

Irvine Shuttle (iShuttle)

The Irvine Shuttle provides weekday access to major employment destinations from local train stations. Routes 400A and 401B serve the Tustin Metrolink station and the Irvine Business Complex, while routes 402C and 403D connect passengers to the Irvine station and Irvine Spectrum areas. Routes are designed around Metrolink and Amtrak schedules to provide commuters and residents efficient service to and from the train stations. For peak period trips, shuttle services depart stations within 5 to 10 minutes of train arrival, and shuttles drop off passengers within 5 to 10 minutes of train departure.

Annual ridership for the 2016 fiscal year on Irvine Shuttle services ranged from 50,944 for Route 403D to 75,228 for Route 401B. Fares are $1, but riders may present a valid Metrolink pass or ticket to ride the shuttle for free.

Previously operated by the City of Irvine, the iShuttle has been operated by OCTA since July 2016.

Laguna Beach Municipal Transit Lines

Laguna Beach Municipal Transit Lines (LBMTL) operated by the City of Laguna Beach, runs two bus routes providing local circulation within Laguna Beach. The North Laguna route links the beaches to the north end of town, while the Monarch Bay & Ritz route travels along the Pacific Coast Highway (PCH) to various commercial and recreational locations. These bus services operate from 6:30 a.m. to 6:30 p.m. on weekdays, and from 9:20 a.m. to 6:30 p.m. on Saturdays. Fares are $0.75 for adults and $0.30 for children, senior citizens, Medicare card holders, and those with disabilities. OCTA day passes are valid for one transfer at overlapping stops.

LBMTL also operates a summer trolley service to connect visitors to various attractions. The trolleys travel along PCH and Laguna Canyon Road every 20 minutes from 9:30 a.m. to 11:30 p.m. The trolley connects riders to destinations along the beach and the Gallery Row District, Canyon Arts District, Hip District, and Pearl Street District. La Habra Express

La Habra Express

The La Habra Express Route 103B serves the community of La Habra on weekdays, connecting riders to St. Jude Medical Center, the Fullerton Transportation Center, and other destinations within the city. Passengers enjoy complimentary Wi-Fi and access to USB charging ports. More than 30,000 passengers used the La Habra Express during the 2016 fiscal year.

Funded by OCTA's Measure M, the service is currently operated by OCTA. The City of La Habra subsidizes fares to $1 for passengers. OCTA passes are accepted. Route 103B) runs every 65-75 minutes from 6:10 a.m. to 6:26 p.m.

Mission Viejo Circulator

OCTA operates the Mission Viejo Circulator service to connect high schools, medical centers, shopping centers, and the Laguna Niguel/Mission Viejo train station. The service is a partnership between OCTA and the City of Mission Viejo, funded by Measure M. Fares are $2, and Metrolink and Amtrak tickets are honored as full fare for passengers traveling to and from the station.

The circulator (Route 182) runs every 30-65 minutes from 6:00 a.m. to 6:24 p.m.

Westminster Little Saigon Circulator

Since fall 2016, OCTA operates the Westminster Little Saigon Circulator, a one-way loop connecting Magnolia Street, Bolsa Avenue, Brookhurst Street, and Bishop Place. Funded through OCTA's Measure M, the service provides a free ride to local shops, restaurants, schools, and other destinations to reduce traffic in the popular Little Saigon area. The circulator (Route 164) runs every 30-65 minutes from 9:47 a.m. to 6:01 p.m.

Other Transportation Services

San Clemente Rideshare

San Clemente and OCTA have partnered to provide a local rideshare service funded by Measure M. The service operates daily from 6 a.m. to 6 p.m., providing access to destinations such as the pier, San Clemente High School, Rancho Clemente Business Park, Walmart, Target, and Sprouts.

To use the service, residents request a ride through the Lyft app at or near a former OC Bus Route 191 or 193 stop (routes were discontinued as part of OC Bus 360°). Passengers pay $2 per ride, and up to $9 of additional fare will be subsidized. Passengers are responsible for additional costs over $11.

Surf City Shuttle

Huntington Beach operates a summer shuttle serving various destinations around the city. In 2016, the service operated on weekends from mid-June to early September, with service from 10 a.m. to 10 p.m. on Friday, and 10 a.m. to 8 p.m. on Saturday and Sunday. There are five stops along the route:

- Downtown – Shorebreak Hotel on 5th Street
- Sunset Beach – Peter's Landing on PCH/Anderson Street
- Bella Terra – Beach Boulevard on Huntington Beach Mall behind Century Theatre
- Beach Promenade – Beach Boulevard/Atlanta Avenue
- Pacific City – Pacific View behind Lot 579

The shuttle operates as a bi-directional loop (except on Friday) along the Pacific Coast Highway, Warner Avenue, and Beach Boulevard. Passengers can track the shuttle's location in real-time on surfcityusashuttle.com.

OC Vanpool

OC Vanpool connects people with similar destinations and work schedules for pick-up at a common location. Costs associated with the vehicle—including gas, insurance, and rentals—are divided among the seven to 15 participants, reducing an individual's commute costs by as much as 75 percent compared to driving alone.

OCTA provides an incentive of $400 per month, per vanpool (applied to the rental fee), as well as assistance to employers and commuters to form vanpools. To qualify, vanpools must set workplace destinations in Orange County, show 70 percent occupancy initially (and 50 percent thereafter), accept riders from nearby destinations, and report ridership monthly via OCTA's database.

There are approximately 500 vanpools currently operating in Orange County, connecting passengers to over 85 employers. OCTA's vanpool website provides tools for those interested joining or starting a vanpool.

ACCESS Service

ACCESS is OCTA's complementary Americans with Disabilities Act (ADA) paratransit service for people who are unable to use fixed-route bus services. As required under ADA, service is provided "curb to curb" (and in some cases "door to door") within three-quarters of a mile of fixed routes. Additional service is also provided to and from Regional Center of Orange County (RCOC) programs, and subsidies are provided to nonprofits in exchange for group trips diverted from ACCESS. ACCESS service is provided under contract by MV Transportation.

Passengers must be certified eligible for the service based on ADA criteria related to physical and cognitive ability, and may be accompanied by a personal care attendant or one or more fare-paying companions, depending on space limitations. Passengers must also request a trip at least one day (and up to three days) in advance. OCTA accepts requests from 7 a.m. to 5 p.m. on weekdays and 8 a.m. to 5 p.m. on weekends and holidays. Service hours are comparable to those of local bus services.

OCTA ACCESS offers two types of ADA service:

- Standard curb-to-curb service, which requires trips to be requested in advance ($3.60 per one-way trip)
- Subscription service, which schedules recurring trips, such as a commute trip, without requiring an advance request ($3.60 per one-way trip)

OCTA also offers same-day taxi service, available from 7 a.m. to 8 p.m. ($3.60 for up to roughly a five-mile trip, or a standard fare of $15.40, after which costs are paid by the passenger), to ACCESS-eligible passengers. Some regular ACCESS trips are also served using taxis, including peak-period "overflow" trips, early and late-night trips, trips on Saturday after 3 p.m., and Sunday trips.

OCTA ACCESS works to accommodate requests. However, requested times may need to be adjusted depending on demand. ACCESS may suspend passengers from using the service if they repeatedly fail to show up for rides, or cancel rides without sufficient notice.

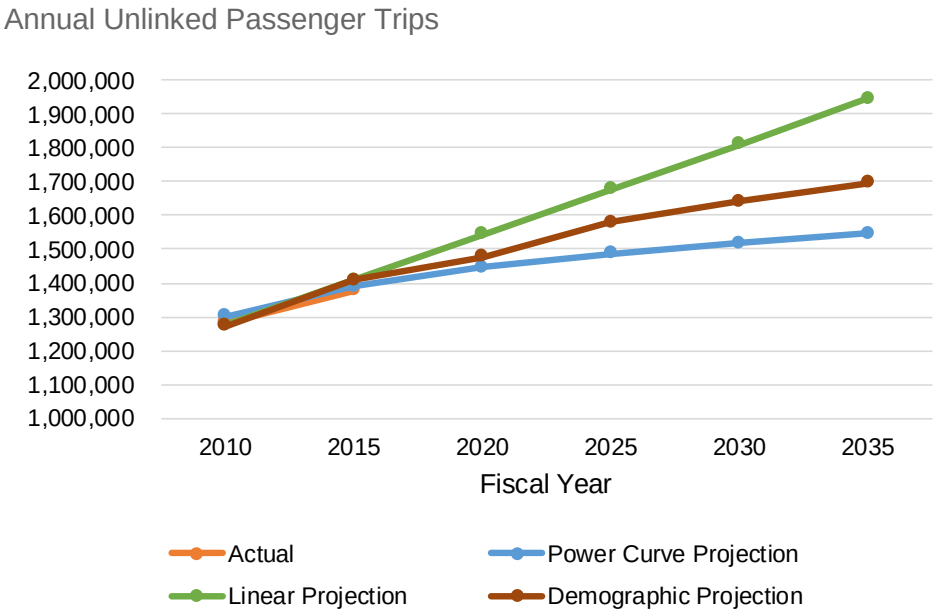
Performance

ACCESS service has accounted for an increasingly large share of OCTA operating costs in recent years, increasing from 10 percent of total costs for all transit modes (including fixed-route, commuter rail and vanpool in addition to paratransit) in FY 2008 to 19 percent in FY 2015. Cost per hour of revenue service for paratransit has increased by 76 percent over that period, and while ridership has increased 14 percent, cost per boarding has increased by 73 percent. In terms of cost per boarding, ACCESS is by far the most expensive mode for OCTA to operate, at $43.28 in FY 2015, compared to $19.63 for Metrolink, $6.18 for OC Vanpool and $5.15 for OC Bus. In FY 2015 ACCESS accounted for about 3 percent of all OCTA boardings, up from about 2 percent in FY 2008.

ACCESS use is projected to continue to increase, in part due to the aging of the Baby Boomer generation (although analysis of August 2016 ridership found that 72 percent of trips were made by those under the age of 65, a reminder that paratransit serves both older persons and persons

with disabilities). Projections developed for this study are illustrated in Figure 2-8 below. The methodologies are based on both statistical analysis and demographic forecasts. They project an increase in ridership of between 12 and 41 percent between Fiscal Years 2015 and 2035.

Figure 2-8 Three Projections of ACCESS Demand



Regional Connections

Los Angeles Metro

OCTA has nine routes that provide service in Los Angeles County and offer connections to LA Metro routes (see 9). LA Metro operates Express Route 460 connecting Downtown Los Angeles to Disneyland and to 10 OC Bus routes within Orange County: 21, 25, 26, 29, 33, 35, 43, 83, 430, and 543.

Figure 2-9 OCTA-Metro Connections in Los Angeles County

OCTA Route	Connecting Metro Routes
1	577X
30	62, 130, 460, 577x
38	62, 460
42	62
46	460
50	460, 577x
60	577x
560	577x
701	45, 81, 108, 115, 358, 745
721	45, 81, 108, 115, 120, 358, 460, 745, Green Line

Metro accepts OC Bus one-day and 30-day bus passes from passengers transferring to inbound Metro routes 62 and 460.

OC Bus accepts Metro Tap cards on nine routes that serve Los Angeles County at stops where OC buses and Metro buses connect directly. Additionally, transfers are accepted from Metro 460 passengers at the following locations:

- Fullerton Park-and-Ride
- Disneyland
- Magnolia Avenue stops between Orangethorpe Avenue and La Palma Avenue
- La Palma Avenue stops between Magnolia Avenue and Beach Boulevard
- Beach Boulevard stops between La Palma Avenue and La Mirada Avenue

Foothill Transit

Foothill Transit serves the San Gabriel and Pomona Valleys of Los Angeles County. Service overlaps with OC Bus routes, providing connections at the following locations:

- Beach Boulevard/La Habra Boulevard – OC Bus routes 29, 129, and 143 connect with Foothill Transit 285, which takes passengers to destinations such as Whittier Hospital and Puente Hills Mall
- Brea Mall – OC Bus routes 57, 129, 143, and 153 connect to Foothill Transit 286 with service to Diamond Bar and Pomona

Foothill Transit accepts OCTA monthly passes and day passes at these transfer locations.

Riverside Transit Agency

Riverside Transit Agency (RTA) provides service to western Riverside County. Thirty-six fixed-route bus services connect local communities while eight CommuterLink express routes connect to regional transit facilities, shopping destinations, and business parks.

CommuterLink Route 216 provides access to Orange County, connecting the Riverside Downtown Transit Terminal to the Village at Orange for $3. Route 216 connects to OC Bus routes 24, 42, 46,

50, 71, 167, and 213. Additionally, RTA Route 15 connects passengers from Downtown Riverside to the La Sierra Metrolink station. OC Bus one-day and 31-day passes are accepted on segments of RTA Route 216 in Orange County (for base fare only).

Long Beach Transit

Long Beach Transit (LBT) serves Long Beach, Lakewood, and Signal Hill. LBT operates 34 bus routes that connect to transit services in neighboring communities, including 15 routes that connect to eight OC Bus routes (see 10). LBT passengers can purchase a $0.50 interagency transfer to transfer to OC Bus services. Though OC Bus does not provide interagency transfers, LBT accepts OCTA day passes for one ride.

Figure 2-10 OCTA-LBT Connections in Los Angeles County Serving OCTA Routes

OCTA Route	Connecting LBT Routes
1	81,91, 92, 93, 94, 121, 131, 171, ZAP 96
30	172, 173, 192
38	173, 191
42	101, 102, 104, 131, 171, 173
46	102, 104
50	81,91, 92, 93, 94, 171, 173, ZAP 96
60	81,91, 92, 93, 94, 121, 171, ZAP 96
560	81, 91, 92, 93, 94, 121, 171, ZAP 96

North County Transit District

The North County Transit District (NCTD) annually serves approximately 12 million passengers in north San Diego County. NCTD operates fixed-route and rapid-bus service throughout the region, commuter rail service connecting Oceanside to Downtown San Diego, and light rail service linking Oceanside to Escondido. It also operates paratransit and on-demand services in certain areas.

OC Bus Route 1 connects passengers to NCTD route 395, linking San Clemente to Oceanside. OCTA day passes are valid for one boarding on NCTD route 395. Additionally, Metrolink OC Line passengers possessing a valid Metrolink pass may use NCTD routes 101, 302, 303, 313, 318, 392, and Sprinter (light rail) services at no additional charge.

TRANSIT FACILITIES

This section describes transit hubs in Orange County. These primarily consist of Metrolink stations, OCTA park-and-rides, and off-street bus transfer centers. These facilities serve as a major point of connectivity between transit routes and between transit and other modes. They are owned by various entities, including OCTA, cities and Caltrans.

Figure 2-11 Transit Hubs

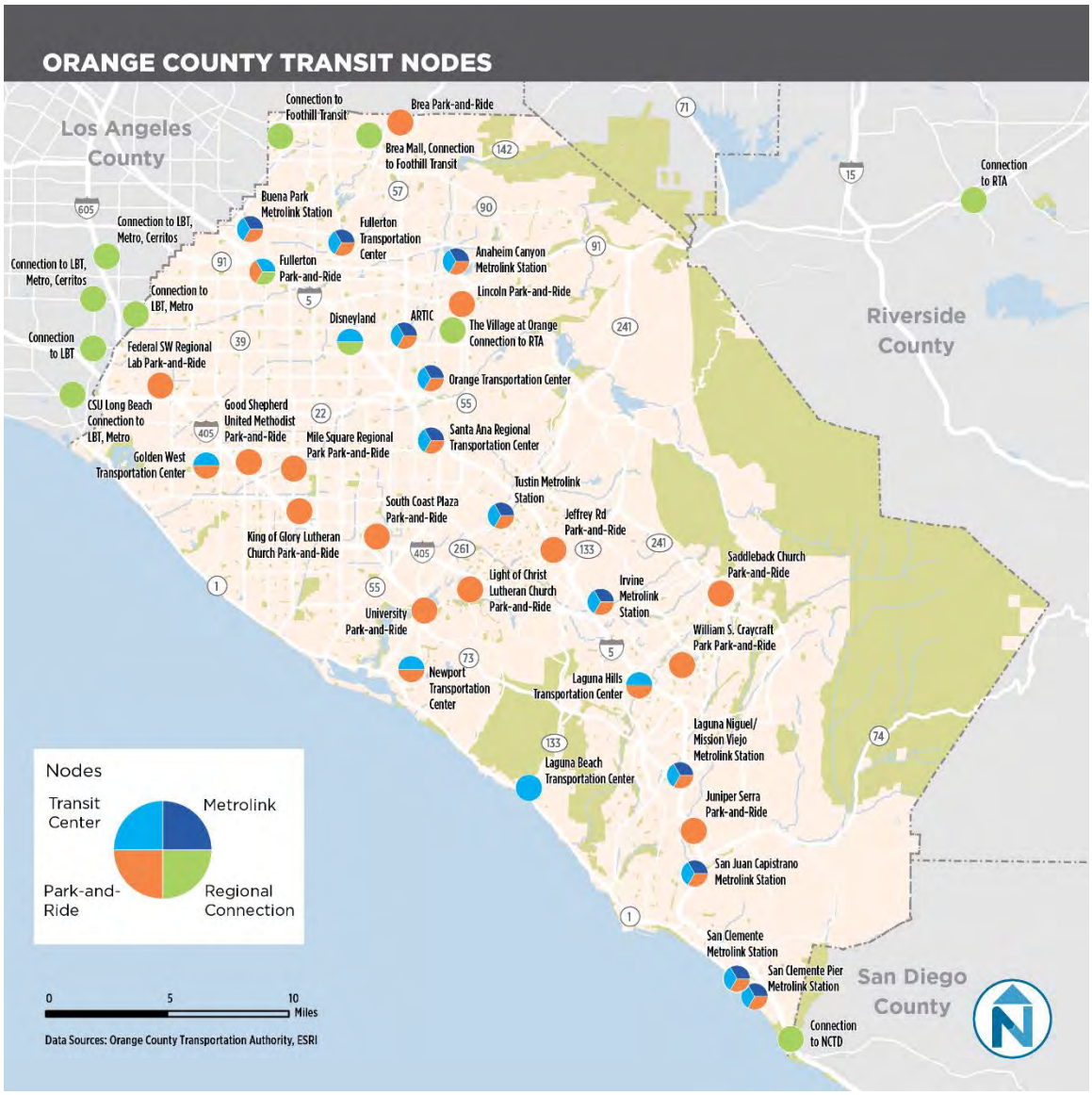
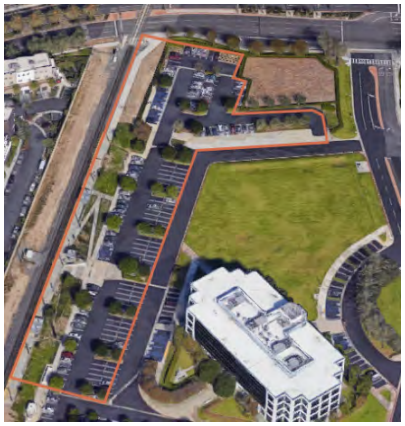
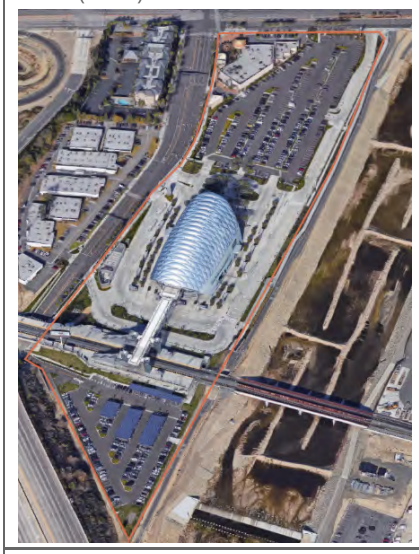
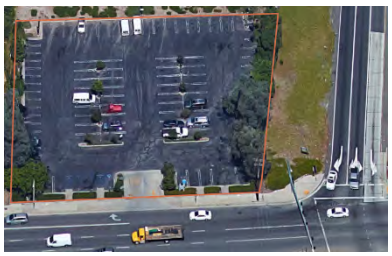


Figure 2-12 Orange County Capital Facilities Matrix

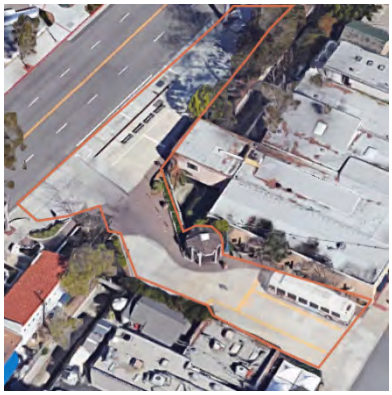
Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Anaheim Canyon Metrolink Station 	●	●	●		144	4	-	▪ Bicycle parking ▪ Shelters ▪ Seating ▪ 16 bicycle lockers
Anaheim Regional Transportation Intermodal Center (ARTIC) 	●	●	●		1,031	13	-	▪ Bicycle parking ▪ 24 bicycle lockers ▪ Restrooms ▪ Indoor meeting rooms ▪ Wi-Fi and charging stations
Brea Park-and-Ride 			●		95	-	-	▪ Bicycle parking ▪ Motorcycle parking

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Buena Park Metrolink Station 	●	●	●		302	4	-	▪ Restrooms ▪ Sheltered seating ▪ 6 bicycle lockers
Disneyland 		●		●	-	4	-	▪ Sheltered seating ▪ Pedestrian esplanade ▪ Unsheltered seating
Federal SW Regional Lab Park-and-Ride 			●		66	-	2	
Fullerton Park-and-Ride 		●	●	●	800	14	5	▪ Restroom ▪ Sheltered seating ▪ Transit system information

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Fullerton Transportation Center 	●	●	●		1,321	6	3	▪ Sheltered seating ▪ Bicycle parking ▪ 48 bicycle lockers ▪ Transit system information
 Goldenwest Transportation Center		●	●		330	10	2	▪ Unsheltered and sheltered seating ▪ Restrooms ▪ Bicycle parking ▪ Transit system information
Good Shepherd United Methodist Park-and-ride 			●		42	-	1	

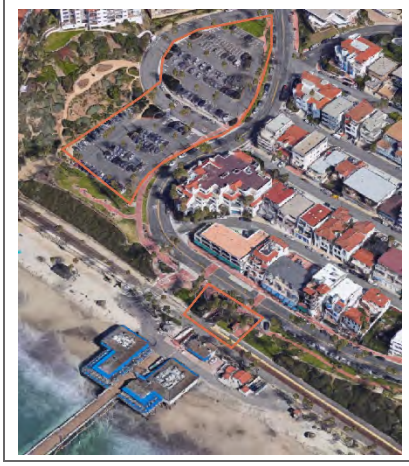
Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Irvine Station 	●	●	●		1,993	8	3	▪ Bicycle parking ▪ 54 bicycle lockers ▪ Restrooms ▪ Indoor waiting/seating area
Jeffrey Road Park-and-Ride 			●		225	-	-	

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Junipero Serra Park-and-Ride 			●		113	-	2	
King of Glory Lutheran Church Park-and-Ride 			●		36	-	-	

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Laguna Beach Transportation Center 		●			-	7	-	▪ Unsheltered and sheltered seating ▪ Restrooms ▪ Bicycle parking ▪ Transit system information
Laguna Hills Transportation Center 		●	●		161	12	3	▪ Unsheltered and sheltered seating ▪ Restrooms ▪ Bicycle parking ▪ Transit system information
Laguna Niguel/Mission Viejo Metrolink Station 	●	●	●		476	-	-	▪ Shelter ▪ Unsheltered seating ▪ 20 bicycle lockers

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Light of Christ Lutheran Church Park-and-Ride 			●		100	-	2	
Lincoln Park-and-Ride 			●		59	-	2	

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Mile Square Regional Park Park-and-Ride 			●		56	-	2	
Newport Transportation Center 		●	●		76	9	-	▪ Sheltered seating ▪ Restrooms ▪ Bicycle parking ▪ Transit system information
Orange Transportation Center 	●	●	●		375	3	-	▪ Unsheltered seating ▪ Shelter ▪ Bicycle parking ▪ 10 bicycle lockers ▪ Restrooms

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Saddleback Church Park-and-Ride 			●		62	-	-	
San Clemente Station 	●	●	●		150	-	3	▪ Pedestrian shelter
San Clemente Pier Station 	●	●	●		144	-	1	▪ Restrooms

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
San Juan Capistrano Metrolink Station 	●	●	●		172	-	2	▪ Restroom ▪ Sheltered seating
Santa Ana Regional Transportation Center 	●	●	●		719	10	2	▪ Indoor waiting/seating area ▪ Restrooms ▪ 15 bicycle lockers ▪ 12 additional bicycle stalls in bike hut
South Coast Plaza Park-and-Ride 			●		50	-	-	

Facility	Metrolink	Transit Center	Park-and-Ride	Regional Connection	Parking Spaces	Bus Bays	Adjacent Bus Stops	Other Amenities
Tustin Metrolink Station 	●	●	●		823	8	-	▪ Sheltered seating ▪ Bicycle parking ▪ 20 bicycle lockers
University Park-and-Ride 			●		40	-	-	
William S. Craycraft Park Park-and-Ride 			●		38	-	2	

TRANSIT ACCESSIBILITY

To function as efficiently and effectively as possible, transit must be integrated into the larger transportation network. This means providing high-quality, multimodal access to stops and stations. No transit trip takes place solely aboard buses or trains, or at stops or stations; each trip includes first-/last-mile connections from origins and to destinations.

Pedestrian

Most trips in Orange County are made by private car, but most trips to transit stops and stations are made on foot. In OCTA's most recent passenger survey, 81 percent of respondents walked to their stops, and 75 percent said they would walk from the bus to their final destination. (The proportion of trips started by walking varies depending on context: most access to OCTA park-and-rides is by car, and train stations attract travelers from farther away, including those making connections from other transit services, biking, or driving longer distances.)

Walking to and from bus stops in Orange County can be difficult due to the largely auto-oriented nature of the built environment. This difficulty manifests itself in several ways:

- The street network in much of the county, particularly in South County where there is a limited street grid, is generally not as well connected as in more traditional walkable neighborhoods. The result is indirect pedestrian pathways and more out-of-direction travel. (This also impacts bus routes themselves, as fewer direct paths are available for buses to take between neighborhoods; instead, South County streets are designed primarily to deliver cars to the freeway.)
- There are long distances between marked crossings on major streets, and long waits to cross at signals.
- The pedestrian experience is negatively impacted by speeding traffic, vehicle fumes, residential noise walls that create barriers, large parking lots fronting the sidewalk, and missing or poor-quality sidewalks.
- Similarly, pedestrian safety is compromised by high speed traffic at pedestrian crossings and by intersection designs allowing for high-speed turns.

Figure 2-13 Typical Pedestrian Conditions in Orange County (Bristol, Santa Ana)

Source: Nelson\Nygaard

Bicycle

OCTA provides two bicycle racks on the front of every bus (available on a first-come, first-served basis), and allows folding bikes on board. The county's bikeway network, created and maintained through a partnership between OCTA and local cities, features more than 1,000 miles of designated bike routes. The quality of the bike facilities varies. In the northernmost part of the county, some routes consist of cyclists and motorists sharing lanes which are marked with "sharrows" rather than providing dedicated bike lanes or paths. Many arterial and collector streets, particularly in South County, do feature on-street bike lanes. Among the county's off-street bike paths is the Santa Ana River Trail, which runs north-south across the county, intersecting a number of bus routes along the way.

Auto

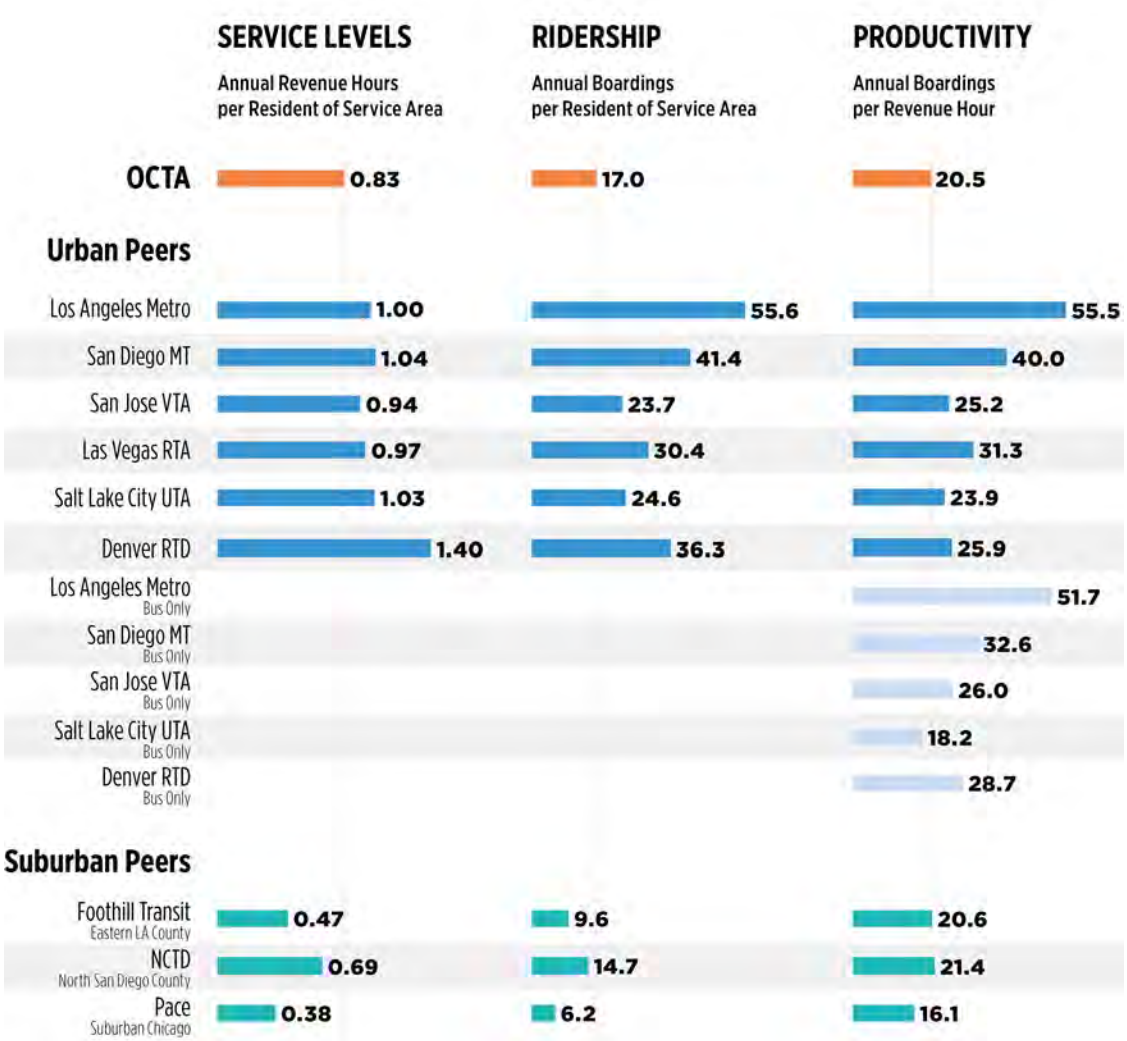
While most bus stops do not have vehicle parking, OCTA and others maintain a number of park-and-ride facilities (see the "Facilities" section in this chapter). These lots may include designated pick-up and drop-off areas for motorists, taxis, and more recently ride-hailing services like Uber and Lyft. They also provide reserved parking for carpools.

PEER REVIEW

Figure 2-14 illustrates how transit service and use in Orange County compares to transit service and use in peer cities and regions, including metropolitan areas in the Southwest as well as other large but primarily suburban areas in Southern California and elsewhere. The data is from 2014, the most current year available in the National Transit Database. Each revenue service hour is a single bus or train picking up and dropping off passengers for one hour.

As the charts indicate, OCTA generally lags behind its more urban peers in the Southwest (Los Angeles, San Diego, San Jose, Las Vegas, Salt Lake City, and Denver) when it comes to service productivity, as expressed by numbers of riders boarding per service hour. It does, however, keep pace with suburban operators in the San Gabriel Valley, northern San Diego County, and suburban Chicago. In terms of both annual boardings per person living in its service area and amount of service offered (service hours per capita), OCTA falls in between its suburban and urban peers.

Figure 2-14 Service Levels, Ridership, and Productivity for OCTA and Peer Agencies (2014)

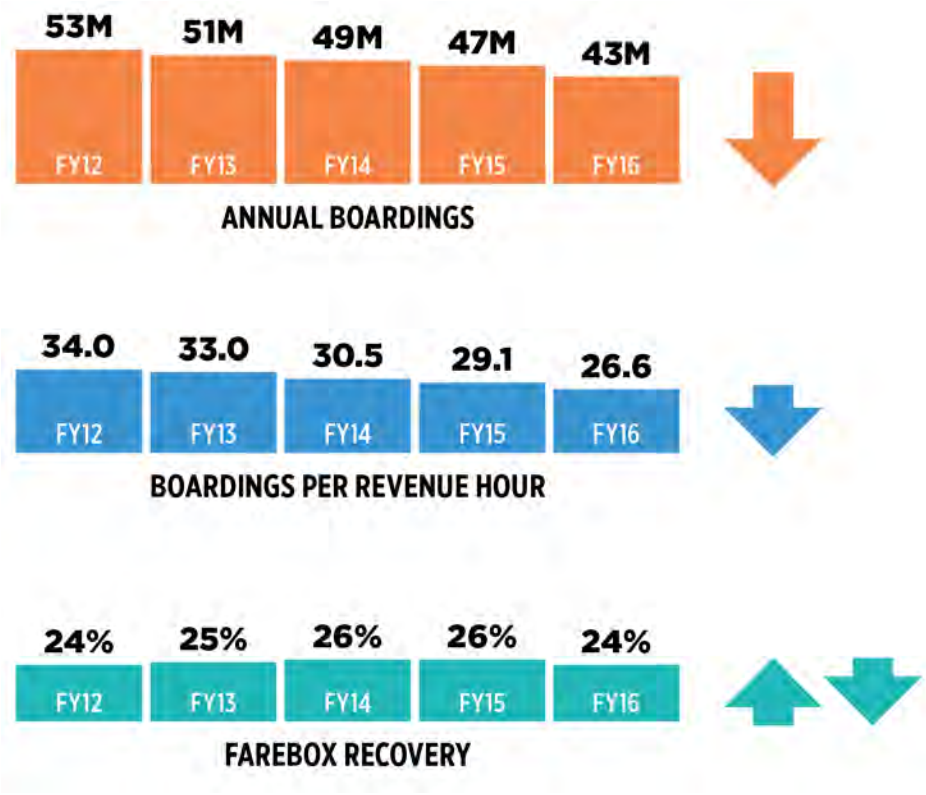


OC BUS SYSTEM PERFORMANCE

System Performance Summary

Over the past five years, annual OC Bus ridership has decreased by about 10 million boardings. System productivity has also decreased from 34 passengers per revenue hour to 27 passengers per revenue hour, following the decline in ridership. Fixed-route farebox recovery increased in the middle of the five-year period from 24 percent to 26 percent due to a fare increase, then returned to 24 percent in fiscal year 2016 (Figure 2-15).

Figure 2-15 Systemwide Performance Trends (FY12-FY16)



Route Categories

OC Bus operates 65 bus routes, each of which is classified into one of five types of bus service. Each category of service has a different purpose and design characteristics, influencing how the category typically performs. Key characteristics of all routes, by category, are shown in Figure 2-16. Maps of the service provided by category on weekdays and weekends are shown in Figure 2-17 and Figure 2-18. Figure 2-19 shows the performance of routes by category in fiscal year 2016.

Major Corridors

Major Corridors are routes that operate every 15 minutes or better during peak times. Route 42 and 83 are also included in this group. Route 42 operates as frequently as every 18 minutes and generates ridership similar to other Major Corridors. Route 83 connects south Orange County to

north Orange County, including Santa Ana and Anaheim Resort district, and operates every 20 minutes in the peak.

Major Corridors operate seven days a week throughout the day. Together, the Major Corridors form a grid on arterial streets throughout the densest parts of the OC Bus service area, primarily in northern parts of the county. As a group, these 19 routes carry more than three quarters of the annual system ridership; are the most productive, averaging 33 boardings per revenue hour; and have the highest farebox recovery ratio of any route category.

Local (Non Major)

Local routes operate on arterials within the grid created by the Major Corridors, but at lower frequencies. Local routes also operate in parts of Orange County with lower transit demand. Most Local routes operate seven days per week, however some operate on weekdays only. Local routes carry about 20 percent of the system ridership and are less productive than Major Corridors, averaging about 20 boardings per revenue hour.

Community

Community routes provide service tailored to connect pockets of transit demand with major destinations and offer local circulation. Routes tend to be less direct than Local routes due to service design focused on serving neighborhoods and destinations off the arterial grid. Half of Community routes operate seven days per week while half operate on weekdays only. Community routes carry less than three percent of OC Bus ridership, averaging 15 boardings per revenue hour. They have the second-highest farebox recovery of any route category (23 percent).

Stationlink

Stationlink routes are rail feeder services designed to connect Metrolink stations to nearby destinations. One or more Stationlink routes serve all Metrolink stations in Orange County except Buena Park, Fullerton, San Juan Capistrano, and San Clemente. These routes have relatively short alignments, with schedules tied to Metrolink arrivals and departures. They operate during weekday peak hours only, in the peak direction, from the station to destinations in the morning and the reverse in the evening. These routes carry less than one percent of OC Bus ridership and have similar productivity to Community routes, averaging 16 boardings per revenue hour.

Express

Express bus service operates on weekdays only at peak times and connects riders over long distances to destinations within and outside of Orange County, often using freeways to access destinations. Express routes carry less than one percent of OC Bus ridership and average nine boardings per revenue hour, the least of any route category. Express routes have 20 percent farebox recovery.

Figure 2-16 Service Span and Frequency by Day of Week (October 2016)

			Weekdays				Saturday		Sunday	
Route	Name	Service Type	Span of Service	Peak	Off-Peak	Evening	Span of Service	All Day	Span of Service	All Day
1	Long Beach to San Clemente	Local	4:33A - 11:41P	30/60	35/70	30/65	5:22A - 9:30P	60	5:22A - 9:30P	60
21	Buena Park to Huntington Beach	Local	5:16A - 9:00P	30/60	-	60	-	-	-	-
24	Buena Park to Mall of Orange	Local	5:00A - 9:50P	60	60	60	-	-	-	-
25	Fullerton to Huntington Beach	Local	5:50A - 11:07P	50	50	50	7:18A - 7:59P	60	7:18A - 7:59P	60
26	Buena Park to Yorba Linda	Major	4:51A - 10:48P	15/30	30	70	7:17A - 7:28P	45	7:17A - 7:28P	45
29	La Habra to Huntington Beach	Major	4:05A - 1:12A	15/20	20/40	20/40	4:06A - 12:41A	18/70	5:06A - 11:37P	18/70
30	Cerritos to Anaheim	Local	4:14A - 11:13P	30	30	30	6:20A - 9:01P	65	6:20A - 9:01P	65
33	Fullerton to Huntington Beach	Local	4:34A - 9:15P	40	40	40	7:19A - 7:30P	75	8:30A-7:55P	70
35	Fullerton to Huntington Beach	Local	4:35A - 11:26P	40	20/40	20/40	4:49A - 8:35P	45	4:49A - 8:12P	50
37	La Habra to Fountain Valley	Major	4:22A - 11:50P	15	30	30	5:21A - 9:19P	55	6:53A - 8:42P	60
38	Lakewood to Anaheim Hills	Major	4:12A - 12:18A	15/30	20/60	30/50	5:15A - 9:24P	45	5:15A - 9:24P	45
42	Orange to Seal Beach	Major	4:11A - 11:42P	18/36	18/54	30	5:42A - 9:21P	25/50	5:42A - 9:21P	25/50
43	Fullerton to Costa Mesa	Major	3:49A - 1:39A	20	20	20/30	4:00A - 1:38A	10	4:15A - 1:36A	22
46	Long Beach to Orange	Local	4:24A - 11:56P	25/30	30/35	30/70	6:30A - 8:42P	55	6:30A - 8:42P	55
47	Fullerton to Newport Beach	Major	3:55 A - 11:37P	15/60	20/60	15/60	4:55A - 10:54P	30/60	4:55A - 10:54P	30/60
50	Long Beach to Orange	Major	3:47A - 1:38A	15/30	30	45	4:00A - 1:43P	60/50/60	4:00A - 1:43P	60/50/60
53	Orange to Irvine	Major	4:31A - 11:43P	10/12	10/12	15/30	5:44A - 10:21P	15/45	5:32A - 10:18P	15/20/60
54	Garden Grove to Orange	Major	4:47A - 11:35P	15/30	15/30	15/30	5:57A - 10:10P	35	6:33A - 9:15P	40
55	Santa Ana to Newport Beach	Major	4:20A - 11:51P	15	20	30	5:01A - 11:10P	30	5:00A - 9:55P	30
56	Garden Grove to Orange	Local	4:49A - 10:10P	40	40	60	6:56A - 7:58P	70	6:57A - 7:51P	70
57	Brea to Newport Beach	Major	4:01A - 2:13A	10/12	10/12	15/20	3:57A - 1:50A	15/30/60	3:57A - 1:51A	15/30/60

Route	Name	Service Type	Weekdays				Saturday		Sunday	
			Span of Service	Peak	Off-Peak	Evening	Span of Service	All Day	Span of Service	All Day
59	Anaheim to Irvine	Local	4:26A - 11:31P	25	35/70	40	6:01A - 10:16P	55	9:00A - 10:16P	55
60	Long Beach to Tustin	Major	3:56A - 1:33A	20	20	20	4:00A - 1:34A	15/30/60	4:00A - 1:34A	15/30/60
64	Huntington Beach to Tustin	Major	4:23A - 11:36P	10/12	10/12	30	5:12A - 10:58P	14/30	5:36A - 10:44P	14/30
66	Huntington Beach to Irvine	Major	4:02A - 11:53P	15/30	15/30	15/30	4:53A - 10:23P	15/60	4:53A - 10:23P	15/60
70	Sunset Beach to Tustin	Major	4:25A - 11:34P	15	20	30	4:48A - 10:30P	20	5:50A - 9:24P	30
71	Yorba Linda to Newport Beach	Local	4:30A - 11:40P	30	30	30	5:55A - 10:31P	45	5:46A - 9:48P	60/65
72	Sunset Beach to Tustin	Local	5:02A - 9:19P	30	30	30	6:52A - 8:19P	60	8:07A - 7:28P	60
76	Huntington Beach to Newport Beach	Local	6:01A - 7:00P	60	60	60	-	-	-	-
79	Tustin to Newport Beach	Local	5:04A - 11:37P	30	30	30	5:43A - 9:06P	60	5:43A - 9:06P	60
82	Mission Viejo to Rancho Santa Margarita	Local	4:51A - 7:58P	70	65	65	-	-	-	-
83	Anaheim to Laguna Hills	Major	4:44A - 12:55A	15/30	35	30/60	5:40A - 11:55P	30/60	5:28A - 11:12P	60/40/55
85	Mission Viejo to Dana Point	Local	5:29A - 10:04P	60	60	60	-	-	-	-
86	Costa Mesa to Mission Viejo	Local	5:42A - 9:53P	60	60	60	-	-	-	-
87	Rancho Santa Margarita to Laguna Niguel	Local	5:59A - 7:07P	60	60	-	-	-	-	-
89	Lake Forest to Laguna Beach	Local	4:50A - 11:11P	35	35	60	4:57A - 9:27P	70/90	4:57A - 9:27P	70/90
90	Tustin to Dana Point	Local	5:18A - 11:16P	30	60	60	6:17A - 11:32P	80	6:05A - 8:58P	80
91	Mission Viejo to Laguna Hills	Local	4:46A - 10:51P	35	35	60	6:48A - 8:27P	45	6:50A - 8:29P	45
129	La Habra to Anaheim	Community	5:28A - 11:03P	45	70	50	5:36A - 10:47P	55	5:36A - 10:47P	55
143	La Habra to Brea	Community	4:32A - 10:56P	75	75	75	5:11A - 10:29P	65	6:14A - 9:43P	65
150	Santa Ana to Costa Mesa	Community	5:55A - 7:01P	35	75	-	-	-	-	-
153	Brea to Orange	Community	4:20A - 10:29P	60/70	60/70	55/65	6:00A - 9:44P	60	7:00A - 9:44P	60
167	Anaheim to Irvine	Community	5:09A - 9:38P	60	60	60	-	-	-	-

			Weekdays				Saturday		Sunday	
Route	Name	Service Type	Span of Service	Peak	Off-Peak	Evening	Span of Service	All Day	Span of Service	All Day
177	Foothill Ranch to Laguna Hills	Community	5:50A - 7:17P	45	45	45	7:25A - 7:15P	80	7:23A - 7:23P	80
178	Huntington Beach to Irvine	Community	5:45A - 11:09P	45	65	60	-		-	-
206	Santa Ana to Lake Forest	Express	SB 3:49A - 12:40P NB 1:20P-10:12P	5 SB trips; 5 NB trips		-	-	-	-	-
211	Irvine to Seal Beach	Express	5:35A - 7:22P	11 SB trips; 11 NB trips	-	-	-	-	-	-
212	Irvine to San Juan Capistrano	Express	NB 5:46A - 7:30A SB 3:54P - 6:47P	2 NB trips; 2 SB trips	-	-	-	-	-	-
213	Brea to Fullerton	Express	SB 5:21A - 7:22A 4:08P - 7:12P	4 SB trips; 4 NB trips	-	-	-	-	-	-
216	Costa Mesa to San Juan Capistrano	Express	NB 6:32A - 7:38A SB 4:35P - 5:50P	1 NB trip; 1 SB trip	-	-	-	-	-	-
411	Anaheim Canyon Metrolink Station	Stationlink	EB 6:25A - 8:35A WB 4:00P - 5:45P	–3 EB trips; 3 WB trips	-	-	-	-	-	-
430	Anaheim Amtrak Station to Anaheim	Stationlink	WB 6:26A - 9:07A EB 3:30P - 6:23P	–6 WB trips; 5 EB trips	-	-	-	-	-	-

Route	Name	Service Type	Weekdays				Saturday		Sunday	
			Span of Service	Peak	Off-Peak	Evening	Span of Service	All Day	Span of Service	All Day
453	Orange Metrolink Station to Orange	Stationlink	SB 5:48A - 9:06A NB 3:27P - 5:38P	7 SB trips; 6 NB trips	-	-	-	-	-	-
454	Orange Metrolink Station to The Block	Stationlink	SB 5:48A - 9:06A NB 3:26A - 6:29P	7 SB trips; 7 NB trips	-	-	-	-	-	-
462	Santa Ana Depot to Civic Center	Stationlink	5:53A - 5:31P	–14 trips	-	-	-	-	-	-
463	Santa Ana Depot to Imperial Promenade	Stationlink	SB 5:53A - 9:21A NB 2:41P - 5:31P	–7 SB trips; 6 NB trips	-	-	-	-	-	-
472	Tustin Metrolink Station to Irvine	Stationlink	SB 6:09A - 9:06A NB 3:29P - 5:21P	–6 SB trips; 4 NB trips	-	-	-	-	-	-
473	Tustin Metrolink Station to UCI	Stationlink	SB 6:09A - 9:21A NB 3:07P - 6:36P	–8 SB trips; 6 NB trips	-	-	-	-	-	-
480	Irvine Metrolink Station to Irvine Spectrum	Stationlink	EB 6:07A - 9:12A WB 3:25P - 5:18P	–6 EB trips; 3 WB trips	-	-	-	-	-	-
490	Laguna Niguel Train Station	Stationlink	NB 6:19A - 9:18A SB 3:18P - 6:25P	–4 NB trips; 5 SB trips	-	-	-	-	-	-
543	Fullerton to Costa Mesa	Major	5:02A - 8:00P	12	18	60	6:51A - 7:49P	22	6:51A - 7:49P	22
560	Santa Ana to Long Beach	Major	6:03A - 7:22P	12/24	15/30	-	-	-	-	-
701	Los Angeles to Huntington Beach Express	Express	NB 5:30A - 8:02A SB 4:15P - 6:45P	3 NB trips; 3 SB trips	-	-	-	-	-	-

Route	Name	Service Type	Weekdays				Saturday		Sunday	
			Span of Service	Peak	Off-Peak	Evening	Span of Service	All Day	Span of Service	All Day
721	Los Angeles to Fullerton Express	Express	NB 5:10A - 6:26A SB 6:10P - 7:26P	7 NB trips; 7 SB trips	-	-	-	-	-	-
794	Riverside / Corona to South Coast Metro Express	Express	WB 4:50A - 8:53A EB 3:25P - 7:06P	–8 WB trips; 7 EB trips	-	-	-	-	-	-

Note: Frequencies noted in the format "# / #" reflect headways of different route patterns.

Figure 2-17 Weekday Service by Category

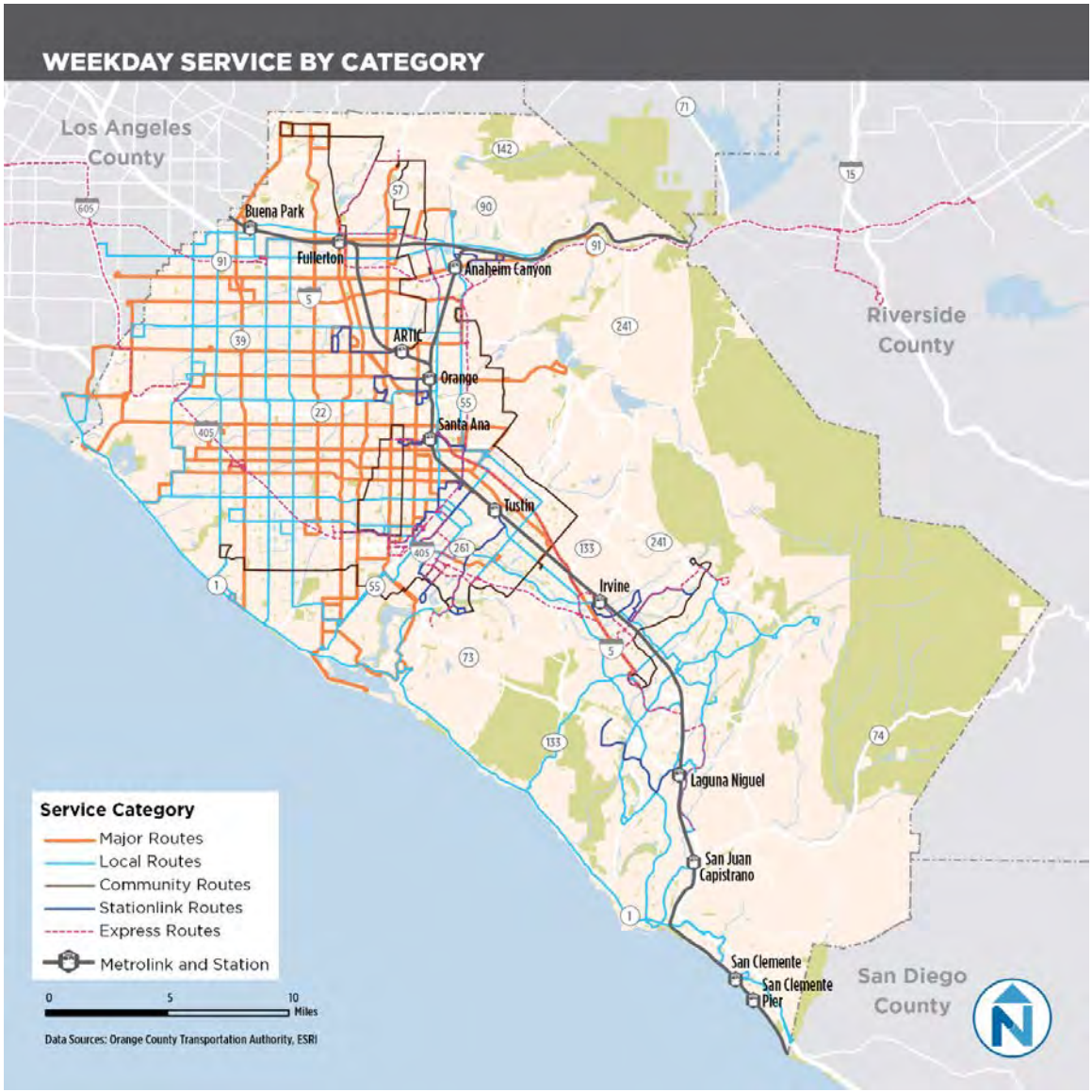
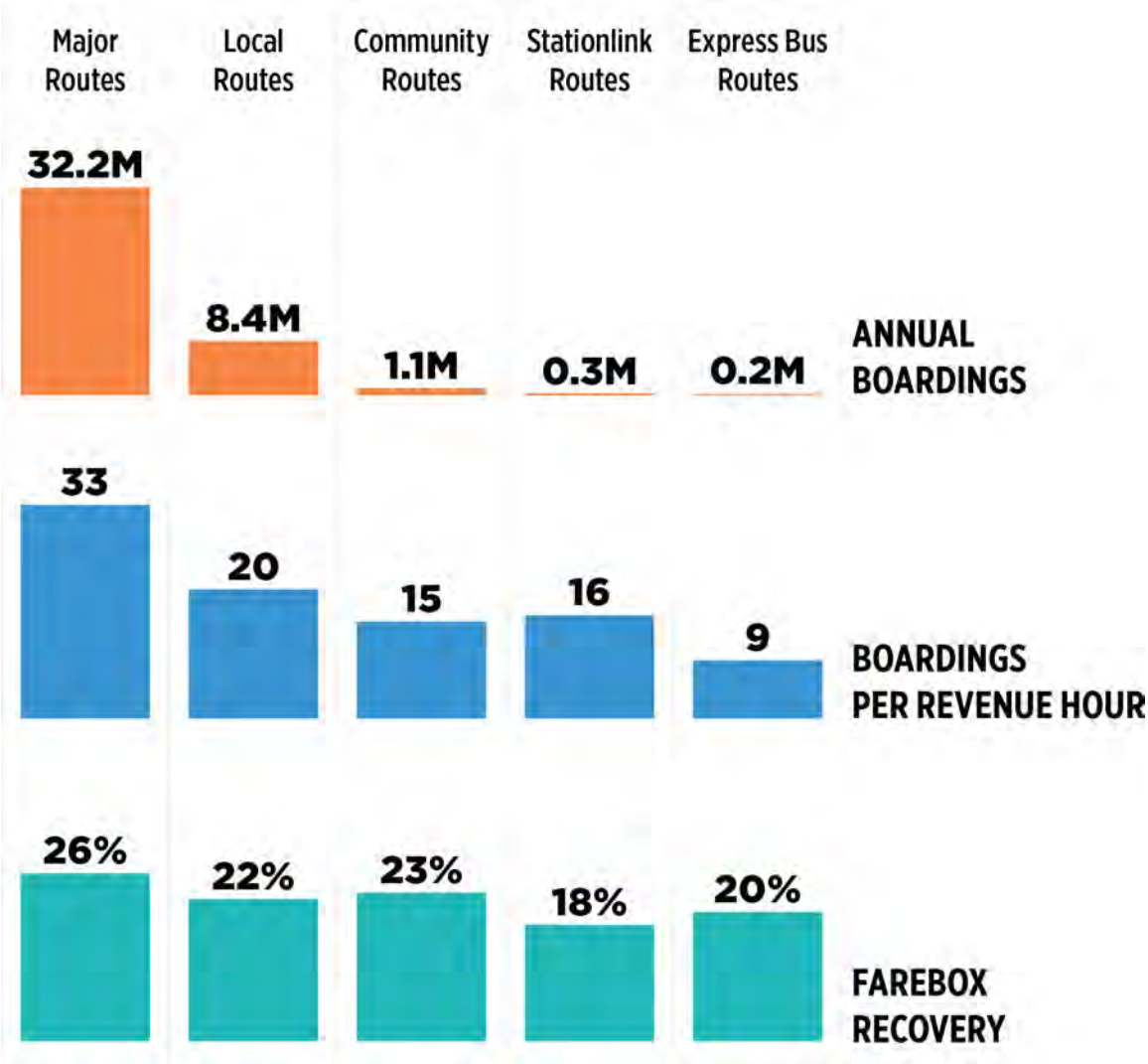


Figure 2-18 Weekend Service by Category

Figure 2-19 Fiscal Year 2016 Route Category Performance Summary

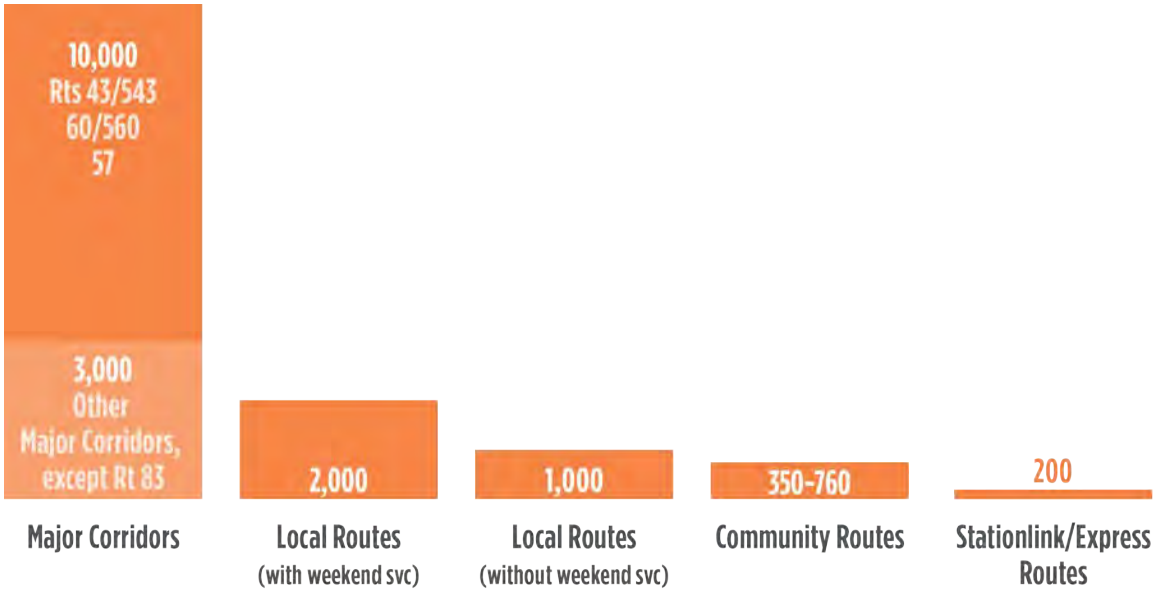


Key Performance Indicators

Since June 2016, OC Bus has undergone two significant service changes as part of the 2016 Bus Service Plan, which is a part of OC Bus 360° initiative, which focused on optimizing system efficiency and effectiveness. Performance indicators in this section are based on fiscal year 2016. As a result, figures do not reflect recent route or service changes. Routes that operated in fiscal year 2016 and have since been discontinued are not included in the following figures.

As shown in Figure 2-20, three OC Bus routes carry more than 10,000 riders on weekdays, all of which are Major Corridors: Route 43/543, Route 60/560, and Route 57. All Major Corridors carry more than 3,000 riders on average weekdays except Route 83. Most Local routes carry fewer than 2,000 riders per weekday, with the exception of Routes 1, 35, 46, 59, and 71. Local routes that do not provide weekend service all carry fewer than 1,000 riders per day. Community routes carry between 350 and 760 riders per weekday, while Stationlink and Express routes carry less than 200 riders per weekday.

Figure 2-20 Ridership Comparison by Route Type

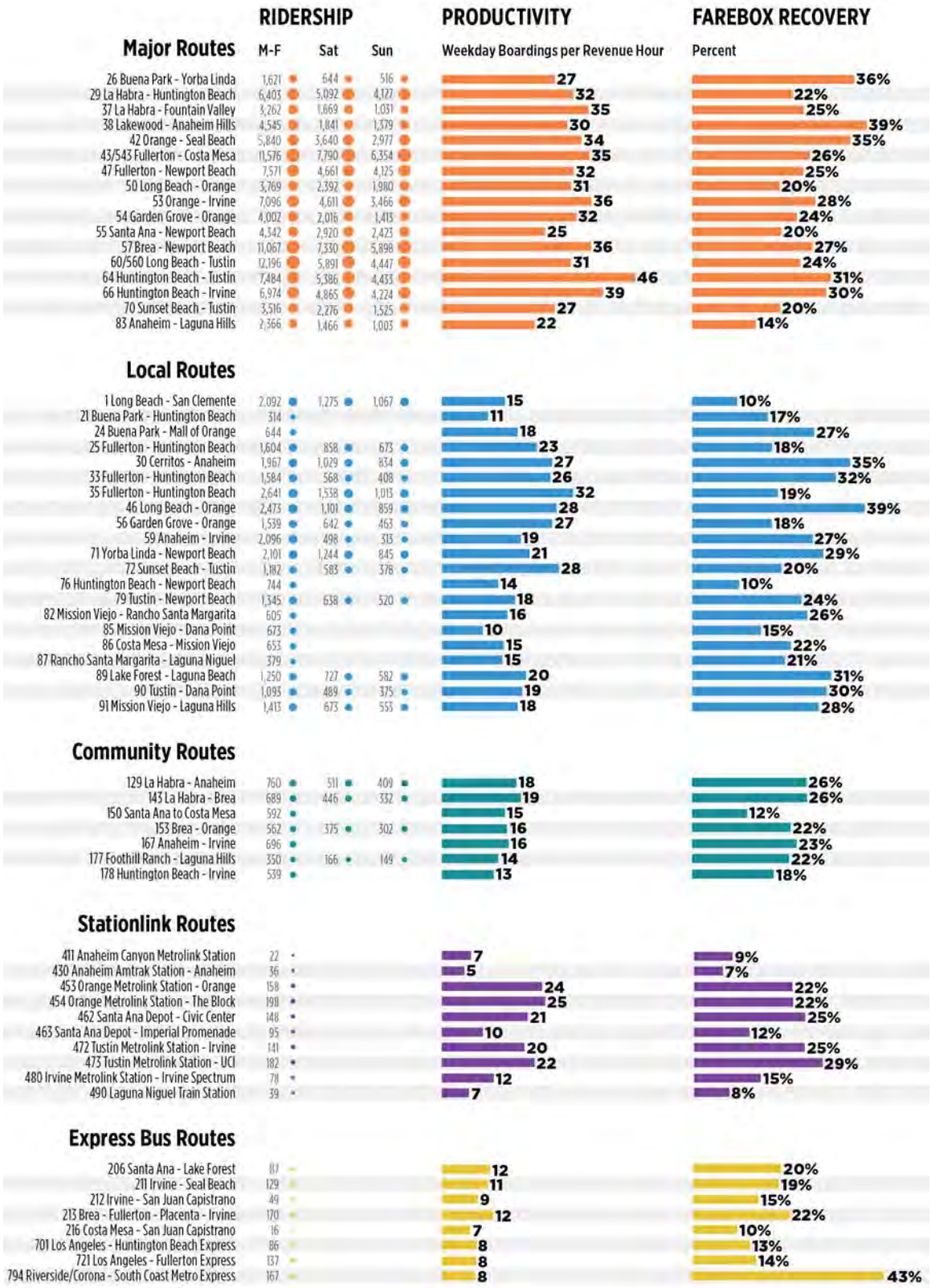


Route productivity, measured in passengers per revenue hour of service, describes the effectiveness of each route. Route 64 is the most productive OC Bus route, carrying 46 passengers per hour. Within the Major Corridors category, Route 83 is the least productive, carrying 22 passengers per hour.

Farebox recovery is the percentage of each route's operating cost that is recovered through passenger fares. Farebox recovery varies within each of the route categories. About half the routes have farebox recovery between 20 and 30 percent. Four routes recover less than 10 percent of their operating costs through fares, while Route 794 has the highest farebox recovery ratio of 43 percent.

Figure 2-21 presents ridership, productivity, and farebox recovery for each route, for the 2016 fiscal year.

Figure 2-21 Ridership (Average Daily Boardings), Productivity, and Farebox Recovery, by Route (FY2016)



Ridership and Frequency

Figures 2-21 to 2-23 show stop-level ridership from March 2016. This data does not reflect changes made in June and October 2016 as part of implementing the 2016 Bus Service Plan. However, it does show general trends in OC Bus ridership throughout Orange County. Ridership volumes are notably higher north of State Route 55. In North Orange County, ridership is concentrated heavily in Santa Ana and is highest where corridors intersect. Because of transfers, The Harbor Boulevard and Westminster Boulevard corridors served by Bravo! routes stand out as major spines for the system. In addition, Beach Boulevard, which is west of the highest ridership concentration, has a strong ridership market. Ridership declines overall on Saturday and Sunday but maintains a similar pattern.

In South Orange County, weekday ridership centers around Metrolink stations and transit hubs such as the Laguna Hills Transportation Center and local high schools. On Saturdays and Sundays, ridership at these transit hubs decreases significantly, as Stationlink and Express services do not operate.

Figure 2-25 shows afternoon peak frequency levels operated by OC Bus. Corridors on which multiple routes operate show levels of service provided by all routes combined. Generally, frequency levels match weekday ridership patterns, with high-ridership corridors supported by 15-minute or better service.

Figure 2-22 Weekday Bus Boardings by Bus Stop

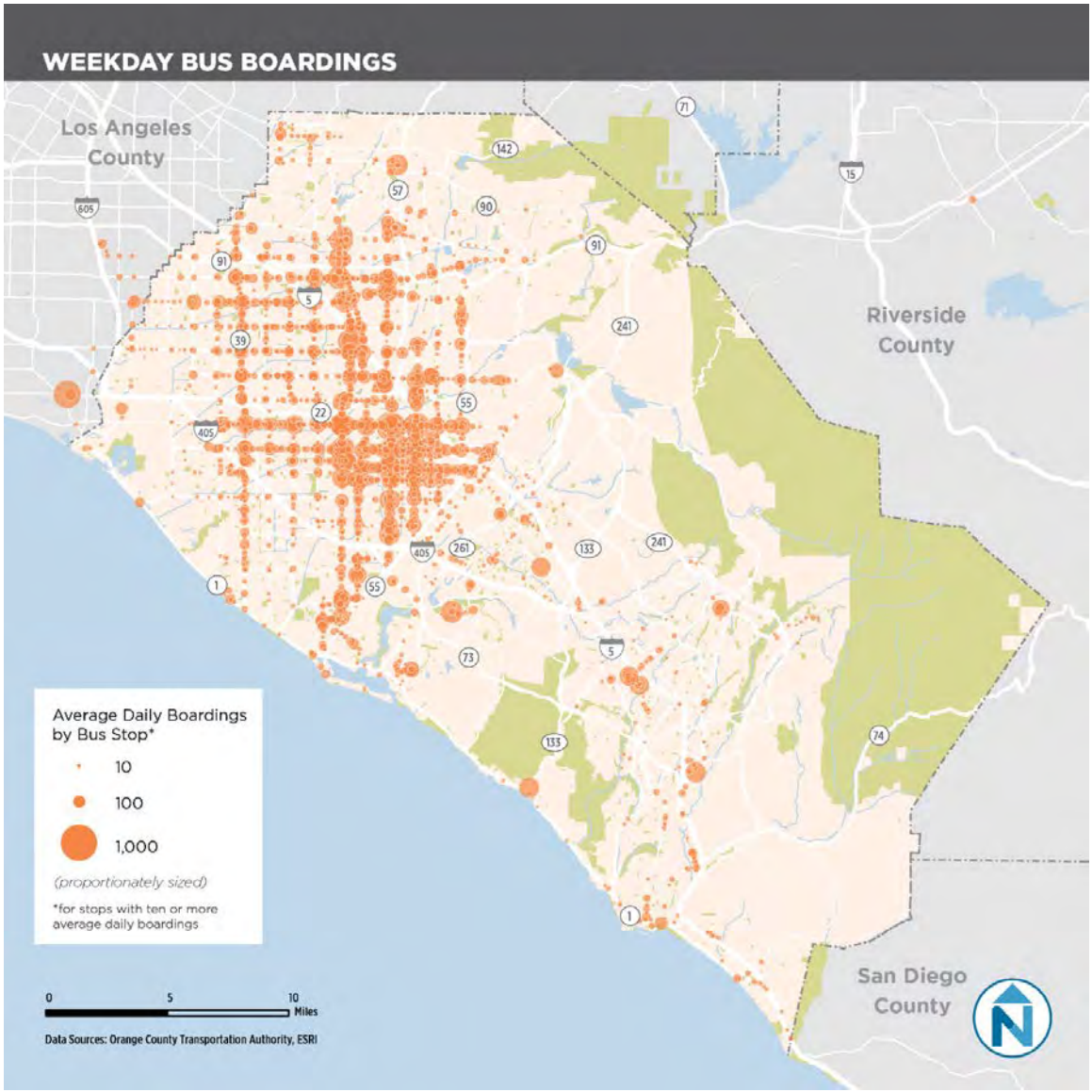


Figure 2-23 Saturday Bus Boardings by Bus Stop

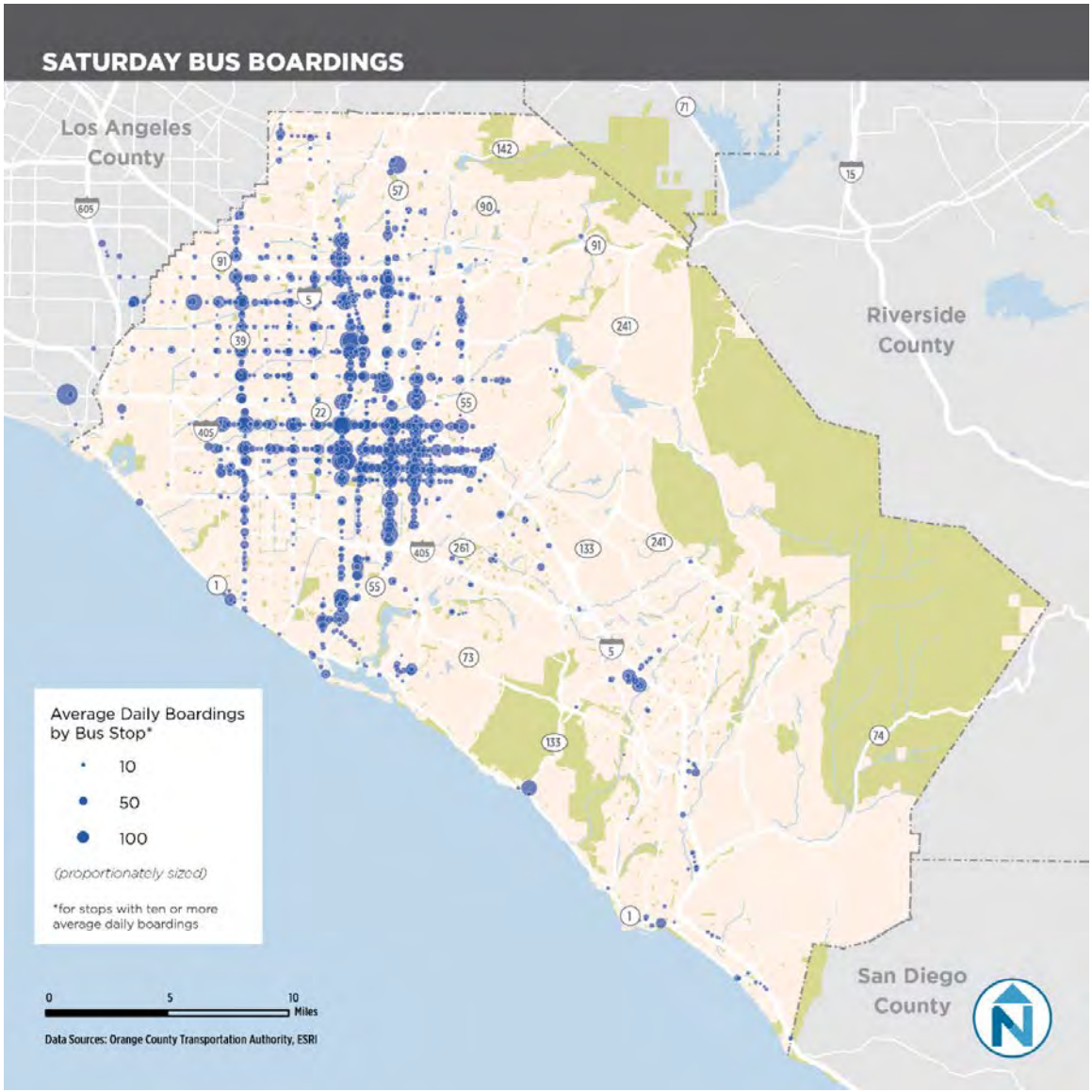


Figure 2-24 Sunday Bus Boardings by Bus Stop

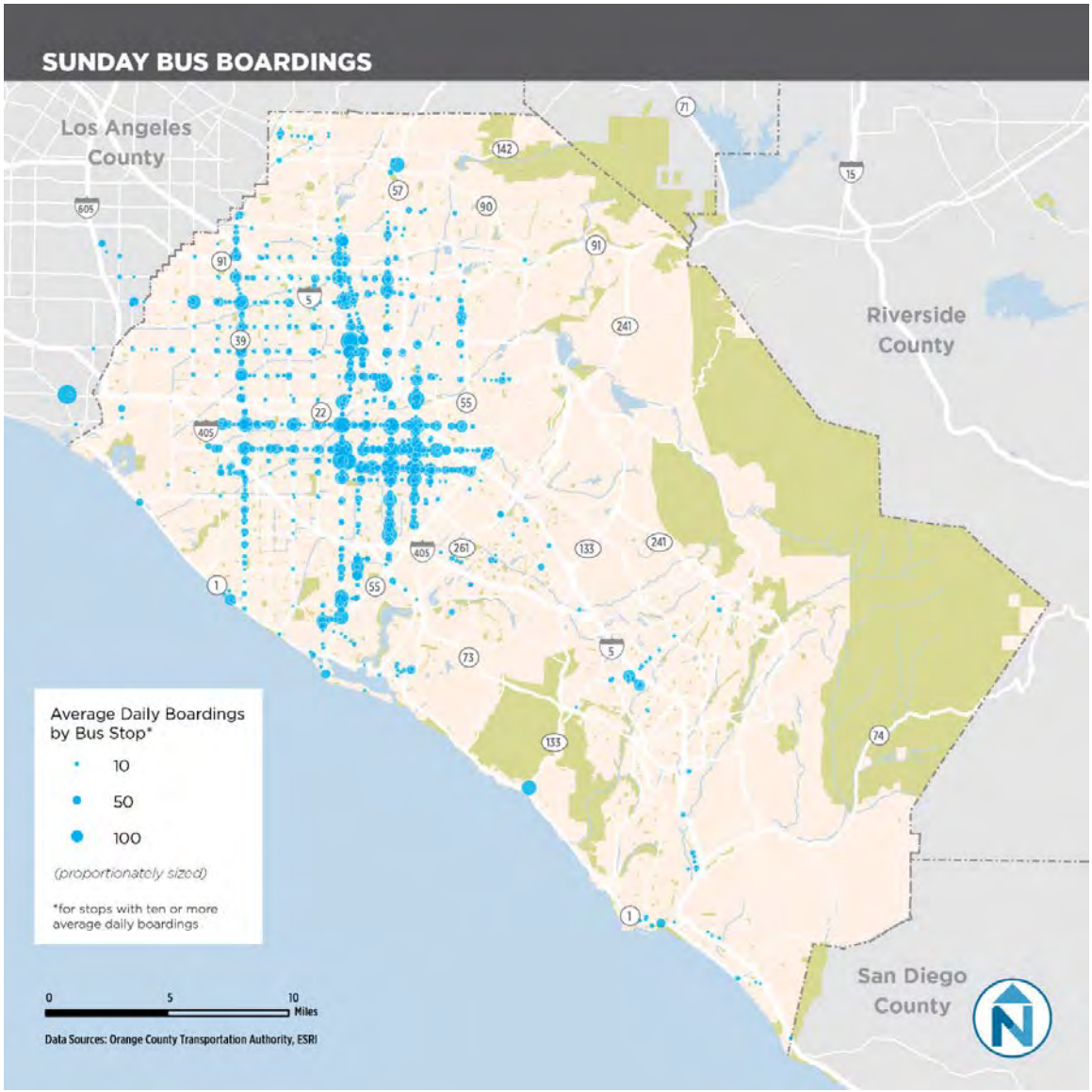
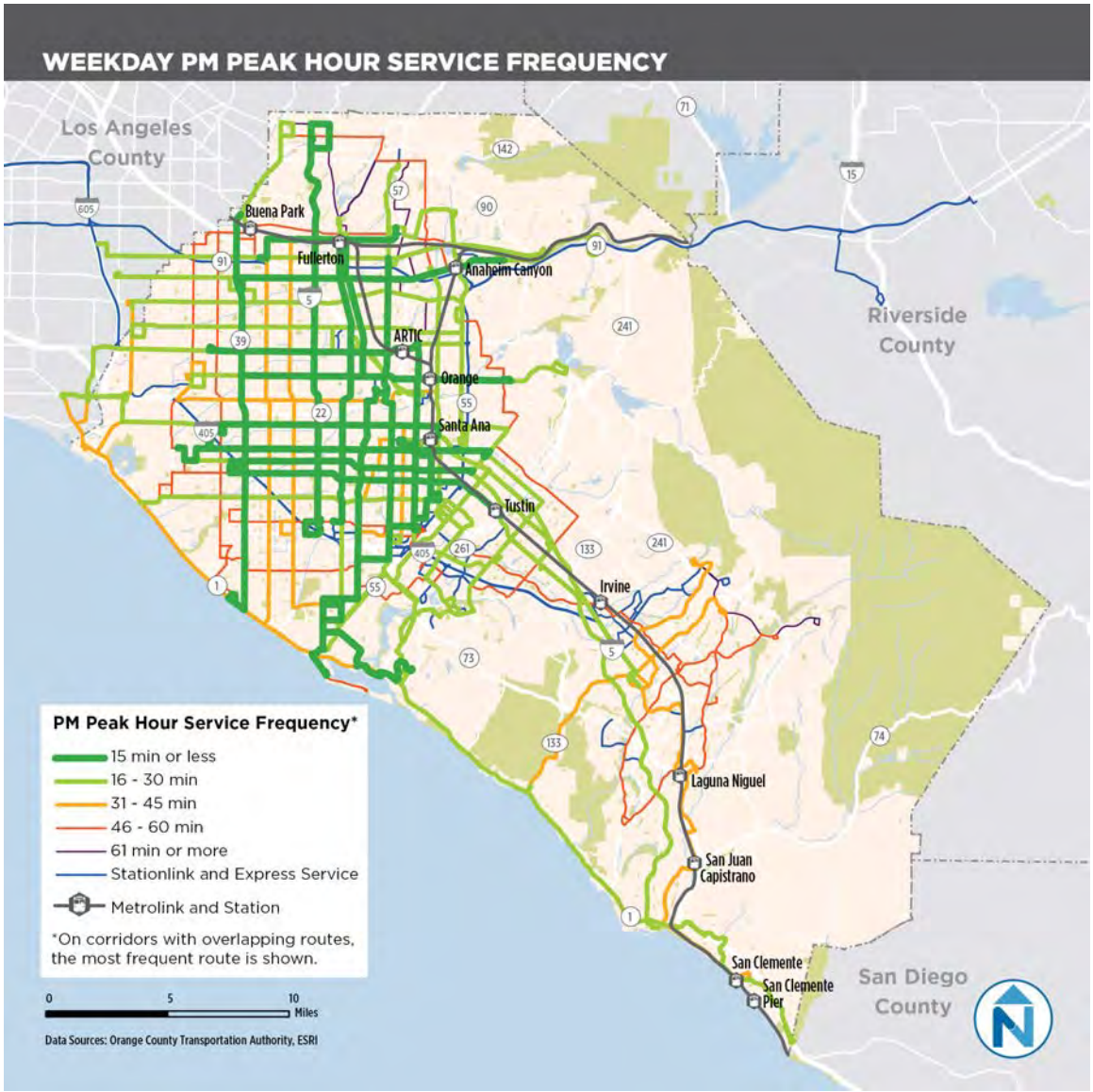


Figure 2-25 Weekday PM Peak Hour Service Frequency



COMPARISON BY MODE

OCTA operates three modes of transit service in addition to OC Bus fixed-route service: ACCESS paratransit service, OC Vanpool service, and Metrolink commuter rail service. While most OCTA service consists of OC Bus (62 percent of revenue service hours in FY 2015), and OC Bus accounts for an even larger majority of all boardings (89 percent in 2015), other modes account for a large share of costs: 35 percent in 2015. As a result, costs per boarding are higher for other modes than for OC Bus: paratransit had a cost per boarding of $43.28 in FY 2015, compared to $19.63 for commuter rail, $6.18 for vanpool, and $5.15 for fixed-route.

At the same time, the other modes serve longer trips—up to 29 miles per trip for commuter rail, and 34 for vanpool—and OC Vanpool has by far the lowest cost per revenue mile, at less than $1 in FY 2015. Notably, commuter rail accounts for just 5 percent of boardings, but 26 percent of passenger miles.

The figures below compares historic (FY 2008) and current (FY 2015) performance for each mode using different indicators of cost, utility, and cost-effectiveness. Most figures are from the National Transit Database. Commuter rail figures are estimated from Metrolink systemwide statistics.

Figure 2-26 Total O& M Expense

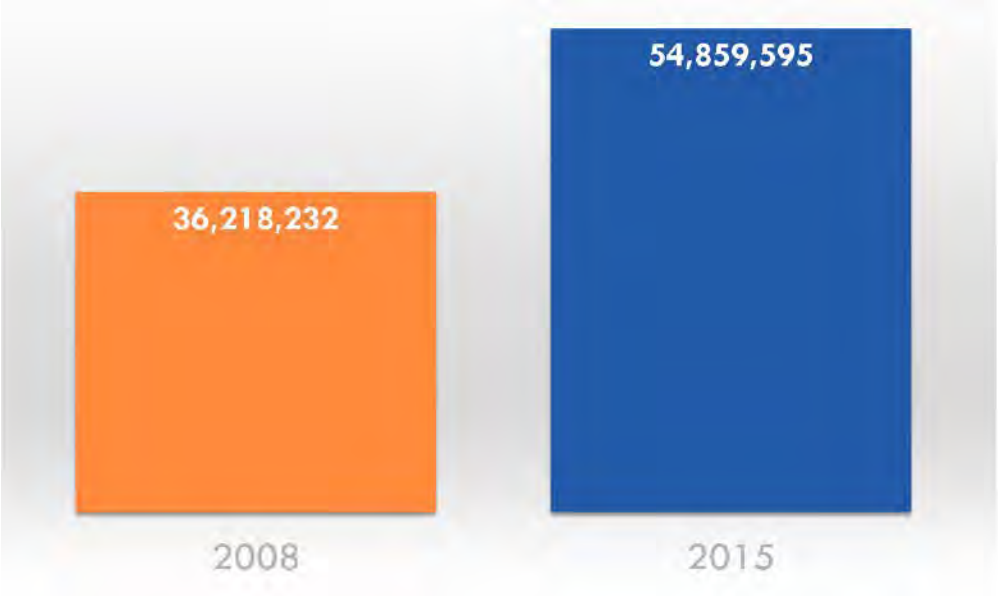


Figure 2-27 Service Area Size (square miles)

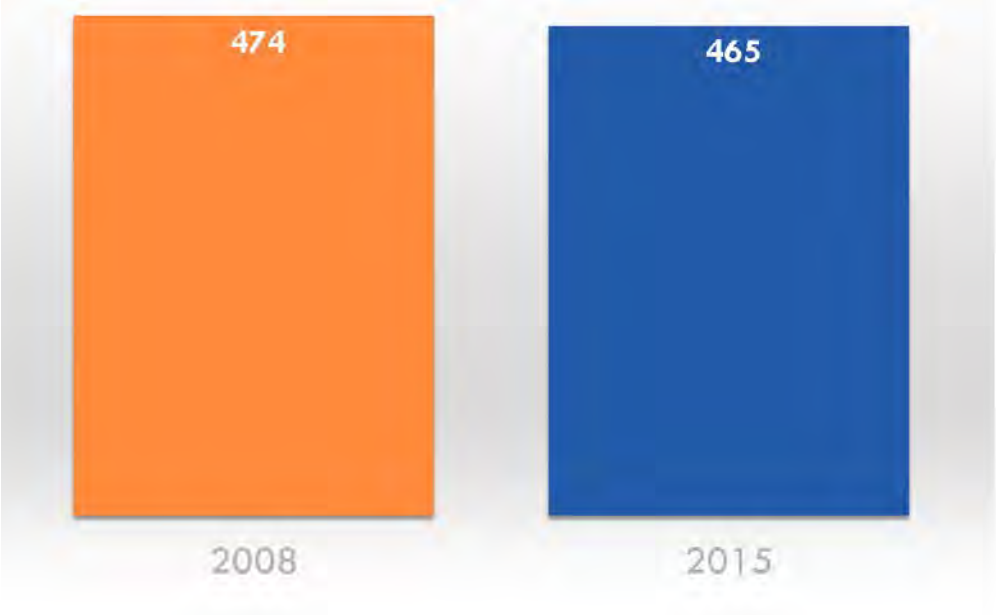


Figure 2-28 Service Area Population

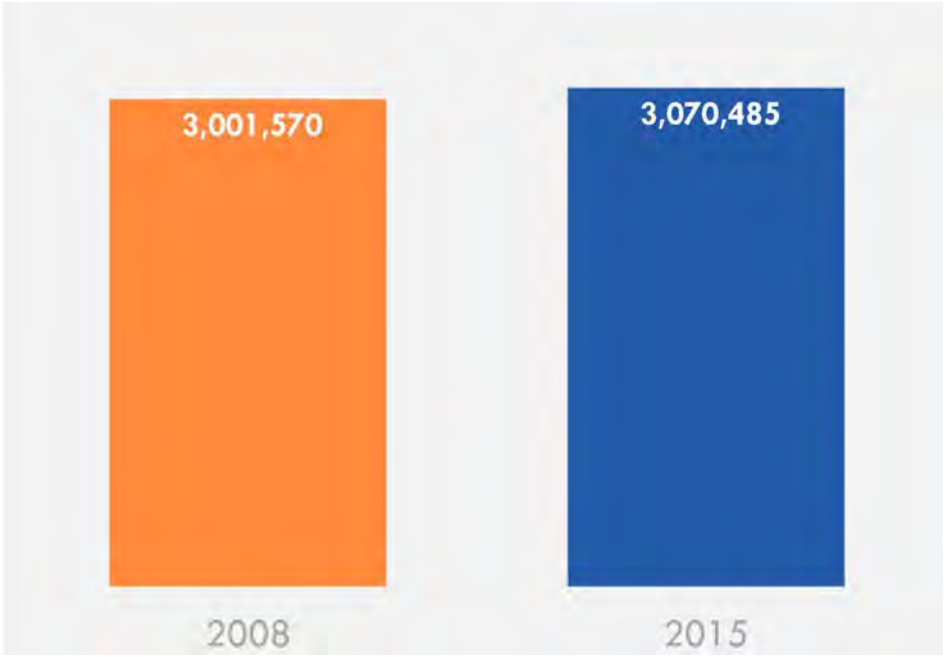


Figure 2-29 All Boardings

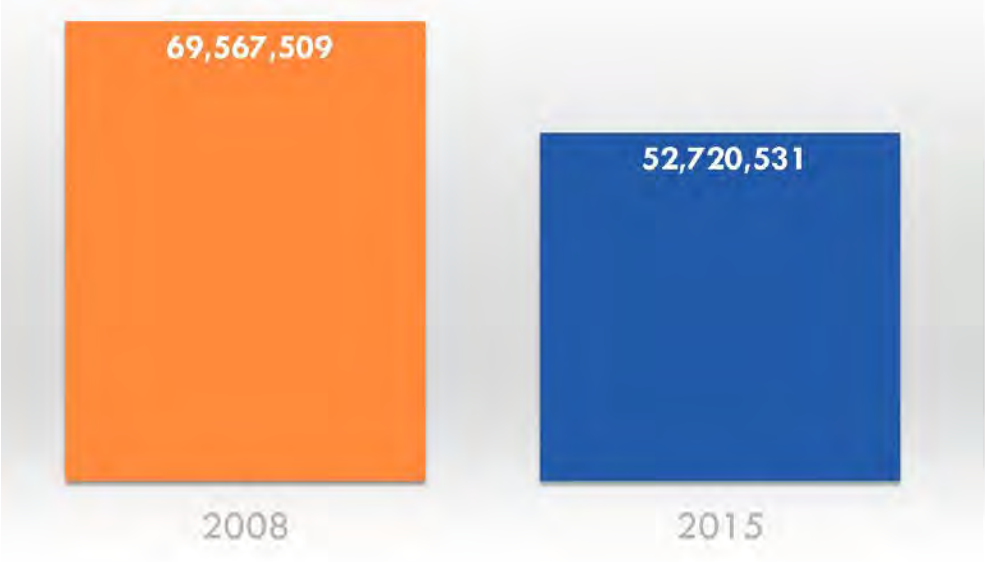


Figure 2-30 Boardings by Mode

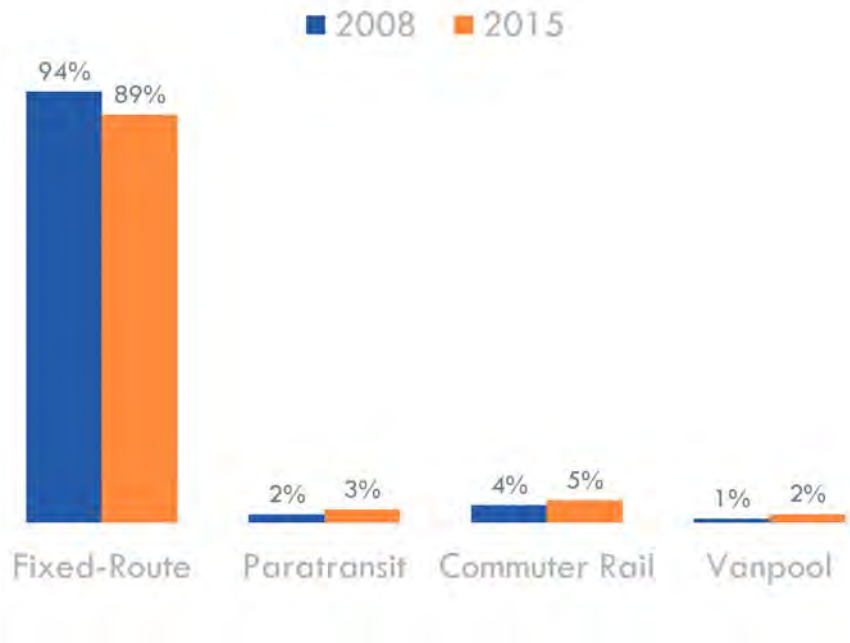


Figure 2-31 Passenger Miles (All Modes)

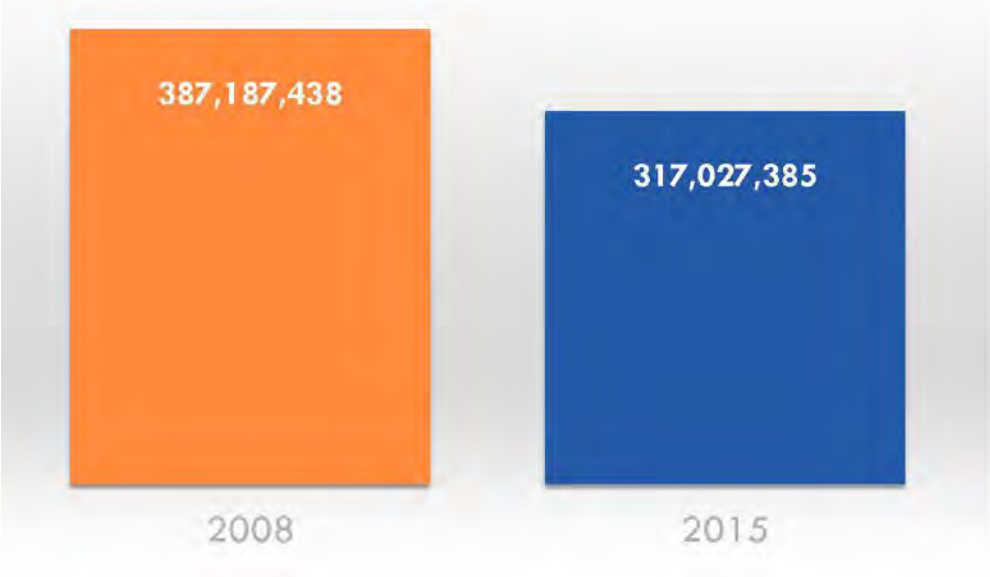


Figure 2-32 Passenger Miles (By Mode)

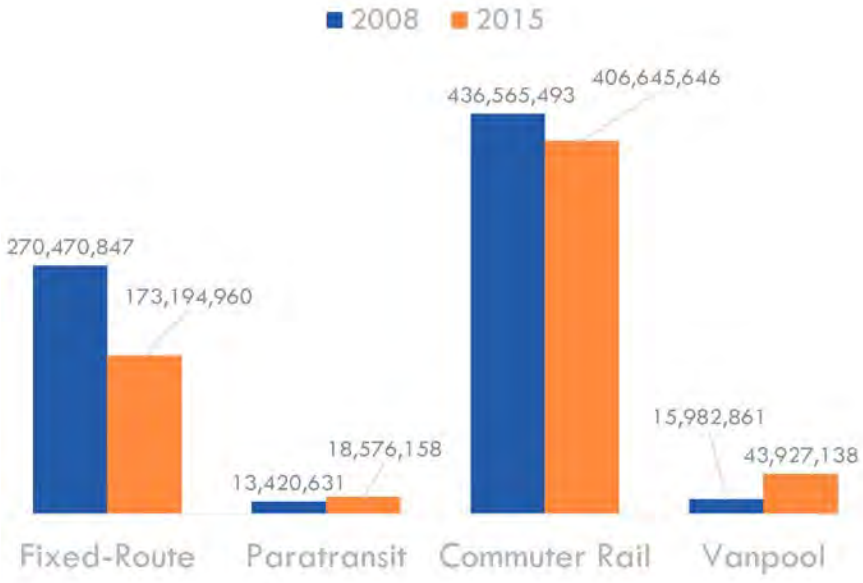


Figure 2-33 Average Trip Length

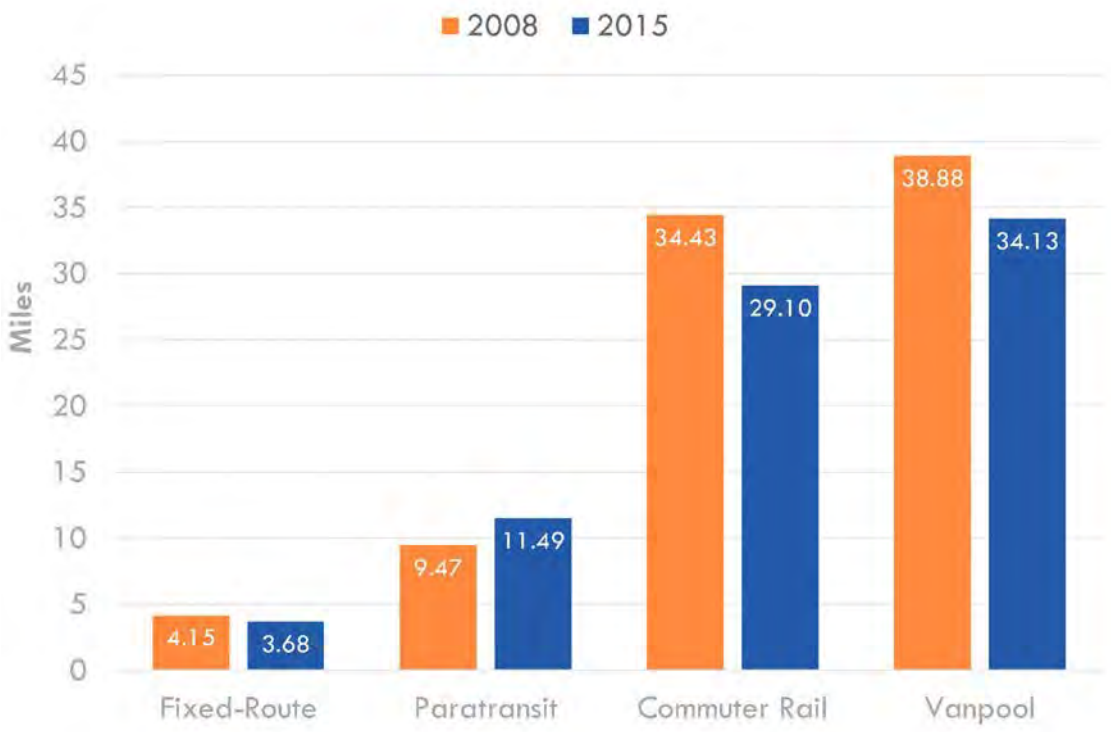


Figure 2-34 Revenue Hours (All Modes)

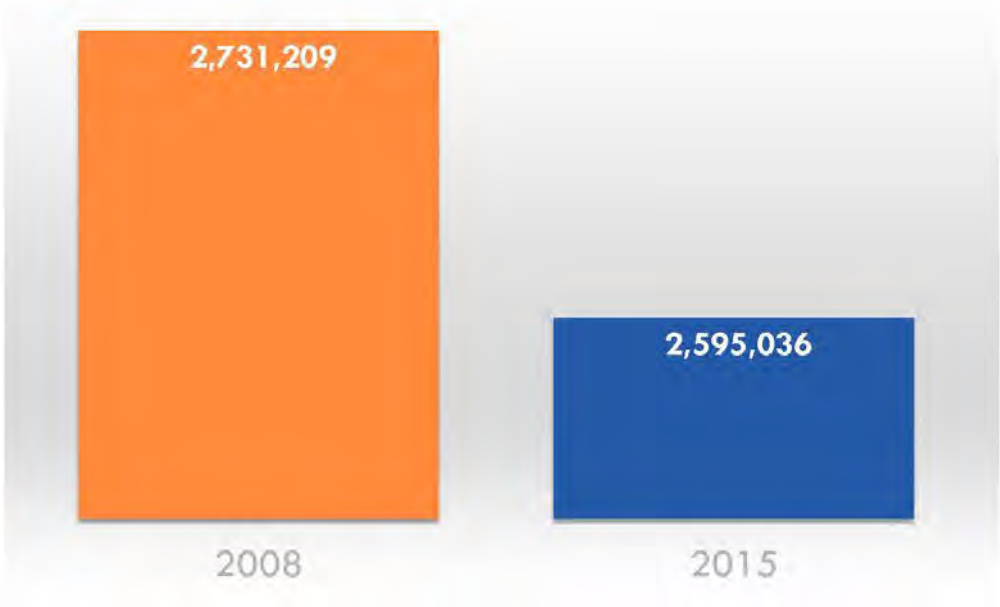


Figure 2-35 Revenue Miles (All Modes)

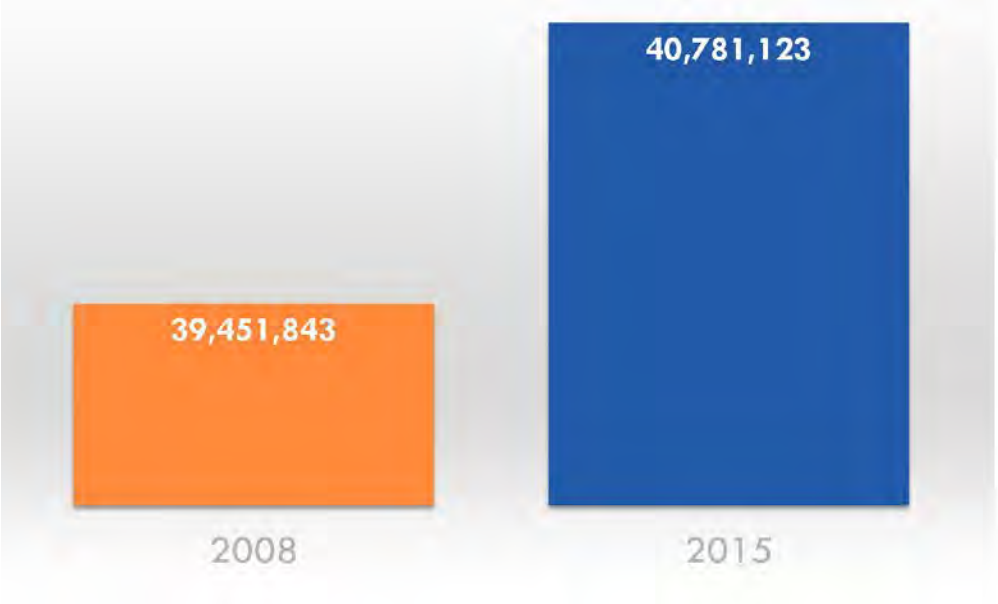


Figure 2-36 Cost per Boarding

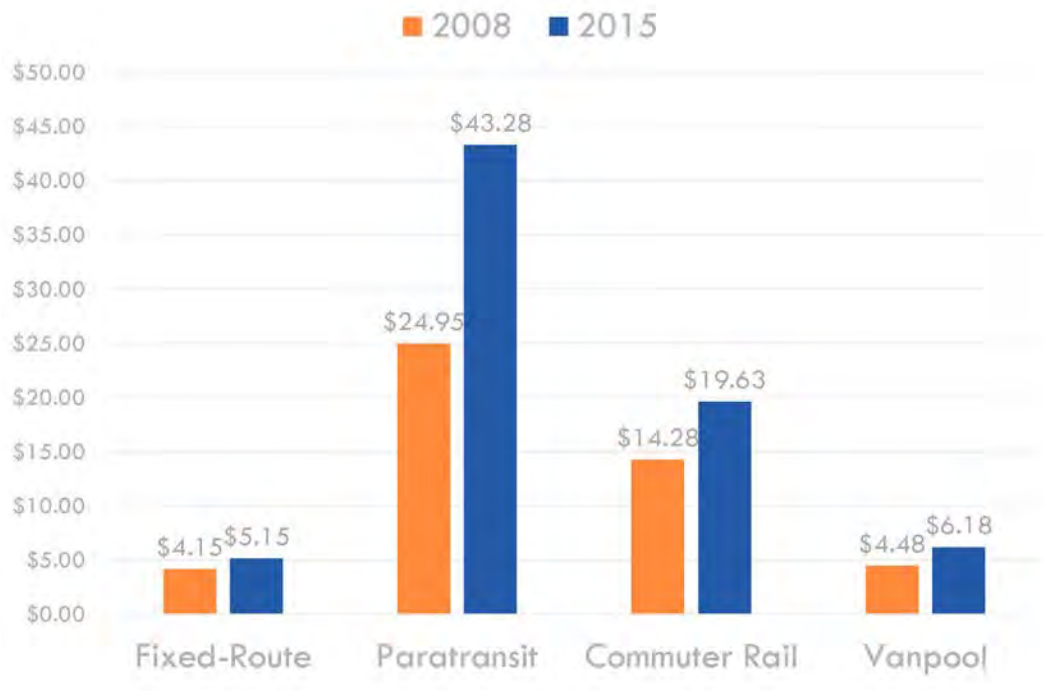
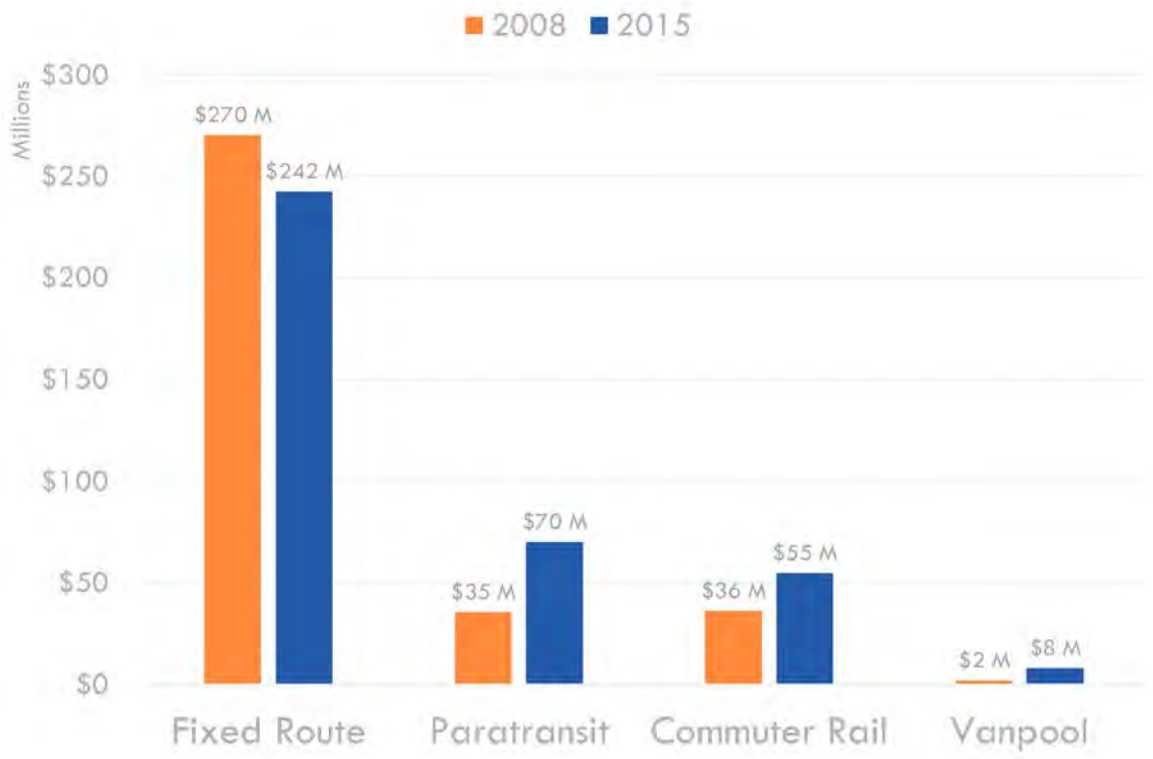


Figure 2-37 Operating Cost



3 PLAN AND POLICY REVIEW

This chapter reviews plans, programs, and ongoing projects that affect the current and future state of transit and transportation in Orange County, focusing on points of emphasis and gaps or conflicts between the plans. Organized by geographic scope, the chapter identifies how each plan, program, and project supports the expansion of existing and development of new transit services.

The chapter also provides a review of transit master plans completed by Nelson\Nygaard for Seattle, Fort Worth, and Nashville.

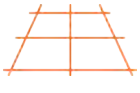
REGIONAL AND COUNTYWIDE PLANS AND POLICIES

This section discusses regional, multicounty, and neighboring county plans, as well as Orange County plans (including OCTA plans). The following major themes emerged from the review of regional and county documents:

Intercity and Intercounty Collaboration. Counties and regional transportation providers like OCTA and Metrolink were very interested in collaborating to solve regional transportation issues. OCTA collaborated with Los Angeles County, San Diego County, and Riverside County to develop regional transportation solutions.

Environmental Concerns. California law requires counties and metropolitan planning organizations (MPOs) to reduce greenhouse gas emissions. Many regional policies are tailored to reducing vehicle emissions and miles traveled.

Increasing Travel Choices. For the region to meet its environmental goals, residents must have high-quality alternatives to driving alone.



Transit/Land Use Connections. Part of building a stronger transportation system is creating urban environments that support walking and easy transit access.

Limited Financial Resources. Local and regional funds are constrained. Current resources may not meet future needs.

Fix-It-First. To reduce the region's transportation costs, particularly overall capital costs, agencies instituted the Fix-It-First policy to ensure all assets are maintained in good repair.

Demand Management. Reducing travel demand requires creating denser, more walkable communities and providing better opportunities for ride sharing and transit. Regional agencies worked to integrate transportation and land-use policy to better manage demand.

Document Overviews

Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities (RTP/SCS) Strategy (2016)

In 2008, the California State Senate passed Senate Bill 375 to reduce greenhouse gas emissions from the transportation sector. The legislature required MPOs such as SCAG to develop sustainable communities strategies integrating transportation and land use planning as part of their regional transportation plans.

The first SCAG RTP/SCS struck a balance between allowing local jurisdictions to determine land use and transportation policies and promoting a more multimodal and sustainable regional transportation network, which requires collaboration across city and county lines.

SCAG's plan drew on previous documents developed by OCTA and Orange County. It incorporated elements of the 2011 Orange County Sustainable Communities Strategy, which encouraged transit-friendly land use and development patterns and endorsed the transit strategy included in the OCTA Long-Range Transportation Plan (described later in this chapter).

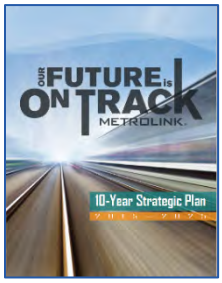
Notable projects recommended for further development in the SCAG RTP/SCS included:

- Anaheim Rapid Connection (ARC)
- Central Harbor Boulevard Study
- OC Streetcar
- Express lanes on the 55 and 405 freeways

Metrolink Short-Range Transit Plan (2015)

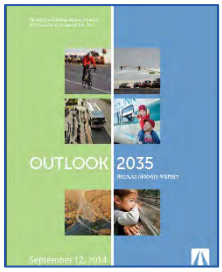
The Short-Range Transit Plan (SRTP) evaluated the opportunities and constraints Metrolink faces as it expands existing commuter rail service in Southern California. The recommendations provided a framework for the Southern California Regional Rail Authority and its member agencies to plan improvements to the Metrolink commuter rail network.

The plan used ridership statistics, projected demographic shifts, and projected operational and capital funding to rank organizational priorities on their ability to increase ridership while maintaining cost-effectiveness. The plan proposed bidirectional all-day service, requiring Metrolink to double-track existing single-track sections of the system. The Orange County Line would be triple-tracked.



Metrolink 10-Year Strategic Plan (2015)

Metrolink's 10-Year Strategic Plan focused on increasing ridership on existing rail lines and restoring and replacing aging infrastructure. Overarching principles included connectivity, collaboration, and transparency.

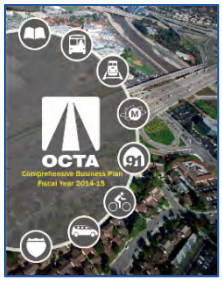


OCTA Long-Range Transportation Plan (2014)

The 2014 update to the Long-Range Transportation Plan (LRTP) recommended building complementary networks of train, bus, bike, and pedestrian infrastructure. The plan was informed by the major investment studies OCTA has completed over the last decade.

The LRTP included a preferred plan that was cost-constrained and prioritized the most vital projects for each mode. Priorities included:

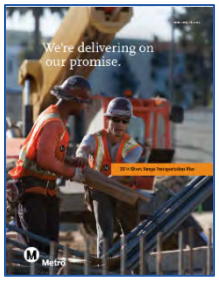
- Implementing intercountry and intracounty bus rapid transit (BRT)
- Increasing frequency on local transit routes
- Adding Bravo! Routes 543 and 560
- Adding/improving Routes 211, 273, 722
- Providing continued support to the Anaheim Rapid Connector and the Santa Ana/Garden Grove Fixed-Guideway project (OC Streetcar)



OCTA Comprehensive Business Plan (2015)

The Fiscal Year 2014-2015 Comprehensive Business Plan, OCTA's most recent, was a financially-constrained tool that served as the basis for the Fiscal Year 2015-2016 Annual Budget. The plan was based on a comprehensive, multimodal approach designed to ensure the financial viability of each of OCTA's programs and remain consistent with the goals of the Strategic Plan and Long-Range Transportation Plan.

The plan described short-range financial trends for the agency, noting that funding sources have not kept pace with increasing costs, although revenues for fiscal year 2012 were higher than in any year since the 2008 recession. To reduce costs, OCTA planned to increase contract service levels to 40 percent of total service and to begin a public engagement process regarding fare increases scheduled every four years, which will help the agency maintain a 20% farebox recovery ratio as required by the FTA.

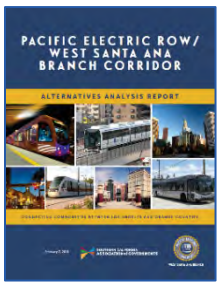


Los Angeles Metro Short-Range Transportation Plan (2014)

Metro's most recent short-range plan is a blueprint for transportation projects in Los Angeles County funded by 2008's Measure R, including new and extended rail and BRT lines. Metro is currently updating its Long Range Transportation Plan to reflect additional projects in the Measure M sales tax measure approved in November 2016.

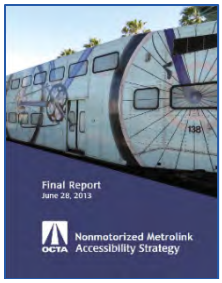
Riverside Transit Agency Short-Range Transit Plan (2014)

The most recent SRTP for the countywide transit operator in Riverside County focused on concentrating bus service in areas of high demand and on increasing service during peak commute periods.



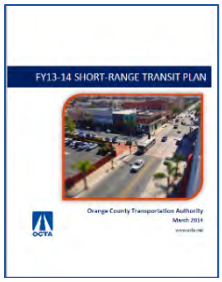
Pacific Electric Right-of-Way/West Santa Ana Branch Corridor Alternatives Analysis (2013)

This Los Angeles County Metro project would convert much of the Los Angeles County segment of the abandoned Pacific-Electric right-of-way into a light-rail line. Metro plans to extend light rail south from downtown Los Angeles to Artesia, while the OC Streetcar is being built in the far southern end of the corridor, in Orange County between Santa Ana and Garden Grove. These will be separate lines using differing technologies.



Metrolink Non-Motorized Accessibility Strategy (2013)

OCTA's vision for intermodal connectivity recognized that rail corridors need good first- and last-mile connections and that the design of both rail stations and surrounding areas impact accessibility and ease of use. The plan provided station-level guidance for bicycle, pedestrian, and Americans with Disabilities Act (ADA) compliance at 11 Metrolink stations.



OCTA Short-Range Transit Plan (2013)

This document guides OCTA's near-term budgeting and capital decisions. The most recent update included recommendations related to BRT, traditional bus service, and demand-responsive transit programs.

OCTA Transit System Study (2012)

This study identified a financially sustainable transit system that could match transit service levels to ridership demand over the short-, medium-, and long-term. The overarching goal was to find more efficient, cost-effective, and sustainable ways to provide transit service in Orange County. Select recommendations have been implemented, such as new Bravo! service (Route 560) and changes to existing routes throughout the county, including elimination of some routes. These changes are discussed in the following chapter.

Orange County Sustainable Communities Strategy (2011)

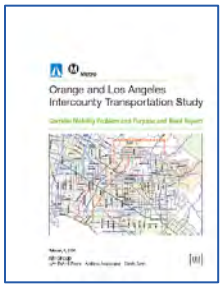
The Sustainable Communities Strategy was the subregional plan for reducing greenhouse gas emissions from the county's transportation systems. Strategies included promoting livable communities, reducing sources of transit delay (such as dwell time at stops), managing transportation demand, and working with local jurisdictions to develop mutually-supportive sustainability policies.

The plan focused on high-demand corridors as candidates for potential BRT service. Corridors included:

- Santa Ana – Long Beach: Westminster Avenue /17th Street
- Fullerton – Costa Mesa: Harbor Boulevard
- Brea Mall – Irvine Transit Center: Bristol Street/State College Boulevard

The plan also recommended a new Metrolink station in Placentia, now in development, and additional transit service between Anaheim and Laguna Hills.

The plan acknowledged that Orange County needs both intercounty and intracounty express transit routes to connect cities in Orange County, Riverside County, and Los Angeles County, and to accommodate long-range residential growth trends.



Orange and Los Angeles Intercounty Transportation Study (2008)

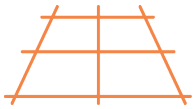
The first joint transportation planning effort for Orange County and Los Angeles County, this study recommended increased frequency and coordination of existing transit services and BRT service in the following corridors:

- On the Pacific-Electric right-of-way connecting to the Metro Rail Green Line (note: Metro is now planning light rail in its portion of the PE right-of-way)
- Between Brea Mall and the Norwalk Metro Rail Green Line Station on Imperial Highway
- Del Amo Boulevard/La Palma Avenue from the Anaheim Canyon Metrolink Station to the Metro Rail Blue Line Del Amo Station
- Willow Street/Katella Avenue from the Anaheim Metrolink Station to the Metro Rail Blue Line Willow Street Station
- Seal Beach Boulevard/Los Alamitos Boulevard/Norwalk Boulevard from Pacific Coast Highway to the Norwalk/Santa Fe Springs Metrolink Station
- Beach Boulevard from downtown Huntington Beach to Whittier Boulevard
- Harbor Boulevard from the Fullerton Metrolink Station to West Covina Mall

Figure 3-1 Themes of Regional and Countywide Documents and Plans

Theme	Plan or Document	Details
 Intercity and Intercounty Collaboration	SCAG Regional Transportation Plan/Sustainable Communities Strategy (2016)	Supported the creation of local land use and transportation policies and recognized that local jurisdictions are crucial players in plan implementation.
	Pacific Electric Right-of-Way/West Santa Ana Branch Corridor Alternatives Analysis (2013)	Would convert much of the Los Angeles segment of the Pacific Electric right-of-way into a light-rail line that could be extended to Orange County.
	Orange and Los Angeles Intercounty Transportation Study (2008)	First significant joint planning effort undertaken by OCTA and Metro that specifically looked at transportation issues spanning the Orange and Los Angeles County lines.
	OCTA Long-Range Transportation Plan (2014)	Coordinated with local jurisdictions to reduce congestion by implementing transportation demand management strategies such as sidewalks, electric vehicle paths, and fixed guideway projects.
		Identified opportunities for intercounty connectivity between Orange County and its neighbors. Potential projects included adding HOV lanes south of the Orange County border, improving transit connections between Metrolink and LAX, and extending the proposed SR-60 extension of the LA Metro Gold Line into Orange County.
	Metrolink Short-Range Transportation Plan (2013)	Voiced Metrolink's commitment to partnering with local transit agencies and Amtrak for seamless transfers.
		Recommended adding trips to all service routes by 2020 and building new track segments to allow passing and bi-directional trips. Addressed the importance of intercounty commute corridors for reducing transportation demand on regional road networks.
 Environmental Concerns	SCAG Regional Transportation Plan/Sustainable Communities Strategy (2016)	Outlined strategies, programs, and projects to reduce greenhouse gas emissions in the SCAG region, meeting or exceeding federal and state targets.
	OCTA Short-Range Transit Plan and Long-Range Transportation Plan (2013, 2014)	Set path for OCTA compliance with the California Global Warming Solutions Act (AB32) and the Sustainable Communities and Climate Protection Act (SB 375).

Theme	Plan or Document	Details
 Increasing Travel Choices	SCAG Regional Transportation Plan/Sustainable Communities Strategy (2016)	Included $56.1 billion for capital transit projects and $156.7 billion for operations and maintenance; notable projects recommended for further development include: ▪ Anaheim Rapid Connection Streetcar ▪ Santa Ana Harbor Boulevard Study ▪ OC Streetcar ▪ Express lanes on Highway 55 and I-405 Recommended extensive improvements for local bus, rapid bus, BRT, and express service throughout the region. Supported implementing and expanding transit signal priority; regional and intercounty fare agreements and media; increased bicycle capacity on transit vehicles; real-time passenger information systems; and first-last-mile strategies to extend the effective reach of transit.
	Orange and Los Angeles Intercounty Transportation Study (2008)	Recommended adding regional transit services to meet forecasted demand, particularly in portions of the study area that are not well-served by the Metrolink commuter rail system (communities such as La Habra, La Mirada, and outlying regions of Fullerton).
	OCTA Strategic Plan (2013)	Identified the need to preserve and modernize existing transit service and to create new services to meet community needs, including increased demand driven by changing land-use patterns.
	OCTA Long-Range Transportation Plan (2014)	Focused on improving multimodal integration, investing in new facilities, and expanding transit services through use of Measure M2 sales-tax funding; over 40 routes were altered or eliminated in 2016.
	Metrolink 10-Year Strategic Plan (2015)	Planned to add more reverse-commute trips to access growing regional employment centers.
	Los Angeles Metro Short-Range Transportation Plan (2014)	Recommended a range of improvements to the Metro Rail and Metro Bus systems.
	Pacific Electric Right-of-Way/West Santa Ana Branch Corridor Alternatives Analysis (2013)	Recommended restoration of rail service in Los Angeles County segments of the Pacific Electric right-of-way.

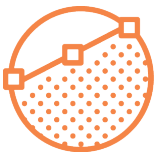
Theme	Plan or Document	Details
 Transit/Land Use Connections	SCAG Regional Transportation Plan/Sustainable Communities Strategy (2016)	Supported the following policies to focus growth around transit: identify strategic areas for infill and investment; structure the plan on centers development; develop Complete Communities; develop nodes along corridors; plan for additional housing and jobs near transit; plan for changing demand in housing types; protect stable, existing single-family areas; ensure adequate open-space access and habitat preservation; and incorporate local feedback on future growth. Supported the development of High Quality Transit Areas, Livable Corridors, and Neighborhood Mobility Areas.
	OCTA Long-Range Transportation Plan (2014)	Recommended increasing ridership by providing better transit connections between underserved areas of the county, including new or improved transit service through Bravo! Routes 543 and 560 to serve the communities of Westminster, Seal Beach, Anaheim, Garden Grove, Fountain Valley, and Santa Ana.
	Riverside Transit Agency Short-Range Transit Plan (2014)	Focused on concentrating transit service in high-demand corridors and on improving long-distance commute service.
	Metrolink 10-Year Strategic Plan (2015)	Called for Metrolink to work with local cities and jurisdictions to promote rail-friendly development patterns.
	OCTA Metrolink Station Non-Motorized Accessibility Strategy (2013)	Acted as a design guide for non-motorized projects, promoting last-mile connections between Metrolink stations and neighborhoods. Focused on identifying station-level treatments that could increase station accessibility for pedestrians and bicyclists.
	Los Angeles Metro Short-Range Transportation Plan (2014)	Recommended a number of extensions to the Metro Rail network serving dense corridors and major employment centers and included funding for the California High Speed Rail project, which would extend into Orange County.
 Limited Financial Resources	OCTA Short-Range Transit Plan (2013)	Focused on extending the life of existing transit assets and only purchasing new assets conservatively; supported development of Measure M2 programs.
	OCTA Long-Range Transportation Plan (2014)	Planned to invest in maintenance of existing infrastructure to reduce overall costs; some transit projects were in the unconstrained plan because no revenue had been identified.
	OCTA Transit System Study (2012)	Implementation of service investments would require additional sources of funding, including farebox revenue, federal funding, and local contributions.
	OCTA Comprehensive Business Plan (2014)	Outlined all planned expenditures for FY 2014-2015. Assumed service levels would remain flat due to funding constraints.

Theme	Plan or Document	Details
 Fix-It-First	SCAG Regional Transportation Plan/Sustainable Communities Strategy (2016)	Called for investment of $275.5 billion toward preserving the existing system, including transit and passenger rail systems, state highways, and regionally significant local streets and roads.
	Metrolink Short-Range Transit Plan (2015)	Set Back-to-Basics policy to ensure that resources are spent on unmet needs and that the fleet was kept in a state of good repair.
 Demand Management	SCAG Regional Transportation Plan/Sustainable Communities Strategy (2016)	Called for investing $6.9 billion in regional Transportation Demand Management strategies. Focused on reducing drive-alone trips and vehicle miles traveled, especially during the peak commute. Encouraged ridesharing, transit use, bicycling, walking, and alternative travel modes. Incentivized telecommuting and alternative work schedules to redistribute or eliminate commute trips.
	OCTA Long-Range Transportation Plan (2014)	Recommended investment in all modes of transportation, including car sharing and vanpooling, to more efficiently use existing infrastructure.
	OCTA Metrolink Station Non-Motorized Accessibility Strategy (2013)	Identified multimodal accessibility opportunities to reduce congestion and parking demand at Metrolink stations. Provided design guidelines for multimodal projects in Orange County.
		Recognized that multimodal projects must be context-sensitive. Focused on providing a set of strategies that cities can choose from to address specific accessibility issues, including sidewalks, intersections, traffic calming, bicycle facilities, and transit stations.

LOCAL PLANS AND POLICIES

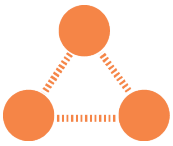
Themes

The themes that emerged from the document review of local plans and policies—including plans for corridors and subareas of the county—included the following:



Space Limitations. Adjacent development constrains each corridor proposed for new transportation systems. Finding ways to make more efficient use of existing right-of-way is essential.

Connections Between and Within Cities. Connections between transit hubs and final destinations are essential in creating a viable transportation system. OCTA has supported first-/last-mile connections through its Measure M2 and discretionary federal funding programs, which gave jurisdictions access to a suite of programs to improve transit, road, and non-motorized transportation systems. These programs may help reduce demand on the regional transportation network and ensured that the transit network would be a viable transportation mode for all riders.

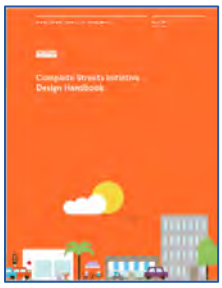


Multimodal Connectivity. People need high-quality local transportation systems to help them access regional transportation networks. Creating safe and easy connections between rail, bus, bicycle, and pedestrian networks is essential to making the entire transportation system productive and efficient.

Local Decisions. All local and regional planning organizations recognized that the success of the system depends on local buy-in.

Fix-It-First. Maintaining assets in a state of good repair is important for both local and regional transportation systems.

Document Overviews

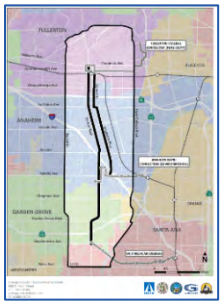


Orange County Complete Streets Initiative (OCCSI) Design Handbook (2016)

The primary goal of the handbook was to provide jurisdictions with draft complete streets policies that could be incorporated into the circulation element of their general plans, meeting the requirements of Assembly Bill 1358, the California Complete Streets Act. The Design Handbook provided a menu of complete streets policies ranging from basic to advanced, allowing jurisdictions to tailor a complete-streets approach that addressed their individual needs and took existing infrastructure into account. The OCCSI Design Handbook created nine street classifications, assigned a designation to all major Orange County streets, and provided design guidelines for "movement corridors," or streets that are suitable for transit and multimodal improvements.

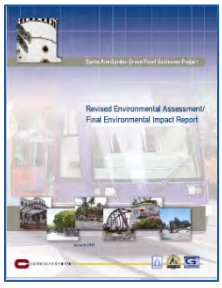
Corridor Study for the Pacific Coast Highway (2016)

The Pacific Coast Highway connects the six coastal cities of Orange County (Seal Beach, Huntington Beach, Newport Beach, Laguna Beach, Dana Point, and San Clemente). This corridor study recognized needs and goals common to all six cities, such as reducing collisions, increasing mobility, and addressing the limitations of cost and Caltrans design standards. The plan resulted in three recommended alternatives, including a transportation system management alternative, and both low- and high-capital alternatives for transit improvements and roadway projects.



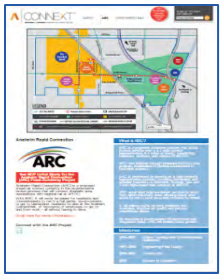
Central Harbor Boulevard Transit Corridor Study (Underway)

OCTA is currently conducting a study to envision the future of transit on Harbor Boulevard from Fullerton Transportation Center in Fullerton to Westminster Avenue in Santa Ana. One of the busiest bus transit corridor in Orange County, this vital north-south connection links residents, businesses, schools, and visitor destinations. The Harbor Boulevard corridor will connect to the OC Streetcar to extend the regional transportation network north to Fullerton. As of Fall 2016, the plan is in the Alternative Development phase.



Santa Ana-Garden Grove Fixed Guideway Project (2015)

The cities of Santa Ana and Garden Grove jointly pursued the Fixed Guideway Project, leading to the development of a streetcar line that will run east-to-west between the Santa Ana Regional Transit Center and the intersection of Harbor and Westminster Boulevards in Garden Grove. Now known as the OC Streetcar, the project received federal funding in 2016 and is entering the next phase of design. It is described in greater detail in the following chapter.

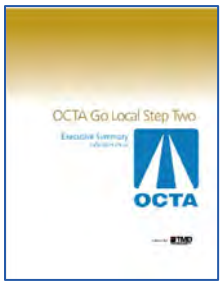


Anaheim Rapid Connection (ARC) Fixed Guideway Project (2015)

The Anaheim Rapid Connection is a proposed streetcar line that would connect Anaheim resort-area destinations with regional rail at ARTIC. The project was suspended in June 2016 by the OCTA Board of Directors and the corridor is now being evaluated as part of the Central Harbor Boulevard Transit Corridor Study described above.

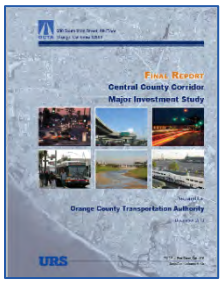
Fullerton College Connector Project (2015)

The Fullerton College Connector Project evaluated BRT, streetcar, and light-rail options for a corridor running from East Fullerton to the downtown core to provide better connectivity between CSU Fullerton and the city. Although the feasibility study was completed in 2015, the planning has not advanced further at this point.



Go Local Planning Studies (2012)

Go Local provided OCTA funding for city-initiated transit planning. Orange County cities applied for a $100,000 grant to study transit extensions linking major local destinations with a Metrolink station. After completing the initial study, cities competed for additional funding to further develop their concept and test its viability. Projects that received OCTA approval moved into development and implementation phases. The Go Local program also converted existing Metrolink stations into multimodal transportation centers offering both rail and bus services. The Go Local program served as early project development for existing and future Project V OCTA funding grants to cities for local circulators, a program described in the following chapter.



Central County Corridor Major Investment Study (2010)

This study informed the SCAG Regional Transportation Plan by reviewing all planned and proposed transportation projects in the area and recommending that demand management, infrastructure improvements, and bus service between existing rail lines be carried forward as the preferred strategy for the region. Some of the recommended projects included the following:

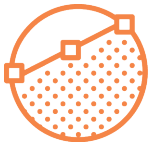
- Enhanced BRT service on six routes, including Harbor Boulevard
- Bolsa Chica Intercounty Express
- North-South Commuter Express
- High-Capacity Fixed Guideways in Santa Ana and Anaheim

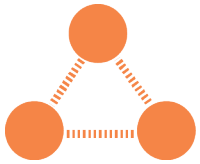
South Orange County Major Investment Study (2008)

This study assessed strategic transportation needs in the southern part of the county and proposed programs and projects for further analysis, including increased demand management, a package of moderate transit investments, a tolled freeway program, and freeway expansion. Highlighted projects included:

- BRT from Tustin Station to Irvine Station
- BRT from Irvine Station to San Juan Capistrano Station
- Doubled-tracking of the LOSSAN rail corridor

Figure 3-2 Themes of Local Plans and Documents

Theme	Plan or Document	Details
 Space Limitations	Corridor Study for the Pacific Coast Highway (2016)	Corridor was constrained by design standards and the lack of developable real estate in the surrounding area.
 Connections Between and Within Cities	Santa Ana-Garden Grove Fixed Guideway Project (2015)	Scheduled to begin operation in 2020 and will provide last-mile connections from the Santa Ana Regional Transportation Center to a new multimodal hub in Garden Grove.
	Anaheim Rapid Connection (2015)	Would create a streetcar connection between the Anaheim Regional Transportation Intermodal Center, the Platinum Triangle, and the Anaheim Resort.
	Fullerton College Connector Study (2014)	Would link several colleges and universities in Fullerton to downtown Fullerton and provide a connection to the proposed Central Harbor Boulevard Corridor.
	Corridor Study for the Pacific Coast Highway (2016)	Identified safety and congestion as pressing concerns for the highway that provides multimodal connections between six coastal cities.
	Central Harbor Boulevard Transit Corridor Study (2010)	The busiest north-south transit spine in Orange County connects Santa Ana, Garden Grove, Anaheim, and Fullerton.
	LOSSAN Rail Corridor Improvement Plan (2009)	Planned for over $900 million in corridor improvements over the next 20 years to create double-track capacity between Orange County and San Diego on the existing LOSSAN rail corridor.
	Central Harbor Boulevard Transit Corridor Study (2016)	Would connect to Measure M projects sponsored by the cities of Santa Ana and Garden Grove to offer better connections to both SARTIC and ARTIC.
	South Orange County Major Investment Study (2008)	Outlined the locally-preferred alternative for transportation projects in southern Orange County, including increased express and local bus service, community shuttles, and new capacity on the LOSSAN rail corridor.

Theme	Plan or Document	Details
 Multimodal Connectivity	Central County Corridor Major Investment Study (2010)	Established a long-term transportation vision and created consensus on a multimodal strategy that includes improvements to arterials, freeways, bus transit, and railways. Proposed specific improvements ranging from arterial and intersection optimization/widening, additional high-occupancy vehicle lanes and interchanges for freeways, enhanced connections to Metrolink/Amtrak passenger rail, investment in community-based shuttles (e.g., Anaheim Resort Transportation (ART)), the development of high-capacity fixed-guideways in Anaheim (ARC) and Santa Ana/Garden Grove (OC Streetcar), and substantial improvements to local bus service in conjunction with the implementation of six BRT routes (including Harbor Boulevard and Katella Avenue). Suggested an intersection improvement feasibility study for the intersection of Harbor Boulevard and Ball Road.
	Orange County Complete Streets Design Handbook (2016)	Provided draft policies for California municipalities to aid in the standardization of street design, recognizing that planning decisions are made on a local level. The draft policies promoted multimodal accessibility by developing a set of defined street typologies that incorporate all modes of transportation.
	Go Local Programs (2012)	Enabled cities to add transit service that complements rather than duplicates OCTA service. Required proposals to meet accessibility and needs criteria to ensure all projects efficiently used funds and met ADA requirements.
 Local Decisions	Orange County Complete Streets Design Handbook (2016)	Integrated the wide variety of street typologies in Southern California into a well-designed, legible network to make interregional travel less stressful.
	Go Local Programs (2012)	Involved local communities in the transportation planning process and allowed them to define local needs and propose custom solutions.
 Fix-It-First	Orange County Complete Streets Design Handbook (2016)	Focused on adding elements of complete streets principles without replacing existing infrastructure.

SUCCESSFUL TRANSIT MASTER PLANS AROUND THE COUNTRY

nMotion Strategic Plan (Nashville, TN; 2016)

More than 1 million people are expected to move to Nashville and the Middle Tennessee region between 2016 and 2040. This presents a pressing mobility challenge, as the development of new roads and right-of-way is not a practical solution in the region. To that end, the Nashville Metropolitan Transit Authority (MTA) and the Regional Transportation Authority of Middle Tennessee (RTA) developed nMotion, the strategic transit plan for Middle Tennessee. The plan focused on transit but also incorporated non-motorized and shared-use mobility options.

nMotion articulated long-term goals that can be met by advancing short-term actions to lay the groundwork for large-scale investments in the future. The plan's guiding principles shaped the recommendations:

- Improving access to opportunity for those with limited auto availability
- Expanding the range of competitive travel options for all Middle Tennesseans
- Simplifying and integrating various transportation systems to develop a seamless and connected system
- Prioritizing major transit investments in transit-supportive areas
- Significantly increasing ridership

The region recognized that achieving these principles would require strong partnerships and new funding sources. To this end, nMotion included a high-level implementation plan that identified regional transportation partners such as local colleges, neighboring transit agencies, and shared mobility services like Lyft and Uber.

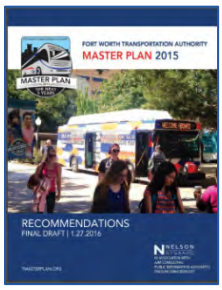
The plan identified short-, medium-, and long-term actions that will transform the region's current transit network into a multimodal system capable of moving more people through the existing right-of-way.

For the next five years, the plan outlined actions to improve local and regional bus service, including the following strategies:

- Extending service hours
- Decreasing headways
- Increasing the legibility of transit service
- Improving pedestrian and bicycle connections to transit
- Beginning feasibility studies on rapid transit services like commuter rail, light rail, and BRT

For the next five to 15 years, the plan called for MTA and RTA to develop dedicated transit lanes in key corridors and construct Middle Tennessee's inaugural rapid transit line. And for the next 25 years, the plan called for expanded rapid transit to new service areas and development of comprehensive regional transit coverage.

Because Nashville and Middle Tennessee have yet to choose what type of rapid transit would be best, nMotion does not provide specific information on exactly how the plan will be implemented. Instead it calls for rapid transit studies and for the development of a Long-Range Implementation Plan.



The T Transit Master Plan (Fort Worth, TX; 2015)

The T Transit Master Plan, completed in 2015, is the master plan for the Fort Worth (Texas) Transportation Authority. The plan focused on finding ways to reinvigorate transit in Tarrant County after almost 40 years of little growth or system investment. It incorporated both short-term goals, like improving existing service and expanding service to new areas, as well as a long-range transit vision focused on modernizing service offerings and attracting new riders. Together, these elements will create a transit system that can accommodate the region's growth.

The five-year recommendations will jumpstart the process of developing a revitalized transit system for Fort Worth. Short-term recommendations included improving existing service, expanding service to new areas, creating a frequent transit network, developing outlying transit hubs, expanding express and regional service, improving access to transit, and improving information and branding for services.

The success of this plan was closely tied to the successful collaboration between the Fort Worth Transportation Authority and local communities. While The T has sufficient funding to provide service at current levels, it does not have the budget to make extensive investments in expanding service area and duration. The T will need to work with local communities to assess jurisdiction-specific needs for transit and propose programs and services to meet those needs.

The transit vision, a longer-term effort to improve transit in the region, builds on the recommendations in the five-year plan. The long-range plan envisions a network that:

- Makes transit an attractive choice
- Connects people and places
- Makes transit more convenient and easier to use
- Creates a system that will be sustainable over the long term

Services that would be used to achieve these goals include a strong core network of countywide frequent transit, comprehensive local services, high-capacity transit offerings, better passenger amenities, and convenient last-mile connections.

City of Seattle Transit Master Plan (Seattle, WA; 2012 and 2015 Update)

Seattle has ambitious growth plans, expecting 200,000 new residents and 200,000 new jobs by 2030. Despite traffic congestion throughout the city, there are no plans or opportunities to add significant motor vehicle capacity; therefore, the bulk of the city's growth must be accommodated by more efficiently using the city's existing street network and by investing in rapid transit. Knowing its future economy and quality of life are at stake, the City of Seattle sought to establish a stronger partnership with its two regional transit providers, King County Metro and Sound Transit, and to create a powerful business case for transit investment.

To help Seattleites understand the scale of future mobility needs, an intensive, data-driven stakeholder process informed a detailed market analysis and the establishment of outcome-focused goals and measures of success. A broad array of corridors was examined, and a "Multiple Account Evaluation" approach was used to prioritize those that offered the greatest opportunity. The plan then considered what type of transit technologies made the most sense in each corridor.

The final report also identified land use and programmatic changes necessary to make transit successful, including coordinated bicycle and pedestrian improvements to optimize benefits in key corridors. The plan prioritized four high-capacity corridors, each of which was subsequently funded for the next level of project development. Of equal importance, detailed speed and reliability capital programs were developed for 15 priority bus corridors.

This data-driven, outcome-focused, stakeholder-led approach resulted in an unprecedented level of consensus on Seattle's mobility future, allowing the mayor to allocate $5 million towards its implementation in 2013-2014, promptly attracting $900,000 in federal support, setting the stage for $2 million in Sound Transit partnership funding, and leading to passage of the $930 Move Seattle Levy in 2015, accompanied by an update of the TMP to reflect changes since 2012. The city is now moving forward on alternatives analyses in preparation for construction.

SUMMARY

This review of previous plans and existing policies helps to set a foundation for the OC Transit Vision by establishing the context for current work and identifying recurring themes in regional and local documents:

- The **importance of collaboration** between agencies and the public and between agencies at all levels of government, from the regional level to countywide and individual cities.
- The role transit can play in helping **to reduce greenhouse gas emissions.**
- The need for a broad range of **convenient travel choices.** In the late 20th century, Orange County was built around the automobile, but has reached the point at which roadway expansions are both more difficult and offer diminishing returns.
- The importance of **integrating transportation with land use planning**, to ensure the transportation network and built environment are mutually supportive and that efforts to achieve broader local and regional goals are as robust and effective as possible.
- The likelihood of continuing **constraints on funding**, and the need for jurisdictions, agencies, and policymakers to be cost-effective and creative in response to those constraints.
- The fundamental **reality of geography**, from space constraints in heavily trafficked corridors to dispersed housing and employment patterns.
- The need for **multimodal connectivity** within the transportation network, including first-/last-mile connections to transit.

4 RECENT TRENDS IN TRANSIT

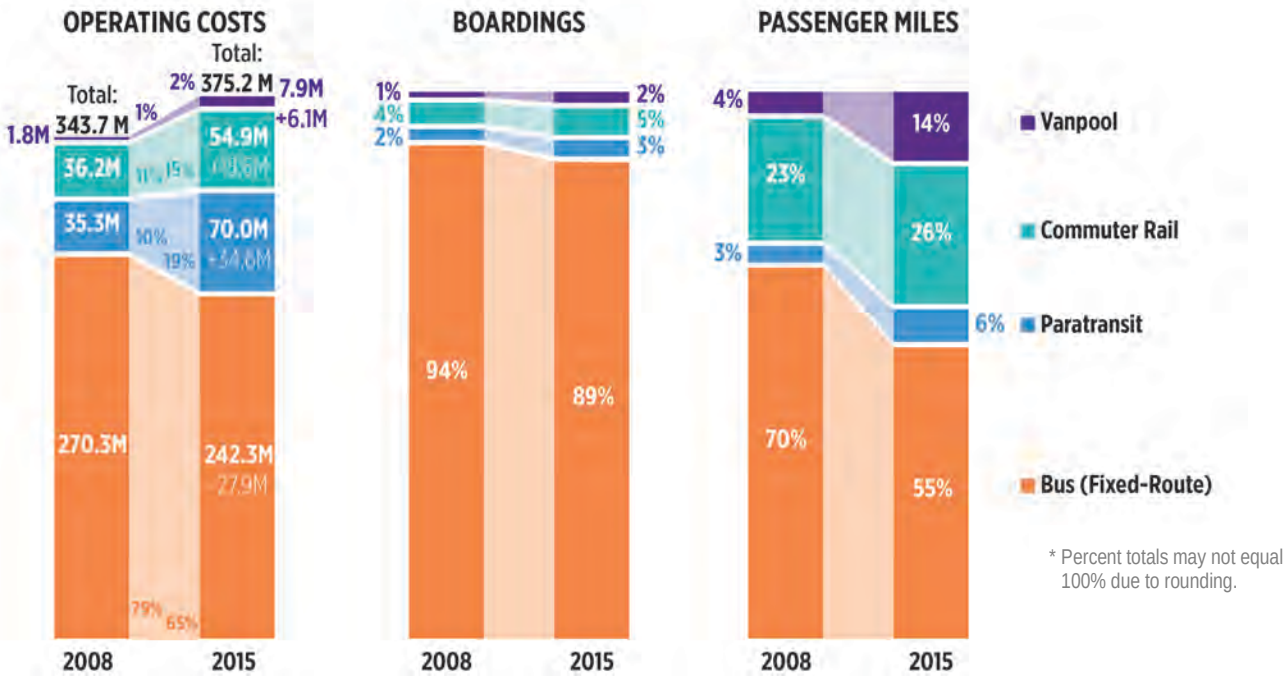
TRANSIT RIDERSHIP

The OC Transit Vision is being developed against the backdrop of a multiyear decline in transit use in Orange County. Since fiscal year 2006-2007, with a peak of more than 69 million annual boardings, ridership on OCTA buses has fallen by 37 percent, to 43.3 million annual boardings in 2015-2016.

OCTA has made a large effort in reversing this decline. The 2016 Bus Service Plan network restructuring is projected to increase transit ridership by 1.6 million boardings over three years, largely by reallocating resources to areas where they can be more cost-effective and productive. The agency has also convened a ridership task force to investigate causes of the decline and to propose creative solutions.

What OCTA has been unable to do is to invest funding in more transit service—or indeed, to reverse the deep budget cuts made during the Great Recession, which coincided with a fare increase. Since 2008, the annual number of fixed-route service hours has been reduced by 14 percent, while the adult cash fare has increased from $1.25 to $2.00 and the cost of a 30-day local pass has increased from $45 to $69. At the same time, required spending on modes other than fixed-route service has increased, from 22 percent in fiscal year 2008 to 36 percent in 2015. This includes an increase in paratransit's share of the overall agency transit budget from 10 to 19 percent (see Figure 4-1).

Figure 4-1 Operating Costs, Boardings and Passenger Miles by Mode *(2008 and 2015)**

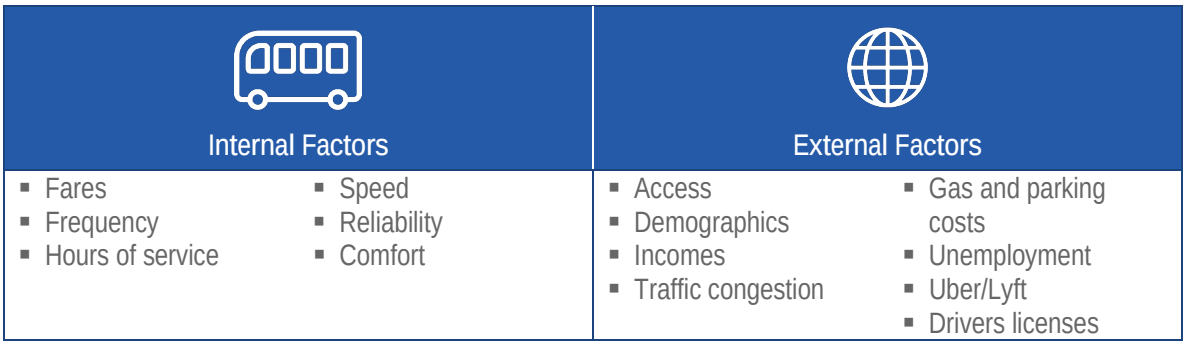


* Percent totals may not equal 100% due to rounding.

Many factors impact transit ridership, but it is useful to think of them in two categories: *internal* versus *external*, and *incentives* versus *disincentives*.

Internal factors are those a transit agency can control: fares and service levels and quality (although funding constrains an agency's ability to control its service levels and quality). A broader range of external factors impact ridership: land use, demographics, access to stops, limited incomes, congestion, and economic conditions, to name a few.

Figure 4-2 Internal and External Factors that Affect Ridership



Then there are incentives and disincentives. Clearly, low fares are an incentive to use transit, while higher fares can be a disincentive. Other factors may not be so obvious. Low gas prices and free parking can incentivize driving, while the need to cross wide streets full of high-speed traffic discourages people from walking to bus stops.

The fact remains that *better transit attracts more riders.*

Some factors are more malleable than others. Much of the research into OCTA's recent ridership decline—and similar declines elsewhere in Southern California and across the nation—has focused on internal and external factors. Recent analysis by the Southern California Association of Governments (SCAG) and others have identified a number of potential factors: rising employment (which increases the number of people commuting but also increases the number of people who can afford to purchase and maintain personal cars), lower gas prices, the rise of ride-hailing companies such as Uber and Lyft, and the new state law allowing undocumented immigrants to obtain driver's licenses. Some of these factors are cyclical in nature, while others may represent longer-term, structural changes. The recent trends in Orange County shows that while population increased 4.7 percent between 2009 and 2015, registered drivers increased by 9.9 percent and registered vehicles increased by 16.9 percent.

A recent study by researchers at the Mineta Transportation Institute in San Jose—"Investigating the Determining Factors for Transit Travel Demand by Bus Mode in US Metropolitan Statistical Areas"—found that:

> *... seven internal factors, which the transit managers and operators have control over, and only one external variable, namely gas price, (are shown) to have significant impacts on transit travel demand by bus mode.* ***Transit supply, transit fare, average headway, transit coverage, service intensity, revenue hours, and safety*** *are the contributing internal factors for transit demand by bus. This indicates that the mechanisms to increase ... transit ridership patronage are in the hands of the transit authorities, which further indicates that they do not need to depend on (the) outside world to attract more ridership but can do so by adjusting the influential internal factors that are under their control.*

CULTURAL, TECHNOLOGICAL, AND TRANSPORTATION TRENDS

Recent social, demographic, technological, and transportation trends that may significantly influence the future of transit both nationally and in Orange County are discussed below.

Cultural Trends

People driving less overall. Starting in 2008, national vehicle miles traveled (VMT) began to trend downward. While low gas prices contributed to an uptick in national VMT in 2015, per capita driving remains at pre-2000 levels. This trend suggests that people are looking for alternatives to driving, and are more open to alternative modes than before.

In particular, younger generations are driving less. Younger people are waiting longer to get driver's licenses and are showing a strong preference for alternative modes of transportation. These trends suggest that, in the future, vehicle ownership and driving may not be as valued as they were in the past.

Renewed desire to live in urban areas. Millennials (generally speaking, those born between roughly 1980 and 2000) like having the world at their fingertips. With the resurgence of urban and denser suburban neighborhoods as centers of economic energy and vitality, a majority of millennials are opting to live in more urban areas over sprawling suburbs or rural communities. Sixty-two percent indicate a preference for living in the type of mixed-use communities typically found in urban areas, where they can be close to shops, restaurants, and offices. Millennials are currently living in these areas at a higher rate than any other generation, and 40 percent say they would like to live in an urban area in the future. For the first time since the 1920s, U.S. cities are growing faster than the rest of the country. Orange County, however, is experience Millennial outmigration, due in part to high housing costs.

More single households. Younger generations are also waiting longer to marry and have children. Housing preferences and travel patterns associated with traditional nuclear-family households are not as dominant as in previous decades.

Aging population. While younger millennials are driving less, are more likely than previous generations to live in urban areas, and are forming families later, the baby boomers that came before them are reaching retirement age and driving less as well. While some empty nester couples with grown children may choose to trade their large suburban homes for smaller, easy-to-maintain apartments in more walkable areas, surveys have found that most would prefer to age in place. They will need accessible and convenient transportation options to do so

Diversifying population. Orange County and California have been at the forefront of America's racial diversification: a minority of Orange County residents are now non-Hispanic white. Many non-white residents are immigrants from countries where transit use is more prevalent, and in general, non-white Americans tend to use transit at higher rates than white Americans.

Increasing housing costs. While other demographic trends should favor transit use over the long term, one recent trend in Orange County (and in other desirable communities in coastal California) runs counter to this: rapidly increasing housing costs. Increasingly unaffordable housing is pushing low-income and even some middle-class residents, including Millennials with less job experience and earning power, out of Orange County or to areas of the county that are more difficult to serve with transit. High housing costs are also increasing commute distances as people seek lower-cost housing in less expensive areas such as Riverside County—for many of these longer trips, transit is a less viable option than driving.

Impacts of technology. Smartphone-based ride-hailing services such as Uber and Lyft (see next section) provide a new set of mobility options. These services provide a quick and relatively affordable alternative for short trips, although there are barriers to use, such as access to a credit card and smartphone.

Changes to shopping behaviors. As internet shopping soars, people are making fewer trips to stores. While this necessarily means an increase in deliveries, it also likely means a decrease in personal shopping trips. For Orange County, online shopping also has a negative impact on sales tax revenues, which support transit operations. This is because many online retailers ship to Orange County from warehouse, in neighboring counties, which receive the sales tax.

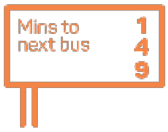
Taking another look at transportation demand management. Finally, transportation demand management (TDM) measures such as variable roadway and parking pricing and employer-based transit benefits are essential tools for transportation planning that were widely used locally in the 1990s, declined somewhat in recent years, but are now on the rise nationally. TDM turns the traditional paradigm of increasing supply and capacity to meet demand on its head, suggesting instead that it may be possible to manage travel demand cost-effectively without increasing supply.

Technological Trends

Recently implemented technologies have rapidly changed how people connect, and where and how they choose to live, work, and travel. Newly developed technologies have changed the expectations of transit riders—dynamic, flexible, and real-time information now informs travel decisions and behavior. The following section addresses mobility options that rely on smartphone apps. This section addresses the technologies themselves as well as a few technologies important to transit operators, if not necessarily the riding public.

Smartphone Applications. Smartphone apps can be used to look up wait times for buses and trains, figure out where a route goes, and even to pay fares. Multimodal mapping services such as Google Maps and Apple Maps provide information on stop locations, routes serving those stops, wait times, and travel times. Transit agencies also deploy proprietary apps to distribute system maps, schedules, and rider alerts.

Websites and Social Media. Before smartphone apps provided real-time travel information, transit agency websites offered custom trip planners, many of which were somewhat difficult to use. Websites are still around, of course, but they have evolved into multiplatform resources available on desktops as well as mobile devices. Agency websites are now also just one element of larger, multichannel information distribution strategies that exploit social media outlets such as Facebook and Twitter to widely and easily distribute service alerts, meeting notices, and other timely information.



Real-Time Arrival Information. Research has found that time spent waiting on transit may be perceived as 50 percent or even 100 percent longer than it actually is. Simply letting riders know not just when their buses or trains are scheduled to arrive, but when they will actually arrive can greatly improve the transit-riding experience. Transit agencies can make real-time information on vehicle locations and projected arrival times widely available, for use in platforms ranging from Google Maps to agency-specific smartphone apps.

Mobile Ticketing. Fare payment options have greatly expanded in the last 15 years. First, stored-value smart cards replaced tokens and eventually paper passes. Customers load cash or prepaid passes onto these cards online, at transit vending machines, and sometimes at local grocery and convenience stores. An example of this is the TAP Card in Los Angeles County. More recently, smart cards have started to give way to mobile ticketing apps (such as OCTA's OC Bus app) that allow users to pay using their smartphones rather than having to acquire and physically reload smart cards.

Vehicle Technologies. Transit operators have recently incorporated a number of new techniques and technologies into their operations, from automated passenger counters aboard vehicles to dispatch software platforms for demand-responsive services. But the most significant advancement may be new methods of vehicle propulsion, most notably the rise of battery-powered electric buses and streetcars. Battery life has been greatly extended in the last few years, and it is now reaching the point where it may be a viable, reliable option for everyday operations. Transit agencies such as King County Metro in Washington state are already putting electric buses into service on a trial basis. (It should be noted, however, that new technologies can be more expensive to operate.)

Transportation Trends

Shared Mobility

In Orange County and elsewhere, the menu of mobility options has also been evolving rapidly.

These options generally fall into the category of shared mobility services, or ways of making private vehicles more efficient by ride sharing or car sharing. Many new alternatives blur the line between private and public transportation. All of them have context-dependent applications and utility. Some will likely compete with transit, while others will prove complementary. Bike sharing and ride sharing, for example, can help traditional fixed-route transit overcome the "first-/last-mile" problem of accessing stops.

Below is a quick snapshot of both newer and older nontraditional mobility offerings. Most of these options already exist in Orange County, although some remain limited to more urban areas.

Car sharing

Round-trip (Traditional). Round-trip car-sharing services offer membership-based short-term car rentals that typically charge by the hour. Reservations are made online or via mobile app; cars are unlocked with the app or membership card. Cars are located in both on-street and off-street spaces throughout a service area and must be returned to the pickup location. The services allow people to occasionally use a car when needed during their otherwise car-free lifestyle.

One-way. One-way car-sharing services operate similarly to round-trip car-sharing, but allow members to park and leave cars at most legal parking spots in the service area. Generally designed to provide shorter trips, one-way services charge by the minute.

Peer-to-peer. This system connects car owners with potential renters via an online interface. Owners list their vehicles online and install hardware in the vehicle to allow immediate access to renters. Reservations for vehicles are made online, and vehicles are returned to the pickup location (or a nearby location) when trips are completed.

Closed network. This system is a private car-share service for a specific development. While closed network services operate similarly to traditional car-sharing services, the car is managed by a property owner and available only to tenants.

Bike sharing

Dock-based. A dock-based bike-share system allows people to check out a bike from a station using a credit card or membership card. Bicycles can be returned to other docks within the system. A standard rental is 30 minutes or less, and most systems offer a variety of memberships and passes.

Dockless. Relying on GPS locators and smartphone technology, this system allows people to reserve a nearby bicycle. Bicycles can be picked up and returned at any ordinary bike rack within a service area, which significantly expands access points and simplifies the return process.

Peer-to-peer. This system connects bicycle owners to potential renters via an online interface. Using a special lock, owners can list their bicycle as available for reservation. Bicycles can be picked up and returned at ordinary bicycle racks within a service area.

Ride hailing

Taxis and Limos. Taxis and limousines are the original private shared mobility services. Both provide for-hire vehicles staffed by professional drivers licensed to transport passengers.

Transportation Network Companies (TNCs). These companies use an online or mobile platform to connect passengers to drivers. Drivers use their personal vehicles, and do not need a special license to transport passengers. Typically more affordable than taxis except during demand surges, such services make it easier for people to leave their vehicles at home but do require a credit or debit card and smartphone. The speed and smooth user interface for many of these services make them attractive options.

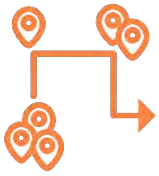
Ride sharing

Carpooling. Carpooling is an arrangement between multiple people to make a trip in a single vehicle. The classic example of carpooling is coworkers who live near each other organizing to share a vehicle to work.

Vanpooling. Vanpooling services are typically fee-based operations operated by a third party. Driven by one of the commuters, the van travels on an agreed-upon schedule to pickup and drop-off locations.

Vanpooling Subscription Services. These services require payment for each trip, providing door-to-door commuting service to people outside of traditional transit service areas or hours. Trips must be booked in advance, and subsidies may be used by lower-income passengers. This service can help to fulfill travel needs not met by transit networks.

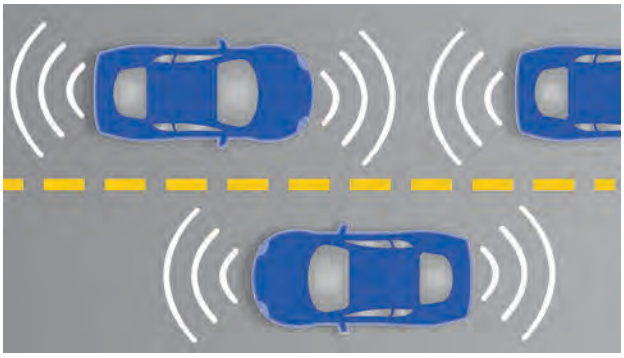
Dynamic ride sharing



Dynamic ride sharing connects passengers and drivers through an online system, pairing individuals making a similar trip. Passengers agree upon and pay a share of the trip's cost. By providing drivers and passengers with an expanded pool of potential travel partners, dynamic ride sharing takes the traditional carpool to a new level.

Autonomous Vehicles

Curiosity about autonomous vehicles has intensified in recent years. As transportation technology continues to evolve rapidly, major benefits such as improved safety, increased mobility, and maximized efficiency may be on the horizon. However, autonomous vehicles will bring new challenges for jurisdictions as technology is slowly integrated with existing infrastructure and human drivers.



Though autonomous vehicles are expected to provide safety improvements, it will take decades for roadways to become fully automated, potentially resulting in friction between autonomous and human drivers. In addition, there are concerns that autonomous vehicles might increase VMT, congestion, and emissions levels. This can result from empty cars traveling long distances to cheaper parking, and commuters traveling longer distances as an attempt at finding cheaper housing.

Additionally, this technology has the potential to increase the capacity of existing roadways through more efficient signal timing and tighter vehicle spacing, reducing congestion concerns and encouraging people to use their own vehicles rather than public transit services. Policies to curtail increased VMT due to autonomous vehicles could play an important role in preventing such concerns from materializing. Potential policies include the following:

- Pay per mile
- Facilitating and encouraging the sharing economy
- Establish autonomous vehicles as support for transit and active modes, not a replacement
- Ensure high quality transit is available, especially along major corridors, as quality will be increasingly important to encourage ridership

Parking is also likely to be impacted as autonomous vehicles emerge. A system of shared autonomous vehicles could reduce the significant amount of land dedicated to parking (if vehicles are shared; if not, parking needs could stay the same, or even increase). This presents a tremendous opportunity to recapture highly underutilized land currently dedicated to storing cars. With technology expected to support complete autonomous capability in 2022—and 100 percent of the market expected to be autonomous by 2045—places like Orange County should begin to

plan for reduced parking in the very near term, especially given the lengthy development process and life span of parking structures[1].

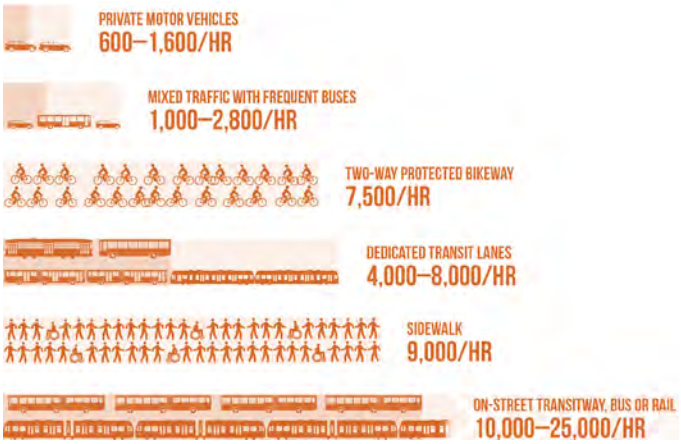
Finally, autonomous vehicles could reduce the cost of providing transit service, if driverless buses are used. However, this is unlikely to occur for some time, if ever, as transit agencies such as OCTA employ thousands of bus operators.

As autonomous technologies begin to emerge, Orange County will need to update infrastructure to maximize capacity and network safety while simultaneously looking ahead to address the potential challenges of managing new technologies.

SUMMARY

These are interesting times for both transit providers and riders. Transit operators are being pulled in multiple directions: on the one hand, cultural, technological, and larger transportation trends are pushing people onto buses and trains. At the same time, factors such as low gas prices are reducing transit ridership. Some transit operators see new transportation options, such as Uber, Lyft, and autonomous vehicles, as existential threats—but in some ways, they are proving complementary to transit. Transit riders, meanwhile, are encountering an unprecedented range of new travel tools and options.

Figure 4-3 10-Foot Lane Capacity, by Mode



The capacity of a single 10-foot lane (or equivalent width) by mode at peak conditions with normal operations.

Source: NACTO Transit Street Design Guide

Whatever the future holds in terms of transportation technology, a few simple facts remain:

- High-capacity transit is a space-efficient (and potentially cost-efficient) way to move large volumes of people in constrained corridors, freeing space for other uses.
- Transit will still have an important role to play in reducing greenhouse gas emissions. Even if electric vehicles become the norm, electricity comes from external sources that are for the most part decades away (at best) from being fully renewable. Transit's ability to use less energy on a per-capita basis matters for the foreseeable future.
- The rise of autonomous vehicles holds the potential to reduce operating costs for transit, making it more cost-effective. Tomorrow's transit network may not look like today's—it is likely to include smaller vehicles and more on-demand operations—but there will still be a transit network featuring high-capacity corridors for decades to come.

[1] Morgan Stanley. (2013). "Autonomous Cars: Self-Driving the New Auto Industry Paradigm." Retrieved from: http://orfe.princeton.edu/~alaink/SmartDrivingCars/PDFs/Nov2013MORGAN-STANLEY-BLUE-PAPER-AUTONOMOUS-CARS%EF%BC%9A-SELF-DRIVING-THE-NEW-AUTO-INDUSTRY-PARADIGM.pdf

5 BEST PRACTICES

This chapter showcases best practices for planning high-capacity transit, with a focus on the Orange County context. It includes the following three sections:

- **High-Capacity and Rapid Transit Modes.** This section defines *transit mode*, and describes the characteristics associated with four forms of high-capacity modes: light rail transit, streetcar, bus rapid transit (BRT), and express bus.
- **Access and Land Use for High-Capacity and Rapid Transit.** High-capacity transit requires a supportive built environment. This section explains and explores how to develop three concepts associated with a transit-supportive built environment: complete streets, multimodal access, and transit-oriented development.
- **Transit Funding.** This section outlines funding sources at the federal, state, county, and local level, as well as alternative funding sources like the private sector and public-private partnerships.

Ultimately, this chapter will help identify high-capacity transit modes that may be suitable for Orange County and examine how these modes have been successfully implemented elsewhere.

Key Points

The following key points are critical when considering different transit modes:

- Each mode consists of four elements: (1) right-of-way design and management, (2) stop design, (3) service model and operating plan, and (4) vehicle type. Each element can have a varying impact on performance outcomes such as speed, reliability, capacity, and rider comfort.
- Modes should not be too narrowly defined. Rather, each mode represents a spectrum of characteristics.
- Some characteristics are necessary for (or typical to) certain modes. Others are more-or-less independent of mode.
- Many elements are interdependent, resulting in complex relationships that must be considered carefully in local decision-making processes.

HIGH-CAPACITY AND RAPID TRANSIT MODES

The capacity and speed of transit are both highly dependent on the transit mode. This section first sets out to define and categorize transit modes, and subsequently compares five modes of high-capacity rapid transit.

Defining a Transit Mode

A transit mode consists of four elements: right-of-way design and management, stop or station design and access requirements, a service model or operating plan, and vehicle type. Figure 5-1 provides examples of each element.

Figure 5-1 Elements of a Transit Mode

Transit Mode Element	Examples
 Right-of-way design and management	Route alignments, dedicated lanes, grade separation, signal priority
 Stop design and access requirements	Stop design, stop amenities, real-time vehicle information, prepaid boarding zones
 Service model/ operating plan	Vehicle frequency, interlining
 Vehicle type	Bus, light rail train, streetcar

A transit mode is not the same thing as a transit vehicle. Misunderstanding transit modes can result in a misguided focus on vehicle selection.[1] This can lead to two problematic outcomes: (1) selecting an unsuitable mode, or (2) selecting a suitable mode, but neglecting to account for elements beyond vehicles (e.g., right-of-way, stops/stations, and service).

Rather, planning for high-capacity transit should be based on a set of desired outcomes that can be tied to measurable performance, such as better passenger comfort, higher capacity, more reliable service, faster travel time, or increased frequency of service. Vehicle selection is one concern among many.

[1] Further adding to the confusion: a mode and vehicle share the same name (e.g., streetcar) and identical vehicles can be used for different modes (e.g., BRT and local bus service).

Categorizing Modes

This section outlines the modes included in (and excluded from) the OC Transit Vision, as well as the non-vehicle elements of a mode. It also discusses the relationship between modes and performance outcomes.

Modes included in this analysis

This analysis of best practices includes five types of modes: express bus, bus rapid transit, streetcar, rapid streetcar (or tram), and light rail transit. These five modes can be described as follows.

Figure 5-2 Modes Included in this Analysis

Mode	Description
 Express bus	Like all bus modes, express bus service can be provided by different types of buses (including buses powered by various fuel sources as well as buses of different sizes, interior configurations, and comfort levels). However, express bus is differentiated from other modes of bus service by its service model and, in many cases, by right-of-way requirements. Express buses make few stops, generally operating from point-to-point rather than along a corridor. Routes are also typically longer than local- or limited-stop bus routes (or streetcar lines), and nonstop segments are often located along freeways, or at least major arterial streets. These routes sometime take advantage of managed lanes on freeways. Stops tend to be curbside or at park-and-ride lots. OCTA operates eight express bus routes (not including Routes 57X,64X, and Bravo!, which are more properly described as "limited-stop" routes, or routes that are not non-stop but have a limited number of stops).
 Rapid bus (Bravo!)	Rapid bus features some, but not all of the features of bus rapid transit (see below). At a minimum, it features a limited number of stops, making service faster and more reliable. It may also include custom branding, transit priority at traffic signals and other features.
 Bus rapid transit (BRT)	BRT is a bus service where a majority of the line operates in a separated right-of-way dedicated for public transportation use during peak periods and includes features that emulate the services provided by rail fixed guideway public transportation systems, including: defined stations; transit signal priority; high-frequency bidirectional services for a substantial part of weekdays and weekend days, pre-board ticketing, platform level boarding, and separate branding.

Mode	Description
 Streetcar	Streetcar vehicles are small railcars (slightly larger than a 60-foot articulated bus) that generally are not coupled to form trains. Streetcar typically operates in mixed traffic, without any priority at signals, and makes curbside stops. Streetcar lines are relatively short, and services usually run often and make stops every few blocks. In terms of mobility, a streetcar may be no better than a local bus, and significantly slower than a rapid bus. However, streetcars provide a smoother ride than most buses, and have been shown to attract adjacent development, which can improve access by bringing destinations closer together.
 Rapid streetcar	Rapid streetcar is not a mode familiar to many Americans, although the term might be used to describe many European "tram" systems. The rapid streetcar concept illustrates the danger of defining modes too narrowly: it can be thought of as a hybrid of streetcar and light rail, and may be appropriate in very specific contexts. Indeed, the western segment of the OC Streetcar between Santa Ana and Garden Grove, which will operate in an off-street right-of-way (the old Pacific Electric right-of-way) with widely spaced stops, might fit the definition of rapid streetcar. Rapid streetcar can combine the modestly designed stops of a typical streetcar project and willingness to incorporate some single-track segments (which limit capacity, but lower cost) with a longer alignment and coupled trains.
 Light rail	Light rail vehicles are somewhat larger than streetcars (80 to 90 feet long), and are typically coupled to form trains. They are also faster, with top speeds around 65 miles per hour, compared to 45 miles per hour for streetcars. Their greater speed and capacity make them an attractive choice for longer trunk routes, and stations are often a mile or more apart. Light rail vehicles often operate in their own off-street right-of-way, although they can and sometimes do run in the street. Light rail can be designed with varying service goals, taking on different service attributes depending on the market to be served. For example, the Los Angeles County Metro Rail's Green Line, which operates largely in the median of the Century (Interstate 105) Freeway, is entirely grade-separated, resembling a somewhat lower-capacity—but equally rapid—heavy-rail or "metro" line. Conversely, Muni light rail in San Francisco serves local in-city trips at slower speeds and with much shorter stop spacing. Here much of the system operates on city streets as there is less need for grade separation to achieve the high speeds needed to provide competitive travel times over long distances between cities.

In addition to the high-capacity transit modes described above, which will be considered for major corridors as part of the OC Transit Vision, the Vision will also explore opportunities for new on-demand transportation services in lower-demand areas, similar to those offered by transportation network companies such as Uber and Lyft.

Modes not included in this analysis

Neither additional **commuter rail** (Metrolink) nor **heavy rail** (Los Angeles Metro Rail Red and Purple lines) are included in this analysis. They are unlikely candidates for local use in Orange County, in the case of commuter rail because it would require new off-street railroad right-of-way, which is unavailable, and in the case of heavy rail because that mode is very high capacity, very expensive, and only appropriate in dense urban areas of very high transit demand.

Non-vehicle elements of a mode

All modes of transit can be categorized using three non-vehicle elements: right-of-way design and management; stop/station design; and service model/operating plan.

- **Right-of-way design and management.** Transit modes are often associated with corridor characteristics or market contexts; for example, streetcars are strongly identified with walkable urban neighborhoods, while light rail is viewed as a more regional solution. Faster modes, such as light rail and express bus, are considered more appropriate for longer alignments. Similarly, rapid streetcar represents an acknowledgement that streetcar vehicles—which are typically associated with local-stop service[2]—may be appropriate in certain light rail corridors. The vehicle would not change, stops might not be more elaborate, and some elements of right-of-way design might not change—for example, there could be some segments in traffic lanes—however, other components would, including greater use of dedicated right-of-way and signal priority at intersections.
- **Stop design and access requirements.** Stop spacing has an important impact on speed for any vehicle type. For example, express bus is faster than local or limited-stop service not because of higher-speed vehicles, but because of its operational model of point-to-point rather than linear service. Similarly, prepaid boarding zones can be used with almost any vehicle type and can reduce dwell times at stops. This in turn improves average speed and reliability.
- **Service model and operating plan.** Operations can have an impact on capacity, by increasing frequency for any given vehicle type.

Relationship between performance and mode elements

The four elements of a mode relate to each other and to performance outcomes (e.g., passenger comfort, capacity, frequency, reliability, speed) in ways that can be quite complex.

For example, overall capacity is a function of both vehicle size and the number of vehicles (i.e., frequency). Frequency, in turn, is a function of various factors including demand, operating cost, right-of-way, and stop design. These are each affected to a certain extent by the type of vehicle.

Certain performance outcomes are more related to vehicle type than others. On one hand, outcomes associated with capacity and rider comfort are closely related to vehicle type. With respect to capacity, for example, a multicar light rail train may carry hundreds of passengers,

[2] Streetcars are more commonly associated with local service in North America.

several times as many as a 40-foot bus. With respect to comfort, passengers tend to view rail travel as more pleasant than bus.

On the other hand, outcomes associated with speed and reliability—while related to vehicle type in some ways—are more closely associated with right-of-way and stop/station considerations. For example, an express bus with no intermediate stops and a dedicated freeway lane may travel more quickly than light rail service with typical stop spacing.

Indeed, one of the strongest arguments made by proponents of bus rapid transit is that service design, right-of-way design and management, and stop design are each largely independent of vehicle type. For example, the following elements can be applied to buses, streetcars, or light rail vehicles:

- Limited stop spacing
- Segregation of the right-of-way to reduce conflicts with other vehicles (using design strategies ranging from part-time transit-only lanes to a fully grade-separated guideway)
- Right-of-way management to reduce other sources of delay (including transit priority at traffic signals)
- Stop design to reduce dwell time, or time spent at stops (including level and all-door, prepaid boarding)

Categorizing modes can assist local discussions regarding major transit investments. However, even when the definition of a mode is correctly understood, modes can be too narrowly defined. This can result in neglecting more important considerations of service quality. Ultimately, modes should be understood as spectrums of characteristics rather than well-defined categories.

Comparing Modes

Following are more detailed descriptions of high-capacity and rapid transit modes that may be recommended for use in Orange County as part of this study. Note that these descriptions are based on typical applications, and that some elements may not be inherent to that mode.

Light Rail Transit

Light rail transit (LRT) is a medium- to high-capacity mode that can operate in a variety of rights-of-way, from off-street rail lines to traffic lanes on city streets. This flexibility is due to the use of overhead wires for electrical power rather than a grade-level third rail such as that used in heavy-rail systems, which requires complete grade separation. Light rail vehicles are typically combined into two- to four-car "consists" (trains). Each car can accommodate 150 to 220 riders, resulting in much higher capacity than buses or single-car streetcars.

Figure 5-3 LRT in San Diego

Light rail stations are usually spaced a half-mile or more apart to allow trains to reach higher speeds, but are sometimes spaced more closely, particularly where light rail operates on-street in urban environments such as Downtown Long Beach. Stations can range from relatively simple stops with shelters to larger, place-making platforms featuring public art, secure bike lockers, bike-share docks, neighborhood or regional maps, and other amenities. Most stations do, however, feature ticket vending machines for off-board fare payment, allowing passengers to quickly board using all doors. Modern light rail systems also feature level or near-level boarding using either high platforms or low-floor vehicles. Like other urban rail modes, light rail service typically operates relatively frequently, every 15 minutes or better throughout the day, seven days a week.

Capital costs for light rail projects vary greatly depending on factors such as the level of grade separation: laying tracks on a street costs significantly less than building a viaduct or digging a subway. In general, light rail costs more than streetcars (partly due to the greater excavation required to provide deeper track foundations) but less than heavy rail lines. The most recent light rail projects completed in Los Angeles County—the Gold Line Foothill Extension and Phase Two of the Expo Line to Santa Monica—cost approximately $65 million and $140 million per mile.

Light rail systems are found throughout the southwestern United States, in Los Angeles County, San Diego, Silicon Valley, San Francisco, Phoenix, Salt Lake City, and Denver. Light rail was the mode proposed for OCTA's CenterLine project in the 1990s.

Streetcar

Streetcars are rail vehicles that are somewhat smaller and slower than light rail vehicles and are usually not coupled together to form trains. They may be either modern low-floor streetcars providing easy access for wheelchairs and strollers, or historic cars (either authentic or replica) with high floors requiring wheelchair ramps at stops. Like light rail, streetcars are powered by overhead wires. In North America, streetcar lines are usually shorter than light rail lines and generally run in mixed traffic. Stop spacing more closely resembles a local bus route than a light rail line. Stops themselves often are located on sidewalks, requiring them to be smaller and simpler than light rail stations, although they may have ticket vending or validating machines allowing prepaid boarding.

Figure 5-4 OC Streetcar

Source: OCTA

Despite their limited speed and reliability advantages over buses—streetcar lines can actually be slower and less reliable than bus rapid transit lines (see next section)—streetcars have become enormously popular in North American cities. They tend to attract somewhat more riders than a comparable bus line, are cheaper and easier to build than light rail lines, and have been proven to attract transit-oriented development and support walkable neighborhoods, making them as much an economic development tool as a mobility tool.

Despite their typical design in North America, streetcars do not necessarily have to make frequent stops, or operate in mixed traffic—and indeed, the planned OC Streetcar between Santa Ana and Garden Grove will operate off-street (in the old Pacific Electric right-of-way) and make relatively few stops in its western segment, making it more of a rapid streetcar as described earlier in this chapter.

Typical differences between streetcar and light rail lines are shown in Figure 5-5.

Figure 5-5 Typical Differences between Streetcar and Light Rail

Service Element	Streetcar	Light Rail
Vehicles	Modern or historic streetcar	Modern light rail vehicle
Train length	1 car	2-4 cars
Line Length	Shorter	Longer
Running Way	Mixed traffic	Dedicated right-of way
Fare Collection	On platform or on vehicle	On platform
Stations	Short platforms; limited amenities	Longer platforms; robust amenities
Station Spacing	2 to 3 blocks	½ to 1 mile
Speed	Slower	Faster
Development Benefits	Along line	Around stations

Bus Rapid Transit

Bus rapid transit (BRT) is a relatively new mode for U.S. transit systems; its use began in Latin America in the 1970s but has only recently become common in North America. The exact definition of BRT is a subject of debate, but it might be described as "buses behaving like trains." (under federal definitions, the majority of a BRT route must be "fixed guideway," or feature dedicated bus lanes). BRT is, essentially, an effort to take all of the things that people like about trains—the speed, the reliability, the convenience and comfort—and apply them to buses.

Figure 5-6 sBX Green Line in San Bernardino

While rail modes are based largely on vehicle—light rail, streetcars, heavy rail, or commuter rail—BRT is not really about the vehicle. Instead it's a toolbox of improvements that can be applied to vehicles, stops, rights-of-way, and operating plans to provide better service. Because there is such a wide range of potential improvements, BRT projects can take many forms, depending on which tools are used. Some of the most common tools are described below:

- **Limited stop spacing.** BRT routes typically feature stop spacing similar to that of light rail: a half-mile or mile apart in many cases. This allows for faster and more reliable service. Placing stops at the busiest locations (including transfer points), can keep most riders close to their bus stop.
- **Bus-only rights-of-way.** This is one of the defining features of what is sometimes called "full" BRT, as opposed to "partial" BRT, "BRT lite," or simply "rapid bus." In a full BRT

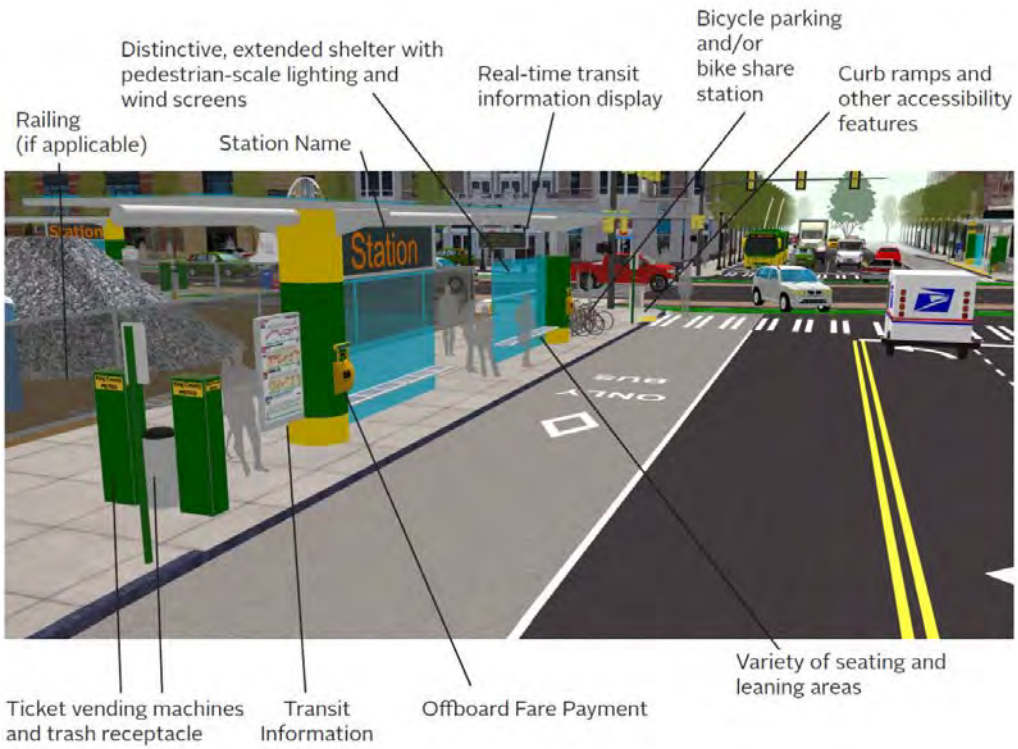
system, buses are partially or fully separated from traffic to further improve speed and reliability. Separation can take many forms:

- a fully grade-separated elevated or underground right-of-way
- a busway with intersections
- transit-only lanes on city streets, typically in the center median to separate buses from right-turning autos
- business access and transit (BAT) lanes shared with cars turning right or accessing parking spaces
- queue jump bypass lanes at traffic signals, either bus-only or shared with right-turning cars

One of the most appealing things about BRT is its flexibility—while trains always require tracks, BRT lines can include segments with bus-only right-of-way and others in which buses mix with traffic. This can, however, lead to watered down projects that have lower costs and impacts but also drastically reduced effectiveness.

- **Other transit-priority treatments.** In addition to fewer stops and bus-only right-of-way, buses can be made faster and more reliable using technology such as transit-priority signals that sense approaching buses and hold the green light a few seconds longer (or, in rare cases, that turn a red light green).
- **Station-like stops.** Full BRT stops are more like light rail stations than local bus stops, with amenities including real-time arrival information, maps, and ticket vending machines for prepaid boarding. Stops may also have raised platforms to enable level or near-level boarding. Together, prepaid boarding and level boarding can greatly speed up the loading and unloading process, further improving speed and reliability.

Figure 5-7 Elements of a Typical BRT Station



- **High-capacity vehicles.** While some BRT lines deploy regular 40-foot coaches, many use 60-foot articulated vehicles that have an open seating configuration with more standing room and overall capacity. Sixty-foot vehicles may have three or even four doors to speed loading and unloading, and in rare cases, doors are located on both sides of the vehicle, allowing for stops on either side of the street. The latter is typically found where there are median- or center-running bus lanes with bidirectional center-island platforms.
- **Custom branding.** Light rail vehicles and streetcars are highly visible, partly due to the vehicles themselves, but also because they run on clearly visible tracks with overhead wires. Since BRT lacks these distinctive elements, transit agencies employ custom branding to distinguish BRT from local buses and to raise awareness of BRT's improved service. This branding can be applied not only to vehicles and stops, but to websites, marketing materials, and all of BRT's public-facing physical or digital elements. Increasingly, bus lanes are painted—often bright red—to differentiate them from regular traffic lanes and further increase visibility.
- **Higher levels of service.** Like light rail or streetcar lines, BRT lines are typically frequent, although less robust lines may not be available evenings or weekends. Thanks to the measures described above, BRT is also more reliable than regular bus lines. Real-time arrival information displayed at stops and on smartphone apps can further reduce both actual and perceived wait times, while features such as level boarding (eliminating the need to climb stairs or mechanically raise platforms) and larger vehicles make BRT more comfortable. Service can further be improved using operational techniques such as headway-based scheduling, which simply schedules buses to arrive every 10 or 12 minutes rather than at than at an exact time. Such scheduling is made possible by frequencies of

less than 15 minutes, eliminating the need for riders to consult a schedule before heading to the bus stop.

BRT provides greater flexibility than rail in other ways. One major advantage is that buses can operate as BRT for part of their routes and as regular local or express service in other segments (in outlying areas, for example). This, in turn, can allow many regular bus routes to take advantage of BRT improvements once they enter a busway or bus lanes, leveraging the BRT investment and extending the reach of enhanced service.

Another advantage of BRT is its lower cost. Depending on which tools are used, BRT can cost anywhere from a few hundred thousand dollars a mile for basic service to many millions of dollars to more closely resemble light rail. All else being equal, however, BRT will always cost less than rail, since tracks and overhead wires are not required. Moreover, BRT lines have consistently increased ridership substantially over the local bus lines they replaced, resulting in high cost-benefit ratios and return on investment.

For these reasons, partial and full BRT is becoming increasingly common in North America. Rapid bus lines in Southern California include OCTA's Bravo! and Los Angeles County's Metro Rapid (both rapid bus services). Full BRT examples include the Metro Orange Line in the San Fernando Valley (featuring a dedicated busway); and Omnitrans' sbX service in San Bernardino (featuring bus-only lanes).

Figure 5-8 Regular Bus vs. Rapid Bus vs. Bus Rapid Transit

Source: Nelson\Nygaard

Express Bus

Express bus service is, as its name suggests, faster than local bus service. While BRT uses a suite of tools to provide a faster service, express buses are faster for two simple reasons: they make fewer stops and they generally operate in high speed rights-of-way. Designed to serve commuters, express buses typically operate only during weekday rush hours. Stops are at regular bus stops or at park-and-rides. Vehicles range from regular buses to Greyhound-like over-the-road coaches with more comfortable high-back seating.

Figure 5-9 Sound Transit Freeway Express

Source: Flickr user Atomic Taco

To increase speed, express bus routes often operate on highways. They sometimes operate in high-occupancy vehicle (HOV) lanes, although doing so may require merging across multiple lanes to make stops. In some cases, express buses solve this problem by running on the shoulder; this has been standard in the Minneapolis/St. Paul area for decades, and is used on a limited basis in the San Francisco Bay Area. Alternately, stops can be built in the median of the freeway, typically connected to park-and-ride facilities using pedestrian bridges; this configuration is used in the Seattle area. A third option is to use bus-only "slip ramps" to access stops beside the freeway without having to travel over city streets; this approach is used in the Denver area. Freeway express routes with median stops or slip ramps are sometimes referred to as "freeway BRT," since they make use of bus-only infrastructure.

OCTA currently operates eight express bus routes, several with long freeway segments. Of all high-capacity transit modes, express bus routes are the cheapest to implement, as they require limited infrastructure. However, because they are designed for specific types of trips (e.g., commutes to work), they are of limited utility for people taking trips outside of the standard peak hours. The exception to these lower costs is unidirectional services operating only during peak periods; they are relatively expensive to operate, as they must deadhead back to their starting point in the reverse direction.

ACCESS AND LAND USE FOR HIGH-CAPACITY AND RAPID TRANSIT

Transit service and infrastructure do not exist in isolation; rather, they are part of a larger, multimodal transportation system. The extent to which transit is effectively integrated with other elements of the system goes a long way toward determining its success.

As discussed in Chapter 5, transit and land use are strongly interrelated. This chapter discusses both transit access and transit-oriented development in more detail.

Complete Streets

Complete streets are designed and operated to safely accommodate people of all ages and abilities. This principle holds true regardless of activity:

- Walking, bicycling, or riding public transit

- Driving or riding in motor vehicles, including taxis and other shared mobility services
- Operating freight or delivery vehicles

Complete streets support transit access and operations, as every transit trip starts with a trip by some other mode. Most transit passengers are pedestrians first, others access transit by bike, and others park a car or are dropped off at a transit stop. Complete streets provide safe walking and bicycling facilities and support the safe and efficient operation of transit, including high quality bus stops and passenger facilities, transit priority treatments, and other design elements that prioritize moving people over moving cars.

The National Complete Streets Coalition describes incomplete streets as "a hindrance to [transit] riders" and to "good service." Poor design slows service and discourages people from riding transit. Even though most transit riders begin their trips on foot, there is often a disconnect between road planning and transit planning. In many cases, this leaves transit riders waiting without shelter on a patch of dirt, and often along a high-traffic street with no sidewalks or safe crossings.

In contrast, complete streets make transit safe, convenient, and comfortable. The Coalition notes, "complete streets policies help create the safe and comfortable bus stops and smooth predictable transit trips that help make public transportation an attractive option."

Benefits of Complete Streets

Complete streets ensure safe and convenient access to public transit for all people. Complete streets include safe and comfortable bus stops and smooth, predictable transit trips that help make transit an attractive travel option. Although the addition or improvement of sidewalks and bikeways are often the biggest physical changes necessary to build a complete street, true complete streets projects also enhance transit service. Major transit benefits of complete streets include the following:

- Improve transit speed and on-time performance by reducing the amount of time buses are stuck in traffic
- Improve access and safety for riders by enhancing first-/last-mile connections to transit services
- Provide space along the street for comfortable transit stops or stations with amenities
- Encourage mixed-use, transit-oriented development that can increase the demand for transit
- Promote economic development by making it easy to cross the street, walk to shops, and bicycle to work
- Improve safety for all people by reducing motor vehicle speeds, intersection crossing distances, and potential conflicts and collisions

Examples of Complete Streets

Figure 5-10 Concept for a Complete Street in Santa Ana

A truly complete street must accommodate the access, mobility, and safety needs of all travelers. For example, a bus stop located far from a safe crossing can put transit riders in danger. Similarly, a sidewalk without curb ramps is useless to someone in a wheelchair. A road with heavy freight traffic must have sufficiently wide lanes and intersections designed to accommodate turning trucks. Accessibility and mobility for automobile drivers and passengers must also be considered in planning for complete streets, as many changes made to better accommodate non-auto modes of transportation will also improve conditions for personal vehicles. Ensuring that streets are designed and operated to safely accommodate all these interests requires that multiple agencies and stakeholders work together, with a clear and consistent set of priorities.

Cities and counties around the country—small and large, rural and urban—have been building complete streets to improve comfort, convenience, and safety, and to increase people's ability to travel by a variety of modes. The photos below illustrate complete streets projects in various contexts.

Figure 5-11 Complete Streets in Kirkland, Washington (Before and After)

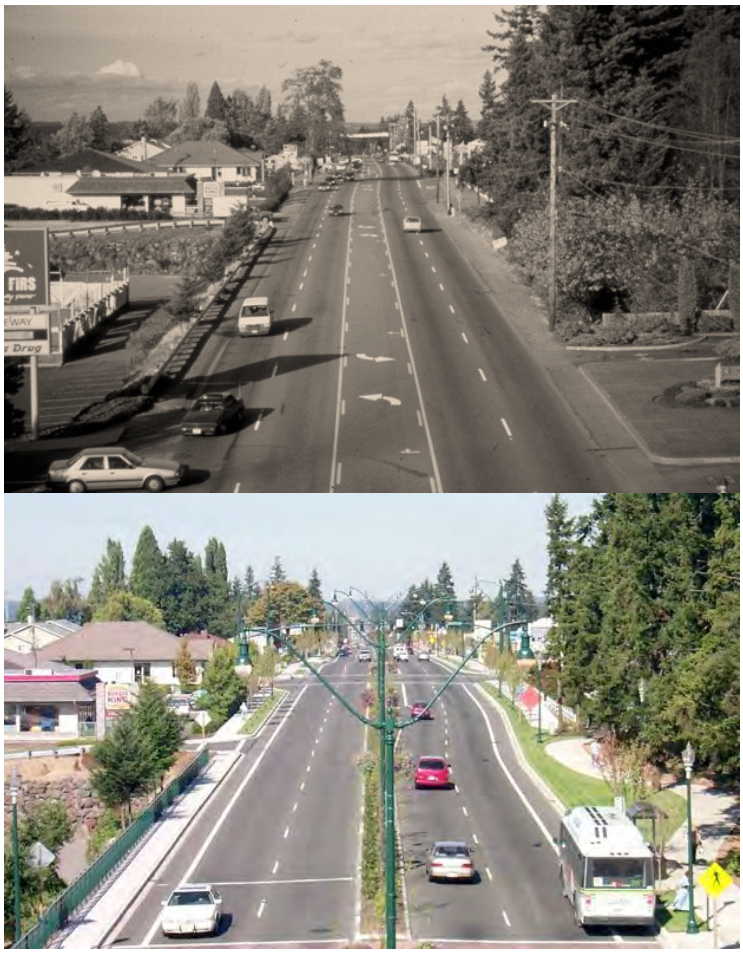


Figure 5-12 Complete Street in Lee County, Florida

When constructed, the LCCSI will transform auto-oriented roads into complete streets that serve all users, as in this rendering of one of the LCCSI projects on Colonial Boulevard, providing new walking and bicycling infrastructure, transit amenities, and wayfinding.

Best Practice: Training and Implementation

Chicago, IL

The City of Chicago adopted a Complete Streets policy in October 2006. To help staff understand and implement the policy, the Chicago Department of Transportation worked with the Chicago Metropolitan Agency for Planning to sponsor a series of training sessions for city planners, engineers, and project managers. Several hundred people participated in four two-day workshops, resulting in a greater awareness of Complete Streets issues and increasing understanding of potential design considerations.

In 2013, Chicago published its Complete Streets Design Guidelines, another implementation tool to help staff operationalize Complete Streets in all phases of a project including planning, design, construction, and maintenance.

Source: Complete Streets: Best Policy and Implementation Practices, Chapter 5, 2013.

Process for Developing Complete Streets

There are four steps to ensure the successful implementation of complete streets:

1. Adopt a complete streets policy
2. Change your practices to implement the policy
3. Follow those new practices and design context-sensitive complete streets
4. Monitor the performance of complete streets projects to ensure they work

Step 1: Policy Development

Complete streets start with a strong, locally-driven policy statement, making explicit the intent to safely accommodate all people in decisions related to street design and operation. A clear policy statement provides guidance for planners, engineers, and community members and can also provide necessary political and institutional momentum for implementation. According to the National Complete Streets Coalition, a comprehensive complete streets policy incorporates the following elements:

- Specifies that "all users" includes pedestrians, bicyclists, and transit passengers of all ages and abilities, as well as trucks, buses, and automobiles
- Applies to new and retrofit projects (including design, planning, maintenance, and operations) for all roads
- Makes any exceptions specific, requiring both clear procedures and high-level approval
- Encourages street connectivity and aims to create a comprehensive, integrated, connected network for all modes
- Directs the use of the latest and best design criteria and guidelines while recognizing the need for flexibility
- Directs that solutions will complement the context of the community
- Establishes performance standards
- Includes specific next steps for implementation of the policy

Orange County has its own recently adopted complete streets policy—the Orange County Complete Streets Initiative—developed by the Orange County Council of Governments.

Step 2: Implementation

Once a strong complete streets policy is in place, the next step is to ensure it moves from paper into practice. An implementation plan is necessary to identify documents and processes that must be changed, assign responsibility for making such changes, and define specific desired outcomes of policy implementation.

One of the biggest challenges is changing "business as usual" practices in transportation budgeting, programming, and street planning, design, and operations. Implementation plans can help guide planners and engineers through new procedures and ways of thinking. Some communities have used procedural training to empower agency staff and ensure they understand how to apply the new policies, practices, and procedures in their work.

Step 3: Designing Complete Streets

Accommodating safe access along and across all streets for people traveling by all modes of transportation can be achieved with a variety of different types of design treatments and street operations. An effective complete streets design is sensitive to community context. Clear guidance for context-appropriate application of complete streets principles can allay fears that "complete

streets" will mean inappropriately wide roads in quiet neighborhoods or miles of costly, little-used sidewalks in rural areas. The table below (Figure 5-11) highlights a selection of complete streets treatments that can facilitate access and mobility for people walking, cycling, or riding transit.

Ultimately, a context-sensitive approach to complete streets planning and design can create a comprehensive, integrated, connected network for all modes that recognizes the need for flexibility in balancing community needs.

Complete streets guidance for Orange County can be found in the OCCOG Complete Streets Initiative Design Handbook.

Figure 5-13 Transit-Supportive Complete Streets Design Treatments

Transit-Supportive Complete Streets Design Treatments

Right Sizing Arterial and Collector Streets

- Conversion from 4 to 3 lanes; allows addition of center turn lane, bikeways
- Improves safety by reducing pedestrian crossing distance and reducing potential conflicts
- Appropriate and can maintain vehicle street capacity up to 25,000 vehicles per day

Median Refuge

- Enables safer pedestrian crossing, with shorter crossing distances

Curb Extensions

- Supports safer pedestrian crossings
- Provides space for high-capacity bus stops/shelters
- Enables more efficient in-lane bus stops

High Quality Bus Stops and Stations

- Spacious and set back from sidewalks to maintain pedestrian walkway
- Amenities, including shelters, benches, line and system maps, trash bins, and real-time bus arrival information

Transit-Only/BAT/HOV Lanes

- Maintains speed and reliability on corridors with high frequency service and transit priority
- Business Access and Transit (BAT) lanes are dedicated to buses and right-turning traffic
- High Occupancy Vehicle (HOV) lanes are viable on some arterials

Transit Stop Islands

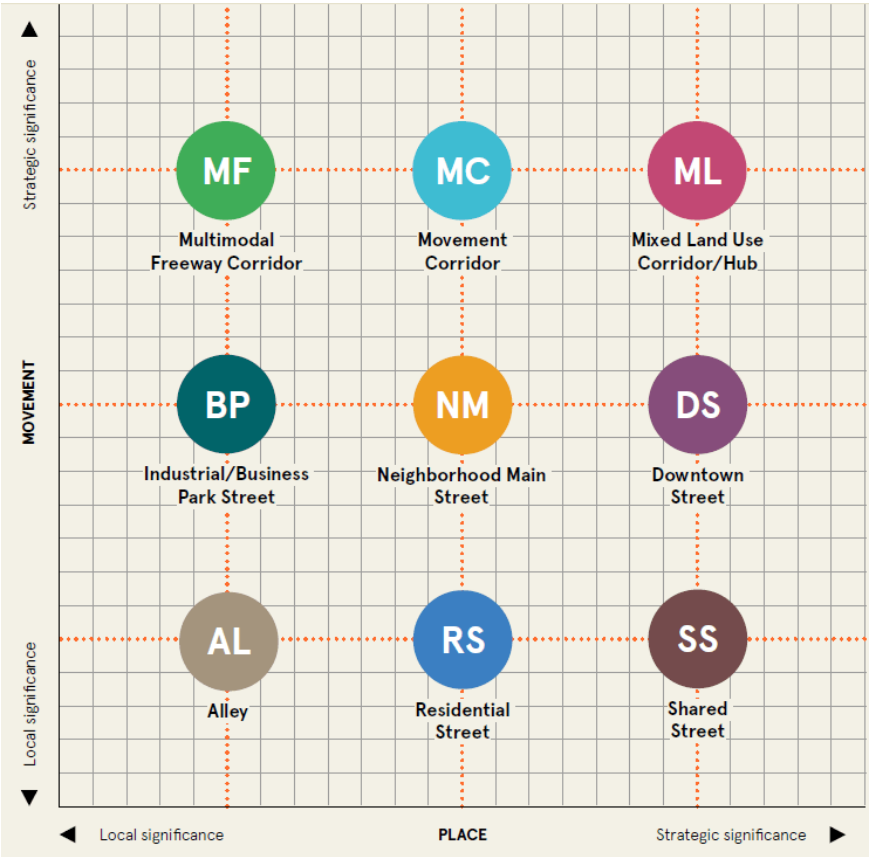
- Transit stop/waiting area located in travelway, with bikeway located between transit stop and the curb
- Completes the street on corridors with separated bikeways and frequent transit service
- Eliminates bus/bike conflict near stops

Step 4: Monitoring Progress

Progress monitoring and adaptation are necessary to ensure effective and consistent implementation of complete streets policies across all agencies and all types of streets. Some communities use quantitative and qualitative performance indicators to gauge how a particular street, street segment, or the entire street system is working. There are several approaches:

- Performance measures can be used for needs assessment to identify problems in the system and to assess their relative severity. For example, in Roanoke, Virginia, planners developed a scoring system for major streets that takes into account safety, connectivity, and design, as well as the presence of street trees, stormwater and drainage issues, and the availability of sufficient right-of-way to accommodate all modes.
- A related approach is to develop a classification system that assesses a street's appropriateness for complete streets treatments. The street typology or categorization system developed for the OCCOG Complete Streets Design Handbook is shown in Figure 5-12. For each street type, a distinct design approach is recommended.
- Finally, some places have developed a comprehensive monitoring system that tracks a suite of performance indicators for the transportation system on a regular basis. For example, Redmond, Washington, uses a Mobility Report Card with over 15 indicators to spot trends and track progress toward goals.

Figure 5-14 OCCOG Street Categorization System

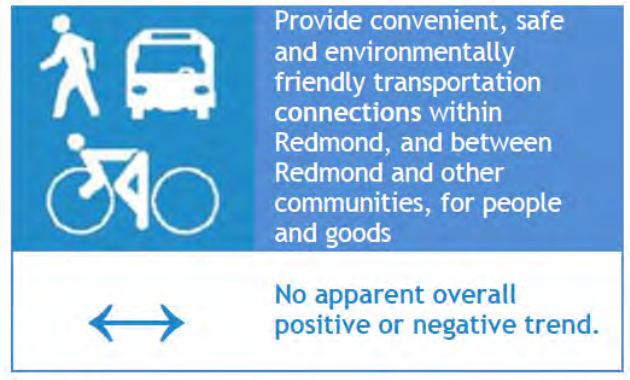


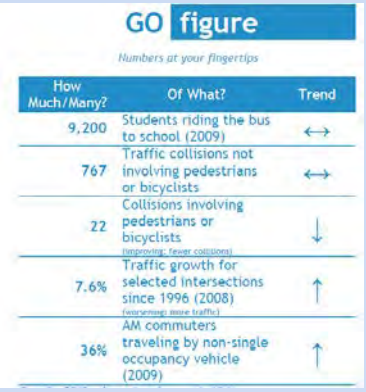
Source: OCCOG

Best Practice: Complete Streets Standards and Indicators

Redmond, WA

In September 2007, Redmond became the third community in the Central Puget Sound Region to adopt a Complete Streets ordinance. The ordinance codified the steps Redmond had already taken in its comprehensive plan and transportation master plan (TMP) to create a balanced, multimodal transportation network. Redmond is a suburban-style community that is using Complete Streets to build support among constituents and elected officials.





In the TMP, Redmond created a mobility report card measuring a variety of indicators: concurrency (between land development and transportation system capacity); a.m. mode share; school bus ridership; public transportation travel time and service frequency; average weekday boardings on public transportation; service hour targets for local public transportation; p.m. peak-hour vehicle miles traveled; average traffic growth by transportation management district; percentage of pedestrian environment designed to "supportive" standards; completion of the bicycle network; number of vehicle, pedestrian, and bicyclist collisions; and status of the Three-Year Priority Action Plan. This information is used to evaluate the performance of each mode, including transit.

Source: Chapter 5 of Complete Streets: Best Policy and Implementation Practices, 2013.

Multimodal Access

Every transit trip starts and ends with a trip by another mode. Providing safe, convenient, and comfortable access to transit stops and stations is fundamental to serving existing transit customers and attracting new riders. Seamless and integrated pedestrian, bicycle, drop-off, and parking infrastructure supports all forms of multimodal transportation, including walking, biking, car sharing, carpooling, and park-and-ride facilities.

Current conditions in parts of Orange County make access to transit a challenge for many people. Wide roadways with no pedestrian crossings, limited sidewalks, and a lack of bicycle infrastructure can make it difficult for people to reach transit.

By working with municipal partners to improve connections and access to transit for people of all ages and abilities traveling by all modes of transportation, OCTA can help increase transit ridership and make transit a more attractive choice for more people.

Types of Access to Transit

There are five primary ways people access transit:

1. Connecting/transferring from other transit routes
2. Walking (including using a mobility device, such as a wheelchair)
3. Bicycling
4. Getting dropped off (either by a partner, family member, friend, taxi, or TNC vehicle); and
5. Driving and parking a vehicle.

In addition, mobility hubs at transit stations and transfer centers provide additional connectivity options, such as car sharing and enhanced bike stations featuring amenities such as bike repair and rentals, secure parking (lockers or staffed valet), and bike-share pods. This section focuses on walking, biking, pick-up/drop-off, and park-and-rides.

Pedestrian Access

A good pedestrian environment is an essential foundation for good access to public transit. As such, it is critical for attracting new riders, increasing ridership among existing passengers, and improving the overall travel experience. The quality of the pedestrian environment is often a deciding factor in choosing whether or not to take transit, especially for those with other options.

Figure 5-15 High-Quality Pedestrian Environment (Lowell, Massachusetts)

Source: Nelson\Nygaard

Pedestrian access to transit refers to the extent to which the pedestrian environment, amenities, and infrastructure support people in accessing transit services. Well-designed, pedestrian-oriented infrastructure increases the safety, comfort, and enjoyment of the entire transit trip. Gaps in the sidewalk network, stops along high-speed roads, and insufficient waiting areas all contribute to less attractive transit facilities and can deter transit riders.

Bicycle Access

The quality of bicycle amenities, facilities, and the environment affect access to transit. Improving bicycle access to transit supports existing ridership levels and attracts new transit passengers by providing additional connectivity to other modes and enhancing the overall travel experience. Targeted coordination of policies, programs, and implementation among agencies and private entities is required to successfully integrate these modes of travel. Bicycle access strategies include safe travel conditions to access transit via on-street facilities or trails, stop amenities such as bike parking, and integration with transit vehicles.

Figure 5-16 Bus/Bike Integration (Seattle)

Source: Nelson\Nygaard

Passenger Pick-up and Drop-off ("Kiss-and-Ride")

Many railway stations and airports feature an area in which cars can drop off and pick up passengers. These "kiss-and-ride" facilities allow drivers to stop and wait, instead of using longer-term parking associated with park-and-ride facilities. A passenger drop-off at a transit stop or station is another important way that people access transit. Especially in cases where people cannot reach a transit stop on foot or by bike, a family member, friend, or carpool might help to make that connection. Ensuring that transit stops and stations have safe, convenient, and well-marked areas for drop-offs is important and can be accomplished through station and stop design, including wayfinding.

Park-and-Ride

Park-and-ride lots are parking lots or parking garages used by transit riders or carpoolers. Park-and-rides are primarily used by traditional commuters who park in the morning, board a transit vehicle, and return in the evening. Park-and-rides can be served by a single route or by multiple routes. Carpoolers and vanpoolers may also use park-and-ride lots to meet and start their trip. Park-and-ride lots might be owned by the transit agency, or the agency might have an agreement with a private operator to allow transit customers to use the lot.

Figure 5-17 OCTA Park-and-Ride

The Importance of Connections

Regardless of the mode of transportation a person uses to access a transit stop or station, the connection must be safe, convenient, and legible.

- **Safe.** Safe connections are those that do not put people on foot or on bike in danger of collision with a motor vehicle. This means providing the right facilities, both along the roadway and across it. Safe connections are also those that make people feel secure, with good lighting both at transit stops and along the way to the stop. This can also mean providing secure bicycle parking at stops and stations so that passengers aren't worried about their bicycle getting stolen while they are on their transit trip.
- **Convenient.** People must find their multimodal connections to transit convenient, otherwise they are unlikely to use transit if other options are available. For example, if a person has to walk five blocks out of their way to reach a signal in order to cross the street to the transit station, they are less likely to walk to the transit station. And if people who want to use a park-and-ride facility can't find the lot or don't know which spaces are available for transit riders, they are likely to just stay in the car rather than trying to use transit for part of their trip.
- **Legible.** When multiple modes come together, it is important that everyone can easily find the areas they need to use and access. Wayfinding is important for improving pedestrian and bicycle access to transit stops and stations, but good signage at the stop is equally important. Someone being dropped off at a transit station should be able to tell very easily where they can get out of the vehicle and then reach their bus. And a commuter using a park-and-ride lot should be able to quickly identify where they should park so they don't get a ticket during the day.

Pedestrian Connections

Pedestrian infrastructure includes an array of amenities and improvements, such as wide and textured sidewalks, level boarding features, curb ramps, benches, lighting, building overhangs, travel information, wayfinding signage, and bus shelters. When well designed, these types of pedestrian infrastructure can help to increase the safety, comfort, and enjoyment of the entire transit trip and promote access to transit. The quality of the pedestrian environment is also influenced by the presence of street trees and landscaping, active retail uses at street level, outdoor café seating, and public art.

By requiring that transit facilities, infrastructure, and equipment be accessible to all people, the Americans with Disabilities Act (ADA) ensures that a certain baseline of accessibility must be met. However, many cities and transit authorities are working together to provide higher quality pedestrian amenities and greater levels of accessibility than required by ADA to create transit-supportive environments.

Cities have found by focusing on pedestrian improvements at transit facilities and beyond can be an effective way to increase transit ridership. Studies report improving pedestrian conditions can decrease the frequency of short automobile trips and increase transit mode share. Research by the Transit Cooperative Research Program (TCRP) found many pedestrians are willing to walk between one-half and one mile to access transit. Walkable communities also provide public health benefits by increasing physical activity.

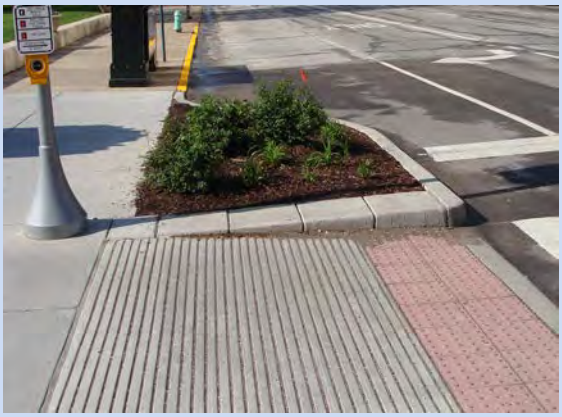
Designing Streets for Pedestrians

Examples of infrastructure and amenities that can help to improve pedestrian access to transit are described below. Not every transit stop or station needs all of these improvements to be accessible; however, a sidewalk or walking path and a safe crossing are critical for all types of stops and stations.

- **Wide Sidewalks.** Continuous sidewalks should be at least 4 feet wide and seamlessly connected to the sidewalk network in the area. A wide and accessible sidewalk network should be complete within a half-mile of every transit stop and station.
- **Curb Extensions.** Streets that have on-street parking typically have a required set-back from an intersection to increase visibility. This "dead space" at the intersection can be rededicated to expand the pedestrian realm and reduce crossing distance. Curb extensions also improve pedestrian and motorist sightlines at intersections and help manage vehicle turn speeds.
- **Pedestrian Refuges.** Refuges should be used where there is higher volume automobile traffic or higher speeds and in wide intersection crossings (e.g., 6 to 8 lane arterial). Examples include pedestrian refuge islands, medians, bollard or planter protection, on-demand push button pedestrian crossing lights, and curb extensions and bulb-outs.
- **Well-Marked Crossings.** Transitions and street crossings should be well-marked and preferably include high-visibility and/or raised crossings (also known as speed tables) that prioritize pedestrians. Raised crossings are better for people walking and rolling and also serve as a traffic calming measure.
- **Traffic Signals.** All signals should have a pedestrian countdown and, if necessary, a push-button to allow a pedestrian to request a crossing. Pedestrian-only crossing phases, as used in scramble (diagonal) crosswalks, at very busy locations—such as downtown—allow pedestrians to cross an intersection in any direction. Leading pedestrian intervals give pedestrians a few seconds of "head start" to claim the crosswalk ahead of turning traffic.

Best Practices in Pedestrian Access and Connections

Pedestrian Scramble (Orange, CA)



Curb Extension, Signal, Ramp, and Landscaping (Indianapolis, IN)

Pedestrian Refuge (Tucson, AZ)

- **Traffic Calming.** Vertical and horizontal traffic calming can greatly improve the quality of the pedestrian environment. These features include road diets, speed bumps, speed tables, raised intersections, diagonal diverters, chicanes, traffic circles, shared streets and other measures designed to discourage speeding by encouraging or requiring drivers to slow down.
- **Universal Design and Accessibility.** Intersections should provide facilities that can safely move people of all ages and abilities across the street. Design elements like curb ramps, level landings and gutter seams, visible and audible signals, smooth surfaces, accessible push buttons (or default WALK phases), and signs that help pedestrians navigate intersections should be integrated into intersection design.
- **Lighting.** Well lit crosswalks and sidewalks provide increased safety and security. In areas with many pedestrians, lighting at the pedestrian scale should be considered to better light sidewalks and walkways.

Best Practices in Pedestrian Access and Connections

Marked and Signed Crossing to Transit Stop (Atlanta, GA)

Accessible Crossing (West Windsor, NJ)

- **Wayfinding.** Street signs, maps, and unique area treatments—such as historical displays and public art—help pedestrians orient themselves and create interest and comfort. Streetscapes that are inherently easy to navigate invite travel by foot and make driver and pedestrian behavior more predictable and safer.
- **Land Use, Landscaping, and Amenities.** The environment beyond the street is also important to provide a comfortable and inviting pedestrian environment. Street trees and landscaping are another element of a walkable environment. Especially in warmer climates, such as Orange County, adding trees reduces the urban heat island effect and makes walking to transit stops and waiting for transit far more pleasant. Amenities include benches and drinking fountains, street-fronting doorways and windows, and buildings designed with pedestrians in mind, including spaces for street-level retail, varied façades, and interesting architectural features.

Bicycle Connections

Connecting bicycle riders with transit routes significantly increases the geographic area that transit can serve. In many cases, bus stops are located further than the one-half to one-mile distance from home that most people are willing to walk to a bus stop. Bicyclists are willing to ride two to three miles to access transit, making bicycle access an effective way to extend the range of first-/last-mile connections to transit.[3]

Transit agencies are finding bicyclists are more willing to take transit when the systems provide bicycle amenities and market their services directly to them. The Portland Bureau of Transportation's Bicycle Program estimates providing improved access for bicyclists increases the capture area of transit investments twelve-fold. Working together, transit agencies and local jurisdictions that develop a comprehensive approach to improving bicycling conditions and amenities can attract additional transit riders at relatively minimal cost.

There are a number of street design features that cities can use to improve cycling safety and comfort, including bicycle lanes, bicycle boulevards, cycle tracks, improved crossing treatments, signage, and traffic calming features. Bicycle parking and end-of-trip facilities, such as lockers and showers, are also important to bicycle riders. Roadway design features geared toward pedestrians—such as lighting, shelters, wayfinding, and road diets—also support bicycle access to transit stops. Studies have found that neighborhoods with high degrees of walking have

Best Practices in Bicycle Access and Connections

Bicycle Wayfinding at Transit Station (San Francisco, CA)

"Floating" Bus Stop and Protected Cycle Track (Los Angeles, CA)

Metro Bikeshare (Los Angeles, CA)

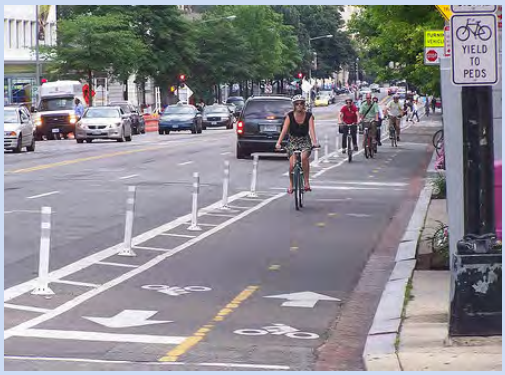
[3] "Guidelines for Providing Access to Public Transportation Stations," Appendix B Assessment of Evaluation Tools, September 2011 http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_153AppendixB.pdf

higher levels of bicycling and transit use than those that don't.[4]

Designing Streets for Cyclists

Examples of infrastructure and amenities that can help improve bicycle access to transit are described below.

Best Practices in Bicycle Access and Connections



Two-Way Cycle Track (Washington, DC)

- **Bicycle Boulevards.** Bicycle boulevards are low-traffic streets that have been optimized for use by cyclists. A variety of traffic calming elements and signage are used to reduce car volumes and speeds, fostering a safe bicycling environment. Bicycle boulevards often include features that allow cyclists to continue through intersections, while cars are forced to turn, thereby reducing traffic volumes while allowing cyclists to proceed unimpeded. Bike boulevards may use sharrows or shared-lane markings that communicate the presence of bicyclists to drivers.
- **Bicycle Lanes and Boxes.** Bicycle lanes are another technique to provide dedicated space in the street for cyclists and to increase driver awareness to the presence of cyclists. Increasingly, cities are using colored pavement treatments to designate bike lanes, either by coloring the beginning of the lane or the entire lane. Colored lanes discourage drivers from entering the portion of the right-of-way dedicated for cyclists. Colored markings can also be used at key spots such as at intersections and turn zones where cars need to cross a bike lane. Bike boxes allow bicyclists to wait ahead of vehicular traffic at an intersection, which provides additional visibility and keeps cyclists out of the path of right-turning vehicles.
- **Cycle Tracks and Protected Bicycle Lanes.** Cycle tracks are bicycle lanes that are physically separated from traffic but are located in the roadway. Cycle tracks are increasingly common throughout the United States, with many cities taking a staggered approach to implementation by using pilot projects to test their designs. They provide a buffer from traffic that creates a much greater level of comfort and sense of protection for cyclists. Cycle track facilities are either paired one-way facilities on each side of the street, or wider, two-way facilities on one side of the street.

[4] Ibid.

Connecting Bicycles and Transit Vehicles, Stops, and Stations

Using a bicycle to access transit provides the rider greater range and flexibility. While space on transit vehicles is often limited, having access to a bicycle at each end of the transit trip improves transit usability. Once cyclists reach a transit stop or station, they are typically faced with a decision to store their bicycle or bring it with them on transit. For many, weather protected and secure parking provides confidence that the bike is safe for an extended time is a critical design feature. Some riders also want or need to bring their bike on the transit trip to complete the other end of the journey. If a traveler is uncertain about the presence of bike parking facilities at the station or whether transit can accommodate their bike on board, they are less likely to choose a bike-to-transit journey.

- **Bicycles Racks on Vehicles.** Most transit agencies provide external bike racks on buses, typically in the front of the bus; OCTA provides dual bicycle racks on the front of each bus. These racks flip up against the bus when they are not carrying bikes. OCTA is moving towards implementing three-position bike racks. Bikes are only allowed onboard OCTA buses on the last trip of the day when the rack is full. Most transit buses don't have onboard space for bicycles given narrow aisles, but bus rapid transit vehicles may have more room to accommodate bicycles. In Washington state, Community Transit's SWIFT BRT vehicles have three doors, and bicycles can be rolled onto the bus and stored in onboard bike racks. Installation of onboard racks protects other riders by securing bikes, provides a more comfortable ride, and results in shorter dwell times at stops.
- **Bike Parking.** Providing bicycle parking at transit facilities is a critical element in achieving high levels of bicycle access to transit. Parking that is convenient, secure, weather-protected, and plentiful provides a measure of predictability and comfort for those who want to travel by both bike and transit. In Portland, TriMet's Bike and Ride facilities offer secure, enclosed bike parking that is accessed with a BikeLink keycard. In Long Beach, the BikeStation offers secure, staffed bike parking along with other amenities such as repair services, transit information, and electric vehicle recharging.

Best Practices in Bicycle Access and Connections

Bikes on Bus (Nashville, TN)


Bikes on Commuter Rail (Boston, MA)


Bike Hut (Santa Ana, CA)

Bike Lockers at DART Station (Dallas, TX)

- **End-of-Trip Facilities.** Weather—be it too hot, too cold, too humid, or too rainy—is a frequently cited reason people chose not to cycle. However, the problem is often not the lack of willingness to cycle in inclement weather, but the condition people end up in after biking through heat or rain. Developing facilities that allow people to store bikes out of the weather and to shower and change at workplaces can help overcome this barrier.

Kiss-and-Ride Zones

Kiss and ride is the term of art for a transit passenger drop-off zone. This activity typically occurs as close to the stop or station entrance as possible, with most drop-offs requiring only a few seconds. A designated kiss-and-ride location (such as a pullout) may not be necessary except for very busy transit facilities. However, at the other end of the commute, drivers often wait for arriving trains or buses for up to 15 or 20 minutes, potentially congesting station entrances and parking lots. Train stations especially can experience significant activity during peak hours, so planning for waiting vehicles is important.

Most major transit stations have some type of designated passenger drop-off and pick-up zone, although each agency and municipality handles such access needs differently. Metrolink stations in Orange County typically include kiss-and-ride zones.

Designing Kiss-and-Ride Areas

Kiss-and-ride areas include facilities for passenger drop-offs and pick-ups by automobile, as well as spaces for short-term parking. Considerations for designing kiss-and-ride areas are described below:

- A curbside lane for a taxi stand, private shuttle buses, and automobiles should be located closer to the station entrance than short-term parking, ideally within 600 feet of the entrance.
- Separate modes whenever possible. Kiss-and-ride vehicular traffic should not be routed through park-and-ride areas or vice versa. Pedestrian and bicycle access to the station should not be impeded by a kiss-and-ride area.
- Design to maximize vehicle turnover, facilitate traffic flow, and avoid traffic conflicts. The area should typically be designed for one-way traffic flow and allow for recirculation.
- For optimum function, the facility should have a direct visual connection with the station entrance, so a driver waiting in an automobile can quickly locate their passenger exiting the station.
- Design a facility that is convenient for both pedestrians and automobiles. Neither transit riders nor motorists and taxis will use inconvenient, congested, or remote kiss-and-rides. They will find another location near the station entrance, a location that may cause undesirable conflicts with other traffic, including transit.

Park-and-Ride Facilities

Park-and-rides are ideal for communities where a large number of drivers travel to a limited number of concentrated areas (such as downtowns, civic centers, or office parks). Park-and-rides reduce demand for parking in these areas, decrease roadway congestion, and decrease the operational costs of providing transit service to dispersed residential communities on the edges of urbanized areas.

Park-and-rides work well at attracting riders who have other travel options and people who primarily use automobiles to access transit. These facilities are best located away from urban cores and in lower density areas (four to five dwelling units per net acre).[5] OCTA has a number of park-and-ride facilities throughout the county. These are described in the "Facilities" section of Chapter 3.

Designing Park-and-Rides

For a park-and-ride facility to maximize the number of riders it will attract, it must be conveniently located and easy to find, provide adequate parking, and feel safe and secure.

- **Convenient Location.** Park-and-rides should be located close to freeways and arterial roads to provide easy access for passengers and transit vehicles alike. If a passenger has to travel out of his or her way to reach a park-and-ride lot, the likelihood of that person using transit significantly decreases. A park-and-ride lot located along a person's natural path of travel is another encouragement to park the car and try the transit service.
- **Easy to Find.** A park-and-ride facility should be designated on a transit or route map, with a specific address whenever possible. The facility should be well signed, making it easy to identify the proper place to park and the right place to wait for the bus.

Best Practices in Bicycle Access and Connections

Dedicated Park-and-Ride Facility (Contra Costa, CA)

High Quality Shelters at Park-and-Ride (Cummings, GA)

Accessible Features at Park-and-Ride Lot (Gallatin, TN)

[5] TCRP Report 165. Transit Capacity and Quality of Service Manual, Third Edition. 2013.

Particularly with shared-use lots, it must be easy for transit riders to understand which spaces are for their use.

- **Adequate Parking.** Whether a shared-use facility or a dedicated facility, a park-and-ride must have adequate space. If a person attempts to use a park-and-ride and consistently finds it full, he or she will likely stop attempting to ride transit, vanpool, or carpool. If space is limited and all transit customers cannot be accommodated, park-and-ride facilities may need to charge for parking or consider a permit program.
- **Safe and Secure.** Shelters and amenities should protect passengers from the elements. Lighting of transit facilities and the full parking area helps passengers feel secure. Park-and-ride users need to feel confident their personal vehicles will be secure.

Transit-Oriented Development

Transit demand is strongly related to development patterns and, in particular, development density. In areas with denser development and more people and employees, transit can be provided in close proximity to many people. Combined with a good pedestrian environment, transit can become very convenient and well used.

Transit-oriented development (TOD) is land development located near transit stations or stops that includes a mixture of housing, office, retail, and sometimes other amenities integrated into a walkable neighborhood. TOD leverages the access transit provides to regional destinations and focuses development in close proximity to those places.

At its most basic, TOD is a mixed-use community that encourages people to live near transit and reduces their dependence on driving. The most effective TOD is located less than a half-mile (roughly 10 minute) walk from a transit stop or station. TOD strives to give people choices in how they travel, minimizing the impact of traffic in their lives and creating a sense of community and place.

The characteristics of TOD are represented in the graphic below; putting these principles into practice can help to create transit-supportive communities that integrate transportation and development. TOD features vibrant streetscapes, pedestrian-oriented buildings, and land use characteristics that make it convenient and safe to walk, bike, and use public transit.

Figure 5-18 Eight Principles for Transit-Oriented Development

Source: Institute for Transportation & Development Policy (ITDP)

TOD Benefits

The primary goal of transit-oriented development in most communities is to build upon transit investments by creating development that supports ridership. However, TOD also provides a number of secondary benefits to transit agencies, communities located close to transit, and the larger metropolitan region. Some of the benefits of TOD include the following:

Figure 5-19 Transit-Oriented Development (Salt Lake City)

- More sustainable and efficient use of land, energy, and resources
- Increased transit ridership and fare revenue
- Potential for added real estate value created through increased or sustained property values where transit investments have occurred
- Reduced household driving and, thus, lower regional congestion and transportation expenditures
- Improvements to air quality and reduced greenhouse gas emissions due to fewer miles driven
- Walkable communities that accommodate healthier and active lifestyles
- Improved access to jobs and economic opportunity for low-income people and working families
- Concentrated development and activity that allows for community reinvestment

To achieve these benefits, development must be truly transit-oriented rather than just transit-adjacent. The differences between these two types of development are described below.

Figure 5-20 "Transit-Oriented" vs. "Transit-Adjacent" Development

Transit-Oriented Development	Transit-Adjacent Development
▪ Grid street pattern ▪ Higher densities ▪ Limited surface parking and efficient parking management ▪ Pedestrian- and bicycle-oriented design ▪ Mixed housing types, including multifamily ▪ Horizontal (side-by-side) and vertical (within the same building) mixed use ▪ Office and retail, particularly on main streets	▪ Suburban street pattern which are non-grid, disconnected including cul-de-sacs ▪ Lower densities ▪ Dominance of surface parking ▪ Limited pedestrian and cycling access ▪ Mainly single-family homes ▪ Segregated land uses ▪ Gas stations, car dealerships, drive-through stores and other automobile-focused land uses

Source: John Renne (2009), "Measuring the Success of Transit Oriented Development," in Transit Oriented Development: Making It Happen, Carey Curtis, John Renne and Luca Bertolini (Eds.) Ashgate (www.ashgate.com), pp. 241-255.

Characteristics of Transit-Oriented Development

A successful transit-oriented development reinforces both the community and the transit system. There are six factors that influence transit demand—the "6 Ds"—and these are integral parts of TODs. Creating a mix of uses within a development promotes activity throughout the day and into the evening. This, in turn, promotes the most efficient use of the transit system: travel in both directions, throughout the day.

Figure 5-21 The "6 Ds" of Transit Demand

6D Factor	Principle
Destinations	Align major destinations along reasonably direct corridors served by frequent transit
Distance	Provide an interconnected system of pedestrian routes so that people can conveniently access transit
Density	Concentrate higher densities close to frequent transit stops and stations and multimodal nodes
Diversity	Provide a rich mix of pedestrian-friendly uses to support street-level activity throughout the day and night
Design	Design high-quality pedestrian-friendly spaces that connect people seamlessly to transit
Demand Management	Provide attractive alternatives to driving by managing parking, providing incentives not to drive, and/or providing programs to help educate people about driving alternatives

Rendering from City of Santa Ana Harbor Mixed-Use Transit Corridor

Source: City of Santa Ana

TOD in Orange County

Apartments Near Fullerton Transportation Center

Source: Driver Urban

TOD has recently become increasingly common in Orange County, in areas including Downtown Santa Ana and Anaheim's Platinum Triangle.

Santa Ana's Harbor Mixed Use Corridor Specific Plan identifies opportunities for urban and transit-oriented mixed-use development and more affordable housing along key transit corridors such as Harbor Boulevard. The plan is intended to promote a vision of Harbor Boulevard as a place for people and a place for connections, including new high-quality transit service that connects people with local and regional job centers, Downtown Santa Ana, and other shopping and recreation destinations. The guiding principles of the plan are:

- Expanded development opportunities that respond to transit investments
- A variety of safe and efficient travel choices
- Economic vitality and new opportunities for businesses and residents
- Create a sense of place
- Community health and wellness

Anaheim's Platinum Triangle blends diverse employment and residential development with major attractions to create an important destination in the heart of Orange County. Urban development, guided by The Platinum Triangle Master Land Use Plan, is bringing high-density, mixed-use, office, restaurant, and residential projects to replace older industrial developments. Many different modes of transportation provide access to and within the Platinum Triangle, including a network of pedestrian-friendly local streets, bikeways, ARTIC (Anaheim Regional Transportation Intermodal Center), ART (Anaheim Resort Transit), and OCTA buses. The Platinum Triangle is supported by a Community Facilities District that helps to finance public infrastructure improvements.

Apartments in Platinum Triangle
Source: Avalon Communities

The "T" in TOD: High-Quality Transit Service

The type of transit that serves a transit-oriented development is less important than the quality of service provided. TOD is often found at subway stations—such as those in Atlanta, Chicago, and San Francisco—where riding transit is relatively easy and convenient. But TOD is also increasingly common around other forms of transit, such as light rail, commuter rail, bus stops, and ferry terminals. The key to this growth in TOD is ensuring the development is centered on high-quality transit service.

High-quality transit service is transit that runs 15 minutes or better during peak hours and at least every 20 minutes during off-peak periods, with service provided throughout the day, every day of the week. These frequencies are the level at which a person can generally expect to arrive at the transit station or stop, without knowing the schedule in advance, and only wait a few minutes for a bus or train.

Station and Stop Design

High-quality transit service found in conjunction with TOD is characterized by stops or stations that provide enhanced waiting areas and amenities for passengers. The transit station can function as a major stop for through service or as a transit center for several transit routes that terminate at the TOD.

The relationship between existing buildings, streets, and sidewalks to the transit station should be easy to navigate and provide direct paths. If needed, visual cues and placemaking can be used to orient people and show the way. Direct, attractive connections designed according to universally accessible design standards—without barriers or dead ends—should be provided.

Best Practice: Active Station Area Planning

Eastside Village, Plano, TX

Helping anchor the rebirth of Downtown Plano, Eastside Village is a $17.7 million high-density mixed-use project fronting directly onto Dallas Area Rapid Transit's (DART) light rail station plaza. The 3.6-acre, 245,000-square foot project features 234 apartment units and 15,000 square feet of ground floor retail. The three- and four-story building wraps around a 351-space parking structure. Eastside Village was the first major step to achieve the city's vision to "transform downtown into a compact, mixed-use, urban center consistent with the principles of new urbanism and transit-oriented design to enhance the community's quality of life and provide a model for sustainable development within a maturing suburban city."

The City of Plano provided the leadership to make the project happen. They advocated for the station location, saw an opportunity to marry development with the DART light rail platform, assembled the site, offered it for development, leased the land to the private developer, paid for public infrastructure and streetscape improvements, increased the allowable density, and waived fees.

Mix of Uses

A range of active land uses located close to the station entrance or transit stop will promote activity within the station area. Higher intensity development (such as office or residential buildings) with active ground floor uses (such as shops or restaurants) clustered within a short walk of station entries helps to promote transit ridership and create vibrant transit-oriented places. Generally, the highest density of buildings is located closest to the transit, with density stepping down farther away from the transit service. Many places have found locating employment closest to transit provides the greatest boost to ridership. A general rule is that for every 100 feet from the station, the share of office workers using transit drops by about one percent.

Special Types of TOD

Joint Development

Joint development is a form of TOD that is often project specific, taking place on, above, or adjacent to transit agency property. The most common joint development arrangements are ground leases and operation-cost sharing. Most often, joint development occurs at rail stations surrounded by a mix of office, commercial, and institutional land uses. However, examples of public-private joint ventures can be found among bus-only systems as well, normally in the form of intermodal transfer hubs joined with commercial and retail space at downtown bus terminals.

TOD Corridors

Many transit-oriented developments are centered around a specific station area or node of activity. However, TOD is increasingly being used as a viable corridor development strategy. As the examples below demonstrate, TOD can stretch over dozens of blocks, particularly around high-capacity corridors:

Figure 5-22 Hiawatha Corridor TOD (Minneapolis)

Source: Corridors of Opportunity

- **Houston.** The city of Houston anticipates several TODs will take form once the Main Street Corridor light rail system is completed.
- **Raleigh-Durham.** Triangle Transit Authority is planning several TODs along the axis connecting Downtown Durham to Downtown Raleigh. Town centers designed around rail stops are planned for the Cary, 9th Street/East Campus, and Alston Avenue stations.
- **Minneapolis.** The city and the Metropolitan Council have joined forces to prepare TOD plans for four station areas along the Hiawatha Corridor.

TOD Implementation Tools

Transit-oriented development should begin with an understanding of the types of stations and land uses along transit corridors in the system. Most often, the public sector takes the primary leadership role to advance TOD and then works with the private sector to commit to specific development projects. Public leadership is needed while a station area is being developed as well as throughout the life of the project.

Once a vision or policy is established, transit agencies and municipalities can use different strategies to implement TOD. Some of the most common are station typologies, station-area planning backed by appropriate zoning, policy incentives and regulations, TOD overlay zones, and transit real estate development departments.

Station Typologies

Some communities have found it helpful to identify the characteristics in their community that lead to successful TOD implementation and to proactively identify TOD-supportive station areas. Other communities have developed station typologies or different types of station areas that share similar characteristics. These similarities can help planners, residents, and elected officials quickly and easily understand what to expect in terms of the character, role, and function of each place.

TOD in Denver

Denver classifies each station area into one of five context types based on characteristics commonly found in places served by rail transit. The typologies provide a snapshot of aspirational character, set expectations for development, and establish a level of magnitude for possible investments.

For example, Reconnecting America's TOD guidance suggests eight typologies for transit stations:

- **Regional Center.** Regional downtowns with primary economic and cultural activities, often characterized by a dense mix of housing, employment, retail, and entertainment that cater to the regional market.
- **Urban Center.** The same mix of uses as a regional center, usually at slightly lower densities and intensities than in regional centers. Destinations draw residents from surrounding neighborhoods.
- **Suburban Center.** A suburban version of the urban center, likewise at lower intensities than regional centers.
- **Transit Town Center.** Local centers of economic and community activity that are less intense than either urban or suburban centers. They attract fewer residents from the rest of the region.
- **Urban Neighborhood.** Primarily high- to moderate-density residential areas mixed with local-serving retail. Well connected to regional centers and urban centers.
- **Transit Neighborhood.** Primarily residential areas that are served by rail or high frequency bus lines that connect at one location.

- **Special Use/Employment District.** A low- to moderate-density area, often focused around a major institution, university, or stadium.
- **Mixed-Use Corridor.** A focus of economic and community activity without a distinct center. These corridors are typically characterized by a mix of moderate-density buildings that house services, retail, employment, and civic or cultural institutions. Many were developed along streetcar lines.

Station-Area Planning

Every station area faces unique challenges requiring specially tailored strategies. Developing conceptual or specific plans for the areas around transit stations or stops lays out the basics—including zoning, design standards, parking requirements, and street connectivity—that will be needed for successful TOD. Detailed station-area plans help leverage the potential of TOD, particularly when there are significant development opportunities. Station plans often reflect the desired density, parking requirements, and land uses, sometimes even before the transit is in place:

Figure 5-23 Fruitvale Station Village (Oakland, California)

- **Sacramento.** The Sacramento Area Council of Governments defines a Transit Priority Area as an area within a half-mile of high-quality transit that provides or will provide at least 15-minute frequency service during peak hours by 2035.
- **San Diego.** The San Diego Association of Governments defines a high-quality transit area as a "generally a walkable transit village or corridor, with a minimum density of 20 dwelling units/acre, within a half-mile of a well-serviced transit stop with 15-minute or less service frequency during peak commute hours."

TOD Overlay Zones

Most local governments control permissible land uses, building setbacks, parking requirements, and allowable densities through zoning. Some communities have created *TOD Overlay Zones* that modify, eliminate, or add regulations to the base zoning around transit stations or in designated TOD-amenable areas. Overlays provide for effective land-use control that promotes transit-supportive developments without increasing regulatory complexity. An overlay district can also secure land for future transit and transit-oriented development. For example, the city of Seattle's interim overlay district prohibits automobile-oriented uses and lowers parking standards within a quarter-mile of proposed light rail stations, preserving future TOD opportunities.

Transit Real Estate Expertise

Transit agencies are vital to TOD since they control where, when, and even if rail and bus services are operated. And when it comes to joint development, transit agencies are at the front line of

implementation, especially when agency-owned land and air rights are to be leased or sold. With TOD providing such benefits to transit, some large agencies have set up in-house real estate departments with dedicated staff to negotiate joint development deals and planners assigned to oversee TOD. Other transit agencies have part-time staff or consultants who focus on land use matters around stations and stops. Still others routinely review development proposals early in the process to ensure they are transit supportive. They also work with city planning departments and neighborhood groups on an ongoing basis as part of both short- and long-range transit planning.

Case Study: Rosslyn-Ballston Corridor

Arlington County, VA

The Rosslyn-Ballston Corridor is arguably the best TOD success story in the United States. Located directly across the Potomac River from Washington, D.C., Arlington County has become an increasingly popular place to live, work, and shop due in part to high-density development along the Rosslyn-Ballston corridor. Before development began, Arlington County adopted a General Land Use Plan to concentrate dense, mixed-use development. More detailed sector plans—which specify land use and zoning as well as urban design, transportation, and open space guidelines for the area a quarter-mile from each of the five stations in the corridor—ensure a distinct sense of community at each station. In addition to the countywide and station-area plans, specific enabling zoning bylaw language regarding density and setback configurations, circulation systems, and zoning classifications were changed. Developments that complied with these classifications could proceed through an expedited review process. The ability of complying developers to create TODs as-of-right was particularly important, for it meant that they could line up capital, secure loans, incur up-front costs, and phase in construction without the fear of local government "changing its mind."

Today, the roughly two square-mile Rosslyn-Ballston Corridor has mixed-use, infill development focused at five Metro stations, and density tapers down to residential neighborhoods. As of 2004, the corridor had over 21 million square feet of office, retail, and commercial space, more than 3,000 hotel rooms, and almost 25,000 residences, creating vibrant "urban villages" where people live, shop, work, and play using transit, pedestrian walkways, bicycles, or cars. The stations along the corridor have captured 26% of the residents and 37% of the jobs on just 8% of the county's land area. The station area boasts one of the highest percentages of transit use in the Washington, D.C. region with 39% of residents commuting to work on transit.

Source: City of Winnipeg TOD Handbook

TRANSIT FUNDING

The OC Transit Vision will recommend new transit projects, potentially including rail and bus rapid transit lines with significant capital costs, which may require funding from a variety of sources. Following are brief summaries of potential capital funding sources, including existing sources used in Orange County. Note that the funding context may change over time; state funding sources have evolved dramatically in recent years.

Federal Sources

On December 4, 2015, the Fixing America's Surface Transportation (FAST) Act (Pub. L. No. 114-94) was signed into law—the first federal law in over a decade to provide long-term funding certainty for surface transportation infrastructure planning and investment. The FAST Act authorizes $305 billion over fiscal years 2016 through 2020 for highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail, and research, technology, and statistics programs. The following sections highlight a number of federal programs that could be used to support transit service in Orange County.

The Federal Transit Administration (FTA) administers the **Section 5309 Capital Investment Grant (CIG) Program.** This program is the primary source of federal funding for major fixed-guideway transit capital investments, such as new and expanded rapid rail, commuter rail, light rail, streetcar, and bus rapid transit. This discretionary program requires projects to proceed through a multi-step, multi-year process to be eligible for funding with FTA evaluation and rating required at various points in the process. The first step is called Project Development, the second Engineering, and the third a Full Funding Grant Agreement for construction.

There are four categories of eligible projects under the FTA Section 5309 program: New Starts, Small Starts, Core Capacity, and Programs of Interrelated Projects. The program can fund up to 60 percent of total project costs for New Starts projects, and up to 80 percent of Small Starts, Core Capacity, and Programs of Interrelated Projects.

- **New Starts** projects are new fixed-guideway projects or extensions to existing fixed-guideway systems with a total estimated capital cost of $300 million or more that are seeking $100 million or more in Section 5309 CIG program funds.
- **Small Starts** projects are new fixed guideway projects, extensions to existing fixed-guideway systems, or corridor-based bus rapid transit projects with a total estimated capital cost of less than $300 million that are seeking less than $100 million in Section 5309 CIG program funds.
- **Core Capacity** projects are substantial corridor-based capital investments in existing fixed-guideway systems that increase capacity by not less than 10 percent in corridors that are at capacity today or will be in five years. Core capacity projects may not include elements designed to maintain a state of good repair.
- **Programs of Interrelated Projects** are comprised of any combination of two or more New Starts, Small Starts, or Core Capacity projects. The projects in the program must have logical connectivity to one another and all must begin construction within a reasonable timeframe.

FTA Section 5307 Urbanized Area Formula Grants provide transit capital and operating assistance and transportation-related planning in urbanized areas of 50,000 residents or more. Eligible purposes include the following:

- Planning, engineering design, and evaluation of transit projects and other technical transportation-related studies
- Capital investments in bus and bus-related activities such as replacement of buses, overhaul of buses, and rebuilding of buses
- Crime prevention and security equipment
- Construction of maintenance and passenger facilities
- Capital investments in new and existing fixed guideway systems including rolling stock, overhaul and rebuilding of vehicles, track, signals, communications, and computer hardware and software
- All preventive maintenance
- Some Americans with Disabilities Act complementary paratransit service costs

FTA Section 5307 funds can be used for up to 80 percent of capital expenses, and up to 90 percent of the cost of vehicle-related equipment attributable to compliance with the Americans with Disabilities Act and the Clean Air Act, and for projects or portions of projects related to bicycles.

For large urbanized areas with populations of 200,000 or more, such as Orange County, funds are apportioned and flow directly to a local designated recipient. These funds are allocated to areas with populations of 200,000 and more, based on a combination of bus revenue vehicle miles, bus passenger miles, fixed guideway revenue vehicle miles, and fixed guideway route miles as well as population and population density. Thus, as OCTA expands services, the amount of Section 5307 funds that it receives may increase. (However, since local funds are distributed by formula among agencies in Los Angeles, San Bernardino, and Riverside counties, it is difficult to know whether funds will increase without knowing the federal government's budget and other agencies' service level and performance.)

In the Los Angeles-Long Beach-Santa Ana urbanized area, which includes all of Orange County, SCAG is the designated recipient and allocates funds to OCTA. OCTA uses these funds largely for preventative maintenance and paratransit purposes.

FTA Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities funds may be used for paratransit capital and operating costs as well as for other projects that serve the special transportation needs of seniors and individuals with disabilities, including projects to improve access to fixed-route transit. These funds are apportioned to states for rural and small urban areas and designated recipients chosen by the governor of the state for large urban areas or to state or local governmental entities that operate a public transportation service. The federal share is 80 percent for capital projects, and 50 percent for operating assistance.

FTA Section 5337 State of Good Repair is a newer funding program dedicated to repair and upgrade of existing rail systems. Funding may be used for projects that maintain, rehabilitate, and replace capital assets, as well as projects that implement transit asset management plans. OCTA has been allocated Section 5337 funding for Metrolink.

FTA Section 5339 Bus and Bus Facilities program provides capital assistance for new and replacement buses, related equipment, and facilities. Eligible bus expenses include purchasing

buses for fleet and service expansion, purchasing replacement vehicles, bus rebuilds, and bus preventive maintenance. Eligible facilities include bus maintenance and administrative facilities, transfer facilities, bus malls, transportation centers, intermodal terminals, park-and-ride stations, and passenger amenities such as shelters and bus stop signs. Eligible equipment includes accessory and miscellaneous equipment such as mobile radio units, supervisory vehicles, fare boxes, computers, and shop and garage equipment. OCTA uses Section 5339 funds for these purposes, and as the agency's service expands will likely be able to leverage more of these funds.

Two discretionary components were added the program in the FAST Act, a national bus and bus facilities competitive program based on asset age and condition, and a low or no emissions bus deployment program. In addition, grantees may use up to 0.5% of their 5339 allocation on Workforce Development activities.

The **Federal Highway Administration (FHWA) Surface Transportation Block Grant Program** is a flexible funding source for many types of transportation projects, including a set-aside specifically for walking, bicycling, and enhancement projects. The program allows state departments of transportation to shift some of these funds to transit projects, moving funds into one or more of the FTA funding programs described above.

The **FHWA Congestion Mitigation and Air Quality Improvement Program** (CMAQ) provides funding to state transportation departments to reduce congestion and improve air quality. Areas eligible for investment include those that do not meet the National Ambient Air Quality Standards (nonattainment areas) and former nonattainment areas that are now in compliance (maintenance areas). Eligible activities under CMAQ include transit system capital expansion and improvements that are projected to realize an increase in ridership; travel demand management strategies and shared ride services; pedestrian and bicycle facilities; and promotional activities that encourage bicycle commuting.

Funds are distributed by state transportation departments based on an area's population by county and the severity of its ozone and carbon monoxide problems within the nonattainment or maintenance area, with greater weight given to areas that are both carbon monoxide and ozone nonattainment/maintenance areas. There are funding set-asides for State Planning and Research and PM2.5 nonattainment or maintenance areas.

Transportation Investment Generating Economic Recovery (TIGER) is a discretionary U.S. Department of Transportation grant program that allows the agency to invest in road, rail, transit, and port projects. Funding varies annually based on congressional allocations, and grants are awarded on a competitive basis.

The **Transportation Infrastructure Finance and Innovation Act (TIFIA)** provides federal secured loans, loan guarantees, and lines of credit to national and regionally-significant surface transportation projects, including bus and rail transit. The program is designed to fill market gaps and leverage substantial private match (or co-development) funds by providing supplemental debt financing. The amount of a TIFIA line of credit cannot exceed 33 percent of the total capital cost of a project; TIFIA loans cannot exceed 49 percent of the total project cost. The loans are backed by federal revenues.

As a general rule, to receive TIFIA credit assistance under the FAST Act, a project must have costs that equal or exceed either $50 million or one-third of the most recently completed fiscal year's formula apportionments for the state in which the project is located. However, transit-oriented development and local infrastructure projects that are sponsored by a local government for a project on a locally-owned facility need only cost $10 million.

The Railroad Rehabilitation and Improvement Financing (RRIF) program provides direct federal loans and loan guarantees to finance the development of railroad infrastructure. The FAST Act contains several provisions intended to streamline the loan approval process, increase access to the program, and fund a wider array of projects. It also makes transit-oriented development elements of passenger rail station projects eligible for RRIF.

State Sources

Cap and Trade Funds. The California State Transportation Agency distributes proceeds from the state's Cap-and-Trade Program, established under AB32, the Global Warming Solutions Act. Cap-and-Trade grants are distributed on both a formula basis (the Low Carbon Transit Operations Program, or LCTOP) as well as on a competitive basis (through the Transit and Intercity Rail Capital and Affordable Housing and Sustainable Communities Programs). The agency auctions off permits to emit greenhouse gases on a quarterly basis. Proceeds have varied widely, so the amount of funding available through the program is unpredictable. In 2016, $390 million was awarded statewide to a variety of transit-related capital projects and transit operators, including Metrolink, the Pacific Surfliner, and Bravo! Route 560. Programs funded by Cap-and-Trade revenues must provide benefits to disadvantaged communities.

State Infrastructure Bank. Public transit projects are eligible for loans, lines of credit, and other capital funding support from the California Infrastructure and Economic Development Bank. A number of projects in Orange County have been partly funded through this source, including the Segerstrom Center for the Arts, which received a $42 million 501(c)(3) tax-exempt loan in June 2016.

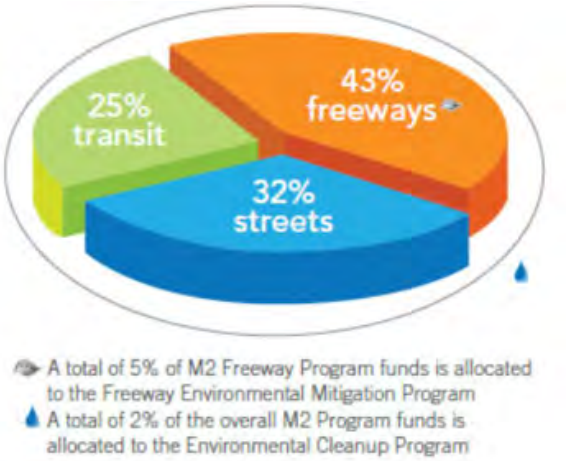
The **Transportation Development Act (TDA)** provides two major sources of funding for public transportation: the Local Transportation Fund (LTF) and the State Transit Assistance fund (STA). LTF is derived from a quarter-cent of the general sales tax collected statewide and STA is derived from the statewide sales tax on diesel fuel. LTF is the most critical funding source for OCTA bus service as it funds approximately 50 percent of operating funds ($161 million in fiscal year 2016-2017). OCTA expects to receive approximately $17.2 million in STA in fiscal year 2016-2017.

State Transportation Improvement Program (STIP) formula-based revenues from the state's excise tax on gasoline are allocated primarily to road projects, but may be used for projects eligible for funding under Article XIX of the State Constitution, including fixed-guideway transit capital projects.

County and Local Sources

Local Sales Taxes. Orange County is a *self-help* county under California law, or a county with a share of its local sales tax dedicated to transportation operations and capital funding. The most recent renewal of Measure M passed in 2006, and will remain in effect through 2042. Sales-tax measures require two-thirds approval from voters. Measure M is likely to remain Orange County's primary source of local funding for transit capital projects.

Figure 5-24 Measure M Allocations



Parcel Taxes. Parcel taxes are common tools used by California cities to raise money for specific projects in an era when general property tax rates cannot be raised because of Proposition 13. Parcel taxes can be bonded to accelerate projects and can be used for both capital and operating funding. The distinction between a parcel tax and a property levy within a district is that a parcel tax is citywide and requires a two-thirds vote of residents. The majority of successful parcel taxes in California are for schools, libraries, and other projects of citywide importance.

Motor Vehicle Fuel/Gas Taxes. In California, the state charges an excise tax on fuel sales, a portion of which it distributes to local transportation projects. Cities, in turn, charge sales taxes on gasoline. Under California law, counties may also add their own fuel taxes.

Vehicle Registration Fees and Excise Taxes. In California, cities may levy vehicle registration fees. Existing examples include the following:

- Orange County charges a $1 fee for motorist services.
- In the Bay Area, the city of Alameda charges a vehicle registration fee of $10 per year, 25 percent of which is dedicated to transit.
- San Francisco charges a $10 annual fee that is used for transportation improvements, including transit.

Real Estate Transaction Fees. In a few cases, real estate transaction fees are used to fund transit:

- Virginia has a deed-recording fee that that ranges from $21 to $54 that is used to support local bond issues for transit projects.
- Florida charges a real estate documentary tax of $0.70 per $100 of the transaction value, 10 percent of which is used to match federal New Starts funds.

Community Facilities District. A Mello Roos Community Facilities District (CFD) is a tool available for assessing a property tax levy on properties that benefit from a local facility. Funds raised through a community facilities district may be used for capital, loan repayment, or as operating funds to support a local project.

Developer Fees and Agreements. Among California cities, San Francisco currently levies impact fees on new development as a condition of approval, while Oakland is currently completing a nexus study as a precursor to establishing fees of its own.

Real Estate Transfer Fees. A real estate transfer fee is paid by property buyers at the time of transaction. Local fees can be increased only with a two-thirds supermajority of voters. Given the trend of increasing real estate costs in coastal California communities (including Orange County), the amounts generated by such fees are likely to continue to increase over time.

Rental Car and Hotel Taxes. Rental car and hotel taxes tend to be more acceptable to voters than other types of taxes, as they fall largely on non-residents. In an area with a large tourism sector such as Orange County, these types of taxes represent a substantial source of potential funding.

Commercial Parking Taxes. Many cities charge a commercial parking tax: the cities of San Francisco and Seattle, for example, have commercial parking tax rates of 25 percent and 12.5 percent, respectively. In those examples, portions of the revenue stream are allocated for major capital projects, with an emphasis on multimodal projects that reduce the demand for parking expansion. There is no statutory limit to the tax and it can be used for a wide variety of transportation projects and programs, including bonding to pay for capital projects.

Commercial parking tax funds are subject to competing priorities, including general fund uses. However, depending on the rate they have the potential to provide needed capital and operating funds.

Parking Benefit Districts. In a parking benefit district, municipalities spend a portion of parking meter revenue collected in the district on local priorities. Parking revenues can also be bonded to accelerate a capital project. The city of Pasadena has employed this funding mechanism in its Old Town district.

General Obligation Voter-Approved Bonds. Voter approval would be required to levy an assessment on real property, payable by property owners. Such *Unlimited Tax GO bonds* must be approved by a majority of voters, and can be used for capital projects. Bonds are usually raised against a specific asset or revenue source. Voters are generally more supportive of bonding more than taxing.

City General Funds. City general funds are composed of a number of funding sources, such as property tax revenues, sales tax revenues, fees, and fines. Cities may elect to fund a portion of a local transit project's capital or operating needs from their general funds. Because any allocation from the general fund would compete directly with other citywide needs, this is a resource that can be difficult to tap for transit projects.

Other Local Sources. A wide variety of other taxes and fees are less commonly used for transit:

- **Alcoholic Drinks in Bars.** Allegheny County, Pennsylvania (Pittsburgh) levies a 10 percent tax on poured drinks in restaurants and bars.
- **Payroll Taxes.** A few jurisdictions levy payroll taxes for transit. One example is the state of Oregon, which levies a payroll tax on employers in areas served by TriMet (Portland) and Lane Transit District.
- **Tolls.** Bridge or high occupancy toll (HOT) lane tolls are another potential source of transit funding. Bridge tolls are a major source of transit funding in the Bay Area, and Metro operates two HOT lanes in Los Angeles County that help fund transportation projects. In

Orange County, the 91 Express Lanes are owned and operated by OCTA. New transit projects in this corridor are eligible for excess toll revenues. Transit may also be an eligible use of excess funds for the upcoming I-405 managed lane project.

Private Sources

Community Benefit District/Business Improvement District (CBD/BID). CBD/BID formation requires the support of property owners who agree to a special assessment on their property tax in exchange for benefits the city would not otherwise provide. In California, a CBD currently lasts up to 10 years and ultimately requires a simple majority to implement. Funding for a transit project could come from an expansion, extension, or reallocation of these funds, subject to a vote of the membership.

Funds from a CBD can be used for both capital and operating purposes, and can be bonded to accelerate project delivery. Expenditures are guided by a management plan detailing how collected funds can be used.

Note that while CBD/BID funding of streetcar projects is relatively common, CBDs are generally not formed in support of bus projects. It is unlikely that both a CFD and CBD would be implemented in the same area, since they are both tools for generating a property tax levy in a confined area.

Value Capture. The concept of value capture is based on the anticipated development and commercial activity a transit investment is projected to spur over a reasonable period of time. Economic and land development will result in added value along the project segment, generating incremental property taxes and other fees that may be used for transit. There are numerous mechanisms, such as different kinds of assessment districts, for carrying out value capture.

Naming Rights. For streetcar projects in particular, sponsorship of stops and vehicles is a common source of funding. Stop sponsorships, which brand the panels at shelters, have been sold in many cities implementing streetcar or shuttle projects. Some systems, such as Tampa's TECO Trolley, have also sold naming rights for the entire system. This practice builds on the more standard practice of selling advertising at stations and on vehicles and allows stations to remain ad-free while still generating revenue.

Public-Private Sources

Public-Private Partnerships (P3s)

P3s are an increasingly common way to finance, construct, and operate transportation infrastructure. In a P3, the sponsoring agency partners with a private firm or firms to reduce the risk of cost and schedule overruns (as the private partner agrees to deliver the project on a fixed schedule, for a fixed price). The partnership reduces initial costs, as the private partner typically contributes part of the capital cost. It also reduces lifecycle costs by taking advantage of private-sector efficiencies: the partnering firm may be unencumbered by regulations that apply to public agencies, such as Buy America requirements, or by political pressure to add unnecessary elements to projects.

Depending on how the P3 is structured, the private partner may take on (with public oversight) various roles that would typically be the responsibility of the sponsoring agency. For example, in a design-build-finance-operate-maintain (DBFOM) arrangement, the private partner would design, build, finance, operate, and maintain the project. Such arrangements are common internationally,

including in Canada, and are often used for toll roads in the United States, including in Orange County. They are increasingly common for transit projects, including a $2.2 billion commuter rail project in Denver, a light rail project in Maryland, and streetcar projects in Washington, D.C., and Detroit.

Congress has encouraged more widespread application of P3s to transit projects, yet there are challenges with implementation in many cases. While often criticized for perceived privatization of public assets, P3s are typically structured so that the public maintains ownership and control over assets and key aspects of operations, such as service levels and fares. Private partners are also typically subject to performance standards. However, P3s may ultimately cost taxpayers more over the long term.

Moreover, sponsoring agencies accustomed to traditional contracting processes may be unprepared for the special requirements associated with a P3, from both a legal and administrative perspective.[6] Finally, private partners will only invest on the expectation of a return. Future projects pursuing P3 arrangements would require much more detailed financial and revenue forecasting analysis.

SUMMARY

An important purpose of this OC Transit Vision will be to develop recommendations for new high-capacity transit lines in high-demand corridors. This will require careful, comprehensive thinking about transit modes—including design of the right-of-way, stops/stations, service, and vehicles—and it will also require thorough thinking about related elements needed to make transit successful, including access to transit and land uses around transit stops and stations. Finally, it will require realistic thinking about potential funding options.

[6] Federal Highway Administration guidance on P3s can be found here: http://www.fhwa.dot.gov/ipd/p3/default.aspx

6 TRANSIT PROPENSITY AND MARKET ANALYSIS

This analysis of current and future travel patterns and demand for transit service in Orange County considers the following factors:

- Land use and the built environment, including current and future land uses, current and future population and employment density, and other major trip generators (colleges and universities, for example)
- Demographics
- Travel patterns and transit demand, including origins and destinations for all modes as well as assessment of transit demand based on regression analysis of the factors most indicative of transit propensity in Orange County

First, however, a brief overview of factors influencing transit demand.

TRANSIT DEMAND FACTORS

Population and employment density, land use diversity, urban design, regional destinations, and distance to quality transit are key factors influencing transit demand. Demand management (pricing, incentives, and other information-based programs) is also an important factor. Referred to as the "6Ds," these factors influence both transit demand and transit success in Orange County.

Figure 6-1 The "6 Ds" of Transit Demand

6D Factor	Principle	
Destinations	Align major destinations along reasonably direct corridors served by frequent transit	
Distance	Provide an interconnected system of pedestrian routes so that people can conveniently access transit	
Density	Concentrate higher densities close to frequent transit stops and stations and multimodal nodes	
Diversity	Provide a rich mix of pedestrian-friendly uses to support street-level activity throughout the day and night	
Design	Design high-quality pedestrian friendly spaces that connect people seamlessly to transit	
Demand Management	Provide attractive alternatives to driving by managing parking, providing incentives not to drive, and/or providing programs to help educate people about driving alternatives	

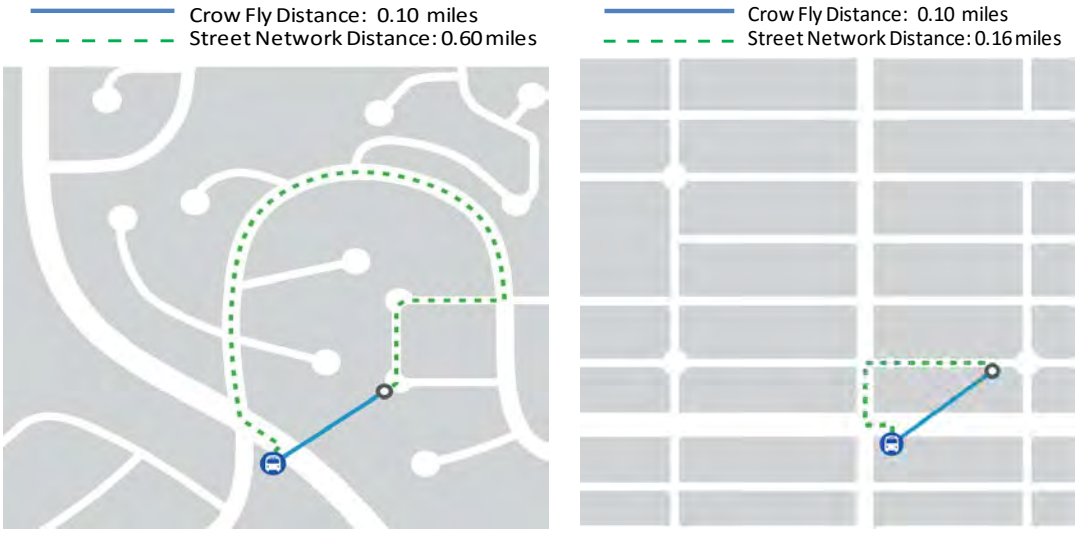
Destinations

People are more likely to choose transit when it conveniently takes them where they want to go. At present, OCTA serves most major destinations in Orange County. However, service is often infrequent, slow, or unreliable.

Distance

Both street connectivity and block length strongly influence people's likelihood of walking or biking to transit. Interconnected streets in a grid pattern tend to shorten distances between transit stops and destinations. Neighborhoods where all roads connect to arterials or collector streets allow transit customers to reach bus stops without walking out of their way, and provide more efficient routing options that support high-frequency service (see Figure 6-2). In addition to being important indicators of effective distance to transit, block length and street network connectivity are often used in transportation research as proxies for design quality. Short blocks and well-connected streets contribute to a higher-quality pedestrian experience and pedestrian realm, and they often occur in places where other elements of good design, such as adequate sidewalks, are also in place.

Figure 6-2 Street Network Design and Walk Distances to Transit



A disconnected street network (shown at left) with long blocks and indirect streets results in long walking distances and less efficient transit operations. A well-connected street network (shown at right) enables shorter, more direct walking connections and is easier to serve cost-effectively with transit.

Source: TransLink Transit Oriented Communities (2011)

The grid-like street pattern in parts of northern Orange County supports easy and comfortable access to transit (see Figure 6-2). However, in many newer areas—including much of South County—pedestrian connections to streets suitable for attractive transit are very limited.

Density

Population and employment densities determine how many people can access transit. By extension, they also strongly influence the amount of service that will be required, and in turn, the types of riders who will use transit. Infrequent service is inconvenient, and will largely serve residents and

workers who, for one reason or another, cannot drive. Frequent service, conversely, is convenient, and attracts many who choose to take transit. While frequent service is clearly desirable, service levels must match demand to constrain operating costs and to avoid running empty buses.

Diversity

Typical suburban zoning separates land uses, sets maximum densities and minimum lot sizes, and usually contains explicit regulations such as bulk and height limits and minimum parking requirements. This approach encourages automobile use and discourages transit use.

Mixed-use development, which reverses this approach, is again becoming more popular as it creates a more interesting environment. It also encourages transit, walking, and bicycling, and focuses much less on cars and parking. Mixed-use development also generates all-day activity in walkable environments that can be well served by transit.

Design

People will not use transit if it is difficult or dangerous to use. Safe and accessible streets are essential to ensure that people will be able to access transit easily and feel safe doing so. Transit stops and stations must also be attractive and clean and, at the very least, include amenities like benches, trash cans, and schedules. As OCTA plans for future investments in transit, coordination with cities to prioritize safe bicycle and pedestrian access will be required. A framework to invest in transit station amenities at high-demand stops also will be important to build demand.

Orange County has recently taken an important step toward higher-quality street design through the Orange County Council of Governments Complete Streets Initiative, which includes new guidelines for transit-oriented street design.

Demand Management

Demand management measures encourage transit use and discourage driving. OCTA already provides the C-Pass, U-Pass, and Perk Pass to encourage more students and employees to ride transit. However, the region needs a comprehensive transportation demand management program that works with employers and residents to provide transit-related information and incentives.

LAND USE AND BUILT ENVIRONMENT

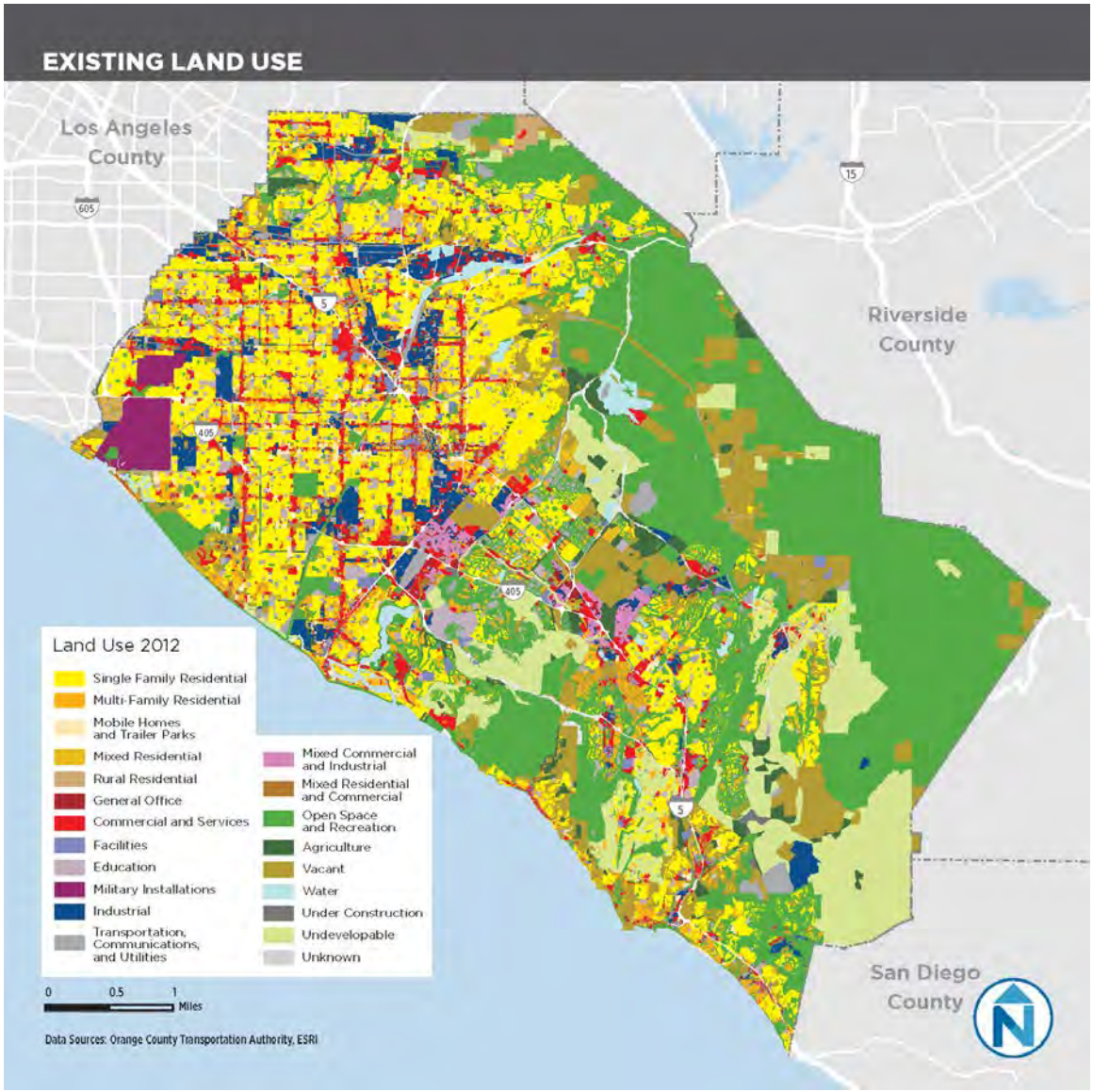
Like many areas of the United States that have developed rapidly since the 1940s, Orange County evolved around the car, with commercial development located primarily in business parks and residential development located largely in single-family subdivisions. In the last few decades, the county and Southern California as a whole have experienced significant demographic shifts that influence land use patterns. Compared to the postwar era, a smaller percentage of households have younger children at home, and the number of households without children is dramatically increasing. The housing market is expected to reflect these trends, increasing demand for smaller-lot single-family homes and multifamily housing closer to jobs, shopping, transit, and other destinations.[1]

Current Land Use

Today, single-family homes constitute the largest active land use in Orange County, covering 22 percent of the county. It is the dominant land use in the northern half of the county, supported by commercial businesses on an arterial grid network conducive to transit. Potentially rich transit markets such as multifamily housing and mixed-use properties tend to be clustered throughout the county, making those centers easier to serve by transit. In contrast to the built-up nature of the northern half of the county, South County is predominately open space, recreational space, and vacant and undevelopable land that does not generate significant transit demand. Where active land uses such as single-family homes occur in South County, development patterns are far more segregated than in the northern half, representing a disjointed patchwork as opposed to a filled-in grid. Existing land use throughout the county is shown in Figure 6-3.

[1] SCAG Regional Transportation Plan/Sustainable Communities Strategy, 2016.

Figure 6-3 Existing Land Uses (2012)



Future Land Use

The 2011 Orange County Sustainable Communities Strategy (SCS) is the county's most recent comprehensive transportation and land use plan. (As explained in Chapter 3 and below, it was later incorporated into the regional SCS developed by the Southern California Association of Governments). The following are key findings from the SCS:

- In recent decades Orange County has transformed from a suburban collection of bedroom communities to one of the most densely populated areas in the United States. Orange County is the most densely populated county in the SCAG region and has the highest residential density per square mile.
- Jurisdictions projected to experience the most population growth between 2008 and 2020 include Anaheim, Brea, Tustin, Irvine, and unincorporated areas.
- A majority of forecasted growth in these areas is expected to occur as a result of approved entitlements for large residential developments such as La Floresta in Brea, the Great Park in Irvine, and the Platinum Triangle in Anaheim.
- While population growth will occur in vacant areas, increased density will be most prevalent in established urban cores through infill, reuse, and mixed-use developments. These development patterns will result in more efficient land use, fostering improved environments for transit and non-motorized travel.
- Housing growth is projected to occur in and around areas forecast for increased employment growth. This will create opportunities to link housing at a human scale, increasing the propensity for transit and use of alternative modes for commute travel.
- Employment centers in the county are increasingly looking to locate near transit stations. Major employment growth was projected to occur near Fullerton, Buena Park, Tustin, and around the Irvine Spectrum and Anaheim Canyon, all near Metrolink rail stations, or high frequency bus corridors.
- As mixed uses develop in these emerging employment nodes centered on transit stations, social and commercial needs once satisfied only by private car will be met by walking, cycling, and transit.

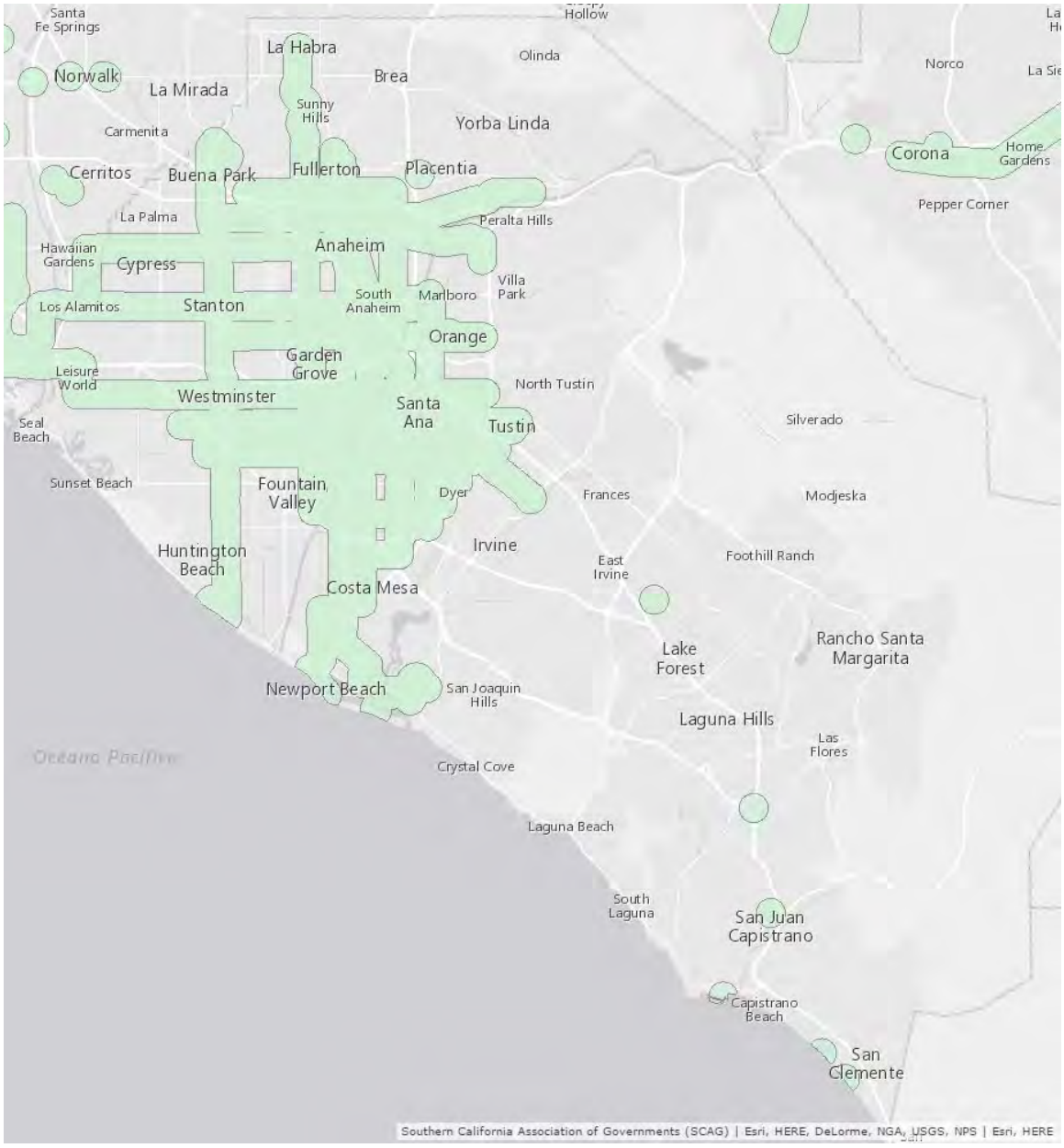
The 2016-2040 SCAG Regional Transportation Plan/Sustainable Community Strategy (2016 RTP/SCS) includes elements of the 2011 Orange County SCS. Recognizing that future growth and transportation investment must be linked, with special emphasis on improving access between housing and jobs, the plan identifies high-quality transit areas (HQTAs) in which to focus both infill development and investment. Consistent with state guidance, the plan defines HQTAs as areas within one-half mile of a fixed guideway transit stop, a ferry terminal served by either bus or rail service, or a bus corridor with headways of 15 minutes or less during peak commute hours.

While HQTAs account for only three percent of total land area in the SCAG region, they are projected to accommodate 46 percent of the region's future household growth and 55 percent of future employment growth. Today, 17 percent of households and 26 percent of jobs in Orange County are within HQTAs. HQTAs in Orange County as projected for the year 2040 are mapped in Figure 6-4.

- Given existing high-frequency bus corridors, HQTAs are projected to form a strong grid in the core urban areas of the northern half of the county. While changes are regularly made to OCTA service, there has been little change over the years to corridors with high-frequency service, which are primarily located in the north of the county.

- With the exception of Newport Beach, HQTAs in South County are confined to half-mile buffers around Metrolink stations in communities such as Irvine, Laguna Niguel, San Juan Capistrano, and San Clemente.
- The Dana Point Harbor in South County qualifies as an HQTA because it provides ferry service to Catalina Island and is served by OCTA bus service.

Figure 6-4 High Quality Transit Areas (2040)



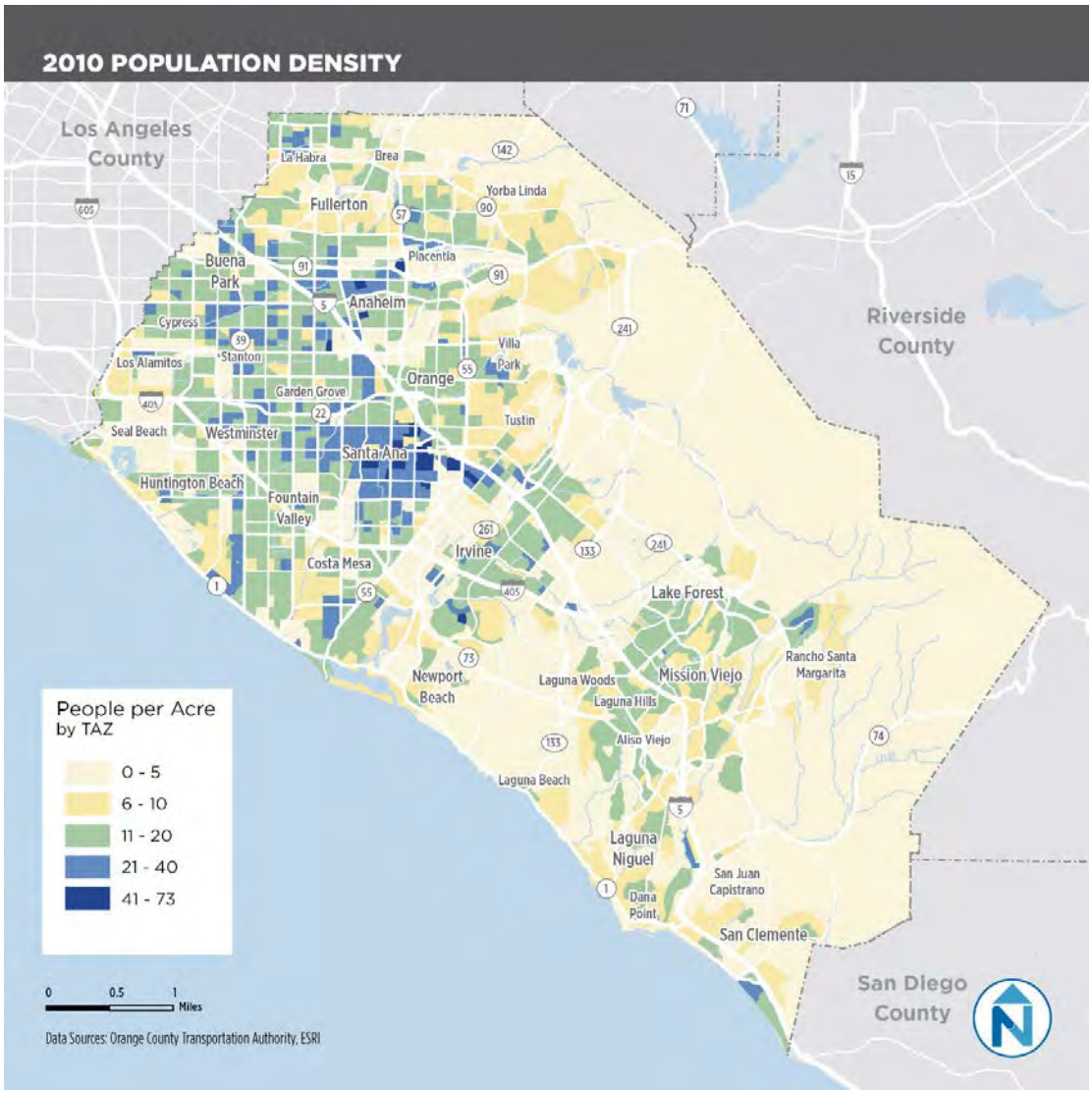
Source: Southern California Association of Governments (SCAG)

Current Population and Employment Density

The population of Orange County is just over 3 million people, making it the third most populous county in California following neighboring Los Angeles and San Diego Counties. At present, more than 1.3 million wage and salary jobs exist throughout the county. Existing (2010) countywide population density is shown in Figure 6-5. Key findings include the following:

- Population density is considerably higher in the northern half of the county.
- The highest population density areas are found throughout Santa Ana and in Anaheim along the state Route 91 corridor.
- Areas with the lowest population densities are primarily a result of geographic constraints (mountains) or restrictive land uses such as the Seal Beach National Wildlife Refuge and John Wayne Airport.

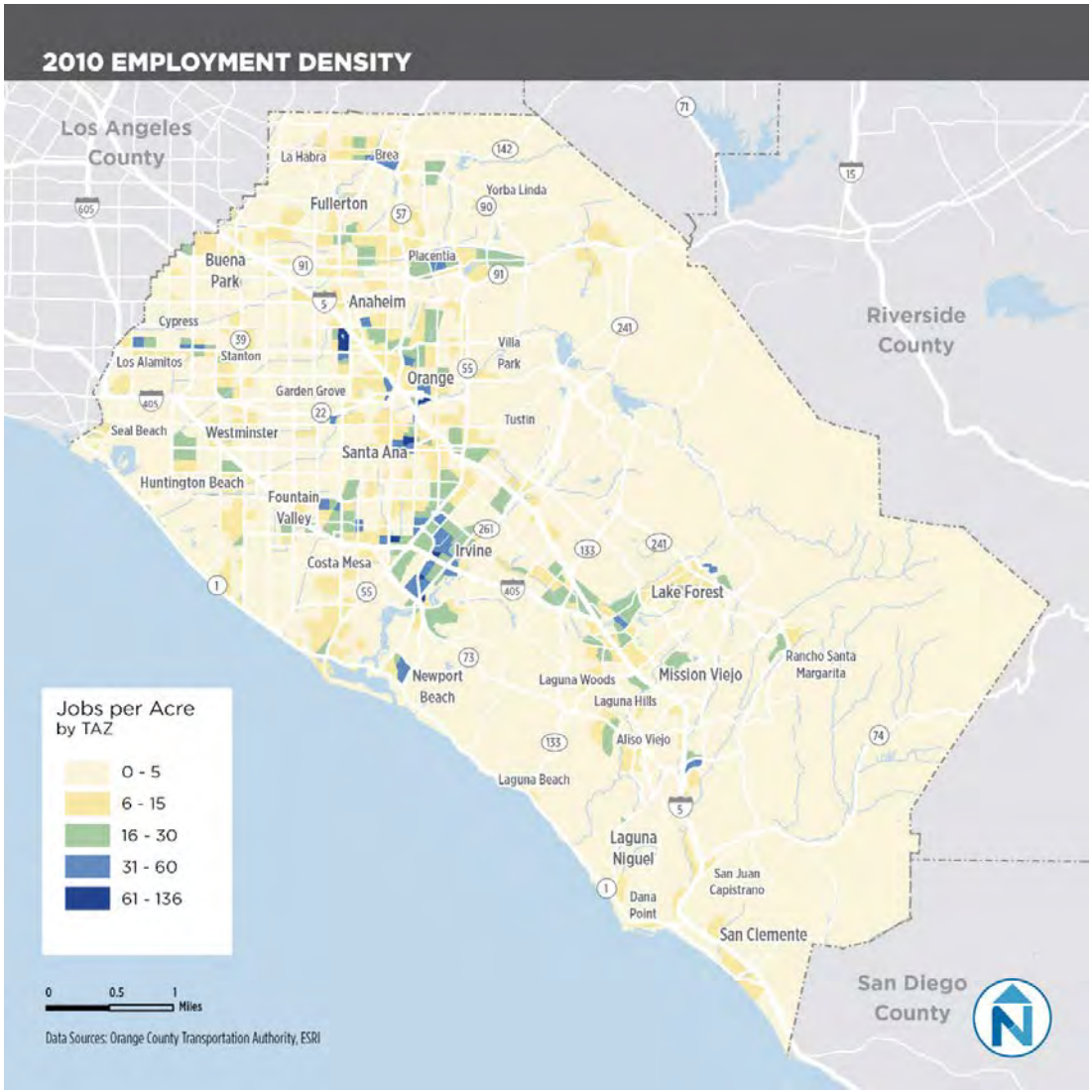
Figure 6-5 Existing Population Density (2010)



Existing (2010) countywide employment density is shown in Figure 6-6. Key findings include the following:

- Countywide, nodes of high employment density are more confined than nodes of high population density.
- As with population density, employment density is greater in the northern half of the county.
- Because centers of high employment density are more clustered than areas of high population density, these nodes may be easier to serve by transit.
- The Irvine Business Complex and the area directly south of John Wayne Airport along MacArthur Boulevard has some of the highest employment densities in the county despite having relatively low population density.
- Other nodes of high employment density include major activity sites such as Disneyland, the MainPlace mall, Brea Mall, Newport Center (Fashion Island), and Downtown Santa Ana.

Figure 6-6 Existing Employment Density (2010)



Future Population and Employment Density

Over the next two decades SCAG forecasts the population of Orange County to grow to over 3.6 million people, representing an increase of more than 21 percent between 2010 and 2035. Likewise, total wage and salary jobs are forecasted to reach almost 2 million, an increase of approximately 47 percent between 2010 and 2035. Projected population density and change are shown in Figure 6-7 and Figure 6-8. These figures illustrate the following:

- Neighborhoods with major projected increases in population density are fairly limited. Exceptions include the Platinum Triangle in Anaheim, Laguna Altura and Cypress Village in Irvine, Westside in Costa Mesa, and Downtown Fullerton.
- Areas with low existing population density projected to see moderate growth include the western side of State Route 241 north of Lake Forest and State Route 74 corridor near Rancho Mission Viejo in the southern half of the county.
- Patterns of projected population density, particularly in areas with the highest density, are relatively unchanged from existing patterns.
- As with existing population density, areas with the highest projected population density are found throughout Santa Ana and in Anaheim along State Route 91.
- The Platinum Triangle in southeast Anaheim (surrounding Angel Stadium and Anaheim-ARTIC Station) is projected to transition from low to medium existing population density to higher density.

Figure 6-7 Projected Population Density (2035)

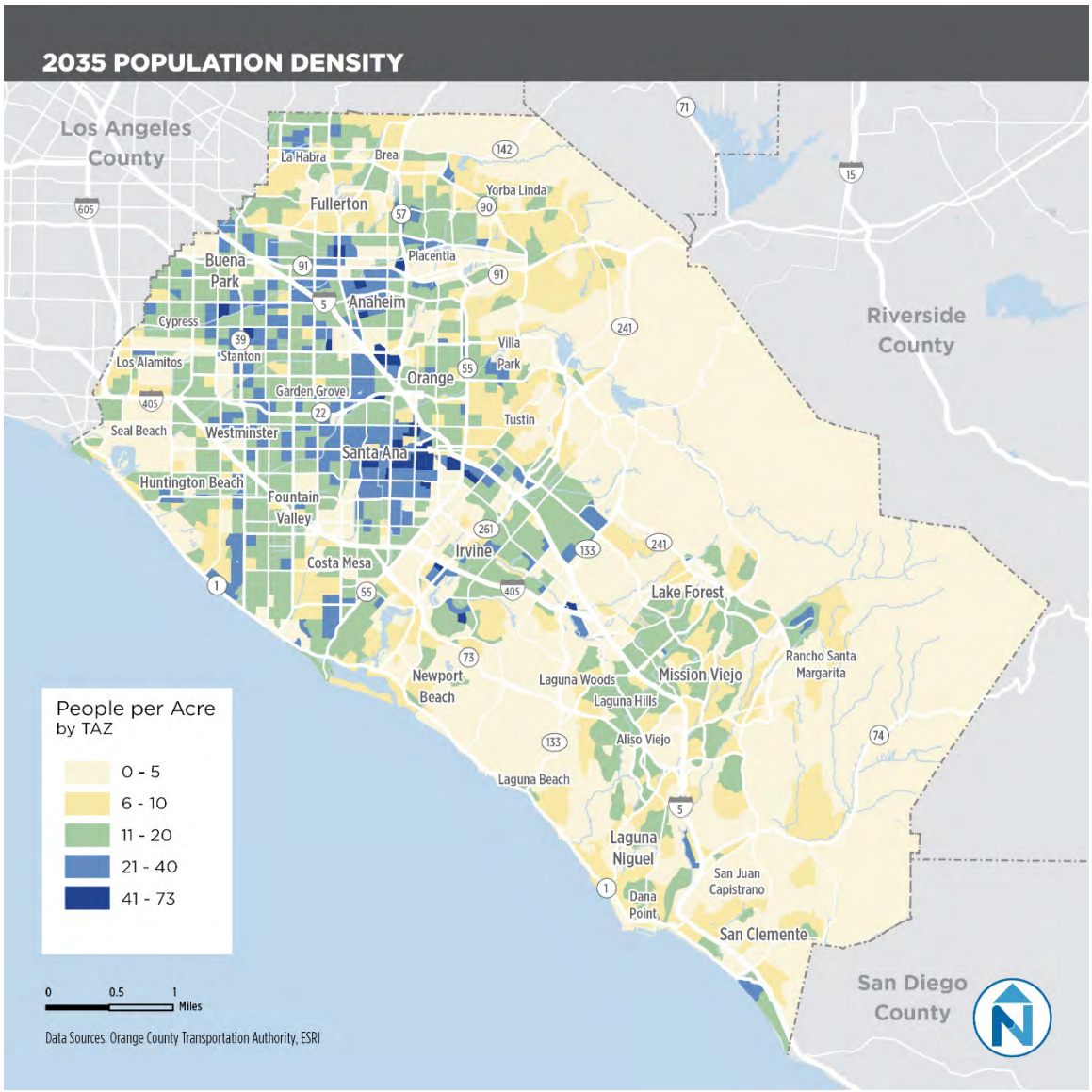
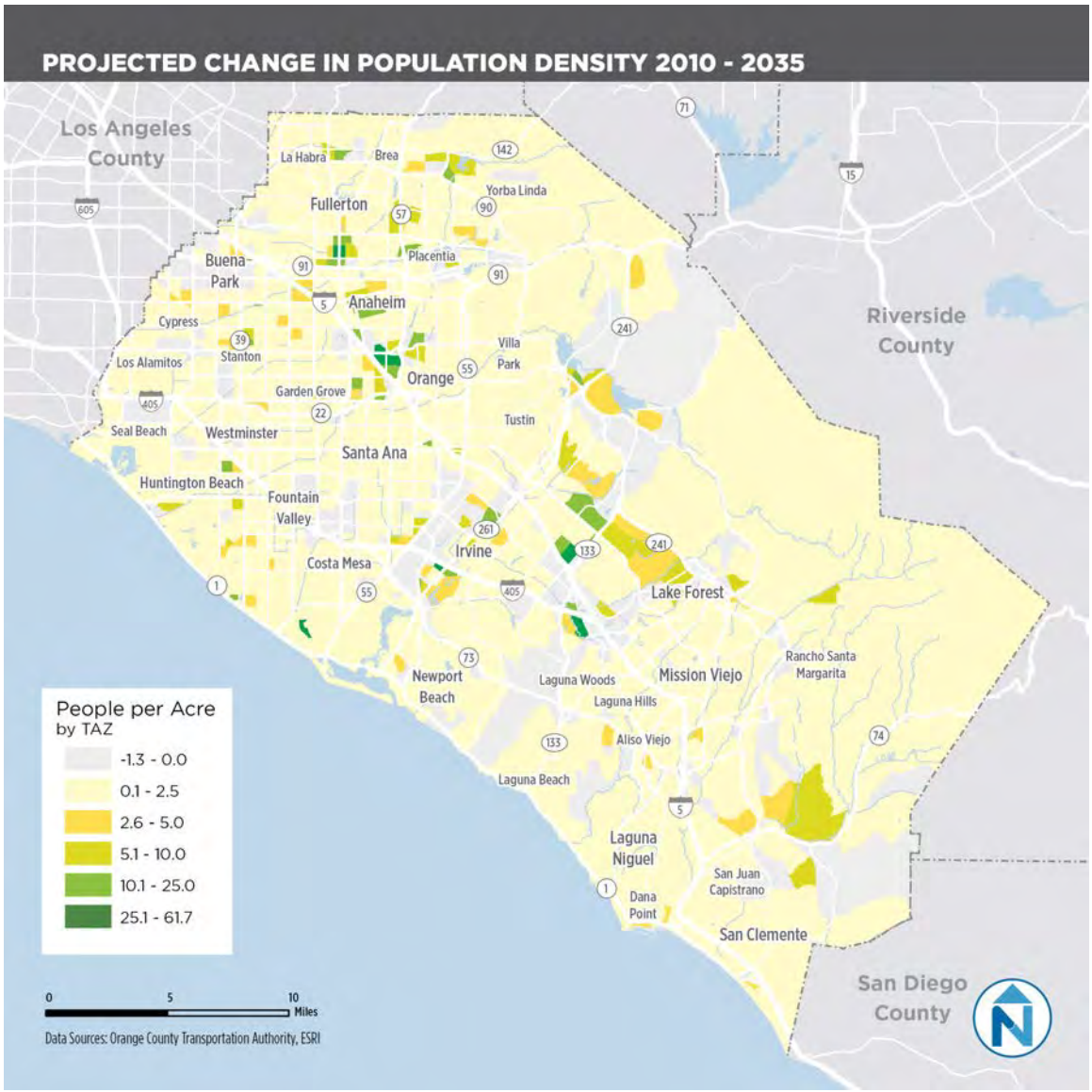


Figure 6-8 Projected Change in Population Density (2010 – 2035)



Projected (2035) employment density and change (2010-2035) are shown in Figure 6-9 and Figure 6-10, respectively. These maps illustrate the following findings:

- To a higher degree than population density, patterns of projected employment density are relatively unchanged from existing patterns.
- Areas with the highest projected employment density include the Irvine Business Complex, Downtown Santa Ana, and major activity sites like Disneyland and large shopping centers.
- Areas with low employment density projected to transition to medium or high density include the Platinum Triangle, southeastern Irvine around the Irvine Medical and Science Complex, and less developed areas surrounding UC Irvine and the Irvine Business Complex.
- Areas with major projected increases in employment density are limited, with the exception of the areas highlighted previously: the Platinum Triangle and areas near the Irvine Business Complex, UC Irvine, and the Irvine Medical and Science Complex.

Figure 6-9 Projected Employment Density (2035)

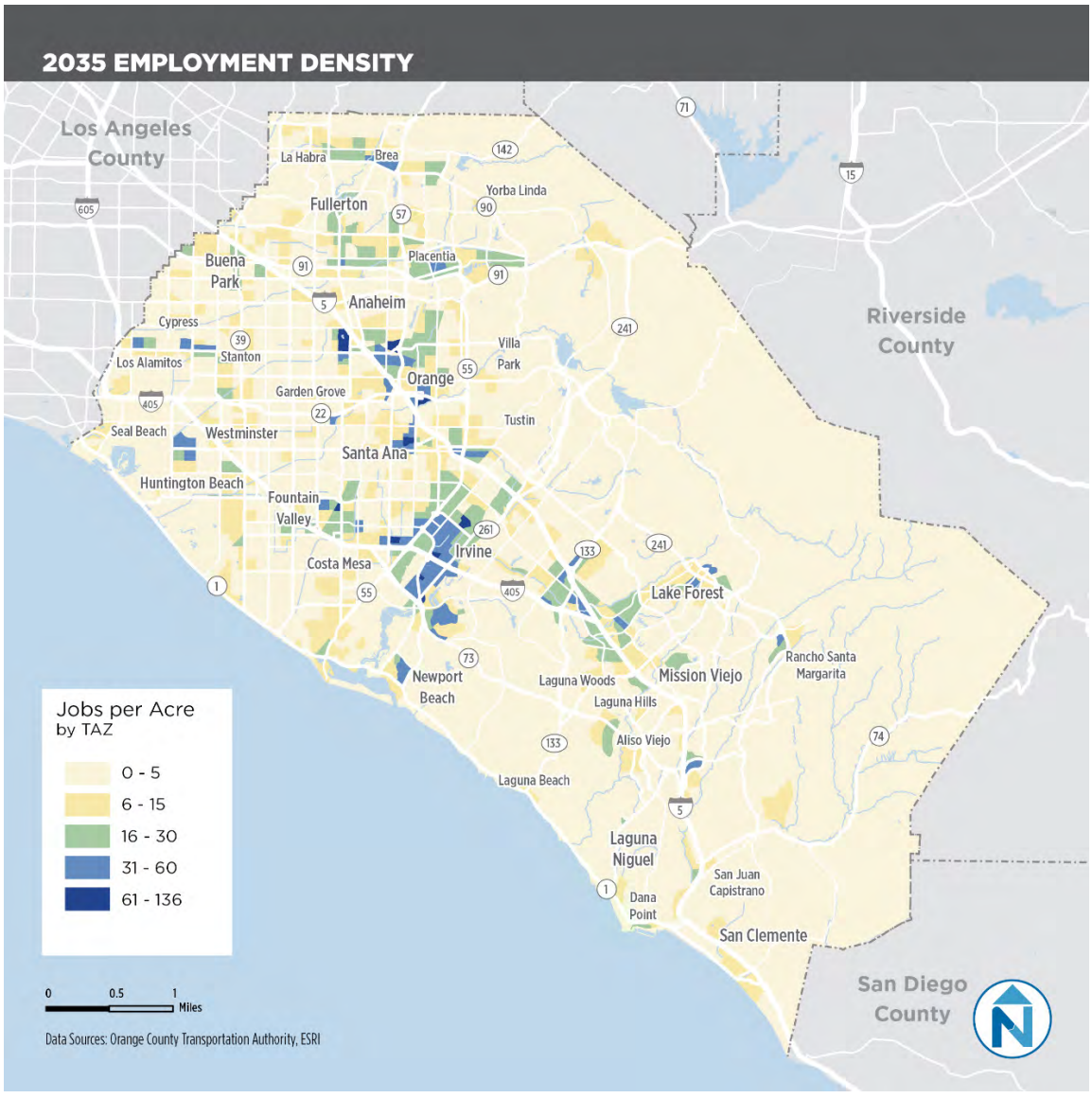
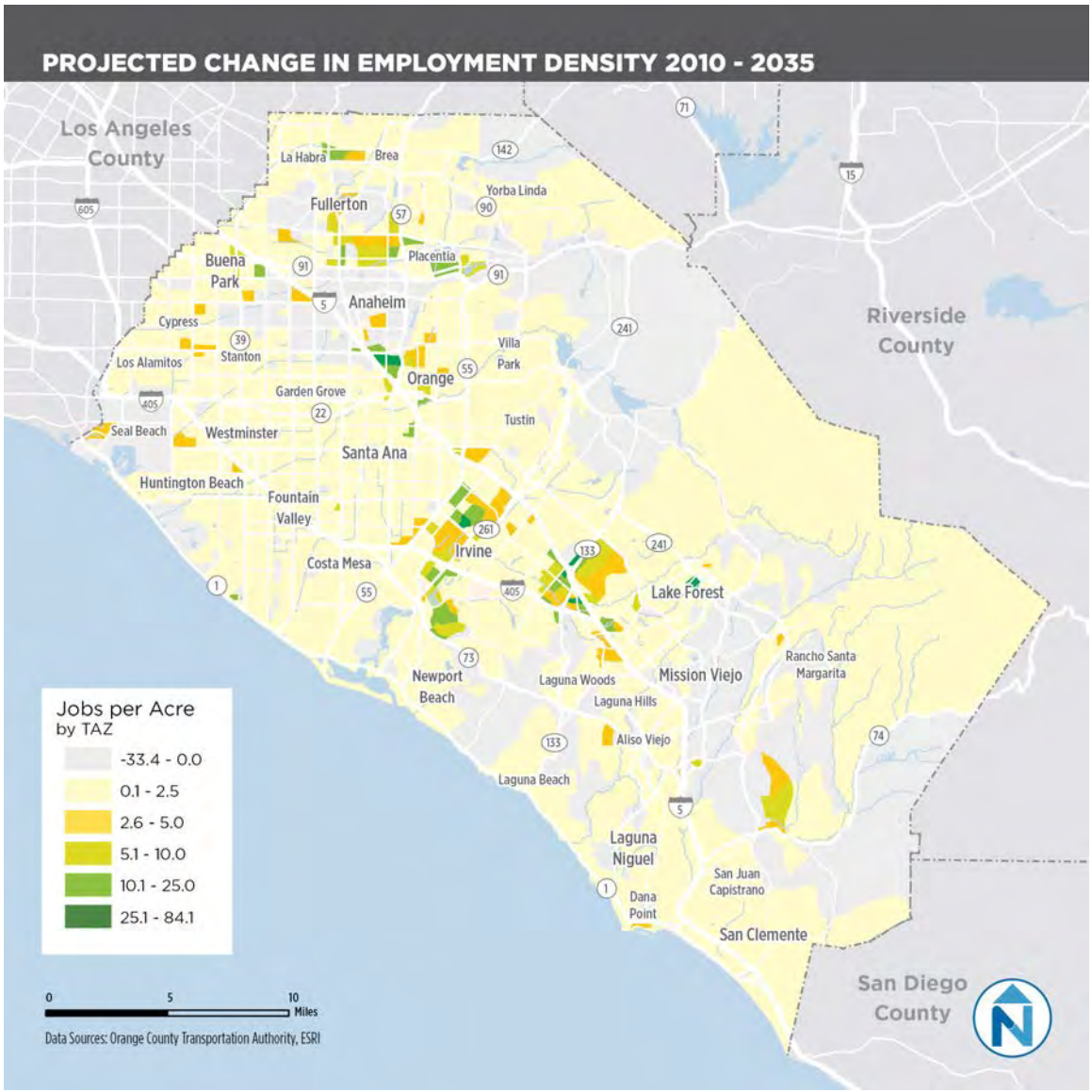


Figure 6-10 Projected Change in Employment Density (2010 – 2035)



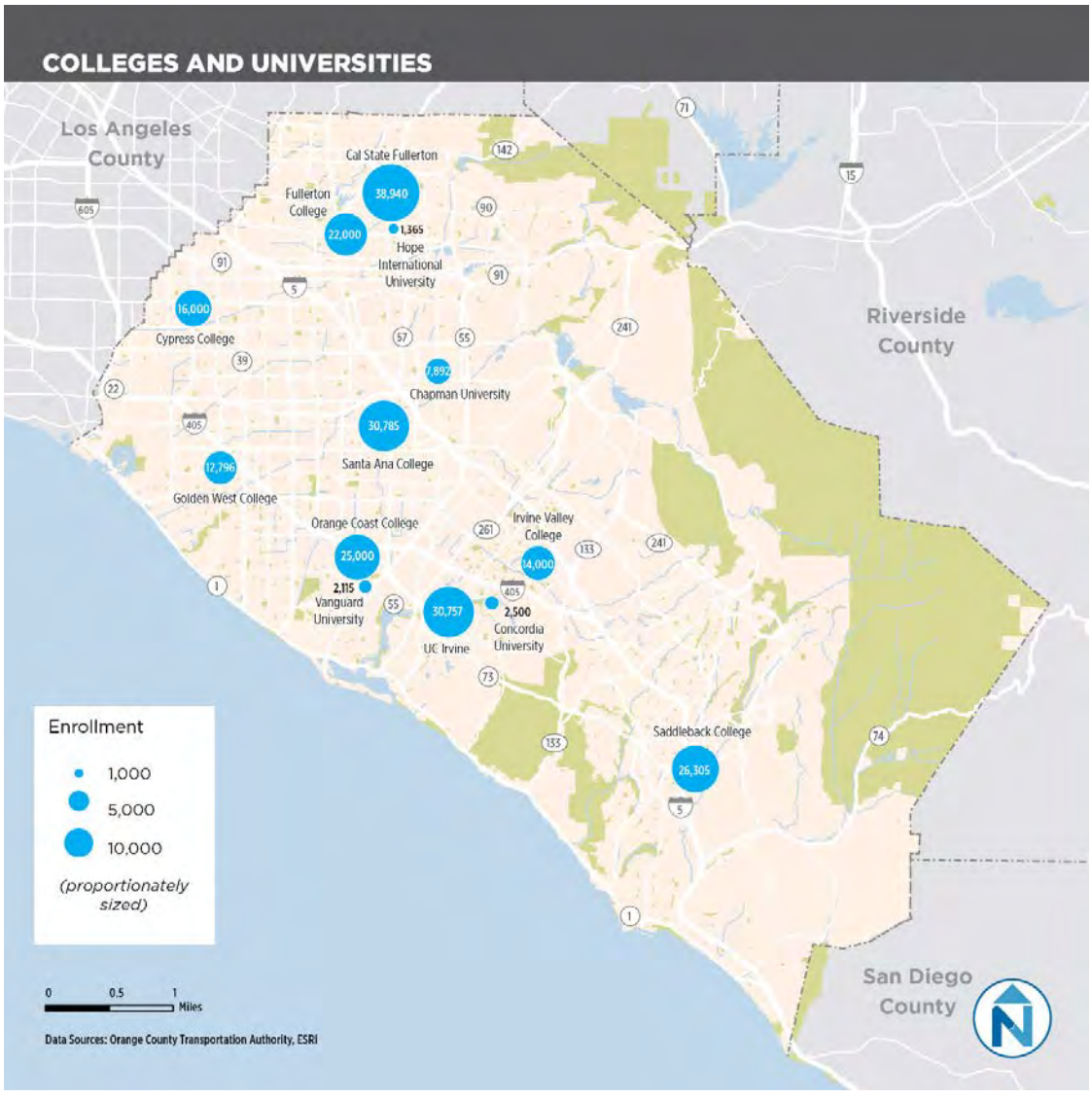
Other Trip Generators

Colleges and Universities

Orange County is home to numerous universities, colleges, and community colleges, which are major employment centers. However, with their generally young and lower-income student bodies, these institutions represent a major potential source of transit ridership beyond employees. College and university transit ridership can be further increased when the transit operator partners with a school to provide discounted fares, as OCTA has done in many cases, or when campuses offer their own service such as UC Irvine's Anteater Express shuttle. Colleges and universities also generate all-day demand for transit—well beyond the peak hours—although demand fluctuates seasonally.

As shown in Figure 6-11, the location of major colleges and universities in Orange County corresponds to areas of higher population density in the northern half of the county. Large institutions with enrollments of over 20,000 students include Cal State Fullerton and Fullerton College in Fullerton, Orange Coast College in Costa Mesa, Santa Ana College in Santa Ana, UC Irvine in Irvine, and Saddleback College in Mission Viejo.

Figure 6-11 Major College and Universities



Major Retail

Like colleges and universities, malls and shopping centers are major job centers and major generators of non-work trips; they are also sources of all-day demand. Figure 6-12 shows the distribution of the largest shopping centers within the county by number of stores; a majority of the retail centers are sited along major corridors in the roadway network such as Interstate 405 and Interstate 5. In addition to being major destinations for shoppers, some of the largest facilities, such as Fashion Island in Newport Beach and Westfield MainPlace in Santa Ana, are areas of the county with high employment density (see Figure 6-6).

Figure 6-12 Major Retail Centers

Medical Facilities

Figure 6-13 presents the distribution of the largest medical centers within the county by number of beds. In general, the distribution of major medical facilities correlates to population distribution, with most facilities located in the urbanized areas of the northern half of the county and facilities in the less populated southern half sited along the I-405 and I-5 corridors.

Figure 6-13 Major Medical Facilities

Other Major Attractions

In addition to schools, shopping malls, and hospitals, the following are also major trip generators: theme parks, stadiums, and arenas.. As shown in Figure 6-14, Orange County's most notable major attractions are in the northern half of the county, often near the intersections of major freeways. Disneyland, which draws visitors from all over the word, also represents a node of high employment density. Venues like Angel Stadium and Honda Center, which host sporting events and concerts, are important given the sheer volume of trips they attract at specific times.

Figure 6-14 Major Attractions

DEMOGRAPHICS

Demographic characteristics such as age, gender, ethnicity, and income tend to correlate with transit use. Figure 6-15 through Figure 6-27 illustrate a broader range of demographic inputs, as well as the ways Orange County populations with a tendency toward transit use (such as low-income and youth populations) overlap spatially. Transit demand generally can be expected to be higher in these areas.

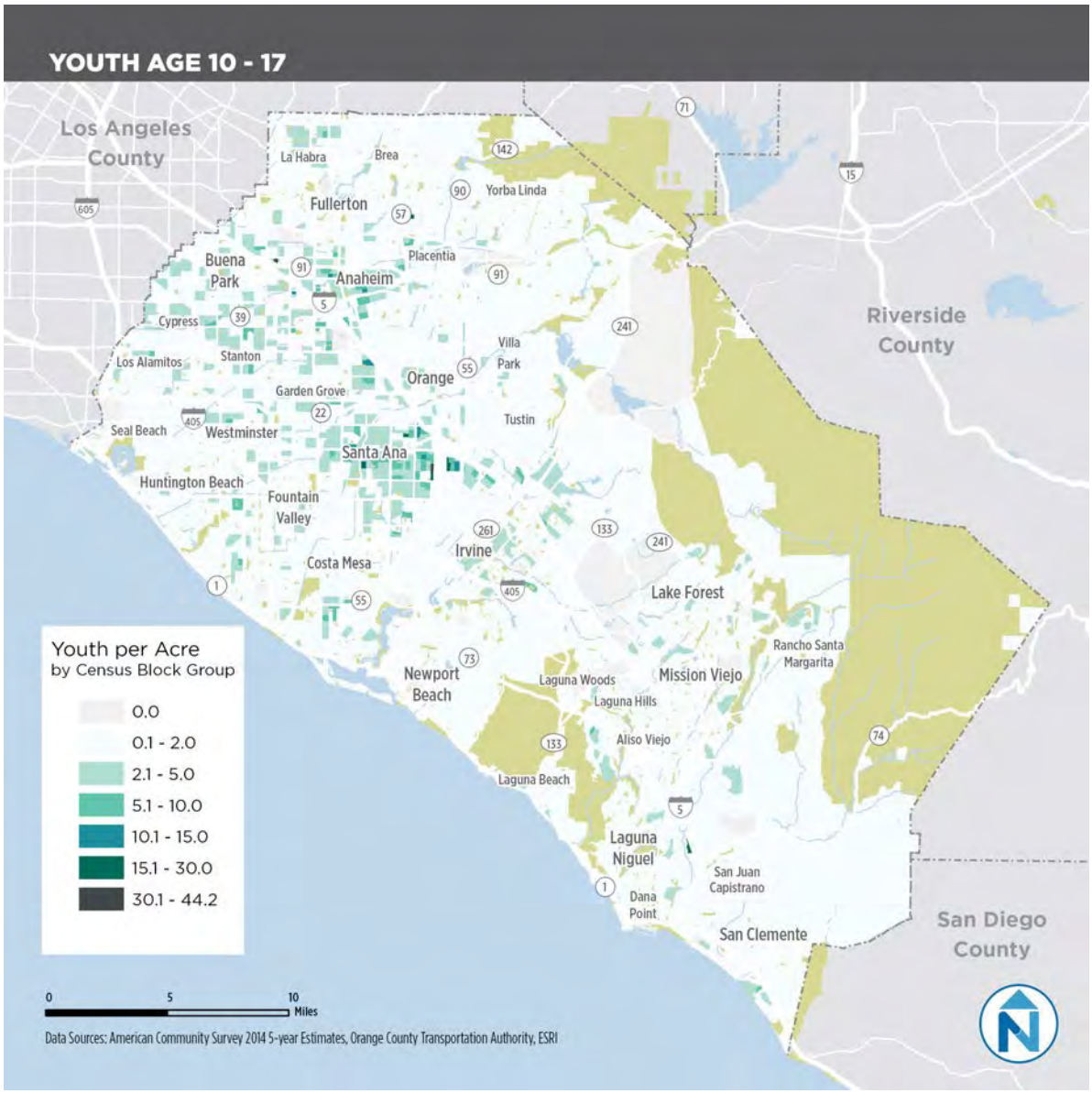
Population Characteristics

Youth

People under 18 are a strong ridership group in many communities. Young people will use transit if it is affordable and meets their educational and recreational transportation needs. Today, approximately 22.6 percent of Orange County residents are under the age of 18. Figure 6-15 represents the density of youth living in Orange County:

- The northern half of the county, particularly around Santa Ana and Anaheim, has clusters of higher density youth populations.
- Areas with higher density youth populations correspond to areas with higher rates of low-income households, households speaking limited English, and large average household size.

Figure 6-15 Density of Youth Population



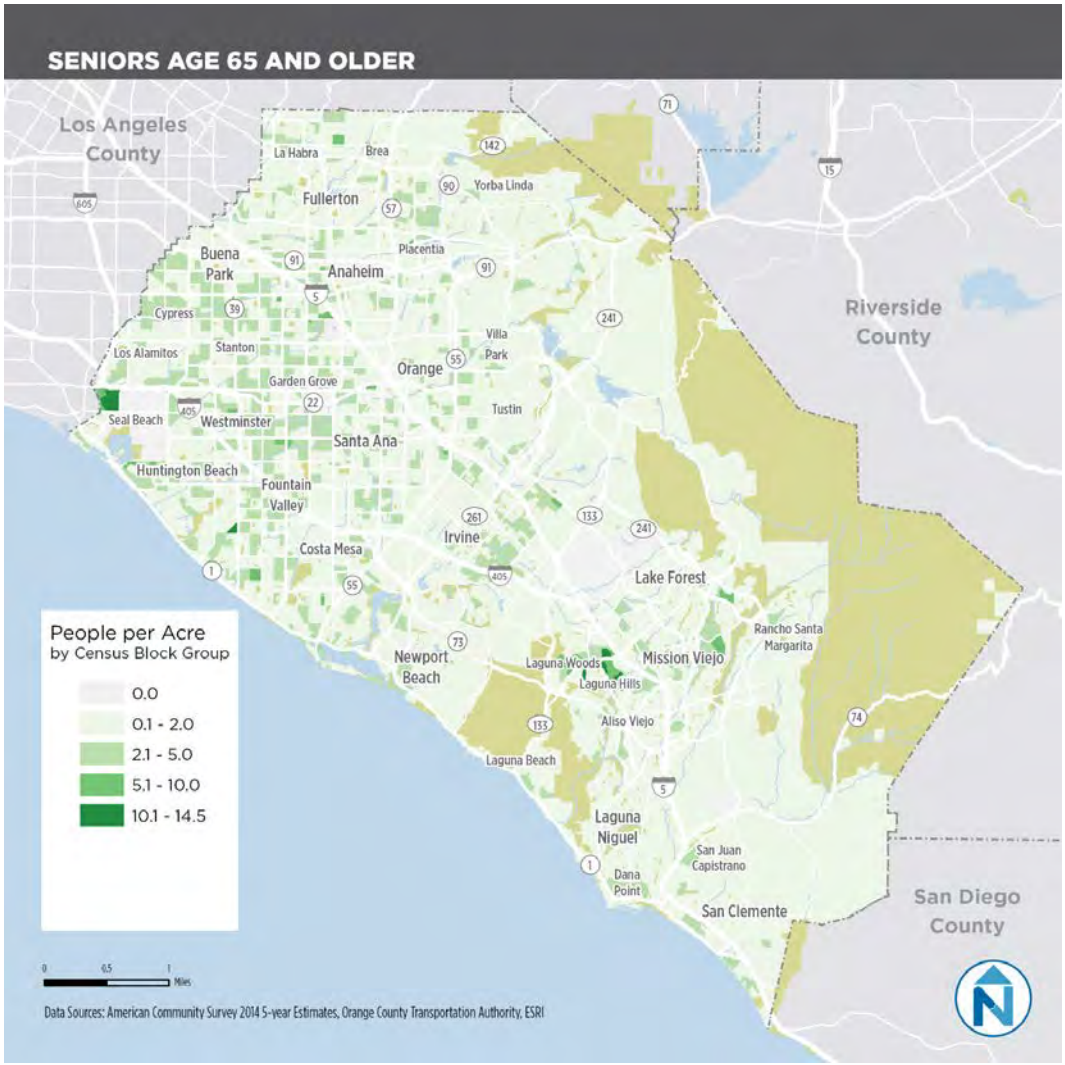
Older Adults

As people age, they often become less comfortable driving or less able to operate a vehicle. Costs associated with auto operation and maintenance can also be a burden as older adults transition to fixed incomes. Transit offers older adults the freedom to stay in their homes, or age in place, even as they transition away from driving.

Recent surveys have shown that the baby boomer generation desires a more active retirement lifestyle than previous generations. Boomers are living longer, staying more active, and seeking out neighborhoods that are walkable and served by transit. Today, approximately 13.6 percent of Orange County residents are age 65 or older. Figure 6-16 represents the density of seniors living within Orange County:

- The largest senior populations are found in a few distinct clusters, such as the Leisure World gated retirement community in Seal Beach and communities surrounding Laguna Woods and Laguna Hills.
- Areas of moderate senior population density are widely dispersed throughout the residential parts of the county.

Figure 6-16 Density of Senior Population

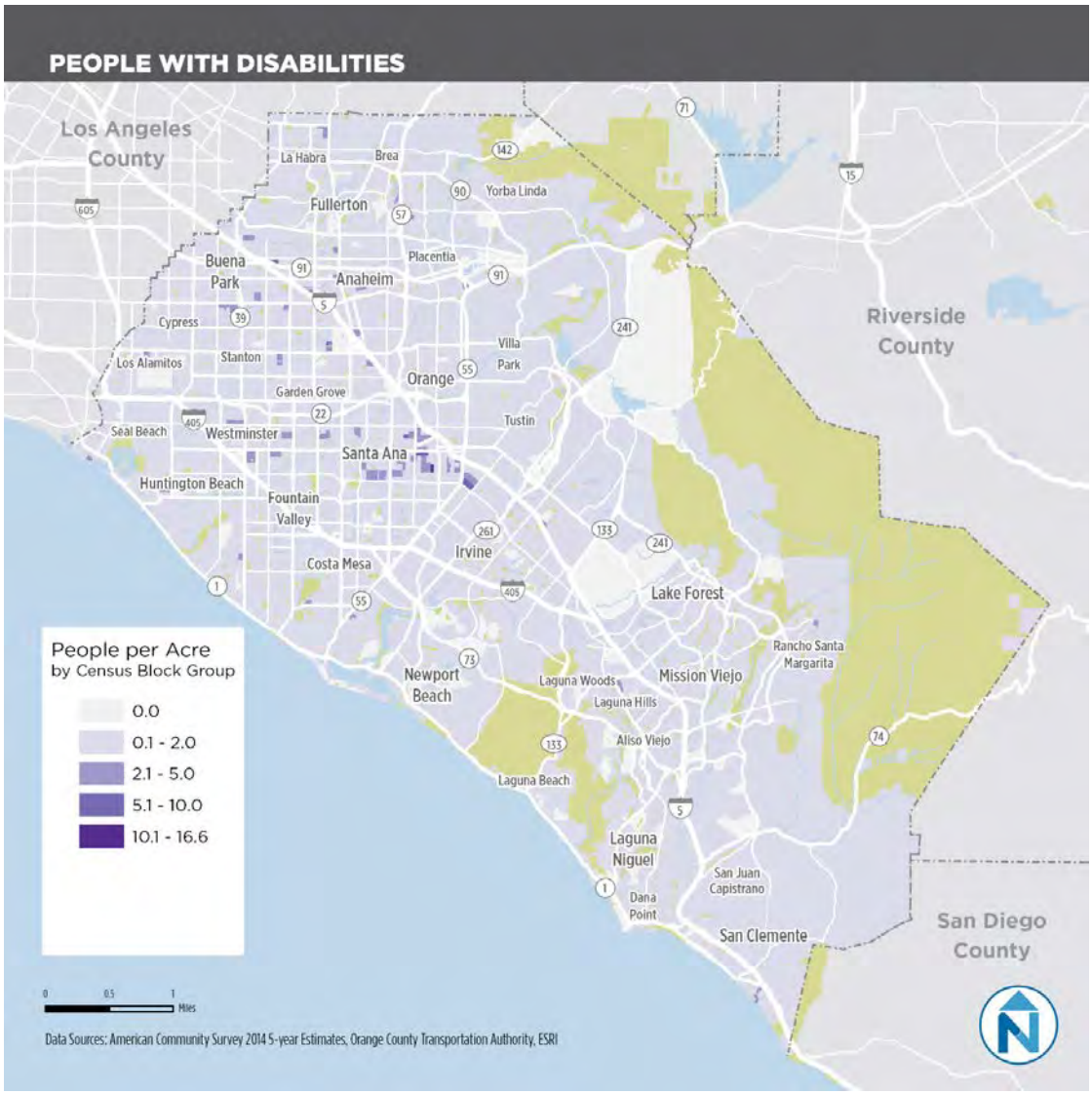


People with Disabilities

People with disabilities often depend on transit for their daily mobility needs. Public transit, including specialized paratransit services, is an essential resource to ensure people with disabilities are able to remain active members of the community. Figure 6-17 represents the density of persons with a disability living within Orange County. Key findings include the following:

- Clusters of people with disabilities correlate to areas of the county with higher population density, such as Santa Ana.
- Areas with the highest density of people with disabilities do not correspond to areas of the county with the highest density of seniors.
- Overall, most census block groups throughout the county have fewer than two residents with a disability per acre.
- The distribution of people with disabilities across the county indicates where there may be a greater need for access and demand-responsive transit service.

Figure 6-17 Density of Populations with Disabilities

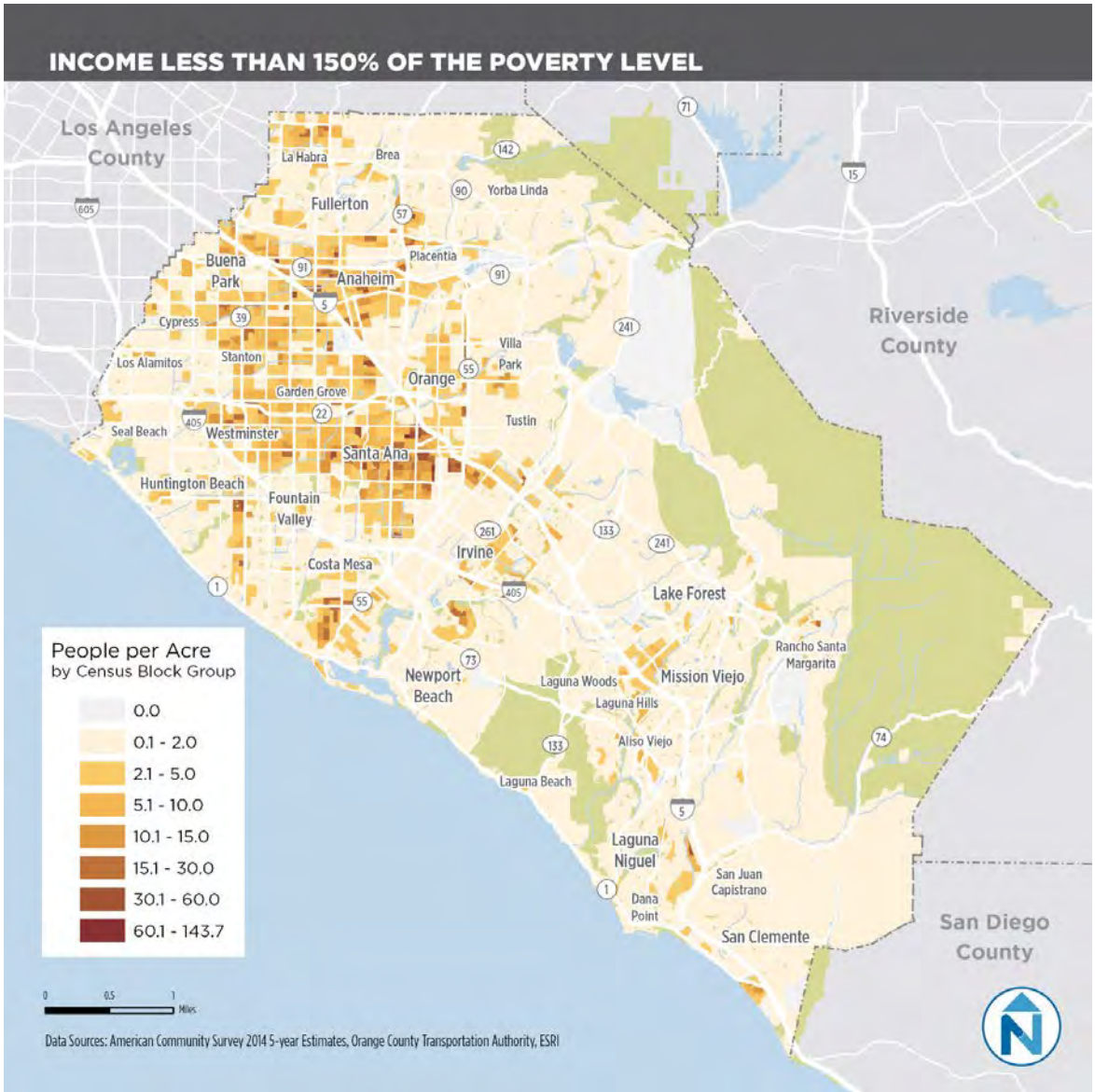


Income

Households with low incomes are generally more dependent on transit services than those with higher incomes. Low-income households are those that earn up to 150 percent of the federal poverty level. The federal poverty level ranges from an annual income of $11,880 for one-person households to $40,890 for households of eight (and $4,160 for each additional person thereafter). Conversely, the 2014 median household income in Orange County was almost $76,000. Figure 6-18 represents the density of low-income households throughout the county:

- Areas of the county with the highest density of low-income households correspond to the highest population densities.
- In many cases, census blocks with the highest rates of low-income households correlate to census blocks with a high density of non-white populations and large average household size.
- Areas of low-income populations are far more prevalent in the northern half of the county.

Figure 6-18 Density of Low-Income Populations

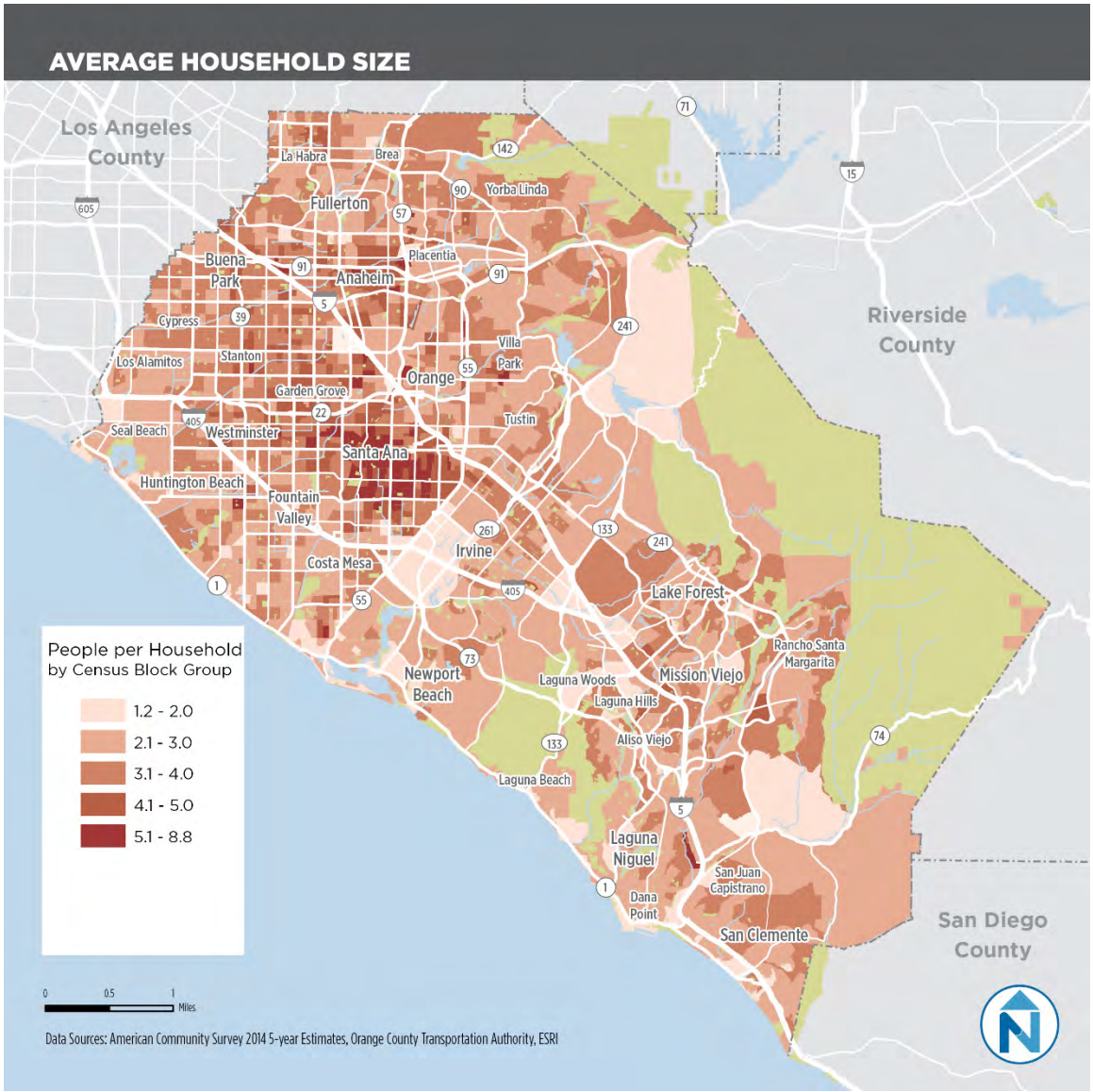


Household Size

Historically, greater household size is an indicator of travel demand commonly observed in lower-income and new immigrant communities. In 2014, the average persons per household in the county was 3.04, compared to 2.95 statewide and just 2.63 nationally. Figure 6-19 represents the density of people per household throughout Orange County. Key findings include the following:

- The areas with the greatest density of large households (more than five people) are consistent with the areas of highest population density, such as central Santa Ana.
- Areas in the northern half of the county with average household sizes above the county average correspond to areas with high rates of low-income households, youth, Latino populations, and limited English speaking households.

Figure 6-19 Density of People per Household

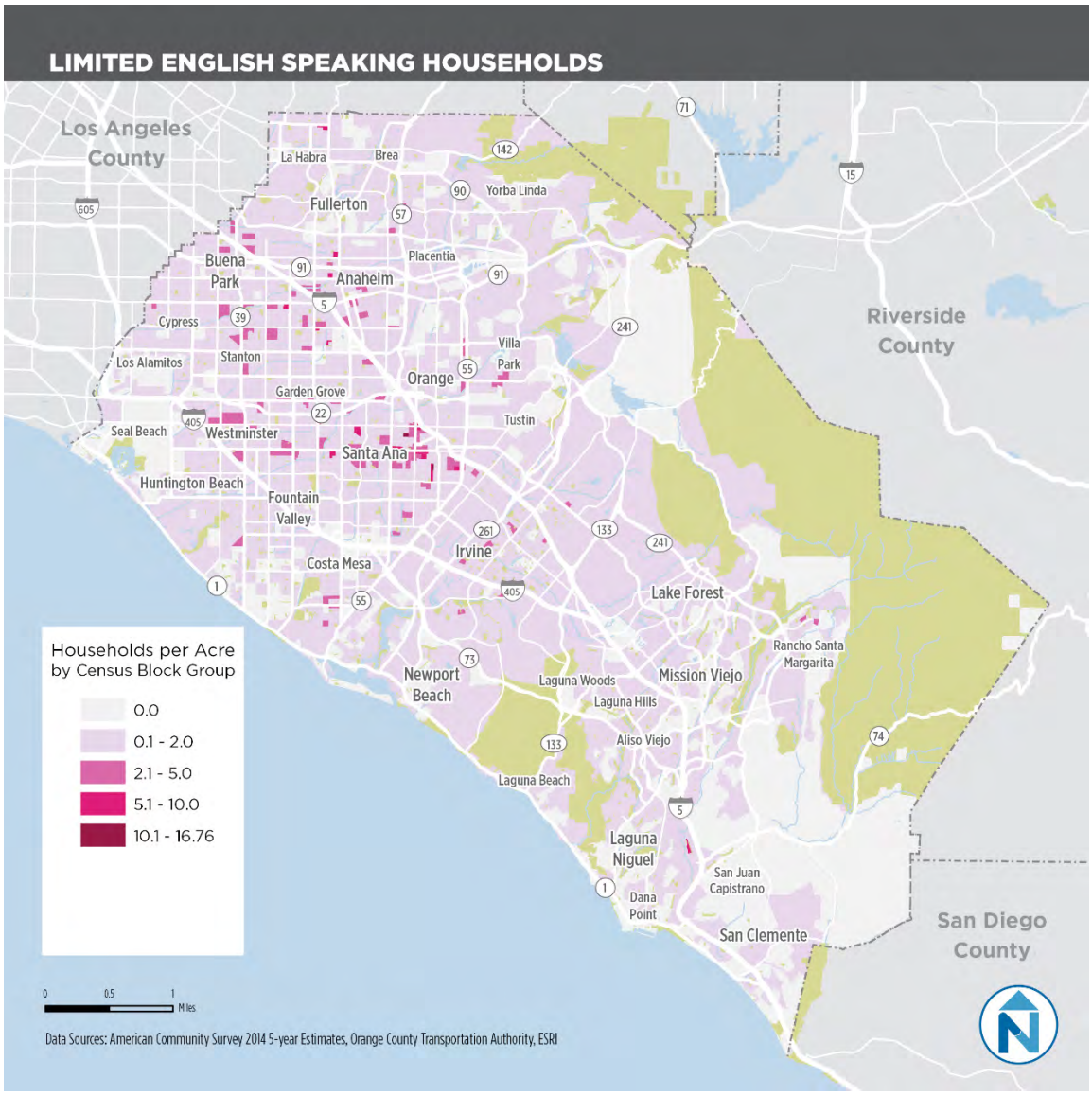


Limited English Proficiency

Individuals who have limited English proficiency (LEP) often have lower incomes because of the barriers that they face in participating in the job market. As a result, LEP populations typically have higher rates of transit use than those of native or fluent English speakers. In 2014, more than 45 percent of people over the age of five in Orange County spoke a language other than English at home, highlighting the diversity of the region. Figure 6-20 represents the density of LEP households throughout the county. Key findings include the following:

- The highest density of LEP households is primarily confined to the highest population density areas in the northern half of the county.
- The location of high density LEP areas corresponds to areas with high rates of low-income households and Latino populations.

Figure 6-20 Density of Limited English Speaking Households



Ethnicity

In the United States, whites are generally less likely to use transit than other racial and ethnic groups. As a group, non-white populations are more likely to have lower incomes and less access to automobiles, and to live in areas with higher population densities. (There are, of course, significant variations both among and within groups.)

Figure 6-21 presents the density of white (non-Hispanic) populations across the county, while Figure 6-22 through Figure 6-26 map the density of non-white populations throughout Orange County. The figures represent the following findings:

- The highest density white populations are most prevalent along the coast and in the southern half of the county.
- In general, non-white populations are far more prevalent in the northern half of the county.
- High-density clusters of Latino populations largely correspond to areas of overall high population density, such as Anaheim and Santa Ana.
- Denser populations of Asians or Pacific Islanders are most prevalent in the northwest quadrant of the county, with a considerable cluster forming a triangle between Westminster, Garden Grove, and Santa Ana. In contrast to all other non-white groups, Asian or Pacific Islander populations also have a considerable presence in Irvine.
- The density of African-American and black populations is low across the county, with the largest population stretching from Los Alamitos to Anaheim in the northwest quadrant of the county.
- Higher density patterns for populations identifying as “other” or mixed race are similar to that of Latino populations but of less intensity outside of core areas.
- The density of American Indian/Alaskan Native populations is low throughout the county.

Figure 6-21 Density of White (not Hispanic or Latino) Populations

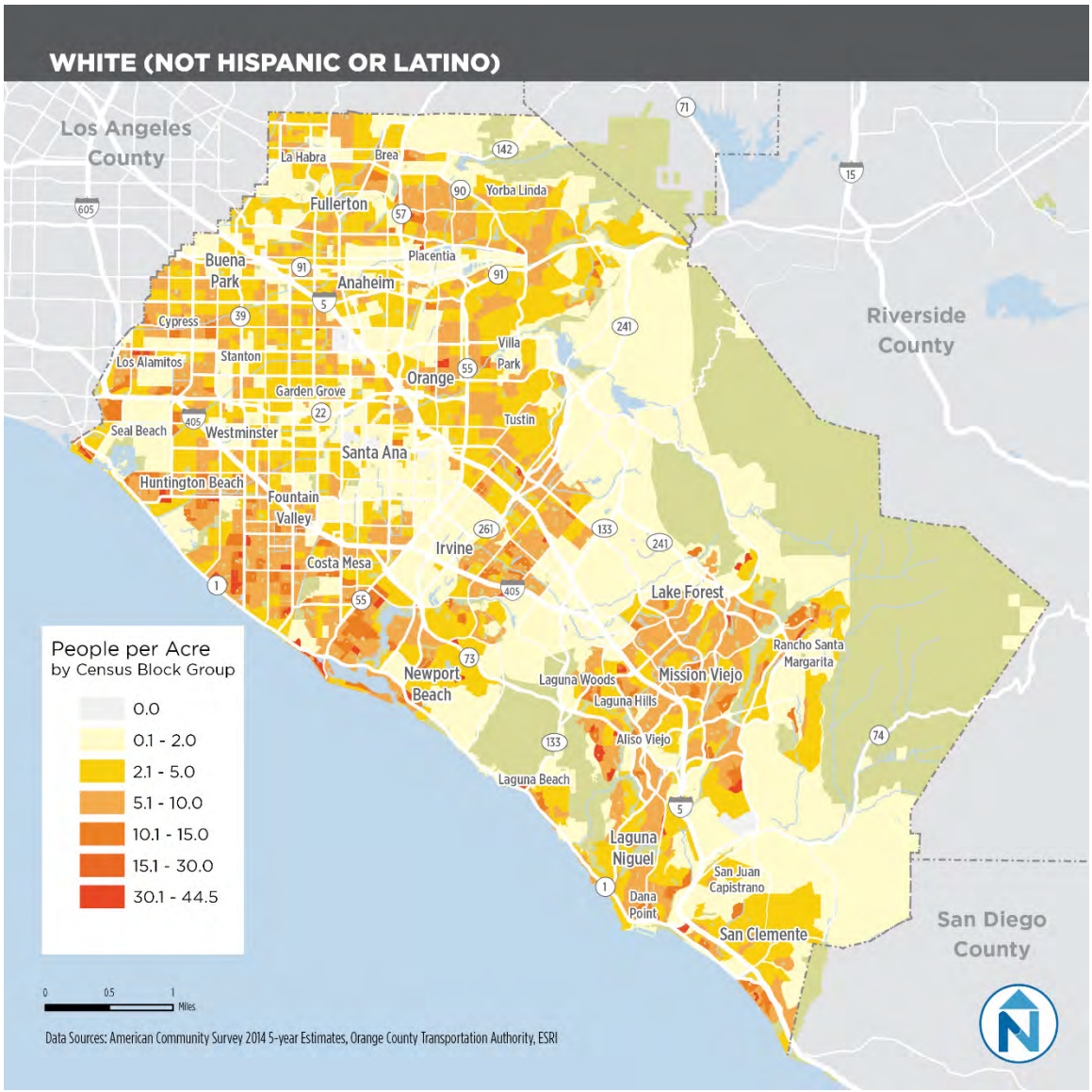


Figure 6-22 Density of Latino (Non-White) Populations

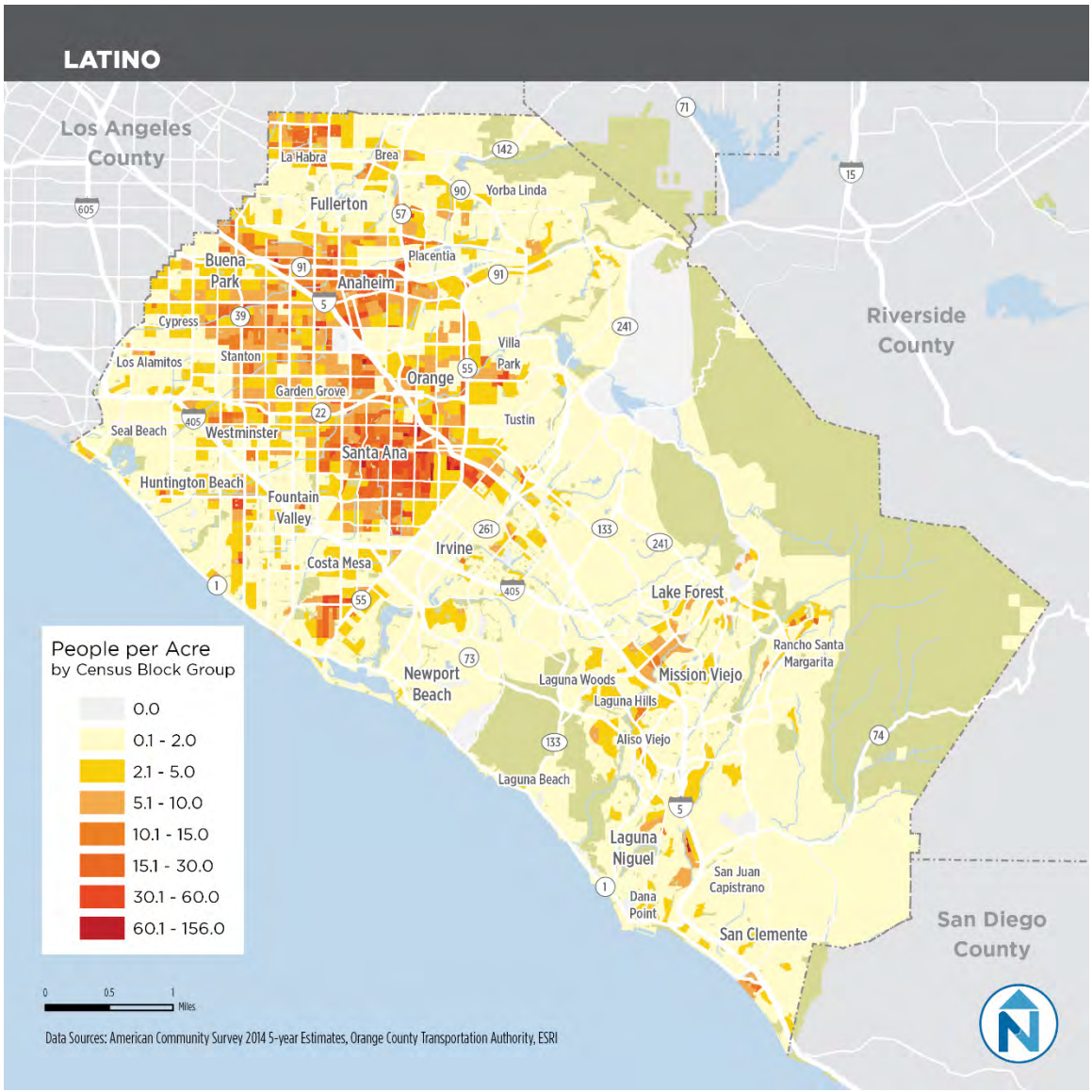


Figure 6-23 Density of Asian or Pacific Islander Populations

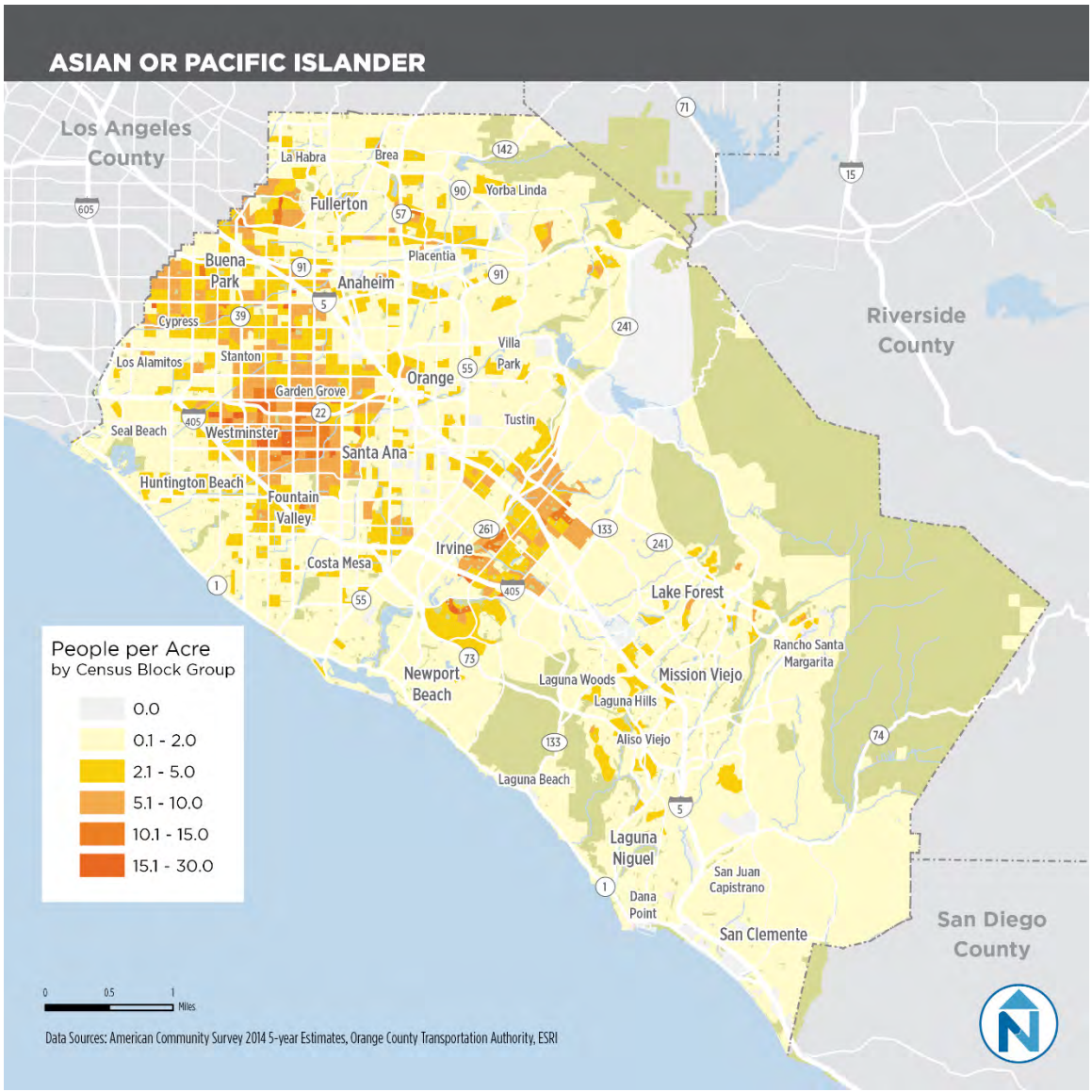


Figure 6-24 Density of African-American/Black Populations

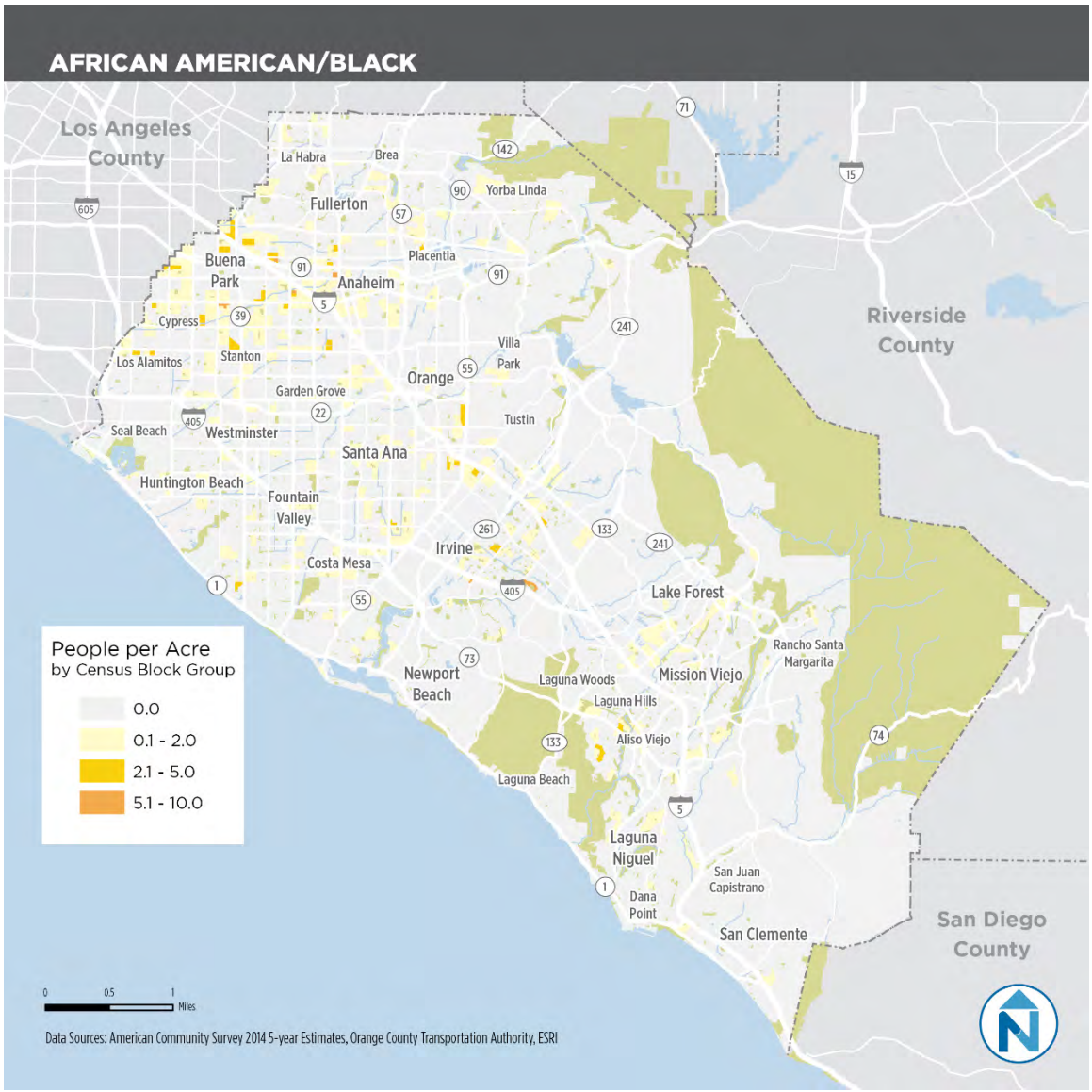


Figure 6-25 Density of Other or More Than One Race

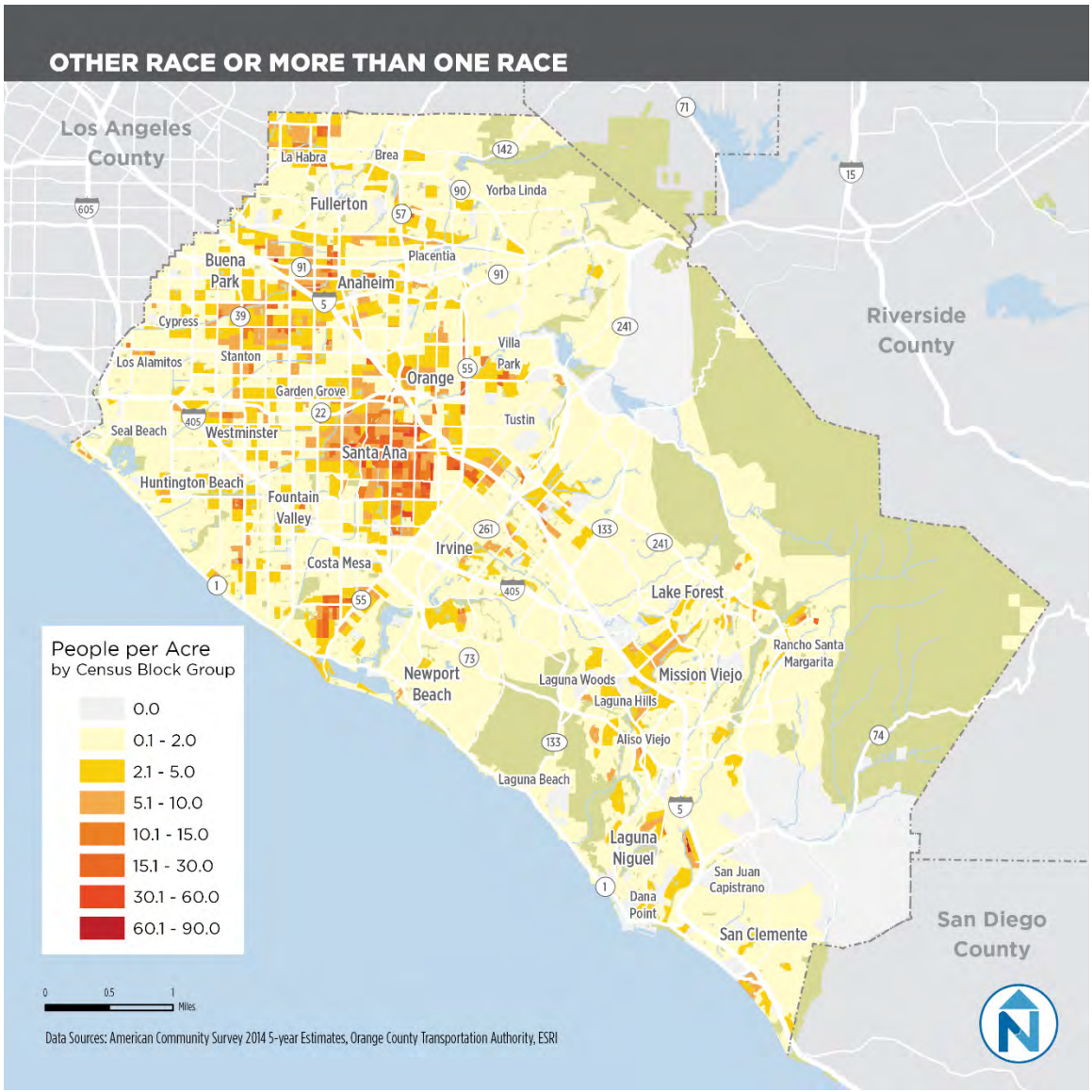
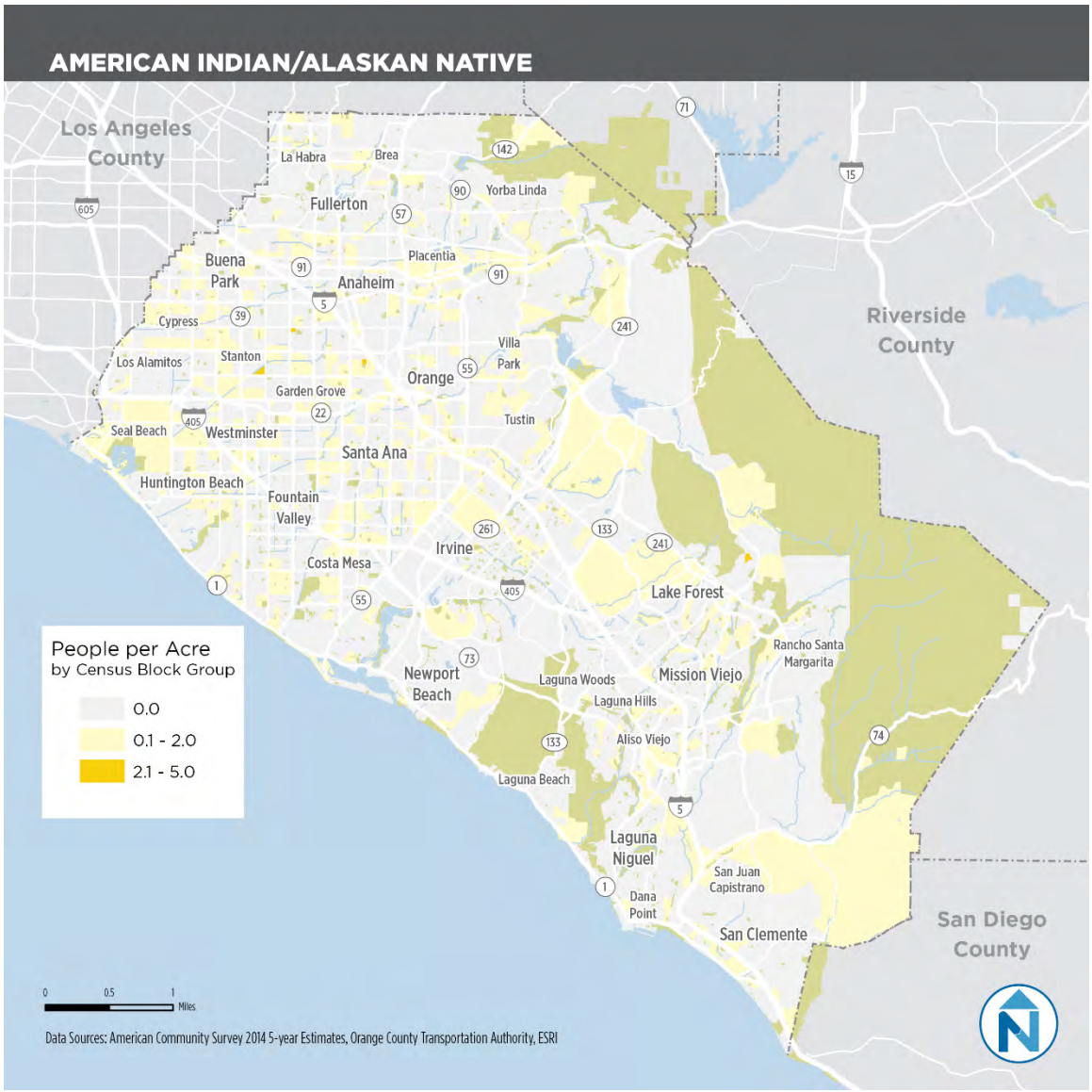


Figure 6-26 Density of American Indian/Alaskan Native Populations

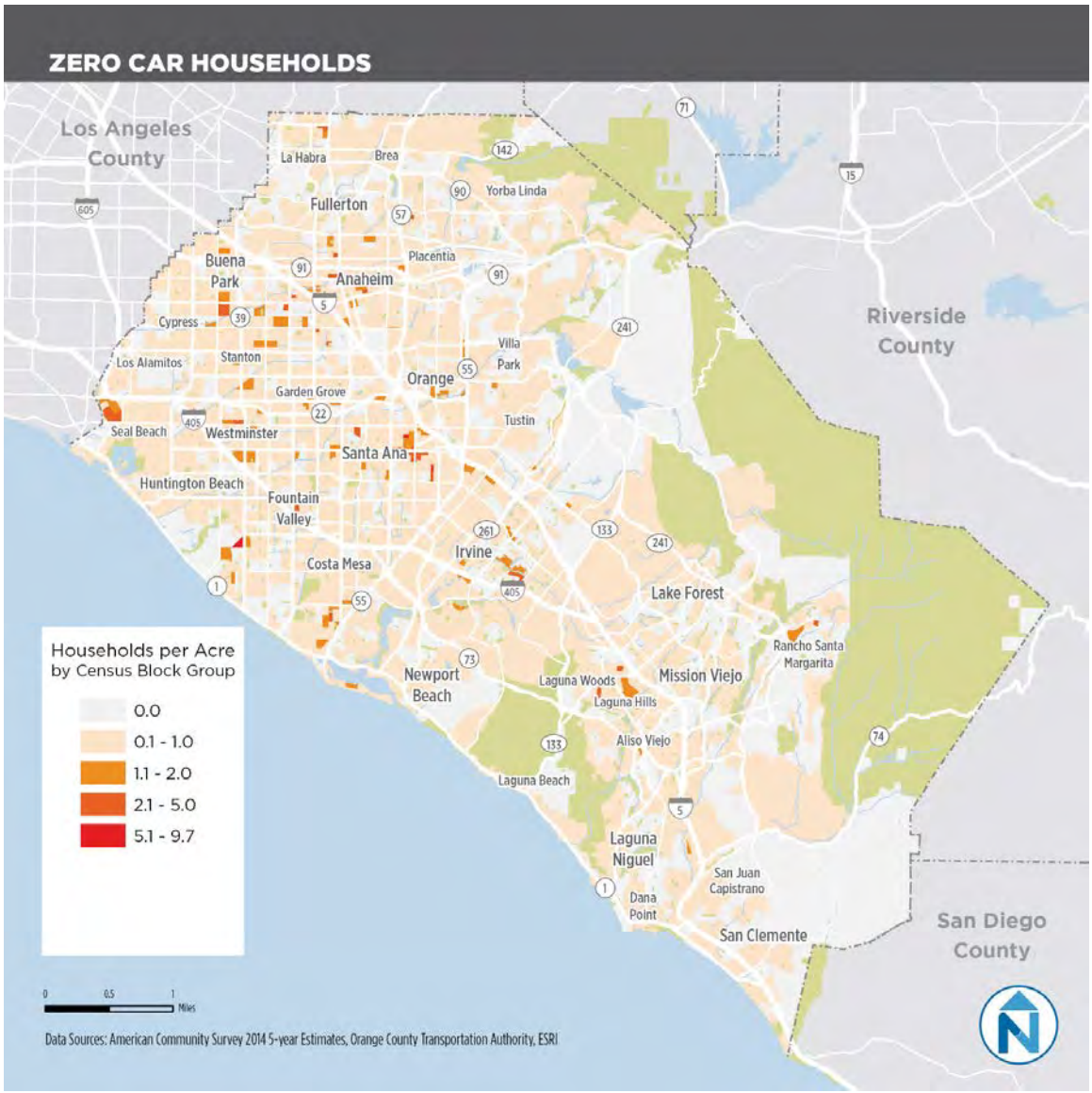


Vehicle Access

In auto-oriented areas with limited transit options, people who can afford a car tend to own a car. The rate of zero-vehicle households in Orange County is approximately 4.3 percent, compared to 7.5 percent across the state of California. Figure 6-27 represents the density of zero-vehicle households throughout the county:

- The overall density of zero-vehicle households throughout the county is low.
- Census groups with the highest density of zero-vehicle households correlate to areas with high rates of low-income and senior populations.

Figure 6-27 Density of Households without a Vehicle



TRAVEL AND TRANSIT DEMAND

Travel Patterns Analysis

In addition to socioeconomic, land use, and demographic conditions, understanding travel patterns is essential to assessing transit and overall travel demand throughout Orange County. The following section presents maps of existing (2010) and projected future (2035) average weekday travel flows (daily trips) when schools are in session. The maps show travel flows both within the county and to and from neighboring counties.

The data is based on OCTA's travel demand model, with 2035 projections based on the Master Plan of Arterial Highways, which includes planned changes to the roadway network. Travel patterns shown are between incorporated cities and census-designated places (CDPs) in unincorporated areas[2]. Remaining unincorporated areas accounting for relatively small numbers of trips are not included in the analysis. Numbers of trips within and between cities and CDPs are, of course, partly a factor of total numbers of residents and jobs within each; for this reason, cities including Anaheim, Santa Ana, and Irvine are both major origins and destinations.

Daily Trips by Purpose

Figure 6-28 presents existing daily trips for all purposes and modes (both single occupant and multiple occupants). In general, the northern half of the county has the highest concentration of travel pairs with the highest number of daily trips between them. Areas of the county with high levels of population density, employment, and activity sites—such as Anaheim, Irvine, and Santa Ana—have heavy daily travel flows between them and multiple other communities. In general, the highest levels of daily trips are shorter trips within communities and between neighboring communities. Longer trips to more distant communities and cross-county flows representing longer trips are less prevalent.

[2] CDPs within Orange County include the following: Coto de Caza, Ladera Ranch, Las Flores, Midway City, North Tustin, and Rossmoor

Figure 6-28 Existing Travel Flows: All Purposes and Modes

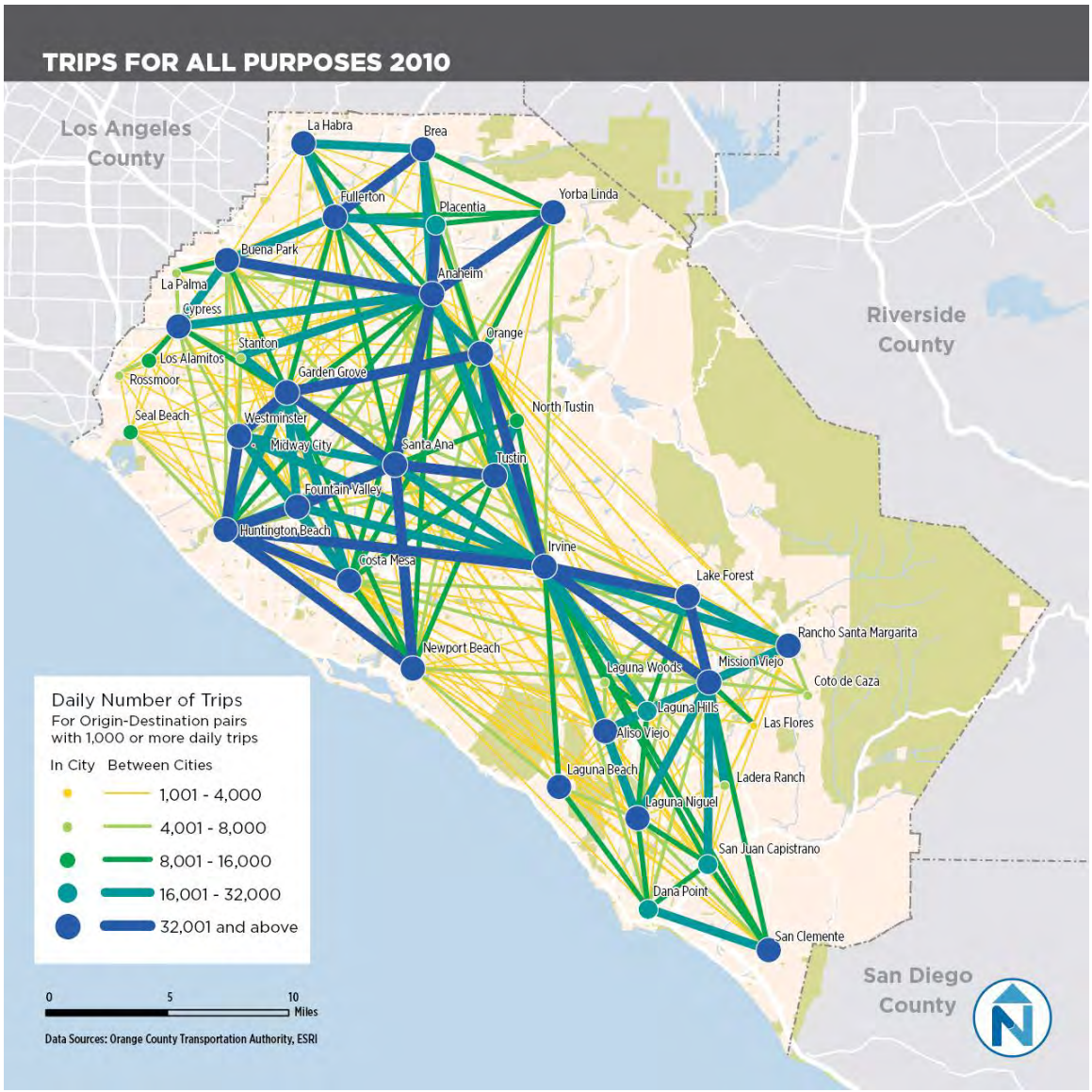


Figure 6-29 through Figure 6-32 show trips by all modes that begin at home (called a *home-based origin*). Key findings include the following:

- Commute trips are largely concentrated in the northern part of the county, including Irvine and Newport Beach. Trips to college and university campuses are more broadly distributed, although Irvine (including UC Irvine as well as Irvine Valley College and Concordia University) is a notable destination.
- K-12 school trips are similarly dispersed.
- Home-based trips for purposes other than traveling to work or school largely occur within the northern part of the county, where most destinations are located.

Figure 6-29 Existing Travel Flows: Home-Based Work Trips

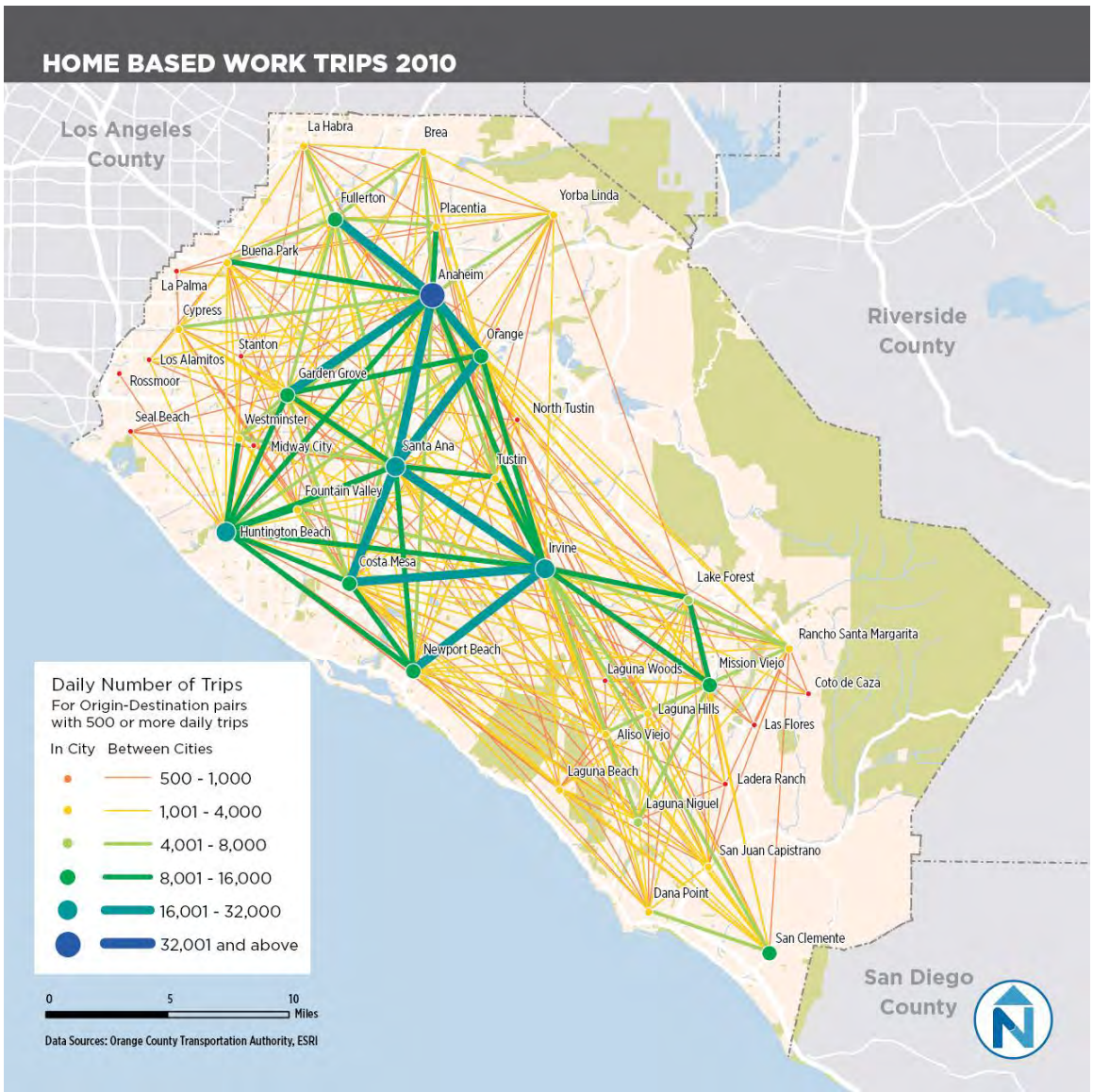


Figure 6-30 Existing Travel Flows: Home-Based University Trips

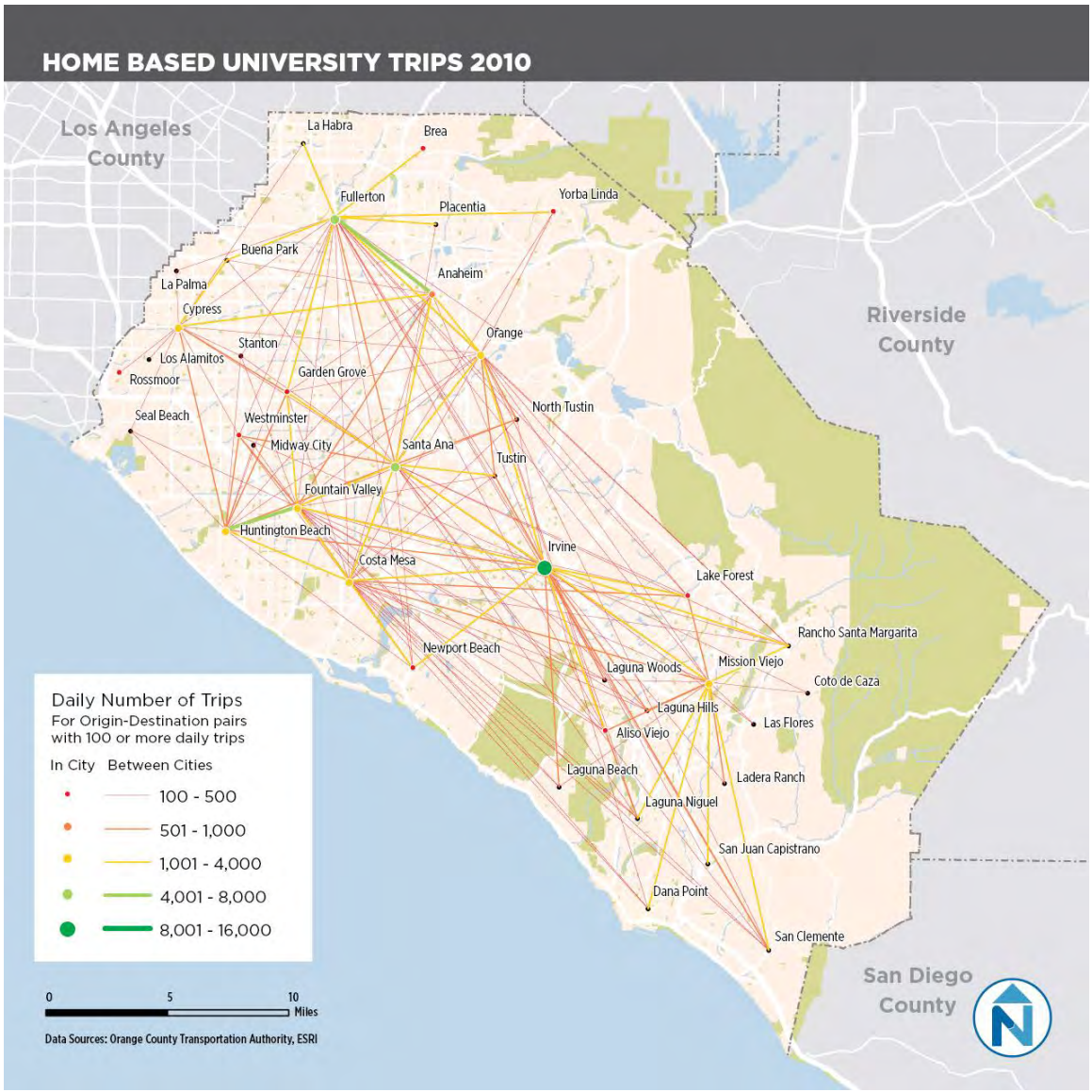


Figure 6-31 Existing Travel Flows: Home-Based School Trips

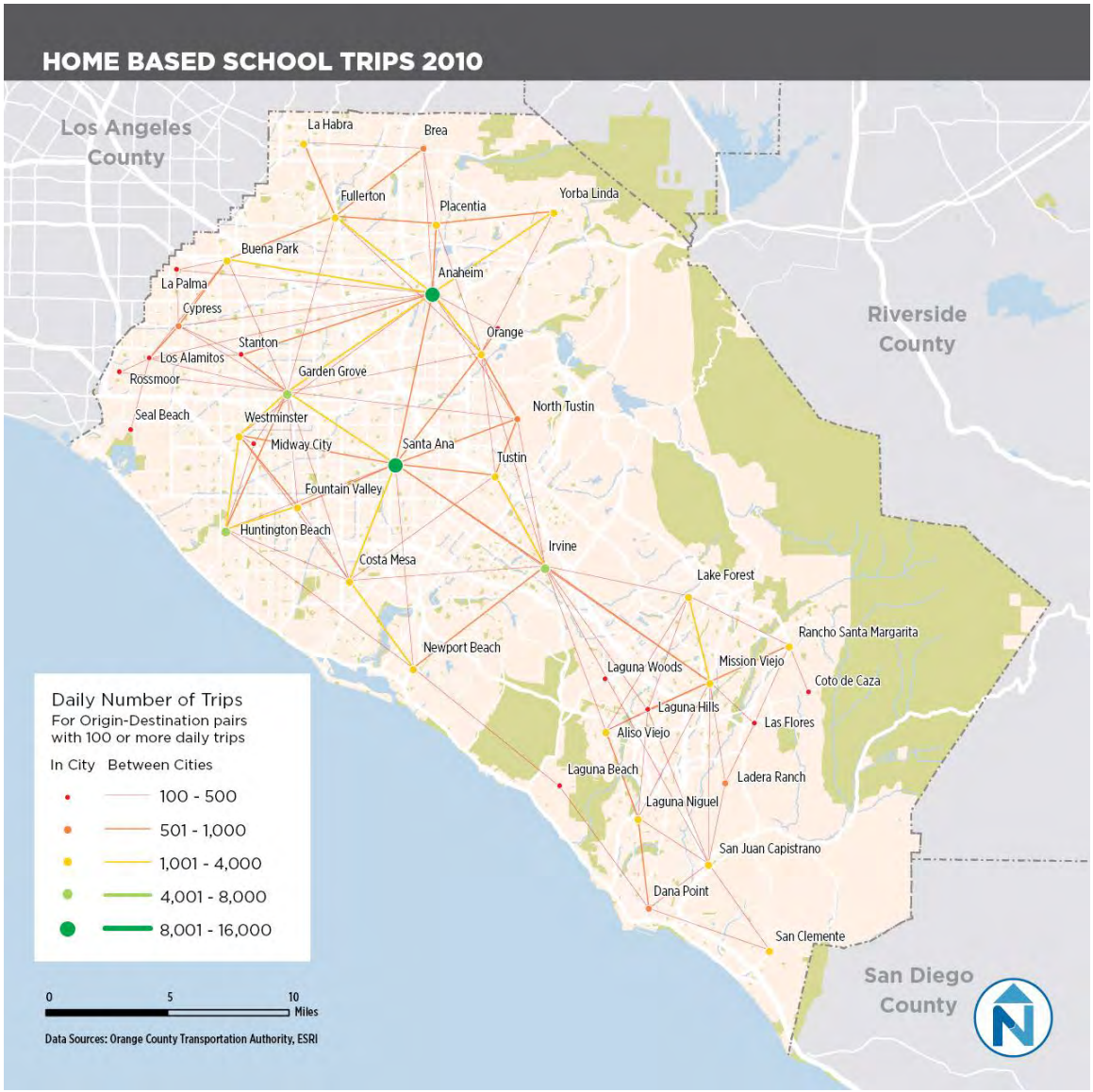


Figure 6-32 Existing Travel Flows: Home-Based Other Trips

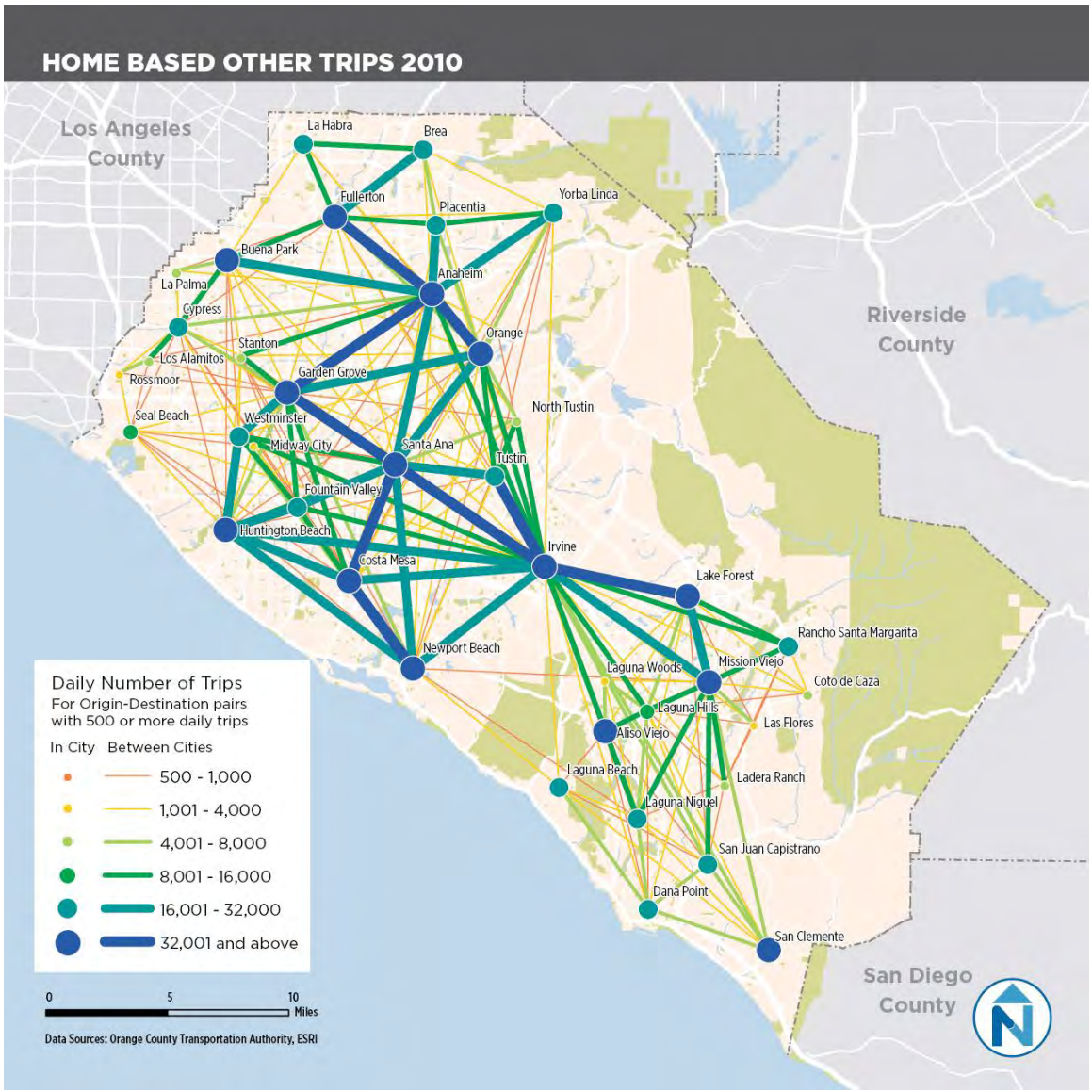


Figure 6-33 through Figure 6-34 show travel between non-residential origins and destinations. *Work-based other trips* are trips that begin or end at the workplace, but do not involve a trip home. *Other-based other trips* are trips that involve neither home nor the workplace at either end of the trip. Common trip purposes that fall within these categories include shopping, medical, and recreation. Key findings include the following:

- The highest concentration of work-based other trips are confined to two areas: the Fullerton-Anaheim-Orange corridor and a pentagonal zone composed of Irvine, Newport Beach, Costa Mesa, Santa Ana, and Tustin.
- The patterns of other-based other trips (those including neither home nor work) are similar to those of work-based other trips but at higher volumes.

Figure 6-33 Existing Travel Flows: Work-Based Other Trips

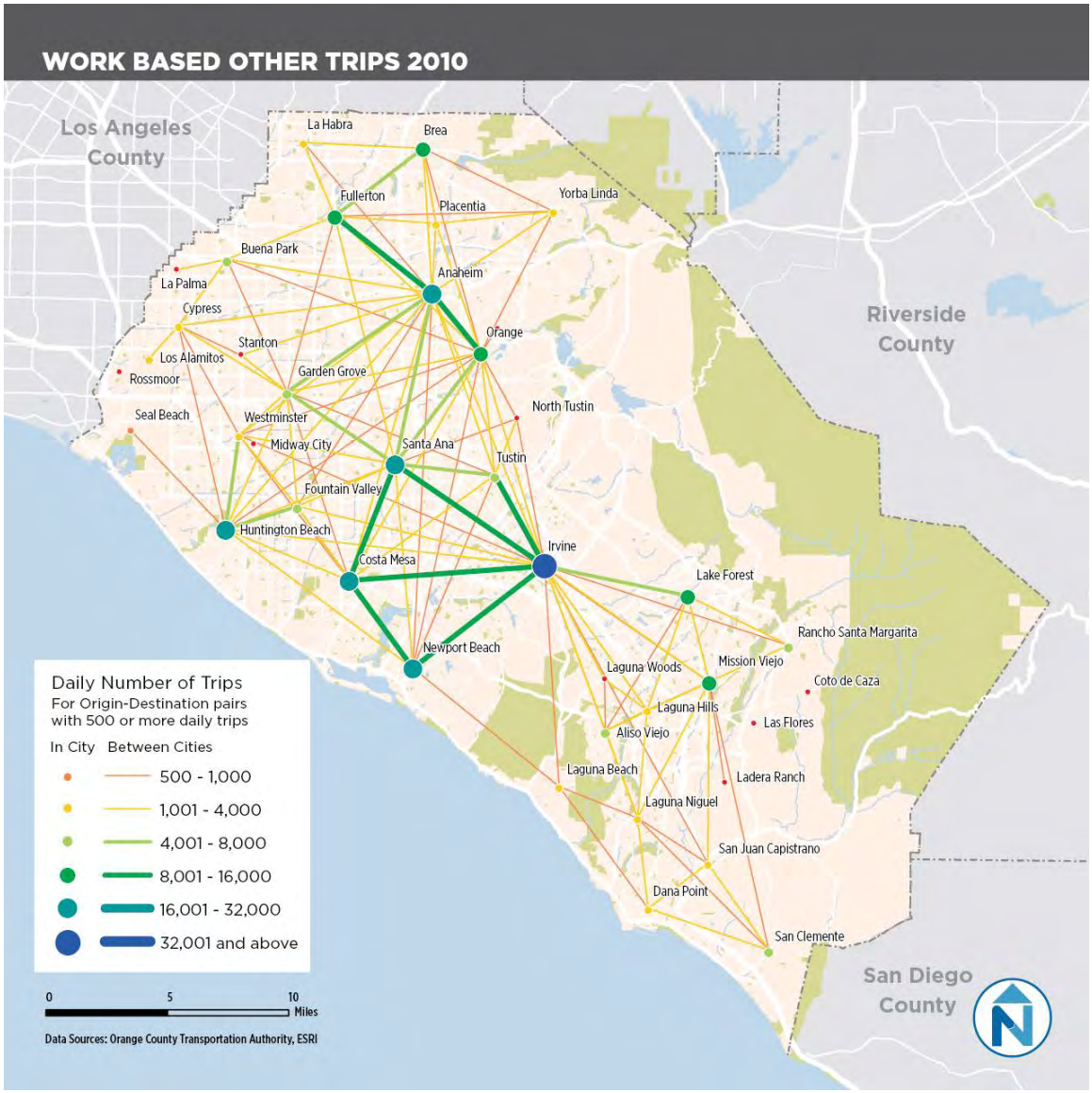
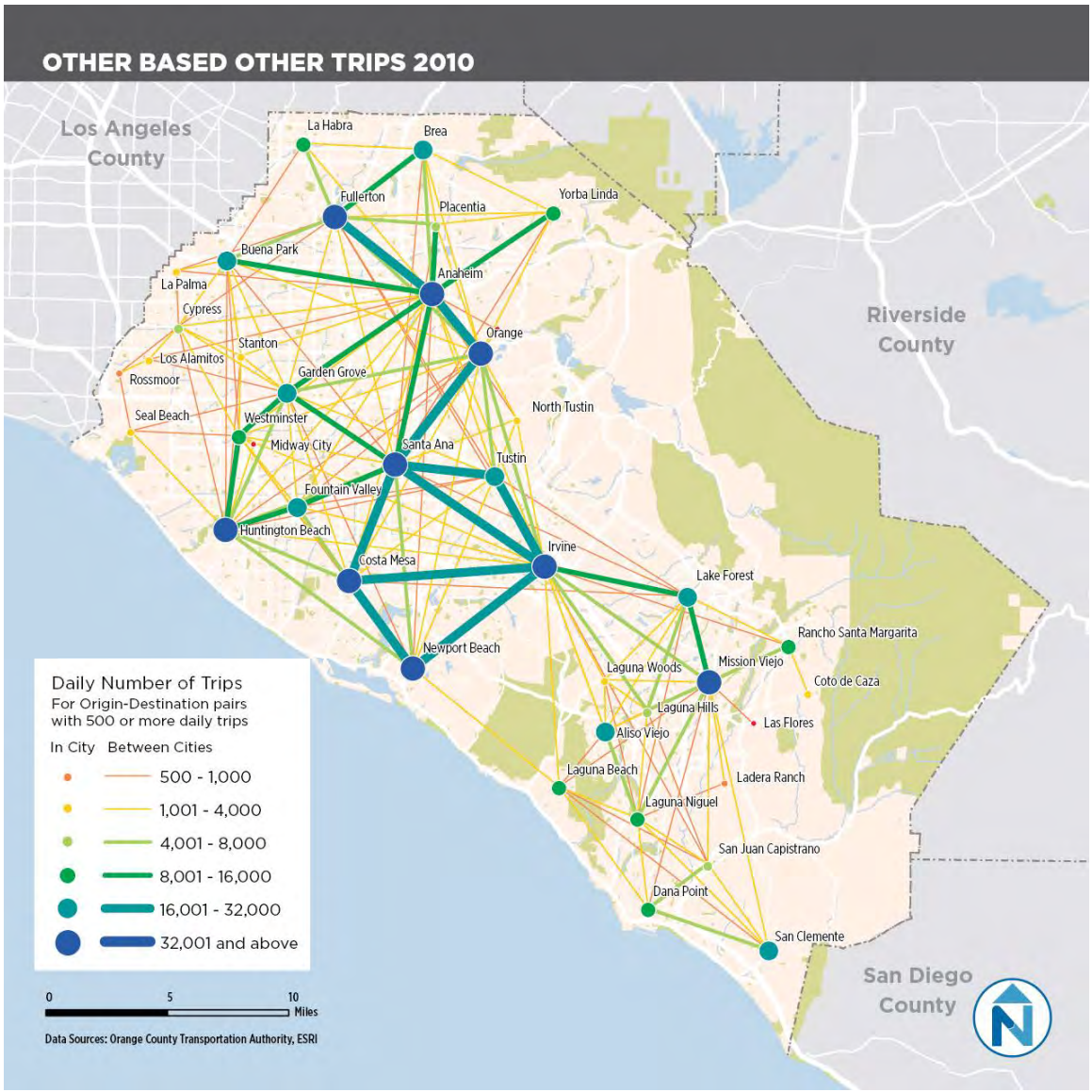


Figure 6-34 Existing Travel Flows: Other-Based Other Trips



Daily Trips by Mode

Figure 6-35 through Figure 6-36 present existing travel flows by mode:

- A majority of trips in Orange County are made by single-occupant vehicle (SOV). A dense web of such trips are made every day between destinations in the northern part of the county, and there are also a number of major origins and destinations with South County.
- The overall rate of high-occupancy vehicle (HOV) trips throughout the county is low.

Figure 6-35 Existing Travel Flows: Single-Occupant Vehicle (SOV)

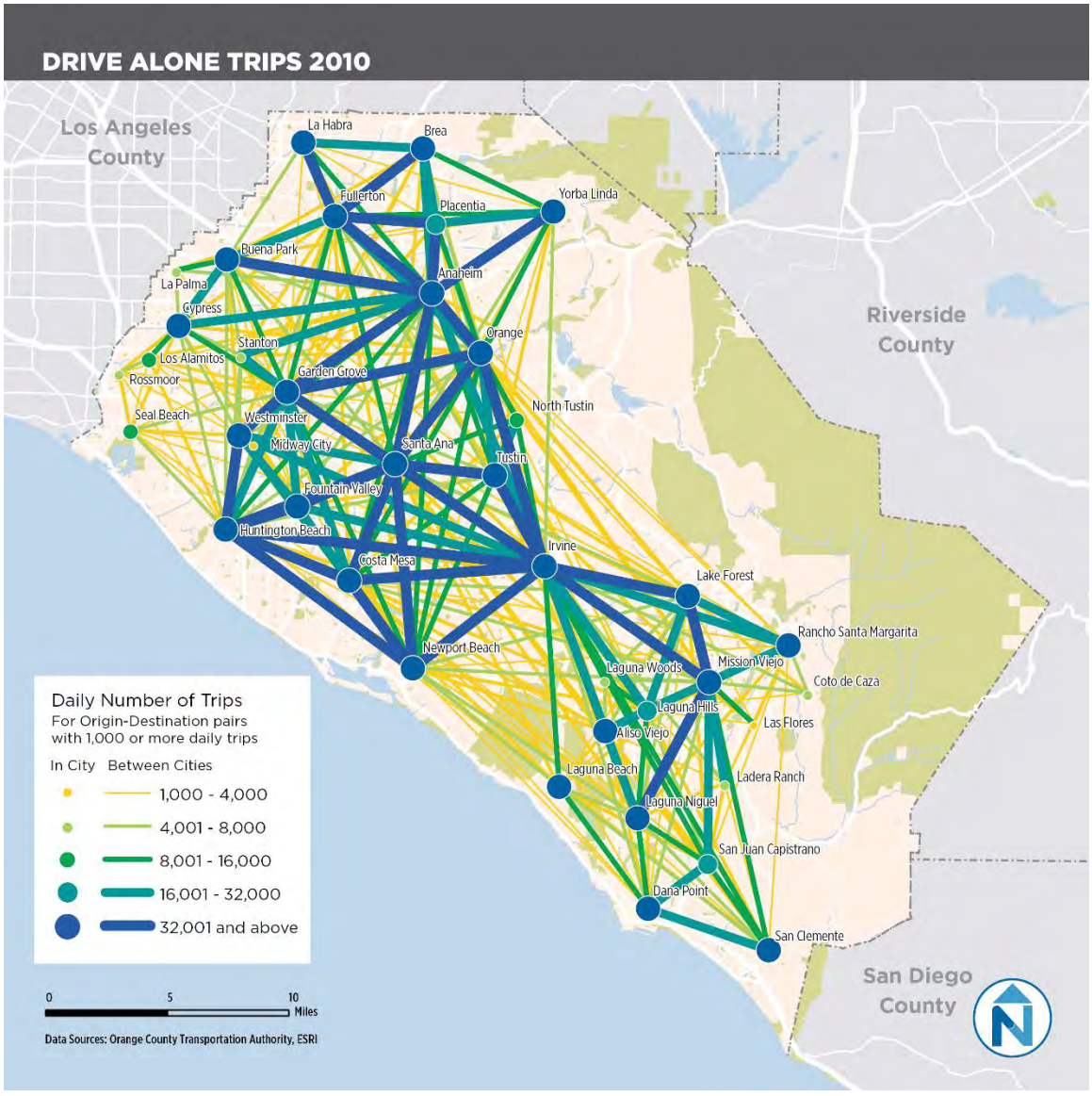
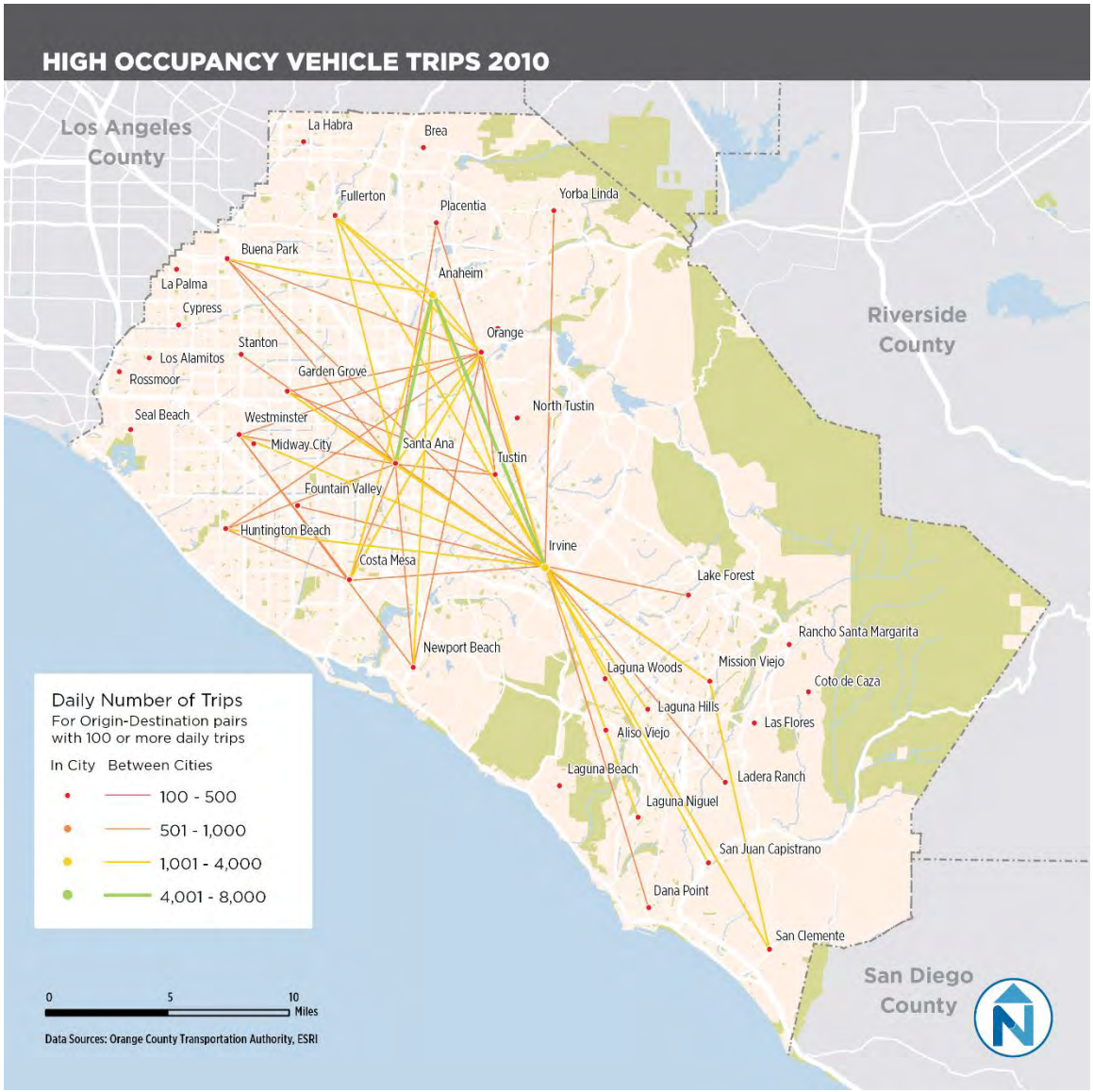


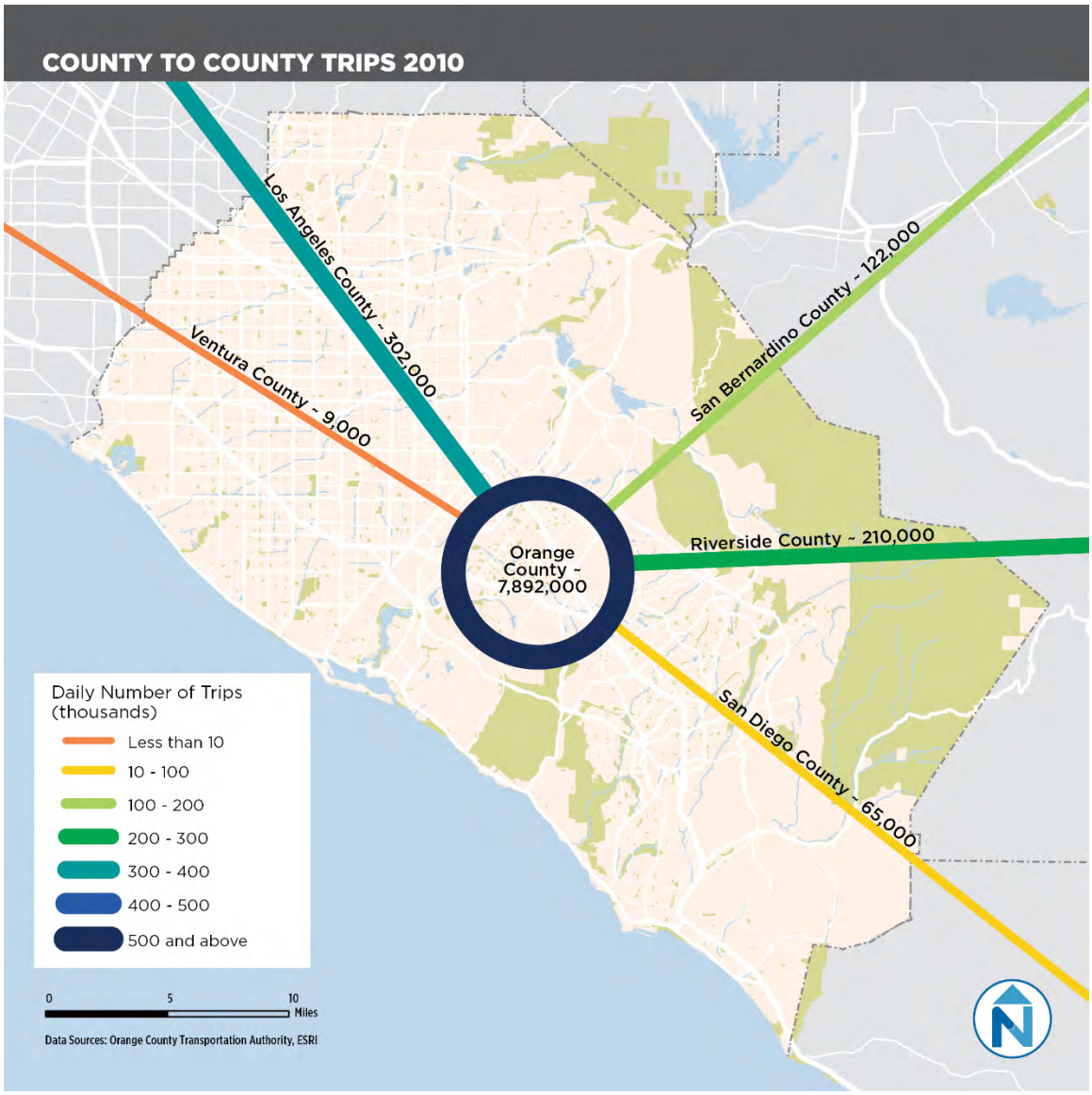
Figure 6-36 Existing Travel Flows: High Occupancy Vehicles (HOV)



Out of County Trips

Existing travel flows both within Orange County and between Orange County and other counties in Southern California are shown in Figure 6-37. The vast majority of trips including Orange County both begin and end within the county. However, there are significant numbers of trips made to and from neighboring counties. With more than 300,000 daily trips, Los Angeles County accounts for approximately 43 percent of travel to other counties in the region. Riverside County (30 percent) and San Bernardino County (17 percent) also generate a large number of daily trips.

Figure 6-37 Existing Travel Flows: Other Counties



Future Daily Trips

Figure 6-38 through Figure 6-39 show projected future weekday average trips, assuming the implementation of planned changes to the transportation network as well as projected population and employment growth.

- Future travel patterns for all trips by all modes are very similar to existing patterns, albeit with an increase in volumes. Most travel will continue to be within the northern part of the county, although large numbers of trips will be made within South County and between other parts of the county.
- Future travel flows between Orange County and other counties in Southern California are projected to increase by more than 37 percent to nearly 1 million daily trips. Trips between Orange County and Los Angeles County are projected to account for almost 70 percent of that increase. Daily trips between the two counties are predicted to increase in volume by more than 60 percent to almost half a million daily trips.

Figure 6-38 Future Travel Flows: All Purposes and Modes

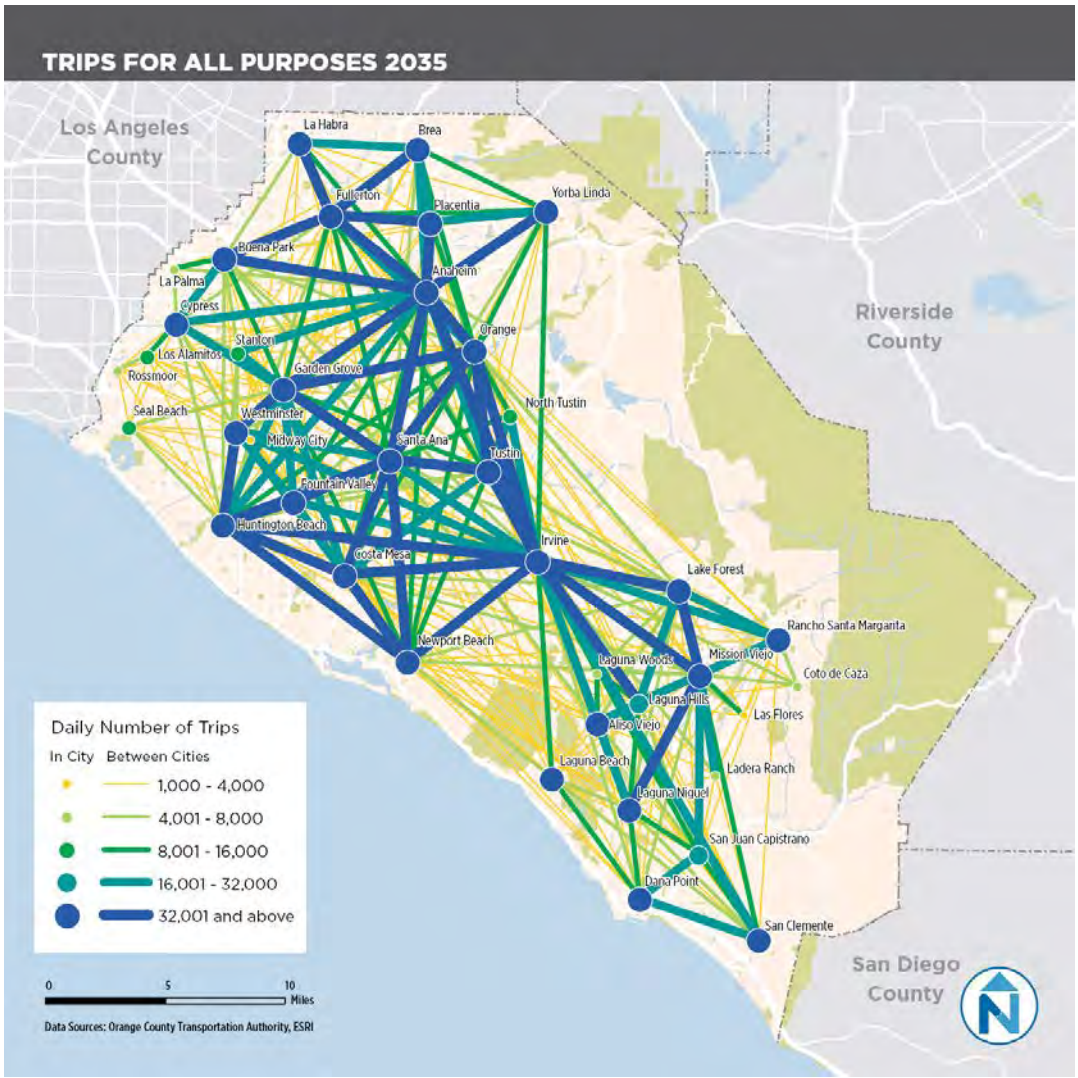
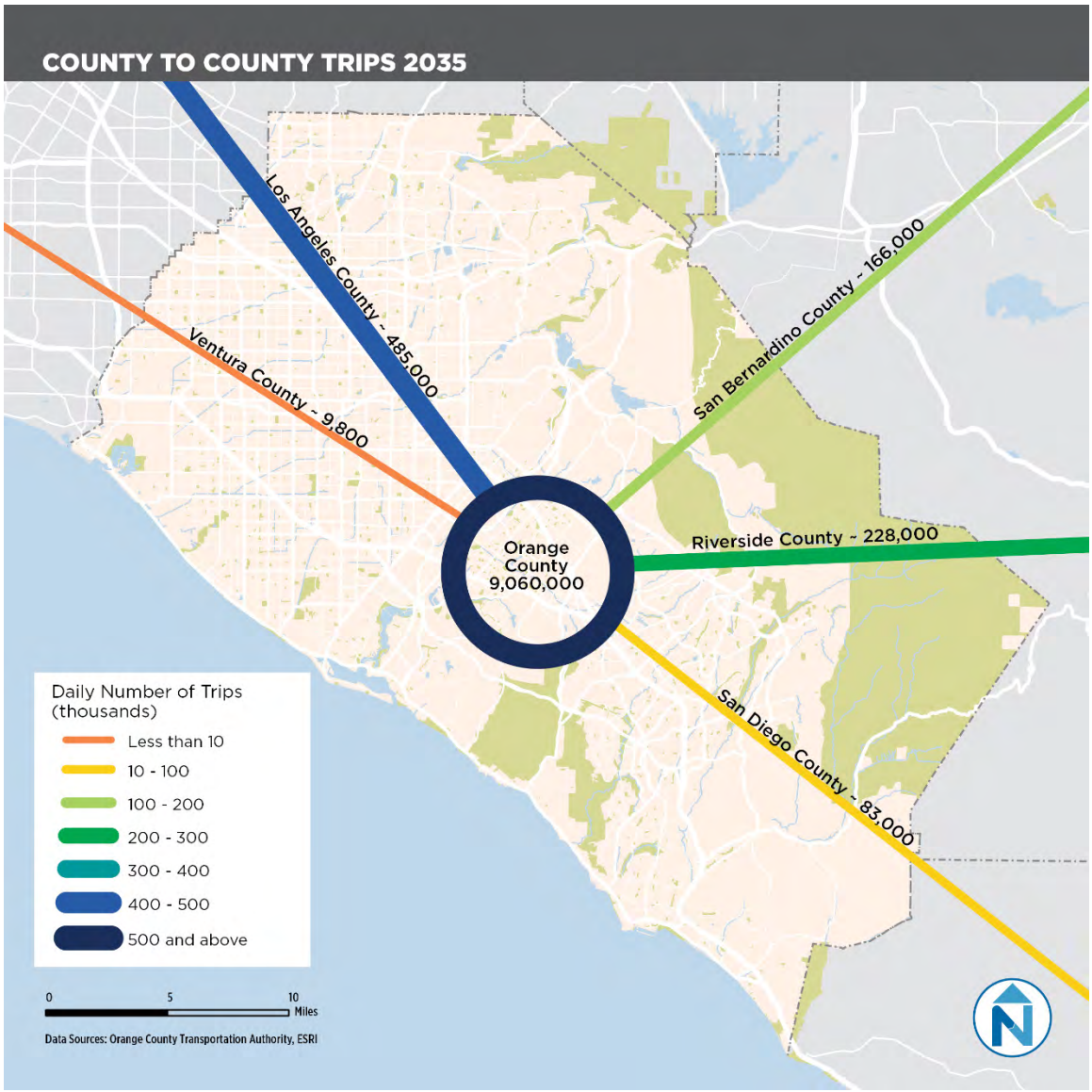


Figure 6-39 Future Travel Flows: Other Counties



Transit Propensity Analysis

Transit propensity is the likelihood that an individual will use transit for trips. It is based on a range of factors, from the quality of available transit service to surrounding land uses and individual demographic characteristics. To determine which factors were the most important predictors of transit use in Orange County, OCTA performed a regression analysis of 30 variables. The analysis determined that the following six factors best predict Orange County locations with a high concentration of people likely to use transit:

- Per-capita income
- Households making less than $45,000 per year
- Approach volumes at intersections (average daily traffic)
- Intersection density (intersections per square mile)
- Total employment (number of workers)
- Employment density (jobs per acre)

Additionally, the analysis established standardized coefficients that can be used to weight the factors relative to one another, as follows: per-capita income, 0.4; approach volumes, 0.25; employment density, 0.21; total employment, 0.13; household incomes, 0.12; and intersection density, .05.

Figure 6-40 through 6-45 map these factors in Orange County. Figure 6-46 shows an amalgamation of all six factors, indicating areas with the highest overall propensity for transit use. In the figures, darker green areas have the highest ridership potential, while dark red areas have the lowest ridership potential. Key findings include the following:

- Low per-capita incomes are particularly pronounced in the urban core of North/Central County north of the 55 freeway, in cities including Santa Ana, Anaheim, Orange, Garden Grove, Westminster and Buena Park. Higher-income areas are more prevalent to the east in areas including Yorba Linda, Anaheim Hills, Villa Park and parts of Tustin, along the coast in communities including Newport Beach and Laguna Beach, and in South County. There are pockets of lower incomes in South County including student housing at UC-Irvine and mobile home parks and retirement communities closer to I-5. Households with annual incomes below $45,000 follow similar patterns.
- Approach volumes at intersections are an indicator of major destinations and trip generators nearby. Areas with heavy traffic include those near job concentrations, as well as retail areas and major destinations such as theme parks. High approach volumes are particularly pronounced in the Irvine Business Complex and in Anaheim's Platinum Triangle and Resort areas.
- Intersection density is an indicator of both the connectedness of the street network and the presence of small blocks, which combine to reduce walking distances and foster walkable, transit-friendly neighborhoods. There does not appear to be a clear relationship between intersection density and the other variables mapped for this analysis. In addition to the North/Central County areas mentioned above and near freeway corridors in South County, areas with a high density of intersections include Downtown Huntington Beach, the Balboa Peninsula and Balboa Island, and Corona del Mar in Newport Beach, as well as residential parts of Irvine.
- The largest employment clusters, in terms of total numbers of jobs, are found at the Irvine Business Complex and, to a lesser extent, in the Resort area of Anaheim and at the Irvine

Spectrum. In addition to these areas, there are high employment densities in Downtown Santa Ana and near the Orange Crush interchange of SR-22, I-5 and SR-57.

Figure 6-40 Per-Capita Income

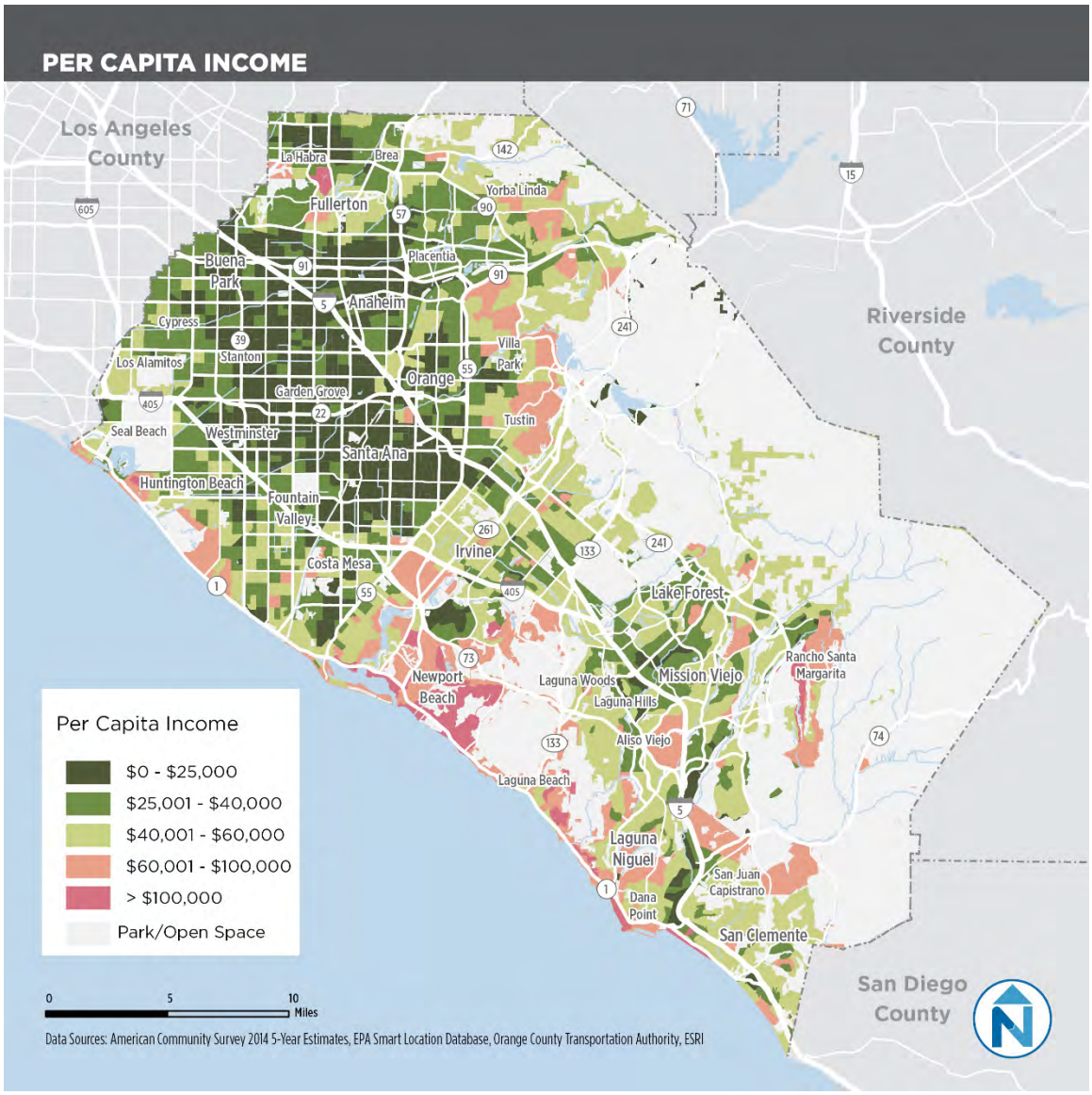


Figure 6-41 Annual Household Income Below $45,000

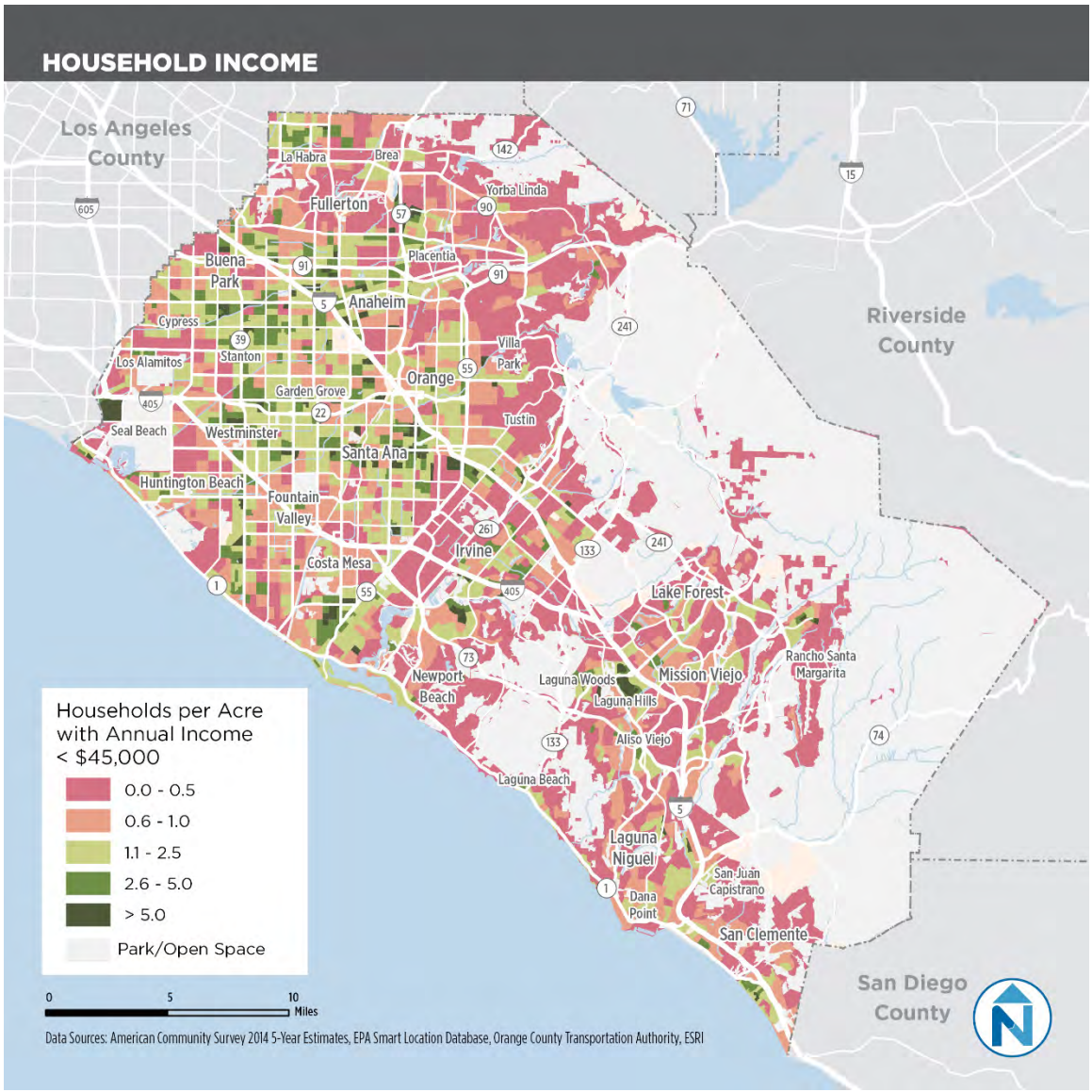


Figure 6-42 Approach Volumes at Intersections

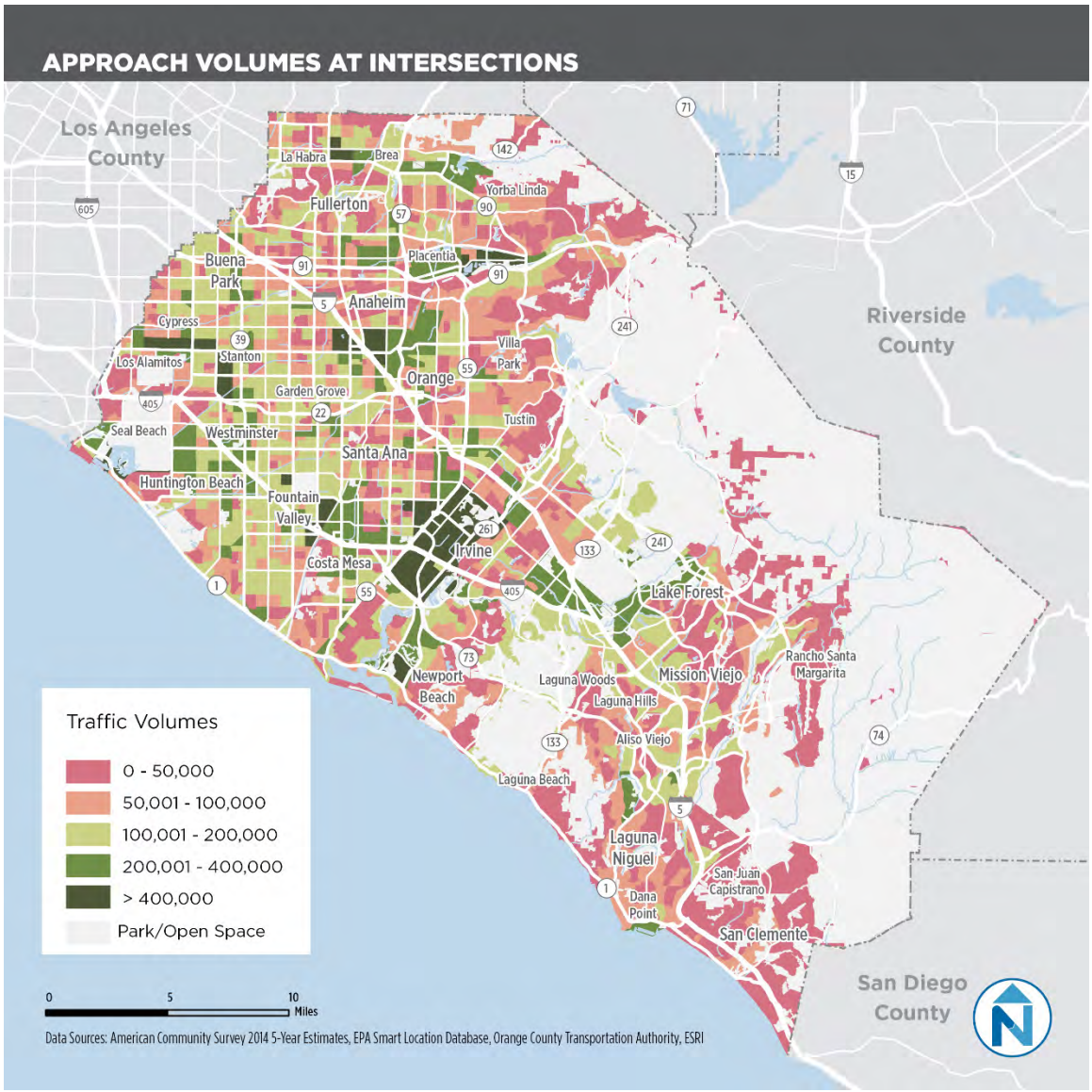


Figure 6-43 Intersection Density

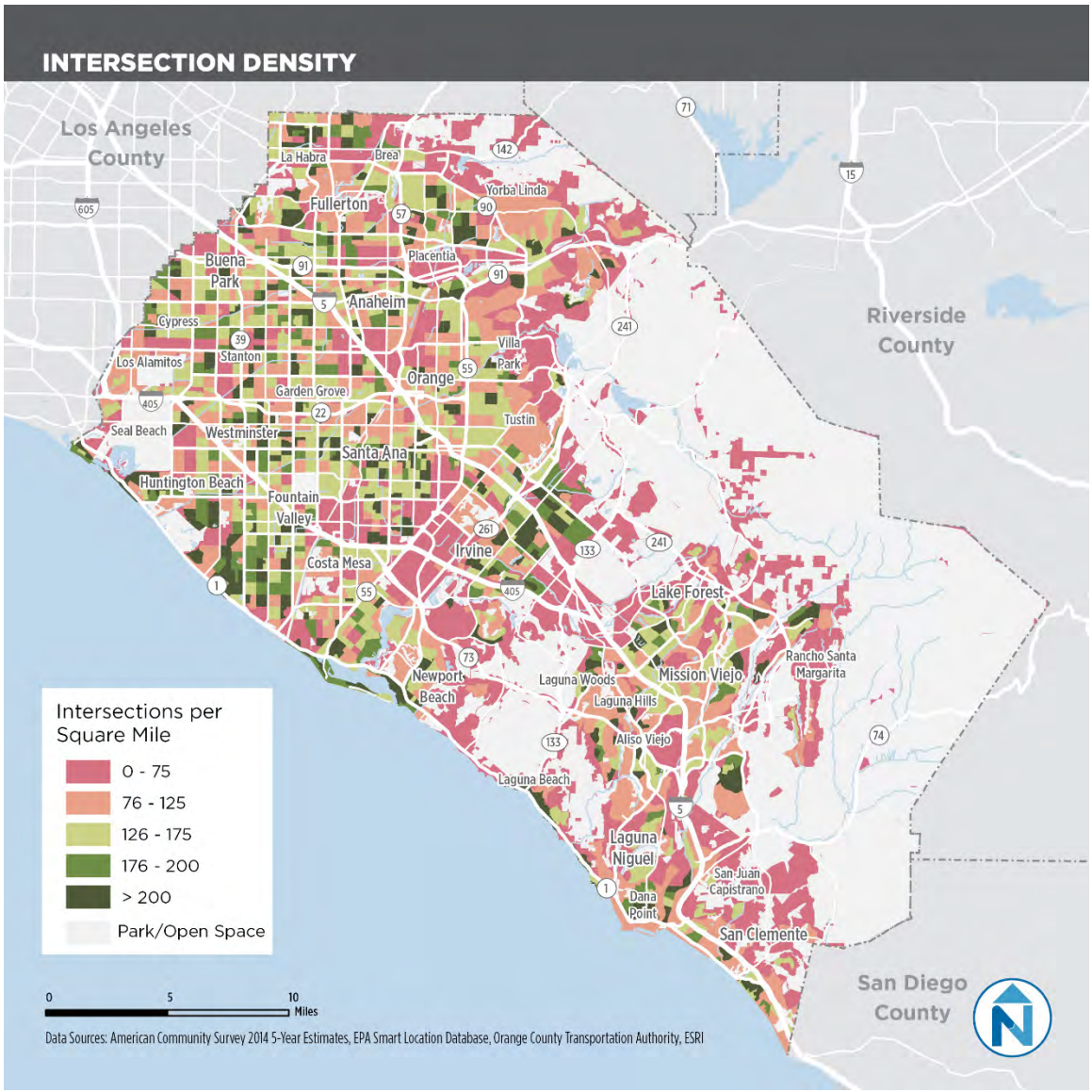


Figure 6-44 Total Employment (Number of Workers)

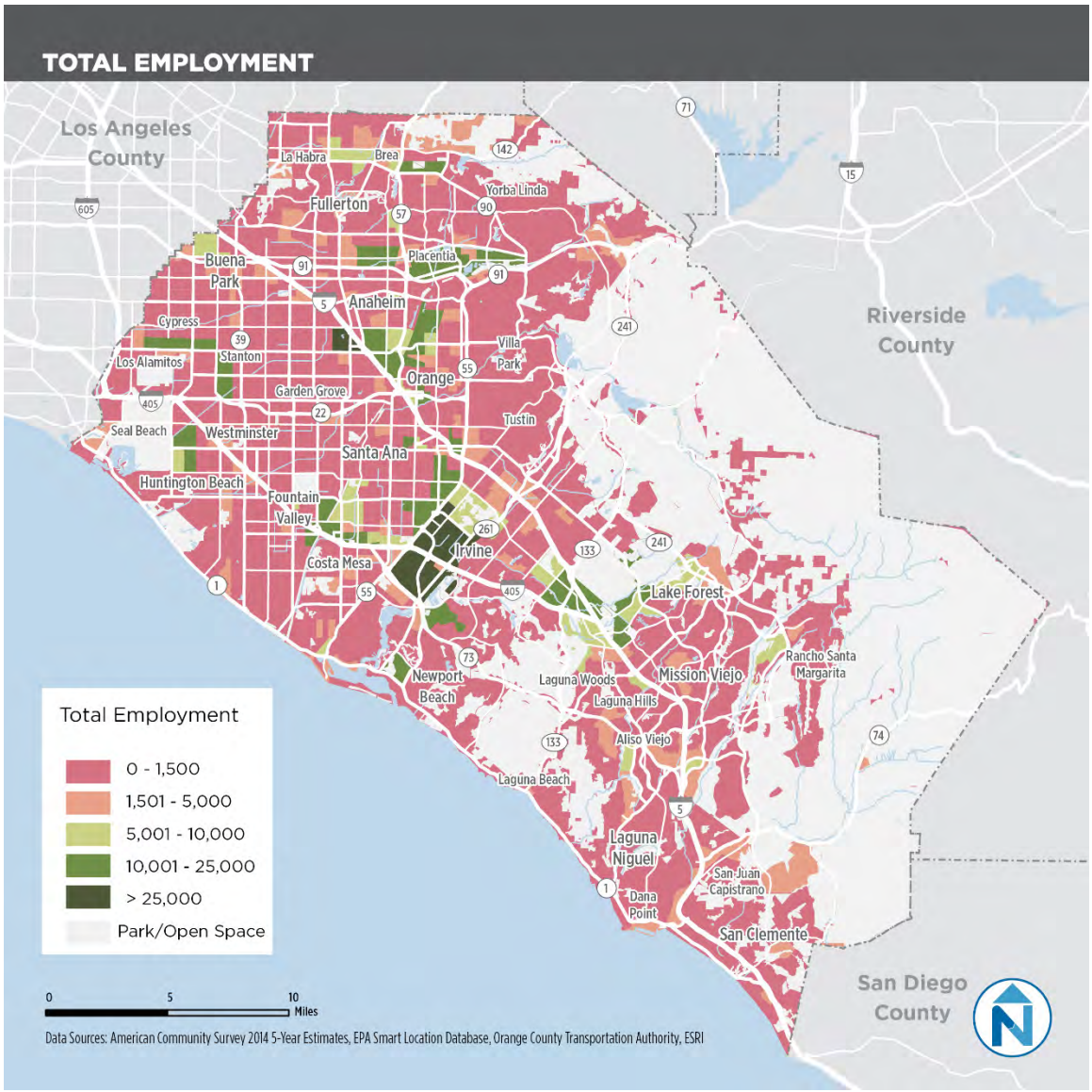


Figure 6-45 Employment Density (Jobs per Acre)

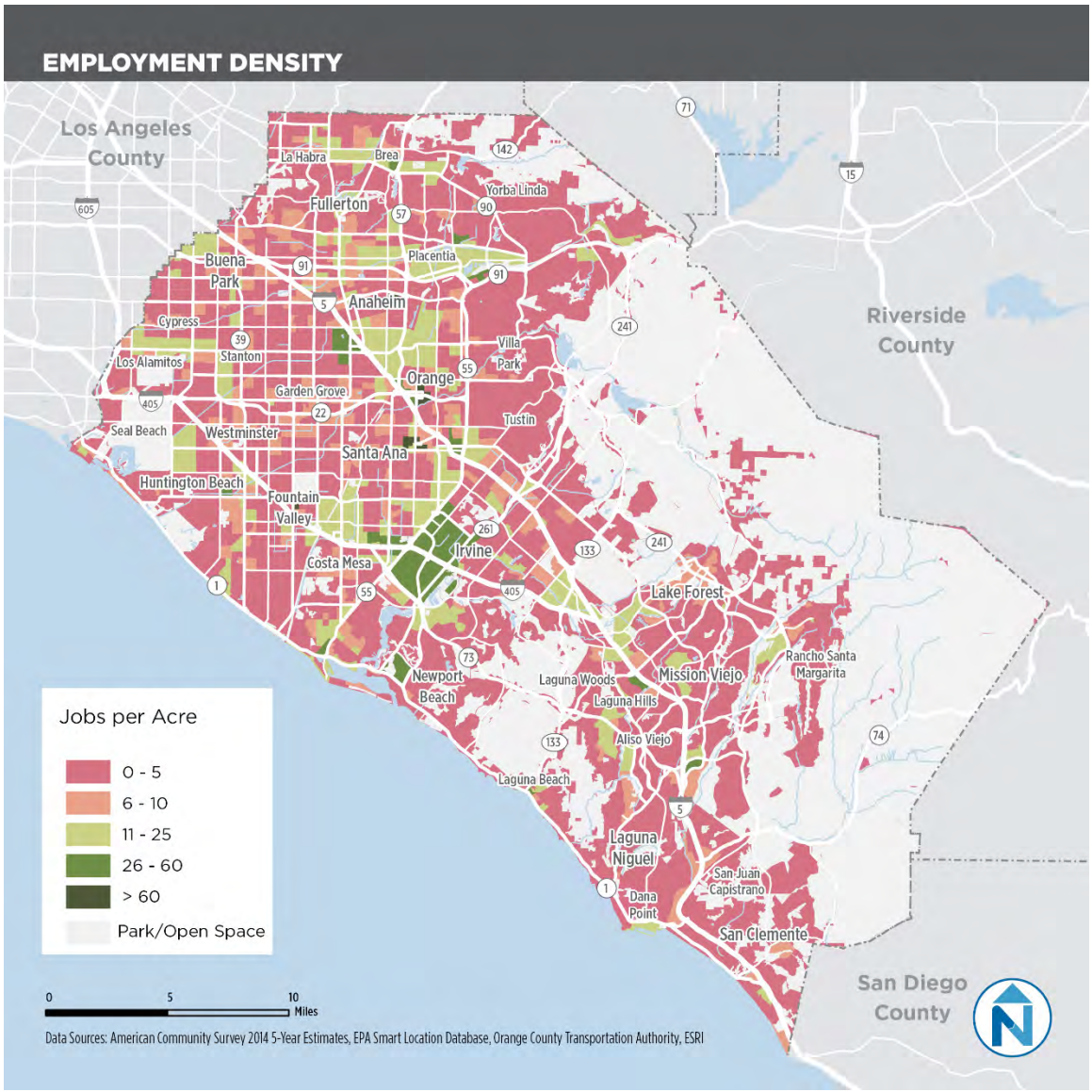
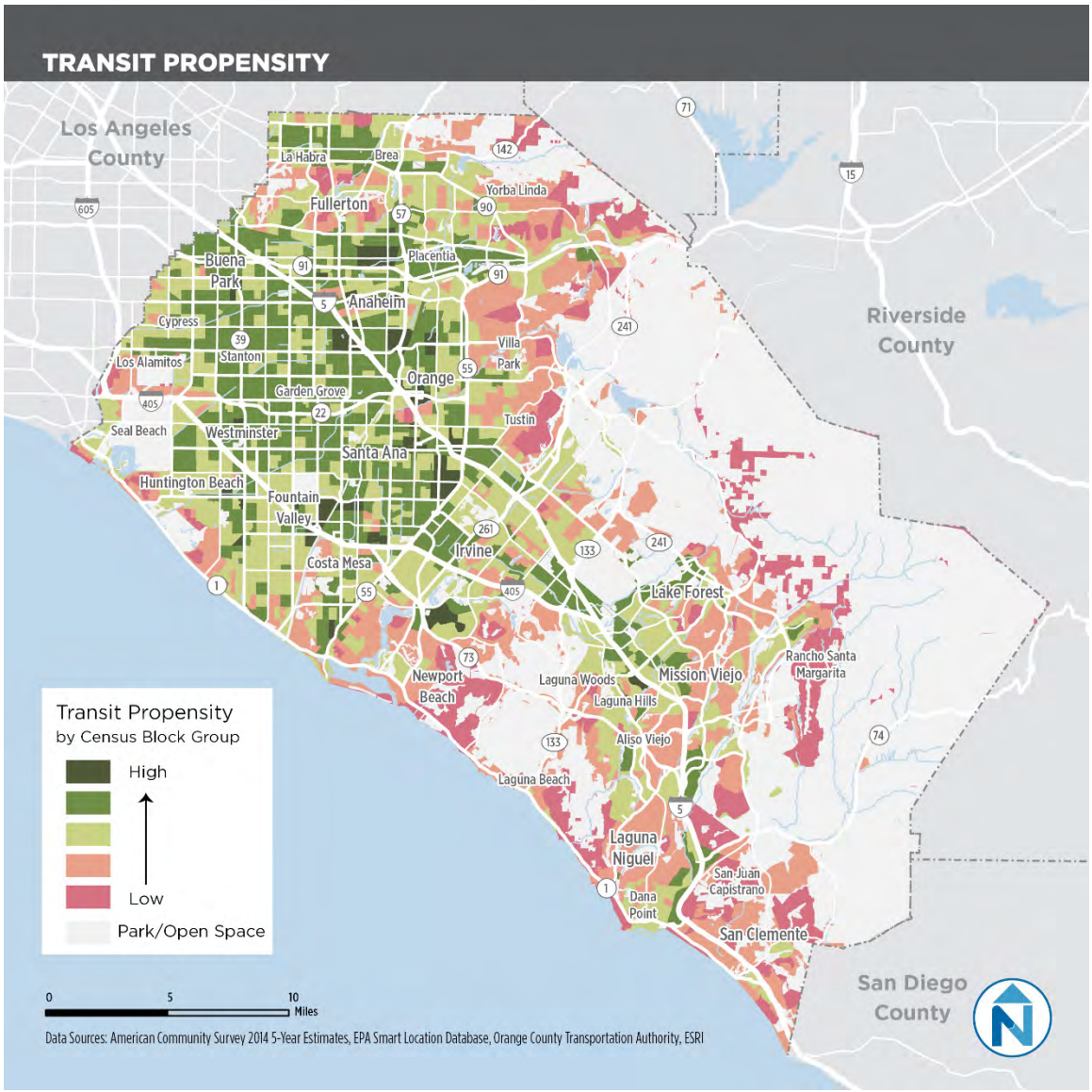


Figure 6-46 combines and weights the six factors to reveal the areas of the county with the highest overall propensity for transit use. Key findings include the following:

- Most areas of high and medium-high transit propensity are located in the urban core of North/Central County, most notably in Santa Ana and Anaheim. There are, however, areas of relatively high propensity throughout Irvine and in South County along the I-5 corridor.
- The methodology includes two separate measures of income, household income and per-capita income, and it weights per-capita income most heavily. Lower-income individuals and households are highly concentrated in the urban core of North/Central County: In much of the area north and west of the 55 and north of the 405, per-capita incomes are less than $25,000 annually.
- As with income, two of the six factors included in the analysis are related to employment, and the largest concentration of jobs in Orange County is at the Irvine Business Complex. However, unlike areas north of the 55, it is not a major source of existing ridership, due most likely to the types of jobs found here—higher-income white-collar office employment, rather than lower-income service sector job—as well as heavily auto-oriented patterns of land use and street design. Put most simply, the Business Complex is a massive office park in the style of a suburban office park or campus rather than a more walkable traditional central business district.
- Areas with lower transit propensity—to the east, along the coast, and in South County—are marked by higher incomes and auto-oriented patterns of design.

Figure 6-46 Transit Propensity



SUMMARY

In developing recommendations for high-capacity transit corridors in Orange County, an understanding of both current and future demand for transit throughout the County will be essential. The analysis in this chapter first considered which factors of the built environment are typically most important in determining transit demand—the "6 Ds" including Destinations, Distance, Density, Diversity, Design, and Demand Management. It then assessed unique conditions of Orange County including current and future land uses, population and employment density, major trip generators, demographic characteristics of the population, and overall travel patterns, culminating in a "transit propensity analysis" based on the factors OCTA has determined to be the greatest predictors of individual propensity toward transit use, and where these factors are found within Orange County. The findings of this analysis are addressed in greater detail in Chapter 8. In short, there are areas of relatively high demand for transit throughout the county, particularly in the northern part of the county.

7 STAKEHOLDER THEMES

A robust public engagement process will ensure the OC Transit Vision truly reflects the needs and values of Orange County residents, employees, and visitors. As a first step in that process, focus group and key stakeholder interviews were being conducted as this document was being prepared. Findings from the four focus groups and 18 stakeholder interviews are described in this chapter. (Focus group interviews support both this effort and the update to the OCTA Long-Range Transportation Plan.)

STAKEHOLDER INTERVIEWS

Citizens Advisory Committee meeting.

The project team interviewed representatives from:

- Automobile Club of Southern California
- California Department of Transportation District 12
- Calvary Chapel Costa Mesa
- County of Orange
- Irvine Company
- John Wayne Airport
- Mariners Church
- OCTA Bus Customer Roundtable
- OCTA Diverse Community Leaders
- Orange County Visitors Association
- Rancho Mission Viejo
- Several OCTA committees including: Citizens Advisory Committee, Special Needs Advisory Committee, and Technical Advisory Committee.
- South Coast Metro Alliance
- Spectrumotion, Irvine
- The Disneyland Resort
- And Transportation Advocate and former OCTA Board Member Sarah Catz

Each group was asked for their transit vision and the interviews generally followed a script of about 15 questions (see appendix), although only select questions were asked in each interview based on the category of interviewee (for example, whether they represented a public agency, business group, institution, or other major category). The transit questions were related to identifying barriers, priorities, opportunities and what is working well.

Interviewees shared a wide range of ideas, issues and insights. Recurring themes included the following:

- Demographic change is driving changing travel needs. As baby boomers reach retirement age, there will be a greater need for transportation tailored to seniors. At the same time, millennials are driving changes, including an increase in creative office space and greater demand for evening travel.
- A number of popular non-commute travel markets in Orange County are not adequately being served with transit, including evening, weekend, and special-event service.
- A number of high-capacity transit modes may be appropriate for Orange County, including both rail and higher-quality bus service (bus-only lanes, express buses with park-and-ride lots).
- Improving connectivity will be key to the future success of transit in Orange County, including both first-/last-mile feeder connections as well as connections between longer distance destinations, such as inland and coastal areas and North and South County.
- Transportation network companies such as Uber and Lyft could play an important role in improving first-/last-mile connectivity. They could also supplement transit in higher-demand corridors by providing alternative service to lower-demand areas.
- Similarly, autonomous vehicle technology could benefit transit by reducing transit operating costs.

Additional key findings included the following:

- OCTA performs well in a number of areas, such as meeting the needs of service-industry workers and collaborating with cities.
- Focus transit resources on areas with higher transit demand, where transit can be more productive and cost-effective.
- For transit in Orange County to truly become a viable travel option for most, it will need to be practical and convenient for residents to live a car-free lifestyle.
- Transit options need to be more diverse and customized depending on the various needs of different demographics.
- I-405 is a heavily trafficked corridor where high-capacity transit might be effective.
- Neighborhood-based circulators are an attractive transit option.
- There appear to have been increases lately in walking and cycling in Orange County.

Recent OCTA surveys of existing customers and people who do not use transit today found that both groups want better service frequency and faster transit travel times. Current riders also expressed a need for expanded weekend and evening service, while non-riders shared preferences for additional express routes and service closer to major destinations.

A summary of findings from each interview can be found in Figure 7-1.

Figure 7-1 Stakeholder Interviews Key Findings (Public Outreach from October to December 2016)

Stakeholders	Observations/General Comments	Vision/Specific Requests
Automobile Club of Southern California *Hamid Bahadori,* *Manager of Transportation Policy and Programs*	▪ Don't necessarily go where you think it is needed, go where people want it ▪ Redevelop resources in the higher demand areas	▪ Offer Uber/ Lyft or something similar in place of bus in some areas and late at night
Brandman University *Sarah Catz,* *Director of Center for Urban Infrastructure*	▪ Focus on improving transit in high-use areas, but outside of that focus on emerging technologies ▪ Spend less money on big transit and look more at partnerships with Uber and Lyft	▪ More designated bus lanes in areas where there are a lot of them ▪ Look more into how to serve the new developments and communities
Caltrans	▪ Tie-in bus service to Park and Ride lots ▪ Offer more service to relieve special event traffic during summer	▪ Offer different types of buses depending on need ▪ Would like to see linkage between Old Town Tustin to Downtown Santa Ana
Calvary Chapel Costa Mesa	▪ Would be good to have pick-ups from bus stations to train depots for flexible access ▪ Perception that the bus is not safe	▪ Service is good along their properties, but wants to ensure that people traveling further out are able to get to them conveniently
County of Orange	▪ OCTA should focus on technology as it relates to new forms of transit	▪ Locations from airport to downtown to Disney for fixed-rail ▪ Serve Rancho Mission Viejo and new units in Irvine
Disneyland Resort	▪ Lack of affluence is holding county back from improving transit ▪ Guests need more convenient and frequent transit options	▪ Bring back station shuttle from Orange train station ▪ Cast members number continues to grow
Irvine Company	▪ Consider the role of driverless cars and public private-partnerships for new services ▪ OCTA's current services are designed more for the transit dependent, not the choice rider	▪ Integration of transit and land use planning by OCTA and cities ▪ Service between residential and nearby business centers, especially within Irvine ▪ Support for growth and development

Stakeholders	Observations/General Comments	Vision/Specific Requests
John Wayne Airport	▪ Span service is an issue for service workers ▪ Vehicles are not good for travelers	▪ AVR survey and tenant survey to provide information about patterns. ▪ 800 space parking lot for employees- "T" lot
Mariners Church	▪ Connectivity between affluent and lower-income areas should be stronger ▪ Increase parking to make it easier for people to use transit	▪ Bonita Canyon is not served well by the Church; bus service is needed
OCTA Bus Customer Roundtable	▪ There should be more variety of bus services across the county ▪ Add diversity to the bus fleet ▪ Expand transit system to travel to all cities so that it is more integrated	▪ BRT on the 5 & 405 ▪ Add light rail ▪ More express bus service ▪ Make it so more bikes can be stored on the buses
OCTA Citizens Advisory Committee	▪ OCTA needs to be more inclusive by getting major hubs connected ▪ Focus on the experience of the riders ▪ There needs to be more of a connection between OCTA and college students	▪ Move more attention to cyclists and pedestrians ▪ Have a rail from Huntington Beach to heart of the county and have rideshare options for millennials ▪ Build on Angel's and OC Fair Express
OCTA Diverse Community Leaders	▪ There needs to be something put in place to get people more educated about transit ▪ The transit system should have more diversity in where it goes ▪ Add amenities such as WiFi to make transit more appealing	▪ Focus on transportation to and from colleges; all 3 schools have parking issues, look at partnerships ▪ Extend the OC Streetcar
OCTA Special Needs Advisory Committee	▪ Look at origin and destination of seniors and students to determine a mix of transportation options ▪ There should be more community-based opportunities for persons with disabilities	▪ More accessibility to park car near the start and end of express routes

Stakeholders	Observations/General Comments	Vision/Specific Requests
OCTA Technical Advisory Committee	▪ Need better connectivity to other modes ▪ Consider technological advances	▪ Offer better access and convenience for riders
OC Visitors Association	▪ Take away the allure of cars and make transit more attractive	▪ Transit needs to be made easier for visitors to use: integrated, seamless, consistent system
Rancho Mission Viejo	▪ Perception of transit is what holds the county back ▪ This is a county of an aging population (55+), so focus on getting that demographic out of cars ▪ More education about transit systems for the public	▪ Would like to see more community hubs ▪ Focus on the Antonio Pkwy corridor.
South Coast Metro *Diane Pritchett, Executive Director*	▪ OCTA does a good job for those that are transit dependent but not for the occasional rider ▪ Public and private partnerships could be beneficial	▪ Consider the millennials; there is a large area west of Fairview that is geared towards millennials and creative office space
Spectrumotion, Irvine	▪ Transit is limited and inconvenient for a lot of people ▪ Public perception of transportation is what holds us back	▪ iShuttle is good but there needs to be better regular service between residential and business/entertainment areas

FOCUS GROUPS

The primary finding from the four focus group interviews is that transit is viewed as an essential element of the future transportation system in Orange County. However, it must be affordable, efficient, accessible, convenient, and reliable.

Additional findings relevant to the OC Transit Vision included the following:

- Improvements to the transit system are the top priority for investment in the transportation system.
- Increasing service in areas of high demand is more important than greater coverage to all areas.
- Improved regional connections, including connections to Los Angeles' Metro Rail system and LAX Airport, are needed.
- The existing transit system in Orange County is good relative to those in other areas, including Los Angeles County.

8 SYSTEM ANALYSIS

The analyses from the previous chapters point to a number of major findings—including notable issues, opportunities, and challenges—that together provide a framework for the OC Transit Vision effort.

- **The majority of existing OC Bus ridership is concentrated in a few key corridors.** Existing ridership is heavily concentrated in major corridors, almost all of which are in the northern part of the county.
- **OC Bus service is focused on the weekday commuter market.** OCTA offers much more service during weekday rush hours than mid-day, in evenings, on weekends, or to special events. Major destinations such as beaches, theme parks, and stadiums can be hard to access via transit during event times, and workers with non-traditional work schedules are not well served.
- **OC Bus service is focused on a select number of hubs, including destinations and connection points.** The network is organized around 30 rail stations, park-and-rides, and bus transfer centers, making multimodal access to these facilities very important.
- **OCTA has begun taking steps to address recent ridership declines.** While declining ridership continues to be a problem, OCTA has taken important steps to reallocate resources to where they can be most effective, and to better leverage existing resources by improving connectivity.
- **Limited funding has constrained ridership growth.** Whatever the reasons for OCTA's ridership decline, it is reasonable to believe that the agency could increase ridership by increasing and otherwise improving service; however, it has lacked the funds to do so.
- **Land uses and demographics in Orange County present both challenges and opportunities for effective transit service.** In many ways, Orange County is not a typical suburban area, and this is true in ways that support transit use: the county has concentrations of jobs and employment, a racially diverse population, and major destinations such as Disneyland. However, land uses are highly auto-oriented, both in their design as well as their distribution throughout the county.
- **The overall transportation network of Orange County presents both challenges and opportunities for effective transit service.** In the northern part of the county, there is a relatively well-connected street grid, and the wide streets throughout the county can make it easier for buses to operate efficiently. However, wide streets with few crossings limit pedestrian access, and roads that have limited connections to other roads lead to indirect pathways that are not conducive to transit.
- **Long-term trends offer a mixed message.** Cultural and demographic trends point toward higher ridership over time, but ridership has continued to decline for a variety of reasons including new technology-based alternatives to transit. Other technologies such as real-

time arrival smartphone apps have benefitted transit, and transit could benefit from future automation of vehicles.

- **Increased transit use can support greenhouse gas reduction targets..** The transportation sector is the largest source of greenhouse gas emissions in California, and transit has an important role to play in reducing impacts from climate change.
- **The future OC Streetcar and Bravo! lines provide a template for future ridership growth.** Recent efforts to improve the quality of transit in key corridors including Bravo! rapid bus service and the OC Streetcar are an important first step in the right direction.
- **Key stakeholder interviews indicate shifting trends.** Interviews with representatives of diverse constituencies in the County found evidence of several of the trends described above, including shifting cultural norms, as well as clear direction on transit priorities including more off-peak service, more premium service, increased connectivity and adoption of new technologies.

Ridership Concentrated

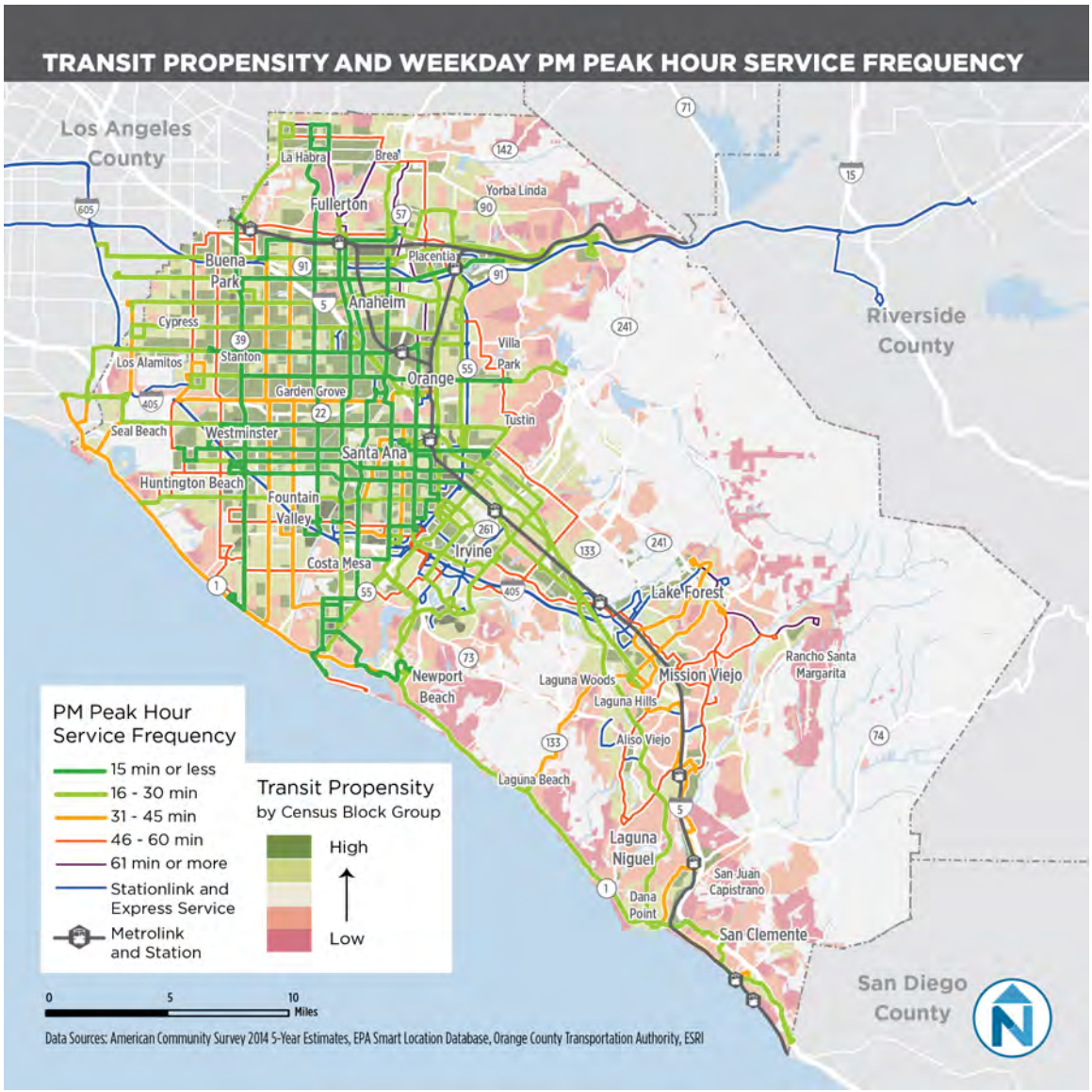
OC Bus service is heavily concentrated in a few corridors, and even more so after the recent 2016 Bus Service Plan restructuring. There are good reasons for this.

While ridership is partly a function of the level of service offered, it is notable that *so much* of OCTA's existing ridership is concentrated in a limited number of major corridors—approximately 75 percent of boardings are on just 19 routes, out of a total of 65 routes in the system. Moreover, fully one-quarter of ridership is in just three corridors: Harbor (Routes 43 and 543), Bristol/State College (Routes 57/57X), and 17th/Westminster (Routes 60 and 560). These three corridors, as well as nearly all major routes, are located in the northern part of the county, generally north of the 55 Freeway. South County is served by two major transit corridors: the Metrolink/Amtrak (LOSSAN) rail corridor, which has its busiest station in South County (at Irvine), and OC Bus Route 83.

While the transit propensity analysis in Chapter 6 shows pockets of high transit demand in South County—where there are large numbers of jobs, among other factors—most demonstrated demand for transit is in the northern part of the county, where important demographic indicators of a propensity toward transit use (most notably, lower incomes) are concentrated. The street network in South County is generally less conducive to both transit operations and pedestrian access than in the north.

The fact that transit demand is so concentrated in a few major corridors points the way toward a strategy of targeted investments to improve the quality of transit service where large numbers of people can benefit. This is the strategy OCTA has already begun to pursue, both through the OC Bus 360° effort as well as Bravo! service, the OC Streetcar, and this study.

Figure 8-1 Transit Propensity and Weekday PM Peak Hour Service Frequency



Service Highest on Weekdays

Like most large transit operators, OCTA operates substantially more service during weekday peak periods and midday on weekends than it does during evenings or all day on weekends. Similarly, OCTA provides only limited supplemental service to special events such as Angels games.

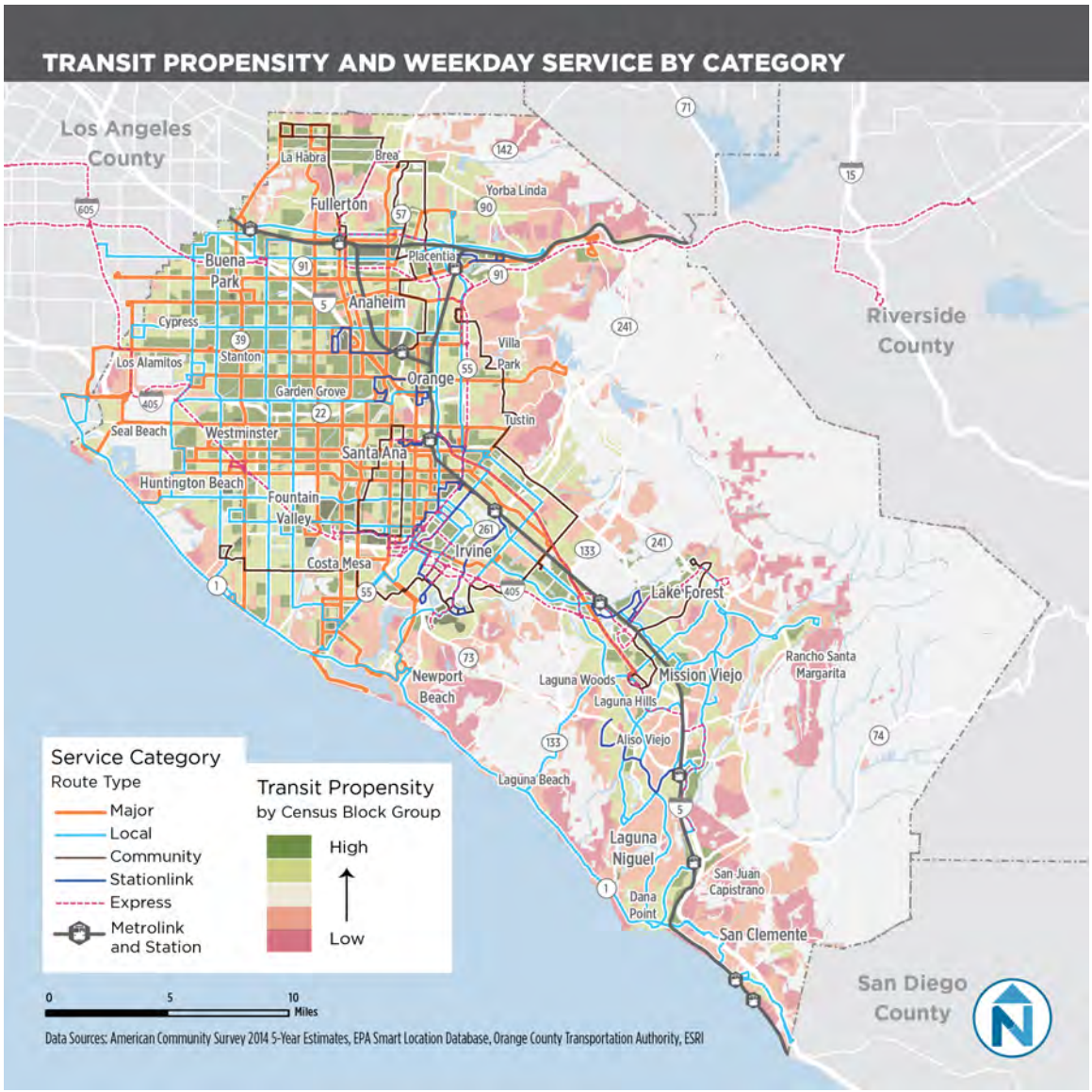
Again, there are good reasons for this: there is generally less transit demand during evenings and on weekends (although it may be increasing with time, as the job market changes), and service to special events can be expensive to operate. Orange County is unique, however, in the variety of weekend and recreational destinations it offers; in some areas, traffic on weekends can be heavier than on weekdays, which is an indicator of travel demand, if not specifically transit demand.

OCTA is constrained by funding and limited in the amount of service it can provide, so the agency must choose wisely when allocating its resources. Nevertheless, there are a number of reasons additional off-peak service might prove worthwhile:

- Special event service and service to leisure destinations could attract new riders, who might then be more likely to use weekday service;
- Transit access for late-shift workers could provide new employment opportunities for Orange County residents; and
- Enabling a "car-free" or "car-light" lifestyle in Orange County would require more non-commute service to social and other non-work destinations.

Members of the millennial generation, in particular, might respond to more evening and weekend service. At a minimum, OCTA should explore opportunities to extend spans of frequent service by an hour or two after the PM peak period in order to facilitate more early-evening travel home from work or to restaurants and other destinations.

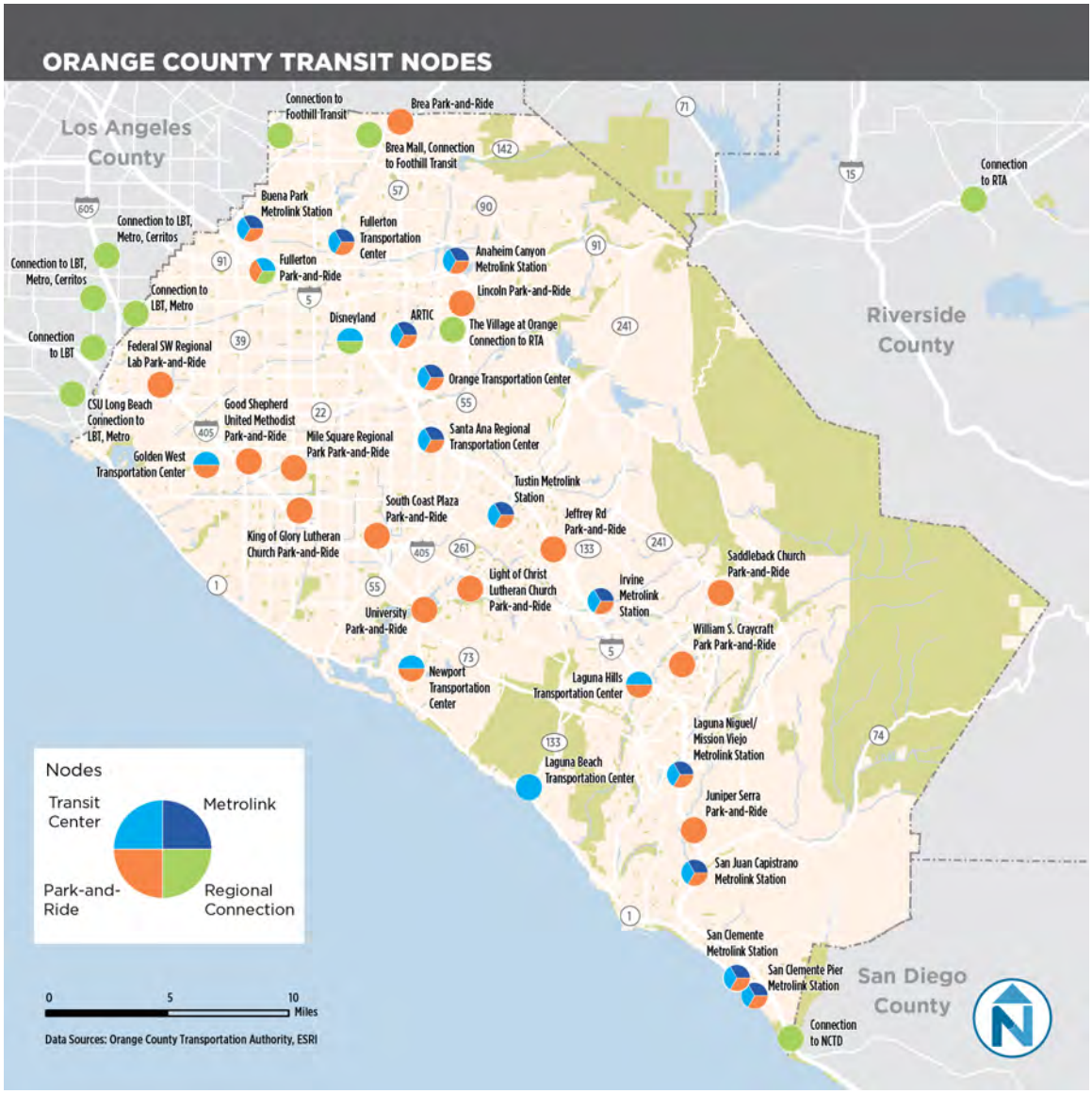
Figure 8-2 Transit Propensity and Weekday Service by Route Category



Connectivity at Hubs

The fixed-route transit system in Orange County is organized around more than 30 major transit hubs, ranging from Metrolink stations to park-and-rides and bus transfer centers (see Figure 8-3). These function in different ways: some facilitate connections between transit routes, while others (such as park-and-rides) are primarily intermodal. In all cases, connectivity both between and to these major nodes are important.

Figure 8-3 Orange County Transit Hubs



One focus of this study is first-/last-mile access to transit hubs. *First-/last-mile* refers to the common case of origins and destinations that are relatively close to transit stops, but not so close that they can be accessed easily by walking. Expanding first-/last-mile opportunities using options such as shuttle service and accommodations for transportation network companies (such as Uber and Lyft) leverages existing assets to expand the reach of the transit system and is a relatively cost-effective strategy for increasing transit use.

Pedestrian access to transit hubs can be improved in many ways, from direct investments in improvements such as new crosswalks to more long-term changes in land use policies and patterns to make Orange County more pedestrian-friendly. Pedestrian access to transit stops is a problem throughout Orange County, but targeted investments in the half-mile around major transit hubs could reap outsized benefits.

Addressing Ridership Decline

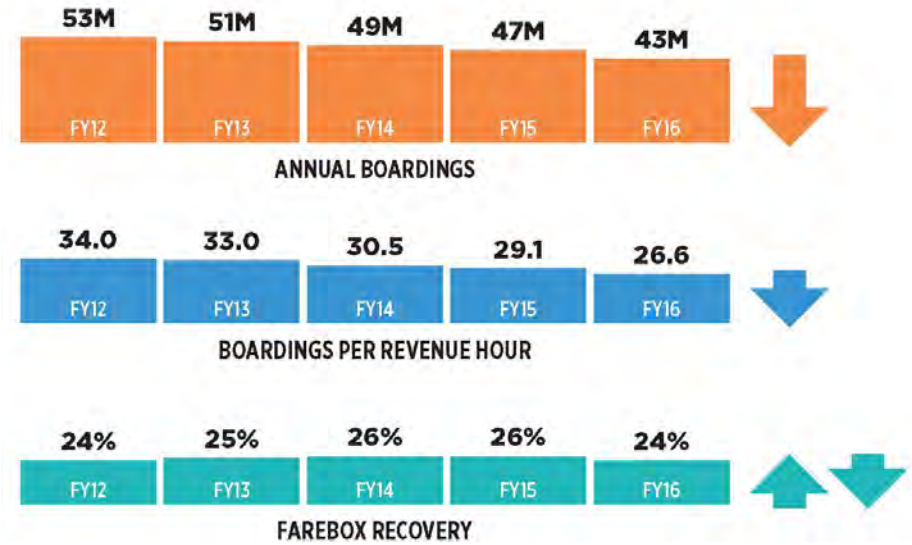
OCTA's decline in ridership over the past few years has been a focus of the agency's attention. Over the past five years, annual OC Bus ridership has decreased by about 10 million boardings. System productivity has also decreased from 34 passengers per revenue hour to 27 passengers per revenue hour. The 2016 Bus Service Plan route network restructuring was designed to increase ridership, and the agency has formed a task force to research potential causes and solutions to address the decline.

A variety of additional factors have reduced ridership. Bus fares have increased as much as 60 percent since 2008, while service hours have decreased 14 percent. Rising employment means more people can afford a car, while plummeting gas prices mean people can afford to drive further and more frequently. A new state law allows undocumented immigrants to obtain a driver's license. Most recent transportation capital investments in the county have focused on reducing auto commute time.

What is clear from industry research is that while there are many possible causes of ridership decline, one thing that is proven to increase ridership is increased service. OCTA has been limited in its ability to improve service due to funding constraints, so the agency has turned to the next best thing: making more cost-effective use of existing resources by allocating service to areas of high demand, and exploring creative alternatives to traditional fixed-route service in areas with lower demand.

The agency has also sought to better leverage its existing assets by focusing on connectivity, including first-/last-mile connections to Metrolink stations and other hubs. Finally, OCTA is investing in higher-quality service in its highest-demand corridors, introducing Bravo! rapid bus service, advancing the OC Streetcar, and funding the OC Transit Vision as well as other efforts, such as the Central Harbor Boulevard study.

Figure 8-4 Ridership Trends



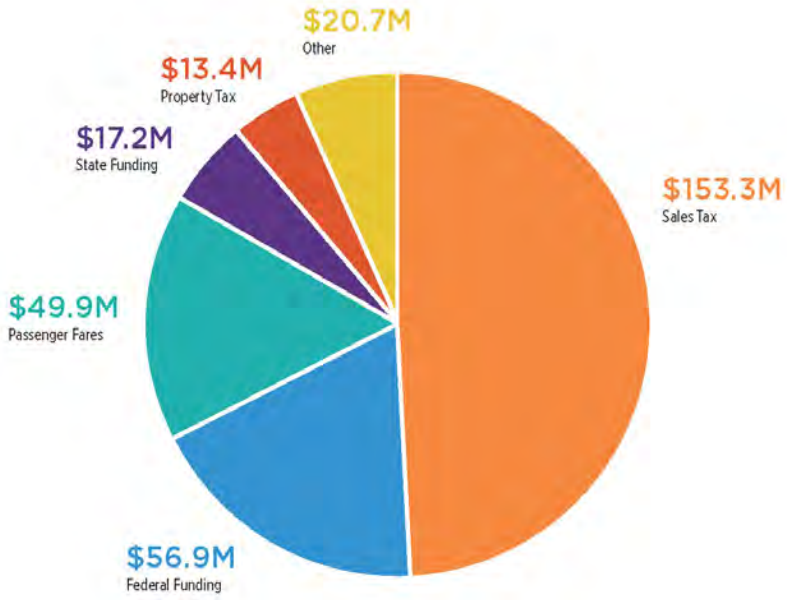
Funding Constraints

While OCTA has worked diligently to make better use of available resources, limited funding has constrained the agency's ability to grow service and to avoid fare increases (see Figure 8-5).

In the transit business, capital and operating funds typically come from different sources. Limited funding has constrained OCTA's ability to grow service and avoid fare increases. Federal funding has remained static, local sales tax has underperformed projections, and OCTA has raised fares to keep pace with increased costs.

Pursuing capital projects and grants that reduce long-term operating costs may be an easier way to improve transit service than securing additional operating revenues.

Figure 8-5 Bus and Paratransit Revenues

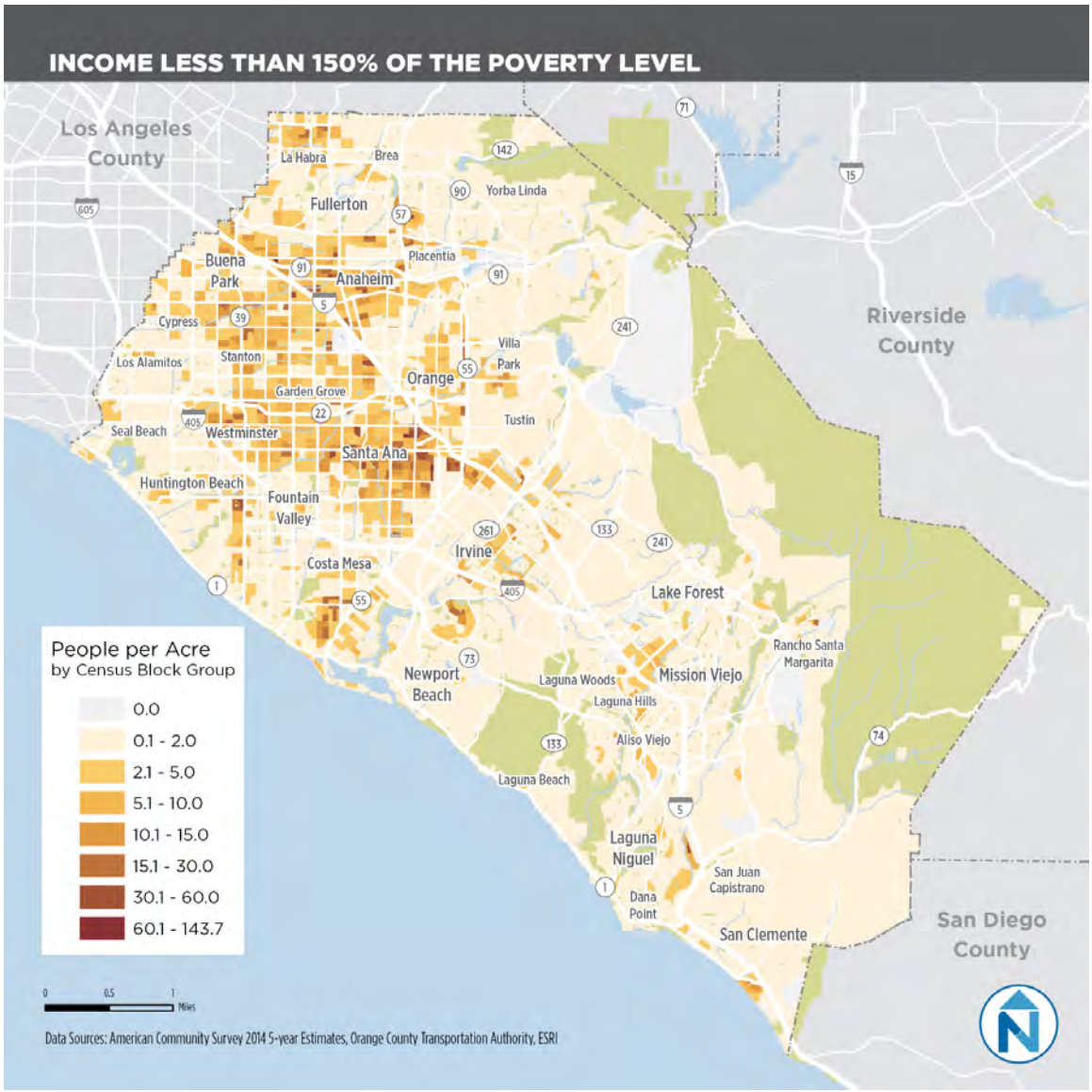


Land Use and Demographics

Orange County is no longer its stereotype (if it ever was). Parts of the county—generally in the north—are much more urban than typical suburban areas, ranging from population density to demographic composition of the population, much of which is low-income and non-white. There are also an unusually large number of major destinations for a suburban area, ranging from job centers to stadiums and arenas, theme parks, and the county's world-famous beaches. As a result, roadways are heavily congested seven days a week, and many nights as well.

Transit, however, has struggled to attract patrons, particularly in recent years. While there are many possible reasons for this, the most obvious is the general auto-orientation of the built environment of Orange County. This manifests itself in a variety of ways, ranging from the transportation network itself (addressed below) to the building and building complexes that it connects. Even in the denser, more urban parts of Orange County, single-family homes are much more common than apartment buildings (which, where they exist, are often designed to be reached by car rather than on foot), retail shops tend to be located in strip malls and shopping centers with large parking lots fronting the street, and offices are located in office parks scattered throughout the county rather than clustered in a central business district. In South County in particular, land uses are highly segregated, with homes some distance away from businesses and other uses. While these conditions may be desirable in some ways, they are not conducive to effective transit service.

Figure 8-6 Locations of Low-Income Individuals



Transportation Infrastructure

Just as the population and built form of Orange County are in some ways more urban than a typical suburban area, the county's transportation network has certain characteristics of a more urban area. In the older, northern part of the county, some of which predates World War II and much of which dates back to the decades immediately after, there is a relatively well-connected street network. Arterial streets follow a grid pattern with major streets every half-mile, and the smaller neighborhood streets within these half-mile squares are generally more interconnected and direct than in newer areas, with their curving streets and cul-de-sacs. As a result, pedestrian pathways are relatively direct, and buses can run in a straight line, with regular connections to crossing routes.

Those arterials, however, tend to be very wide—often seven or eight lanes, including turn lanes—and have crosswalks only at major streets. Traffic signals are timed to favor traffic on the main street itself rather than crossing traffic or pedestrians, resulting in both out-of-direction travel and long waits to cross the street. While this configuration can actually benefit transit operations in a very narrow sense—buses encounter less congestion and fewer red lights—it discourages transit use, as pedestrian access to bus stops is limited.

In South County, where streets tend to be indirect and disconnected, both buses and pedestrians are challenged. Walking along main streets in Orange County, pedestrians are likely to be surrounded by cars, parking lots, and sound walls, and may feel both uncomfortable and unsafe. This encourages people to drive rather than to walk, take transit, or ride a bike, and further compounds the cycle of auto-oriented transportation and land use patterns.

Long-Term Trends

Whether or not OCTA ridership—and indeed, transit use nationally—will grow over the long-term is very much an open question. There are indicators pointing in both directions. The recent trend has been negative, for a variety of reasons discussed in this document ranging from low gas prices to service availability. But looking ahead, there are positive cultural and demographic signs, such as the travel preferences of Millennials, the aging of the population, the growth of infill development (and relatedly, the lack of available space for continued roadway expansions) and as technological trends such as autonomous vehicles that could reduce transit agencies' costs.

At the same time, some new technologies represent a threat to transit ridership, most notably transportation network companies (TNCs). So far, TNCs have worked both at odds with and in partnership with transit agencies, sometimes providing services that duplicate transit routes and sometimes providing critical first-/last-mile connections or service where OCTA does not operate. OCTA is currently exploring opportunities for additional win-win scenarios with TNCs.

The pace of both cultural and technological change has accelerated in recent years, and this is not likely to be reversed soon. Transit agencies such as OCTA will need to learn to adapt, and to remain nimble and flexible in their thinking.

Greenhouse Gas Reduction

In Orange County, in Southern California, and statewide—especially on the state and regional levels—reduction in greenhouse gas (GHG) emissions has become a policy imperative and major initiative. In California, the transportation sector is responsible for the largest share of GHG emissions, owing largely to high rates of single-occupancy vehicle (SOV) travel. For this reason, transit has an important role to play in mitigating impacts from climate change. It can only perform this function, however, by improving service to grow ridership. Improving access to transit by active transportation modes such as walking and cycling can help to increase ridership and further reduce GHG emissions.

High-Capacity Transit Corridors

A primary focus of the OC Transit Vision is to identify potential high-capacity and rapid transit corridors. While there are no existing urban rail corridors in Orange County (as opposed to regional rail like Metrolink and Amtrak), there are Bravo! rapid bus lines and the OC Streetcar will soon operate in Santa Ana and Garden Grove. Light rail will also be included in this effort, as will full-featured bus rapid transit with bus-only lanes.

OCTA's approach to improving its highest-demand transit corridors has demonstrated certain characteristics that will prove useful in the OC Transit Vision process. First, OCTA recognizes that the mode selected for a corridor should be based on the specific context of the corridor—the agency has shown flexibility by advancing bus solutions in some cases and rail in others. It has also taken a practical approach, scaling cost to available resources as well as potential demand. OCTA has focused on areas with the highest potential demand, resisting the urge to make investments that may have more political than technical merit. Finally, the agency has worked in close partnership with cities to ensure that the needs of local residents and workers are met.

Figure 8-7 Route 43/543 High-Capacity Transit Corridor in Orange County

Appendix A

Route Profiles

Table of Contents

INTRODUCTION

Major Corridors are those routes with the strongest existing transit markets. Appendix A includes detailed route profiles for 17 Major Corridors. These profiles help to provide a better understanding of the strengths and weaknesses of existing services, identifying opportunities for future transit investments. This introduction describes the contents, data sources, and purpose of each section of the route profiles.

SERVICE PATTERNS

A transit service pattern is the term used to describe how a bus or train serves the stops along the route (e.g., serving every stop or skipping some stops). Based on the October 2016 service change, this section describes both weekday and weekend service patterns.

SPAN AND FREQUENCY

Span is the length of time a transit service operates during a 24-hour period, and frequency is how often the bus or train arrives. Service span and frequency impact the availability and convenience of transit service. This section depicts the relationship between frequency (in terms of buses per hour) and ridership by time of day. Frequency and span data are based on the October 2016 service change; ridership data is from fiscal year 2016. In some cases, ridership data may not reflect recent service level changes, and this is noted in the text.

RIDERSHIP

Each profile contains a map of weekday ridership—the number of people boarding the transit service—at each stop based on March 2016 data. Profiles include a discussion of ridership and productivity levels compared to other routes, as well as notable patterns in the ridership map.

PERFORMANCE

This section reports five performance indicators for weekdays, Saturdays, and Sundays based on fiscal year 2016 data.

- **Daily boardings** measure of the number of people boarding a route on a daily basis.
- **Revenue hours** measure the amount of daily transit service a route provides.
- **Productivity**, defined as the ratio of daily boardings to revenue hours, indicates the effectiveness of service in terms of the number of boardings that occur within one hour of service on average.
- **Farebox recovery** is the percentage of operating costs recovered through passenger fares.
- **On-time performance** measures the percent of trips that arrive on-time at scheduled points.

SERVICE DESIGN

Five service design indicators are reported based on the October 2016 service change.

- **Stops per mile** reports the average stop spacing on a route (i.e., the distance between stops); stop spacing impacts both trip speed and how far an average rider walks to reach a stop.
- **Average speed** impacts travel time.
- **Peak headway** is the most frequent service level operated on any portion of the corridor.
- **Off-peak and Saturday service levels** are rated to indicate service quality outside peak times. While demand is often highest during rush hour, off-peak frequency impacts the availability and quality of service for nontraditional work schedules and other types of trips, such as shopping and recreational trips.
  - <15 min = excellent
  - 16-29 min = good
  - 30 min = fair
  - >30 min = poor

STRENGTHS AND WEAKNESSES

These sections synthesize the characteristics and indicators reported in the profile, summarizing the strengths and weaknesses of a corridor as a whole.

ROUTE PROFILES

This section presents route profiles for the following routes:

- Route 26 Fullerton – Placentia
- Route 29 La Habra – Huntington Beach
- Route 37 La Habra – Fountain Valley
- Route 38 Lakewood – Anaheim Hills
- Route 42 Seal Beach – Orange
- Route 47 Fullerton – Balboa
- Route 50 Long Beach – Orange
- Route 53 Anaheim – Irvine
- Route 54 Garden Grove – Orange
- Route 55 Santa Ana – Newport Beach
- Route 57 Brea – Newport Beach
- Route 64 Huntington Beach – Tustin
- Route 66 Huntington Beach – Irvine
- Route 70 Sunset Beach – Tustin
- Route 83 Anaheim – Laguna Hills
- Route 43/543 Fullerton/Santa Ana – Costa Mesa
- Route 60/560 Long Beach – Tustin/Santa Ana – Long Beach

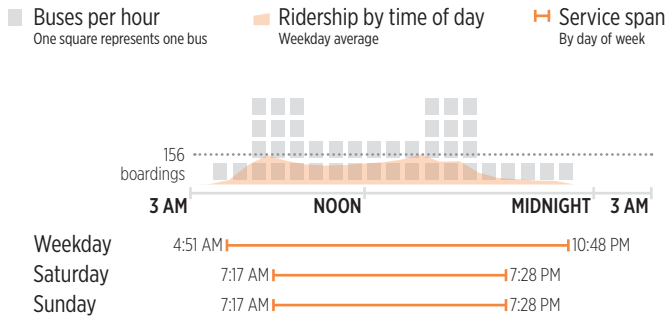
FULLERTON TO PLACENTIA VIA COMMONWEALTH AVE/YORBA LINDA AVE

26

Service Patterns

Route 26 operates all day 30-minute service between the Fullerton Park-and-Ride and Rose Drive/Yorba Linda Avenue in Placentia. During peak periods Route 26 operates a short-line pattern between Fullerton Park-and-Ride and Cal State Fullerton, providing 15 minute service in that segment.

Span and Frequency



Ridership

In October 2016 Route 26 was truncated at Rose Avenue and began operating 15 minute peak service. Ridership data does not reflect these changes. However, ridership trends prior to the service change show increased demand at peak times, indicating warrants for the newly implemented service. Cal State Fullerton and the Fullerton Transportation Center are the major ridership generators on Route 26.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	1,621	644	516
Revenue Hours	60	32	31
Productivity	27.1	20.4	16.5
Farebox Recovery	38.8%	28.4%	22.0%
On-Time Performance	86.4%	66.5%	76.7%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.8	12.68	15	Fair	Poor

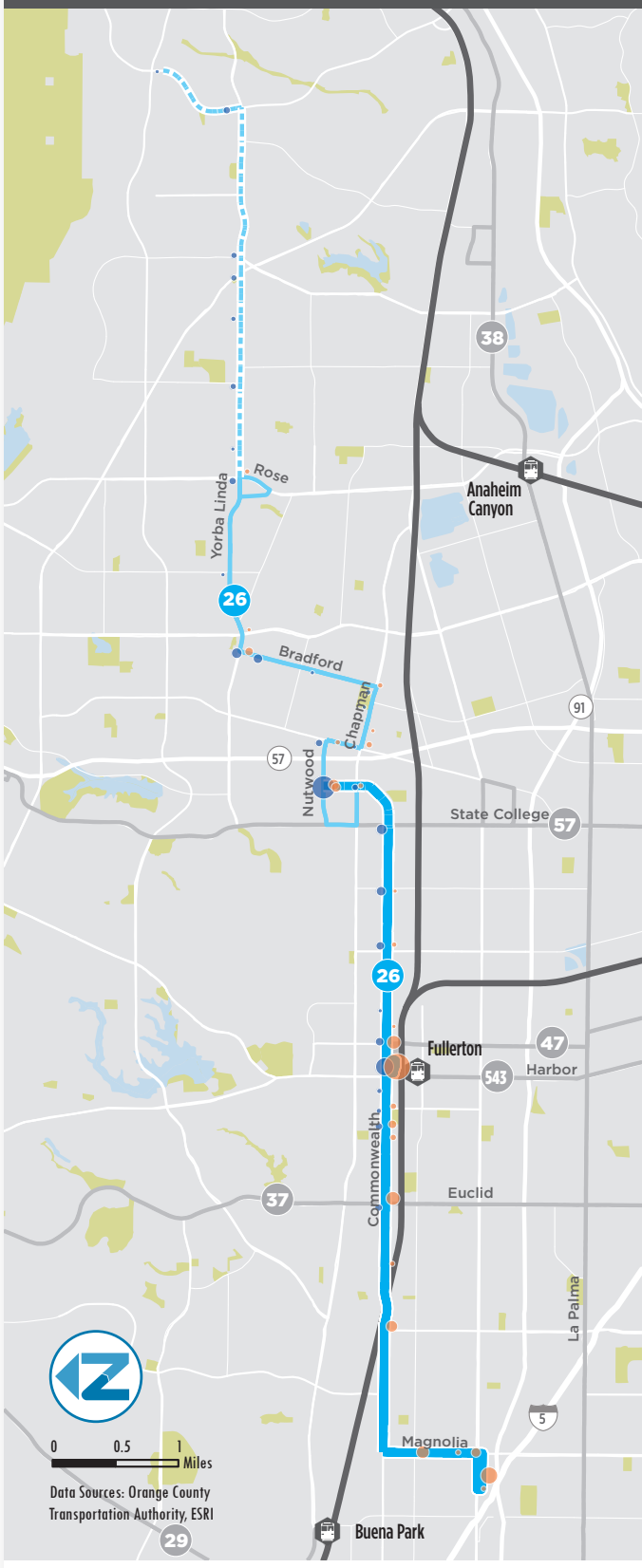
Strengths

Route 26 has the second highest farebox recovery of any Major Corridor, with almost 40% of operating costs recovered through passenger fares. With Cal-State Fullerton, a commuter-oriented market, being the primary ridership generator, recent changes to peak service levels may have a positive impact on ridership.

Weaknesses

Compared to other Major Corridors, Route 26 has the lowest average weekday ridership, more comparable to local routes. In addition, ridership levels reduce by more than half on Saturdays and by two-thirds on Sundays compared to Weekday ridership levels. Service levels are also significantly reduced at off-peak times, which, despite recent improvements to peak frequency, will not improve the all-day ridership market.

Route 26 Weekday Boardings



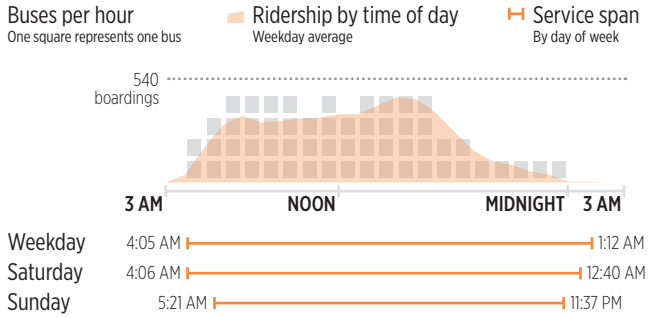
LA HABRA – HUNTINGTON BEACH VIA BEACH BOULEVARD

29

Service Patterns

Route 29 operates two service patterns which alternate every trip. Half of trips terminate at the Buena Park Metrolink Station and half terminate at La Habra Boulevard and do not serve Buena Park Metrolink. The segment between PCH/1st and Beach/Malvern has 15-minute service during morning and afternoon peak periods on weekdays and 18-minute service on weekends.

Span and Frequency



Ridership

Route 29 carries 6,403 passengers per weekday on average. The strongest ridership segment is between McFadden Avenue and Lincoln Avenue, with many stops generating more than 100 riders per day. In the southbound direction the stop at Beach/Lincoln, which provides transfers to Route 42, generates 241 per weekday on average, more than any other stop. Segments north of Malvern Avenue, which are only served on half of trips, generate less ridership, with only the stop at Beach/Imperial generating more than 50 riders per weekday.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	6,403	5,092	4,127
Revenue Hours	203	180	158
Productivity	31.6	28.2	26.0
Farebox Recovery	23.5%	20.3%	18.3%
On-Time Performance	86.7%	85.9%	86.4%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
3.8	13.28	15	Good	Good

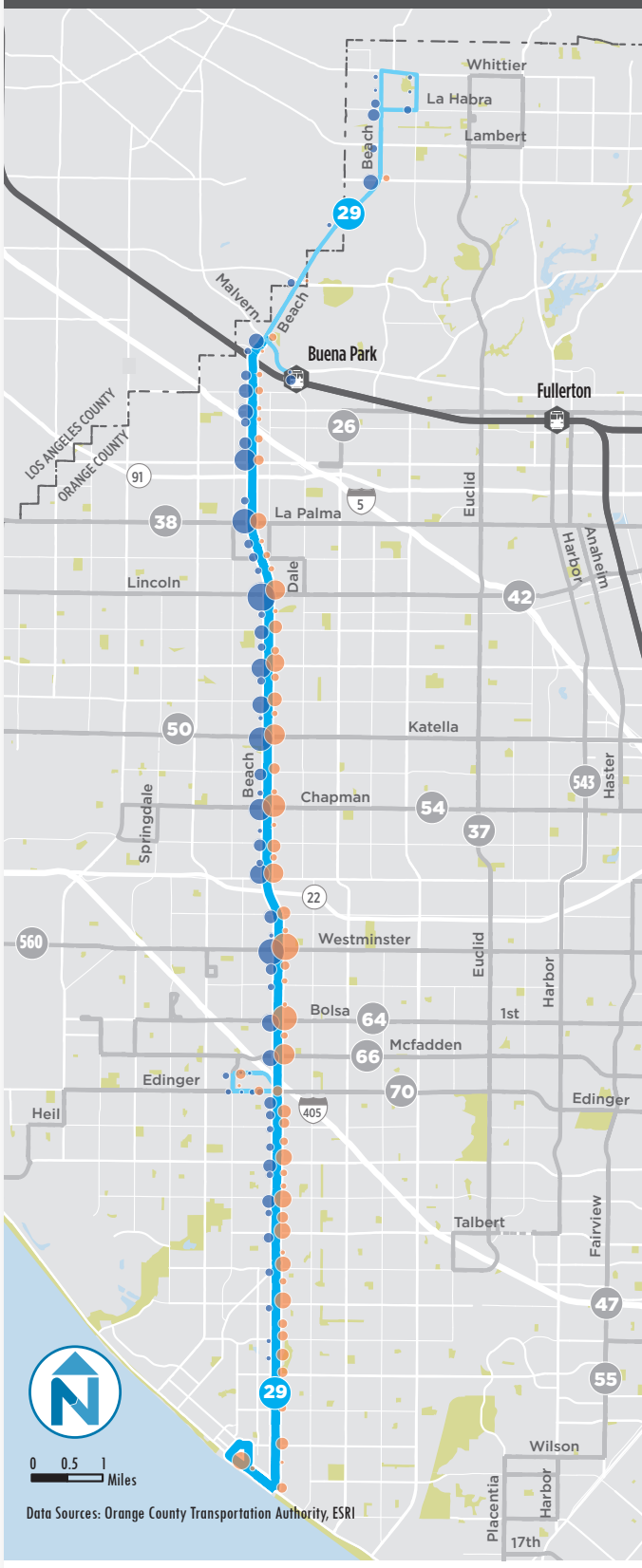
Strengths

Weekday ridership is above the Major Corridor group average. Compared to all other Major Corridors, Route 29 has the highest ratio of Saturday to Weekday ridership, 80%, which is supported by the high level of weekend service. Strong Saturday ridership indicates a diverse mix of rider types and trip purposes.

Weaknesses

After 6:00 p.m. on weekdays ridership declines precipitously along with service levels. While it is typical for demand to decline in the evenings, the drop from 15-minute to 60-minute by 8:00 p.m. service may make service inconvenient for riders returning from retail or service industry shifts that end later in the day. Farebox recovery is in the bottom third of the Major Corridors.

Route 29 Weekday Boardings



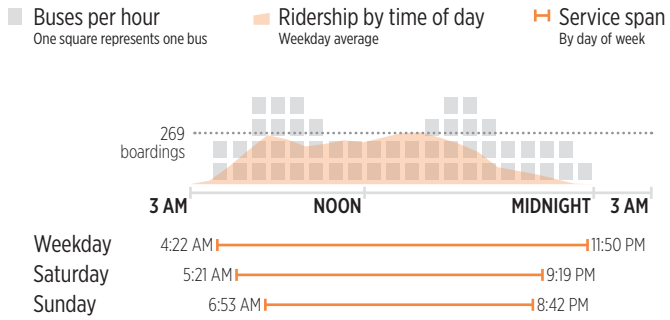
LA HABRA TO FOUNTAIN VALLEY VIA EUCLID STREET

37

Service Patterns

Route 37 operates one consistent route pattern at all times, with 15 minute peak and 30 minute off-peak service on weekdays. Weekend service operates every 60 minutes.

Span and Frequency



Ridership

As of October 2016 Route 37 doubled peak service levels from 30 minutes to 15 minutes and increased midday service from 40-minutes to 30 minutes. Ridership data does not reflect these changes. Ridership is strongest between La Palma Avenue and Westminster Avenue. The stop at Euclid/Ball generates the most ridership, providing transfers to Route 46 and serving Gilbert High School and Loara High School. Ridership is highest at peak times, with the afternoon peak in ridership occuring between 2:00 p.m. and 3:00 p.m., potentially driven by school bell times.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	3,262	1,669	1,031
Revenue Hours	92	63	37
Productivity	35.3	26.7	27.5
Farebox Recovery	26.2%	19.7%	20.1%
On-Time Performance	84.3%	79.6%	85.0%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.1	14.61	15	Fair	Poor

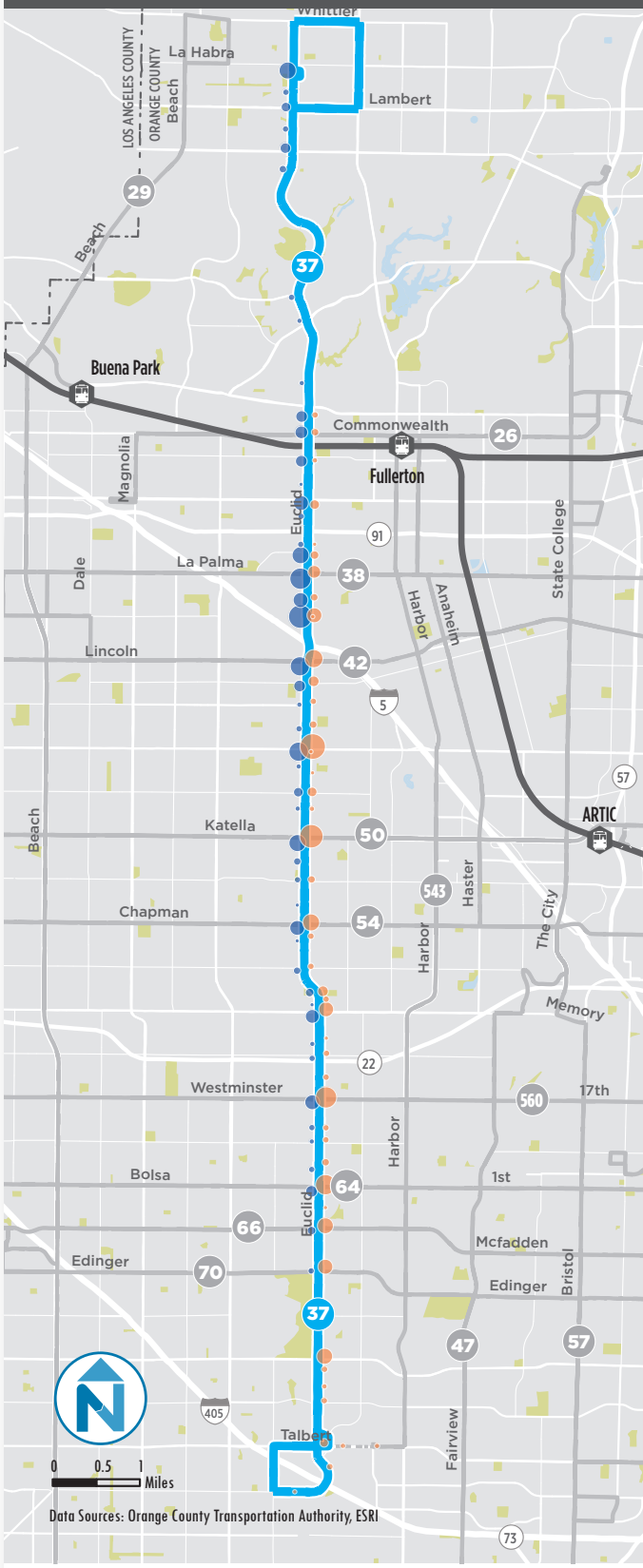
Strengths

Route 37 is one of the most productive Major Corridors, carrying more than 35 boardings per hour. This level of productivity supports the recent improvements to peak frequency. In addition Route 37 has the 4th fastest average speed of all Major Corridors.

Weaknesses

Overall weekday ridership on Route 37 is third lowest of the Major Corridors, which can partially be explained by its shorter length and lower service levels prior to October 2016. Off-peak service levels remain low and do not support an all-day market for transit. Despite operating a faster average speed, Route 37 On-Time Performance is below average for a Major Corridor.

Route 37 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

- Frequent Service (Every 15 minutes)
- Less Frequent Service
- No Longer in Service
- Other Major Route

Metrolink

- Station/Line

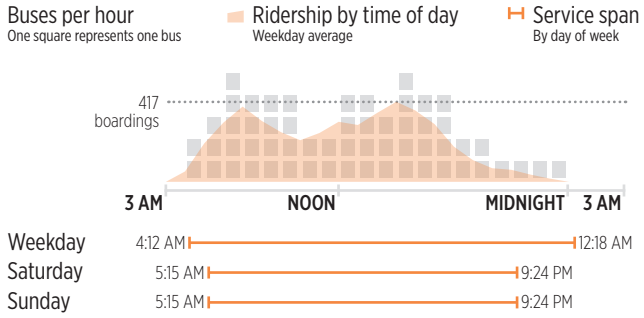
LAKEWOOD TO ANAHEIM HILLS VIA DEL AMO BLVD/LA PALMA AVE

38

Service Patterns

Route 38 operates six service patterns total, though the majority of service consists of the following three: Between Del Amo Boulevard/Pioneer Boulevard and Anaheim Hills; Between La Palma Avenue/Stanton Avenue and La Palma Avenue/Kellogg Drive; Between La Palma Avenue/Stanton Avenue and Anaheim Hills. Together these provide 15 minute service at peak times between La Palma Avenue/Beach Boulevard and La Palma Avenue/Kellogg Drive. Weekend service operates the same pattern every 45 minutes between Del Amo Boulevard/Pioneer Boulevard and Anaheim Hills.

Span and Frequency



Ridership

Route 38 carries 4,545 riders and 30.1 boardings per hour on weekdays, both slightly below average for Major Corridors. Ridership by time of day shows a strong peak pattern, matching service levels. Route 38's highest ridership stops are all those that intersect with Major Corridors: Euclid Street (37), Harbor Boulevard (543), and State College Boulevard (57). Each of these stops generates more than 300 riders per day. No other stop on Route 38 generates more than 200 riders per day except the stop at Beach Boulevard which serves Knotts Berry Farm and also interesects a Major Corridor - Route 29. Ridership west of Beach Boulevard and east of Kellogg Drive, where service levels are low throughout the day, generate notably lower ridership.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	4,545	1,841	1,379
Revenue Hours	151	63	62
Productivity	30.1	29.4	22.4
Farebox Recovery	40.1%	38.8%	29.0%
On-Time Performance	86.1%	80.2%	88.5%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.4	14.46	15	Good	Fair

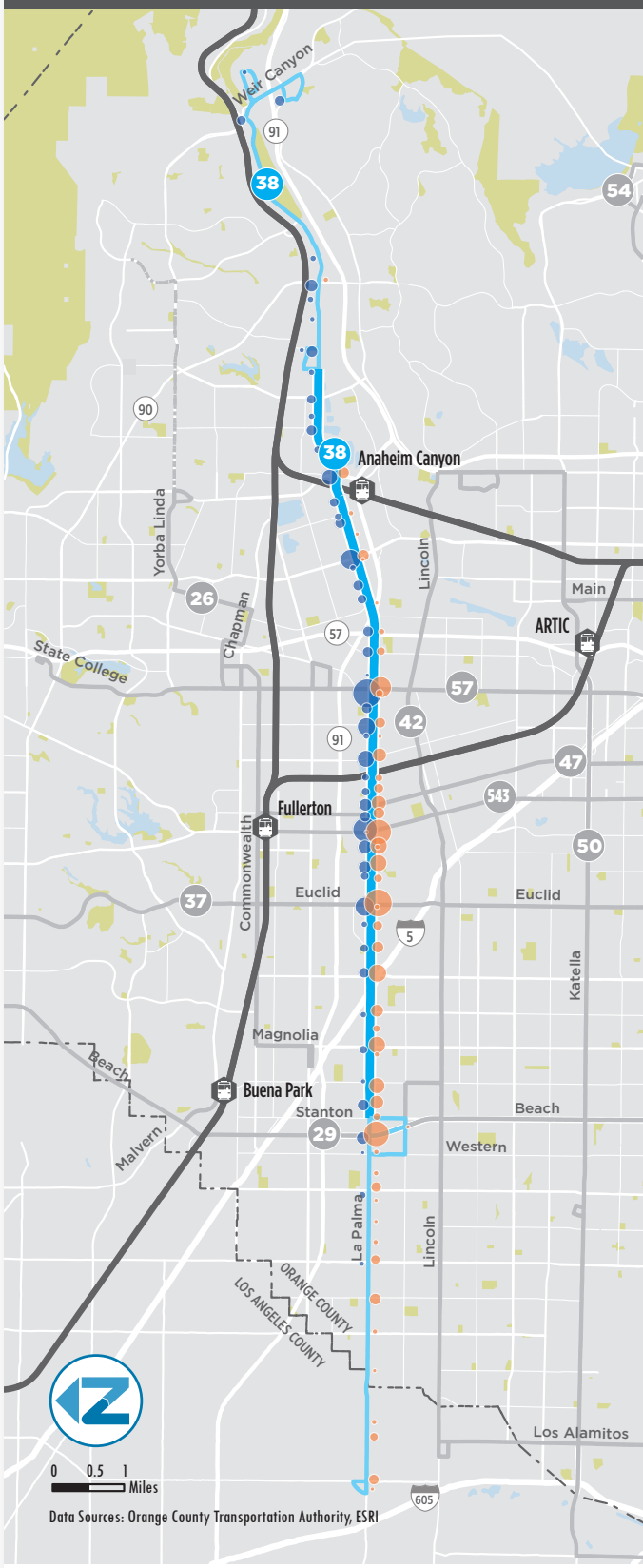
Strengths

Ridership patterns suggest that Route 38 provides east-west distribution riders transferring from major north-south corridors. Route 38 has the highest farebox recovery of any Major Corridor, recovering just over 40% of operating costs through passenger fares.

Weaknesses

Outside of intersections with other Major Routes, Route 38 stops have relatively low ridership. Though La Palma Avenue serves a mix of residential and commercial uses, much of the development is lower density than other Major Corridors. Multiple service patterns provide good service levels on portions of the route, but limited frequency for end-to-end connections, and add complexity to understanding how to use the service.

Route 38 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

- Frequent Service (Every 15 minutes)
- Less Frequent Service
- No Longer in Service
- Other Major Route

Metrolink

- Station/Line

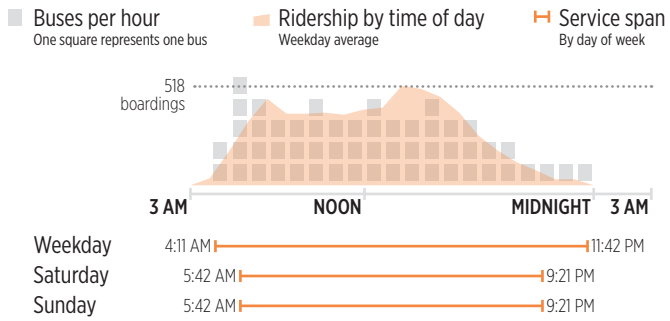
42

SEAL BEACH TO ORANGE

Service Patterns

Route 42 primarily operates between Norwalk Boulevard and The Village at Orange, providing 18-minute service throughout the day on weekdays and 25-minute service on weekends. Service is provided roughly every hour on Los Alamitos between Lincoln Avenue and Seal Beach. In addition, some trips deviate to serve the Braille Institute on Dale Avenue.

Span and Frequency



Ridership

Average weekday ridership on Route 42 (5,840) is the median of the Major Corridor group. Ridership is strongest between State College Boulevard and Valley View Street. Major ridership generators include Cypress College as well as intersections with Routes 29, 37, 543, and 57.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	5,840	3,640	2,977
Revenue Hours	174	105	105
Productivity	33.5	34.5	28.3
Farebox Recovery	34.6%	43.9%	35.6%
On-Time Performance	82.0%	64.5%	78.8%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.9	12.96	18	Good	Good

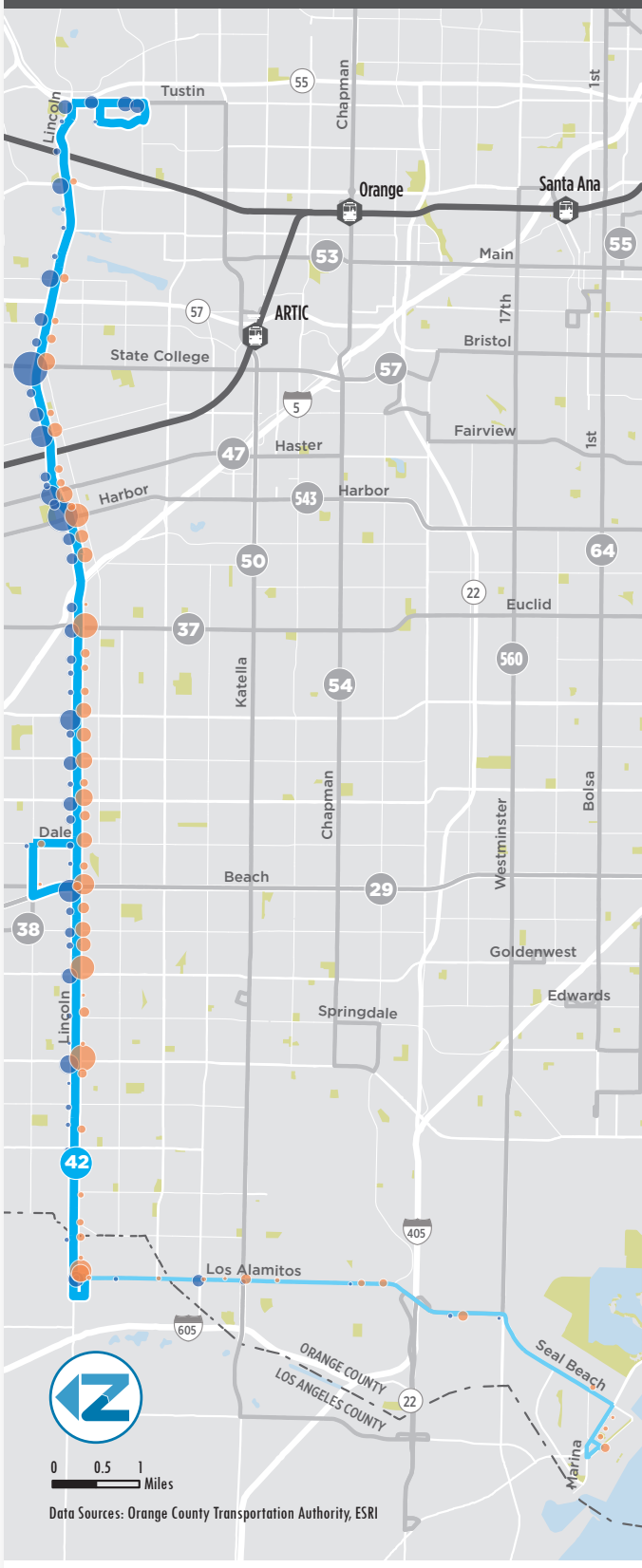
Strengths

Route 42 has consistent service levels throughout the day, maintaining a relatively frequenty headway of 18 minutes at peak and off peak times and supporting an all-day ridership market. Route 42's best segment is between Brookhurst Street and State College Boulevard, where 40% of ridership is generated on a four mile segment of the 26 mile route.

Weaknesses

Stop spacing on Route 42 is narrow compared to other Major Corridors, though speed is only slightly below average. Route 42 has the third lowest on-time performance of Major Corridors which may be associated with frequent stops. Route 42 does not provide service as frequently at peak times as other Major Corridors and may benefit from increased peak service to match demand.

Route 42 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

Frequent Service (Every 15 minutes)

Less Frequent Service

No Longer in Service

Other Major Route

Metrolink

Station/Line

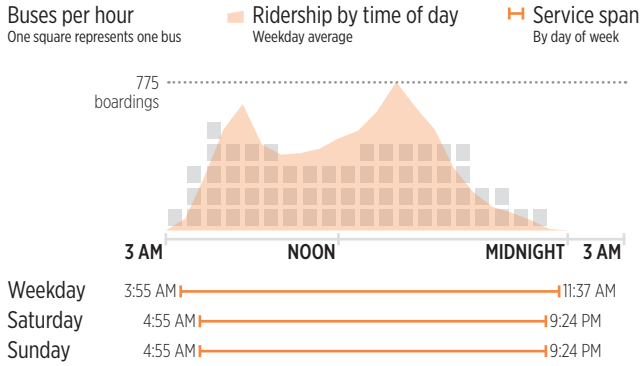
FULLERTON TO PENINSULA (NEWPORT BEACH) VIA ANAHEIM BLVD/FAIRVIEW ST

47

Service Patterns

Route 47 operates two patterns, both of which start at Fullerton Transportation Center. Most trips end at Balboa Boulevard/23rd Street. Roughly once every hour service extends to Balboa Pier. Service operates along the trunk of the route every 15 minutes during peak times and every 20 minutes during off-peak times. On weekends Route 47 operates the same two patterns, with the trunk operating every 20-30 minutes.

Span and Frequency



Ridership

Route 47 carries more than 7,500 boardings per day, the fourth highest ridership in the system. Route 47 has the highest ridership of any corridor without enhanced or limited stop service (such as Bravo! or Xpress) and average productivity for a Major Corridor. As of October 2016 Route 47 operates the hourly extension on Balboa Boulevard to Balboa Pier. Ridership data does not reflect this change. Highest ridership stops are those connecting to other Major Routes at Westminster, Mcfadden, and Edinger.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	7,571	4,661	4,125
Revenue Hours	239	145	145
Productivity	31.6	32.1	28.4
Farebox Recovery	25.2%	25.8%	22.5%
On-Time Performance	87.3%	85.5%	91.1%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.7	13.3	15	Good	Fair

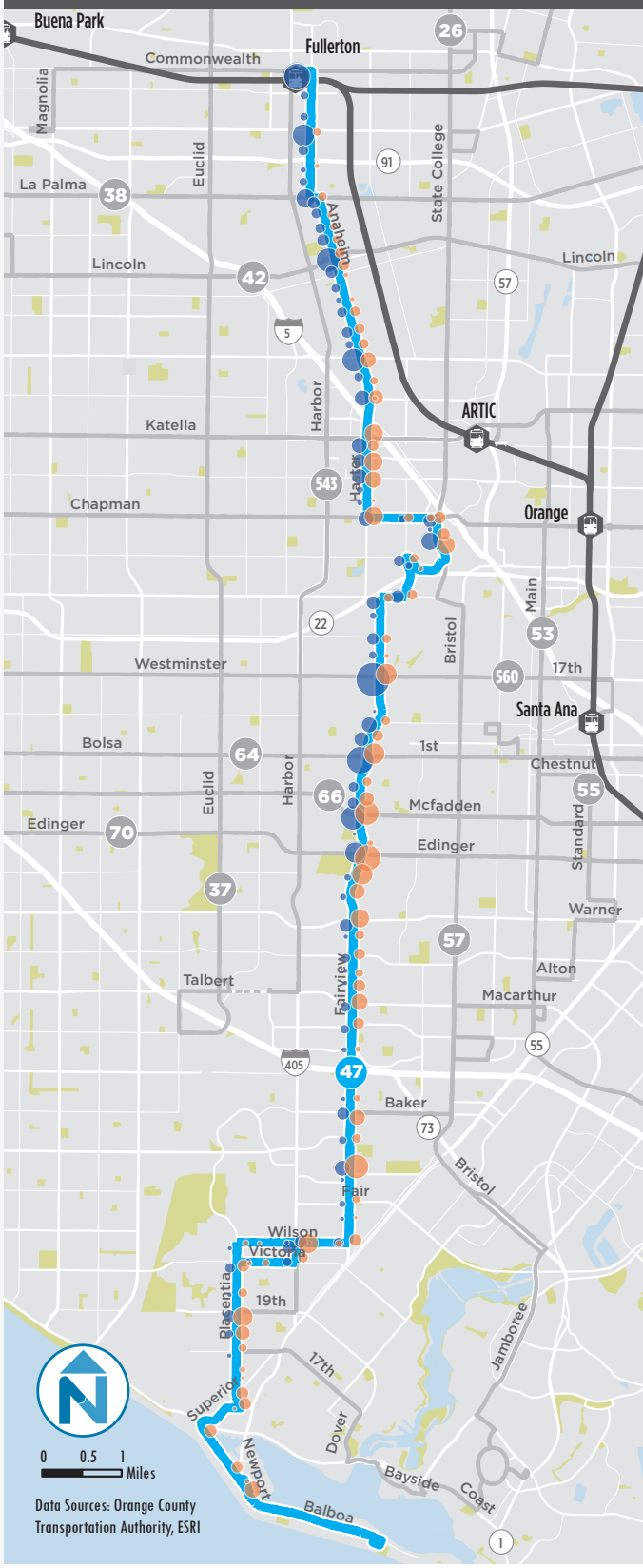
Strengths

In addition to 15 minute peak service, Route 47 maintains a good level of service during off-peak times. Overall the Fairview Street/Anaheim Boulevard corridor generates strong transit ridership.

Weaknesses

Route 47 service ends just after 11:30 p.m. on weekdays, a shorter service span than that of other routes with similar ridership levels. Route 47 deviates from Fairview Street to serve the Outlets at Orange. While this deviation is warranted given the ridership, it adds out-of-direction travel for those traveling between destinations on either side.

Route 47 Weekday Boardings



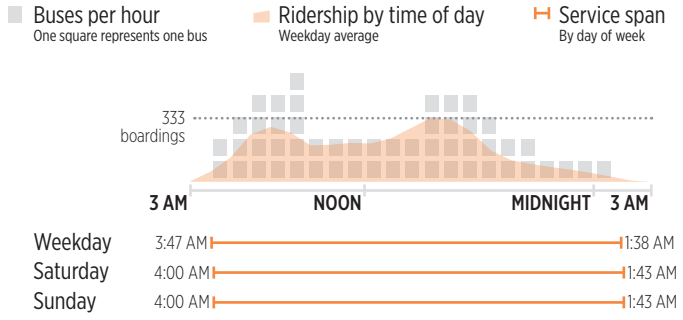
LONG BEACH TO ORANGE VIA KATELLA STREET

50

Service Patterns

Route 50 operates two service patterns. Regular service operates between CSU Long Beach and The Village at Orange operates every 30 minutes all day and every 60 minutes on weekends. At peak times 15 minute service is operated between Katella Avenue/Meridian Drive and ARTIC.

Span and Frequency



Ridership

The short line pattern between Meridian Drive and ARTIC providing 15-minute service is new as of June 2016 and is not reflected in the ridership data. Route 50 carries 3,769 boardings on weekdays, below average for Major Corridors. In the westbound direction the stop at Harbor Boulevard has the highest ridership (Disneyland and connections to route 543). In the eastbound direction CSU Long Beach has the highest ridership, despite being served only every 30 minutes.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	3,769	2,392	1,980
Revenue Hours	121	76	76
Productivity	31.1	31.3	26.0
Farebox Recovery	19.9%	20.3%	16.8%
On-Time Performance	81.6%	79.2%	89.0%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
3.5	13.74	15	Fair	Poor

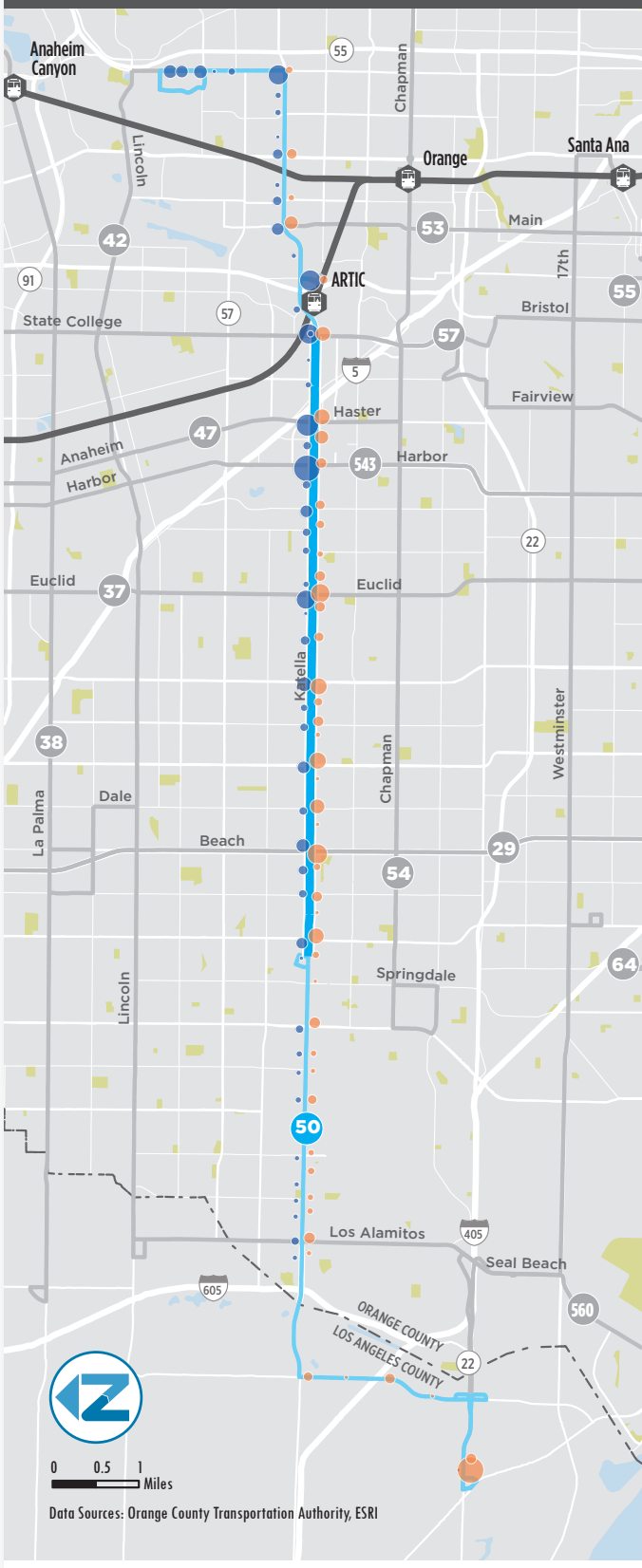
Strengths

Route 50 service span operates until 1:30 a.m. seven days per week. This span is longer than that of many other routes, but likely provides important connections for those traveling to events or commuting to second shift jobs at Disneyland, Angel Stadium, and the Anaheim Convention Center.

Weaknesses

CSU Long Beach, the single highest ridership stop, is only served every 30 minutes, however segments of Katella Avenue between CSU Long Beach and Meridian Drive (where peak 15 minute service begins) may not warrant increased service. Route 50 has the second lowest farebox recovery ratio of the Major Corridors, recovering less than 20% of fares on weekdays.

Route 50 Weekday Boardings



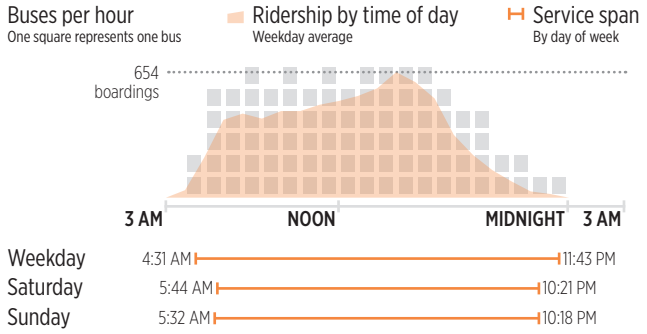
ANAHEIM TO IRVINE VIA MAIN STREET

53

Service Patterns

Route 53 operates service every 10 to 12 minutes between ARTIC and Macarthur Boulevard on Main Avenue. Every 20 to 30 minutes service extends to Culver Drive. On weekends Route 53 operates every 15 minutes on the trunk and every 45 minutes on the extended portion of the route.

Span and Frequency



Ridership

Route 53 carries more than 7,000 boardings per weekday and is highly productive, carrying more than 35 boardings per hour. Ridership is strong in the segment served by frequent headways, particularly between Edinger Boulevard and 17th Street. Ridership is highest in the afternoon peak, but is supported by consistently frequent service between 5:00 a.m. and 5:00 p.m., showing a strong all day market for transit. The southern segment with lower service levels generates little ridership by comparison.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	7,096	4,611	3,466
Revenue Hours	197	141	115
Productivity	35.9	32.6	30.1
Farebox Recovery	28.5%	26.1%	23.2%
On-Time Performance	89.8%	95.1%	91.0%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.4	11.34	10	Excellent	Excellent

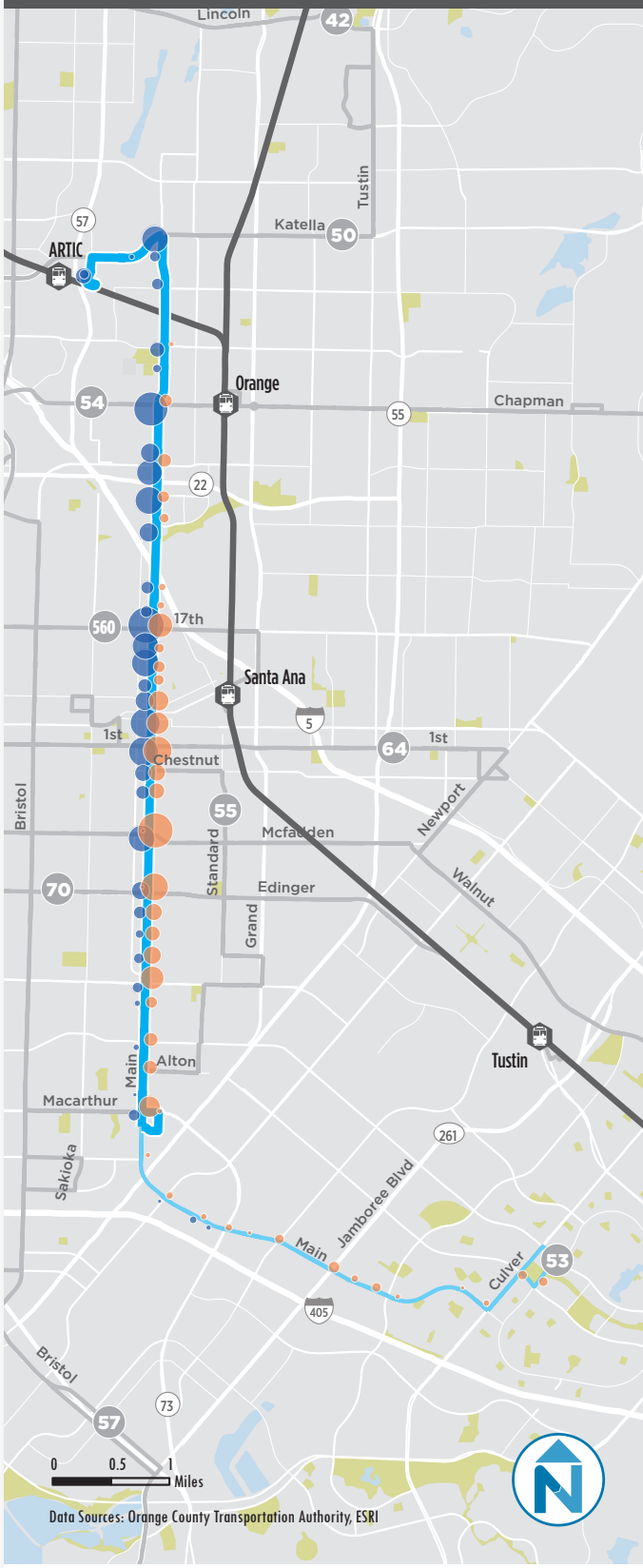
Strengths

Route 53 has the second best on-time performance of any Major Corridor and some of the highest all-day and weekend service levels, indicating a mature transit market.

Weaknesses

Average speed on Route 53 is the slowest of any Major Corridor, less than 12 miles per hour. Stop spacing is average, but could potentially be consolidated or operated with a limited stop overlay to improve travel times. In addition, weekday service ends before midnight, earlier than routes with similar ridership levels.

Route 53 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

Frequent Service (Every 15 minutes)

Less Frequent Service

No Longer in Service

Other Major Route

Metrolink

Station/Line

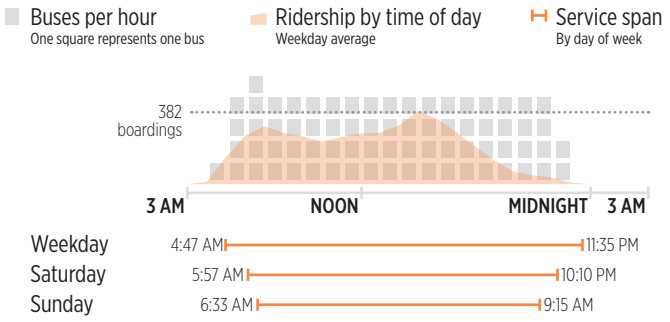
GARDEN GROVE TO ORANGE VIA CHAPMAN AVE

54

Service Patterns

Route 54 operates two patterns which alternate throughout the day. Half of trips start at Chapman Avenue/Valley View Street and end at Santiago Canyon College. The other half operate between Chapman Avanue/Beach Boulevard and Chapman Avenue/Rancho Santiago Boulevard only, providing service every 15 minutes in that segment on weekdays. On weekends service operates every 40 minutes from end-to-end.

Span and Frequency



Ridership

The short line pattern between Beach Boulevard and Rancho Santiago Boulevard is new as of June 2016 and is not reflected in the ridership data. Route 54 carries fewer riders than average for Major Corridors, just over 4,000 on weekdays, and has average productivity. In the westbound direction Santiago Canyon College and Chapman Avenue/Main Street are the highest ridership stops. In the eastbound direction Chapman Avenue/Beach Boulevard and Chapman Avenue/Main Street generate the most ridership.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	4,002	2,016	1,413
Revenue Hours	124	67	47
Productivity	32.2	30.3	29.8
Farebox Recovery	23.9%	22.0%	20.9%
On-Time Performance	91.2%	86.6%	92.6%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4	13.84	15	Excellent	Poor

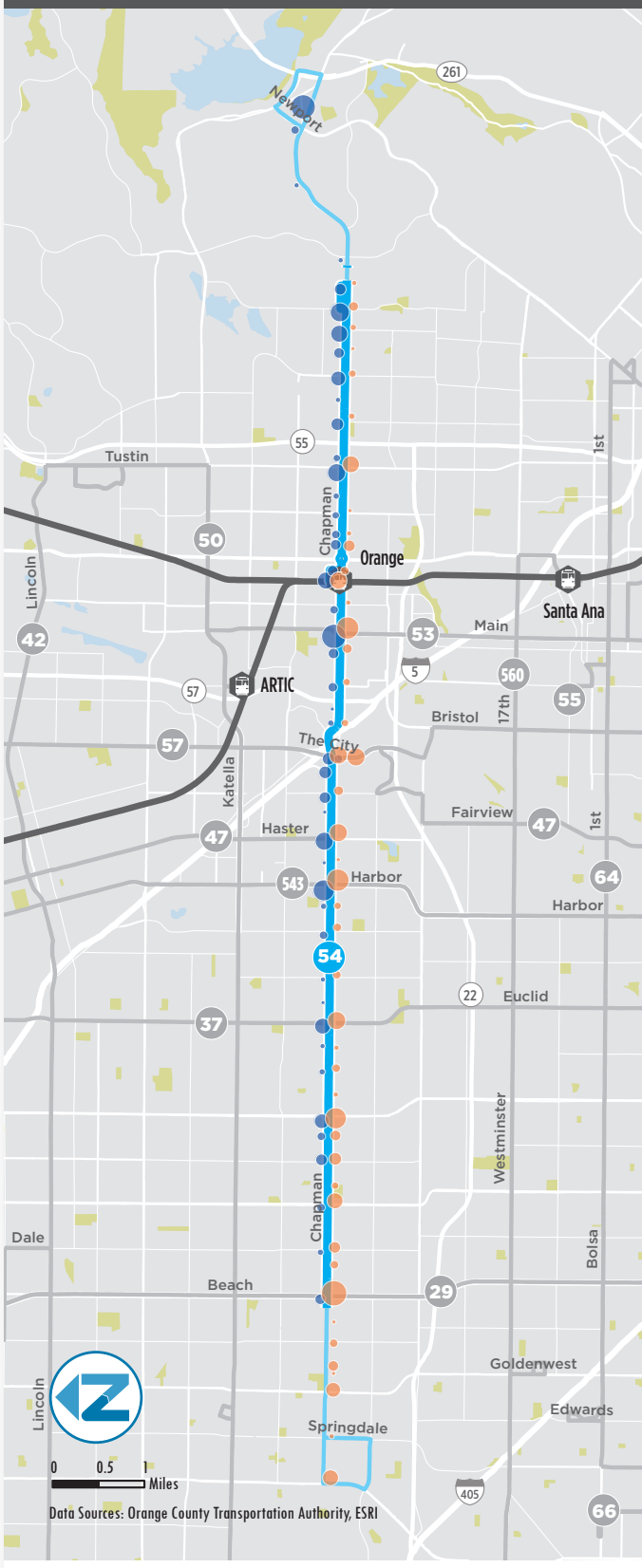
Strengths

Route 54 has the best on-time performance of any Major Corridor route with more than 90% of weekday trips arriving on-time. Though not yet reflected in the ridership data, all day 15 minute service will likely increase ridership.

Weaknesses

Weekend service operates every 40 minutes, significantly reducing the appeal of Route 54 service for those making trips outside of normal commute days.

Route 54 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound		Southbound
•	10	•
●	50	●
●	100	●

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

- Frequent Service (Every 15 minutes)
- Less Frequent Service
- No Longer in Service
- Other Major Route

Metrolink

- Station/Line

SANTA ANA TO NEWPORT BEACH VIA STANDARD AVE/BRISTOL ST/ FAIRVIEW ST/17TH ST

55

Service Patterns

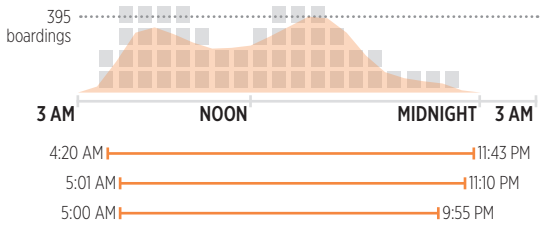
Route 55 operates a single service pattern between Santa Ana and Newport Beach with service every 15 minutes during peak periods and every 30 minutes at off-peak times and on weekends.

Span and Frequency

Buses per hour
One square represents one bus

Ridership by time of day
Weekday average

Service span
By day of week



Ridership

Route 55 carries below average ridership for Major Corridors and has the second lowest productivity, 24.8 boardings per hour. Ridership generators are focused at the intersections with other Major Routes, including Harbor Boulevard, Bristol Street, and Main Street.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	4,342	2,920	2,423
Revenue Hours	175	122	108
Productivity	24.8	23.9	22.4
Farebox Recovery	20.2%	20.0%	18.3%
On-Time Performance	87.2%	89.2%	90.6%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.7	12.75	15	Fair	Fair

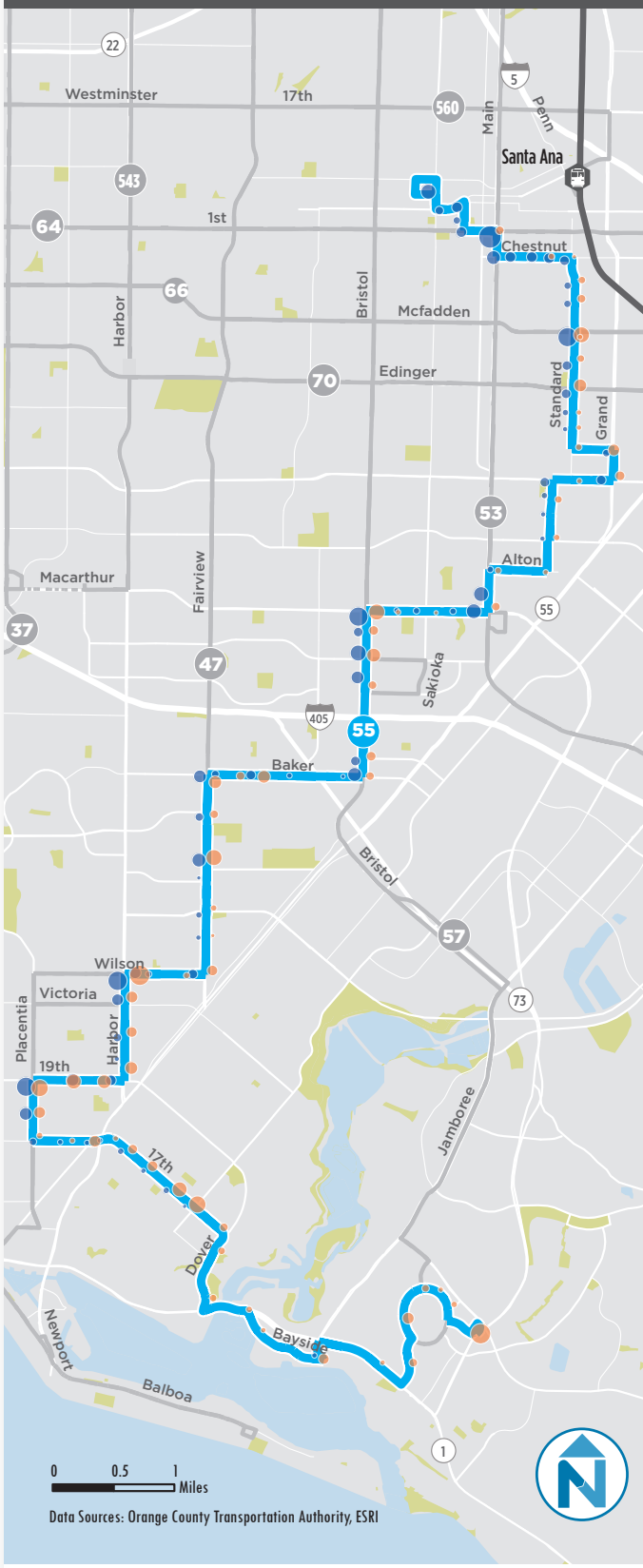
Strengths

Route 55 generally travels at an angle which, unlike most Major Corridors, may provide a one-seat ride to customers whose trips do not follow a single arterial.

Weaknesses

Compared to other Major Corridors, Route 55's alignment is complex with more than 20 turning movements in each direction. In addition, Route 55 service reduces to every 60 minutes by 7:00 p.m. which may be inconvenient for riders returning from retail jobs at Fashion Island, which typically end later in the day. Route 55's farebox recovery ratio is second lowest amonth Major Corridors.

Route 55 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

Frequent Service (Every 15 minutes)

Less Frequent Service

No Longer in Service

Other Major Route

Metrolink

Station/Line

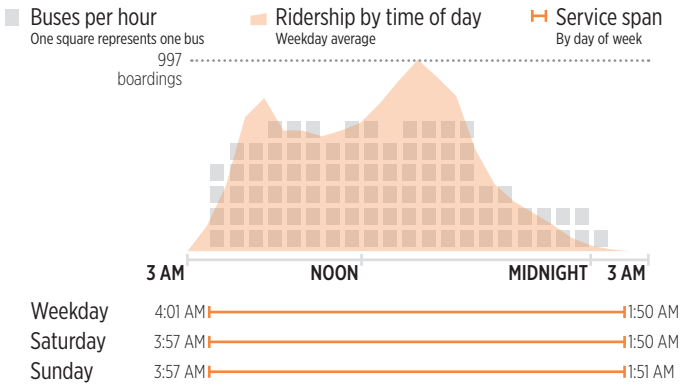
BREA TO NEWPORT BEACH
VIA STATE COLLEGE BLVD/BRISTOL ST

57

Service Patterns

Route 57 operates two service patterns. The first operates between Brea Mall and the Newport Transportation Center. Between State College Boulevard/Orangethorpe Avenue and Bristol Street/Sunflower Avenue this pattern operates as a limited stop Xpress service. The second pattern operates local service between State College Boulevard/Orangethorpe Avenue and Bristol Street/Sunflower Avenue, serving all stops. Xpress and local trips alternate between 6:00 a.m. and 6:00 p.m. on weekdays, providing 10-12 minute frequencies on the Xpress portion. On Sundays Route 57 alternates between both alignments, but serves all stops on all trips, providing 15 minute local service on the short-line segment.

Span and Frequency



Ridership

Route 57 carries more riders than any Major Corridor except for Bravo! Corridors and has above average productivity. Stops served by the Xpress trips have significantly more ridership than those served by local service. Route 57 generates 665 daily boardings at the southbound stop at Bristol Street/17th Street the highest ridership stop in the OC Bus system. Southbound stops at Bristol Street/McFadden Avenue, Bristol Street/1st Street and the northbound stop at Bristol Street/17th Street all generate more than 400 boardings per weekday.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	11,067	7,330	5,898
Revenue Hours	309	219	203
Productivity	35.8	33.4	29.1
Farebox Recovery	27.8%	25.6%	21.9%
On-Time Performance	84.8%	86.4%	88.5%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4	13.84	15	Excellent	Poor

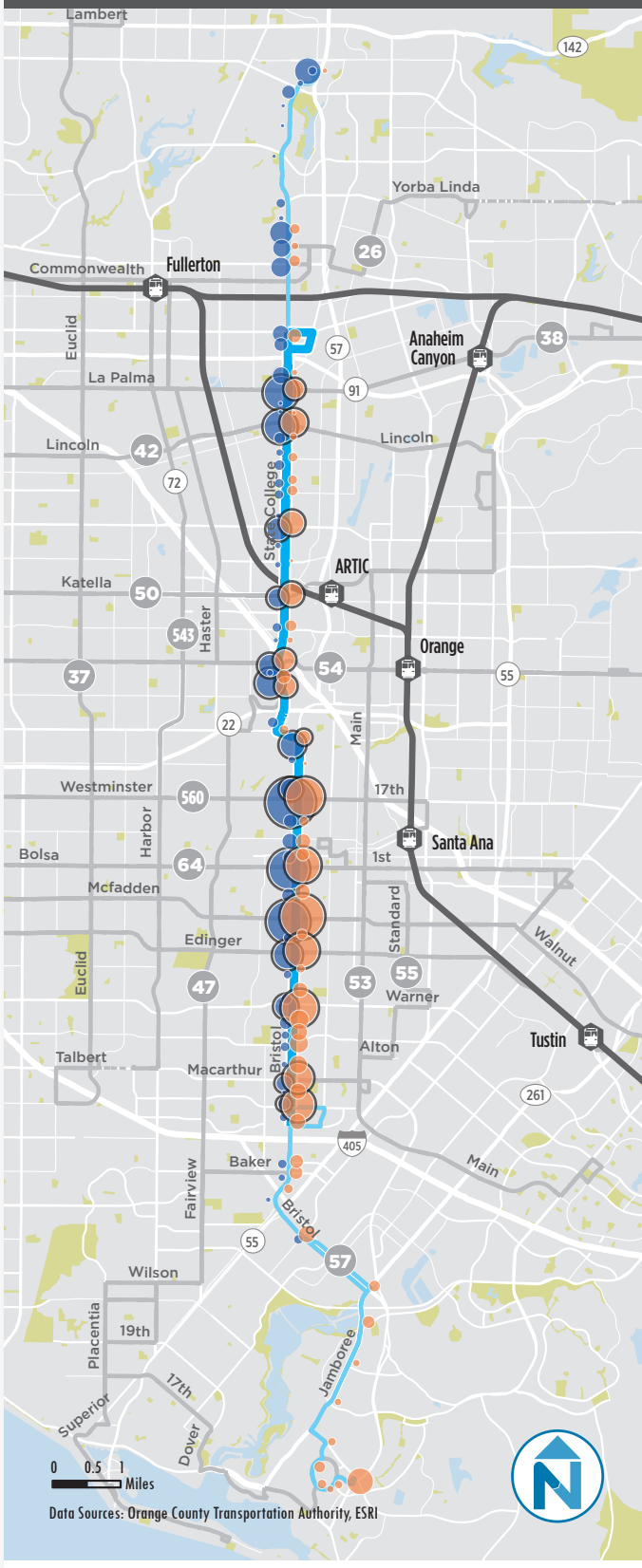
Strengths

The Xpress overlay on Route 57 provides improved travel times for riders traveling longer distances to major stops. Ridership patterns show that, though wider stop spacing on the Xpress pattern may require longer walk distances, the faster travel time is a worthwhile tradeoff.

Weaknesses

The Xpress pattern stops operating at 6:00 p.m., which may be earlier than many commuters leave work. Extending the Xpress span may improve travel times for more customers.

Route 57 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

Bravo/Xpress

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

Frequent Service (Every 15 minutes)

Less Frequent Service

No Longer in Service

Other Major Route

Metrolink

Station/Line

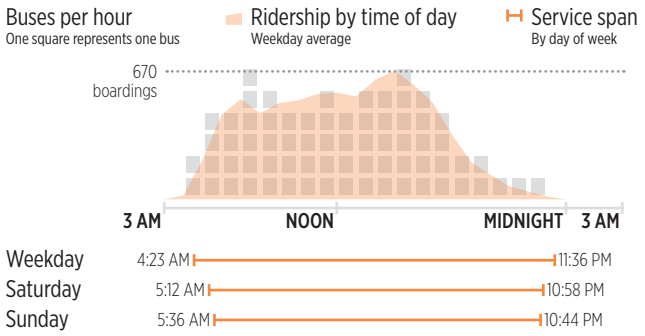
HUNTINGTON BEACH TO TUSTIN VIA BOLSA AVE/1ST ST

64

Service Patterns

Route 64 operates alternating local service and limited stop Xpress service between Bolsa Avenue/Edwards Street and Larwin Square every 10 to 15 minutes on weekdays. Early morning service operates locally and starts at Westminster Mall. In the morning and afternoon peak period, trips extend west to the Boeing Campus in Huntington Beach roughly every hour. Weekend service operate every 15 minutes between Edwards Street and Larwin Square.

Span and Frequency



Ridership

Route 64x carries 7,484 boardings per day and is the most productive route in the system carrying 46.4 boardings per hour. Stios at Main Street, Harbor Boulevard, and Bristol Street each have bidirectional boardings of more than 600 riders per weekday, likely associated with transfers to Major Corridors.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	7,484	5,386	4,433
Revenue Hours	161	150	129
Productivity	46.4	35.9	34.4
Farebox Recovery	33.4%	25.8%	23.6%
On-Time Performance	85.7%	90.6%	83.4%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.1	12.46	10	Excellent	Excellent

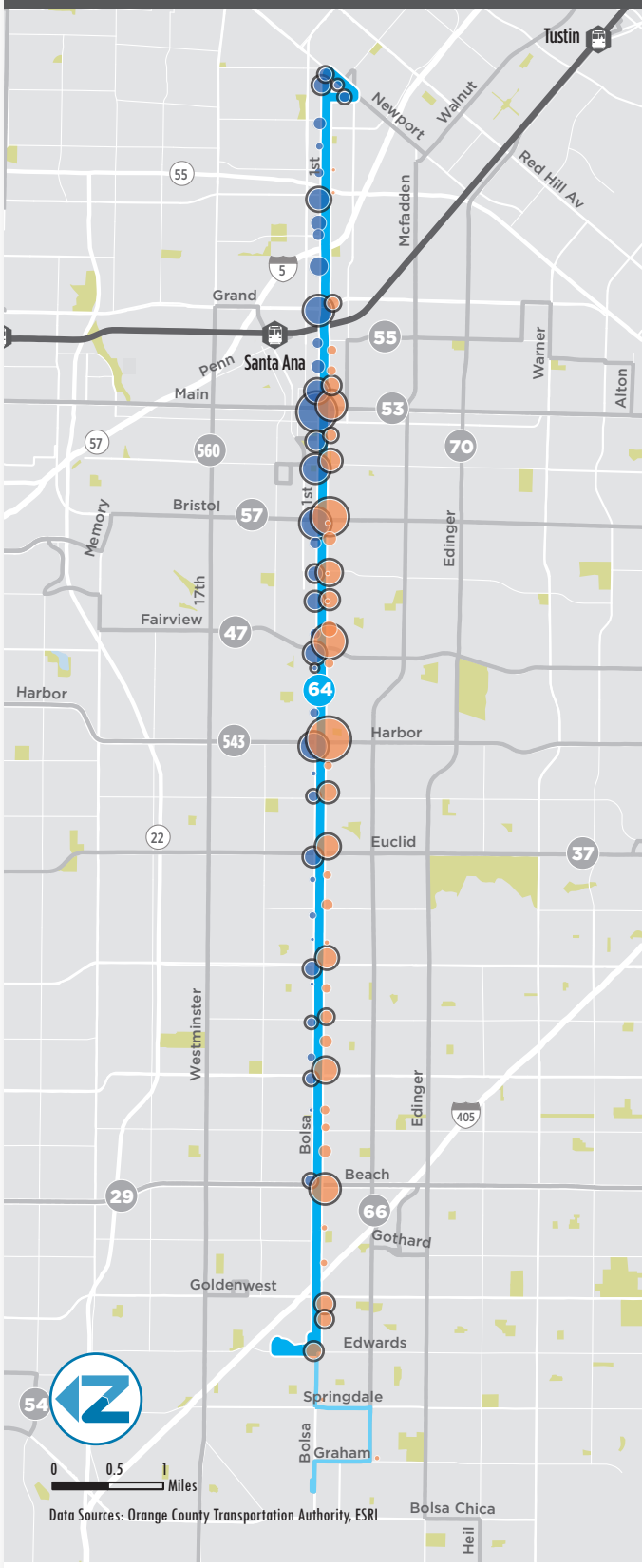
Strengths

High levels of productivity on Route 64 indicates that the rider market could support additional service. Average stop spacing on the Xpress overlay is roughly twice as wide as the local service, providing faster travel time for riders and making the service more attractive.

Weaknesses

Service levels on Route 64 are consistently high until 6:00 p.m. when the Xpress pattern stops operating and service drops to every 30 minutes. Extending the span of the Xpress pattern may make the service more convenient for commuters whose shifts end later in the evening.

Route 64 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

Bravo/Xpress

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

Frequent Service (Every 15 minutes)

Less Frequent Service

No Longer in Service

Other Major Route

Metrolink

Station/Line

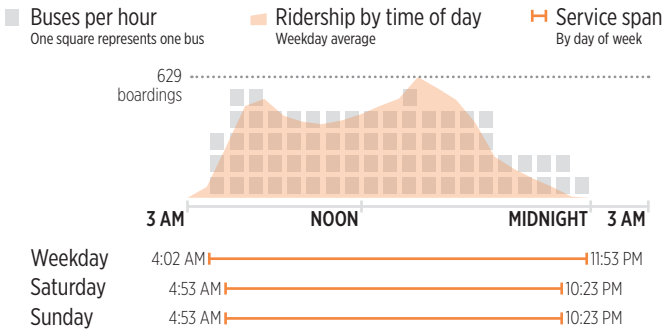
HUNTINGTON BEACH TO IRVINE VIA MCFADDEN AVE/WALNUT AVE

66

Service Patterns

Route 66 operates two alternating service patterns throughout the day and a third at peak times. Half of trips operate between Goldenwest Transportation Center and Irvine Valley College and half of trips operate between Goldenwest Transportation Center and Larwin Square in Tustin. Service operates every 12-15 minutes between Goldenwest Transportation Center and McFadden Avenue/Grand Avenue throughout the day. In the morning and afternoon/evening Route 66 extends west to the Boeing campus on Bolsa Avenue in Huntington Beach roughly every hour. Combined with Route 64, there is service every 20-30 minutes during peak times to Boeing. On weekends Route 66 operates 20 minute service between Goldenwest Transportation Center and Mcfadden Avenue/Grand Avenue with two out of three trips serving Larwin Square and hourly service to Irvine Valley College.

Span and Frequency



Ridership

Route 66 carries almost 7,000 passengers per weekday and has the second highest productivity of any route, 38.7 boardings per hour. Ridership is highest between Harbor Boulevard and Walnut Avenue, with the stops at Bristol Street generating more than 800 passengers per day in both directions.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	6,974	4,865	4,224
Revenue Hours	180	115	118
Productivity	38.7	42.4	35.9
Farebox Recovery	30.4%	30.9%	26.8%
On-Time Performance	89.8%	86.3%	91.6%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.7	12.81	15	Excellent	Excellent

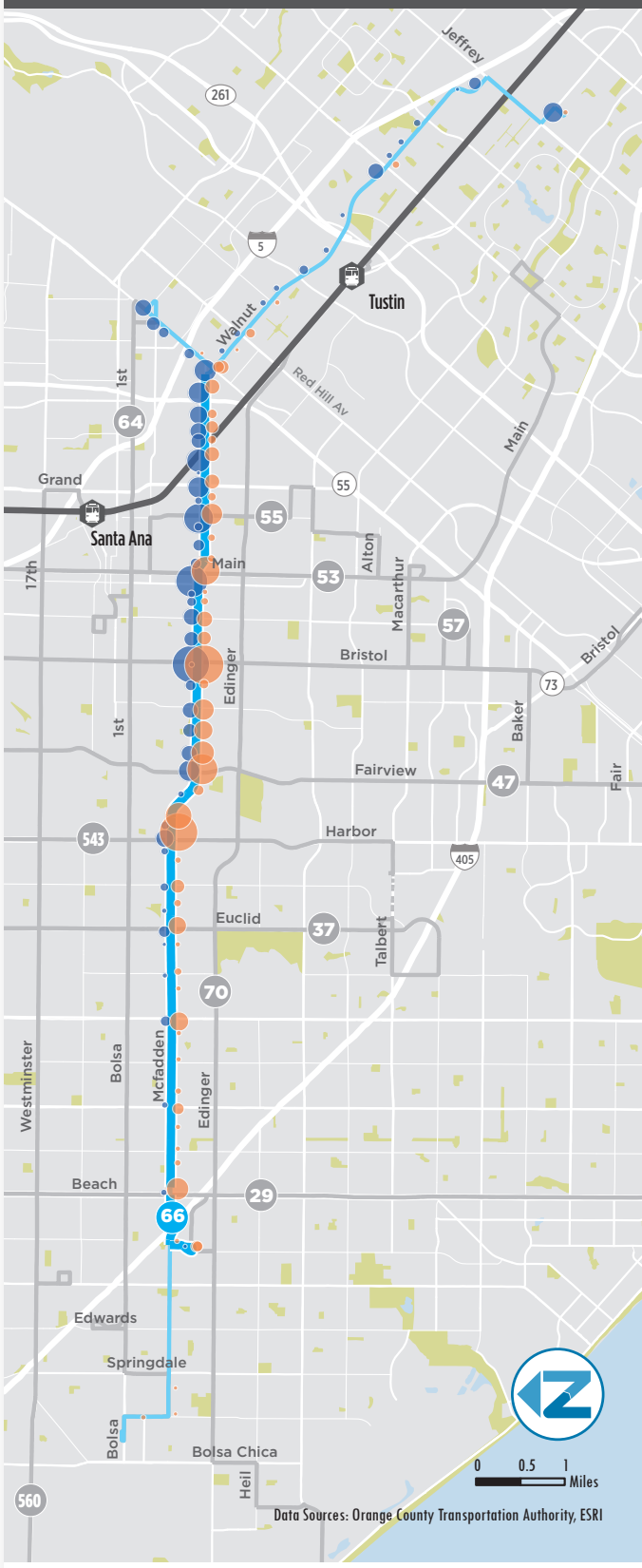
Strengths

Route 66 has a high level of service throughout the day and on weekends and has almost 90% on-time performance, providing a consistent and reliable service for customers. In addition, the high productivity of this routes indicates that it could potentially support increased levels of service in the trunk segment of the route.

Weaknesses

Less frequent segments serving Boeing, Larwin Square, and Irvine Valley College generate lower levels of ridership compared to the trunk of the route.

Route 66 Weekday Boardings



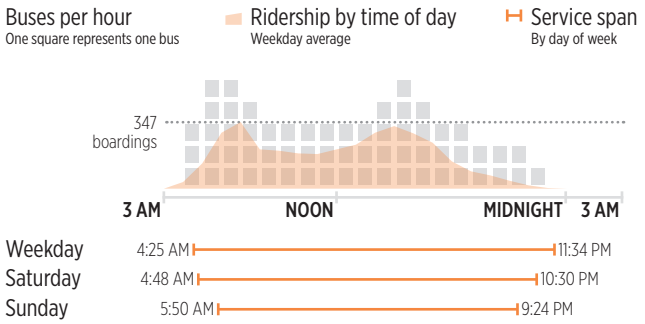
SUNSET BEACH TO TUSTIN VIA EDINGER AVE

70

Service Patterns

Route 70 operates between the Goldenwest Transportation Center and Tustin Metrolink Station every 15 minutes during peak periods and every 20 minutes during midday. On an hourly basis trips extend west to Warner Avenue/Pacific Coast Highway. Saturday and Sunday service operates every 20 and 30 minutes, respectively, with the Warner Avenue/Pacific Coast Highway extension served on half of trips.

Span and Frequency



Ridership

Route 70 has below average ridership and productivity compared to other Major Routes. Ridership is consistently higher east of Harbor Boulevard and matches service levels throughout the day, with higher ridership in the peak periods.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	3,516	2,276	1,525
Revenue Hours	129	103	63
Productivity	27.2	22.0	24.2
Farebox Recovery	20.5%	16.1%	16.9%
On-Time Performance	87.2%	87.0%	87.3%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.2	15.22	15	Good	Fair

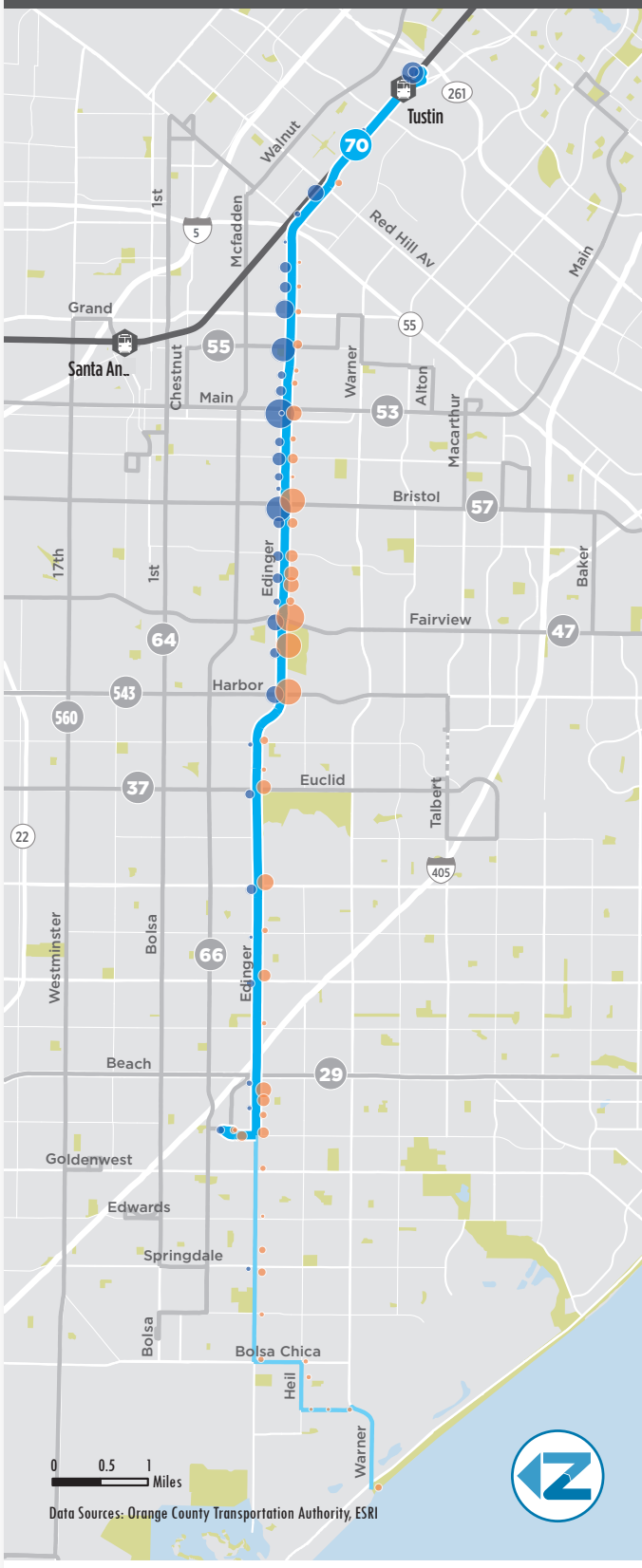
Strengths

Route 70 has the highest average speed of all surface-running Major Corridors and good on-time performance.

Weaknesses

The hourly extension to Pacific Coast Highway generates lower levels of ridership and reduces Route 70's productivity.

Route 70 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

Frequent Service (Every 15 minutes)

Less Frequent Service

No Longer in Service

Other Major Route

Metrolink

Station/Line

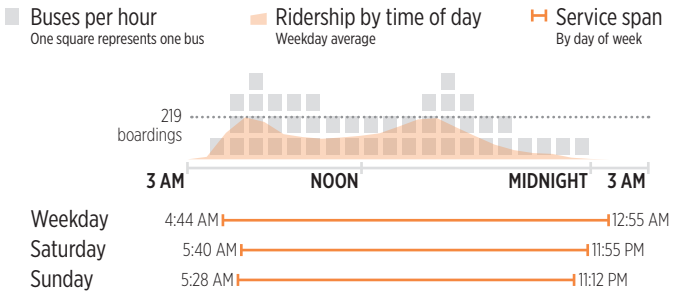
ANAHEIM TO LAGUNA HILLS VIA 5 FWY/MAIN ST

83

Service Patterns

Route 83 operates between Laguna Hills Transportation Center and Disneyland using a combination of surface streets and the 5 Freeway. During peak times Route 83 operates a short-line pattern between the Orange County Civic Center in Santa Ana and Laguna Hills Transportation Center, providing service every 20-30 minutes in that segment. At off-peak times and on weekends Route 83 operates every 35-40 minutes.

Span and Frequency



Ridership

Route 83 has the second lowest ridership and is the least productive of the Major Corridors. In the northbound direction ridership is highest at the Laguna Hills Transportation Center and the stop at El Toro Road/Paseo De Valencia (likely due to commuters parking in nearby surface lots when the Laguna Hills Transportation Center is full). In the southbound direction ridership is highest at Disneyland.

Performance

Indicator	Weekday	Saturday	Sunday
Daily Boardings	2,366	1,466	1,003
Revenue Hours	106	77	54
Productivity	22.3	19.1	18.7
Farebox Recovery	14.6%	12.9%	12.7%
On-Time Performance	84.9%	82.0%	84.8%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
1.9	20.99	15	Poor	Poor

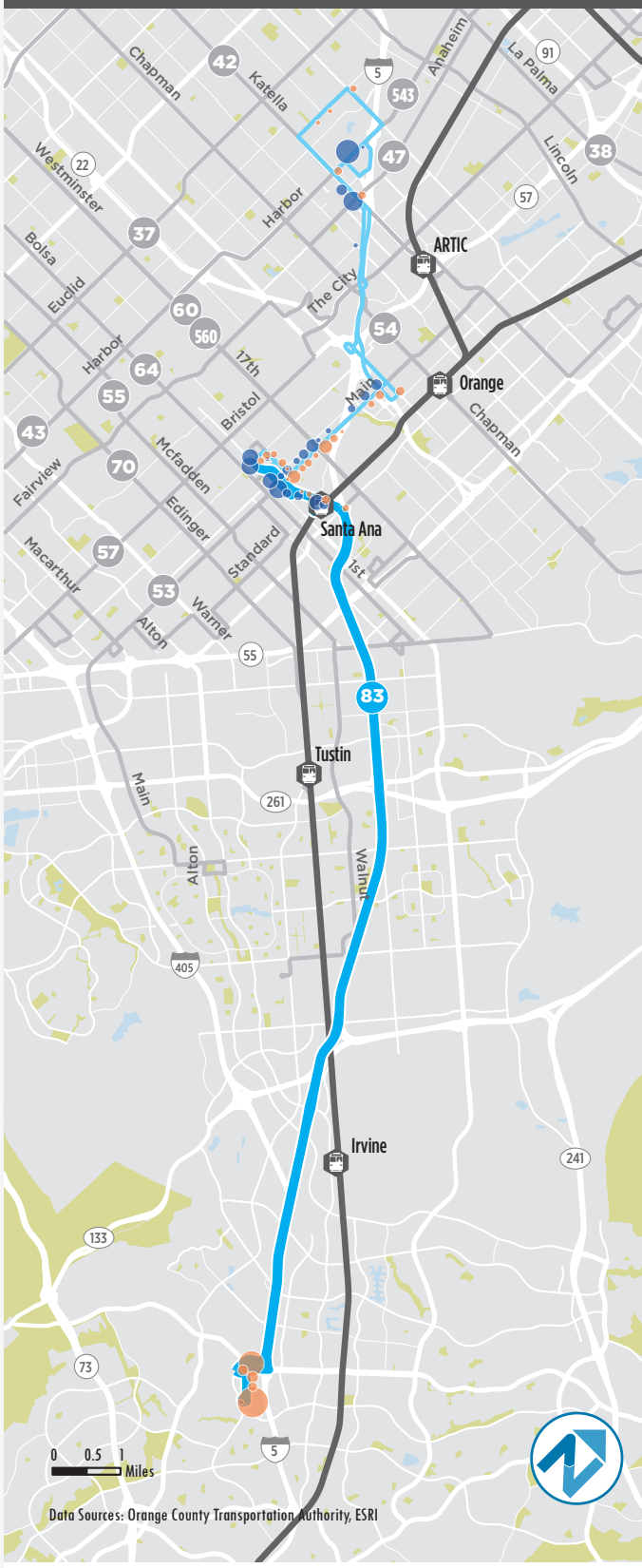
Strengths

Due to operating a long segment on the freeway, Route 83 operates at higher average speeds than any other Major Corridor. In addition, the route is anchored by two major destinations on the north end, the Orange County Civic Center and Disneyland, which have the potential to draw commuters and visitors from south Orange County.

Weaknesses

Route 83 is a hybrid between local and express service, which serves a distinct market of commuters but lacks all-day frequency and consistent stop spacing of more productive major corridors. With the majority of the alignment operated closed-door on the freeway there is a limited draw area for riders.

Route 83 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

- Frequent Service (Every 15 minutes)
- Less Frequent Service
- No Longer in Service
- Other Major Route

Metrolink

- Station/Line

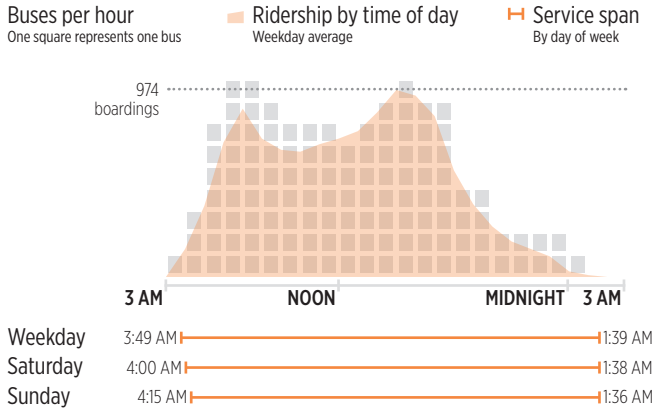
FULLERTON TO COSTA MESA VIA HARBOR BLVD

43/543

Service Patterns

Route 43 and Bravo! 543 both operate in the Harbor Boulevard corridor, providing combined frequency of every 7-8 minutes between 6:00 a.m. and 6:00 p.m. Local Route 43 operates between Harbor Boulevard/Bernard in Costa Mesa and the North Justice Center in Fullerton. Bravo! 543 operates a shorter alignment with wider stop spacing between Harbor Boulevard/MacArthur Boulevard and the Fullerton Transportation Center. Both routes operate every 20 minutes on weekends, providing combined frequency of 10 minutes.

Span and Frequency



Ridership

Combined, Route 43 and 543 carry 11,576 riders on weekdays, second only to Route 60/560. Productivity of 43 is slightly higher than 543. Ridership at stops served by Bravo! Is notably higher than those only served by Route 43.

Performance

	43			543		
Indicator	Weekday	Saturday	Sunday	Weekday	Saturday	Sunday
Daily Boardings	7,417	5,449	4,367	4,159	2,341	1,986
Revenue Hours	202	166	141	124	76	73
Productivity	36.6	32.9	30.9	33.5	30.9	27.2
Farebox Recovery	29.4%	25.4%	23.4%	24.3%	23.0%	19.5%
On-Time Performance	81.1%	75.7%	80.0%	82.3%	76.5%	83.7%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
4.2	15.22	15	Good	Fair

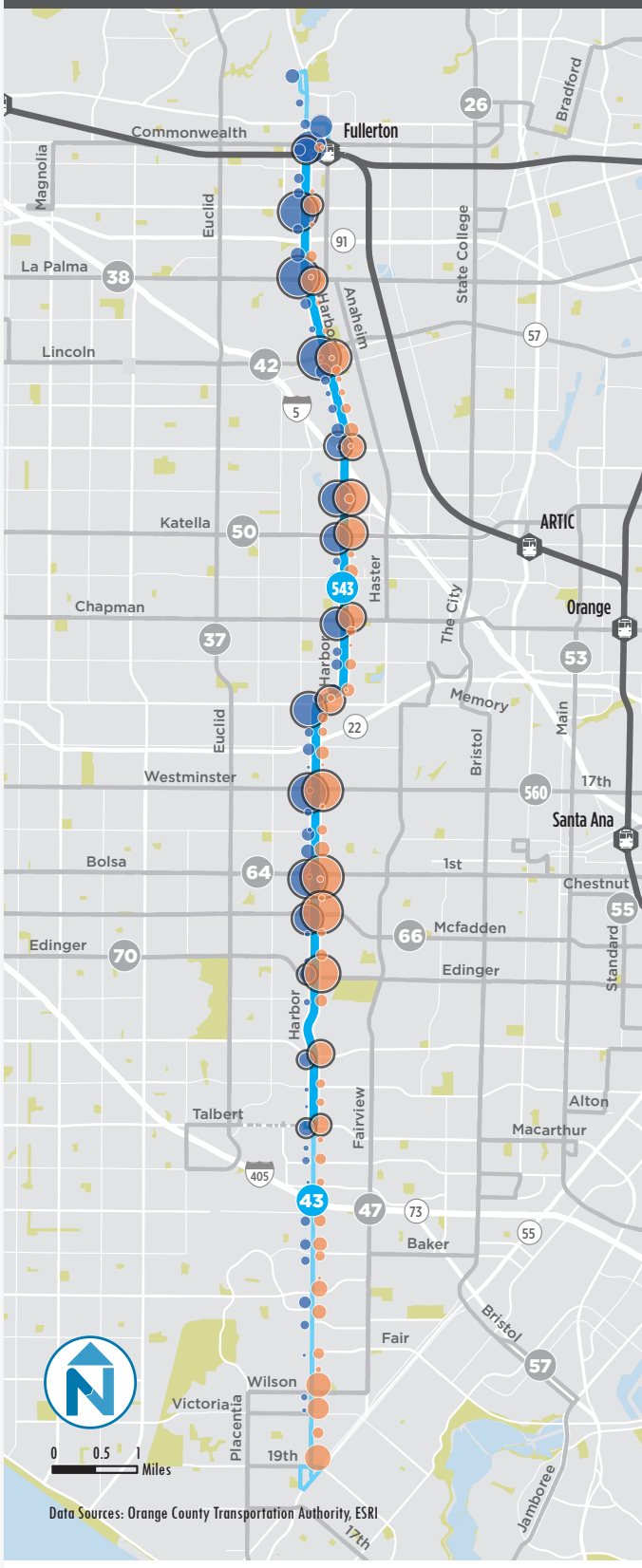
Strengths

The Harbor Boulevard Corridor has consistently high ridership in the Bravo! Segment and serves as a primary north-south spine moving passengers in north Orange County. Limited stop spacing on Bravo! provides 20% faster travel times on average.

Weaknesses

Bravo! service reduces to hourly at 6:00 p.m. and stops after 7:00 p.m., limiting access to the service for commuters whose shifts end later in the evening. Route 43 has the worst on-time performance of any Major Corridor and Route 543 on-time performance is also below average, potentially impacting the reliability of the service for riders.

Route 43/543 Weekday Boardings



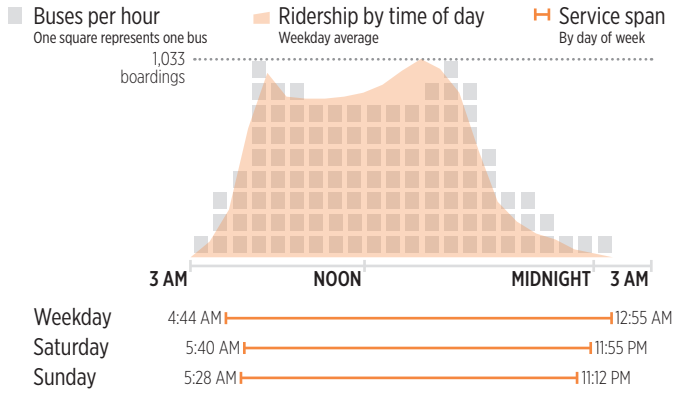
LONG BEACH TO TUSTIN VIA WESTMINSTER AVE/17TH ST

60/560

Service Patterns

Route 60 and Bravo! 560 serve the Westminster/17th corridor, providing alternating local and limited stop service every 7-9 minutes between the Santa Ana Regional Transportation Center and Westminster Boulevard/Goldenwest Street between 6:00 a.m. and 6:00 p.m. on weekdays. Route 60 operates further east, providing 20 minute service to Larwin Square throughout the day. Every other Bravo! trip serves CSU Long Beach, providing 30 minute service on weekdays. When Bravo! is not operating (early mornings, evenings, and weekends), Route 60 serves CSU Long Beach. On weekdends Route 60 operates local only service every 15 minutes.

Span and Frequency



Ridership

Route 60 and Bravo! 560 combined carry more passengers than any other corridor, 12,196 on average. Route 560 is a new service as of June 2016, and is not reflected in stop-level ridership data, however stops that are now served by Bravo! are those that generated the most ridership prior to implementation of Route 560.

Performance

	60			560
Indicator	Weekday	Saturday	Sunday	Weekday
Daily Boardings	9,460	5,891	4,447	2,735
Revenue Hours	260	170	150	134
Productivity	36.4	34.6	29.7	20.4
Farebox Recovery	25.4%	23.5%	18.9%	13.6%
On-Time Performance	88.8%	87.0%	88.3%	87.3%

Service Design

Stops per Mile	Average Speed (MPH)	Peak Headway	Off-Peak Service Levels	Saturday Service Levels
1.9	20.99	15	Poor	Poor

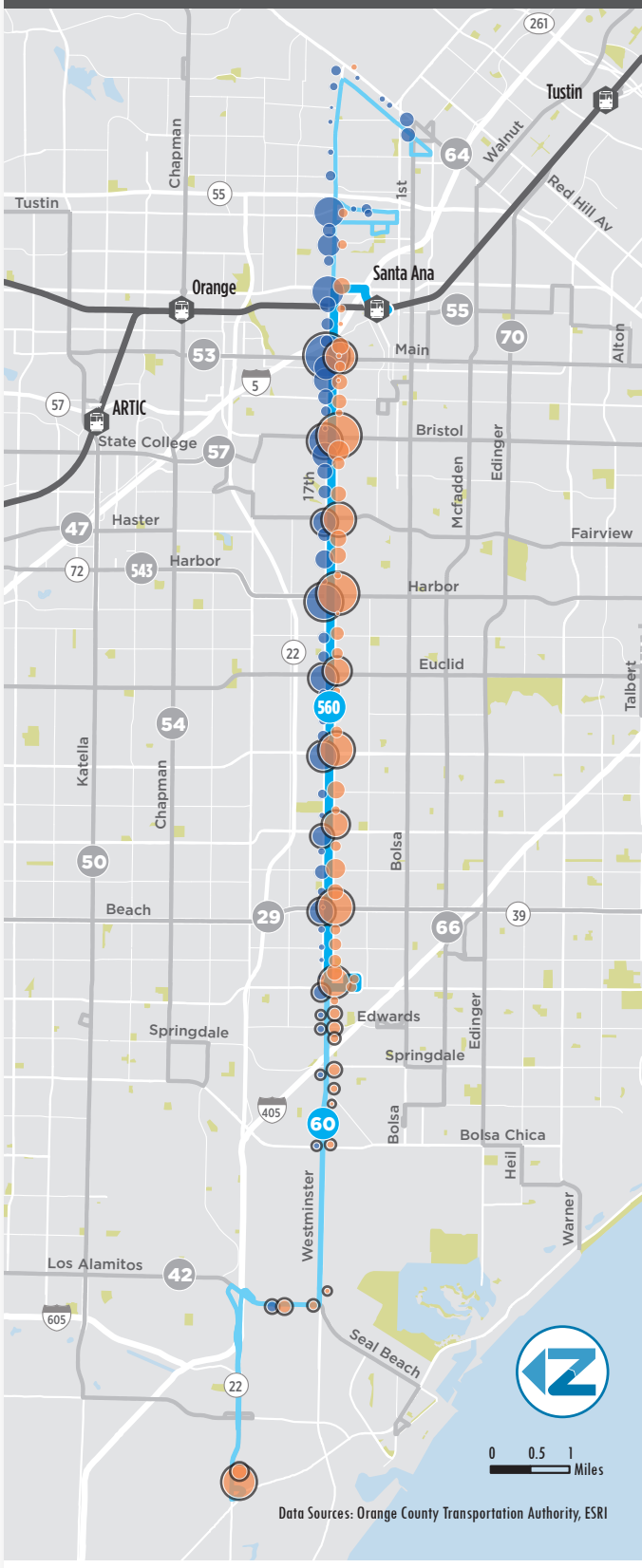
Strengths

Route 60 and Bravo! 560 serve as a major spine for the network, providing quality and frequent connections for passengers traveling east-west. Though not yet reflected in the ridership data, the introduction of Bravo! Service to this corridor marks a major expansion of enhanced service provided by OC Bus.

Weaknesses

Unlike Bravo! 543, Bravo! 560 does not operate on weekends. Though Route 60 provides a high level of service on weekdays, faster service provided by Bravo! on weekends may be warranted.

Route 60/560 Weekday Boardings



Average Daily Boardings by Bus Stop, March 2016*

Northbound Southbound

10

50

100

Bravo/Xpress

(proportionately sized)

*for stops with five or more average daily boardings

Transit

Major Bus Routes

Frequent Service (Every 15 minutes)

Less Frequent Service

No Longer in Service

Other Major Route

Metrolink

Station/Line