TRANSPORTATION SYSTEM

TRANSIT

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

2016 2040 RTPSCS

APPENDIX

ADOPTED | APRIL 2016

2016 2040 RTPSCS

APPENDIX

TRANSPORTATION SYSTEM | TRANSIT

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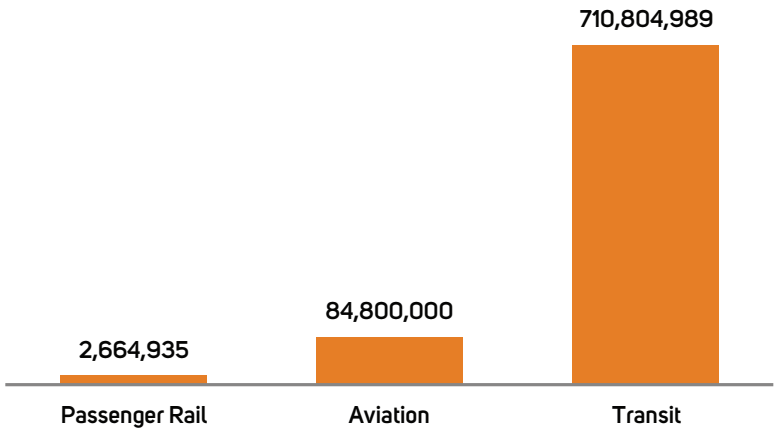
TRANSIT

OVERVIEW AND DESCRIPTION

The transit system in the six-county Southern California region is comprised of an extensive network of services provided by dozens of operators. The network includes fixed-route local bus, community circulators, express bus, bus rapid transit (BRT), demand response, commuter rail, heavy rail and light rail. The combined regional transit network provides the second largest number of service hours in the country, after that of the New York City metropolitan area.

While Southern California has a national reputation for auto-centricity, our region has an extensive transit network. According to the Public Transportation Fact Book from the American Public Transportation Authority (APTA), the Los Angeles-Long Beach-Santa Ana Urbanized Statistical Area (UZA) ranked number two nationally in several important measures. The Los Angeles County Metropolitan Transportation Authority (Metro) is the fifth largest operator nationally, when ranked in terms of service hours. Eight other properties, The City of Santa Monica's Big Blue Bus, Orange County Transportation Authority (OCTA), Access Services Incorporated (ASI), Foothill Transit, City of Los Angeles Department of Transportation (LADOT), Riverside Transit Agency (RTA), Omnitrans and Long Beach Transit (LBT) rank among the 100 largest properties nationally.[1]

FIGURE 1 Passenger Transportation–FY 2011 Annual Trips



Source: NTD, Amtrak, SCAG Aviation Department

Southern California's transit network is also its largest non-automotive passenger transportation mode by trip volume, by a huge degree. Transit riders took more than eight times as many trips as air travelers in FY 2011-2012, and nearly 267 times as many trips as passenger rail travelers. See **FIGURE 1**.

PUBLIC TRANSPORTATION MODES IN THE SCAG REGION

The five transit modes in the SCAG region, as they are considered in this analysis and as they are defined by the National Transit Database (NTD):

1. **Fixed Route Bus Service:** Referred to as Motor Bus and defined as " A transit mode comprised of rubber-tired passenger vehicles operating on fixed routes and schedules over roadways. " Most transit service in the SCAG Region is provided via this mode.
2. **Demand Response:** Defined as "a transit mode comprised of passenger cars, vans, or small buses operating in response to calls from passengers or their agents to the transit operator, who then dispatches a vehicle to pick up the passengers and transport them to their destinations." Access Services and OCTA Access are examples of this mode in the SCAG Region.
3. **Light Rail:** Defined as "a transit mode that typically is an electric railway with a light volume traffic capacity compared to heavy rail. It is characterized by passenger rail cars operating on fixed rails in shared or exclusive right-of-way (ROW) and vehicle power drawn from an overhead electric line via a trolley or a pantograph." The Metro Blue, Green, Gold and Expo lines are examples of this mode in the SCAG Region.
4. **Heavy Rail:** Defined as "a transit mode that is an electric railway with the capacity for a heavy volume of traffic. It is characterized by separate ROWs from which all other vehicular and foot traffic are excluded and high speed and rapid acceleration passenger rail cars operating singly or in multi-car trains on fixed rails." The Metro Red and Purple Lines are examples of this mode in the SCAG Region.
5. **Commuter Rail:** Defined as a transit mode that is an electric or diesel propelled railway for urban passenger train service consisting of local short distance travel operating between a central city and adjacent suburbs. Service must be operated on a regular basis by or under contract with a transit operator for the purpose of transporting passengers within UZAs, or between urbanized areas and outlying areas." Discussion of this mode is included in the Passenger Rail Appendix. Metrolink is an example of this mode in the SCAG Region.

TRANSIT GOVERNANCE AND SERVICE AREAS

SCAG is the largest Metropolitan Planning Organization in the United States, consisting of about 38,000 square miles and bounded by Mexico, the Pacific Ocean, Arizona and Nevada, in addition to Kern, San Diego and Santa Barbara counties. The region is home to about 18 million residents and contains 15 urbanized areas (UZAs), as designated by the United States Census Bureau.[2] See **TABLE 1**.

Each of the counties in the SCAG region is served by a state designated county transportation commission, created pursuant to California Public Utilities Code Section 130050. These entities were created to further the goal of local control over the transportation planning and are key partners in creating the vision for the 2016 RTP/SCS:

- The Imperial County Transportation Commission (ICTC)
- The Los Angeles County Metropolitan Transportation Authority (Metro)
- The Orange County Transportation Authority (OCTA)
- The Riverside County Transportation Commission (RCTC)
- The San Bernardino Associated Governments (SANBAG)
- The Ventura County Transportation Commission (VCTC)

These commissions play an important role in selecting transit projects for inclusion in the RTP, apportioning local, state and federal transit funds among the various transit properties and guiding the local vision for public transportation in their respective counties. The commissions help to build local support and consensus for projects in the long range and implement projects in the short range.

The SCAG Region is also divided into 15 subregional units, represented by subregional Councils of Government. Two subregions, ICTC and SANBAG, are also county transportation commissions. See **TABLE 2**.

Currently, there are 68 fixed route transit operators in the region and over 100 providers of various specialized services, including community circulators, ferries, dial-a-rides, Americans with Disabilities Act (ADA) mandated paratransit and specialized services operating beyond the ADA.

These agencies are administered through a wide variety of governance structures. The three most significant types are wholly owned municipal transit properties (both fixed route and demand response), joint powers structures and four county transportation commissions who also operate transit service. Two of the commissions, Metro and OCTA, are also designated as transit districts by the State of California. VCTC and ICTC also operate transit service.

TABLE 1 Urbanized Areas (UZAs) within the SCAG Region

Los Angeles-Long Beach-Anaheim, CA	Santa Clarita, CA
Riverside-San Bernardino, CA	Thousand Oaks, CA
Indio-Cathedral City, CA	Victorville-Hesperia, CA
Lancaster-Palmdale, CA	Camarillo, CA
Mission Viejo-Lake Forest-San Clemente, CA*	El Centro-Calexico, CA
Murrieta-Temecula-Menifee, CA	Hemet, CA
Oxnard, CA	Simi Valley, CA
Yuma, AZ-CA*	*Bi-regional/ Bi-state urbanized areas

Source: Census 2010

TABLE 2 Subregions of the SCAG Region

Arroyo Verdugo Subregion	San Bernardino Associated Governments (SANBAG)
City of Los Angeles	San Gabriel Valley Council of Governments (SGVCOG)
Coachella Valley Association of Governments (CVAG)	San Fernando Valley Council of Governments (SFVCOG)
Gateway Cities Council of Governments (GCCOG)	South Bay Cities Council of Governments (SBCCOG)
Imperial County Transportation Commission (ICTC)	Ventura Council of Governments (VCOG)
Las Virgenes-Malibu Council of Governments	Western Riverside Council of Governments (WRCOG)
North Los Angeles County	Westside Cities Council of Governments (WCCOG)
Orange County Council of Governments (OCCOG)	

Source: Census 2010

Seven Joint Powers Authority (JPA) operators provide fixed route bus service at a subregional scale through multiple jurisdictions. These include the Antelope Valley Transit Authority (AVTA), Foothill Transit, Gold Coast Transit, Omnitrans, Riverside Transit Agency (RTA), SunLine Transit Agency and Victor Valley Transit Authority (VVTA). Additionally, the Southern California Regional Rail Authority operates commuter rail service under the Metrolink service brand at a regional scale.

IMPERIAL COUNTY

Within Imperial County, the bulk of service is operated by Imperial Valley Transit (IVT), a service brand of the ICTC. IVT currently operates service between municipalities in the Imperial Valley and is establishing a series of local circulators. The services are a mix of small urban and rural transit services. Circulator services are also historically provided within the City of Calexico by the Calexico Transit System.

In addition, the Yuma County Intergovernmental Public Transportation Authority (YCIPTA) provides local services in the Yuma AZ-CA UZA under the Yuma County Area Transit service brand, including the community of Winterhaven and Quechan Tribal Lands in the SCAG Region. YCIPTA also provides an express service between Yuma and El Centro on Mondays, Wednesdays and Saturdays. See **EXHIBIT 1**.

LOS ANGELES COUNTY

Los Angeles County is one of the most robust transit markets in the nation. The Los Angeles-Long Beach-Anaheim CA UZA, composed primarily of Los Angeles and Orange Counties, provided the second largest share of transit trips, service hours and service miles of all UZAs nationally in FY 2011-2012. Agencies in the Los Angeles-Long Beach-Anaheim CA UZA also provided the third largest total of passenger miles travelled nationally. Given the size and productivity of transit service in Los Angeles County, it's no surprise that transit service provision is extraordinarily complex.

Transit service in LA County can be divided into three categories—Metro service, the LA County Municipal Operators and local and specialized providers:

- **METRO:** Metro is typically the 3rd or 4th largest provider of transit trips in the U.S. in any given year and provides the vast bulk of all transit trips in the SCAG Region. Their service area includes the portions of Los Angeles County south of the Angeles National Forest. Metro operates multiple transit modes, including light rail, heavy rail, bus rapid transit and fixed route bus services. In cities or subregions where there are local operators, Metro often operates trunk routes and serves long distance markets. Metro funds Metrolink service in LA County. Metro is a designated transit district per Chapter 4, Article 1, Section 99213 of the California Public Utilities Code.[3]
- **LA County Municipal Operators:** The municipal operators of transit, called the 'Munis,' consist of thirteen municipal transit properties and two joint powers operators. These operators are designated as eligible recipients of federal formula funds via Chapter 4, Article 1, Section 99207.5 of the California Public Utilities Code. Most offer fixed route services between jurisdictions, though the municipal operators service areas tend to be centered around the jurisdiction that owns them. In most cases, these operators provide the bulk of local trips within their service area while Metro service is overlaid to support longer distance trips.[4] Some of the Munis have fairly small service areas, such as Beach Cities or Culver City Transit. Others, including Long Beach Transit and Foothill Transit, have very large service areas. Foothill is a JPA operator serving as the primary fixed route operator in the San Gabriel Valley, an LA County subregion with two million residents. AVTA is a JPA and the sole provider of fixed route bus service in the Lancaster-Palmdale UZA. See **TABLE 3**.
- **Specialized and Local Operators:** Local circulator and demand response services are provided by a variety of transit properties throughout LA County. Access Services of Los Angeles, Incorporated, is the largest provider of ADA paratransit trips in the county and provides some or all complimentary ADA paratransit service for Metro and various municipal bus operators. ASI's service area includes the entire county and they are unique in that respect. Similarly, the Pomona Valley Transit Authority is a JPA providing demand response service in eastern Los Angeles County. More localized providers are referred to as the "local operators." They are typically municipally owned and provide demand response or circulator services within jurisdictional boundaries. These operators are represented in the planning process via Metro's Local Transportation Systems Subcommittee (LTSS) of the Technical Advisory Committee.

The American Public Transportation Authority's (APTA) 2013 Public Transportation Fact Book illustrates the size and complexity of the transit system in Los Angeles County. In FY 2011-2012, Metro was the second largest provider of bus passenger trips and passenger miles in the nation and LADOT, Foothill Transit, Long Beach Transit and Santa Monica's Big Blue Bus also ranked in the top fifty largest providers of passenger trips and passenger miles. LADOT was also the third largest provider of commuter bus trips, while Metro was the largest provider of light rail passenger miles and the third largest provider of light rail trips in the country. The LTSS operators, together as a group, provided the 18th largest total of demand response trips in the nation and Access Services provided the second largest total.[5] See **EXHIBIT 2**.

ORANGE COUNTY

Within Orange County, OCTA operates the second largest fixed route bus transit fleet in the SCAG Region and was the nation's 22nd largest provider of transit trips and 20th largest provider of passenger miles in FY 2011-2012. Additionally, OCTA operates ADA paratransit and funds Metrolink commuter rail service. The cities of Irvine, La Habra, and Laguna

Beach operate local circulator service, and the cities of Anaheim, Garden Grove and Santa Ana are working with OCTA to implement rail circulators. In addition, a 501c(4) non-profit entity composed of stakeholders throughout the Anaheim Resort area, the Anaheim Transit Network, operates Anaheim Resort Transit. OCTA also provides funds through Measure M for cities to plan and operate seasonal transit services (Project V), as well as a program to provide specialized transit service for seniors and persons with disabilities (Project U).

OCTA is a designated transit district per Chapter 4, Article 1, Section 99213 of the California Public Utilities Code[6]. See **EXHIBIT 3**.

RIVERSIDE COUNTY

In Riverside County, fixed route bus service is primarily operated by RTA and SunLine Transit. RTA's service area is the western portion of Riverside County and SunLine's service area is the Coachella Valley. RTA's service area is among the largest transit systems in the nation, and SunLine has led the industry by being the first public agency to convert all of its vehicles to CNG. RCTC funds the county's participation in the regional commuter rail service via Metrolink, and the cities of Riverside and Corona operate demand response and local circulator service.

In addition, the cities of Banning and Beaumont also provide service via the Pass Transit service brand, and Desert Roadrunner service is provided by the Palo Verde Valley Transit Agency covering the City of Blythe and unincorporated eastern Riverside County. Rural transit service in southwestern Riverside County is provided by the Reservation Transportation Authority, a collaborative of 18 federally recognized tribal groups. See **EXHIBIT 4**.

SAN BERNARDINO COUNTY

Omnitrans is the largest agency in southern San Bernardino County and the Victor Valley Transit Authority (VVTA) provides fixed route service in the Victorville-Hesperia UZA. SANBAG funds the county's participation in Metrolink.

TABLE 3 Municipal Operators of Los Angeles County

Agency	Structure	Service Area
Arcadia Transit	Municipally Owned	City of Arcadia
AVTA	JPA	Lancaster-Palmdale UZA
Beach Cities Transit	Municipally Owned	Western South Bay Subregion
Claremont Dial a Ride	Municipally Owned	Pomona Valley
Commerce Municipal Bus Lines	Municipally Owned	City of Commerce and Surrounding Communities
Culver City Municipal Bus Lines	Municipally Owned	City of Culver City and Surrounding Communities
Foothill Transit	JPA	San Gabriel Valley Subregion
Gardena Municipal Bus Lines	Municipally Owned	Northern South Bay Cities Subregion
LADOT	Municipally Owned	Local Circulators Throughout City of Los Angeles
La Mirada Transit	Municipally Owned	Northern Gateway Cities, Near City of La Mirada
Long Beach Transit	Municipally Owned	Southern Gateway Cities
Montebello Bus Lines	Municipally Owned	North Western Gateway Cities
Norwalk Transit System	Municipally Owned	Eastern Gateway Cities
Santa Clarita Transit	Municipally Owned	Santa Clarita UZA
Santa Monica's Big Blue Bus	Municipally Owned	Cities of Santa Monica, Culver City and Los Angeles (Westside Cities Subregion)
Torrance Transit System	Municipally Owned	Southern South Bay Cities

Rural fixed route transit is provided by several operators in San Bernardino County, including the Mountain Area Regional Transit Authority (MARTA), the Morongo Basin Transit Authority (MBTA), Needles Area Transit and Barstow Area Transport. See **EXHIBIT 5**.

VENTURA COUNTY

The largest operator of fixed route bus service in Ventura County is Gold Coast Transit. Their service area is centered on the western end of the county and extends as far north as the city of Ojai,and includes the communities of Oxnard, Ventura, Port Hueneme, El Rio, Mira Monte, Saticoy and Oak View. Simi Valley Transit, Thousand Oaks Transit, Moorpark City Transit and Camarillo Area Transit are municipally owned transit properties providing service within their respective jurisdictions. The Ventura Intercity Service Transit Authority (VISTA) operates service between jurisdictions. VCTC owns and operates VISTA and also funds Ventura County's participation in Metrolink. The Ojai Trolley provides rural transit service in and around the City of Ojai. See **EXHIBIT 6**.

METROLINK

Metrolink is the commuter rail operator in the SCAG region, operating 165 daily trains on seven different lines on 536 route miles. These lines are the Antelope Valley Line, connecting Los Angeles to Palmdale and Lancaster in the Antelope Valley; the Inland Empire/Orange County Line (IEOC), connecting San Bernardino and Riverside with Oceanside via Orange County; the Orange County Line, operating between Los Angeles and Oceanside through Orange County: the Riverside Line from Los Angeles to downtown Riverside; the San Bernardino Line, between Los Angeles and the City of San Bernardino; the Ventura County Line, operating between Los Angeles and East Ventura via the San Fernando Valley; and the 91 Line, operating between downtown Los Angeles to downtown Riverside via Fullerton and along the SR 91 corridor. The Orange County Line extends south to Oceanside in San Diego County, where it connects with the COASTER commuter rail service to San Diego and the SPRINTER rail service inland to Escondido. Both of these services are operated by the North County Transit District (NCTD). The COASTER is a commuter railroad like Metrolink that also operates on the weekends and the SPRINTER is a light rail using diesel multiple units (DMUs).

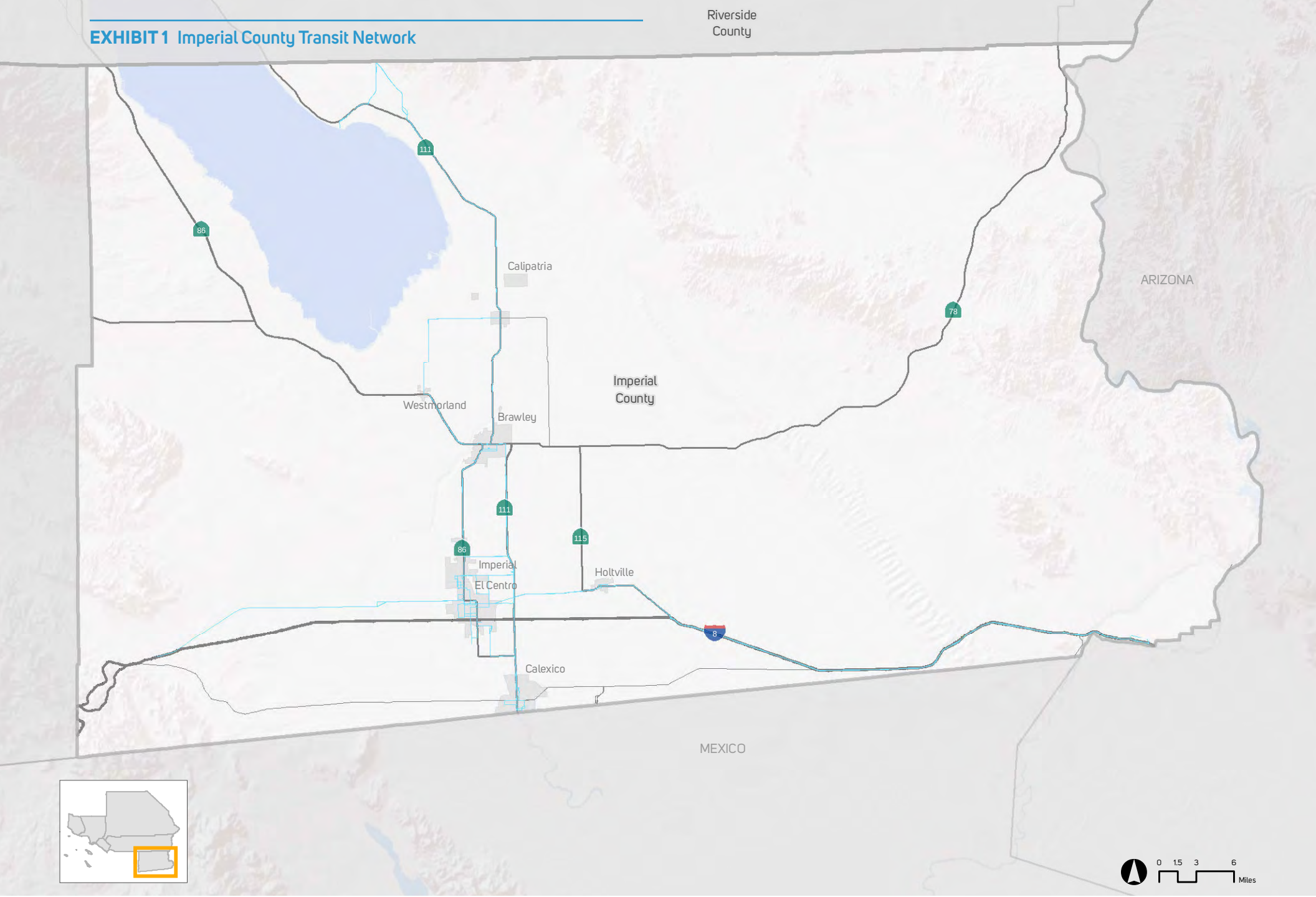
The Antelope Valley, IEOC, Orange County, San Bernardino and 91 Lines also operate weekend service. Metrolink operates mostly along track and right-of-way (ROW) owned by the transportation commissions. Much of their track however is owned by the freight railroads: BNSF and UP. For example, the Ventura County Line is owned by the UP west of Moorpark station; The 91 Line is owned by BNSF; and the Riverside Line is owned by UP. The operator of Metrolink, SCRRA, has cooperative agreements with the freights in these corridors and these agreements limit service, perhaps most severely on the Riverside Line which is limited to just six round trips per day. The San Bernardino Line, Metrolink's busiest carrying about 11,000 passenger per day, has 38 daily trips and limited weekend service.

INTERREGIONAL SERVICES

In addition to the services listed above, several transit agencies provide service outside the boundaries of the SCAG Region:

- **VISTA** in Ventura County provides service into neighboring Santa Barbara County, including Carpinteria, Santa Barbara, Goleta and UCSB via its Coastal Express service.
- **The Eastern Sierra Transit Authority** provides thrice weekly service from the Lancaster Metrolink Station to Mammoth via the Owens Valley, with connections to Reno, Nevada and Yosemite National Park.
- **RTA route 202 and Metrolink's Orange County and Inland Empire-Orange County Lines** provide service to the Oceanside Transit Center in San Diego County.
- **YCIPTA** also provides an express service between Yuma, Arizona and El Centro on Mondays, Wednesdays and Saturdays.
- **The North County Transit District's (NCTD) route 395** operates from Northern San Diego County into the City of San Clemente.
- **Kern Transit** operates two routes, the 100 and the 250, connecting the City of Lancaster with destinations in Kern County including Mojave, California City, Tehachapi and Bakersfield.
- **Santa Barbara's Metropolitan Transit District** currently operates four routes (86, 87, 88, 89) connecting the Ventura County Government Center with Santa Barbara and Goleta as a construction mitigation.

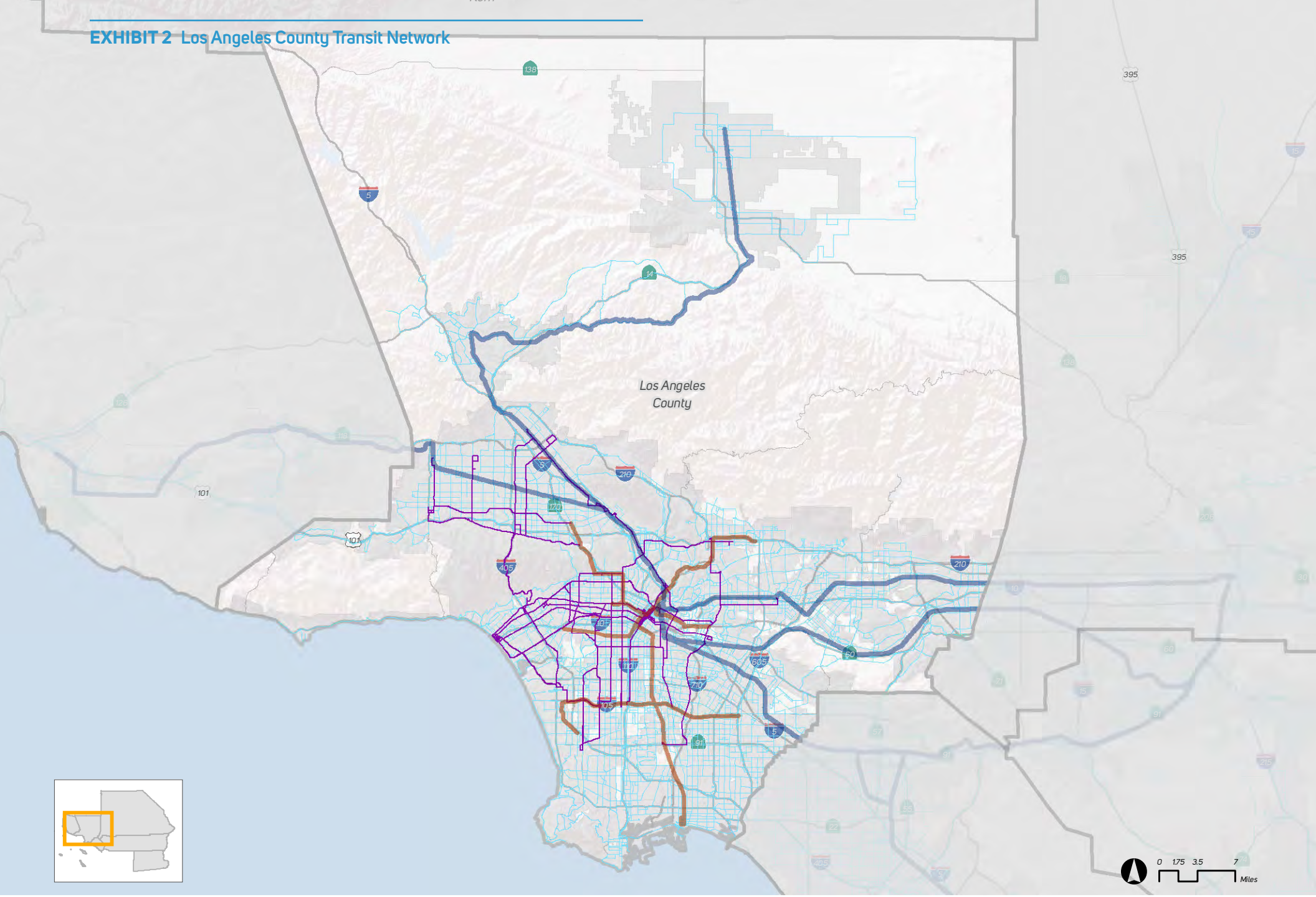
EXHIBIT 1 Imperial County Transit Network



Bus Routes (2012)

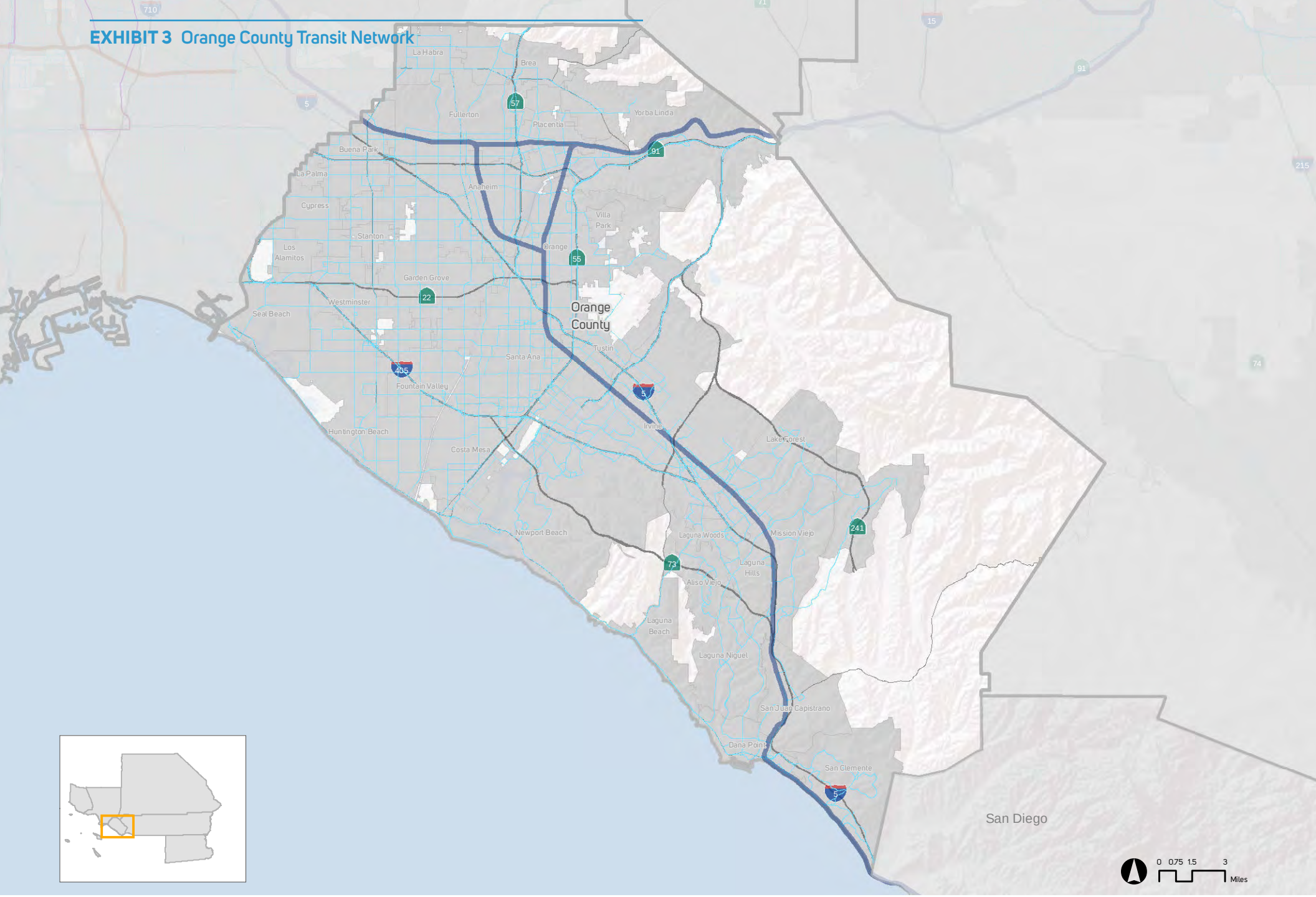
(Source: SCAG)

EXHIBIT 2 Los Angeles County Transit Network



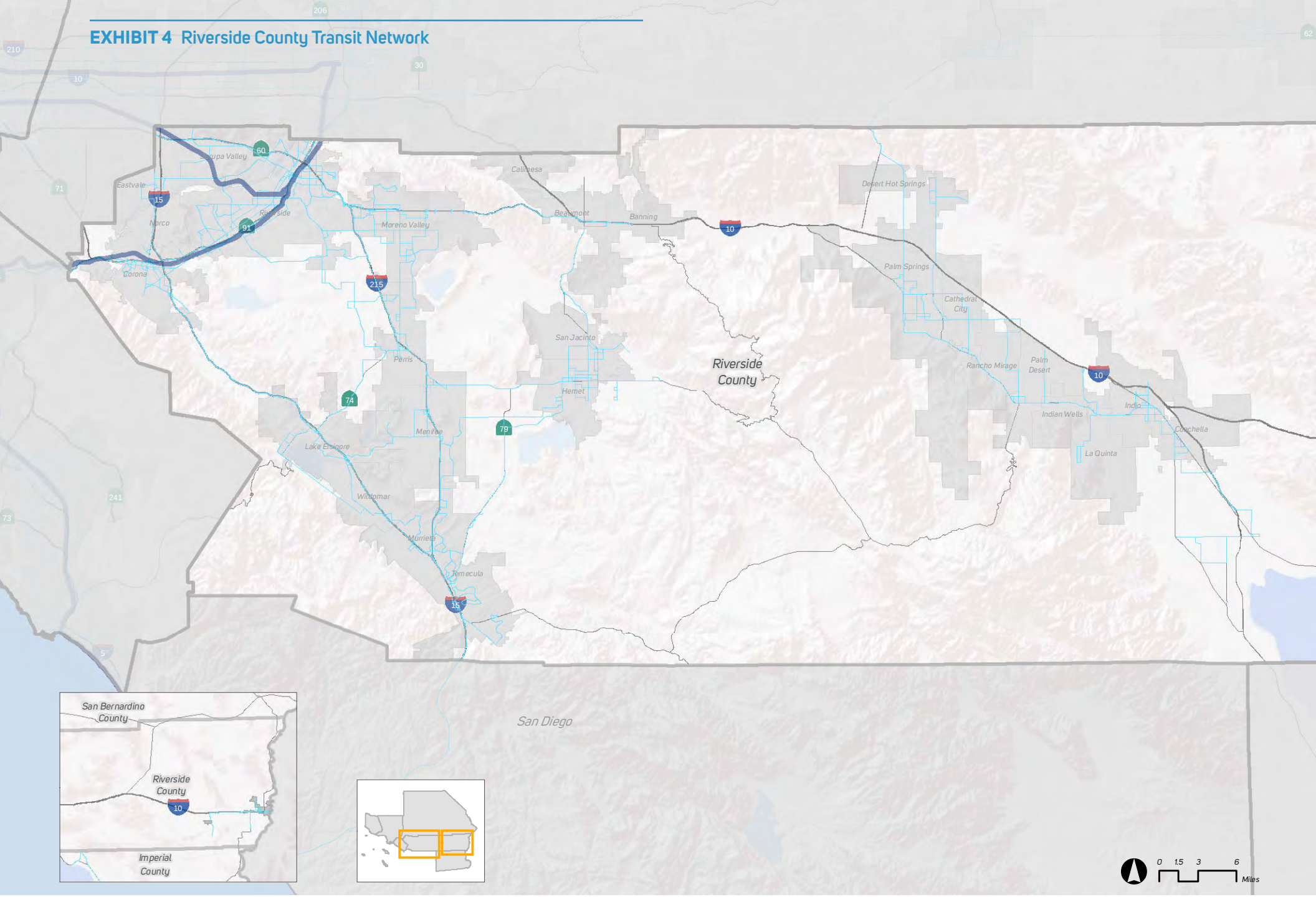
(Source: SCAG)

EXHIBIT 3 Orange County Transit Network



(Source: SCAG)

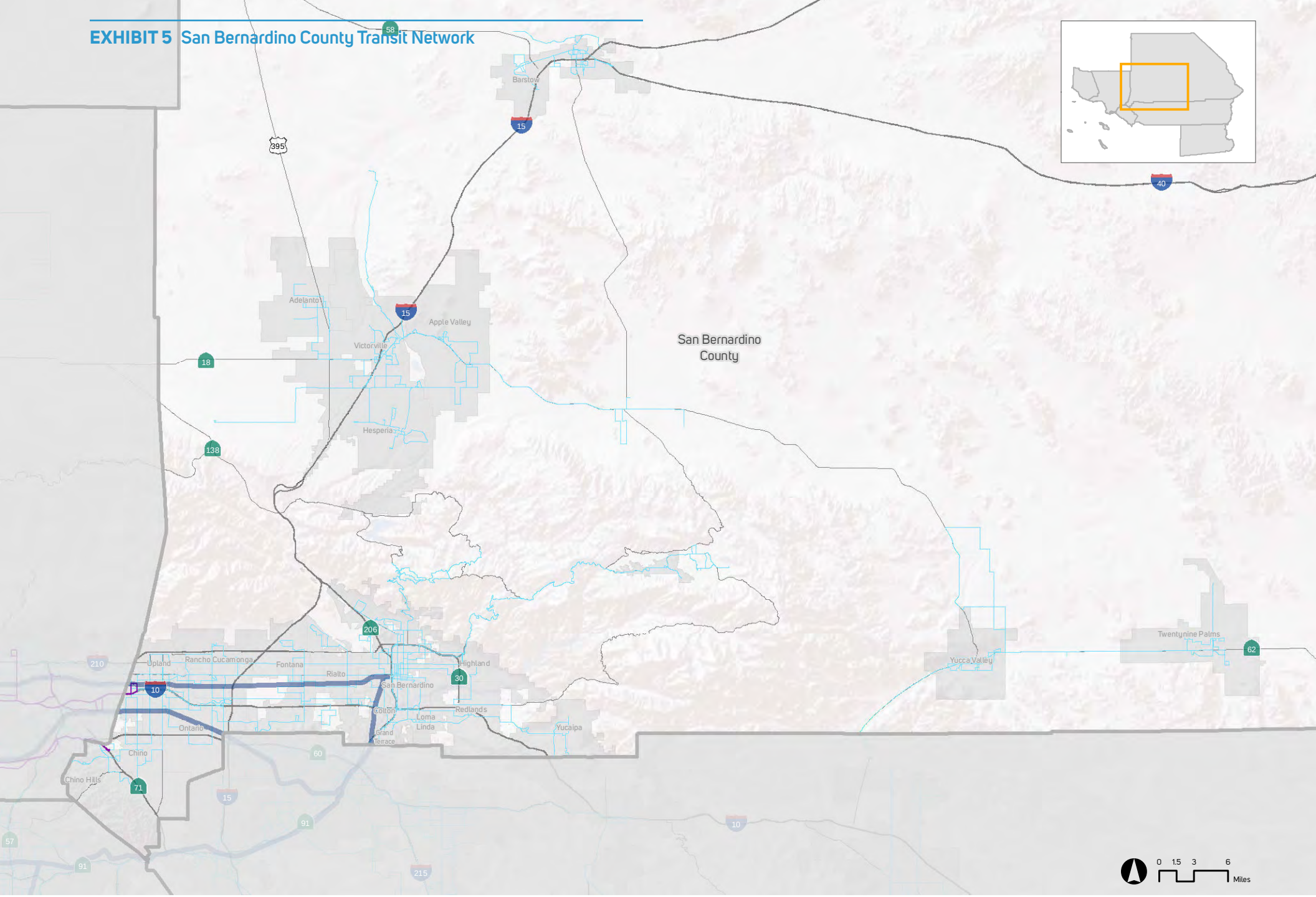
EXHIBIT 4 Riverside County Transit Network



Metrolink (2012) Bus Routes (2012)

(Source: SCAG)

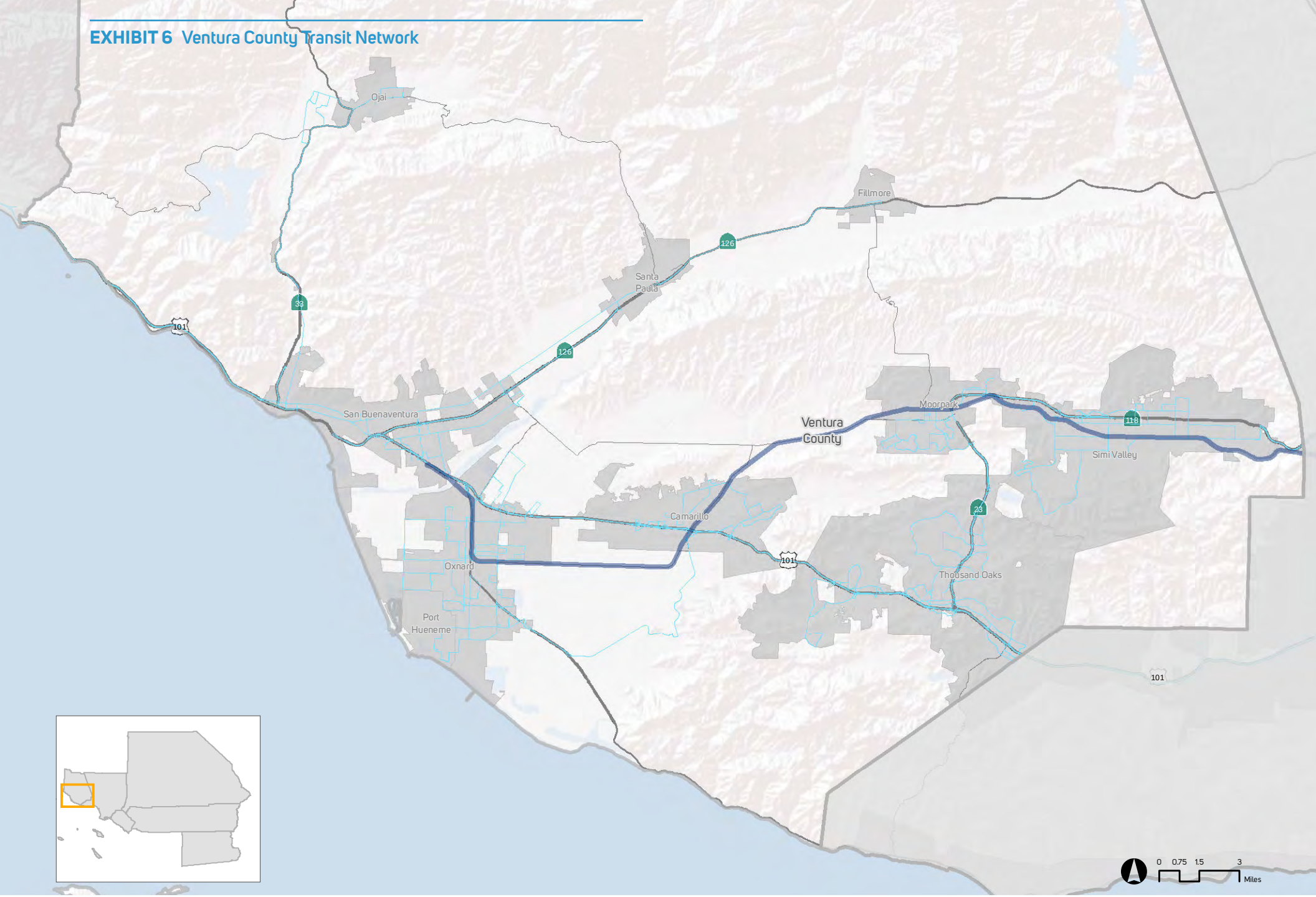
EXHIBIT 5 San Bernardino County Transit Network



Metrolink (2012) Rapid Bus (2012) Bus Routes (2012)

(Source: SCAG)

EXHIBIT 6 Ventura County Transit Network



Metrolink (2012) Bus Routes (2012)

(Source: SCAG)

TRANSIT AND MOBILITY IN THE SCAG REGION

As of the beginning of FY 2011-2012, our region's transit system consisted of about 9,000 miles of bus routes and 70 miles of heavy and light rail, in addition to 388 route miles of rail utilized by Metrolink. Almost 5 percent of travelers in the SCAG Region used transit to reach their destinations in 2009. According to data reported to the National Transit Database, transit agencies in the SCAG Region experienced 716 million boardings and invested $2.45 billion in operations and maintenance in FY 2011-2012.

TABLE 4 illustrates transit's role in terms of total travel in the SCAG Region. These data, which were obtained from the Federal Highway Administration's 2009 National Household Travel Survey, represent a sample of all travel in the region, regardless of time, length or duration. Transit's overall role is comparatively small, but it serves an important role in providing modal choice.[7]

TABLE 4 Total Trips by County, All Purposes

Total Trips				
County	**Auto**	**Transit**	**Bicycle**	**Walk**
Imperial	114,018,194	Not available	318,631	10,361,556
Los Angeles	6,231,994,828	400,196,991	166,397,229	2,083,153,592
Orange	2,180,289,337	67,656,250	39,874,041	388,410,530
Riverside	1,272,756,998	17,577,906	21,621,490	214,696,550
San Bernardino	1,434,093,895	26,259,261	21,761,307	230,494,820
Ventura	477,831,965	6,490,657	15,518,240	79,642,547
Total	11,710,985,217	518,181,065	265,490,938	3,006,759,595
Percentage of Trips				
Imperial	90.49%	Not available	0.25%	8.22%
Los Angeles	69.65%	4.47%	1.86%	23.28%
Orange	80.76%	2.51%	1.48%	14.39%
Riverside	82.60%	1.14%	1.40%	13.93%
San Bernardino	83.21%	1.52%	1.26%	13.37%
Ventura	81.49%	1.11%	2.65%	13.58%
SCAG Region	74.96%	3.32%	1.70%	19.24%

Source: 2009 National Household Travel Survey

Transit is particularly important for commute trips, which tend to occur during peak congestion periods. **TABLE 5** presents Journey to Work data obtained from the U.S. Census's 2009-2011 American Community Survey 3-Year Estimates. These data demonstrate that the overall mode share for transit is much higher for commute trips than overall trips. Los Angeles County has a particularly high transit commute mode share—7.2 percent of all work trips, which compares favorably with the state share of 5.2 percent and the national share of 5 percent. [8]

The other counties of the region are well below both the state and national averages with respect to transit mode share. However, it should be noted that given the sheer size of the SCAG region, it still remains one of the largest transit markets in the country. Orange County's commute mode share may only be 2.9 percent, but OCTA still ranks among the 50 largest providers of public transportation.

TABLE 5 Journey to Work by County

2011 3 year ACS Estimates	Imperial County	Los Angeles County	Orange County	Riverside County	San Bernardino County	Ventura County
Workers 16 Years and Over	57,099	4,327,711	1,400,804	838,422	782,989	378,846
Means of Transportation to Work						
Car, Truck, or Van	90.2%	83.0%	88.2%	90.0%	91.0%	89.1%
Drove Alone	78.9%	72.2%	78.1%	77.1%	74.4%	75.9%
Carpooled	11.3%	10.8%	10.0%	13.0%	16.7%	13.2%
In 2-Person Carpool	7.9%	8.4%	7.7%	9.6%	13.2%	9.7%
In 3-Person Carpool	1.7%	1.5%	1.3%	1.9%	2.0%	1.7%
In 4-Or-More Person Carpool	1.8%	1.0%	0.9%	1.5%	1.5%	1.8%
Workers Per Car, Truck, or Van	1.08	1.08	1.07	1.09	1.11	1.09
Public Transportation	1.5%	7.2%	2.9%	1.5%	1.9%	1.4%
Walked	2.0%	2.9%	2.0%	1.6%	2.0%	2.3%
Bicycle	0.5%	0.8%	1.0%	0.4%	0.4%	0.8%
Taxicab, Motorcycle, or Other Means	1.3%	1.2%	1.0%	1.4%	1.0%	1.0%
Worked at Home	4.5%	4.9%	5.0%	5.1%	3.7%	5.5%

Source: 2009 National Household Travel Survey

TRANSIT DEPENDENCY

Transit plays an important role in providing mobility and modal choice in the SCAG region, but also helps to provide mobility for households or travelers with limited or no access to vehicles. **TABLE 6** displays Five Year Estimates of Vehicles Available by Household, as reported by the U.S. Census's American Community Survey. One out of ten households in Imperial and Los Angeles Counties have no vehicles available, and about 1/4 to 1/3 of households in all counties have only one vehicle available. Public transportation remains an effective way of providing mobility options for those households.[9]

As noted in the Brookings Institution Report, "Transit Access and Zero Vehicle Households," the SCAG Region contains three of the 100 Metropolitan Statistical Areas (MSAs) with the largest concentrations of zero vehicle households. As the second largest MSA in the country, it is not surprising that the Los Angeles-Long Beach-Santa Ana[10] MSA has the third largest number of zero car households, behind New York-Northern New Jersey-Long Island NY-NJ-PA and Chicago-Naperville-Jolliet IL-IN-WI. The 358,705 zero car households represent nearly 5 percent of the national total and are nearly as much as the combined total of the San Francisco-Oakland-Fremont CA and Washington-Arlington-Alexandria DC-VA-MD-MV MSAs.[11]

The Riverside-San Bernardino-Ontario CA and Oxnard-Thousand Oaks-Ventura, CA MSAs are also represented within the index, with 65,862 and 10,200 households, respectively. These two areas both rank within the bottom quintile for the share of jobs accessible via transit within 90 minutes, while Los Angeles-Long Beach-Santa Ana ranks within the middle quintile (Riverside-San Bernardino-Ontario ranks 99 out of 100, and Oxnard-Thousand Oaks-Ventura ranks 85). Ninety-nine percent of zero vehicle households within Los Angeles-Long Beach-Santa Ana have access to some sort of public transportation, while 87 percent of Riverside- San Bernardino-Ontario households and 91 percent of Oxnard-Thousand Oaks-Ventura households do.

EXTERNAL BENEFITS OF TRANSIT USE

Transit use also provides external benefits to the region's transportation system, through investment, reduced traffic congestion and air pollution emissions reductions. APTA estimates that for every billion dollars invested in transit (as of 2007) about 36,000 jobs are created. This includes the direct purchasing power of transit agencies and also the spending power of the employees of transit agencies.[12] Were this rate to have held constant into FY 2011-2012, transit spending in the SCAG Region would have resulted in the creation or maintenance of roughly 150,000 jobs.

Similar studies by APTA have concluded that compact, transit friendly communities have a per capita transit fatality rate roughly 25 percent that of auto dependent communities and have less severe traffic collisions. Further, as the market share for cleaner transit fuels has reached 30.4 percent nationally, the per passenger mile air pollution emissions profile of transit has decreased significantly, especially regarding diesel particulate, oxides of nitrogen and hydrocarbons.[13]

The Texas Transportation Institute (TTI), in its annual Urban Mobility Report, estimates traffic congestion delay averted due to the use of the region's public transportation system. **FIGURE 2**, **FIGURE 3** and **FIGURE 4** track monetized costs avoided via public transit usage, and the amount of delay averted in aggregate and per capita hours in the Indio-Cathedral City-Palm Springs CA, Lancaster-Palmdale CA, Los Angeles-Long Beach-Santa Ana CA, Oxnard CA and Riverside-San Bernardino CA urbanized areas (UZAs).

As discussed in Chapter 7 of the 2016 RTP/SCS, delay is a commonly used measure of mobility, often defined as the difference between actual travel time and the travel time at a predefined "optimal speed" for the mode being considered. For the purposes of the TTI report, the delay in question relates to auto travel, measured in Vehicle Hours of Delay.

TABLE 6 Vehicles Available By Household

Vehicles Available by Household	Imperial County	Los Angeles County	Orange County	Riverside County	San Bernardino County	Ventura County
No Vehicles Available	11%	10%	5%	5%	5%	5%
1 Vehicle Available	31%	35%	29%	30%	28%	26%
2 Vehicles Available	35%	35%	42%	39%	38%	41%
3 or More Vehicles Available	23%	20%	25%	26%	29%	29%

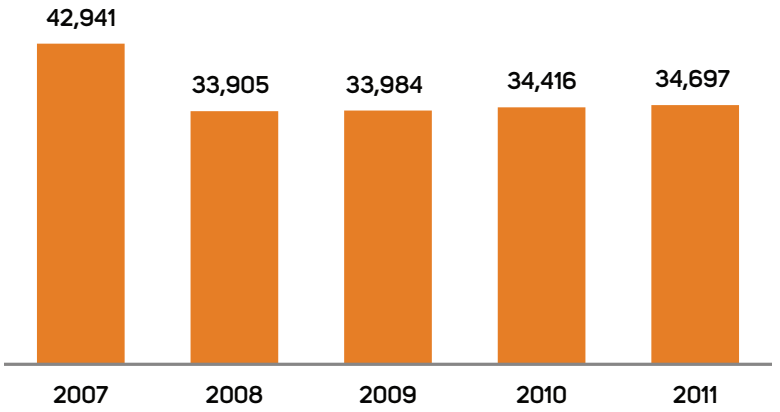
Source: 2011 American Community Survey

As displayed in **FIGURE 2** significant externalized costs of auto operation are avoided in the SCAG region due to travelers choosing transit instead of driving. During the economic boom year of 2007, these cost savings totaled nearly one billion dollars. These estimated savings are especially significant when compared with the total congestion related costs, estimated to be more than $14 billion for the SCAG region in 2007. The impact of the recession of 2008-2009 and subsequent service cuts can be seen as the cost savings diminish in the 2008-2011 period.[14]

Similarly, **FIGURE 3** outlines the aggregated hours of delay averted by travelers who choose to use transit instead of driving. In 2007, transit riders averted a total of nearly 45,000 delay hours by not using road facilities. As the economy worsened, the delay benefits decreased significantly. However, transit's impact on reducing delays will be greatest when demand for road-space is greatest. This would imply that when the economy recovers to pre-2008 levels, so will transit's benefit of reducing delays.

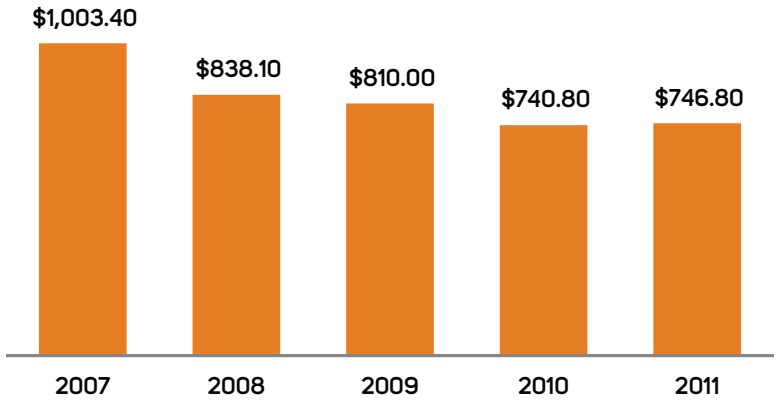
FIGURE 4 displays transit's delay reduction benefit on a per capita basis. Transit riders in the SCAG region saved residents roughly ten hours in delay averted in 2011.

FIGURE 3 Aggregate Delay Hours Averted by Public Transit, Medium and Large UZAs



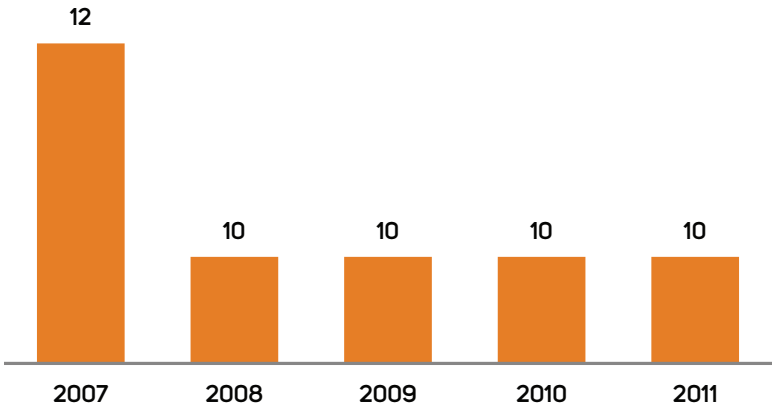
Source: TTI 2012

FIGURE 2 Annual Delay Costs Averted by Public Transit, Medium and Large UZAs



Source: TTI 2012

FIGURE 4 Per Capita Delay Hours Averted by Public Transit



Source: TTI 2012

UNDERSTANDING TRANSIT SYSTEM PERFORMANCE

PERFORMANCE MANAGEMENT

Since the passage of the United States Government Performance and Results Act of 1993, the federal government has advised MPOs to integrate performance management into their business practices and long range plans. The initial federal guidance on performance consisted of:

"Performance management is the practice of setting goals and objectives; an ongoing process of selecting measures, setting targets and using measures in decision–making to achieve desired performance outcomes; and reporting results (FHWA Performance Based Planning and Programming Guidebook)." FHWA adds that Performance Management should be included in the following activities:

- "Enacting agency mission statements
- Generating outcome oriented goals and objectives
- Employing specific performance objectives expressed in quantifiable and measurable forms Identification of performance measures or indicators to be used in measuring or assessing relevant outputs, service levels and outcomes
- Description of how performance measures relate to goals and objectives
- A discussion of how actual performance relates to stated goals
- Identification of those factors beyond an agency's control that could affect performance
- A description of the resources required to achieve the performance goals" [15]

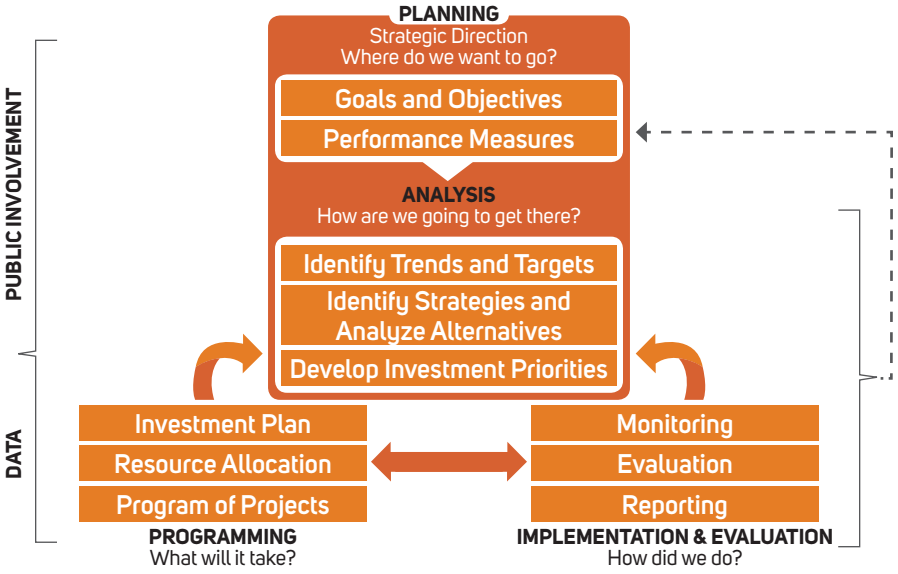
The US DOT defines performance based planning and programming as an approach to applying performance management principles to transportation system policy and investment decisions. It is a data-driven process that can identify strategies and investments at the system or corridor levels and can "provide a nuanced means of assessing progress toward meeting the intent of the RTP."

Within the context of transportation planning, the Federal Highway Administration (FHWA) defines performance based planning as "selecting investments to most effectively and efficiently achieve desired outcomes, as determined through public input and agency strategic direction. A Performance Based Planning and Programming (PBPP) process becomes cyclical with information on the performance of the system and the expected benefits of system improvements strategically directing investments." **FIGURE 5** outlines the cyclical nature of the PBPP process.

The FHWA sees performance based planning processes as potentially integrated into all of the processes of MPOs. The text below, quoted from the FHWA's Performance Based Planning and Programming Guidebook, outlines the benefits of integrating performance based processes into statewide and metropolitan planning processes.

"Performance-based planning and programming (PBPP) refers to the application of performance management within the planning and programming processes of transportation agencies to achieve desired performance outcomes for the multimodal transportation system. This includes a range of activities and products undertaken by a transportation agency together with other agencies, stakeholders and the public as part of a 3C (cooperative, continuing and comprehensive) process. It includes development of: long range transportation plans (LRTPs), other plans and processes (including those Federally-required, such as Strategic Highway Safety Plans, Asset Management Plans, the Congestion Management Process, Transit Agency Asset Management Plans and Transit Agency Safety Plans, as well as others that are not required) and programming documents, including State and metropolitan Transportation Improvement Programs (STIPs and TIPs). PBPP attempts to ensure that transportation investment decisions are made—both in long-term planning and short-term programming of projects—based on their ability to meet established goals."

FIGURE 5 The Performance Based-Planning Process under MAP-21



Source: FHWA

The Federal Transit Administration's (FTA's) Policy on Performance Measurement provides a framework for refining the administration's performance measures and ensuring consistency in measures. The policy stresses the importance of linking measures to goals, providing clear, concise measures and starting from a validated baseline. As illustrated in **FIGURE 6,** the integration of goals, targets, indicators and a validated background is important to accurately measuring the impact of plans and policies in the transportation planning process.

FTA's Fully Integrated Performance Management Goal Structure:

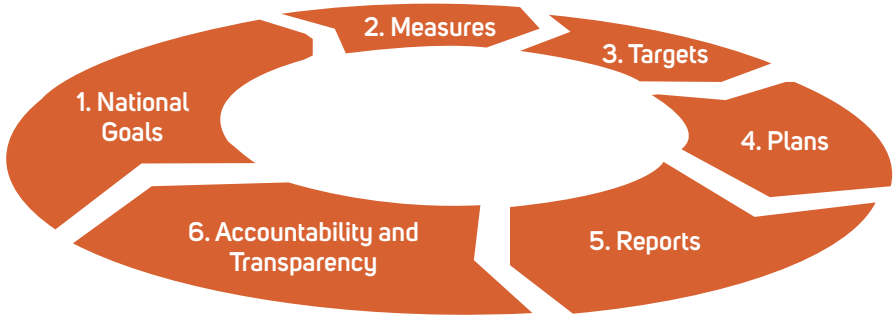
- Strategic Objective
- Performance Goals
- Performance Indicators
- Annual Performance Targets: Outcome or Output Oriented
- Inputs/Resources /Data
- Validated Baseline

MAP-21 AND PERFORMANCE BASED PLANNING

MAP-21 continues to reinforce the importance of performance based planning in the RTP process, while also reinforcing the importance of maintaining a state of good repair for transportation infrastructure and assets. MAP-21 will mandate state and local target setting in the following national goal areas:

- Safety
- Infrastructure Condition
- System Reliability
- Freight Movement and Economic Vitality
- Environment Sustainability; and
- Reduced Project Delivery Delays

FIGURE 6 The Transportation Performance Management Process



Source: FHWA

SCAG has incorporated performance based planning aspects of performance management into its Regional Transportation Plans (RTPs) since 1998 and has encouraged performance based planning throughout the region. For the 2004 RTP, SCAG developed a set of measurable goals and outcomes that included the principal of sustainability, which is not limited only to the environment and the transportation-land use connection, but also has important implications on how the region meets its critical system preservation needs.

The legislation amends 23 U.S.C 150(c) to require MPOs to work in collaboration with transit agencies and state DOTs to establish performance measures consistent with performance targets related to transit asset management and transit safety, as set forth in 49 U.S.C. 5326(c) and 5329(d). Rules pertinent to implementing this legislation are still forthcoming and most likely will be in effect for the 2020 RTP/SCS. Given the system performance mandates contained in MAP-21, that RTP/SCS will need to incorporate more multimodal measures within its adopted measures, possibly including transit specific measures. As a result, this report will also inform the process for selecting the measures to be included in upcoming System Performance Reports and the transit component of the 2020 RTP/SCS.

Furthermore, as the Federal Transit Administration completes its rulemaking processes regarding MAP-21, staff will have to incorporate new transit specific measures into the 2020 RTP/SCS, including safety and state of good repair measures.

MAP-21 also mandates RTPs must employ performance based planning, that RTPs must include a System Performance Report and that Federal Transportation Improvement Programs (FTIP) must include "a description of the anticipated progress brought about by implementing the FTIP towards achieving the performance targets."

The FHWA and the FTA have outlined a process for the incorporation of performance based planning into the transportation planning process. FHWA's six-step transportation planning process is outlined in **FIGURE 6**. The nine rulemaking processes that will implement the MAP-21 performance requirements will affect the transportation planning process in a variety of ways, but the Metropolitan and Planning Statewide rulemaking will establish performance based planning processes at the state and regional levels and establish coordination procedures for establishing of performance targets and linking of those targets to the planning and programming processes.

TRANSIT PERFORMANCE MEASUREMENT SYSTEMS

The Transit Cooperative Research Program Report 088: A Guide Book for Developing a Transit Performance Measurement System divides transit performance measures into 8 distinct categories. These categories are displayed in **TABLE 7**.

These performance measurement categories can also be broken into four levels of analysis. These include the Agency, the Customer, the Vehicle/Driver and the Community levels.

The Customer level of analysis usually includes measures of service availability, comfort and quality of service, most especially relating to comfort and convenience. Performance measures within the travel time, availability, service delivery, safety and security and maintenance and construction categories are applicable to this level of analysis.

The Agency level of analysis is more concerned with the efficiency and effectiveness of transit operations. Appropriate categories include maintenance and construction and economic measures. Due to the availability of NTD cost and utilization data, the agency level is among the most commonly analyzed.

The Vehicle/Driver point of view includes measures of vehicular speed and delay, such as those routinely calculated for streets and highways as proscribed in the Institute for Transportation Engineers (ITE) Highway Capacity Manual. Vehicle/Driver measures can also include measures of facility or guideway capacity. Examples include average vehicle speed, volume/capacity ratios, roadway capacity and vehicular capacity. Within the context of transit, the measures often focus on the performance of an individual route or run.

Measures at the Community level assess transit's role in meeting broad community objectives. The impact of transit service on different aspects of a community, including economic growth, property values and employment, mobility and the environment are among the most common community level measures.

TABLE 7 Transit Performance Measurement Categories from TCRP 88

Category	Description
Availability	Measures how easily potential passengers can use transit for particular types of trips
Service Delivery	Measures that assess passengers day to day experiences using transit
Community/Transit Impact	Measures of transit's role in meeting passengers day to day experiences using transit
Travel Time	How long it takes to make a trip by transit, by itself, in comparison with another mode, or in comparison with an ideal value
Safety and Security	The likelihood that one will be involved in an accident (safety) or become a victim of a crime (security) while using transit
Maintenance and Construction	The effectiveness of the agency's maintenance and the impacts of transit construction on passengers
Economic	Measures of transit performance from a business perspective
Capacity	The ability or transit facilities to move people and vehicles

Source: 2003 Transit Cooperative Research Program Report 88

NATIONAL TRANSIT DATABASE (NTD)

The NTD was established by Congress in 1979 to be the nation's primary source for information and statistics on its transit systems. Recipients or beneficiaries of grants from the FTA under the Urbanized Area Formula Program (§5307) or Other than Urbanized Area (Rural) Formula Program (§5311) are required by statute to submit financial and service data to the NTD. APTA states that "the operating and financial data reporting system is among the most complete transportation data collection systems for any transportation mode in the world."

More than 660 transit providers in urbanized areas annually report performance data to the NTD and larger reporters are required to submit monthly operating and safety data. These data are used to apportion more than $5 billion of FTA funds to transit agencies in urbanized areas (UZAs). Annual NTD reports are submitted to Congress summarizing transit service and safety data. Data reported to NTD by transit agencies allow for analysis to be conducted most easily at the agency level. NTD data is not an effective tool for measuring service as it is experienced by the passenger.

The legislative requirement for the NTD is found in Title 49 U.S.C. 5335(a). NTD data for the SCAG region include annual operations and financial reports dating back to 1991 and monthly non-audited operations reports dating back to 2002. The FTA uses these data to apportion more than $8 billion to UZAs, states and recipients from the above programs and others, such as §5337 (State of Good Repair grants), §5339 (Bus and Bus Facilities capital program) and §5310 (Transportation for Elderly Persons and Persons with Disabilities).[16]

Year to year changes in NTD reporting mandates can affect the data used in performance measurement. As directed by Congress or through various rulemaking processes, agencies may be required to report new types of data to the NTD. Within the past two years, NTD has established several new reporting modes, including Commuter Bus and Rapid Bus, which affect the way the data are analyzed. Where appropriate these modes are specifically called out and in other cases the data are subsumed into the Motor Bus mode to maintain the time series. See **TABLE 8**.

PERFORMANCE MEASURE SELECTION

The performance measures selected for analysis in the 2016 RTP/SCS Transit Appendix are the result of a long process working with transit sector stakeholders and local elected officials, via the High Speed Rail and Transit Subcommittee of SCAG's Transportation Committee and the Regional Transit Technical Advisory Committee. As part of this effort, staff reviewed planning documents, reports and resources to assess what types of performance measures should be analyzed annually, what modes should be analyzed and which transit properties should be included in the analysis. Input was also sought from the Regional Transit Technical Advisory Committee, consisting of representatives from the region's transit providers.

This process culminated with the publication of the Fiscal Year (FY) 2011-2012 Transit System Performance Report in the spring of 2015. The annual Transit System Performance reports that SCAG produces are incremental steps toward producing existing conditions analyses for the transit elements of RTPs. They represent the incorporation of an annual review of system performance geared toward planning for operations and maintenance into SCAG's transit modal planning practices. The FY 2011-2012 Report contains the performance data for the plan's FY 2011-2012 Base Year.

TABLE 8 Performance Measure Data Reported to the National Transit Database

Service Provision and Consumption Measures	Financial Measures
Vehicle Revenue Miles (Passenger Car Revenue Miles for Rail Modes)	Fare Revenues Earned by Mode and Type of Service
Vehicle Revenue Hours (Passenger Car Revenue Hours for Rail Modes)	Operating Expense by Mode and Type of Service
Vehicles Operated in Maximum Service	Operating Expense by Mode and Type of Service for Vehicle Operations
Directional Route Miles (Fixed-Guideway and Mixed-Traffic when Applicable)	Operating Expense by Mode and Type of Service for Vehicle Maintenance
Passenger Miles Travelled	Operating Expense by Mode and Type of Service for Non-Vehicle Maintenance
Unlinked Passenger Trips	Operating Expense by Mode and Type of Service for General Administration
Monthly Operational Measures	Total Capital Expenditure
	Capital Expenditure—Rolling Stock
	Capital Expenditure—Facilities

Source: 2012 NTD

Similar to the Metropolitan Transportation Commission's (MTC) *Statistical Summary of Bay Area Transit Operators*, these reports provide an annual format for measuring system performance, through the analysis of data reported by transit operators to the National Transit Database (NTD). The incorporation of a transit property into this analysis is therefore contingent upon a steady report of performance data to the NTD.

The *2010 Regional Transportation Plan Guidelines,* adopted by the California Transportation Commission (CTC), provides guidance in the use of performance measurement in regional planning. The Guide defines performance measures as a set of "objective, measurable criteria used to evaluate the performance and effectiveness of the transportation system, government policies, plans and programs. Performance measures use statistical evidence to determine progress toward specific and defined objectives." Performance measures can be quantitative or qualitative and should "help set goals and outcomes, detect and correct problems and document accomplishments."

Performance measurement can occur at the regional or corridor level and at either the system or a project by project basis. The CTC's State Transportation Improvement Program (STIP) Guidelines establish performance criteria at both the project and the system level. These guidelines provide the following examples of appropriate system performance measures:

- Safety
- Mobility
- Accessibility
- Reliability
- Productivity/ Throughput
- System Preservation
- Return on Investment/Lifecycle Cost

PERFORMANCE MEASUREMENT IN THE 2016 RTP/SCS

The adopted performance measures for the 2016 RTP/SCS are outlined in Chapter 7 of the Plan and are further discussed in the Plan's Performance Measurement Appendix. In addition to the traditional measures of mobility and economic impact, the adopted performance measures also included two new categories: location efficiency and public health. As detailed in **TABLE 9**, the adopted performance measures focus on outcomes mostly related to land use, air quality, congestion related delay, road safety and economic impacts of planned investments.

TABLE 9 Adopted Performance Measures from the 2012 RTP/SCS

Outcome	Performance Measure/Indicator	Definition
LOCATION EFFICIENCY	Land consumption (total & per capita)	Total and per capita of land areas used development
	Median distance for work and non-work trips	The travel distance from which half of the work or non-work trips exceed and the other half below
	Percent of work trips less than 3 miles	The share of total work trips which are fewer than 3 miles
	Share of growth in transit priority areas	Share of the region's growth in population, households and employment in transit priority areas
	Work trip length distribution	The statistical distribution of work trip length in the region
MOBILITY/ ACCESSIBILITY	Person delay per capita	Delay per capita can be used as a supplemental measure to account for population growth impacts on delay
	Person delay by facility type (mixed flow, HOV, arterials)	Delay—excess travel time resulting from the difference between a reference speed and actual speed
	Truck delay by facility type (Highway, Arterials)	Delay—excess travel time resulting from the difference between a reference speed and actual speed
	Travel time distribution for transit, SOV, HOV for work and non-work trips	Travel time distribution for transit, SOV, HOV for work and non-work trips
SAFETY AND HEALTH	Collision/accident rates by severity by mode	Accident rates per million vehicle miles by mode (all, bicycle/pedestrian and fatality/killed)
	Tons of pollutants	Measured/forecast emissions include CO, NO_X, $PM_{2.5}$, PM_{10}, SOX, and VOC. CO_2 as secondary measure to reflect greenhouse gas emissions
ENVIRONMENTAL QUALITY	Net tons of pollutants (criteria pollutants) and greenhouse gas emissions	Measured/forecast emissions include CO, NO_X, $PM_{2.5}$, PM_{10}, SO_X, and VOC. CO_2 as secondary measure to reflect greenhouse gas emissions
ECONOMIC WELL BEING	Additional jobs supported by improving competitiveness	Number of jobs added to the economy as a result of improved transportation conditions which make the Region more competitive
	Additional jobs supported by transportation investment	Total number of jobs supported in the economy as a result of transportation expenditures
	Net contribution to Gross Regional Product	Gross Regional Product due to transportation investments and increased competitiveness
INVESTMENT EFFECTIVENESS	Benefit/Cost Ratio	Ratio of monetized user and societal benefits to the agency transportation costs
SYSTEM SUSTAINABILITY	Cost per capita to preserve multi-modal system to current and state of good repair conditions	Annual costs per capita required to preserve the multi-modal system to current conditions

Source: SCAG 2012-2035 RTP/SCS

EXISTING CONDITIONS

MACROECONOMIC CONTEXT

Two key factors outline the macroeconomic context in which the Region's transit performance should be situated—retail fuel prices volatility and the impacts of the recession of 2008-2009.

INCREASING REAL RETAIL FUEL PRICES

The marginal costs of operating motor vehicles, particularly fuel and parking costs, appear to have strong impacts on travel behavior decision making. As discussed on page 22, below, as fuel or parking costs rise, so does the use of public transportation or other less costly modes. In this context, the dramatic fuel price instability of the last 15 years should be understood to have had a dramatic impact on transit ridership.

FIGURE 7 and **FIGURE 8** display national trends in crude oil and fuel prices. The US Energy Information Administration (EIA) estimates that about two-thirds of retail gasoline prices are driven by crude oil prices. The dramatic spikes in crude oil prices after 2005 have had large impacts on the retail price of gasoline, as displayed in **FIGURE 8**.[17] Fuel prices have reversed their growth trend and began declining in 2014 and 2015.

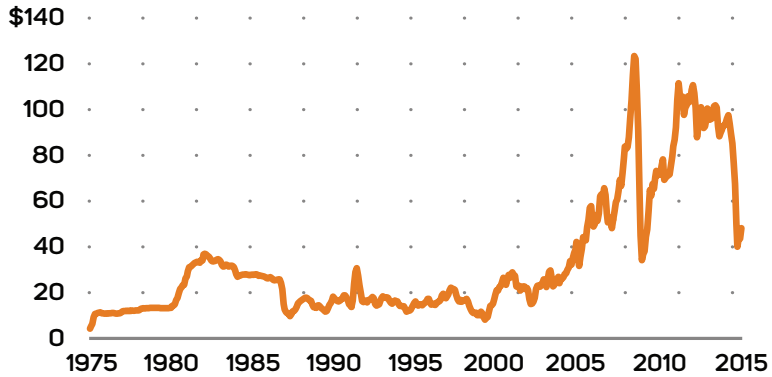
THE VMT INFLECTION POINT AND TRANSIT CROSS ELASTICITIES

These fuel prices increases may have led to a leveling off of growth in total VMT and a decline in per capita VMT. National per capita VMT peaked in 2004 and total national VMT peaked in 2007. However, declining fuel prices appear to be having an effect on total driving; the FHWA projects that 2014 was the third year on record when aggregate national travel surpassed 3 trillion VMT. Per Capita vehicle travel remains below the 2004 peak.[18]

Economists define differences in demand due to price changes as elasticities. These are frequently quantified as the change in consumer demand due to a one percent change in price. High values for elasticities indicate that consumers are very sensitive to price changes. Low values indicated that consumer demand is not sensitive to price. Goods where changes in demand occur at a rate smaller than changes in price are called 'inelastic'.[19]

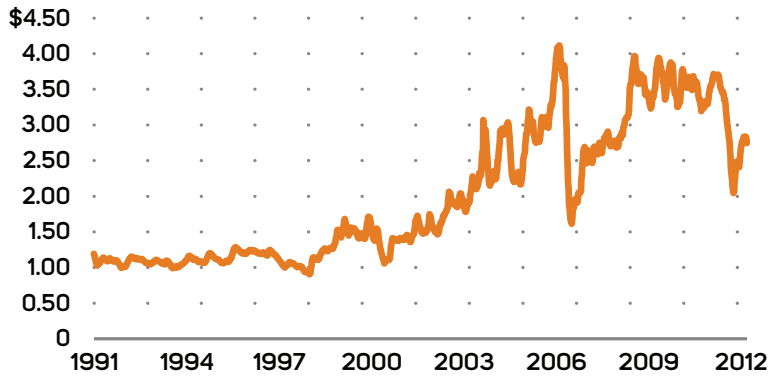
The subject of cross elasticities of demand between retail fuel prices and transit trips has mainly been explored by academics. The University of Texas at El Paso's Bradley Lane (Lane) published a 2002-2009 timeseries based survey of gasoline costs and transit ridership across 33 cities in 2012. He found that fuel price increases of 10 percent corresponded to up to 8 percent increase in rail transit use and a 4 percent rise in bus transit use.[20]

FIGURE 7 US Landed Costs of Crude Oil (Dollars per Barrell)



Source: US Energy Information Administration:

FIGURE 8 National Retail Gasoline Costs, All Grades (Dollars per Gallon)



Source: US Energy Information Administration

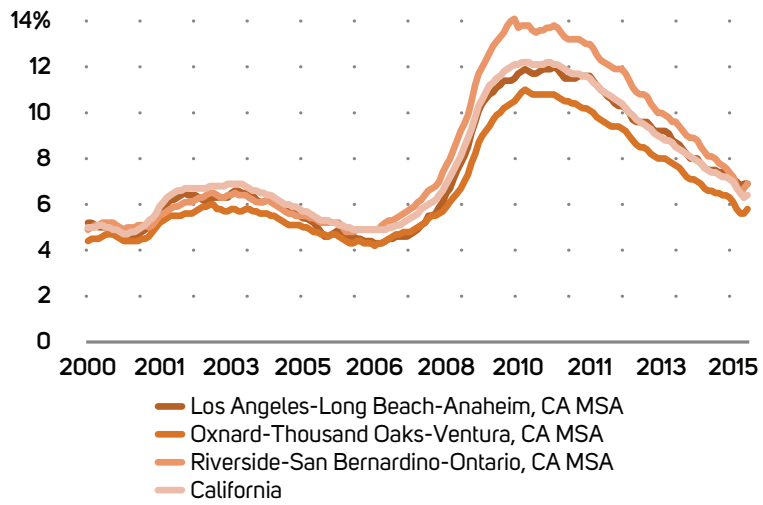
In a separate paper, Lane reported a 0.06 percent gasoline cross elasticity for bus ridership for the LA –Long Beach Santa Ana MSA and a 14.7 percent elasticity for rail ridership, correlating nominal fuel prices with monthly unlinked passenger trips. Southern California's elasticity was among the top 20 percent of the 42 metropolitan areas surveyed. He finds that gasoline prices are among the strongest predictors of ridership.[21]

Iseki and Ali (2014) also found a relationship between fuel prices and transit ridership. Using a panel data regression analyzing monthly unlinked passenger trips in nine metropolitan regions from 2002 to 2011, they found that in the long run, a 10 percent increase in gasoline prices yielded a 1.67 percent ridership increase for bus transit and a 2.05 percent increase for commuter rail. In the short run effects were much less pronounced, at 0.61 percent. Once the $4 per gallon threshold was crossed, effects were more pronounced, with light rail displaying a 9.34 percent change for every 20 percent increase in gasoline prices.[22]

Alam, Nixon and Zhang (2015) surveyed 273 metropolitan areas and found that gasoline prices, fares, service levels, safety and extent of coverage are statistically significant predictors of bus transit ridership and that land use and socioeconomic data were not as strongly correlated with bus transit ridership and did not have statistically significant impacts. Gas prices have the strongest impact of any variable not controllable by a transit agency.

In May of 2015, the Victoria Transport Policy Institute's Todd Littman produced a literature review of a series of cross elasticies of transit demand, examining service levels, fares and vehicle operating costs. He cites the Congressional Budget Office's (CBO) 2008 report "effects of Gasoline prices on Driving Behavior and Vehicle Markets," a survey of 13 highway corridors in California's large metropolitan areas. The CBO reports find that a 20 percent increase in gasoline prices in a corridor with parallel rail transit led to a roughly 0.7 percent average weekday decrease in congestion and increase in ridership, while corridors without rail saw little change. Littman also argues that cross elasticities between vehicle operating costs and transit demand are weak in the short run (0.05) but could possibly increase to 0.3 and 0.4 over the long run. He also finds that cross elasticities on transit ridership tend to experience some delay.

FIGURE 9 Unemployent Trends by MSA



Source: Bureau of Labor Statistics Local Area Unemployment Statistics Program, 2015

THE RECESSION OF 2008-2009

Between December 2007 and December 2010, the six county SCAG Region experienced the deepest and longest recession since the 1930s, with 1 million jobs lost. Even though the recession technically ended over four years ago, California continues to have the third highest unemployment rate in the nation with more than 1.3 million out of work, including over 672,000 in the region (December 2014). **FIGURE 9** tracks unemployment levels across three time periods. The first column displays December 2007, before the recession. The second displays the peak of unemployment in December 2010 and the third unemployment in late 2014. As shown in the graphs to the right and below, unemployment levels are below their peak. However, none have returned to the level prior to the recession.

The impacts of the recession of 2008-2009 on transit operators in the SCAG region were significant. Up until that time, transit ridership nationally was at near modern record levels and had been continually growing in Southern California, as Los Angeles County has continued to add new transit facilities and other operators have continued to increase and improve their services as well.

Beyond our region, fiscal challenges for transit properties were nationwide. Cuts to State and local operating subsidies are forcing transit properties to raise fares, reduce service and lay off employees. According to a March 2011 survey conducted by the American Public Transit Association, of 117 responding agencies 71 percent saw static or decreasing local funding and 83 percent saw static or decreased state funding. Seventy-nine percent of those agencies reduced service after January 2010, and 51 percent had already reduced service prior to January 2010.

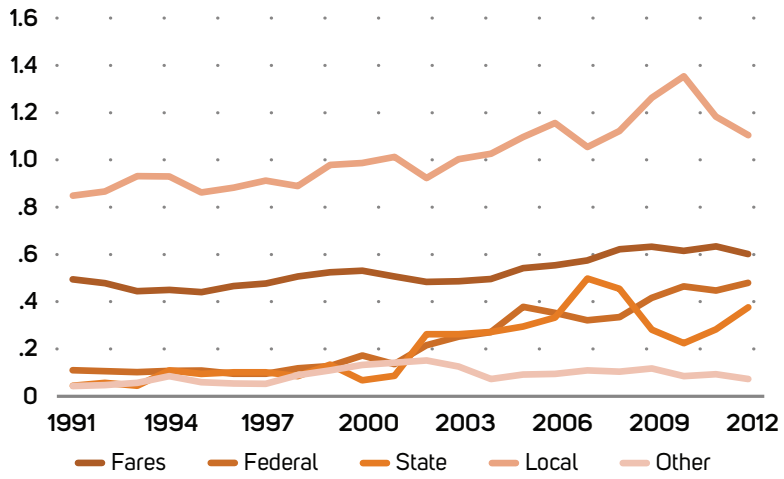
These economic challenges have been felt by public transportation agencies, in our region and nationally. APTA documented the national impacts of the recession in a March 2011 survey of 117 responding transit agencies. Seventy-one percent of respondents saw static or decreasing local funding and 83 percent saw static or decreased State funding. 79 percent of those agencies reduced service after January 2010 and 51 percent had already reduced service prior to January 2010.

As displayed in **FIGURE 10**, the recession also had a significant impact on funding for transit operations in the SCAG region. State revenues dropped precipitously during the recession and local revenues fell significantly in the period of slow growth that followed. Total revenues dropped by nearly 4 percent between FY 2009-2012 and FY 2011-2012.

As part of the technical work of the 2012 RTP, twenty-five transit agencies were surveyed in the SCAG region regarding their boardings, service hours and fares from FY 2008 to FY 2010. Information was also collected for FY 2011. Findings include:

- About half of transit operators cut service hours due to the recession, by between 2 percent and 20 percent. Of those, four agencies have cut service by more than 10 percent.
- Boardings are also generally down, by between 2 percent and 27 percent. Four agencies have seen boardings reduced by more than 15 percent. But again, in the burgeoning areas, it tends to have increased. While Metro Bus ridership is down 5.4 percent, its rail is up slightly in the last two years. The opening of the Metro Gold Line Eastside Extension may be a factor in this growth. Employment is generally the number one factor effecting transit boarding levels.
- Almost all agencies surveyed raised fares, with some still planning additional increases in the coming year. Fare increases generally correspond to a decrease in boardings, at least initially. The amount of decrease varies by operator and the overall structure of the fare adjustment and elasticities for that operator.

FIGURE 10 SCAG Region Overall Operating Revenues (In Billions)



Source: NTD 2012

The above trends continued to affect local transit agencies until very recently. **TABLE 10** displays change in total revenue hours between FY 2008-2009 and FY 2012-2013 for fixed route service, by market segment. In FY 2008-2009 total service hours peaked at 20,098,877 and then dropped nearly 5.2 percent by FY 2010-2011. Total service hours (including demand response) have increased again 2.7 percent by FY 2012-2013, so that the total drop from the pre-recessionary peak is 2.48 percent.

There appears to be a continuing trend as documented in the 2012 RTP/SCS. Service cuts in **TABLE 10** appear most drastic in the agencies with the most robust networks and agencies in rapidly growing areas such as the Inland Empire and Ventura County appear to have added service. Despite massive service cuts to the Metro Bus network, Metro Rail service has grown by nearly 49 percent.

The next section of this appendix, provides a fuller discussion of recent trends regarding the provision and consumption of transit service.

TABLE 10 Transit Service After the Recession

Fixed Route Market Segment	Change in Service Hours, FY 2008-2009 to FY 2012-2013	Percent Change in Service Hours, FY 2008-2009 to FY 2012-2013
Imperial County	-369	-1.14%
LA Munis	-117,945	-3.15%
LTSS	13,296	2.77%
Metro Bus	-789,636	-10.39%
Metro Rail	315,530	49.26%
Metrolink	82,023	32.05%
Orange County	-226,722	-11.05%
Riverside County	10,152	1.51%
San Bernardino County	8,357	1.16%
Ventura County	53,736	22.99%
Total	-651,578	-3.96%

Source: NTD 2013

SERVICE PROVIDED AND CONSUMED

The 2012 RTP/SCS contained an analysis of transit performance trends in FY 2007-2008 and FY 2008-2009, and the subsequent FY 2010-2011 and FY 2011-2012 Transit System Performance Reports focused on analyzing each year's performance. One key finding of these efforts was that the years between FY 2008-2009 and FY 2011-2012 were a period of austerity and downsizing for households and employers in the region and subsequently also for transit agencies. This austerity was the product of the Recession of 2008-2009 and led to cuts in service and dropping demand.

As reported in the FY 2010-2011 Transit System Performance Report and displayed in **FIGURES 11, 13 AND 14,** the 710.9 million trips reported in FY 2010-2011 represent a 6 percent decrease from the FY 2008-2009 data point, and per capita trips have fallen from a high of over 42 in 2005-2006 to 38.8 in 2011-2012.

FIGURE 11 demonstrates basic service provision and consumption measures for the region, as obtained from NTD's 2012 data.

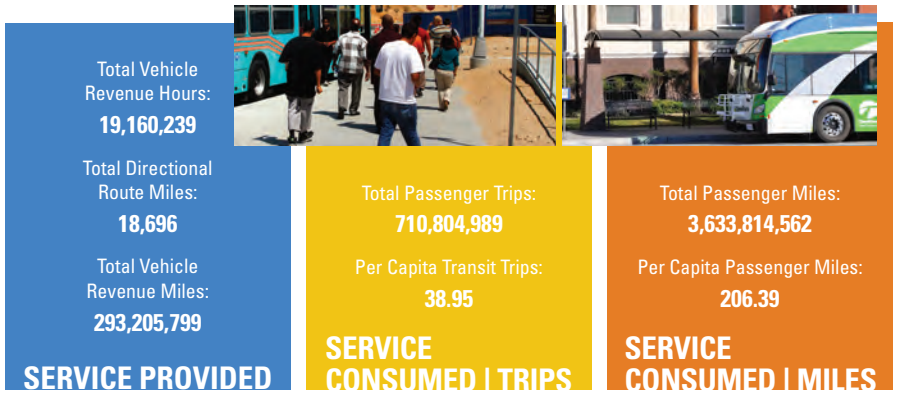
In Fiscal Year 2011-2012, the region's transit agencies provided just over 19 million hours of bus, rail and demand response transit service, along 18,696 directional miles of routes. These service levels along these routes combined to just under 300 million vehicle revenue miles of service. Passengers in the region took just under 711 million unlinked passenger trips on those bus, rail and demand response services and traveled just over 3.6 billion miles on those services.

SERVICE PROVIDED AND CONSUMED: TWENTY YEAR TRENDS

National Transit Database data provides an opportunity to construct time series dating back to 1991. Given that this period contains the enactment of the Americans with Disabilities Act and the onset of Metrolink and Metro Rail service in the SCAG region, it is helpful to look at this timeseries in order to understand the changing nature of transit service provision and consumption in the SCAG region.

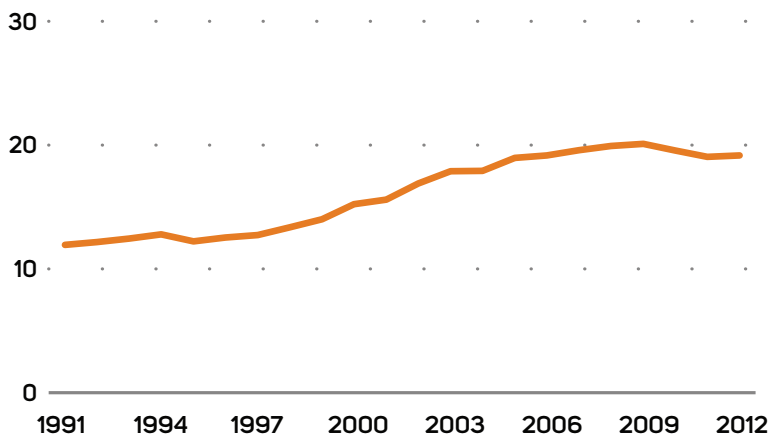
The number of service hours has grown by roughly 60 percent since 1991, but that growth has stagnated since the recession of 2008-2009. See **FIGURE 12**.

FIGURE 11 Characteristics of Transit Service in Scag Region: Service Provision and Consumption in FY 2011-2012



Source: NTD 2012

FIGURE 12 Total Service Hours (In Billions)



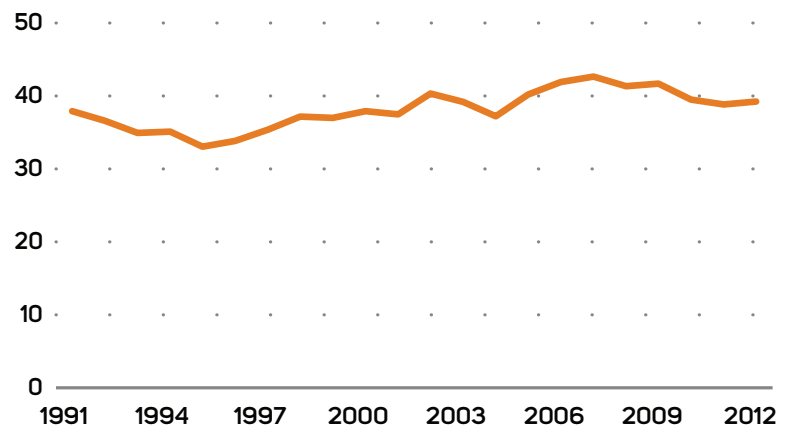
Source: NTD 2012

The declines in productivity evident in **FIGURE 13** and **FIGURE 14** are most likely a product of the increase in service hours over the last 20 years. As service has increased, it is no longer being used as intensely as it was in the early 1990s. Of course, there are valid policy reasons to seek to reduce the number of passengers per hour or mile. For instance, an agency could seek to extend service further into the evening, seeking to provide later return trip options for travelers or to provide mobility for service sector workers who often work well into the evening. Similarly, an agency might determine that the load factors on its runs are too high and seek to provide extra service so that travelers would have more comfortable rides. Passengers per hour are decreasing as displayed in **FIGURE 15**, while the cost per passenger trip is increasing commensurately.

Total transit boardings have grown by about 26 percent since 1991, but are roughly 6 percent below their high point in 2008. As noted above, service cuts and the economic recession have had negative effects on ridership. FY 2011-2012 represents an annual uptick in ridership, a growth of 1.7 percent total trips taken and 0.3 percent per capita trips. This gain is still 7.2 percent below the pre-recession high of 42 per capita trips. A further discussion of more recent trends can be found on page 58.

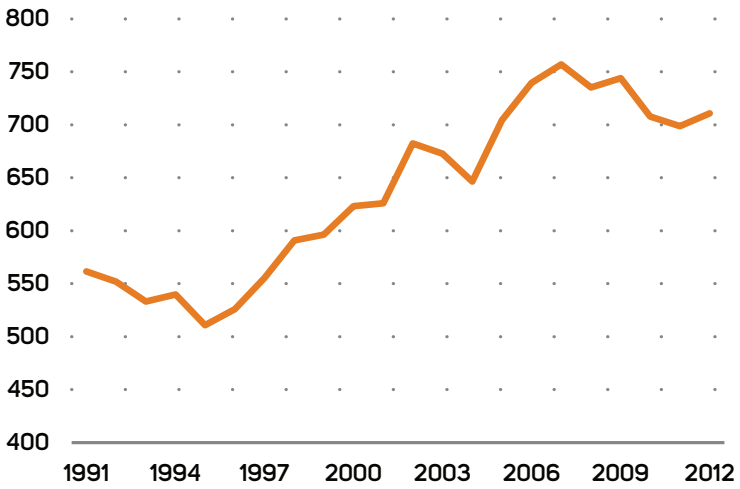
The use of per capita transit trips as a measure of regional performance has a long history at SCAG, dating back to the 2001 RTP. The Transit appendices to the 2001 and 2004 RTPs spell out the region's per capita trip performance targets, as endorsed by the Regional Transit

FIGURE 14 Per Capita Trip Consumption



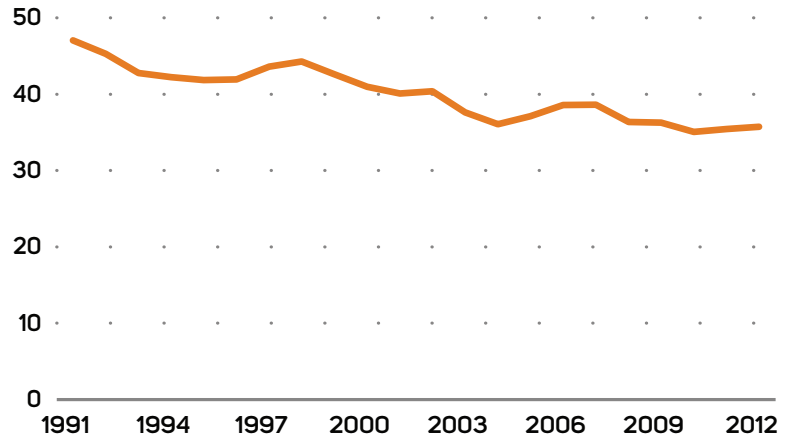
Source: NTD 2012

FIGURE 13 Total Boardings (In Millions)



Source: NTD 2012

FIGURE 15 Passengers Per Vehicle Revenue Hours

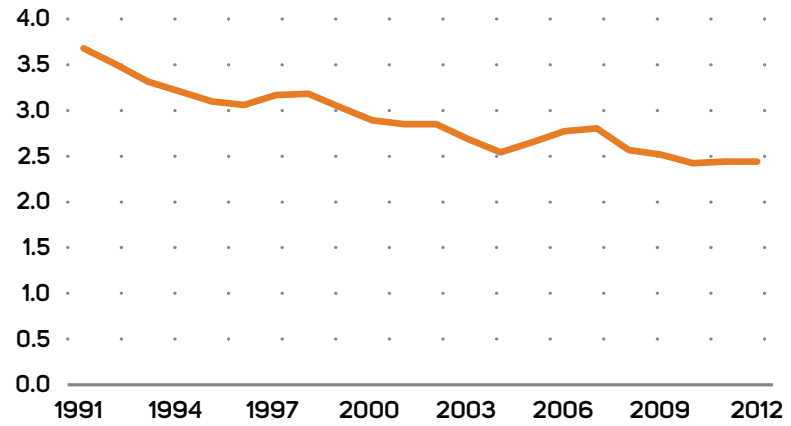


Source: NTD 2012

Task Force (RTTF) and Transportation and Communications Committee (TCC). This goal was 34.9 trips per year, a figure that is being slightly exceeded in FY 2011-2012. However, that goal was enacted in light of the drastic drop in per capita transit trips in the mid-1990s, and represented the 1997 total. The TCC and RTTF hoped to stabilize and maintain total per capita transit trips, and this goal has been achieved.

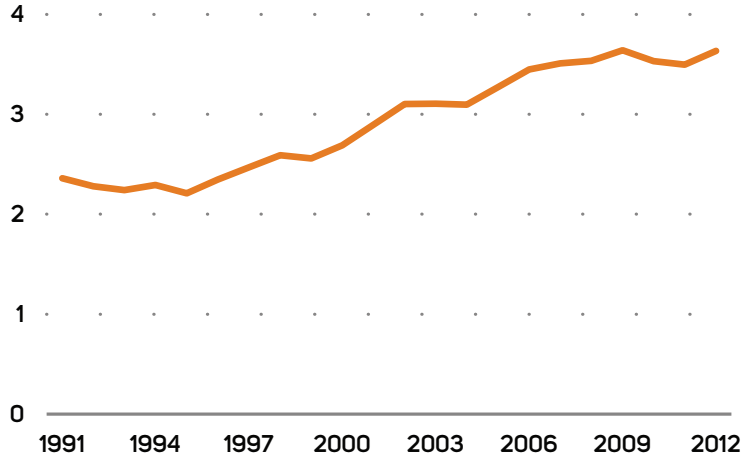
The region's pattern of service provision has changed drastically over the past 20 years, as rail and demand response transportation have become a much greater focus of regional transit provision. Metro Rail, which provided only 4 percent of all vehicle revenue hours in 2012, accounted for 13 percent of all operating expenses and carried roughly 14.3 percent of all trips. Annual per capita passenger miles do appear to be growing though, suggesting a long term trend towards longer transit trips. See **FIGURE 18**.

FIGURE 17 Passengers Per Vehicle Revenue Mile



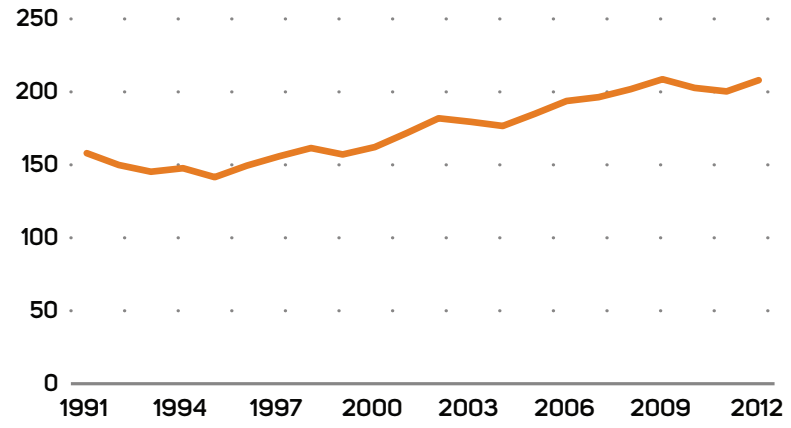
Source: NTD 2012

FIGURE 16 Total Passenger Miles (In Billions)



Source: NTD 2012

FIGURE 18 Per Capita Passenger Miles Traveled



Source: NTD 2012

Passenger miles per seat miles are displayed in **FIGURE 19**. The trend over the last few years has been towards increased passenger miles per seat mile, as service cuts have taken effect, particularly in Los Angeles County.

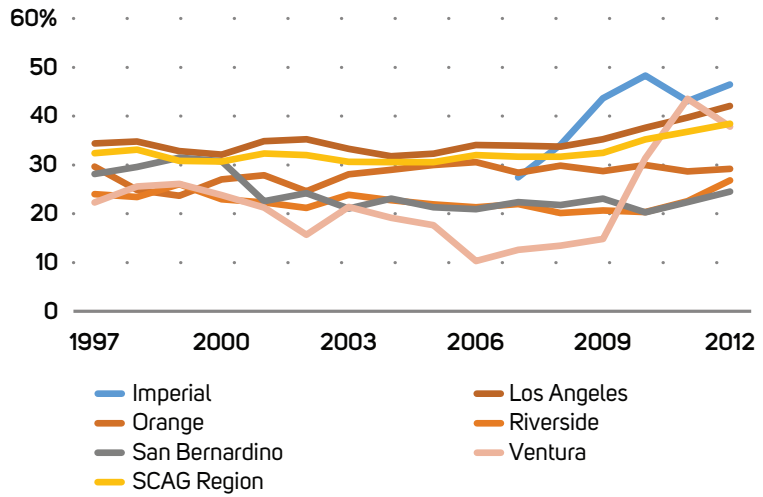
Over the last several RTP cycles, the comparison of passenger miles to seat miles has been used as a measure of transit productivity. This is a common measure of productivity in the commercial aviation industry, where passengers do not regularly board and alight mid trip, and there are no standees. At a high level, this measure can give a sense of how much of the system's capacity is being consumed, though not as effectively as in the aviation industry. This measure was envisioned as a corollary to the RTP highway productivity measure.

Within the transit industry, measures of productivity are most frequently tied to measures of service provided or cost performance. Essentially, agencies seek to balance how much value is being derived from each unit of output. Most typically, passengers per revenue hour or passengers per revenue mile are employed. These measures do not include deadheading, which can skew outcomes negatively, but which are included in the reporting of seat miles.

Furthermore, partners at the Regional Transit Technical Advisory Committee have expressed discomfort with the passenger miles to seat miles measure for some time. Partners from smaller agencies note that the measure of seat miles is closely related to vehicle size, and that where they employ smaller vehicles for operational reasons, load factor performance could be made to look less crowded simply by buying oversized buses. Further, stakeholders felt that if such a measure were established as a standard, it would create incentives to buy unnecessarily large vehicles, with higher maintenance and fueling costs. Direct measures of productivity do not create these incentives, or representations of performance, as they measure service consumption by unit of service provided instead of seats or vehicle size.

As such, direct measures of productivity have been included in this appendix, including passengers per revenue mile and passengers per revenue hour. Moving forward, direct measures of productivity will be used to monitor performance.

FIGURE 19 Ratio of Transit Passenger MilesSeat Miles



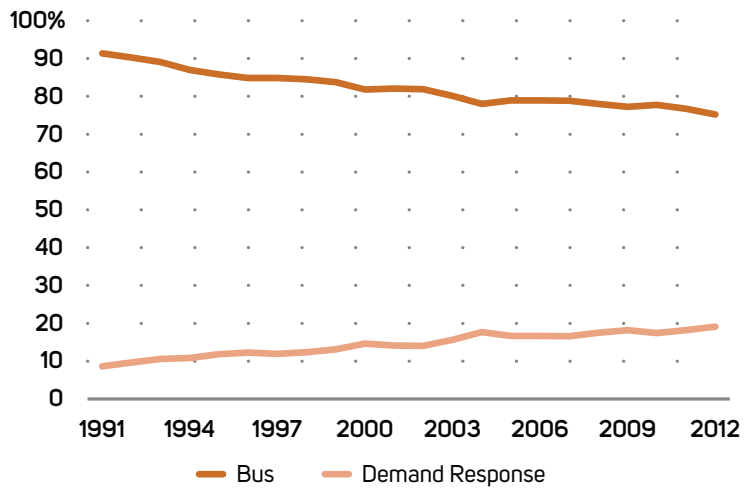
CHANGING PATTERNS OF SERVICE PROVISION

As shown in **FIGURE 20**, the share of vehicle revenue hours devoted to demand response has doubled, from 9 percent in 1991 to 19 percent in 2012. Similarly, the share of operating expenses devoted to demand response also doubled, from 5 percent to 10 percent over the same period, as shown in **TABLE 13** on page 36 of this appendix.

The split of passenger miles traveled by mode has also changed drastically over the past 20 years. In 1991, 99 percent of passenger miles were provided by bus, whereas in 2012 only 69 percent were. In 2012, Metro Rail accounted for 16 percent of all passenger miles and commuter rail for 12 percent, with demand response accounting for 2 percent of all passenger miles. See **FIGURE 21**.

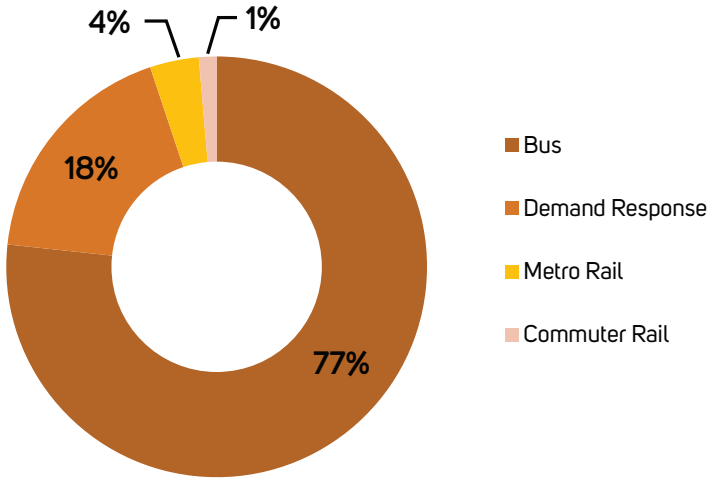
Another key trend in understanding fixed route trip provision is the growing importance of Metro Rail and municipal transit operations. Between 1993 and 2012, Metro Rail service grew from 2 percent to 8 percent of all transit service in Los Angeles County. Similarly, the LA County Munis share of total service hours doubled, from 15 percent to 30 percent. In Orange County, since it began reporting in FY 2006-2007, the Anaheim Transit Network has grown from 4 percent of all Orange County service hours in to nearly 12 percent in FY 2011-2012. See **FIGURE 22**.

FIGURE 21 Modal Share of Service Provided in the SCAG Region



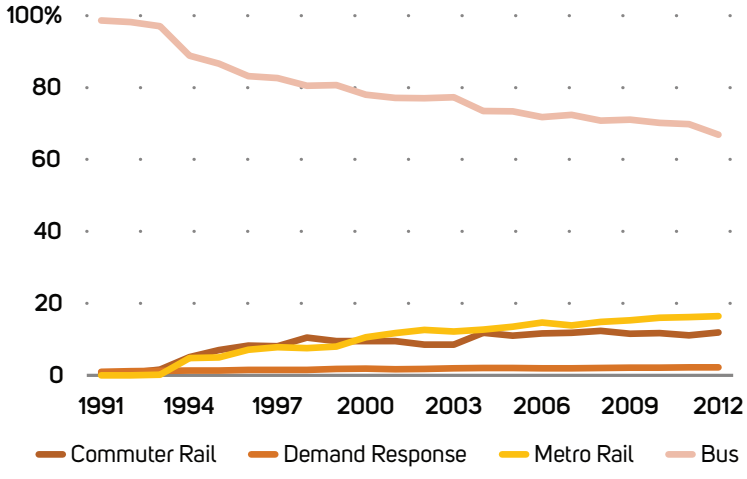
Source: NTD 2012

FIGURE 20 Share of Total Vehicle Revenue Hours By Mode, 2012



Source: NTD 2012

FIGURE 22 Modal Share of Passenger Miles



Source: NTD 2012

EVOLVING TRANSIT MODE SHARES

Since 1991, transit agencies in the SCAG Region have provided about 13.22 billion transit trips, almost 90 percent occurring on buses, 4 percent on heavy rail, 5 percent on light rail and commuter rail and demand response each providing 1 percent.

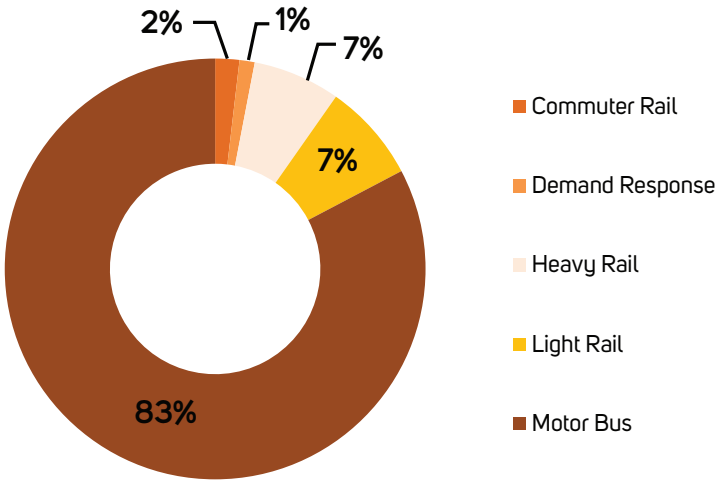
Between 1991 and 2011, there was a massive effort to expand the scope and nature of transit in the region. One strategy has been the proliferation of fixed guideway transit facilities. The NTD defines a fixed guideway as:

- "A public transportation facility using and occupying:
  - A separate right-of-way (ROW) or rail for the exclusive use of public transportation and other high occupancy vehicles (HOV), or
  - A fixed catenary system useable by other forms of transportation."

As of 1990, all regional fixed guideway transit operations consisted of express buses operating in HOV lanes. Between 1991 and 1993, the Los Angeles County Transportation Commission (LACTC), the Southern California Rapid Transit District (RTD) and Metrolink began operating light, heavy and commuter rail service. Similarly, the passage of the Americans with Disabilities Act in 1990 mandated that accessible parartransit be provided to passengers with disabilities within three-quarters of a mile of any fixed route bus service.

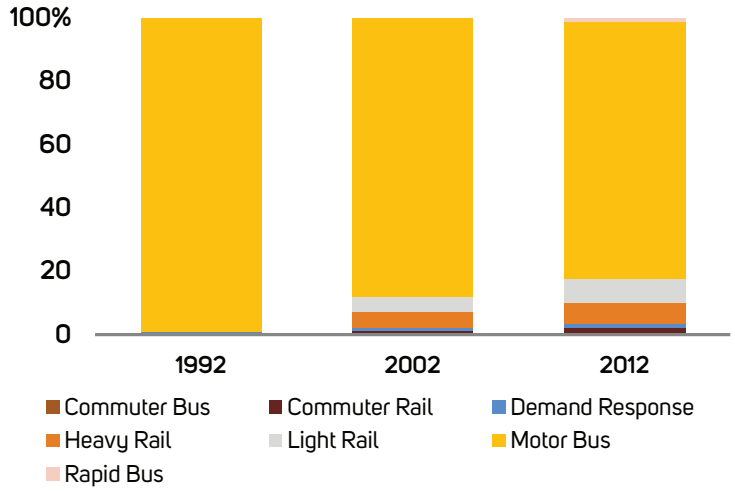
Since the opening of the Metro Blue Line in 1991, rail transit has grown from 1.3 percent of transit trips to about 10 percent in 2002 and to 16 percent of trips in 2012. Conversely, bus trips have declined from 99 percent of trips to 83 percent of trips. Rail transit supplies only 12 percent of all Vehicle Revenue Miles, since the per vehicle capacity of various rail modes is much higher than that of buses. However rail transit services also constitute 21 percent of all operating expenses in the SCAG region. See **FIGURE 24**.

FIGURE 23 SCAG Region Transit Mode Share, 2012



Source: NTD 2012

FIGURE 24 SCAG Region Transit Mode Share, 1992, 2002, 2012



Source: NTD 2012

GEOSPATIAL TRENDS IN SERVICE CONSUMPTION

GEOGRAPHIC DISTRIBUTION OF TRANSIT TRIPS

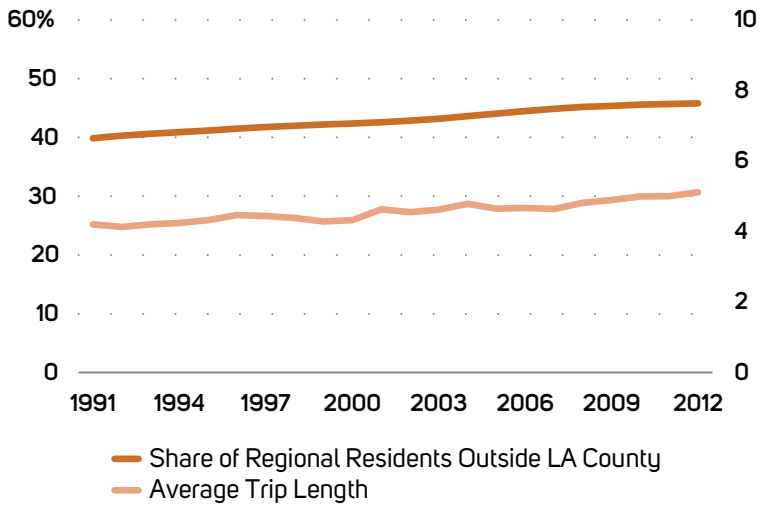
Los Angeles County is the largest and densest county in the region, and it is no surprise that the largest percentage of transit services provided and consumed occur there. However, while Los Angeles County represents slightly more than half of the total population of the SCAG region, it has historically represented over 80-90 percent of total transit ridership.

As demonstrated in **FIGURE 25**, Orange County, while having roughly 17 percent of the region's population, has seen between 8 percent and 12 percent of the total transit trip consumption since 1991. Riverside and San Bernardino Counties, despite both having grown rapidly since 1991, have differing growth patterns in terms of their overall share of regional transit consumption. While San Bernardino County has grown from 1 percent to nearly 3 percent, Riverside County has hovered steadily at roughly 1 percent. Ventura and Imperial Counties represent fairly small portions of the region's overall transit trips. Los Angeles County is not depicted below in order to maintain the scale of the chart.

INCREASING AVERAGE TRIP LENGTH

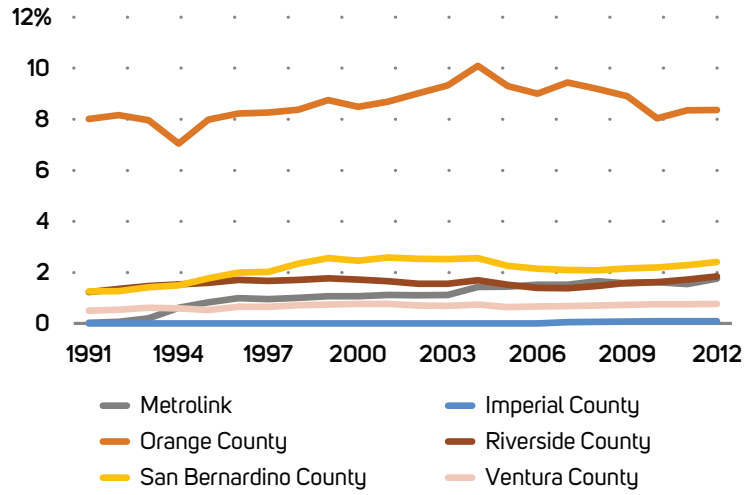
FIGURE 26 details the impact of changes in residential patterns by county on average trip length. As the share of regional residents living in a County other than Los Angeles County has grown from 39.9 percent to 45.8 percent, the average length of a transit trip has grown by 15 percent.

FIGURE 26 Average Trip Length and Residential Distribution by County



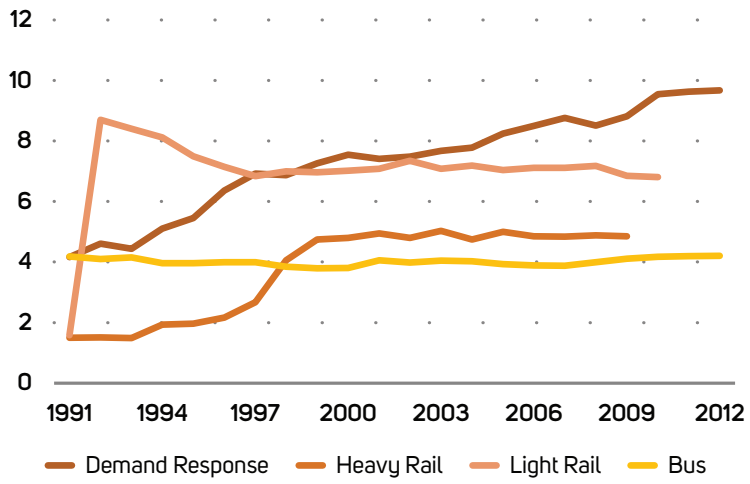
Source: NTD 2012

FIGURE 25 Transit Trip Share All Counties but Los Angeles



Source: NTD 2012

FIGURE 27 Average Trip Length by Mode



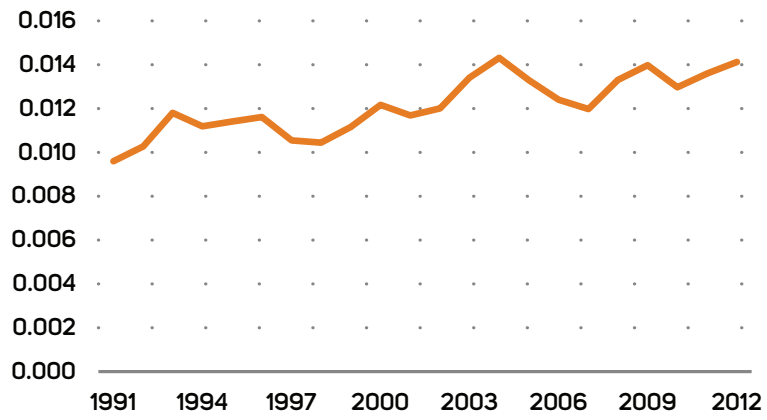
Source: NTD 2012

FIGURE 27 demonstrates the modal breakdown of this growth in average trip length. Newer modes, including commuter rail and light rail, are being used to serve much longer trips and increasing demand response trip lengths reflect new residential distribution patterns. Commuter rail trips have retained an average of nearly 35 miles a trip and range of standard deviation of 2.4 (roughly 7 percent of the mean value). Bus trips have also maintained a mean trip length of four miles, with a standard deviation of .12.

Changes in average rail trip length relate most closely to system expansions by Metro. As new rail corridors enter service, they serve travel markets of varying lengths. The average trip length of light rail transit started at 8.7 miles when the Metro Blue entered service in the early 1990s, serving a relatively longer distance market. The subsequent opening of the Metro Green Line, Metro Gold Line and Metro Gold Line Eastside Extension led to an eventual 21 percent decline in average trip lengths, as those corridors served shorter distance trips.

In contrast, the heavy rail mode shows great growth after the opening of the Metro Red Line Extensions to Hollywood and North Hollywood in 1999 and 2000, respectively. These extensions doubled and then tripled the extent of the regional heavy rail system, from 10 directional route miles, to 20 and then to 32.

FIGURE 28 Demand Response Trip per Fixed Route Trip



Source: NTD 2012

In contrast, demand response trips have seen a radical growth of 232 percent, from just over four miles a trip to nearly 9.5 miles a trip. This is the largest average trip length growth of any transit mode and partially explains the rapid growth of the demand response mode in terms of service hours.

Transit agency stakeholders commented during the draft process that a good way of understanding those changes to demand is the measure of Demand Response trips per fixed route bus trip. **FIGURE 28** captures that measure and also display the rate of demand response trips to all fixed route trips. The average number of demand response trips per fixed route bus trip has grown by 47 percent in the past 21 years. By 2012, the region was providing 0.014 demand response trips for every fixed route bus trip.

SERVICE PROVISION AND CONSUMPTION BY URBANIZED AREA

Within the U.S. Census defined urbanized areas of the SCAG region, there is a similar pattern in the provision and consumption of transit service. These areas exclude rural areas, where relatively small proportions of the region's transit service is provided or consumed. As demonstrated in **TABLE 11** the vast bulk of transit service, trips, passenger miles and operating expenses occur in the Los Angeles-Long Beach-Anaheim UZA. This UZA, containing central Los Angeles County, Northern Orange County and small portions of Riverside and San Bernardino Counties represents the vast bulk of the population of the SCAG Region, with over 12 million residents.

Given its massive size, it's no surprise that the Los Angeles-Long Beach-Anaheim UZA makes up the largest portion of service provided, service consumed and costs. However, the UZA represents approximately 89 percent of all operating costs, while supplying 87 percent of the service hours and carrying 94 percent of all trips. While each individual unit of service might be more expensive to provide within the UZA, it can be concluded that this service is more productive on the whole.

TABLE 11 Share of Service Provision and Consumption by Urbanized Area

	Vehicle Revenue Miles	Vehicle Revenue Hours	Unlinked Passenger Trips	Operating Expenses
Camarillo, CA	0.07%	0.08%	0.01%	0.04%
El Centro-Calexico, CA	0.34%	0.23%	0.09%	0.18%
Indio-Cathedral City, CA	1.14%	1.23%	0.64%	0.89%
Lancaster-Palmdale, CA	1.03%	0.91%	0.44%	0.82%
Los Angeles-Long Beach-Anaheim, CA	85.86%	86.34%	93.75%	90.61%
Oxnard, CA	1.39%	1.41%	0.64%	0.86%
Riverside-San Bernardino, CA	7.61%	7.49%	3.54%	4.95%
Santa Clarita, CA	1.19%	1.05%	0.51%	0.86%
Simi Valley, CA	0.20%	0.22%	0.06%	0.20%
Thousand Oaks, CA	0.31%	0.30%	0.05%	0.17%
Victorville-Hesperia, CA	0.86%	0.74%	0.26%	0.42%
Yuma AZ-CA	0.20%	0.13%	0.03%	0.13%

Source: 2012 NTD

EXISTING CONDITIONS: REVENUES AND COSTS

Cost effectiveness and efficiency are important measures for understanding the performance of transit. Transit capital and operations and maintenance costs total roughly half of the investments in the 2012 RTP/SCS. The annual operating costs of transit service in the SCAG region are significant. In FY 2011-2012, operating costs totaled nearly $2.39 billion and capital investments were slightly over $1.1 billion. See **TABLE 12**.

TABLE 12 Characteristics of Transit Operating Expenditures in SCAG Region

SCAG Region FY 2011-2012: Operating Costs And Revenues from NTD	
Total Operating Expenditures	$2,455,096,615
Vehicle Operations Costs	$1,348,570,441
Vehicle Maintenance	$460,565,064
Non Vehicle Maintenance	$162,374,398
General Administration	$469,429,994
Fare Box Revenues	$638,174,478

Source: 2012 NTD

FIGURE 29 details the proportions of capital funds spent on facilities and the proportions spent on vehicles. According to APTA, in 2007 the nation spent roughly 27 percent of its transit capital funds on vehicle acquisition and roughly 73 percent on the development of facilities, implying that the region is keeping pace with national trends.

HISTORICAL INVESTMENTS

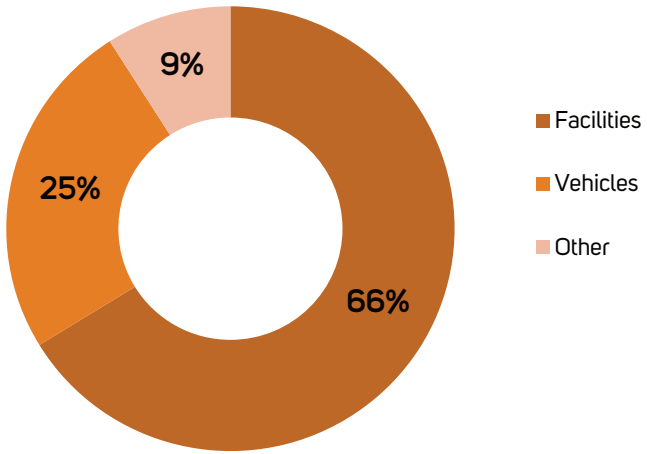
Since 1992, transit agencies have spent $14.67 Billion in 2012 dollars on capital investments: 36 percent for rolling stock; 48 percent for facilities, including passenger stations, guideways, administration buildings and maintenance buildings; and 15 percent for other expenses, including purchased transportation services, communications-information systems and fare collection equipment.

In the period since 1991, transit agencies have spent a further $42.898 billion (2012 dollars) on Operations and Maintenance expenses. Nearly 78 percent of those expenses have been for fixed route bus service, nearly 6 percent each for light rail and commuter rail, 8 percent for demand response and 3.3 percent for heavy rail.

FUND SOURCES

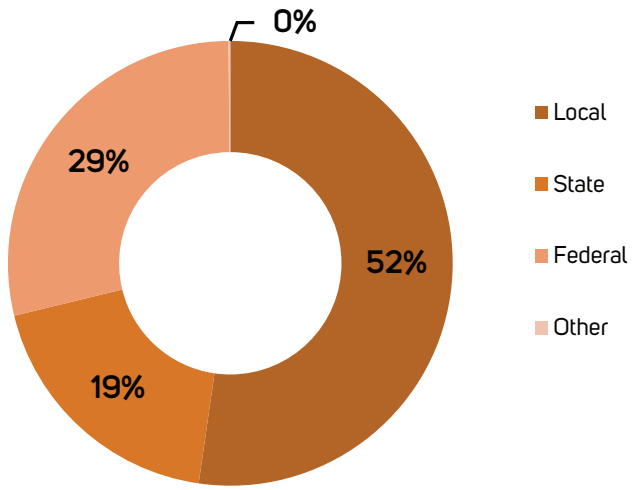
As of FY 2011-2012, local funding makes up just over half of all transit capital funds in the SCAG region. This is consistent with the national trend of diminishing federal shares in transportation funding. However, it should also be noted that one reason the SCAG region is able to fund nearly half its capital budget locally is the success of local option sales taxes for transportation. Five of the six counties in the SCAG region are self-help counties and Los Angeles County has passed a total of three sales tax measures. See FIGURE 30.

FIGURE 29 Transit Capital Expenditures, SCAG Region, FY 2011-2012 (in Millions)



Source: NTD 2012

FIGURE 30 Sources of Capital Funds, FY 2011-2012



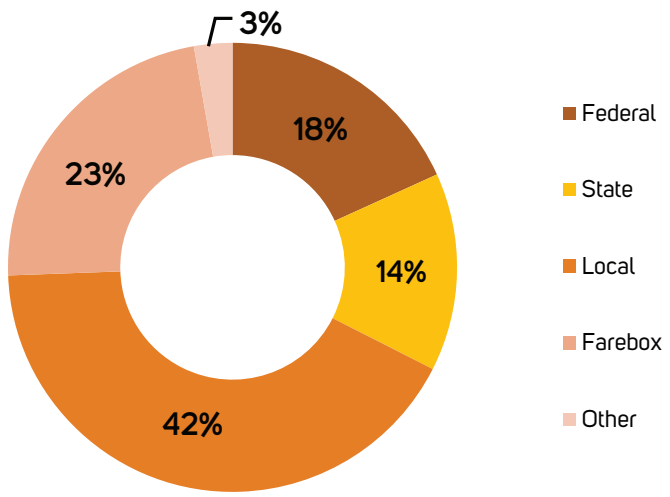
Source: NTD 2012

As demonstrated in **FIGURE 31**, from 1998 to 2003 well over 60 percent of all capital revenues were federal. This period coincides with Metro Red Line extensions to Hollywood and the San Fernando Valley and demonstrates the importance of the region's ability to compete for federal resources. The precipitous decline in state revenues between 2008 and 2012 coincides with declines in Local Transportation Fund (LTF) revenues as documented in the Transit Appendix of the 2012 RTP/SCS.

FIGURE 32 displays total FY 2011-2012 O&M funding for the region's transit properties. In FY 2011-2012 only 32 percent of transit O&M revenues were generated outside the region, with the remaining coming from farebox revenues or other local sources. The 20-year trend for O&M funding is more stable than for capital funding, reflecting the federal government's reluctance to directly support operations in urbanized areas in the Post-Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) era. Declining state revenues in recent years reflect similar trends as declining capital funds.

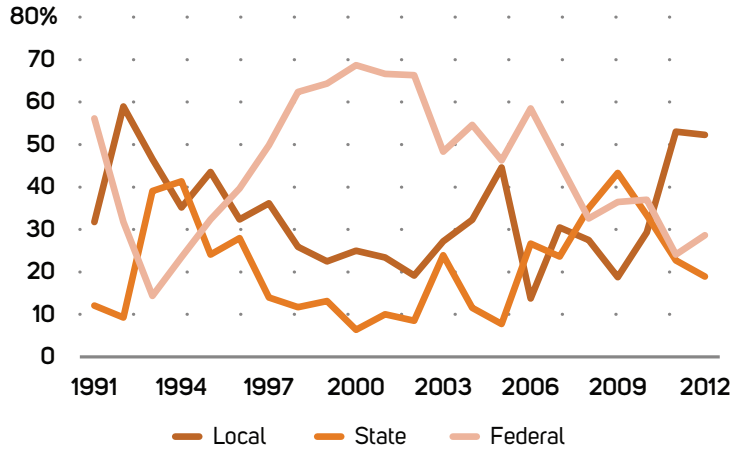
The importance of LTF funds to transit agencies operating budgets is demonstrated in **FIGURE 33**. As state revenues grew beginning in 2000, local monies were freed up for other uses. However, decreases in state funds between 2007 and 2012 have meant that local funds are increasingly important, in addition to causing many operators to cut service.

FIGURE 32 Sources of Operations Revenues, FY 2011-2012



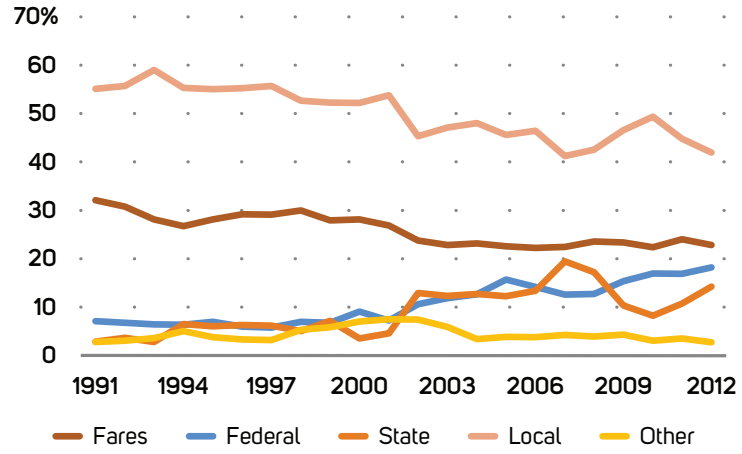
Source: NTD 2012

FIGURE 31 Transit Capital Fund Sources



Source: NTD 2012

FIGURE 33 Trends in Operating Funding



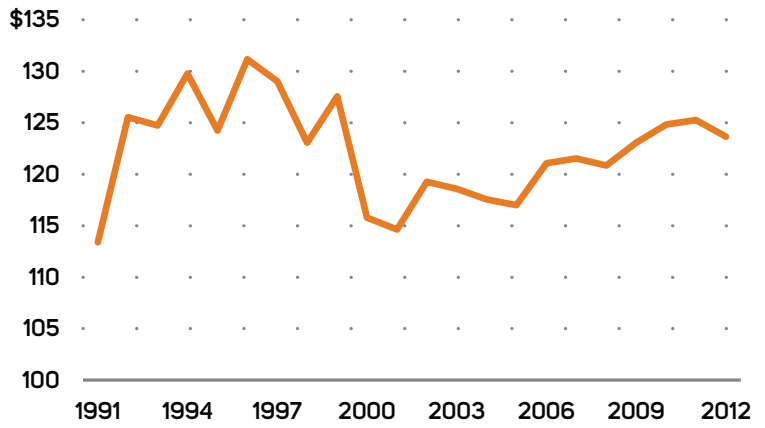
Source: NTD 2012

COST PERFORMANCE

The region's operating costs per revenue hour have fluctuated significantly over the past 20 years but have been steadily increasing over the last decade, while farebox recovery has remained fairly steady. Costs per passenger mile were fairly volatile in the 1990s, but they have been surprisingly steady since 2001, given the rising importance of rail transit in the region. See **FIGURE 35**.

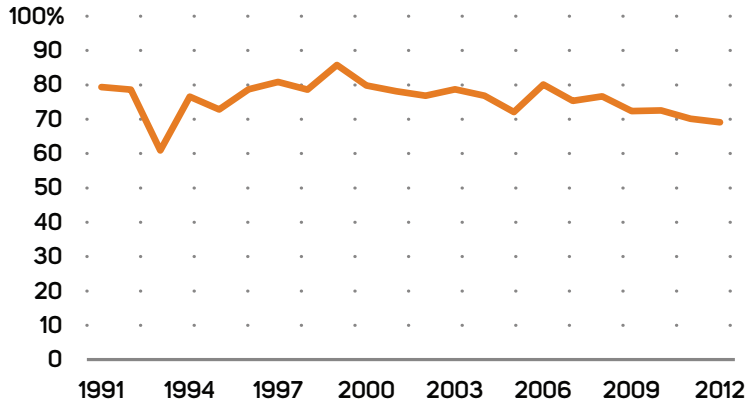
Operating costs per passenger trip have grown by 44 percent since 1991, when indexed for inflation. During the year 2010, when the stress of the recession peaked for the transit system, the cost per trip also peaked at $3.56. See **FIGURE 36**.

FIGURE 35 Operating Costs per Revenue Hour



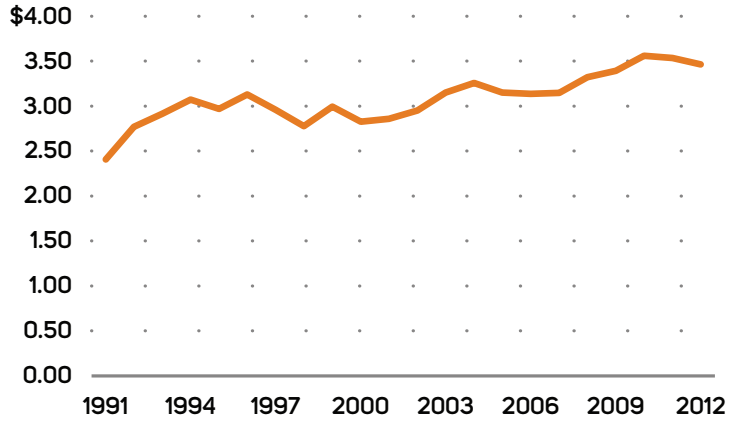
Source: NTD 2012

FIGURE 34 Operations Revenues as a Share of All Revenues



Source: NTD 2012

FIGURE 36 Operating Costs per Passenger Trip



Source: NTD 2012

Costs are rising as the distribution of residents spreads and the average length of transit trips grows. As can be seen in **FIGURE 36**, the average cost of a passenger trip has grown by 47 percent, while the average cost per passenger mile has grown only by 15 percent, as shown in **FIGURE 37**. This confirms that longer, costlier-to-supply trips are growing as a proportion of all transit travel. Operating costs per PMT since 1991 have grown, although they have hovered near $0.70 since 1994.

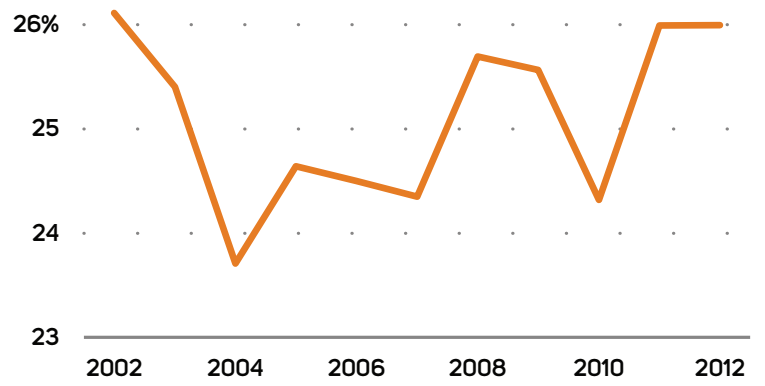
FIGURE 38 outlines the region's farebox recovery performance between 2002, when reporting requirements began, and 2013. The recovery rate has been relatively stable, varying from 26.1 percent in 2002 to just over 26 percent in 2012. Since the aftermath of the recession of 2008-2009, the farebox recovery rate has grown from 24.3 percent to nearly 26 percent.

OPERATING EXPENSES BY TRANSIT MODE

TABLE 13 demonstrates the splits among modes in terms of O&M spending. The region's increasing financial commitment to rail transit and demand response is evident in the period between 1992 and 2012, as total combined spending on rail and demand response modes grew from 5 percent in 1992, to 23 percent in 2002 and to 29 percent in 2012.

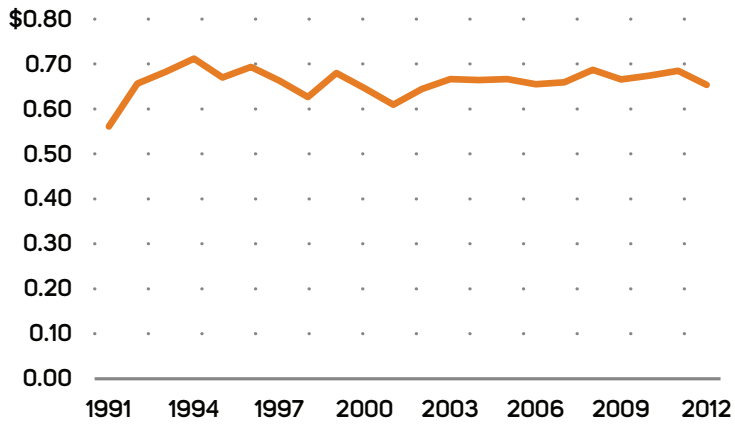
Transit faces significant funding challenges in the SCAG region. While five of the six counties in the region have passed or extended local option sales taxes dedicated to transportation within the last decade, state and federal revenues for transit have been

FIGURE 38 Farebox Recovery, 1991-2012



Source: NTD 2012

FIGURE 37 Operating Costs per Passenger Mile



Source: NTD 2012

TABLE 13 Operating Expenses by Mode 1992, 2002, 2012

	1992	2002	2012
Commuter Bus	0%	0%	1%
Commuter Rail	0%	6%	7%
Demand Response	5%	8%	10%
Heavy Rail	0%	4%	4%
Light Rail	0%	5%	8%
Motor Bus	95%	76%	68%
Rapid Bus	0%	0%	1%

Source: NTD 2012

diminishing, particularly from the State Transit Assistance (STA) and Local Transportation Fund (LTF). These two funds provide transit operations funding, and if they continue to diminish strategies for transit in the SCAG region will need to be geared toward low-cost incremental improvements, operational enhancements, and policies that increase access to transit rather than increasing transit service to appropriate levels and corridors to meet passenger demand.

These positive developments have been significantly impacted, however, by recent revenue declines and cutbacks in funding. As mentioned above, the Great Recession and its anemic recovery have led to serious fiscal challenges for our transit operators. Since FY 2007-2008, transit providers within the SCAG region have seen a decrease in STA funds of about $759 million. LTF allocations for FY 2009-2010 were 21 percent lower than FY 2006-2007. By February of 2011, half of the surveyed agencies had cut service by between 2 percent and 20 percent. Of those, four agencies had cut service by more than 10 percent. During this same period, 14 out of 25 of these operators had seen their boardings fall between 2 percent and 27 percent. Of those, four agencies had boardings fall by more than 15 percent. To offset this large revenue decline, nearly all operators have raised fares. While this has increased fare revenues in the region, it does not provide an incentive for increased passenger boardings.

Coupled with the revenue setbacks, costs for transit providers are heading in the opposite direction by rising faster than inflation. Each mode has shown cost per passenger miles traveled (PMT) increase over the past decade: bus service by 24 nearly, Metro Rail by 41 nearly and Metrolink by 48 nearly. Transit providers' fare revenue has decreased from 32 nearly of the cost of providing service to just 27 nearly since 2000.

These cost and revenue trends weaken the long term stability of transit services in the SCAG region. Unless transit operators in our region find ways to improve the fare revenue to cost ratio, transit services will require much greater subsidies or services will continue to be cut. This conflict will grow as new operational funds will need to be applied towards new capital projects currently in development once they are ready for revenue service.

CONTEXTUALIZING REGIONAL TRANSIT PERFORMANCE

SYSTEM PERFORMANCE: BENCHMARKING TO PEER REGIONS

The performance of the region's transit system can also be contextualized through performance benchmarking. Doing so establishes a frame of reference for the cost effectiveness of current operations, and identifies areas where other regions are providing service at a lower cost. Further, doing so will allow regional stakeholders to identify areas of possible improvement and to identify peer regions and peer agencies that might provide best practices examples.

Performance benchmarking through peer comparison is relatively new in transit;peer comparison exercises by public agencies are more commonly performed in the education and public safety fields. Increasingly though, transit properties are using the availability of National Transit Database (NTD) data to measure agency performance in comparison to peer agencies. It is also an emerging practice at the regional level.

Over the past ten years, several performance benchmarking exercises have been performed at the system level by regional bodies. Beginning in 2003, The Metropolitan Council of Minneapolis has added a benchmarking component to its quadrennial transit system performance audit. The Atlanta Regional Council (ARC) performed similar analysis in 2005, focusing on peer regions with similar populations, growth rates, density and travel characteristics. The State of Illinois Department of Transportation's Performance Audit of Mass Transit Agencies in Northeastern Illinois: RTA, CTA, Metro and Pace, included comparison of each mode in the region with five peer services.

Methodology

Previously, SCAG has performed performance benchmarking activities in the context of the State of the Region Report, where our region's performance was measured and compared along a broad axis of multi-sectoral indicators. Historically, the peer group in this analysis has been regions with populations over five million. For the purposes of this exercise, that peer group metric has been retained. Using US Census 2013 estimates, a peer cohort of eleven Combined Statistical Areas (CSAs) with more than five million residents was identified.

The Office of Management and Budget created the Combined Statistical Area in 2000 and currently recognizes 169 CSAs composed of 524 statistical areas. The OMB characterizes CSAs as "representing larger regions that reflect broader social and economic interactions, such as wholesaling, commodity distribution and weekend recreation activities and are likely to be of considerable interest to regional authorities and the private sector." Combined Statistical Areas are often an amalgamation of adjacent Metropolitan and Micropolitan Statistical Areas. Since they reflect connectivity between contiguous Metropolitan Statistical Areas, CSAs can be a valuable comparison geography for large metropolitan areas such as the SCAG region. See **TABLE 14**.

Using data provided by the National Transit Database at the Urbanized Area (UZA) level, various reporters were attached to a peer region at the CSA level. These data were examined in the context of variables that were identified as important by stakeholders during the FY 2011-2012 Transit System Performance Report process.

Peer Regions Context

Population and Transit Expenditures

The peer regions group contains 115 million residents as of the 2013 Census estimates, more than one-third of the national population. The peer group also represents a significant portion of the nation's transit investment, service and ridership. There are 279 separate agencies reporting data within the peer regions comparison group, across a variety of transit modes. To contextualize, the table below presents the amount of service and productivity of various modes in the peer regions comparison group. The group spends an enormous amount of its transportation resources on public transportation, including a combined $39.043 billion in FY 2011-2012. See **TABLE 15**.

TABLE 14 Peer Regions CSAs

Peer Region	Combined Statistical Area	Population
New York-New Jersey	New York-Newark, NY-NJ-CT-PA CSA	23,368,541
SCAG Region	Los Angeles-Long Beach, CA CSA	18,213,775
Chicago	Chicago-Naperville, IL-IN-WI CSA	9,891,237
Miami	Miami-Fort Lauderdale-Port St. Lucie, FL CSA	6,375,718
Philadelphia	Philadelphia-Reading-Camden, PA-NJ-DE-MD CSA	7,129,715
Dallas-Fort Worth	Dallas-Fort Worth, TX-OK CSA	7,097,014
Houston	Houston-The Woodlands, TX CSA	6,369,855
Washington-Baltimore	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA CSA	9,334,630
Atlanta	Atlanta–Athens-Clarke County–Sandy Springs, GA CSA	6,088,358
Boston-Providence	Boston-Worcester-Providence, MA-RI-NH-CT CSA	7,991,835
Detroit	Detroit-Warren-Ann Arbor, MI CSA	5,311,778
The Greater Bay Area	San Jose-San Francisco-Oakland, CA CSA	8,364,559

Source: 2010 US Census, 2012 NTD

TABLE 15 Peer Regions Total Combined Transit Expenditures

Peer Region	Total Combined Transit Expenditures FY 2011-2012
New York-New Jersey	$17,750,397,725
Washington-Baltimore	$3,929,929,850
Southern California	$3,586,720,128
Greater Bay Area	$3,463,710,654
Chicago	$3,025,985,517
Boston-Providence	$1,983,084,797
Philadelphia	$1,696,803,066
Houston	$894,431,244
Miami	$845,767,313
Dallas-Fort Worth	$840,854,221
Atlanta	$645,869,305
Detroit	$379,935,783
Peer Regions Total	$39,043,489,603

Source: 2012 NTD

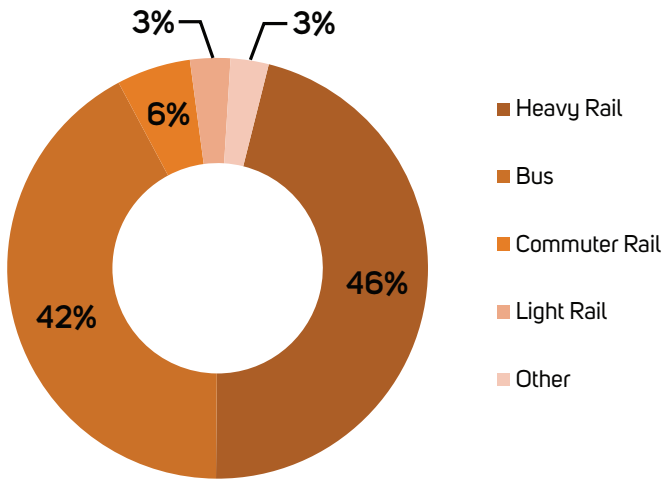
Modes of Service

Heavy rail and local bus service dominate the service provided and consumed in the peer regions group. Bus services makes up roughly half of all service provided and heavy rail 20 percent. Demand response constitutes another 17 percent. The distribution of total revenue hours in FY 2011-2012 is displayed in **FIGURE 39**.

Similarly, **FIGURE 40** displays the importance of bus service and heavy rail service in providing mobility. Bus trips make up 42 percent of all trips in the group and heavy rail trips constitute 46 percent of all trips in the group.

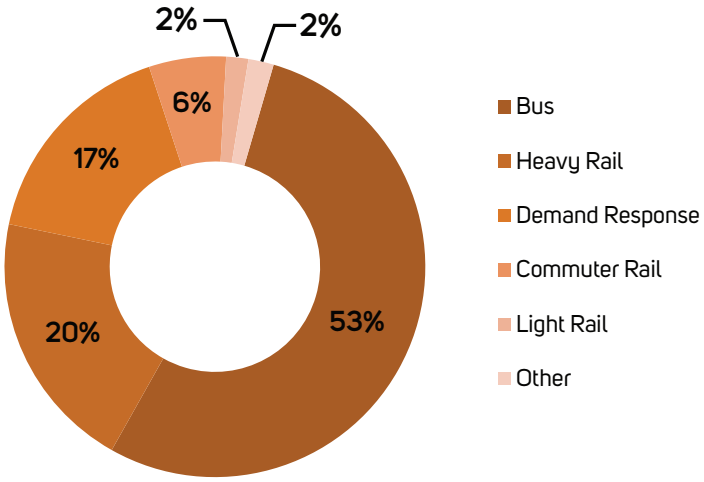
These findings help to mark a clear distinction between regions with extensive heavy rail networks and those without. **FIGURE 41** outlines the ration between bus and heavy rail revenue hours in each of the regions. In those regions where the ratio exceeds .20, differences in cost and productivity begin to appear.

FIGURE 40 Unlinked Trips by Mode



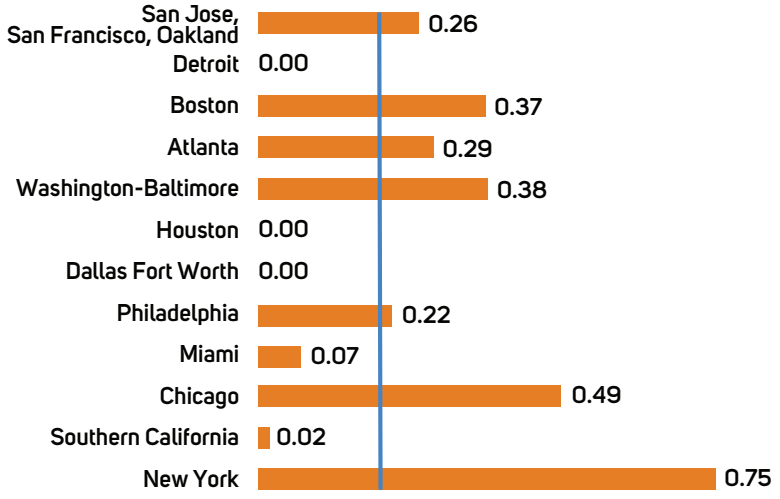
Source: NTD 2012

FIGURE 39 Revenue Hours in Peer Regions by Mode, FY 2011-2012



Source: NTD 2012

FIGURE 41 Ration of Heavy Rail Service to Bus Service



Source: NTD 2012

System Level Performance

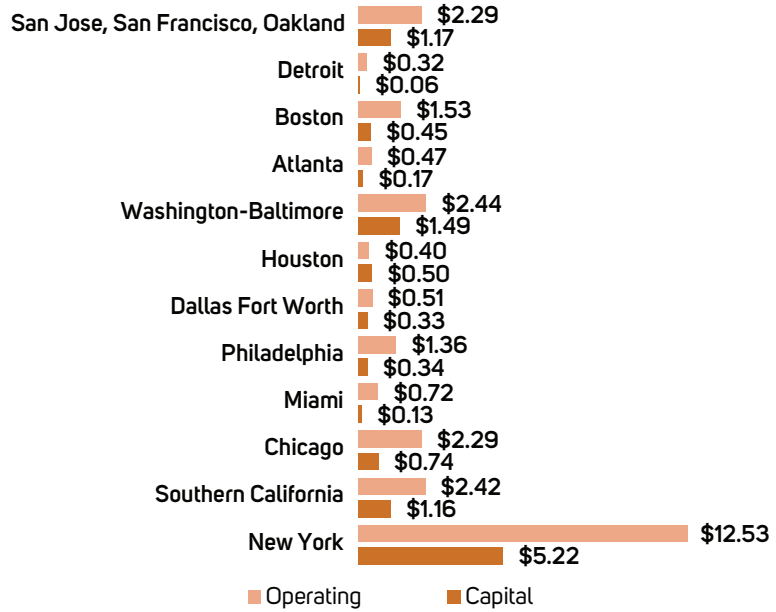
Peer Regions: Funding and Service Provided

The peer regions group offers just over three quarters of the nation's transit service and expends just over 66 percent of the nation's total operating dollars. As mentioned above, the group spent just over $39 billion dollars on transit in FY 2011-2012.

FIGURE 42 displays the breakdown of how those funds are spent across the regions. As seen below, New York-New Jersey dominates all spending on transit. Only Washington-Baltimore and the Greater Bay Area are competitive with Southern California's Capital spending. Similarly, only Chicago, Washington-Baltimore and the greater Bay Area compete with Southern California on operations and maintenance spending.

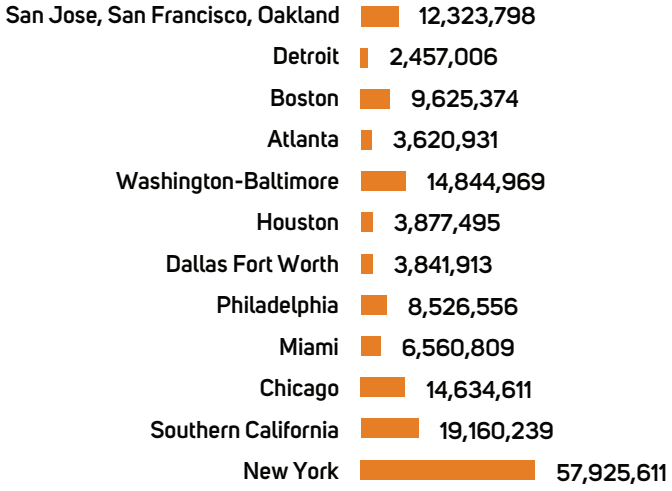
The peer regions provided a grand total of 157 million revenue hours of service in FY 2011-2012. New York-New Jersey provide roughly a third of that service, with 57.9 million hours reported. The SCAG provided the second highest total amount of service, with 19 million hours. As displayed in **FIGURE 43** Chicago, Washington-Baltimore and the greater Bay Area also provided more than 10 million revenue hours of service. Detroit provided the least, with just less than 2.5 million hours.

FIGURE 42 Peer Regions Capital and Operating Expenditure, FY2011-2012 (in Billions)



Source: NTD 2012

FIGURE 43 Peer Regions Vehicle Revenue Hours, FY 2011-2012



Source: NTD 2012

Peer Regions: Service Consumed

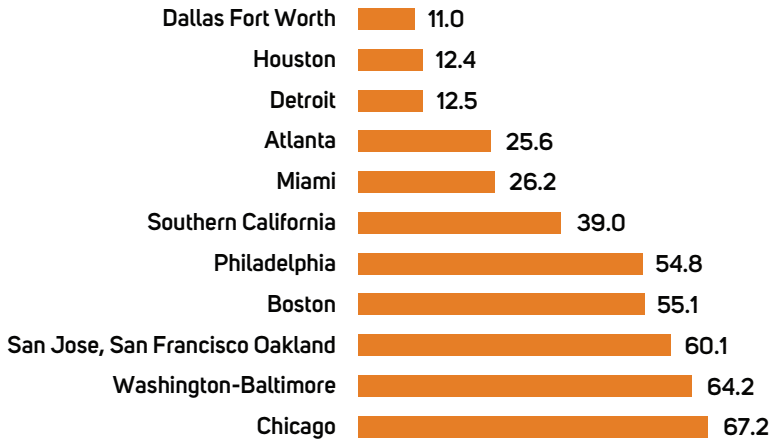
As previously mentioned, per capita trip making has been a historically important measure at SCAG and has been included in the system level performance analysis since SCAG's Transportation and Communications Committee endorsed it in 2001. Recently, stagnating per capita trip making, as documented in the FY 2011-2012 Transit System Performance Report, has been identified as a key issue for further investigation.

FIGURE 44 displays a comparison of per capita trip making across the peer regions group, using July 1, 2012 population projections at the CSA level provided by the U.S. Census. As displayed above, the SCAG region is solidly in the bottom half of per-capita trips taken. Despite being third in total combined spending on public transportation, the SCAG region is seventh in per capita trips.

FIGURE 45 excludes the New York–New Jersey region, whose 180 annual trips are more than two-and-a-half times as high as Chicago, the measure's second place performer. The SCAG region is the seventh largest provider of per capita trips in the group. This should be understood in the context that the SCAG region is the second largest provider of revenue hours and expended the third largest combined funds of the group.

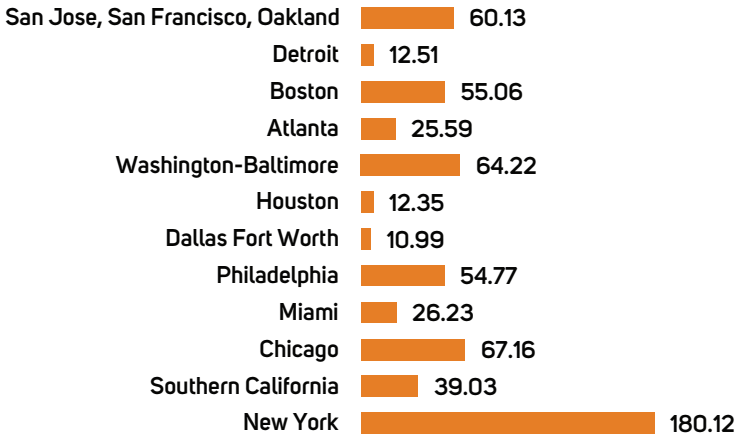
FIGURE 46 displays unlinked passenger trips per vehicle revenue hour for the peer regions. The SCAG region's productivity is in the higher end of the bottom half of the distribution, roughly competitive with Washington-Baltimore.

FIGURE 45 Peer Regions per Capita Trips Excluding New York, FY 2011-2012



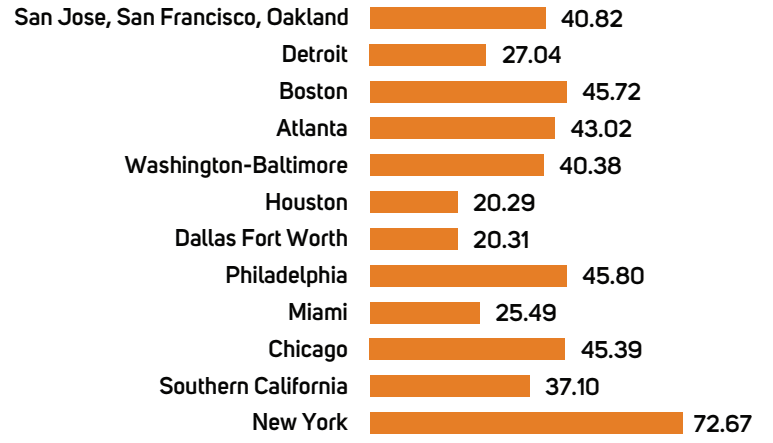
Source: NTD 2012

FIGURE 44 Peer Regions per Capita Trips, FY 2011-2012



Source: NTD 2012

FIGURE 46 Peer Regions Unlinked Passenger Trips per Vehicle Revenue Hour, FY 2011-2012



Source: NTD 2012

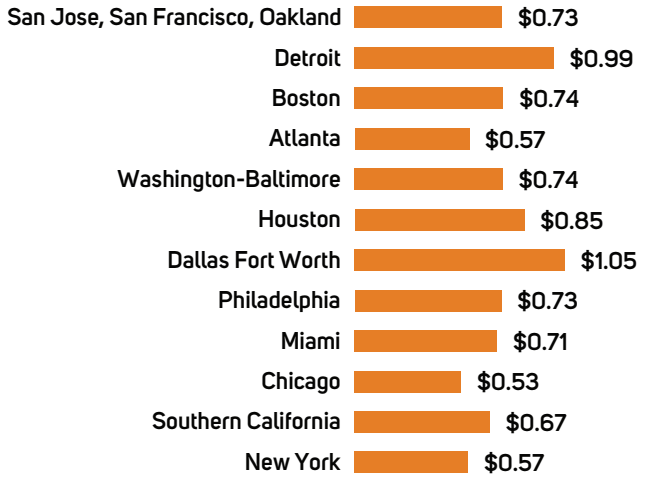
Cost Performance

The region's operating cost per unlinked passenger trip performance is displayed below in **FIGURE 47**. The cost per trip is very competitive, and among the top half of performers in the group.

The region's operating cost per passenger mile traveled performance is displayed in **FIGURE 48**. The cost per trip is competitive, especially compared to other regions that are not highly reliant on heavy rail and commuter rail, such as Houston, Dallas, Miami, Washington-Baltimore and Atlanta.

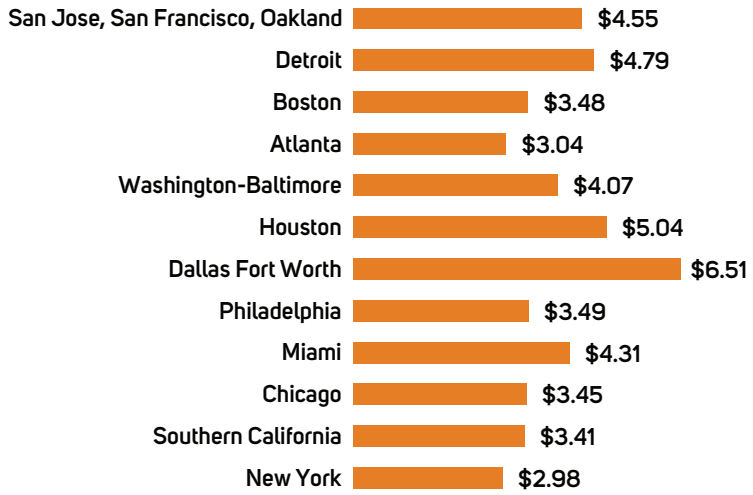
FIGURE 49 displays operating costs per vehicle revenue hour for the peer regions. The region's performance is among the lower third in operating costs, though regions with large heavy rail systems, such as New York, Chicago, Washington-Baltimore and the greater Bay Area, tend to have the highest per-hour operating costs.

FIGURE 48 Peer Regions Operating Cost per Passenger Mile Travelled, FY 2011-2012



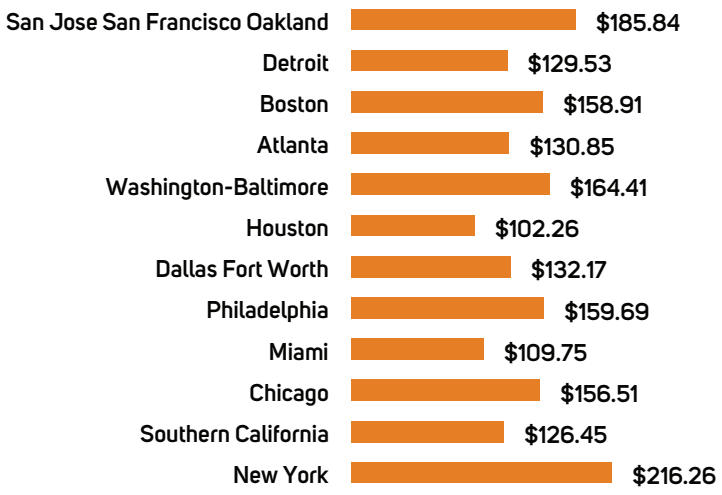
Source: NTD 2012

FIGURE 47 Peer Regions Operating Cost per Unlinked Passenger Trip, FY 2011-2012



Source: NTD 2012

FIGURE 49 Peer Regions Operating Cost per Revenue Hour, FY 2011-2012



Source: NTD 2012

DEMAND RESPONSE PERFORMANCE BENCHMARKING

Another key area for additional investigation identified in the FY 2011-2012 Transit System Performance Report was the growing average trip lengths for the demand response mode. As displayed **TABLE 16,** the SCAG region is the second largest provider of demand response trips in the group and provides nearly two-and-a-half times the median number of demand response trips.

FIGURE 50 displays the ratio of demand response trips to fixed route bus trips among the peer regions in FY 2011-2012. The FTA's rulemaking process surrounding the mobility and access portions of the Americans with Disabilities Act mandates that:

> **(a)** Service Area—(1) Bus. (i) The entity shall provide complementary paratransit service to origins and destinations within corridors with a width of three-fourths of a mile on each side of each fixed route. The corridor shall include an area with a three-fourths of a mile radius at the ends of each fixed route.
>
> **(ii)** Within the core service area, the entity also shall provide service to small areas not inside any of the corridors but which are surrounded by corridors.
>
> **(iii)** Outside the core service area, the entity may designate corridors with widths from three-fourths of a mile up to one and one half miles on each side of a fixed route, based on local circumstances.
>
> **(iv)** For purposes of this paragraph, the core service area is that area in which corridors with a width of three-fourths of a mile on each side of each fixed route merge together such that, with few and small exceptions, all origins and destinations within the area would be served.

Citation: 49 CFR 7.121

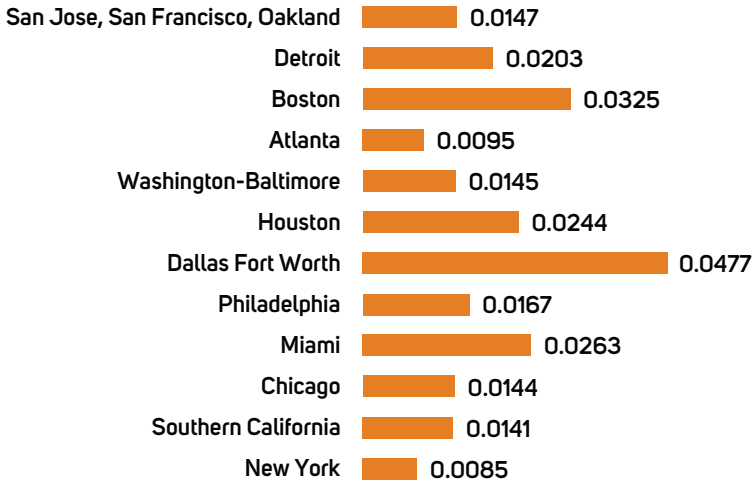
The finding discussed previously and illustrated in **FIGURE 27** on page 30, that demand response trip lengths have nearly doubled in the last twenty years, has also been a cause for concern among stakeholders. As displayed in **FIGURE 51,** however, demand response trip lengths in the SCAG region do not seem exceptionally long when compared with the peer regions. The SCAG region's average trip length is only 7 percent higher than the aggregated total for the peer regions group.

TABLE 16 Peer Regions Demand Response Overview

Region	Total Demand Response Trips FY 2011-2012	Demand Response Passenger Miles FY 2011-2012
New York-New Jersey	10,457,140	93,057,088
Southern California	8,301,830	79,993,537
Chicago	5,030,637	39,366,827
Boston-Providence	4,951,240	34,516,082
Washington-Baltimore	3,962,247	30,889,130
Miami	3,470,151	41,312,946
Philadelphia	3,385,249	28,513,462
San Jose, San Francisco, Oakland	3,246,924	30,043,260
Dallas Fort Worth	2,191,252	23,326,048
Houston	1,603,851	18,816,362
Detroit	1,275,117	10,958,672
Atlanta	785,390	8,736,939

Source: NTD 2012

FIGURE 50 Peer Regions Demand Reponse Trips Per Bus Trips, FY 2011-2012



Source: NTD 2012

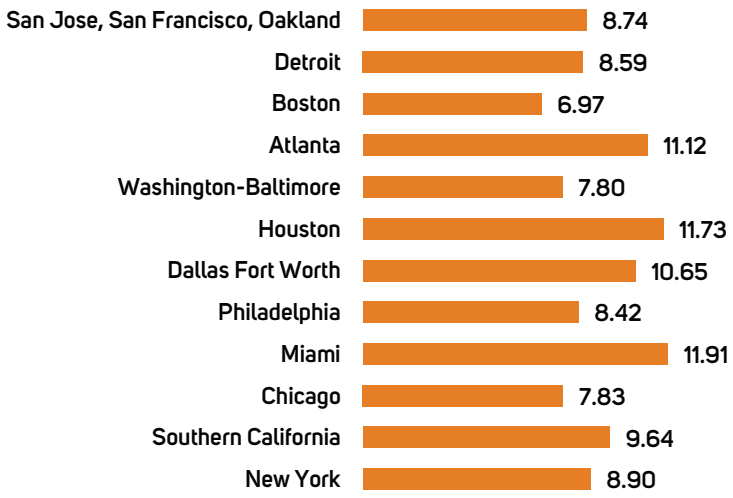
Demand response trips per fixed route bus trip is a measure that provides a sense of how frequently paratransit services are being used in the context of total trips and the extent to which each fixed route trips subsidizes a demand response trip. As seen **IN FIGURE 50,** the region is performing very well in terms of total demand response per fixed route consumption.

RANKING THE REGION'S PERFORMANCE

TABLE 17 presents a ranking of the region's performance among the various CSAs examined here, along five categories of measures. Given that the SCAG region is the second largest in the country, we should expect that its performance would be in the top half on measures that are impacted by population.

Measures of funding and service provided are sensitive to the size of the overall population, and we should expect that the region would perform well. As displayed above, the region ranks third on total operating expenditures, and combined expenditures and fourth on capital expenditures. The region ranks second on total revenue hours provided.

FIGURE 51 Peer Regions Demand Response Average Trip Length FY2011-2012



Source: NTD 2012

TABLE 17 Benchmarking Assessment of Regional Performance

Benchmarking Assessment of Regional Performance		
Benchmarked Performance Measure		**Ranking Among Peer Regions**
MEASURES OF FUNDING AND SERVICE PROVIDED	Populations Estimates 7/1/2012, US Census	2
	Total Operating Expenditures	3
	Capital Expenditures	4
	Total Expenditures Combined	3
	Vehicle Revenue Hours	2
MEASURES OF SERVICE CONSUMED	Unlinked Passenger Trips	2
	Passenger Miles Travelled	3
	Per Capita Trips	7
	Unlinked Passenger Trip per Vehicle Revenue Hour	8
	Passenger Miles Travelled per Vehicle Revenue Hour	8
COST PERFORMANCE MEASURES	Operating Cost per Unlinked Passenger Trip	3
	Operating Cost per Passenger Mile Travelled	3
	Operating Cost per Revenue Hour	3
CONSUMPTION BY MODE	Combined Bus Unlinked Passenger Trips	2
	Demand Response Unlinked Passenger Trips	2
	Heavy Rail Unlinked Passenger Trips	8
	Light Rail Unlinked Passenger Trips	3
	Commuter Rail Unlinked Passenger Trips	7
DEMAND RESPONSE SPECIFIC MEASURES	Demand Response Passenger Miles	2
	Demand Response Average Trip Length	2
	Demand Response Trips per Bus Trips	2

Source: 2012 NTD

In the categories of aggregate service consumed, the region is ranked second on total unlinked trips and third on passenger miles. The region ranks eighth on per capita trip consumption, however, meaning that its competitiveness is largely a function of size and that the average resident is taking relatively few transit trips.

Moreover, in terms of productivity, the region ranks eighth in both trips and passenger miles per revenue hour. This appears to be a function of technology and mode of service. The most competitive regions are New York-Newark, Chicago, Philadelphia, Washington-Baltimore, Atlanta, Boston and the Greater Bay Area. All of these regions have heavy rail to bus service ratios of more than 0.20, and this more intensive mode appears to allow them to move more passengers per hour. The SCAG region is the most competitive among those regions, having a ratio below 0.20.

The region ranks third among all three cost performance measures, implying that local cost containment strategies are relatively successful. Some of this would appear to be a function of mode of service, as those regions with higher heavy rail to bus service ratios tend to have higher costs per revenue hour. Further work to disaggregate cost performance data by mode will add to the understanding of these trends.

The fourth series of measures presented displays trip consumption by mode and they mainly help to provide context for how the region's mode of service decisions compare with that of the region's peer groups.

The SCAG region's performance, along demand response measures, is tracked in the final set of measures. The region ranks second in Demand Response Passenger Miles, Demand Response Average Trip Length and Demand Response Trips per Bus Trips. Given the growth trends of the region's demand response operators, this would seem to reflect that the region is being affected by national trends.

Overall, it can be said that the region's system is performing well on a comparative basis. Costs are relatively low, service levels are relatively appropriate for a region of this size, and productivity is relatively high for a region that is focused on bus service. However, per capita trip consumption is relatively very low, and additional work should be performed to understand this finding.

AVAILABILITY ANALYSIS

The existing transit network covers a wide area, but a better sense of its performance can be provided by analyzing how many jobs, households and residents are within 0.25 miles of an existing station stop.

A GIS based analysis of the region's transit network was performed using a .25 buffer file, compared to the travel demand model's base year 2012 network, categorized by service frequency. Socioeconomic data were added at the Traffic Analysis Zone (TAZ) level. The numbers displayed in **TABLE 18** represent access to transit via selected modes at various service levels.

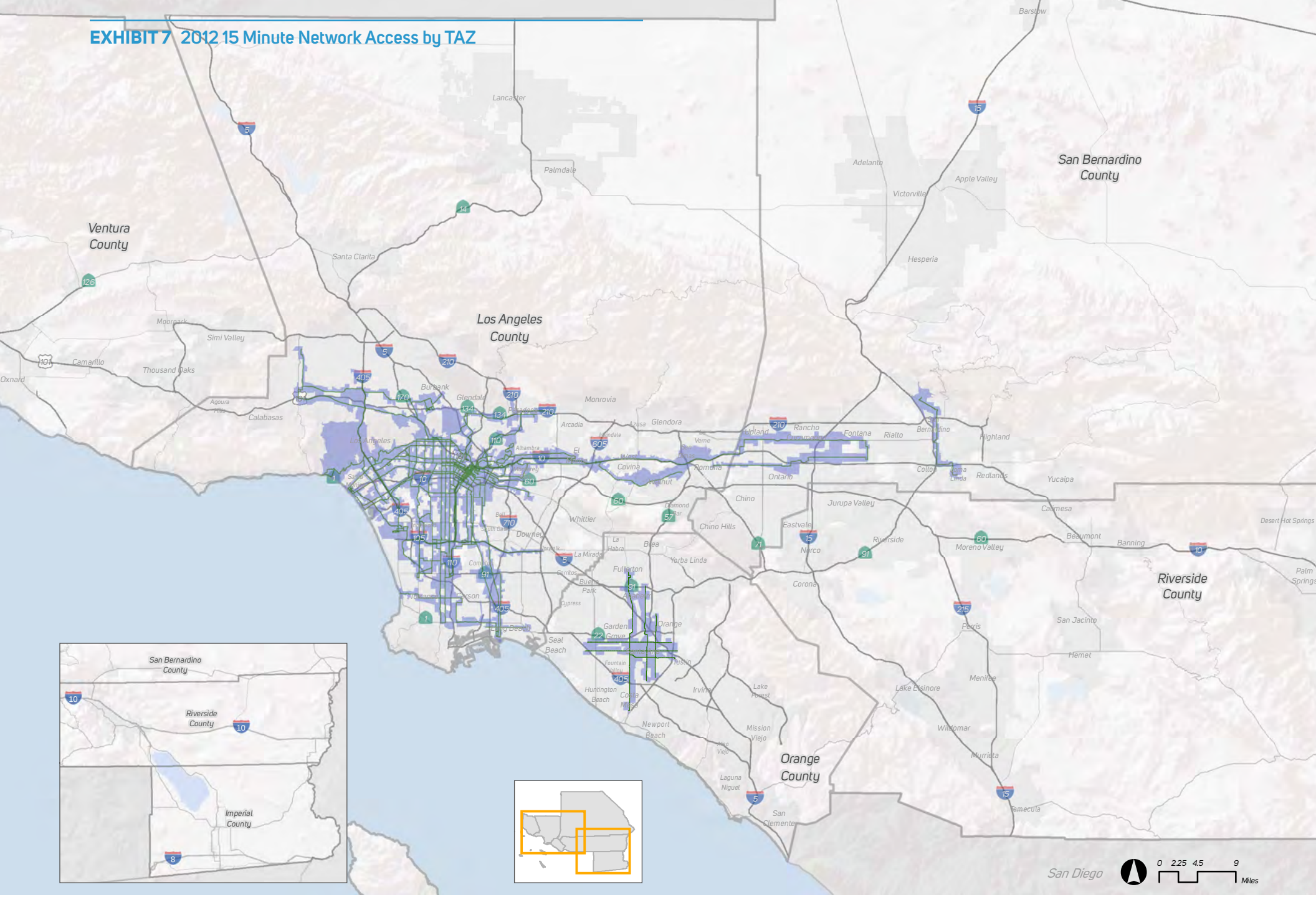
EXHIBITS 7, 8, 9, 10 AND 11 display the extent of the transit network, and how it serves selected categories of residents across the network.

TABLE 18 2012 Availability Analysis

	Heavy and Light Rail	Rapid Bus and Bus Rapid Transit	Express Bus	Local Buses with Less Than 15 Minute Headways	Local Buses with 16 to 30 Minute Headways	Local Buses with 31 to 60 Headways	Local Buses with Greater Than 60 Minute Headways
Total Jobs with Access	554,105	1,731,579	2,534,674	1,918,967	3,606,523	4,560,839	3,501,895
Total Household with Access	218,883	1,006,483	1,289,849	1,182,751	2,313,767	3,123,562	2,232,090
Total Population with Access	624,537	2,849,109	3,751,796	3,571,051	7,118,808	9,647,878	6,909,394
Residents in TAZs with 15% or more of Households Having No Vehicles Access	42,247	159,013	126,701	215,647	881,209	960,638	701,838

Source: SCAG

EXHIBIT 7 2012 15 Minute Network Access by TAZ

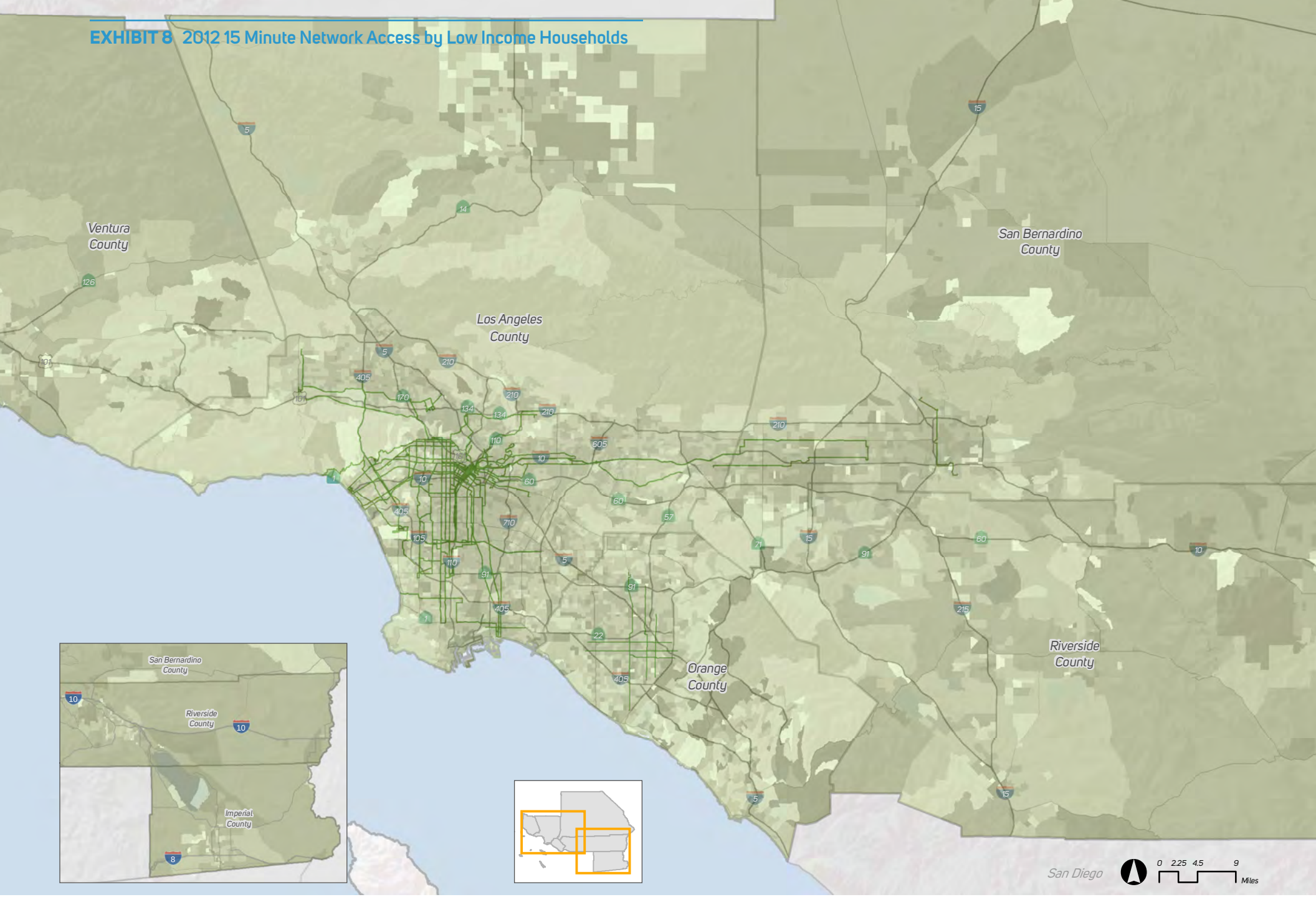


15 Minutes Transit Network Access (2012)

15 Minutes Transit Network Access By TAZ

(Source: SCAG)

EXHIBIT 8 2012 15 Minute Network Access by Low Income Households



15 Minutes Transit Network Access (2012)

Median Income

$178,780 and More

$99,636 - $178,779

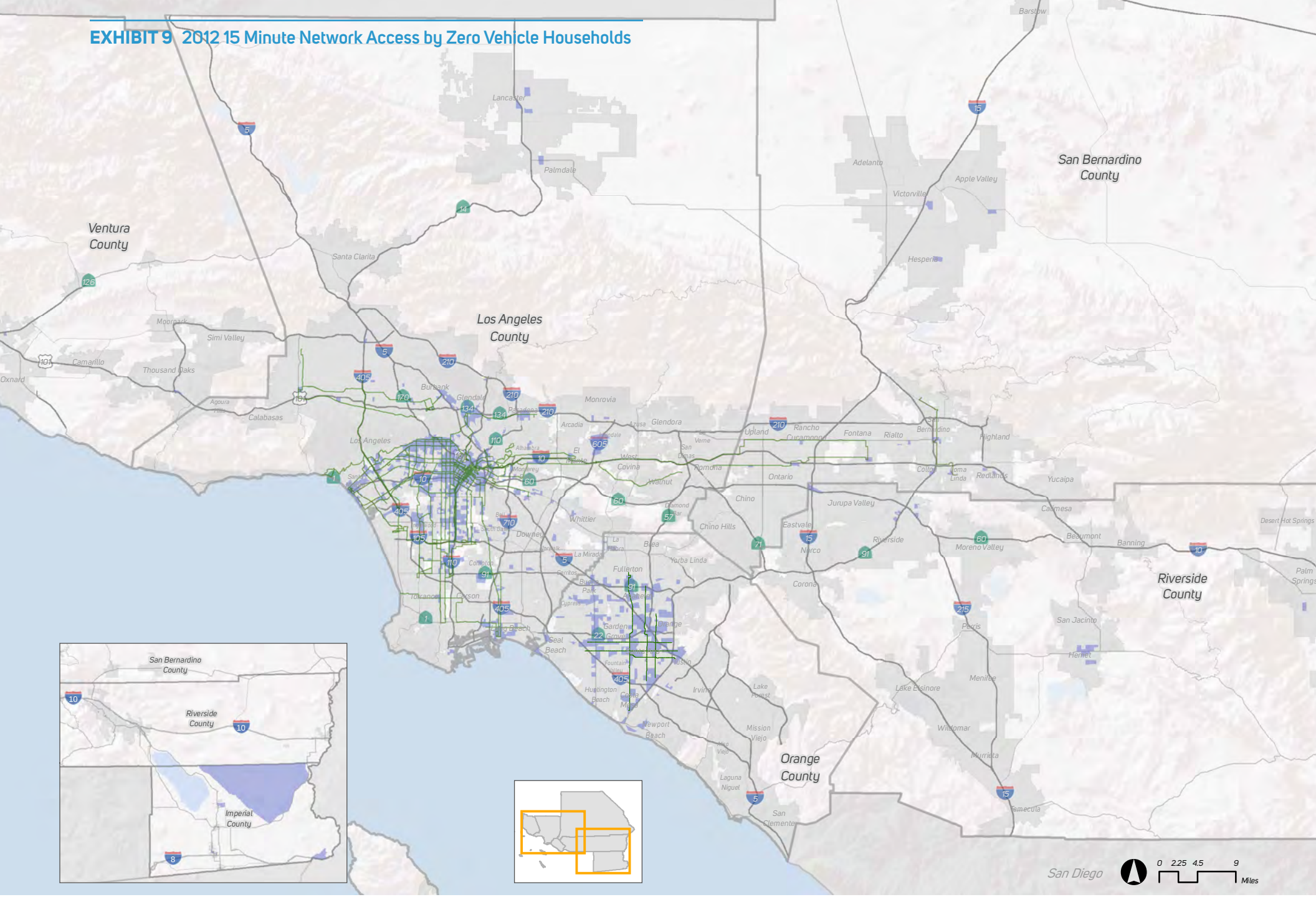
$59,874 - $99,635

$28,347 - $59,873

$28,346 and Less

(Source: SCAG, 2015)

EXHIBIT 9 2012 15 Minute Network Access by Zero Vehicle Households

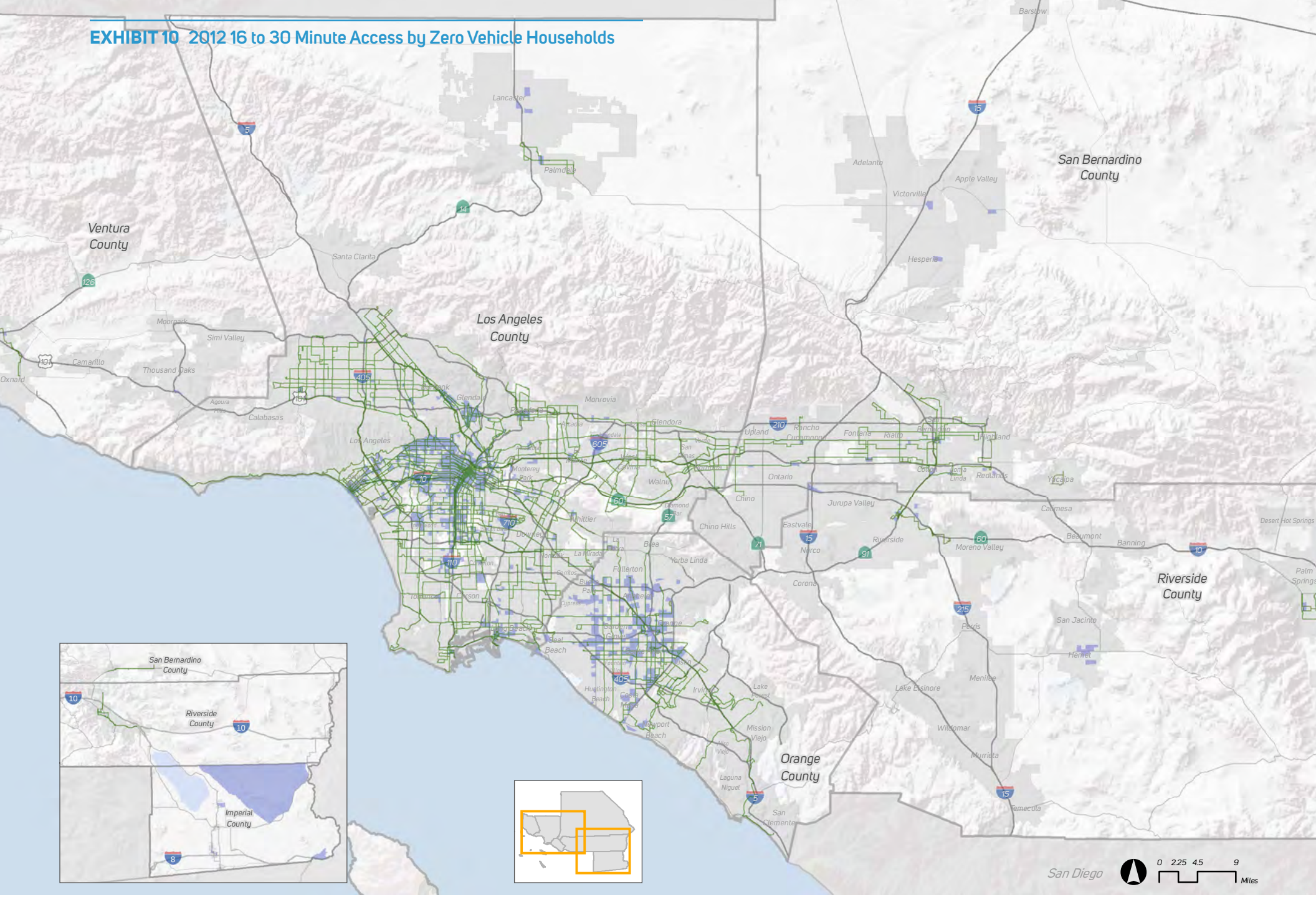


15 Minutes Transit Network Access (2012)

2012 Zero Vehicle Households by Taz (15% or more)

(Source: SCAG)

EXHIBIT 10 2012 16 to 30 Minute Access by Zero Vehicle Households

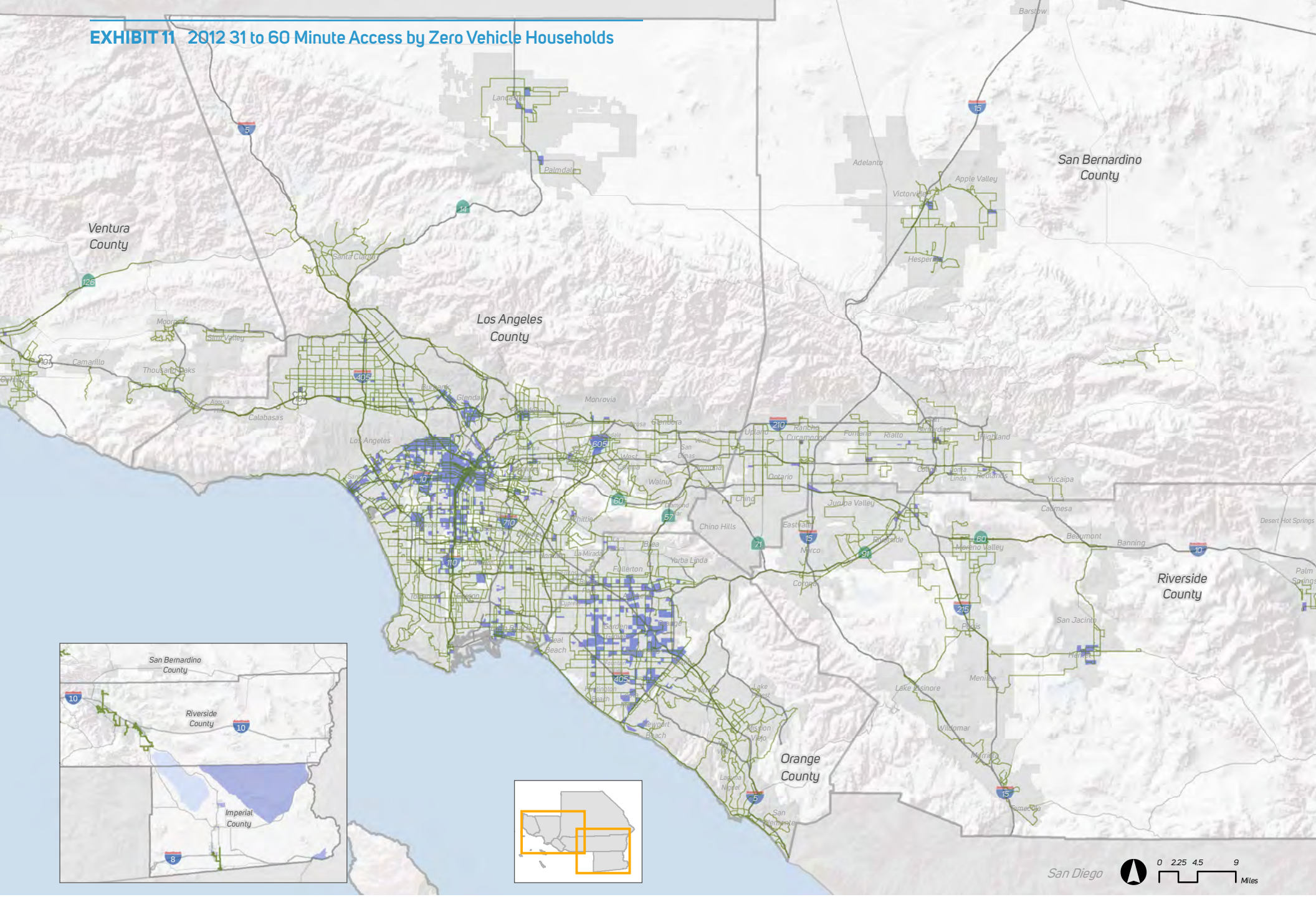


16 to 30 Minutes Transit Network Access (2012)

2012 Zero Vehicle Households by Taz (15% or more)

(Source: SCAG)

EXHIBIT 11 2012 31 to 60 Minute Access by Zero Vehicle Households



2012 Zero Vehicle Households by Taz (15% or more) 31 to 60 Minutes Transit Access Network (2012)

(Source: SCAG)

THE 2012 RTP/SCS

INVESTMENTS FROM THE 2012 RTP/SCS

The 2012 RTP/SCS included significant investment in public transit across all transit modes. There was a $56.6 billion dollar investment in transit capital, a $47.7 billion dollar investment in passenger rail and a $139.3 billion investment in transit operations and maintenance. Transit represented 64 percent of total operations and maintenance in the 2012 RTP/SCS and 20 percent of capital investments. Passenger rail, including Phase I of the California High-Speed Rail program, accounts for another 18 percent of total capital investment in the 2012 RTP/SCS.

Projects carried forward from the 2012 RTP/SCS will form a major component of the 2016 RTP/SCS constrained plan. Major capital investments from that plan are reviewed in more depth in **TABLE 19**.

THE MEASURE R EXPENDITURE PLAN

In November 2008, the voters of Los Angeles County approved a third Local Option Sales Tax to fund both capital and operations within Los Angeles County. The Los Angeles County Metropolitan Transportation Authority (Metro), which already administers Proposition A and C funds, will use 35 percent of Measure R revenues to develop a series of major transit capital projects.

Three large Measure R projects, the Westside Subway extension, the Regional Connector Transit Corridor and the Exposition Transit Corridor have the potential to connect residents to employment centers in the highly congested central Los Angeles area and the similarly congested Westside Subregion, providing important alternatives to road travel. The Regional Connector will allow light rail vehicles to connect between now-unconnected rail corridors. Upon completion, passengers boarding a rail vehicle in Pasadena or Azusa will be able to travel to Long Beach without transferring; similarly passengers boarding at the terminus of the Metro Gold Line Phase 2 will be able to travel to Culver City or Santa Monica without transferring.

Other Measure R projects will extend the reach of the Metro Rail system to a large portion of Los Angeles County. The South Bay Metro Green Line extension will extend rail transit much deeper into the South Bay and connect residents of the South Bay cities to an important job center in El Segundo. Similarly, the Foothill and Eastside Gold Line Extensions will increase the ability of residents of eastern Los Angeles County to access the Metro Rail System and travel to important regional centers.

The West Santa Ana Branch Corridor will serve a currently underserved market in the Northeastern and Central Gateway Cities area, and provide important links to the Metro Green Line and a variety of transit options in Downtown Los Angeles. Many corridor area residents are in low income households and have limited vehicle access; the corridor serves them by connecting to important recreational and shopping opportunities, in addition to employment centers.

TABLE 19 Major Transit Capital Projects Funded with Measure R Revenues

Major Transit Capital Projects Funded with Measure R Revenues	
Exposition Transit Corridor, Phase 2 to Santa Monica	South Bay Metro Green Line Extension
Regional Connector	Metro Gold Line Foothill Extension Phase 2A
Crenshaw LAX Transit Corridor	East San Fernando Valley Transit Corridor
Eastside Transit Corridor Phase 2	Metro Orange Line Extension (Completed)
Sepulveda Pass Corridor	West Santa Ana Branch Transit Corridor
Airport Metro Connector	Purple Line Extension [1]

Source:Metro, 2008 Measure R Expenditure Plan

2012 RTP/SCS MAJOR CAPITAL INVESTMENTS IN OTHER COUNTIES

The Anaheim Rapid Connection (ARC) will offer connectivity to the Anaheim Resort from the Anaheim Regional Transportation Intermodal Center (ARTIC). Travelers on ARC will be able to transfer to the Harbor Blvd Bravo! rapid bus service and to Metrolink, Amtrak's Pacific Surfliner and High-Speed Rail at ARTIC. Similarly, the Santa Ana Garden Grove Fixed Guideway will connect the central business district of Santa Ana to the Santa Ana Regional Transportation Center, allowing transfers to Metrolink and the Pacific Surfliner. The other terminus of the Santa Ana Garden Grove Fixed Guideway, at Harbor Blvd, will also offer connectivity to two separate BRT routes.

In the Inland Empire, new projects will also increase transit mobility. New BRT services in San Bernardino will complement the recently opened E street sBX BRT line, connecting to multiple Metrolink stations and extending the reach of our region's commuter rail network. Furthermore, the Redlands Rail project will extend Metrolink's service area deeper into the eastern San Bernardino Valley and provide access to one of San Bernardino County's major universities.

Further south, the Metrolink system will be extended into Southwestern Riverside County into the Temecula Valley.

FIXED GUIDEWAY GAP CLOSURES

To further develop the integrated transit passenger rail networks, SCAG staff developed a list of fixed guideway gap closures for the 2012RTP/SCS. These projects were developed by reviewing performance data from County Transportation Commission strategic planning documents and were analyzed from a list of more than 32 potential projects developed in these plans and studies. The resultant projects were analyzed on the basis of several factors:

1. Did the project close gap in the existing rapid transit network?
2. Did the projects serve comparatively dense areas?
3. Did the projects provide intermodal connectivity?
4. Did the projects serve important regional or subregional centers for housing or employment?
5. Using locally generated performance data, what was the capital cost per out-year boarding?

Five projects were selected using this analysis. These projects, collectively titled the "fixed guideway gap closures", will provide important links in our 2035 transit network. All but one of the five projects serve a minimum of 20 tier 2 Travel Analysis Zones (TAZ) projected to contain more than 15 jobs or residents in 2035. All five projects connect a minimum of two other fixed guideway transit corridors, and leverage those connections into additional transit mobility and to produce at least one million annual boardings by the 2035 forecast year.

The fixed guideway gap closure projects leverage existing investments in rail transit technology to expand the connectivity of the rail travel network, creating a system of seamless transferability throughout the network.

The Vermont Short Corridor is a three-mile southward extension of the Metro Red Line serving one of the most important transit markets in Southern California. Vermont Avenue has long been Metro's second most productive bus corridor, and its ridership is often competitive with the entirety of the Metrolink system. On the north end, the Vermont Corridor will allow transferability to the completed Metro Westside Subway extension, allowing passengers to access important employment, residential and cultural centers on the Westside. On the southern end, the short corridor will allow onward transfers to the Metro Exposition Line, allowing passengers to travel to Culver City, Santa Monica, or to transfer to the Crenshaw Corridor and travel to South Los Angeles, Inglewood or LAX.

Important regional destinations, including the University of Southern California, Pico Union and Koreatown, are directly served by the Vermont Short Corridor. Similarly, the corridor has a high proportion of low-income transit dependent residents ; the corridor will allow them a greater ability to access job centers on the Westside, in the South Bay, and in Downtown Los Angeles.

TABLE 20 Fixed Guideway Gap Closures Initial Performance Analysis

Corridor	Boundaries	Length (miles)	Cost (in Millions)	Locally Estimated Annual Boardings	Rail Transit Connections
Vermont Short Corridor	Wilshire Vermont to Exposition and Vermont	3	$1,177.90	3,709,332	Metro Purple Line, Metro Red Line, Metro Exposition Line
Slauson Light Rail	Crenshaw Corridor to Metro Blue Line Slauson Station	5.4	$554.00	5,213,808	Metro Crenshaw Corridor, Metro Blue Line
Metro Red Line Extension	From North Hollywood Station to Burbank Airport Metrolink	2.4	$933.30	5,350,818	Metro Red Line, California High Speed Rail, Amtrak Pacific Surfliner, Metrolink
Metro Green Line Norwalk Extension	Norwalk Transit Center to Norwalk Metrolink (Aerial Option)	2.3	$480.20	1,495,006	Amtrak Pacific Surfliner, California High Speed Rail, Metro Green Line, Metrolink
Metro Gold Line Foothill Extension Phase 2B	Sierra Madre Villa Station to Montclair Metrolink Station	13.1	$998.40	3,023,603	Metro Gold Line, Metrolink

Source: Metro 2008 Draft Long Range Transportation Plan (Technical Document)

The Northward extension of the Metro Red line to the California High-Speed Rail Authority's planned Burbank station will similarly allow greater access to intermodal transportation. The likely Burbank station for Phase I of the High-Speed Train Project is at Bob Hope Burbank Airport, which is also served by Metrolink and Amtrak. By using tunnels and people mover technology in the new Red Line station, the station could serve all three transportation facilities. This extension will allow users to access intercity rail, commuter rail, high speed rail and air travel facilities.

Similarly the Norwalk Green Line extension will increase the ability of travelers in the South Bay and Gateway Cities to access to the proposed California High-Speed Train station in Norwalk. This station, which is already served by Metrolink and the very occasional Surfliner train, also provides good connectivity to bus transit via the Norwalk Transit System.

The Slauson Light Rail would connect the Crenshaw Corridor with the Metro Blue line and provide important mobility improvements in a dense corridor with a high percentage of transit dependent residents. As noted in Chapter 6 of the Harbor Subdivision Alternatives Analysis, the corridor is currently underserved by transit and would provide many stops within close distance to dense population and employment nodes.

Phase 2B of the Metro Gold Line Foothill Extension will extend the reach of the Metro Gold Line an additional 12.6 miles in to the San Gabriel Valley, adding stations in Glendora, San Dimas, La Verne, Pomona, Claremont and Montclair along a former Atchison Topeka Santa Fe right-of-way.

2012 RTP/SCS IMPLEMENTATION AND DEVELOPMENTS BETWEEN 2012-2016

ONGOING PLANNING PROCESSES

The various counties of the SCAG region have chosen to pursue a variety of strategies to deliver public transit service. In Los Angeles, Riverside and San Bernardino Counties, these strategies have been project based and using large capital investments to improve service on identified corridors. Imperial, Orange and Ventura Counties have focused on smaller capital investments and operational strategies to improve service.

Imperial County

The Imperial County Transportation Commission recently completed a Specific Operational Analysis for Imperial Valley Transit (IVT), which assessed how existing transit service can be altered to more efficiently and effectively meet existing travel demand. Given that Imperial County has had approximately 33 percent growth over the past ten years, this project is especially timely. The plan outlined a vision for serving Imperial Valley cities with local circulators, which would feed trunk services between those cities. The IVT Gold Line is an example of that strategy.

The Comprehensive Operational Analysis built on ICTC's FY 2010-2011 Short Range Transit Plan (SRTP). The SRTP for the ICTC was the result of a planning process that involved the examination of transit, socio-economic and demographic data, as well as an extensive public outreach process that involved meetings with members of the public and current transit system riders, as well as interviews with community stakeholders. The information gathered during this planning process was utilized to develop a set of recommendations for both the IVT fixed route bus system and the various demandresponse transit services operated throughout Imperial County.

TABLE 21 Number of TAZs Served by Fixed Guideway Gap Closure Projects

Project	Tier 2 TAZs with More than 150 Residents or 50 Jobs per Acre	Tier 2 TAZs with More than 50 Residents or Jobs per Acre	Tier 2 TAZs with More than 30 Residents or Jobs per Acre	Tier 2 TAZs with More than 15 Residents or Jobs per Acre
Metro Red Line Extension	0	2	13	21
Vermont Short Corridor	7	39	60	66
Slauson Light Rail	0	10	39	77
Metro Green Line Norwalk Extension	0	0	0	23
Metro Foothill Goldline Extension Phase 2B	0	0	0	14

Source: SCAG, 2011 ACS

The SRTP presents the proposed improvements to the IV Transit system in three phases, and those for the demand response services in two phases. Recommendations for consideration as part of Imperial County's Long-Range Transit Vision are also provided. Finally, estimated impacts on the operating funding needs, the capital requirements and various other operational measures are also provided as part of this SRTP.[23]

Los Angeles County

LA County Metro recently completed work on a Short Range Transportation Plan (SRTP). Metro's 2014 SRTP was developed as a focused ten-year plan that guides actions through 2024. The Plan will advance Los Angeles County toward the long-term goals outlined in the 2009 Long Range Transportation Plan (LRTP), a 30-year vision for addressing growth and traffic in LA County. The Plan monitors our progress in moving projects and programs forward to ensure that our system moves people and goods safely.

The 2014 SRTP sets out a vision for doubling rail vehicle revenue miles by 2024 and expediting Measure R investments.[24]

Orange County

In 2011, OCTA completed work on the Transit System Study which sought to find financially sustainable service delivery strategies and to more closely tie bus and rail services to passenger demand. This effort led to focused on identifying and investing in high performing services, integrating city shuttles to connect Metrolink service and community circulators with the fixed route network, matching service products to markets, and improving service efficiency and speeds in an integrated network. Key outcomes were new transit service and more frequent service in areas with high ridership potential. OCTA is proposing to implement many of these recommendations in 2016.

These strategies were incorporated into OCTA's 2014 Long Range Transportation Plan. This plan also identified strategies including expanded Metrolink service, Metrolink station improvements and local streetcar circulators as part of their vision for increased mobility choice in Orange County.

Riverside County

The Riverside County Transportation Commission and RTA continue have both engaged local planning efforts. At the system level, RTA recently completed a Comprehensive Operational Analysis, leading to more frequent service on key corridors. RCTC continues to engage in corridor level planning efforts for commuter and passenger rail service. This project is discussed in greater depth in the passenger rail appendix.

San Bernardino County

The San Bernardino Associated Governments (SANBAG) released a Long Range Transit Plan in 2011 outlining a series of investments and strategies throughout the county including a network of rapid and express bus service. In addition, corridor level efforts continue regarding the Redlands Rail project.

In the summer of 2015, SANBAG issued a draft County Transportation Plan (SBCTP). Similar to the long range plans of Metro and OCTA, this multimodal document laid out a strategy for the long term in, and management of, San Bernardino County's transportation assets. The plan was developed in conjunction with the goals identified in SANBAG's Mission Statement, to address existing and future mobility needs in San Bernardino County and in keeping with the Measure I Ten Year Implementation Plan.

The Draft SBCTP include most of the 2011 Long Range Transit Plan's investment strategies in the San Bernardino Valley and identifies a network of express bus, rapid bus and bus rapid transit corridors to serve that area, in conjunction with a connection between existing Metrolink San Bernardino line and Los Angeles Ontario International Airport. The plan does not identify funds for service expansions in the mountain and desert sub-areas of San Bernardino County.

In addition, the plan notes the 2015 Barstow Area Transit merger with the Victor Valley Transit Authority (VVTA), to realize cost savings and achieve more efficient transit administration.

Ventura County

Ventura County has perhaps the most dynamic planning environment of any of the six counties in the region. As a result of legislative changes, public transportation in Ventura County is undergoing significant reorganization.

SB 716

The California State Legislature enacted the Transportation Development Act (TDA), SB 325, Chapter 1400, Statutes of 1971, to ensure "the efficient and orderly movement of people and goods in the urban areas of the state." The TDA authorized the boards of supervisors in each county to impose a one-quarter-percent local sales tax for public transportation purposes. This included an allowance for rural counties to use these funds for streets and highways, given that they certified through a public process that no unmet needs could be met with those funds.

Senate Bill 716 of 2009 amended the TDA mandate that all counties with populations over 500,000 as of the 2010 census would have to allocate all TDA revenues to transit by 2014. However, cities with populations under 100,000 in these urban counties could continue to use TDA funds for either transit or local streets and roads, provided unmet needs certification. Ventura County was exempted from the legislation and given additional time to develop a transit plan.

As a response to the mandates of SB 716, VCTC proposed strategies for responding to SB 716, including the creation of a transit district in western Ventura County and the execution of a Memorandum of Understanding (MOU) in East County between the cities of Camarillo, Moorpark, Simi Valley and Thousand Oaks and the County of Ventura for unincorporated East County, to further coordinate individual services.

This process led to the execution of an MOU between those agencies, for the implementation of an East County Transit Alliance. This alliance is seen as framework for enhancing service and connectivity, service, fare, eligibility and marketing coordination and establishing a single provider for ADA paratransit and Senior Dial-a-Ride in the east Ventura County. The MOU outlines a strategy for cooperation and coordination in the provision of transit service in Eastern Ventura County under the name East County Transit Alliance (ECTA), and it will assist the municipal transit properties in Eastern Ventura County with compliance with the requirements of Senate Bill 716.

In addition, the cities of Santa Paula, Fillmore and Piru have negotiated a joint powers agreement to form the Heritage Valley Transit District. This group seeks to implement a series of fixed route community circulators and fixed route service between the cities of Fillmore and Piru.

AB 664 and the Gold Coast Transit District

In a further response to the mandates of SB 716, stakeholders sought authority to establish a transit district in western Ventura County. As of July 1, 2014, per the recommendations of the VCTC "Regional Transit Study final Report: Executive Summary and Response to the Legislature," the Gold Coast Transit (GCT) Joint Powers Authority was replaced by the Gold Coast Transit District. This new district was created by AB 664 and includes the Cities of Oxnard, Ventura, Port Hueneme and Ojai and unincorporated areas of the County of Ventura.

The new structure allows the district to pool all funds and allows Gold Coast to plan and operate service based on need, rather than local contributions. Also, by pooling funds, it will be easier for the District to guarantee local matches for state and federal grant funds. Additionally, the fiscal health of any one member will no longer affect service levels, as occurred during the recession.

Moving forward, an ongoing Short Range Transit Plan update will guide service delivery over the next 4-5 years, by providing:

- A Systemwide Evaluation by Route
- A Fixed-Route Service Delivery Plan
- A Capital Improvement Plan
- A Marketing and Regional Coordination

TRACKING IMPLEMENTATION PROGRESS

Since the 2012 RTP/SCS was adopted, the region has made progress toward completing several major transit and rail projects that are part of the region's strategic expansion of mass transit and rail, while significantly regressing in terms of the amount of service offered.

Selected New Services

New services have also been initiated, including those displayed in **TABLE 22**. However, service levels have continued the downward trend discussed in the 2012 RTP/SCS. Between 2008 and 2012, total annual service hours dropped by roughly 5 percent. Initial analysis suggests that the downward trend may have ended in 2012, and that service hours reached their 20 million hours again in 2014. However these preliminary NTD data have yet to be audited.

TABLE 22 2012-2035 RTP/SCS Service Implementation Matrix

Status	Project Name	Completion Year
SERVICES INITIATED	Metro Silver Line	2009
	Imperial Valley Transit Gold Line	2012
	Metro Valley Westside Express	2014
	Gold Coast Transit District	2014
	Heritage Valley Service	2015
	Anaheim Resort Service Expansion	2011
	VVTA Barstow Service	2015

Selected Capital Projects Completed

The region has made significant progress in delivering transit capital projects. **TABLE 23** displays a selection of the transit capital projects from the 2012 RTP/SCS that have been completed since the adoption of that plan.

Metro completed construction and began operations of the Edward R. Roybal Metro Gold Line Eastside Extension, which extended Gold Line service to Boyle Heights and East Los Angeles in 2009. Revenue service on the Exposition Transit Corridor phase 1 began in early 2012. The initial operating segment of the Expo Line opened April 28, 2012, serving an 8.6 mile corridor from 7th Street Metro Center/Julian Dixon to La Cienega Blvd. Additional stations at Culver Blvd and Farmdale Ave opened on June 20, 2012. The Expo Line provided nearly 600,000 trips and 2.2 million passenger miles in FY 2011-2012, with a weekday average of 13,897 trips and 51,141 passenger miles.

Additionally, Omnitrans recently completed work on the E Street sbX BRT Corridor, between California State University San Bernardino and the City of Loma Lina.

Selected Capital Projects Initiated

The region has also made significant progress in initiating major transit capital projects. **TABLE 24** displays a selection of the transit capital projects from the 2012 RTP/SCS that have been initiated since the adoption of that plan.

Many of Metro's Measure R projects saw construction work begin since the adoption of the 2012 RTP/SCS, including the Crenshaw/LAX Transit Corridor, the Regional Connector and the Purple Line Extension Phase:

1. Additionally, work continues on the Exposition Transit Corridor, Phase 2 to Santa Monica and the Metro Gold Line Foothill Extension Phase 2A. Both of those projects are expected to enter revenue service in 2016.
2. SANBAG continues to work with local transit properties to provide more travel options in the San Bernardino Valley. Two capital projects of note include and the Downtown San Bernardino Passenger Rail Project, which will extend Metrolink service into Downtown San Bernardino. Similarly, the Riverside County Transportation Commission is nearing completion of the Perris Valley Line, a 24 mile extension of Metrolink "SR-91 Line" service to South Perris.

IMPLEMENTATION PERFORMANCE

A key measure of the region's implementation of the policies and strategies of the 2012 RTP/SCS, is the total amount of service provided. NTD data are typically audited and released roughly two years after the completion of the fiscal year of their report. Unaudited monthly data are also made available for a large majority of reporting agencies and can be analyzed, but with a lower degree of confidence in the results. Below is discussion of a comparison of the trends of annual and monthly performance in the years following since the 2012 RTP/SCS's 2008 base year.

TABLE 23 2012-2035 RTP/SCS Capital Project Implementation Matrix

Status	Project Name	Completion Year
PROJECTS COMPLETED	The Yucaipa Transit Center (Omnitrans)	2010
	VVTA Administrative, Operations and Maintenance Facility	2011
	Metro Orange Line Extension	2012
	Metro Expo Line	2012
	The Brawley Transit Center (ICTC)	2013
	Fullerton Metrolink parking structure station (OCTA)	2013
	Omnitrans E street SBX	2014
	ARTIC	2014
	Metrolink Perris Valley Line (RCTC)	2015
	SunLine Transit Administrative Facility	2015

TABLE 24 2012-2035 RTP/SCS Transit Element Capital Project Implementation Matrix

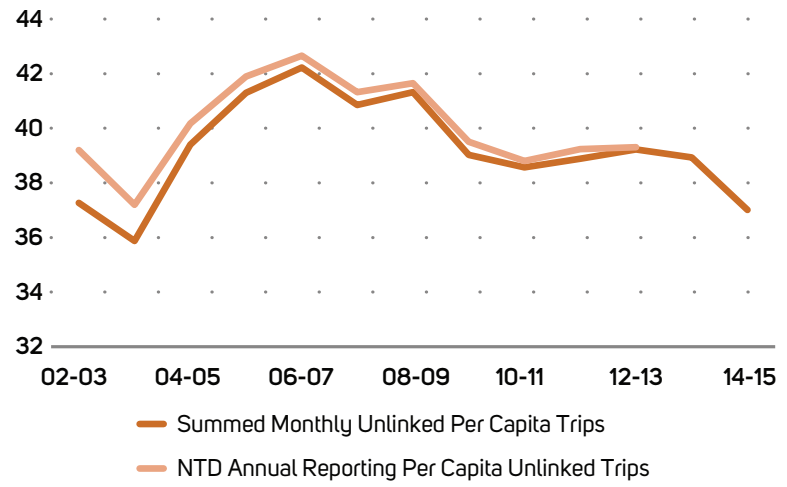
Status	Project Name	Completion Year
PROJECTS INITIATED	Crenshaw/LAX Transit Corridor	2019
	Regional Connector	2020
	San Bernardino Transit Center	2015
	Metro Gold Line Foothill Extension, Phase 2A	2016
	Exposition Transit Corridor, Phase 2 to Santa Monica	2016
	Placentia Metrolink Station (OCTA)	2017
	OC Bridges Grade Separations (OCTA)	2018
	San Bernardino Metrolink Station (SANBAG)	2016
	Purple Line Extension Phase 1	2023

Since the 2012 RTP/SCS was adopted, the region has made progress toward completing several major capital projects while also experiencing significant realignments in terms of the amount of service offered. New services have also been initiated, including those discussed above. In addition, the total amount of rail and demand response service offered by the region's providers has grown significantly, as the total amount of fixed route bus service has shrunk.

Initial estimates for FY 2014-2015, show that the total amount of service offered may have reached pre-recessionary levels. These preliminary projections, compiled using unaudited data, reflect that the region may have exceeded 20 million annual service hours for the first time since the recession. These gains are mainly due to growth in rail service hours (up 63 percent over ten years) and demand response growth (up 29 percent over ten years) which are mitigating a decrease in total fixed route bus hours (down 3 percent over ten years). These contrasting growth trends led to a decline in bus service's share of overall service provision from 79 percent in May 2005 to 72.9 percent in May 2015.

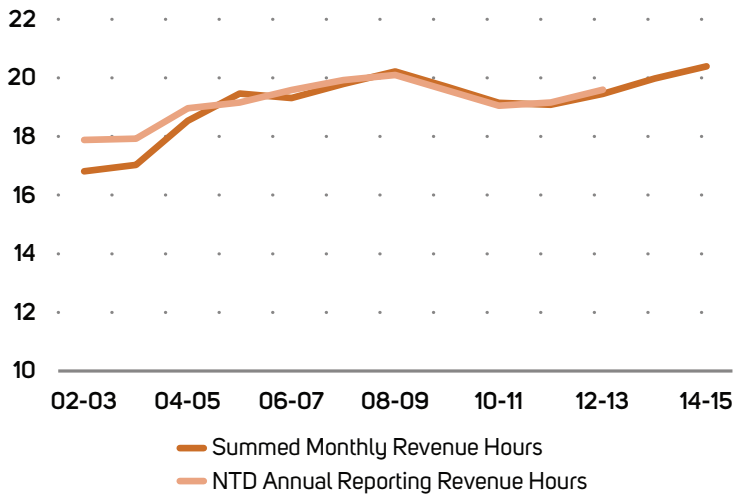
Total consumption of transit service appears to be dropping in FY 2014-2015. Initial estimates are that the region's total transit trips taken will be below 700 million for the first time since FY 2003-2004. This trend indicates a ten-year drop in consumption of 1.7 percent and a 7.9 percent decline in per capita trip making. See **FIGURE 52**, **FIGURE 53** and **FIGURE 54**.

FIGURE 53 Per Capita Trips Trend



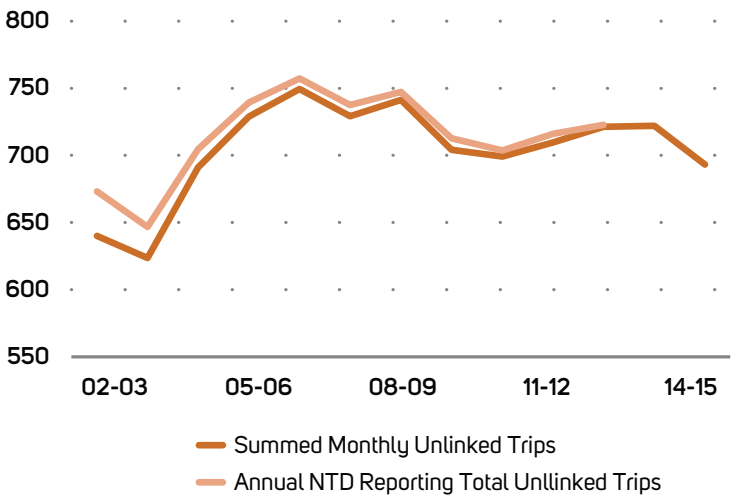
Source: NTD 2012

FIGURE 52 Revenue Hours Trends (in Millions)



Source: NTD 2012

FIGURE 54 Total Trips Trend (In Millions)



Source: NTD 2012

The respective boards of directors of Metro and OCTA have begun examining these declines in transit ridership. Both agencies cut service and increased fares during the recession, and both boards are working to identify strategies to build ridership back to pre-recessionary levels.

OCTA has identified a mix of short- and long-range strategies that they believe will address local ridership losses. The identified short-term strategies include limited-stop service on busy routes, including Bristol/State College and Bolsa/1st corridors; stop consolidations to improve vehicle speeds; youth pass price reductions; and a marketing study. Longer term strategies include additional Bravo! and reallocating service from lower productivity routes to higher ridership corridors.

In Los Angeles County, the Metro Board of Directors has instructed staff to prepare a plan to evaluate existing travel demand and identify new ridership opportunities, optimize the existing network, improve on time performance and develop marketing campaigns.

NEEDS ASSESSMENT AND TRANSIT CHALLENGES

Our region is set to grow by 3.8 million new residents by 2040, and it will add 1.5 million new households. In addition, 2.4 million new jobs will be in place in 2040.

Many of the most dramatic changes to the region will revolve around the region's age demographics, as the share of older residents grows. In 2040, residents over 65 will comprise 29.1 percent of the total population and will head 18.1 percent share of households. The very old, those over 85, will comprise 2.93 percent share of residents.Many of these residents will have expanding mobility assistance needs and may create a strain on the demand response network.

Additional transit needs may arise due to changes in land use. Many stakeholders believe that compact development and "transit oriented development" will lead to increased demand for public transportation. If so, this additional demand would represent residents who move close to contemporary fixed route services, meaning that any additional demand they embody would be addressed via adjustments of service levels along contemporarily existing routes. These needs would be have to be addressed via the service planning process.

TRANSIT DEPENDENCY, POVERTY AND ACCESS TO JOBS

In addition, poverty is an ongoing challenge for the region. By 2040, 13.8 percent of the region's households will be living in poverty. Given that 455,054 households currently have no vehicle access, this should be interpreted as a major challenge. By 2040, between 669,8467 and 777,763 households are forecasted to not have access to a vehicle.

TABLE 25 Trends in Job Proximity by Metro Area

	All Residents			Poor Residents		
Metro name	2000	2012	Change	2000	2012	Change
Los Angeles-Long Beach-Anaheim, CA	638,289	591,079	-7%	745,798	668,270	-10%
Oxnard-Thousand Oaks-Ventura, CA	42,739	46,806	10%	40,084	44,570	11%
Riverside-San Bernardino-Ontario, CA	115,127	126,418	10%	113,844	119,134	5%

Source:2011 Brookings

TABLE 26 Trends in Job Proximity in Suburbs by Metro Area

	All Residents			Poor Residents		
Metro Name	2000	2012	Change	2000	2012	Change
Los Angeles-Long Beach-Anaheim, CA	549,872	510,488	-7%	631,649	563,106	-11%
Oxnard-Thousand Oaks-Ventura, CA	32,343	36,068	12%	27,477	31,106	13%
Riverside-San Bernardino-Ontario, CA	99,440	111,065	12%	92,476	96,925	5%

Source: 2011 Brookings

Lower income households tend to have less access to vehicles per capita and higher mobility needs as a result. However, in the wake of the housing market instability and recessions of the 2000s, poverty has expanded, quantitatively and geographically. Nationally, more people are in poverty than ever before and those people are more likely to live in suburbs than urban or rural environments.[25]

TABLE 25 provides an overview of the change in jobs available within that region's median commute distance. LA-Long Beach Anaheim lost jobs in that period, while Riverside San Bernardino and Oxnard-Thousand-Oaks-Ventura both added jobs. **TABLE 26** displays that same statistic for suburban residents.

The *Los Angeles Equity Atlas Framework*, a study conducted by the California Community Foundation and Reconnecting America, used GIS mapping to analyze forecast the equity impacts of the Measure R expenditure package. They found that roughly 90 percent of transit commuters in Los Angeles County had incomes under $50,000, and 70 percent had incomes below $25,000. They also found that 31 percent percent of households with incomes under $25,000 who live near frequent transit take it to work, versus 13 percent of workers in households earning between $25,000 and $50,000.

Moreover, a key finding of the study was that low and middle wage jobs are increasingly decentralized throughout the county, while higher wage jobs are increasingly centralized in locations that are easily served by frequent transit and often located near fixed guideway station stops.

Given that low income commuters are key part of any transit market, this trend indicates that future transit service in the region will have to find better ways to serve dispersed jobs and residences with frequent service. Increased frequent bus service along productive corridors can be a key strategy to serve those areas.[26]

COUNTY TRANSPORTATION PLANS/PROJECT LISTS

As discussed on page 53 of this appendix, county transportation planning and programming efforts are a key RTP implementation strategy in the short run. In the long run, however, they are also a key tool for building the RTP investment package. County plans and corridor planning efforts are a tool by which local support and consensus can be built around projects and strategies. They are also a key tool for estimating service levels in the future and for setting local priorities.

One of the key new capital projects in the plan, the Sepulveda Pass Corridor, was first funded by Measure R and included in Metro's 2009 Long Range Transportation Plan. Further details can be found in the Project List Appendix.

COORDINATED HUMAN SERVICES TRANSPORTATION PLANS

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Section 3046, amended 49 U.S.C. Sections 5302, 5303, 5310, 5311, 5314, 5316 and 5317 to require metropolitan regions or component parts of metropolitan regions to produce a Coordinated Human Services Transportation Plan.

Congress intended the Coordinated Plan to begin communication between the transportation industry and human service providers about the special mobility needs of particular target populations, especially low income workers and the elderly and disabled community.

MAP-21 amended 49 U.S.C. sections 5310 and 5307 to consolidate human services transportation grants at FTA and to require that projects receiving FTA funds in the 5310 Transportation for Elderly Persons and Persons with Disabilities, some 5311 Formula Grants for Other than Urbanized Areas, 5307 Urbanized Area Formula Grants to be included from the local adopted coordinated plan. The FTA has recently provided guidance, via FTA Circular 9070.1G, states that:

"Projects may be identified as strategies, activities and/or specific projects addressing an identified service gap or transportation coordination objective articulated and prioritized within the plan."[27]

In the SCAG region, a mix of County Transportation Commissions and Consolidated Transportation Service Agencies (CTSAs) are responsible for producing Coordinated Plans. These agencies operate at the county level and since the passage of SAFETEA-LU have produced coordinated plans at that level.

IMPERIAL COUNTY

The *2014 Public Transit-Human Services Transportation Coordination Plan Update* addressed the following four objectives on behalf of Imperial County:

1. **To ensure compliance with law** by Imperial County, including FTA Circular 9070.1G that requires the regular conduct of a Coordinated Plan.
2. **To validate past or identify new unmet transportation needs and mobility gaps** of the target groups: older persons, persons with disabilities and persons of low-income. Veterans are also included as their mobility needs may differ from the general public.
3. **To engender dialogue between two service sector public transportation and human services** for purposes of identifying coordinated projects to address unmet needs and mobility gaps. The populations of interest here overlap with those of many Imperial County human service agencies. And trip needs described are often those most difficult to make or cannot be made on public transportation.

Seeking solutions to these trip needs for Imperial County's older adults, persons with disabilities and those of low income will require solutions that go beyond what public transportation can do alone, hence the need for this Coordinated Plan.

4. **To establish a list of responsive and prioritized mobility projects and strategies**, positioning Imperial County stakeholders to pursue grant and specialized transportation funding opportunities that support such strategies over the next four to five years.

This effort included analysis on the changes to and distribution of this Plan's target populations throughout Imperial County. The County's 2012 population of almost 173,500 persons had grown considerably over the previous decade, a 22 percent increase from 2000, adding an additional 142,000 persons. There were changes among groups within the overall population that will impact the mobility of individuals.

- **Older adults** in Imperial County are 10.6 percent of the population, at 18,360 persons. The proportion of older adults is increasing at rates faster than for the general population and three times that of the national growth rate for persons age 65 and older.
- **Persons of low income**, specifically adults who are at 100% of the federal poverty levels, are 11 percent of the total population, or 19,000 adults and an additional 3,100 adults age 65 and older. Persons living at 150 percent of the federal poverty level are sometimes a better measure of low income. These low-income persons total nearly 64,000, or 39 percent of the County's 2012 population.
- **Persons with disabilities** are difficult to compare with year 2000 demographics because the U.S. Census changed its reporting on disabilities. Individuals are now asked to identify functional areas with which they have difficulty. Among adults ages 18 to 64, almost 2,300 or 5 percent of the County's population report ambulation difficulties, while almost 2,000 adults aged 65 and older report ambulation difficulties. Combined, these 4,300 persons are just under 10 percent of the County's overall population and reporting varying mobility problems.
- **U.S. military veterans** number 6,631 persons. Vietnam-era veterans are the largest group, now beginning to age and some having increasing health-related difficulties. Working-age veterans in Imperial County have an unemployment rate of almost 15 percent, more than double the national veteran unemployment rate of 7 percent.
- **LEP populations, or limited English proficiency** are 49,398 individuals, or 31 percent of the County's total population, predominately Spanish speakers who *speak English less than very well*, according to the 2012 American Community Survey. This third of the population are residents only and do not include those who travel daily into Imperial County from Mexico and may also be of limited English proficiency.
- **Persons in households without vehicles** are almost 3,400 households or 11percent of Imperial Counties 49,000 households. Exhibit ES-1 identifies these geographic pockets and areas of high need around the county. [28]

LOS ANGELES COUNTY

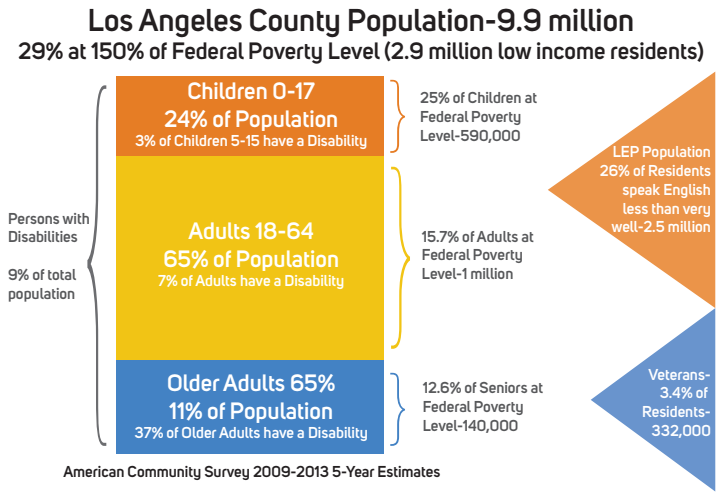
Currently, the most recently updated coordinated plan for Los Angeles County is *Action Plan: A Locally Developed, Coordinated Public Transit Human Services Transportation* Plan for Los Angeles County, adopted by Access Services Incorporated in 2007.

Metro is in the process of updating this plan and the 2016-2019 Coordinated Public Transit-Human Services Transportation Plan for Los Angeles County was adopted in July of 2015. The 2016-2019 Coordinated Plan is intended to follow Federal guidance to:

1. Identify the transportation needs of individuals with disabilities, older adults and people of low-income;
2. Identify strategies for meeting those needs;
3. Prioritize transportation strategies for funding and implementation.[29]

See **FIGURE 55**.

FIGURE 55 Los Angeles County Special Needs Populations



Source: 2016-2019 Coordinated Public Transit-Human Services Transportation Plan for Los Angeles County Draft Executive Summary

ORANGE COUNTY

The Coordinated Public Transit-Human Services Transportation Plan for Orange County, or the Coordinated Plan, is mandated by FTA and brings together human service organizations and public transit agencies to identify and meet mobility needs of older adults, persons with disabilities and persons of low income. Building upon a history of coordination requirements within its Section 5310 program, Enhanced Mobility of Seniors and Individuals with Disabilities, the Coordinated Plan aims to 1) identify the transportation needs of individuals with disabilities, seniors, veterans and people with low income; 2) provide strategies for meeting those needs; and 3) prioritize transportation services and projects for funding and implementation.

The Plan's development process helps to identify, leverage and extend scarce transportation resources by coordinating often separate "siloed" service systems around the mobility needs of the target populations. In 2012, new transportation authorizing legislation, MAP-21, included changes that impacted the Coordinated Plan. MAP-21 repealed both the Job Access and Reverse Commute and New Freedom programs, both of which had been tied to the Coordinated Plan. MAP-21 retained and strengthened the 5310 program, restating the requirement of the Coordinated Plan and providing funding support for the strategies and projects identified in and recommended through the Coordinated Plan process. Chapter 1 includes additional information about the FTA Section 5310 program.

2015 Plan Purposes:

This 2015 Coordinated Plan will address the following three objectives:

1. **Ensure compliance with law by Orange County**, including FTA Circular 9070.1G that requires the regular conduct of a Coordinated Plan;
2. **Validate past or identify new unmet transportation needs and mobility gaps of the target groups**; Engender dialogue between two service sectors—the public transit provider and the human service agencies—for purposes of identifying and supporting coordinated projects by which unmet needs and mobility gaps can be addressed; and
3. **Establish a list of responsive and prioritized strategies and projects by which to meet unmet needs and mobility gaps**, positioning Orange County stakeholders to pursue grant and specialized transportation funding opportunities that support these efforts during the next four years.

See **FIGURE 56**.

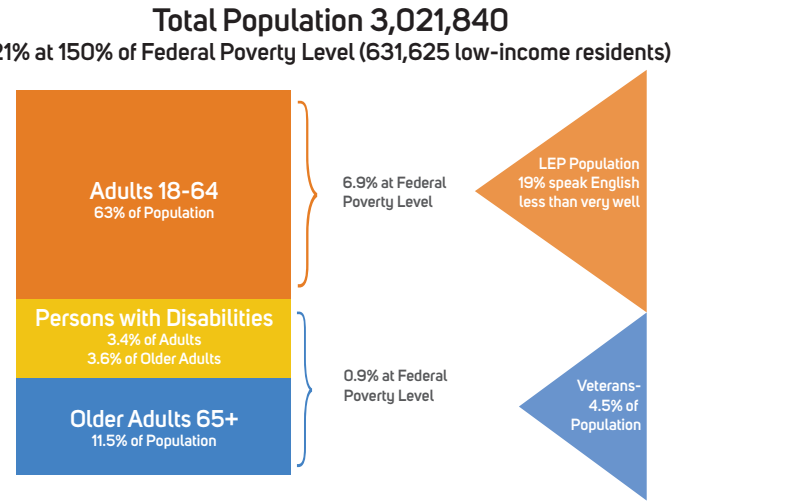
Older adults make up 11.5 percent. The senior population is projected to increase further to 14.9 percent of the population by 2020 and to 19.6 percent by 2030, reflecting the impact of the aging baby boomers.

Persons of low income, specifically adults who are at 100 percent of the federal poverty level are nearly 7 percent of the total population, or 205,331 adults. There are an additional 27,981 older adults living at the federal poverty level. Persons with incomes at 150 percent of the federal poverty level are another measure of low income. These total over 600,000 persons or 21 percent of the county's total population.

Persons with disabilities are difficult to compare with year 2000 demographics because the U.S. Census changed the way that it invites reporting on disabilities. Individuals now identify the functional areas with which they have difficulties. Among adults ages 18–64,101,722, or 3.4 percent of Orange County's population, report one or more disability characteristics. Another 110,098 adults aged 65 and older report one or more disability.

Combined, these 211,820 persons total 7 percent of the county's overall population.

FIGURE 56 Orange County Special Needs Populations



Source: Source: 2016-2019 Coordinated Public Transit-Human Services Transportation Plan for Los Angeles County Draft Executive Summary

RIVERSIDE COUNTY

The 2012 Update to the Public Transit—Human Services Transportation Coordination Plan for Riverside County augmented the 2008 Public Transit-Human Services Transportation Coordination Plan for Riverside County. These Coordinated Plans are intended to promote mobility by identifying needs and transportation service gaps of three targeted populations:

1. Older persons
2. Persons with disabilities
3. Persons of limited means.

The Riverside County Coordinated Plans do not provide for funding, but help to guide funding decisions, specifically those related to FTA 5307-*Urbanized Area Formula Grant* and the 5310 *Capital Program for Seniors and Persons with Disabilities*, in addition to local Measure A Specialized Transportation Program. Projects funded from these programs must be "derived from a locally developed, coordinated public transit-human services transportation plan." This plan can also help support and provide rationale for additional funding requests, both by public transit providers and by its human services partners.

The 2012 Update found that Riverside County has grown by almost 40 percent in the past decade, adding another 600,000 new residents. The 2010 Census identified Riverside County as among the two fastest growing counties in the State of California, growing from 1.5 million persons to 2.1 million residents. Within this growth, there have been important changes among the target group populations:

- Low-income adults, ages 18 to 64, are a fast growing sub-group, increasing by 46percent over the past decade and adding 52,000 individuals.
- Adults with disabilities, ages 18 to 64, represent 8.5 percent of the adult population or 110,000 persons.
- Older adults, ages 65 and up, are now 11.7 percent of the County's total population, or 253,000 persons.
- Oldest adults, ages 85 and older are the fastest growing sub-group, increasing to 1.4 percent of the County's total population, over 30,000 individuals.[30]

SAN BERNARDINO COUNTY

The county transportation commission is required to consider the longer-term transportation needs of its region. The San Bernardino County Long Range Transit Plan proposes strategies for a twenty-five year planning horizon, addressing the challenges, planning needs and projected future conditions as they can be best understood at the time of writing.

Addressing the issue of growth, the report states:

Population growth has pushed urbanized areas outward into the Victor Valley and the Morongo Basin. As urban expansion occurs further into the county, the sheer size of the county and low density development heavily restricts the role of transit in providing mobility to many of its citizens. As the population of the county ages and minority populations continue to grow, shifting demographics will continue to influence travel behavior and transit's ability to serve regional needs. (ES-1) The plan anticipates continuing "explosive" growth that manifests in increases in populations, in the numbers of households, in the numbers of trips and, importantly, transit-related increases of 53% more travel trips by 2035. Planning for such increases is the intent of the Long Range Transit Plan. With a focus primarily on the San Bernardino Valley and the Victor Valley, many of the plan's recommendations promote "premium transit" including rapid buses and rail services. These mass transit modes are promoted because they may attract those currently driving in private autos onto public transportation.

Faster transit and regionally-oriented mass transit, which characterizes much of the premium transit discussed in SANBAG's Long Range Transit Plan, will benefit seniors, persons of low-income and those with disabilities where it promotes greater accessibility to regional destinations they may use.

VENTURA COUNTY

Updated every four years, the Ventura County Public Transit-Human Services Transportation Coordination Plan identifies the needs and transportation service gaps of three targeted populations (older persons, persons with disabilities and persons of limited means). It does not provide funding but serves as a guide for funding decisions. Ventura County projects funded from such programs as Job Access Reverse Commute (JARC), New Freedom and Capital Program for Seniors and Persons with Disabilities must be derived from this plan.

The two principal recommendations from the previous plan included the implementation of a standard eligibility policy for older adults for publicly-operated paratransit systems and the implementation of a coordinated approach to automated dispatching and trip scheduling for public paratransit systems. The current plan accounts for changes in population and demographics (which found an increase among all three target populations), assesses the various modes of transit available to the public and inventories the eleven projects that VCTC has awarded through JARC and New Freedom projects.

An analysis of the input garnered from various stakeholders identified four themes as they relate to the transportation needs of target population groups:

- Regional and inter-city travel. Coordinating smooth connections between cities and speed of travel between jurisdiction via public transit
- Transit capacity building. Maintaining existing transit services and expanding where possible
- Individualized transit information and assistance. Customizing the provision of information and assistance to facilitate access to specialized transportation

Coordination of leadership and administration. Coordination outcomes that are well reported within the county and to constituents' agency representatives Based on these themes, the Coordination Plan presents a framework for prioritizing service solutions, with each theme having a corresponding goal and implementing objectives. Finally, the plan recommends administrative actions for VCTC and agencies working with target populations to support the newly-established goals for mobility improvement.[31]

THE 2016 RTP/SCS CONSTRAINED PLAN

The 2016 RTP/SCS fiscally constrained plan is the culmination of work with a diverse group of stakeholders including county transportation commissions, transit agencies, local government, advocacy groups and the general public. Many of the projects contained are derived from local corridor planning efforts or local long range plans, reflecting SCAG's 50-year commitment to local control in planning efforts and constitute a combined regional vision for public transportation as it will exist in 2040.

PROJECTS AND INVESTMENTS

The 2016 RTP/SCS includes significant investment in public transit across all transit modes. It includes a $56.1 billion dollar investment in transit capital, and a $156.7 billion investment in transit operations and maintenance. Transit represented 64 percent of total operations and maintenance in the 2016 RTP/SCS and 20 percent of capital investments. As discussed in the Passenger Rail Appendix, passenger rail, including Phase I of the California High-Speed Rail program, accounts for another $38.6 of the total capital investment in the 2016 RTP/SCS.

This investment package includes a selection of major capital investments as described in **TABLE 28** which displays selected capital projects. These investments include new rail transit facilities, vehicle replacements, bus system improvements and capitalized maintenance projects.

Similarly, **TABLE 27** describes all Transit Operations and Maintenance investments over $500 Million in the constrained plan. This list includes bus, rail and paratransit operations, the implementation of OCTA's Short Range Transit Plan, Metrolink Operations, expanded bus service on targeted productive corridors, preventative maintenance and an increased commitment on asset preservation funded from innovative revenue sources.

EXHIBITS 12, 13, 14, 15, 16 AND 17 depict each county's local transit network as the Plan envisions it in 2040.

TABLE 27 Major Transit Operations and Maintenance Projects And Investments (Over $500 Million)

County	Project
Los Angeles	Access Services Incorporated (Paratransit)–Metro subsidy
Los Angeles	Preventive Maintenance (Capital & Operating Maintenance Items Only) - LA County
Orange	Countywide Fixed Route, Express, and Paratransit Operations–Orange County
Orange	OCTA SRTP Implementation
Orange	Metrolink Operations–Orange County
Orange	Transit Extensions to Metrolink–Go Local Operations–Orange County
San Bernardino	San Bernardino Countywide Local Transit Service Operations
Regionwide	Regionwide Transit Operations and Maintenance–Preservation
Regionwide	Expand Bus Service: Productive Corridors
Regionwide	Expand Bus Service: BRT
Regionwide	Expand Bus Service: Point-to-Point

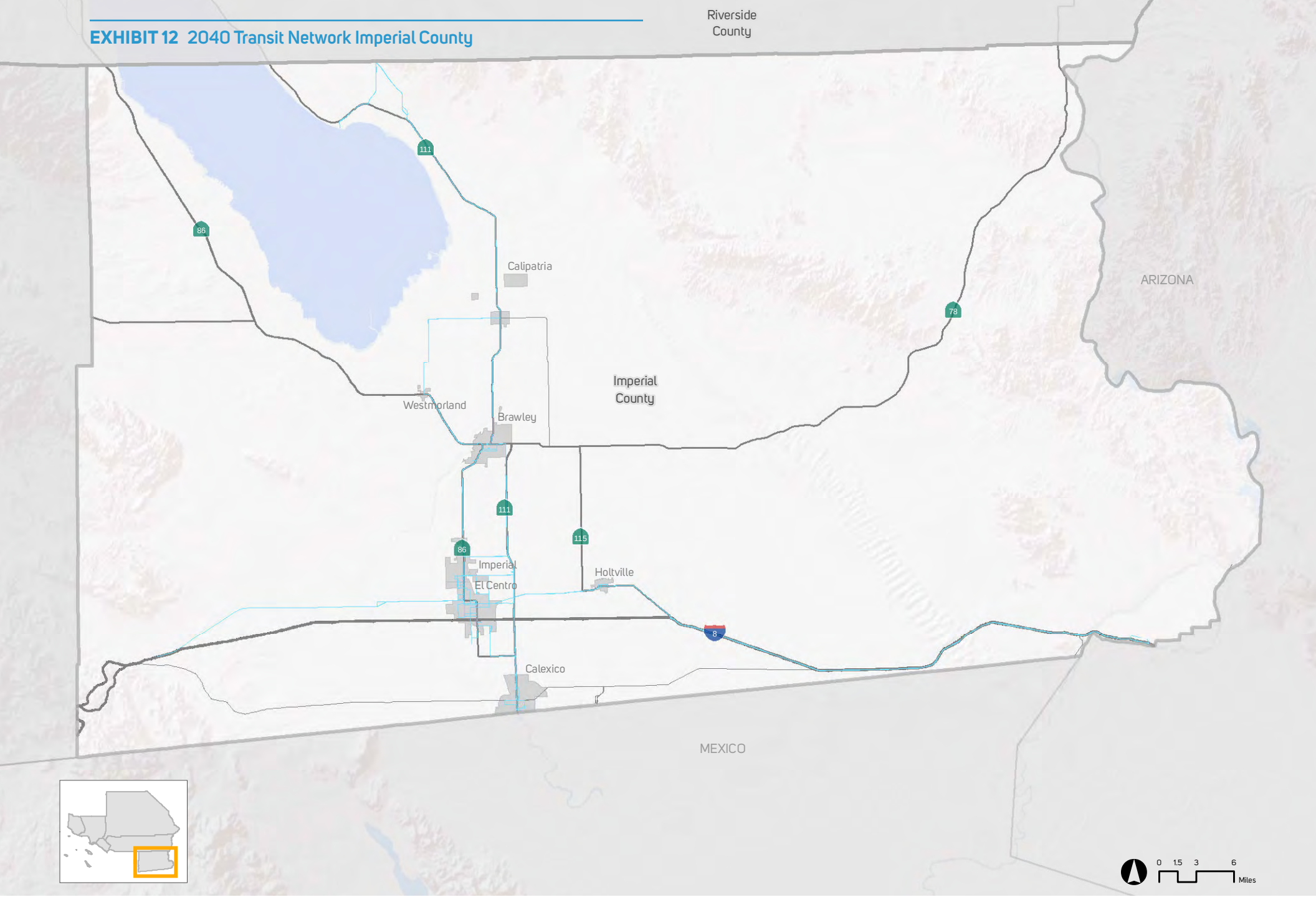
Source: 2016-2040 RTP/SCS Project List

TABLE 28 Selected Transit Capital Projects

County	Project
Los Angeles	Airport Metro Connector
Los Angeles	Crenshaw LAX Transit Corridor
Los Angeles	East San Fernando Valley Transit Corridor
Los Angeles	Eastside Transit Corridor Phase 2
Los Angeles	Exposition Transit Corridor, Phase 2 to Santa Monica
Los Angeles	Metro Gold Line Foothill Extension Phase 2A
Los Angeles	Metro Gold Line Foothill Extension: Azusa to County Line
Los Angeles	Purple Line Extension to La Cienega, Century City, Westwood
Los Angeles	Regional Connector
Los Angeles	Sepulveda Pass Corridor
Los Angeles	South Bay Metro Green Line Extension
Los Angeles	West Santa Ana Branch Transit Corridor
Los Angeles	Bus & Rail Capital—LA County Near Term
Los Angeles	Countywide Bus System Improvement–Metro Fleet
Los Angeles	Countywide Bus System Improvement—LA County Muni Fleet
Los Angeles	Metro Rail System Improvements (Capital Costs Only)
Los Angeles	Metro Rail Rehabilitation and Replacement (Capital Costs Only)
Los Angeles	Transit contingency/new rail yards/additional rail cars (Capital costs only)–LA County
Los Angeles	Vermont Short Corridor
Los Angeles	Metro Red Line Extension: Metro Red Line Station North Hollywood to Burbank Bob Hope Airport
Los Angeles	Metro Green Line Extension: Metro Green Line Norwalk Station to Norwalk Metrolink Station
Los Angeles	Slauson Light Rail: Crenshaw Corridor to Metro Blue Line Slauson Station
Orange	Anaheim Rapid Connection
Orange	Countywide Fixed Route, Express, and Paratransit capital (Baseline)–Orange County
Orange	Santa Ana and Garden Grove Streetcar
Riverside	Coachella Valley Bus Rapid Service
Riverside	Perris Valley Line
Riverside	Perris Valley Line Extension to San Jacinto
San Bernardino	Foothill/5th Bus Rapid Transit
San Bernardino	Gold Line Phase 2B to Montclair
San Bernardino	Metrolink San Bernardino Line Double tracking
San Bernardino	Passenger Rail Service from San Bernardino to Ontario Airport
San Bernardino	Redlands Rail
San Bernardino	West Valley Connector Bus Rapid Transit

Source:2016-2040 RTP/SCS Project List

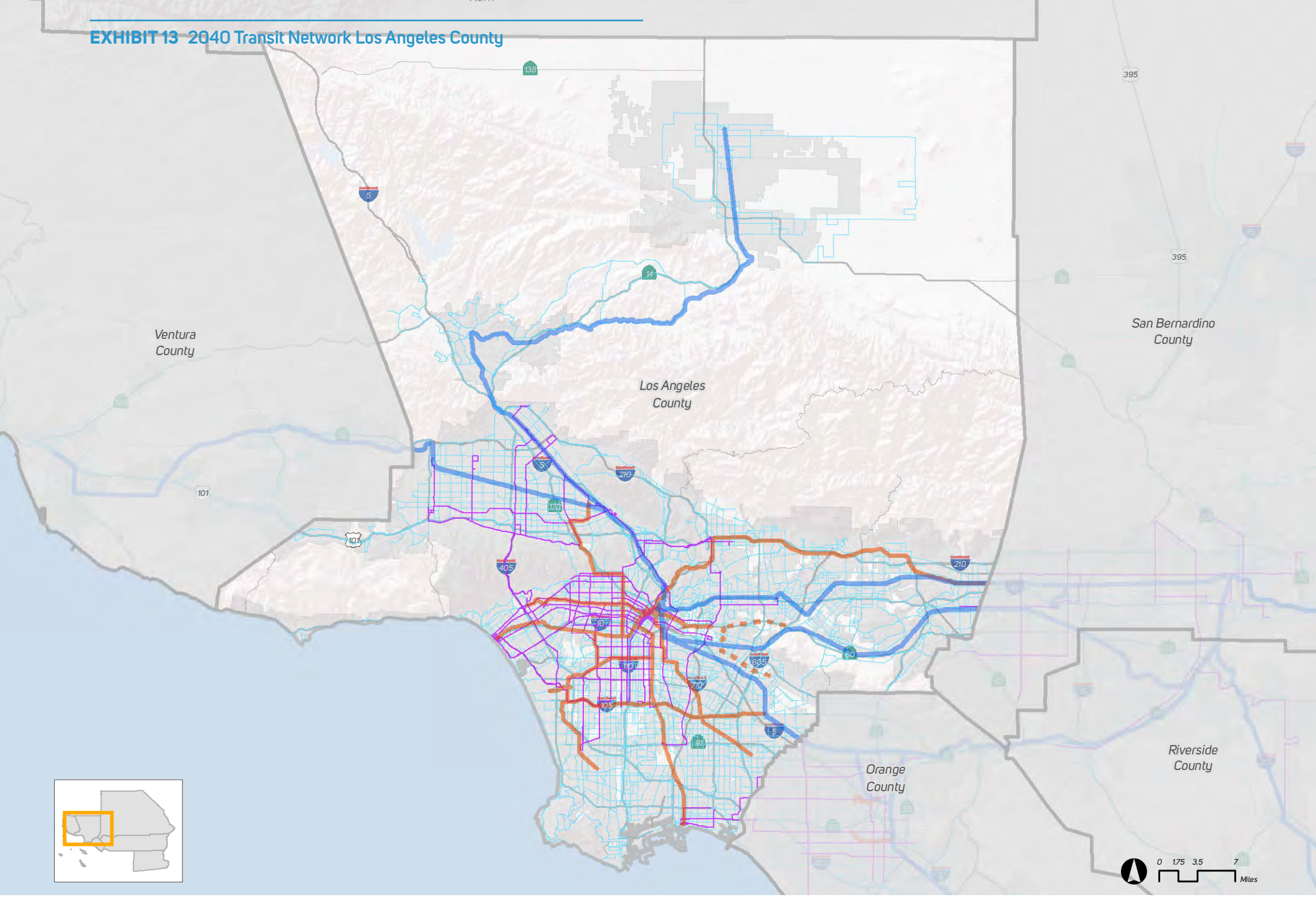
EXHIBIT 12 2040 Transit Network Imperial County



Bus Routes (2040)

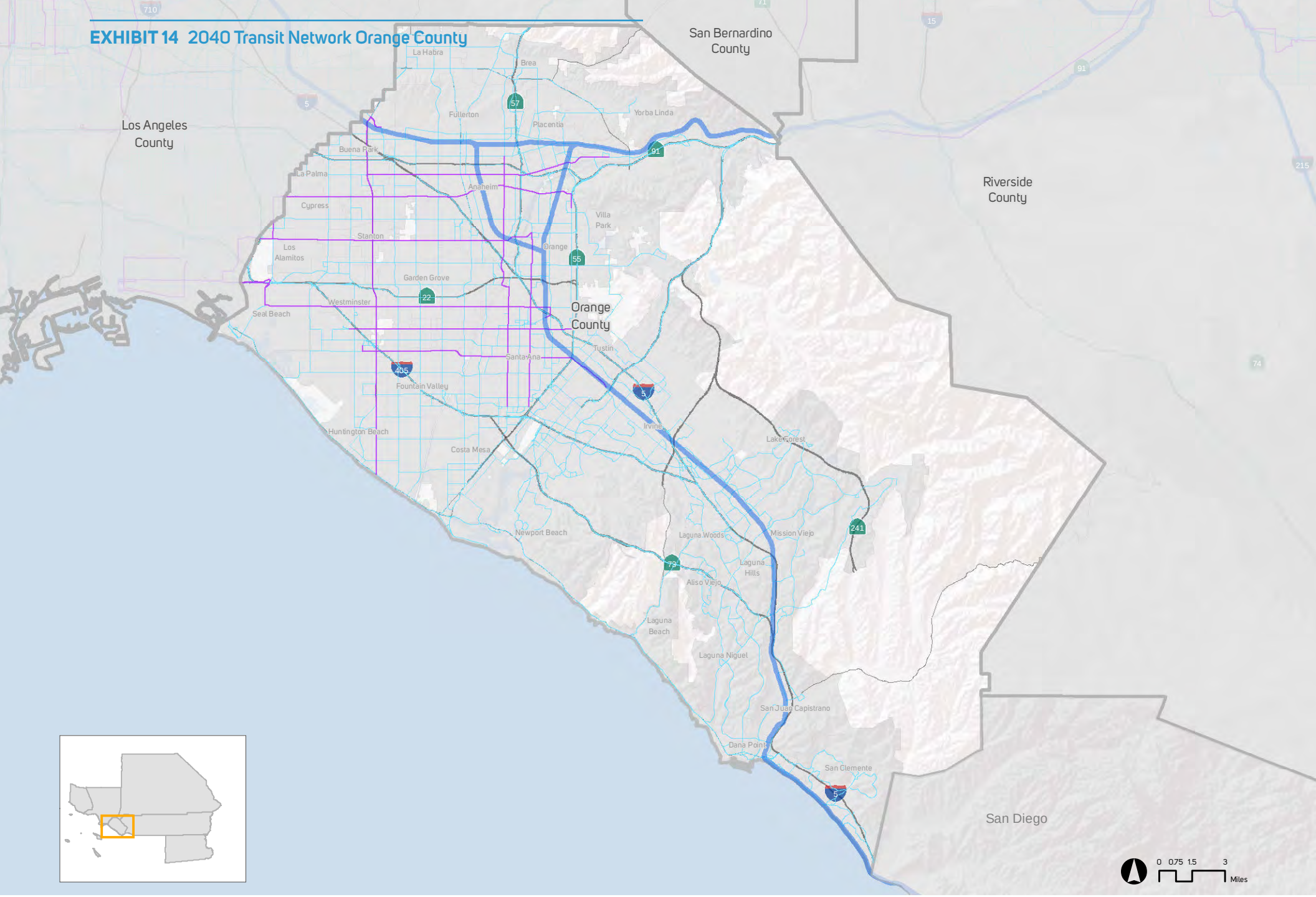
(Source: SCAG)

EXHIBIT 13 2040 Transit Network Los Angeles County



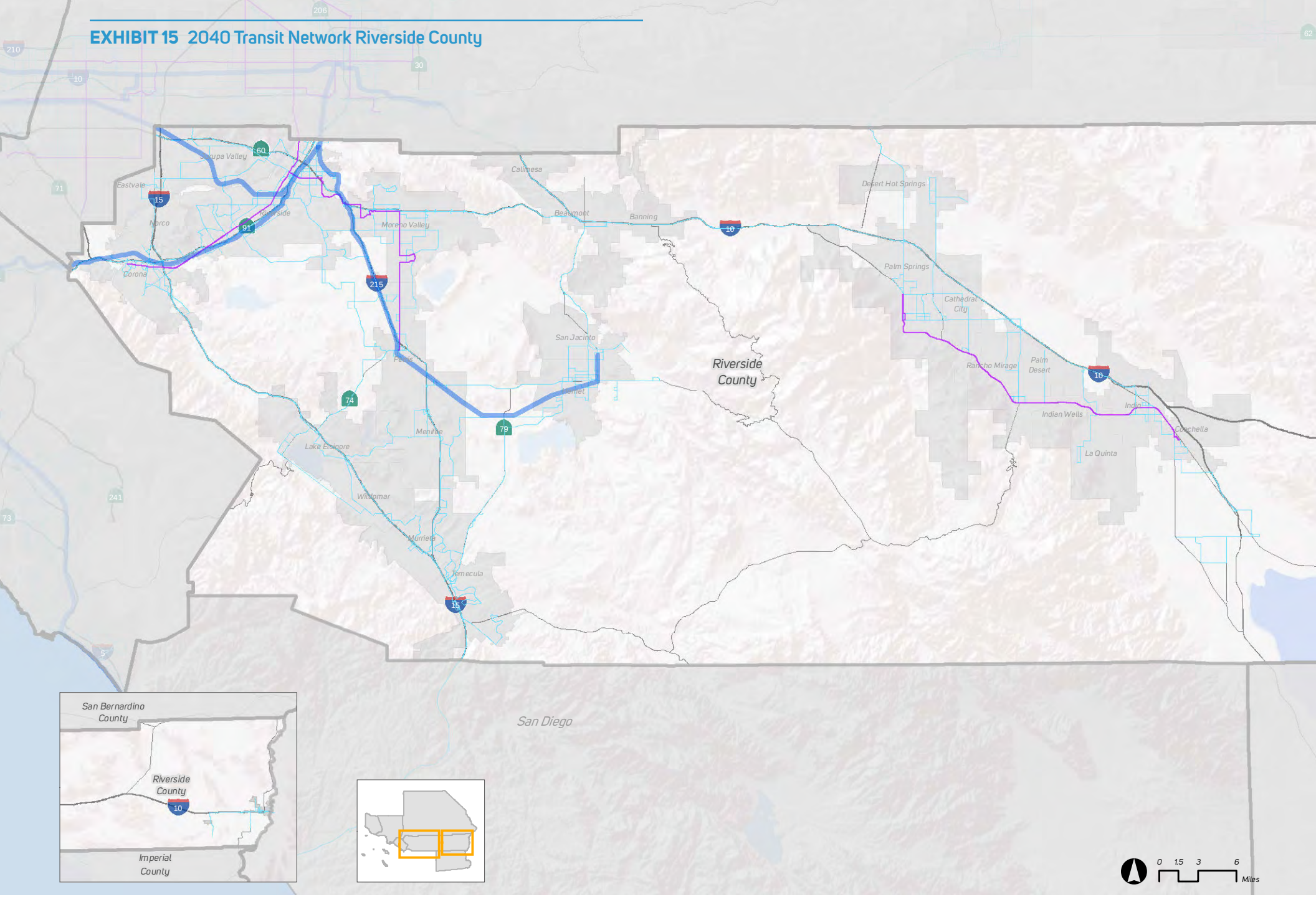
(Source: SCAG)

EXHIBIT 14 2040 Transit Network Orange County



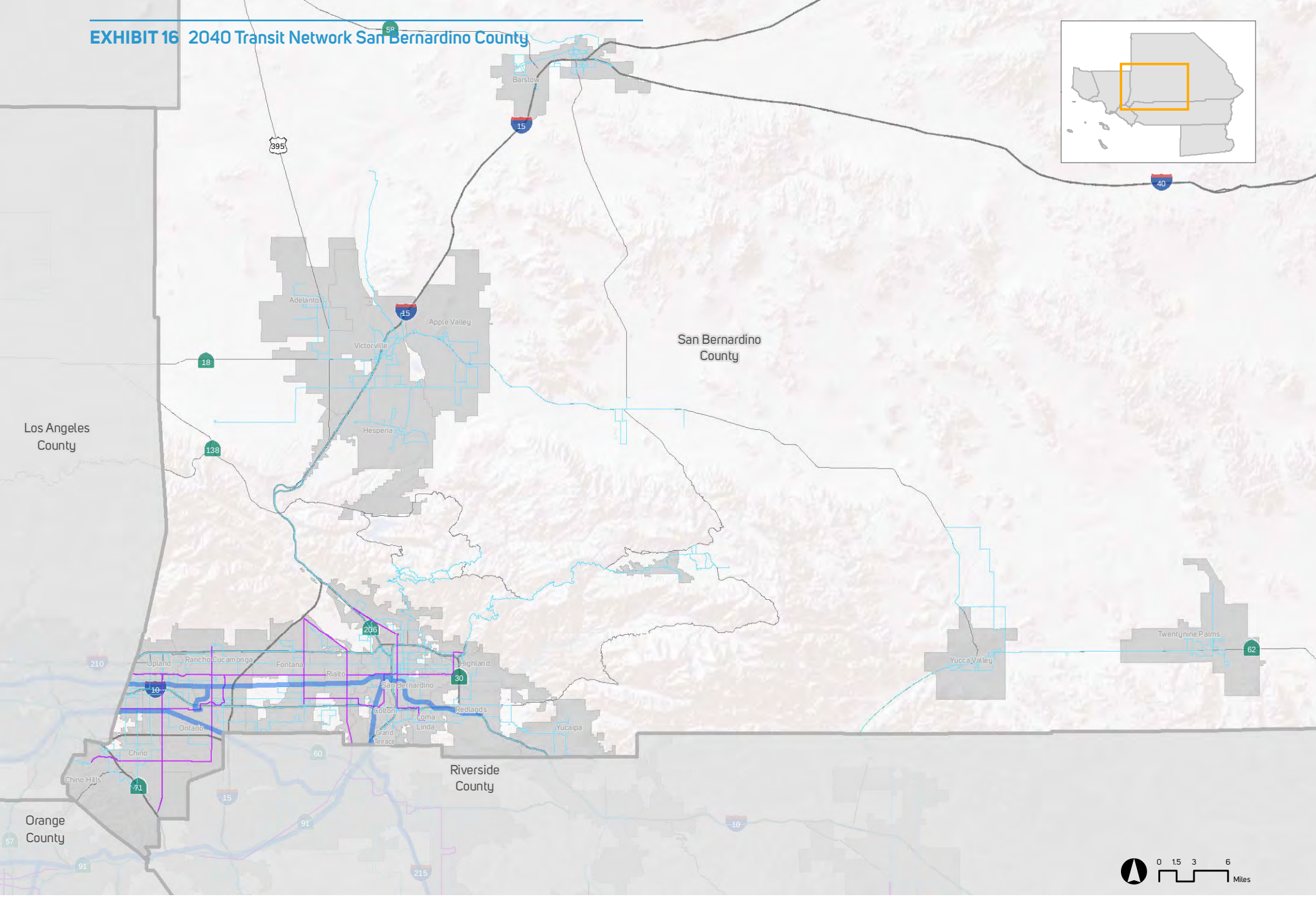
(Source: SCAG)

EXHIBIT 15 2040 Transit Network Riverside County



(Source: SCAG)

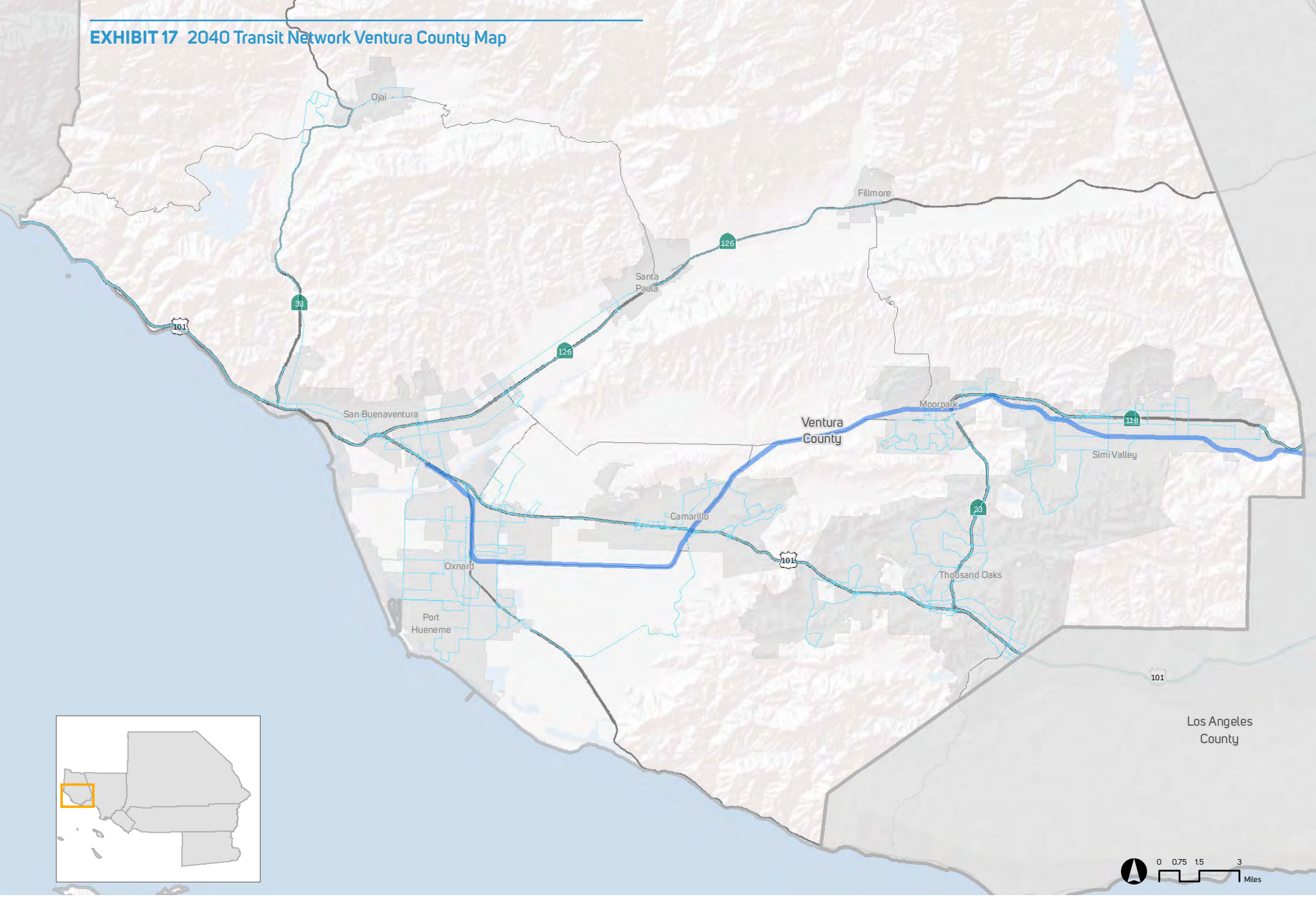
EXHIBIT 16 2040 Transit Network San Bernardino County



Commuter Rail (2040) Rapid Bus (2040) Bus Routes (2040)

(Source: SCAG)

EXHIBIT 17 2040 Transit Network Ventura County Map



(Source: SCAG)

STRATEGIES AND RECOMMENDATIONS

PRODUCTIVE BUS CORRIDORS

As discussed above on page 53, staff surveyed agencies and County Transportation Commissions on their short- and long-range plans for bus corridors. Current High Quality Transit Corriors (HQTC) were identified through consultation with transit providers in our region using 2014 schedules. In addition, SCAG staff asked transit operators to identify future corridors that they expect to improve to 15-minute or better headways in the future.

In addition, the 2016 RTP/SCS includes enhanced, BRT and express services for the 2040 network. BRT includes BRT Light or rapid bus. These services are based on CTC submittal and short- and long-range planning documents.

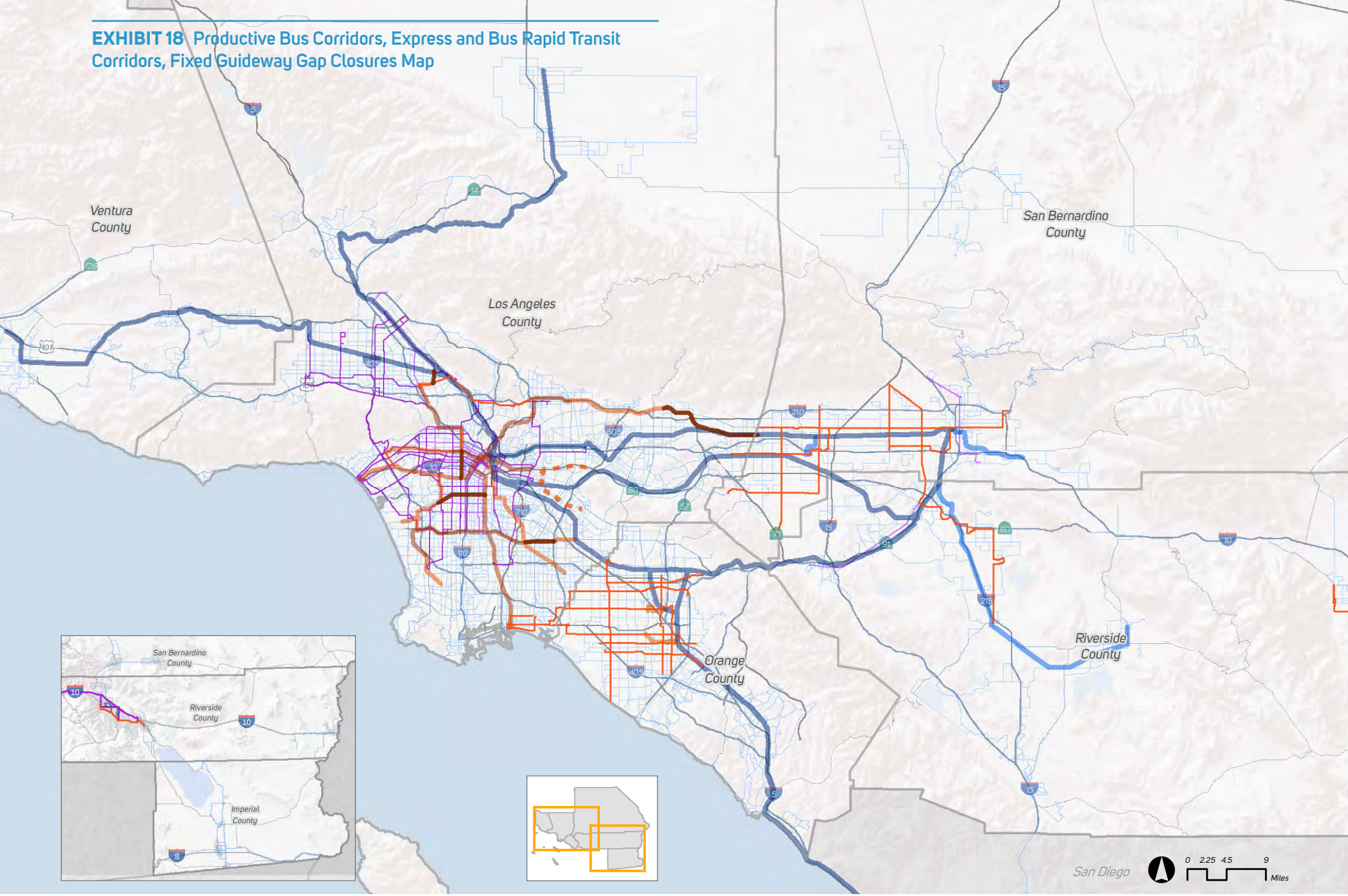
The 2016 RTP/SCS includes additional corridors identified for improved, premium transit services, including implementing higher frequencies, point-to-point express services, and BRT and BRT "Light" service. These services are drawn from county transportation commission and transit operator planning efforts such as Metro's "Strategic Bus Network Plan" and OCTA's 2014 Long Range Plan, but they reflect additional investments above and beyond adopted countywide transportation plans and are assumed to be funded with innovative sources identified in the RTP financial plan strategy. The Metro Strategic Bus Network Plan closely mirrors the City of Los Angeles' Transit Enhanced Network identified in its draft Mobility Plan 2035. These new services also coincide with active transportation, complete streets and livable corridors efforts. See **EXHIBIT 18**.

RECOMMENDED OPERATIONAL STRATEGIES

Aside from capital projects, there are many improvements that can be made in transit accessibility and operations. The 2016 RTP/SCS recommends transit initiatives including:

- **Implement and Expand Transit Priority Systems:**. Transit priority strategies include transit signal priority, queue jumpers and bus lanes. Signal priority is a highly effective treatment that speeds up bus service and attracts new transit riders. The Metro Rapid program in L.A. County has increased speeds by more than 20 percent, compared with the local service on the same street. It also has brought new riders to its system. Bus lanes are even more effective at increasing speeds, however in our region there is a dearth of such lanes. Transit agencies should heavily lobby local jurisdictions in which they operate to implement them, at least for peak-period operation.
- **Implement Regional and Inter-County Fare Agreements and Media.** Implementing additional inter-jurisdictional fare agreements and media, such as L.A. County's EZ Pass, will make transit more attractive and accessible. A pass that would cover all transit services in L.A. and Orange counties, or the whole SCAG region, is an example. The Pacific Surfliner also has fare agreements with some local transit operators along its corridor where an Amtrak ticket is good for a connecting transit fare. This could be expanded to all operators along its corridor.
- **Implement new BRT and limited-stop bus service**: BRT service provides frequent, high quality bus service and is characterized by features such as dedicated lanes, traffic signal priority, limited stops, pre-boarding fare payment, and unique branding. BRT is a good 20 percent faster than traditional local bus service. It is viewed as a premium service, and has proven to attract new riders to transit. BRT implementation does require some capital investment, but it is scalable so that transit agencies can implement a range of elements to improve bus service depending upon the resources available. In an environment of scarce funding, offering limited-stop service is also an excellent alternative to BRT because it simply involves strategically reducing the number of stops a bus would serve along a given route. Limited-stop service has been shown to be about 15 percent faster than traditional local service.

EXHIBIT 18 Productive Bus Corridors, Express and Bus Rapid Transit Corridors, Fixed Guideway Gap Closures Map



- Fixed Guideway Gap Closures
- Enhanced Rapid Bus and Bus Rapid Transit
- Enhanced Express Bus
- Enhanced Local Bus
- Metrolink (2012)
- Metrolink (2040)
- Urban Rail (2012)
- Urban Rail (2040)
- Urban Rail Alternatives
- Rapid Bus and Bus Rapid Transit (2012)
- Rapid Bus and Bus Rapid Transit (2040)
- Bus Routes (Existing and Planned)

(Source: SCAG, 2015)

RECOMMENDED ACCESSIBILITY STRATEGIES

- **Increasing bicycle carrying capacity on bus and rail vehicles:** Bicycling is becoming more popular, and our transit system can do more to accommodate bicyclists. Many buses have bike racks with capacity for only two bikes. Meanwhile, Metro and Metrolink are now allowing more bicycles on their railcars and providing bicycle lockers at rail and fixed guideway bus stations. Allowing more bikes on transit vehicles, to a reasonable point, will increase transit ridership.
- **Expanding and improving real-time passenger information systems:** Most medium- to large-size transit agencies now offer up-to-the-minute updates on arrival and departure times. This allows passengers to make more informed travel decisions and improve the overall travel experience.
- **Implementing first/last mile strategies to extend the effective reach of transit:** This is an area of study with recent focus. Making transit more accessible for biking or walking that first mile to a transit station, or from a transit station, or both, will encourage more transit usage and reduce greenhouse gas emissions. More than 90 percent of Metrolink riders drive to their origin station, representing a significant potential for providing alternatives. As mentioned before, several cities in Orange County are planning streetcar services to connect Metrolink riders to their final destinations.
- **Implementing Local Circulators.** Many cities in the region already have networks of local community circulators and fixed-route systems. Implementing more of these services would provide alternatives for residents of increasingly compact communities.

PLAN PERFORMANCE

SERVICE CONSUMED

The Plan's performance as a whole, including mobility, air quality, greenhouse gas emissions reductions, land consumption, accessibility, public health and economics, cannot be separated from its investments in public transportation. A holistic analysis of the Plan's performance, incorporating those measures of performance, is presented in Chapter 8 of the main document. An analysis of the Plan's performance specific to public transportation investments is presented here.

On a per capita level, transit ridership is projected to grow. The region will see 3.8 million residents, 2.4 million new jobs and 1.5 million more households by 2040. Between 2012 and 2040, per capita Metro Rail boardings are projected to grow by 124 percent and per capita Metrolink boardings are projected to grow by 47percent. Bus boardings are projected to grow by 60 percent, meaning that the overall per capita transit ridership are projected to grow by 67 percent.

As is discussed in the Active Transportation Appendix, the 2016 RTP/SCS calls for increased development near transit stations as well as improved access to and from transit. Walking and biking are the simplest methods for reaching transit stations in most situations. The Plan calls for $2.2 billion in improving bicyclist and pedestrian accessibility to rail transit and along busy transit corridors, improving sidewalks, wayfinding signage and bikeways.

AVAILABILITY ANALYSIS — THE CONSTRAINED PLAN

The Availability Analysis on page 46, discusses how effective the existing transit system is in serving jobs, households and residents across the region. **TABLE 31** demonstrates how effective the 2040 transit network is in serving those same classes. **EXHIBIT 19** demonstrates the extent of the region having access to transit routes offering 15-minute or more frequent service in peak periods. See **TABLE 32**.

TABLE 29 2040 Forecast Unlinked Passenger Trips

Total Trips	2001	2005	2008	2012	2040 Plan*
Metro Rail	61,802,000	74,243,000	86,707,000	101,516,533	275,411,594
Commuter Rail	7,398,000	10,693,000	12,681,000	13,155,790	23,368,844
Bus	548,728,000	609,795,000	622,286,000	587,830,836	1,141,705,164
Total	617,928,000	694,731,000	721,674,000	702,503,159	1,440,485,602

Source: National Transit Database (NTD) for past years and SCAG model estimates for 2040 based on Draft 2016 RTP/SCS

TABLE 30 2040 Per Capita Trips

Per Capita Trips	2001	2005	2008	2012	2040 Plan*
Metro Rail	3.67	4.41	5.156	5.56	12.4
Commuter Rail	0.44	0.64	0.75	0.72	1.1
Bus	32.61	36.24	36.98	32.21	51.6
Total	36.73	41.29	42.89	38.95	65.1

Source: National Transit Database (NTD) for past years and SCAG model estimates for 2040 based on Draft 2016 RTP/SCS

EXHIBIT 20 demonstrates the extent to which TAZs with 15 percent or more of households have annual incomes below $15,000 have access to frequent transit.

EXHIBIT 21 demonstrates the extent to which TAZs where 15 percent or more of households have no vehicle have access to frequent transit. Compared with 2012, access grows from 401,543 to 571,901, an increase of 42.4 percent.

EXHIBIT 22 demonstrates the extent to which TAZs where 15 percent or more of households have no vehicle have access to transit services with frequencies between 16 to 30 minutes in peak periods. Compared with 2012, access grows from 881,209 to 1,335,343, an increase of 51.5 percent

EXHIBIT 23 demonstrates the extent to which TAZs where 15 percent or more of households have no vehicle have access to transit services frequencies between 31 to 60 minutes in peak periods. Compared with 2012, access grows from 960,638 to 1,527,654, an increase of 59 percent.

TABLE 31 2040 Plan Availability Analysis

	Heavy and Light Rail	Rapid Bus and Bus Rapid Transit	Express Bus	Local Buses with Less Than 15 Minute Headways	Local Buses with 16 To 30 Minute Headways	Local Buses with 31 To 60 Headways	Local Buses with Greater Than 60 Minute Headways
Total Jobs with Access	561,439	1,637,340	1,540,270	2,166,997	4,492,118	5,542,140	4,436,380
Total Household with Access	202,164	853,098	645,948	1,354,308	2,854,921	3,714,099	2,812,129
Total Population with Access	500,716	2,257,696	1,620,567	3,781,883	8,225,999	10,871,899	8,196,868
Residents of TAZs with 15% of Households Having No Vehicles Access	52,299	218,630	190,368	571,901	1,335,343	1,527,654	1,070,772

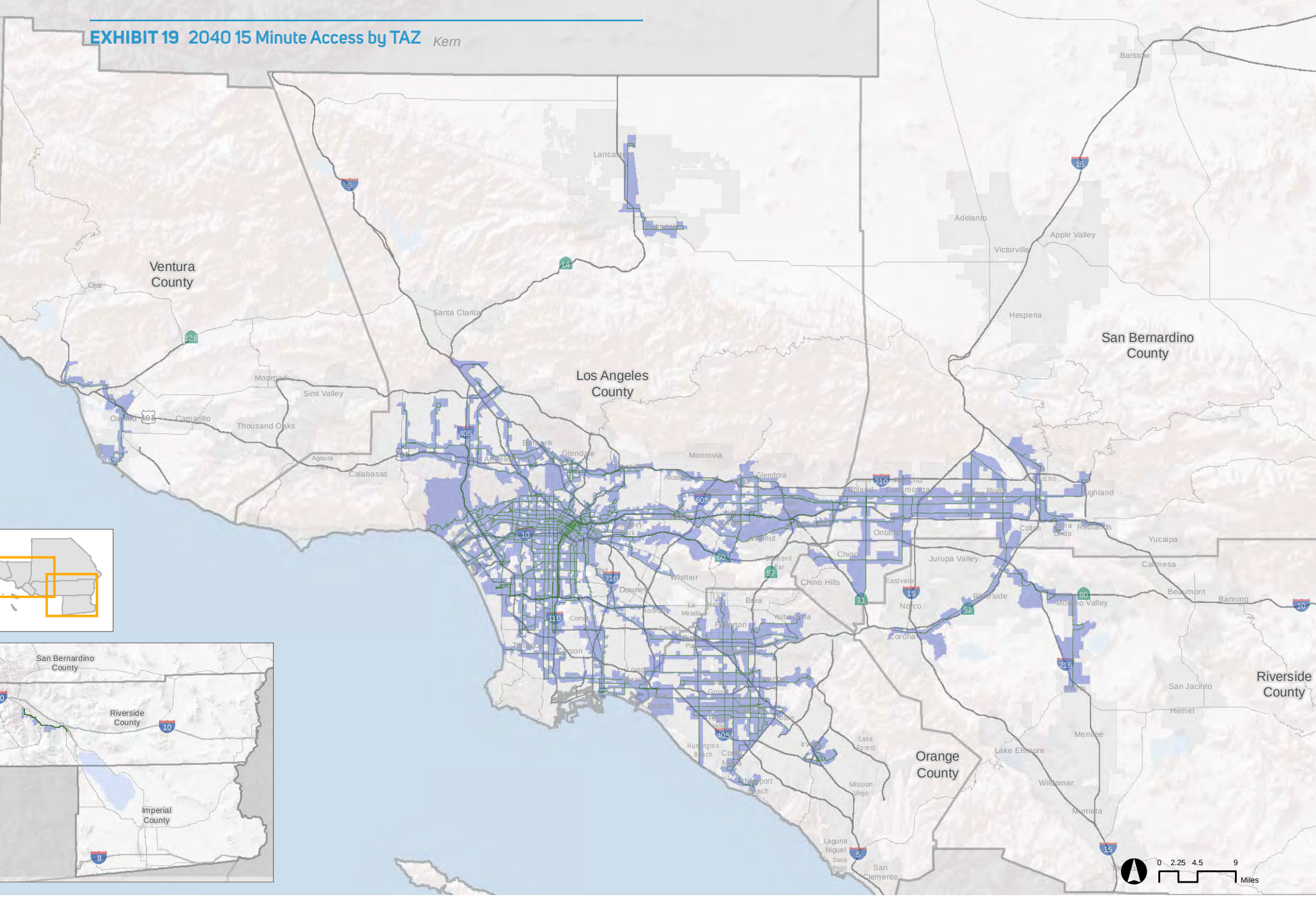
Source: SCAG 2016-2040 RTP/SCS Growth Forecast

TABLE 32 2040 Baseline Availability Analysis

	Heavy and Light Rail	Rapid Bus and Bus Rapid Transit	Express Bus	Local Buses with Less Than 15 Minute Headways	Local Buses with 16 To 30 Minute Headways	Local Buses with 31 To 60 Headways	Local Buses with Greater Than 60 Minute Headways
Total Jobs with Access	766,361	2,189,246	3,107,238	1,659,671	4,482,748	5,769,101	4,428,013
Total Household with Access	327,408	1,236,674	1,589,244	949,189	2,768,299	3,759,583	2,699,856
Total Population with Access	906,621	3,364,852	4,443,639	2,710,124	8,168,751	11,168,507	8,016,617
Tazs with 15% of Households Having No Vehicles Access	85,555	244,136	210,480	620,122	1,351,077	1,502,339	1,080,429

Source: SCAG 2016-2040 RTP/SCS Growth Forecast

EXHIBIT 19 2040 15 Minute Access by TAZ *Kern*

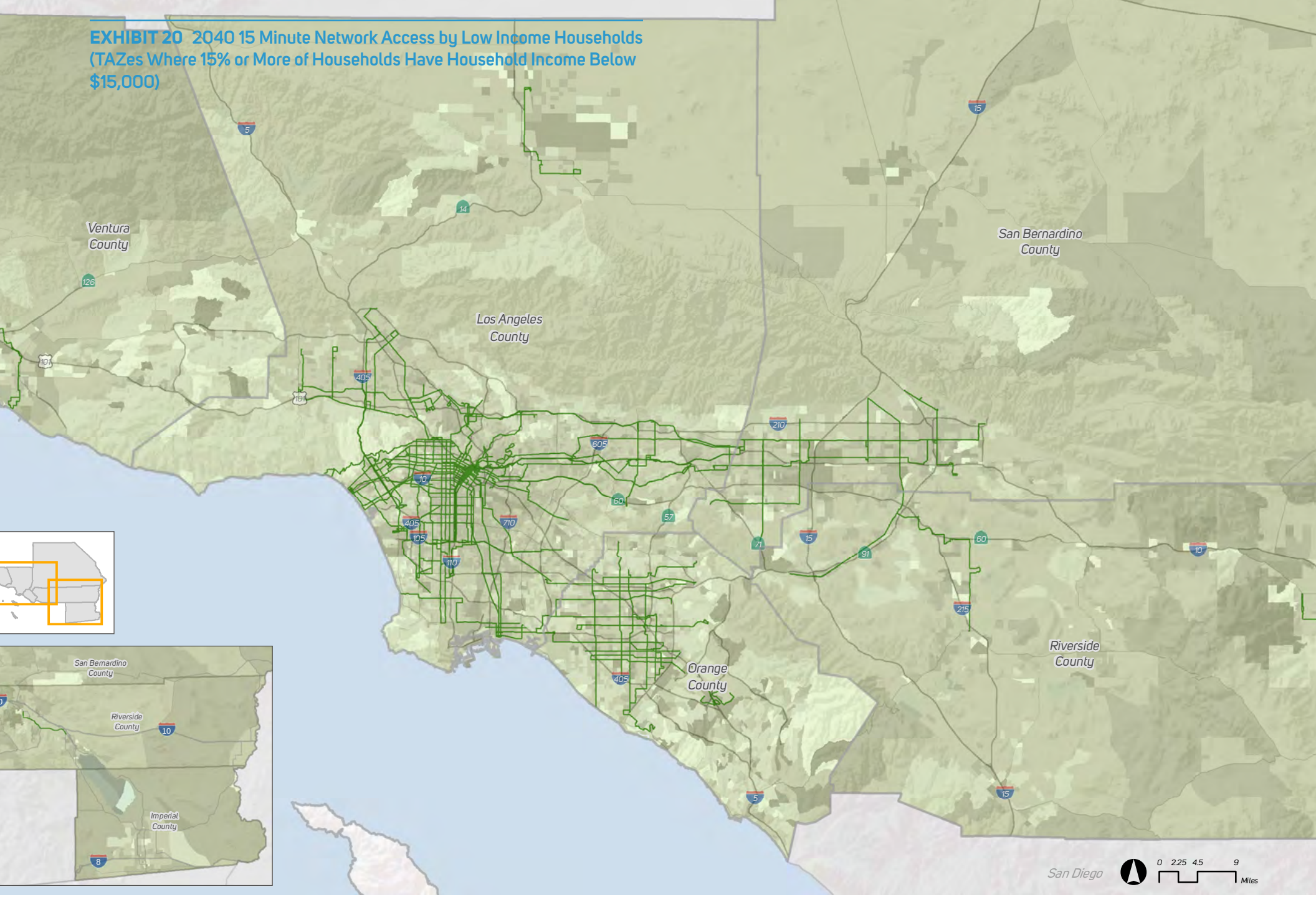


15 Minutes Transit Network Access (2040)

15 Minutes Transit Network Access By TAZ (2040)

(Source: SCAG)

EXHIBIT 20 2040 15 Minute Network Access by Low Income Households (TAZes Where 15% or More of Households Have Household Income Below $15,000)



15 Minutes Transit Network Access (2040)

Median Income

$149,072 and More

$81,014 - $149,071

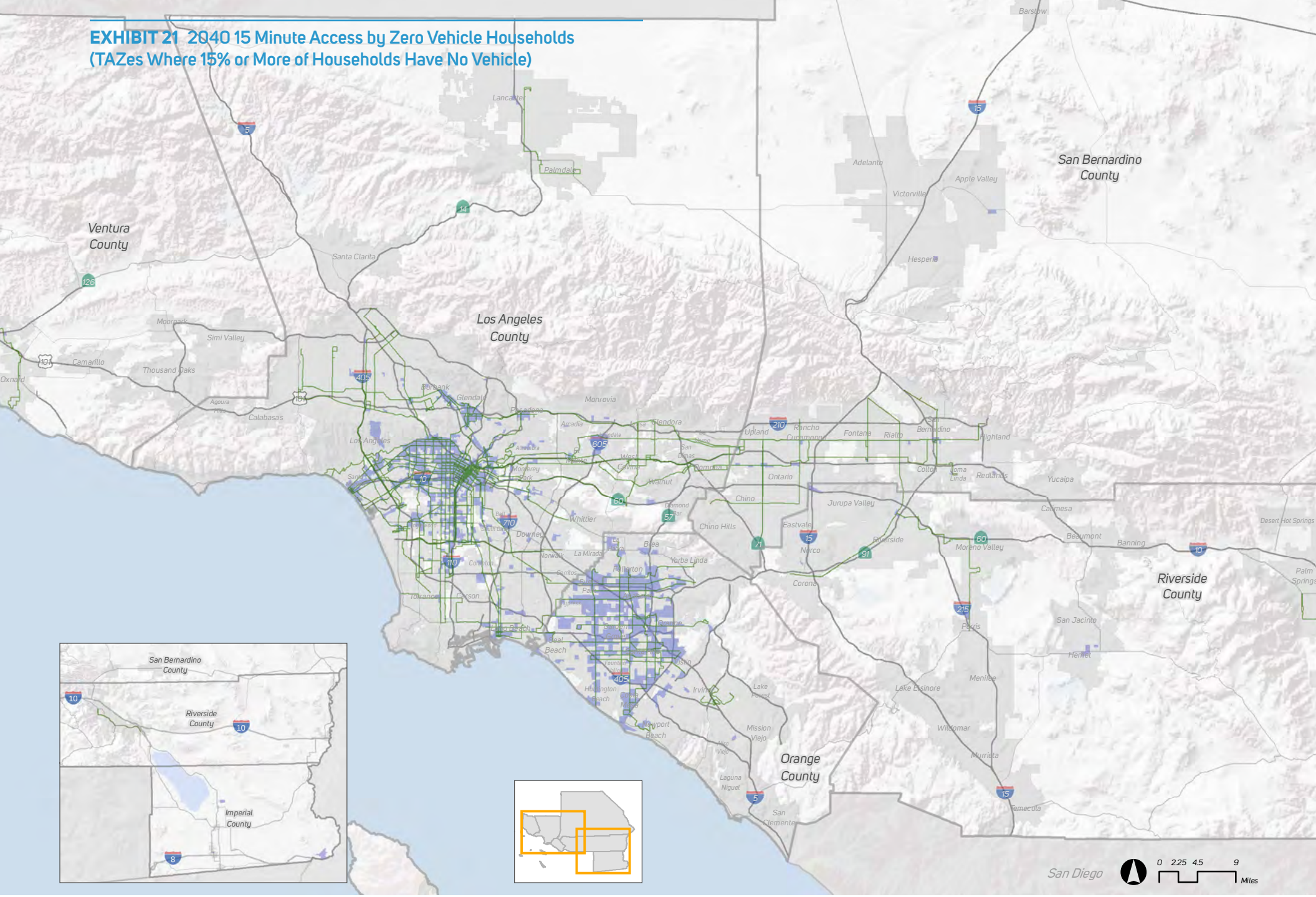
$48,459 - $81,013

$18,965 - $48,458

$18,964 and Less

(Source: SCAG)

EXHIBIT 21 2040 15 Minute Access by Zero Vehicle Households (TAZes Where 15% or More of Households Have No Vehicle)

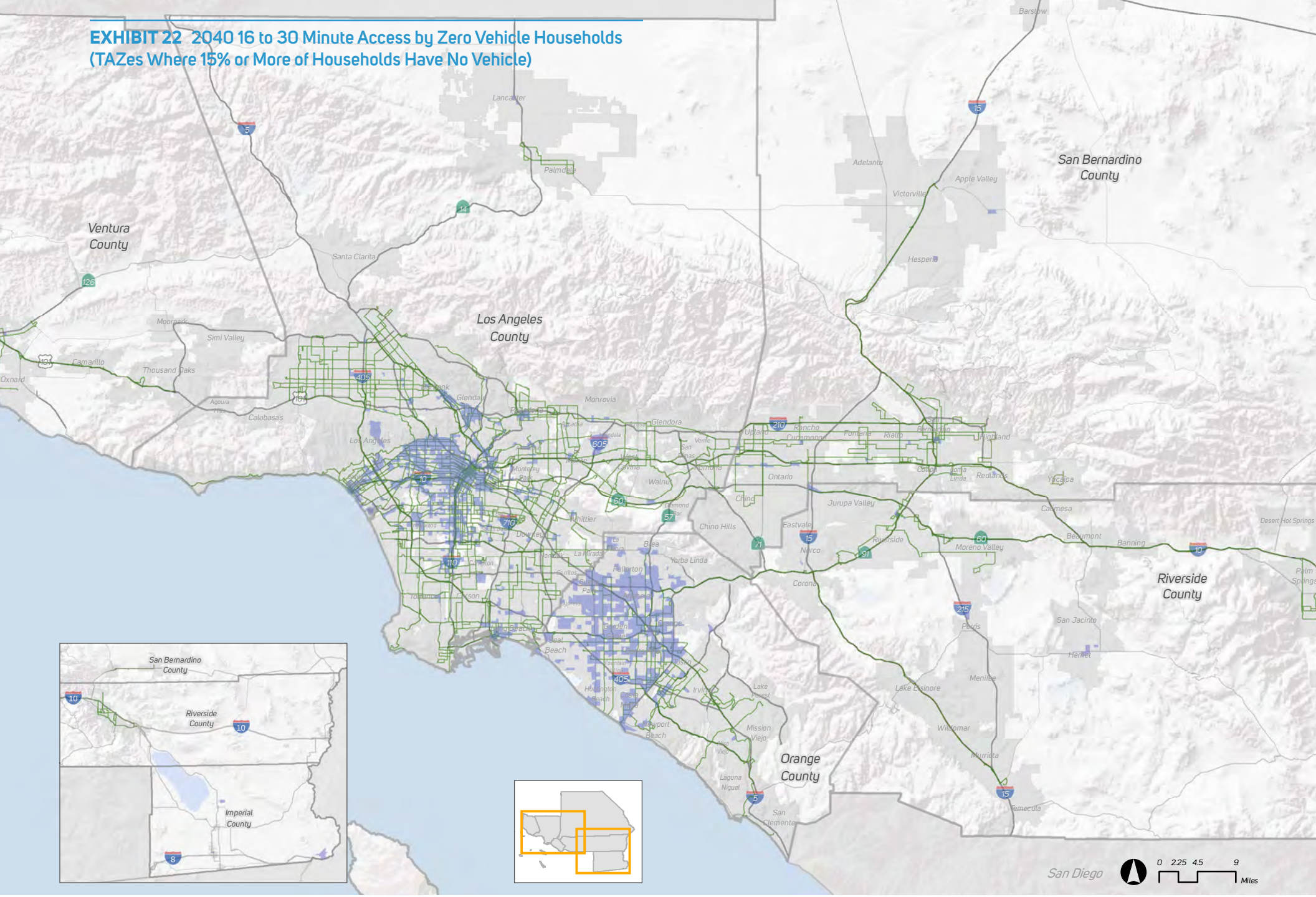


15 Minutes Transit Network Access (2040)

2040 Zero Vehicle Households by TAZ (15% or More)

(Source: SCAG)

EXHIBIT 22 2040 16 to 30 Minute Access by Zero Vehicle Households (TAZes Where 15% or More of Households Have No Vehicle)

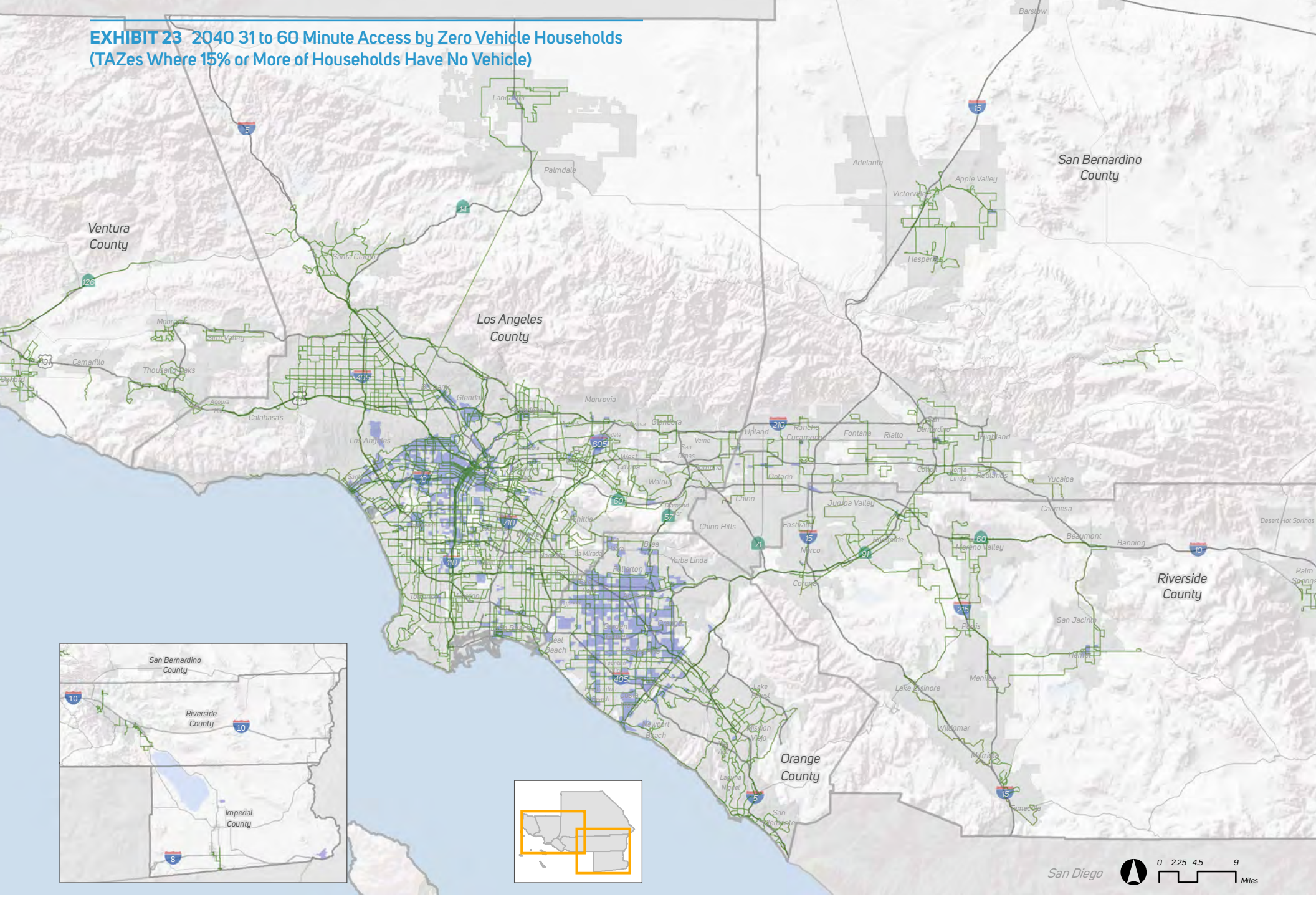


16 to 30 Minutes Transit Network Access (2040)

2040 Zero Vehicle Households by TAZ (15% or More)

(Source: SCAG)

EXHIBIT 23 2040 31 to 60 Minute Access by Zero Vehicle Households (TAZes Where 15% or More of Households Have No Vehicle)



31 to 60 Minutes Transit Network Access (2040)

2040 Zero Vehicle Households by TAZ (15% or More)

(Source: SCAG)

NEXT STEPS: EMERGING ISSUES

The implementation program for the 2016 RTP/SCS transit element encompasses environmental review, capital construction and new operational strategies. However, it also examines the issues that arose as a result of the outreach and technical work performed as part of the RTP/SCS update. Below is a discussion of those issues, which will continue to be a focus of SCAG's transit planning efforts over the next four years.

TRANSIT AND EMERGING TECHNOLOGIES

This section discusses emerging technologies specific to public transportation. A more robust discussion of innovative mobility practices can be found in the Technologies and New Shared Mobility technical appendix.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS) FOR TRANSIT

The FTA defines Intelligent Transportation Systems as techniques and methods for relieving congestion, improving road and transit safety, and increasing economic productivity. During the last few decades, there have been rapid advances in information and communications technology. Many transit agencies have employed a number of these different technologies in order to supplement or enhance the transportation services they offer to the public. ITS encompasses a variety of different technology-based systems. The FTA is currently dividing ITS applications into two broad categories:

Intelligent Infrastructure Systems

- Intelligent infrastructure systems
- Arterial Management
- Freeway Management
- Transit Management
- Incident Management
- Emergency Management
- Electronic Payment & Pricing
- Traveler Information
- Information Management
- Crash Prevention & Safety
- Roadway Operations & Maintenance
- Road Weather Management
- Commercial Vehicle Operations
- Intermodal Freight

Intelligent Vehicle Systems

- Collision Avoidance Systems
- Driver Assistance Systems
- Collision Notification Systems

Recently, it has become very common to refer to these strategies by the terms "connected vehicles" and "connected infrastructure".

ITS AT SCAG

As the designated Metropolitan Planning Organization (MPO) for the six county area encompassing Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura Counties, SCAG maintains the Southern California Regional ITS Architecture to address multicounty ITS deployments, per 23 CFR Section 940.5 and 23 CFR Section 940.9. In addition, the respective counties each maintain their own county-wide ITS architectures.

ITS projects, or projects with ITS elements, must be consistent with the Southern California Regional ITS Architecture in order to be eligible for federal funding. This architecture allows ITS systems to communicate with each other by mapping data transmissions and ensuring that data will be shared in consistent formats.

TECHNOLOGICAL INNOVATION AND MODE CHOICE

In the summer of 2014, SCAG performed a review of existing literature on how new mobility technologies would impact travel behavior, particularly with regard to mode choice and vehicle miles traveled. This included a review of existing transit ITS applications and an overview of less established mobility technologies, including smart phone dispatch, open data standards and flexible routing. Findings of the effort revealed that these new technologies may not have pronounced impacts on travel behavior, though they may be very useful in terms of dispatching and operations control, cost containment, or as passenger amenities.

ON BOARD TRANSIT ITS APPLICATIONS

Computer Aided Dispatch Automatic Vehicle Location (CAD/AVL) is the package of ITS Applications that has the most potential to affect how transit agencies monitor and control their operations. AVL consists of a GPS unit that tracks vehicles, integrating their locations with GIS systems for display and analysis purposes. This auto-location technology is the data that is used for almost all location based transit ITS applications. The CAD portion of systems provide data of special interest to the dispatcher, including run assignments and communications and can be a key tool for implementing recovery strategies or in emergency response situations. These systems can also aid in implementing timed transfers. Some more advanced CAD/AVL systems allow for the monitoring of boardings, alightings and fare

collection in real time. Other agencies rely on an Automated Passenger Counter System as part of their farebox systems.

Two Transit ITS applications that have been developed in the last twenty years often employ CAD/AVL location data to project the arrival of individual transit vehicles at particular locations on their routes. These are Transit Signal Priority (TSP) technologies and Real Time Passenger Information (RTPI) systems.

TSP technologies react to the location of individual transit vehicles and, based on detection or communications technologies, employ an algorithm to predict the time of arrival of the vehicle at a particular intersection and send a message to the traffic control device at that intersection. The traffic control device would then adjust its phasing to reduce the oncoming transit vehicle's exposure to a red phase. Eric Bruun, in the book "*Better Public Transit Systems*," estimated that TSP could reduce transit vehicle travel times by 10 percent to 25 percent.[33]

Metro and LADOT inaugurated a TSP system in the spring of 2001. This system was designed by LADOT staff and features a vehicle based transponder system that triggers a receiver in the traffic loop, sending a message to ATSAC, wherein the data is fed into a predictive algorithm and an intersection arrival prediction is sent to the intersection's traffic control device. In combination with local detection by that intersection's traffic loops, the system can reduce red phase exposure for the oncoming vehicle. This system has primarily been installed on Metro Rapid vehicles and routes.

Recently, Metro has begun switching to a GPS based system, which reduces the need to improve intersection detection loops and therefore the capital costs of installing the system. Nationally, GPS-based TPS systems appear to be gaining market share much faster than Loops and Transponders systems, for that reason. These systems usually function via communications from the Traffic Control Center to the intersection traffic control device.

Metro also introduced an on-street RTPI system, based on the arrival predictions generated through its TPS system. This information was pushed to a website hosted by LADOT and to changeable message signs as station stops. Metro found the O&M costs of these signs to be particularly high.

The Joint Committee on National Transportation Communications for Intelligent Transportation Systems Protocols, a joint project of AASHTO, ITE and the National Electrical Manufacturers Association effort funded by the US DOT Joint Program on ITS, is developing a data protocol to define data elements for information management and operations of signal control and prioritization (SCP). This standard will organize functional user requirements and facilitate the installation of TSP across jurisdictional lines.

As displayed in **TABLE 33,** the brief literature review conducted seems to suggest that Real Time Passenger Information Systems have minimal observed impact on travel behavior. TPS systems affect transit vehicle speeds, which are not captured in the model. There is no reason to think that other Transit ITS applications will have a statistically significant impact on travel behavior.

At this point, it appears that there is no technically justifiable reason to make assumptions about the role of Transit ITS Applications in our modelling processes. Currently, the transit model includes a rapid bus mode to address the passenger benefits of the Metro Rapid service brand, including TPS. No further action is warranted.

There is already significant investment in these technologies in the region, though it is often difficult to capture the extent of it, as ITS applications or hardware are often bundled in with vehicle procurements or other capital expenditures. The 2015 FTIP has a total of $13.2 million in transit projects with ITS program codes over the course of six years, though this does not reflect projects where the sponsor did not include a program code.

OPEN TRANSIT DATA

There is a growing trend toward transit agencies sharing the data feeds produced by their ITS and run cutting systems. Portland Trimet and Google Incorporated pioneered the notion that transit agencies should share schedule information with third parties via a common data format, the General Transit Feed Specification (GTFS), allowing third parties to supply trip planning applications to the general public. The GTFS format is a collection of comma separated value (.csv) files containing schedule data that can be pushed to a trip planning application or used to power a predictive arrival algortithm. As of 2011, GTFS can also package vehicle location, schedule adherence and incident management data.

The American Public Transportation Authority (APTA) is also at work on a standard for transit data transmission, the APTA Transit Communications Interface Protocol . This work is sponsored by the US DOT ITS Joint Program Office, and will include a concept of operations, model architecture, dialog definitions and a modular approach to conformance. This standard will address scheduling, passenger information, TSP, control center operations, on board systems, spatial referencing and possibly fare collection.

Open data practices are growing rapidly among the largest transit systems. Wong, Reed, Watkins and Hammond argued that in 2010, about 85 percent of transit passenger miles were on systems with open data, and 49 of the 50 largest providers of passenger miles are supplying open data feeds. Traditionally, hesitance to provide open data feeds has revolved around issue of legal exposure, brand protection, advertising revenue and loss of control of transit information dissemination, but these concerns appear to be waning.

As part of the technological innovation and mode choice work effort described on page 83, a review of the literature surrounding transit data sharing and mode choice was conducted. At this point there is very little empirical evidence for the role of transit data in increasing transit ridership. A University of Washington stated preference study found that riders reported making 10-15 percent more trips, but RTPI systems have proven difficult to assess via stated preference methods. Roger Teal of DemanTrans Solutions, in a 2013 presentation to the Lake Arrowhead Symposium, stated that there is "no evidence yet that real-time data leads to major increases in ridership, or 'market penetration.'"

An enormous variety of third party applications use open transit feeds to push schedule data to passengers' computers or mobile phones. Map applications have been especially popular; Google maps have been the most expansive and successful, but Bing maps and Mapquest also incorporate some transit schedule data. OpenTrip Planner is an open source trip planner currently in beta-testing, incorporates multimodal trip planning, including transit, non-motorized transportation and driving. Other applications develop regularly and are of varying quality.

There is no feasible way to model data transmission in a travel demand model. Open data will not help to reduce vehicle miles traveled ,and it will not help to meet reduction targets for greenhouse gas emissions, as per SB 375. However, it can help to lead to agencies having more control over their data by lessening the incentive to "screen-scrape schedule data." It can assist with marketing, and eventually it can be a format for communications between systems and infrastructure amongst a variety of agencies.

TABLE 33 Literature Regarding the Ridership Impacts of Real Time Passenger Information Systems

Literature Regarding the Ridership Impacts of Real Time Passenger Information Systems			
Study	**Methodology**	**Finding**	**Date**
"Examination of Traveler Reponses to Real-time Bus Arrival Information Using Panel Data" Zhang, Shen, Clifton	Panel survey data analyzed using probit models.	No significant impact on trip making.	2008
"Passenger Wait Time Perceptions at Bus Stops: Empirical Results and Impacts on Evaluating Real Time Bus Arrival Information" Mishalani, McCord, Wirtz, Edwards and Kelsey	Quantifying the difference between reported/perceived wait times and observed wait times.	The authors suggest that passengers derive value from the delta between perceived and observed wait times.	2006
"Traveler Response to Real Time Transit Passenger Information Systems" Zhang	Dissertation focusing on the psychological aspects of trip time uncertainty reductions due to real time passenger information, and resultant impacts to travel behavior.	Empirical results did not suggest that travelers would shift modes or increase transit trip frequency due to real time passenger information systems.	2010
"Ridership Effects of Real-Time Bus Information Systems: A Case Study in the City of Chicago" Tang, Thakuriah	Longitudinal monthly average weekday boardings from the CTA bus system to achieve a quasi-experimental design with limited controls, to examine pre and post implementation ridership.	Real time passenger information displays generate modest growth in ridership, roughly 126 average weekday boardings more than pre-real time display.	2012
"Analysis of the Role of Real Time Passenger Information on Bus Users in a European City: The Case of Dublin, Ireland" Sweeney	Stated preference survey, based in Dublin Ireland.	30% of respondents reported that they would use transit more if Real Time Predictive Arrival were implemented	2012
"Examining the Political and practical Reality of Bus Based Real Time Passenger Information " Holdsworth, Enoch, Ison	Case study examination of implementation of Real Time Passenger Information systems in two midsize English towns.	"The evidence is unclear as to whether Real-Time Passenger Information does actually enhance public transport service provision."	2006
"Riding in Real-Time: Estimating Ridership Effects of the Adoption of Mobile Real Time Transit Tracking Applications" Vonderschmitt	Panel survey of 27 medium sized transit agencies that implemented real time passenger information systems to evaluate the effects of adoption on ridership and passenger miles.	The study finds there is no impact of real time passenger information systems on ridership, and concludes that this is due to the "captive" nature of the transit market.	2014

TABLE 34 Transit Agencies Providing Data to Google Via Gtfs

Transit Agencies Providing Data to Google via GTFS		
Burbank Bus	Anaheim Resort Transportation	Laguna Beach Transit
Gold Coast Transit	Banning/Pass Transit	Long Beach Transit
Morongo Basin Transit Authority	Barstow Area Transit	Big Blue Bus
OMNITRANS	Beaumont/Pass Transit System	City of West Hollywood
Orange County Transportation Authority	Mountain Area Transit Authority	Culver City Bus
Palos Verdes Peninsula Transit Authority	Palo Verde Valley Transit Agency	LADOT
Sunline Transit Agency	Cerritos on Wheels	Metro-Los Angeles
Torrance Transit	Corona Cruiser	Metrolink
Victor Valley Transit Authority	Irvine Shuttle	Needles Area Transit
Pasadena Area Rapid Transit System (ARTS Bus)	Foothill Transit	Riverside Transit Agency
Thousand Oaks Transit	Glendale Beeline	

The costs to this practice seem to be fairly small and it may in fact reduce the costs agencies are spending on developing their own trip planning applications. See **TABLE 34**.

FIRST MILE LAST MILE CONNECTIVITY

SCAG has been involved in first/last mile studies since 2007, including completing four studies completed in Orange, Los Angeles and San Bernardino Counties. A further discussion of first/last mile connectivity can be found in the Active Transportation Appendix.

EMERGENCY PREPAREDNESS

Metro and 14 other providers are entering into a Transit Mutual Assistance Compact. SCAG is initiating a transit climate change adaptation assessment to build on existing Metro-led efforts.

This Transit Mutual Assistance Compact (TransMAC) and its members have established a formal process whereby they may receive and provide Mutual Assistance to each other in the form of personnel, services and equipment as deemed to be necessary or advisable in an emergency. This agreement has undergone revisions, and upon implementation it can be a way for transit agencies to respond to the service disruptions that can accompany natural disasters.

POVERTY

SCAG has become involved in efforts to address poverty in the region. The Southern California Economic Recovery & Job Creation Strategy identifies the region's strongest economic clusters and strategies to expand potential for job growth. A Regional Action Plan on Poverty identifies opportunities to grow jobs and improve access to jobs. A consistent theme has been the importance of improving mobility and increasing mobility choices through the implementation of its 2012 RTP/SCS.

In addition, the Coordinated Human Services Transportation Plans also provide roadmaps for providing mobility to the very poor. Working with CTSAs, County Transportation Commissions and transit agencies to implement those plans can be a key strategy for connecting low income households with economic opportunity.

STAGNATING PER CAPITA DEMAND

A key finding of the FY 2011-2012 Transit System Performance Report was that per capita trips have stagnated when compared with FY 1990-1991. While per capita trips grew in the period before the recession, they have stagnated since that point. Unemployment rates and service cuts may have played a key role in creating that stagnation. SCAG will continue to work with County Transportation Commissions and transit agencies to identify the causes of this trend and potential remedies for it.

SYSTEM PRESERVATION, ASSET MANAGEMENT AND ADAPTATION TO GLOBAL CLIMATE CHANGE

Public transportation in the United States has faced long term maintenance funding challenges. The US DOT's 2010 'Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress' forecasted a national transit maintenance shortfall of $116.5 Billion by 2028, with the share of assets in a maintenance backlog increasing from 11.7 percent to 17.5 percent by 2028. Within the next 40 years, the stresses of global climate change, including the potential ramifications of changes in storm activity, sea levels, temperature and precipitation patterns, will create additional stresses on transit assets and services. Providers of public transportation will need to develop strategies to protect key assets and services from added wear induced by climate change and to recover from natural disaster events exacerbated by climate change.

As noted in Caltrans's April 2013 report, "Caltrans Activities to Address Climate Change: Reducing Greenhouse Gas Emissions and Adapting to Impacts": "The Climate in California is already changing and further changes are anticipated throughout the 21st century. Climate Change will cause the sea level to rise, the temperature to warm and precipitation patterns to change-all of which have important implications on transportation assets and services." These impacts will affect agencies' ability to provide service and to properly maintain their assets, negatively impacting the mobility of low income transit dependent populations and affecting the region's ability to meet its system preservation goals. In the wake of Super Storm Sandy, the FTA, FHWA, Caltrans and some transit operators are rapidly moving toward planning for climate adaptation and resilience, evaluating the potential effects of climate changes on transportation assets and services and seeking to ensure their ability to provide services in the face of climatic instability.

SCAG intends to work with stakeholders to complete a Transit Climate Adaptation and Resiliency Strategy for Southern California, leveraging work done by Metro to address these challenges by working with the region's county transportation commissions, Caltrans and transit providers to collaboratively assess potential climate change related stresses to transit assets and key services and formulate strategies to address those impacts.

PROPULSION TECHNOLOGIES

The California Air Resources Board (ARB) first promulgated rules regarding transit bus fleet emissions in 2000. These rules were wildly successful; nearly 60 percent of the current fleet is composed of natural gas vehicles. The ARB is currently reviewing those rules, per the implementation of a zero-emissions bus vehicle rule. The agency is developing strategies to transition the heavy-duty mobile source sector to zero and near-zero technologies to meet air quality, climate and public health protection goals. The Advanced Clean Transit (ACT) being developed by the ARB is intended to achieve this transition in various modes of public transit.[34]

California faces challenging mandates to reduce criteria air pollutant and greenhouse gas emissions to meet both federal air quality standards and state and local climate change goals, while protecting residents from exposure to harmful emissions. The emissions reductions goals affecting the ACT include:

- A 90 percent reduction in oxides of nitrogen (NO_x) emissions to attain federal ozone standards by 2031;
- An 80 percent reduction in greenhouse gas emissions below 1990 levels by 2050 and a 40 percent reduction from 1990 levels by 2030;
- Significant improvements in efficiency and the use of renewable fuels to meet the Governor's 50 percent petroleum reduction target by 2030; and
- Continued reductions in diesel PM and air toxics to protect public health.

California ARB staff are evaluating four comprehensive elements to the Advanced Clean Transit regulation:

- **"Require Zero Emission Bus Purchases:** mandate a modest fraction of bus purchases to be zero emission technology starting in 2018, and set a goal of complete transit fleet transition to zero emission technologies by 2040.
- **Minimize Emissions from Conventional Fleet:** require use of renewable fuels and the cleanest available engines as soon as feasible.
- **Provide Regional Flexibility for Zero Emission Buses:** allow fleets within a region the option to pool requirements and work together to achieve a zero emission bus fleet.
- **Innovative Transit Beyond Buses:** allow for transits to work with MPOs to develop and implement plans for increased efficiencies through the use of innovative transit technologies beyond conventional transit operations." [35]

Staff from the ARB have evaluated the feasibility of widescale zero emission and reduced emission bus vehicle procurements. The list of propulsion technologies evaluated includes:

- Battery Electric Bus Vehicles
- Fuel Cell Electric Bus Vehicles
- Diesel Hybrid Bus Vehicles
- Low NO_x Buses
- Renewable fuels including renewable natural gas and biofuels

They find that there are still up-front price premiums on purchasing zero emissions buses, but that these premiums are rapidly declining. Prices for advanced zero emission propulsion technologies, such as Battery Electric and Fuel Cell Electric, are declining and vehicles are now commercially available. At least eight agencies statewide are operating zero emission bus vehicles.

In addition, nearly half of all current year diesel bus procurements are hybrids, which can lower emissions through greater fuel efficiency. The low NO_x buses, expected to be available by 2016 or 2017, will reduce per vehicle NO_x emissions by up to 90 percent.

The amended ACT rulemaking is likely to be formalized by the Spring of 2016. One of the key proposals that will be evaluated will require initial zero emission bus procurements by 2018 and will require 100 percent zero emissions bus fleets by 2040. If adopted, this rule will require SCAG to work with providers of public transportation to identify and address any funding shortfalls due to these new procurement regulations.

TRANSIT AND EMERGING TRAVEL BEHAVIOR TRENDS

THE VMT INFLECTION

As was mentioned in the second section of this Appendix, Existing Conditions (Macroeconomic Context), aggregate national VMT growth peaked in 2007 and per capita growth peaked in 2004. The period following these years was one where VMT remained relatively level. Analysts have differed as to whether this represents a cultural shift, or a reaction to macroeconomic conditions including retail fuel prices and the recession of 2008-2009.

However, 2014 was the second highest year ever for aggregate VMT. Given short term fuel price trends, it seems safe to tentatively conclude that these prices may be having a great impact on mode choice. Going forward, SCAG must work with local county transportation commissions and transit agencies to account for fuel price volatility and subsequent impacts on travel behavior in planning processes.

VOLUNTEER DRIVER PROGRAM

The Transportation Reimbursement and Information Project (TRIP) for Riverside County California is a special self-directed, mileage reimbursement transportation service that complements public transportation by encouraging volunteer friends and neighbors to transport older adults and people with disabilities to access medical services and for other purposes where no transit service exists or when the individual is too frail, ill, or unable to use public transportation for other reasons.

The TRIP model was designed as a low-cost, low-maintenance, rider-focused approach to provide transportation for unserved and *underserved*, transit dependent older adults, persons with disabilities and other difficult to serve populations. Originally, TRIP was the outcome of a collaborative partnership between the Independent Living Partnership, sponsor of TRIP, the local Area Agency on Aging, and the Riverside County Transportation Commission in California.

TRIP began providing transportation assistance for older adults and people with disabilities through-out Riverside County in 1993. The efficiency and effectiveness of the TRIP Model has been proven in cities, suburban, and rural areas. So far the program has provided over 16.1 million miles of assisted travel and more than a 1.6 million free, escorted trips for 5,000+ Riverside County passengers with up to 1,000 volunteer drivers each year. TRIP continues to be funded by the Riverside County Transportation Commission, the Riverside County Office on Aging, foundations, and with support from cities that want service focused on their residents' needs.

Innovative passenger friendly service characteristics include:

- Passengers are enabled to choose and recruit their own volunteer drivers from friends and neighbors they know and trust
- Volunteer drivers receive mileage reimbursement payments through the passenger
- Rides are scheduled by passengers and volunteer drivers, as mutually convenient
- Transportation is provided in personal volunteer driver's vehicles
- 24/7 transportation is available, as agreeable between riders and volunteers
- Travel can be provided to other cities or even outside the county, if needed
- Rides are free to passengers.
- Each month, more than 10,000 trips are provided for Riverside County residents who would not have been able to travel to access needed services or for quality of life purposes. In 2009 TRIP was named by The Beverly Foundation as "the best volunteer driver model in the nation". And also received the 2012 STAR AWARD for Excellence.

Source: : http://ilpconnect.org/trip-riverside/

The baby boom generation is aging out of its peak driving years, and the millennial generation is aging into its peak driving years. The coming decade will provide an excellent test for the hypothesis that aggregate VMT is stagnating due to a generational cultural shift, as opposed to macroeconomic trends.

GROWING OLDER COHORT

One of the key themes of the 2016 RTP/SCS is the region's evolving age demographics. Per the growth forecast, in 2040 18.1 percent of the region will be over the age of 65 and 2.93 percent will be over the age of 85. Typically, travel patterns change drastically after retirement, and the trip types best served by fixed route transit, such as commuting, are no longer made.

However, as the cohort of the very old grows, there will be an increased demand for demand response transit services. As noted in the fifth section of this appendix, Needs Assessment and Transit Challenges, the counties in the SCAG region are engaged in coordinated human services transportation planning processes to identify the transportation needs of key populations, including the elderly and the disabled.

The region will have to move forward with more advanced paratransit demand forecasting techniques and strategies to provide cost effective mobility strategies to special needs populations. One key strategy to do so has been pioneered in the SCAG region–the volunteer driver program in Riveside (see page 88) and Los Angeles Counties.

TRANSPORTATION NETWORK COMPANIES AND ELDER MOBILITY

One of the areas of greater uncertainty about mobility provision for elderly and disabled communities is the growing role of transportation network companies such as Uber and Lyft.

In the short run, many analysts feel TNCs represent a threat to the taxi industry, which has been a key source of mobility for populations with special mobility needs.[36] In FY 2011-2012, local agencies reported providing roughly 850,000 demand taxi trips for a total of nearly 3 million passenger miles. Many cities and counties have worked with licensed livery companies to expand the ADA accessible taxi fleet; New York City had a goal of 50 percent accessibility by 2020. However, taxi drivers are increasingly switching to operating TNC service, leading to a shortage of drivers—San Francisco recently reported that 25 percent of its ADA accessible taxi fleet sits unused due to a driver shortage.

Five TNCs - Instacab, Sidecar, Wingz, Lyft and Uber - recently submitted ADA access plans to the California Public Utilities Commission as part of ongoing rulemaking processes regarding TNCs. Strategies discussed include nondiscrimination statements and application accessibility; a roadmap to guaranteeing service for populations with special mobility needs still needs to be agreed upon.

Uber recently initiated Uber WAV service in New York City's outer boroughs. This service allows application users to summon accessible livery vehicles ("Boro Taxis"), though payment is handled outside the application. A similar service has begun operating in San Francisco, but requires a $25 minimum fare and does not accept a locally subsidized fare card.

The City of Seattle, responding to this trend, initiated a $0.10 tax on TNCs trips, to be used to subsidize accessible taxi service.

In the long run, it is entirely possible that TNCs and local governments could partner to procure and operate accessible vehicles.

MILLENNIAL TRAVEL BEHAVIOR

As mentioned on pages 21 and 22 of this Appendix, national VMT trends indicated per capita and total decline between 2000 and 2012. Many observers have speculated that these declines were the result of the millennial generation's changing mode choice proclivities. The United States Public Interest Research Group (U.S. PIRG) published a study in early 2013 argued that there was a six decade period of steadily increasing per capita VMT, and that this period has ended. The PIRG researchers found that a combination of low fuel prices and an expanding workforce, including increasing female labor force participation, led to the boom, but that those conditions no longer existed. The team also found that "*a new generation—the Millennials—is demanding a new American Dream less dependent on driving.*" [37]

The PIRG report also found that "Young people aged 16 to 34 drove 23 percent fewer miles on average in 2009 than they did in 2001—a greater decline in driving than any other age group. The severe economic recession was likely responsible for some of the decline, but not all." They argue that labor force participation fell from 67.3 percent in 2000 to 63.6 percent in 2011, and cite a CBO projection that it would fall to 63% by 2021. They also argue that vehicle registrations per licensed driver fell 4 percent between 2006 and 2011, and that drivers licensing fell to 86 percent in 2011.

Perhaps most pertinent for public transportation, the authors also argue that a significant factor in future VMT decreases will be the increase in older Americans. Given that travel declines with age, the size of the "baby boom" generation means that we should expect significant declines in per capita VMT.

APTA completed the Millennials and Mobility: Understanding the Mobility Mindset study in the 2013. This study assumed that millennials were less likely to drive, and sought to ascertain why and how transit agencies could capitalize on this assumed fact. The methodology employed telephone interviews with eleven self-identified transit riders in

Boston, San Francisco, Austin, Boulder and Minneapolis, aged 18-34 and used the findings to compile an on-line survey. This on-line survey was then administered in Boston, San Francisco, Chicago, Portland and Washington DC to "Explore attitudes toward mobility generally, including factors that play a role in mobility decision-making (e.g., social, financial, environmental, etc.) and the relationship between major life decisions (e.g., where to live and work) to specific transportation choices." The authors purposefully constructed a methodology to "Speak with Millennials living within or just outside of urban centers who are using public transit & other transportation options."

The study found that millennials were likely to rank buses, trains and bicycles twice as highly as cars or walking in a ranked preference survey, were somewhat likely to state that having children would not force them to purchase a car or move to the suburbs and were more likely to report cost as a mode choice selection factor than other factors including logistical simplicity, convenience, flexibility and exercise.

Recent data released by the US Census suggests that focusing on very dense cities is not the best way to understand millennial location choice. These data indicate that far more workers under thirty are moving from cities to suburbs than vice versa. It should be understood that the ratio between these two factors is declining and that the rate of suburbanization among the young is slowing. Many analysts, though, believe that a pattern of urbanizing high income millennials and suburbanizing low to moderate income millennials is emerging.[38]

A team of UCLA affiliated researchers published a report in 2012 which attempted to look at travel behavior among youth and young adults from a broader, national perspective, encompassing both cities and suburbs.[39] They examined reported travel data from the Nationwide Personal Transportation Survey of 1990 and the national Household Travel Surveys of 2001 and 2009, comparing the travel behavior of teens and young adults (15-26) with that of working aged adults (ages 27-61). The methodology involved the use of cross sectional statistical models. They found "little evidence in these data that living circumstances, technological innovations, or driving regulations are dramatically altering travel behavior.

Specifically, the researchers found that:

- **"Economic Factors Predominate**: (a) Employment status, household income and other measures of economic status strongly influence all forms of youth and adult travel behavior across all three study years, (b) these factors generally have an even greater influence on the travel of youth than adults.
- **The Effects of Other Factors Are Mixed:** The effects of (a) young adults living with their parents, (b) the explosion of information and communications technologies use and (c) stricter teen driver's licensing requirements are far milder and more mixed compared to the consistently strong travel behavior effects of economic factors. Information and communications technology use is measured as daily web use and, when significant, tends to be associated with more travel and not less.
- **Graduated Driver's License Regulations:** (a) more teens are licensing later, but most do eventually license and drive, (b) the regulations are associated with lower teen person miles of travel over the short-term, but not much change in trips and (c) transit commuting is higher in states with stricter licensing regulations, but for adults as well as teens—as such, this probably says more about the states that adopt tough licensing laws than the effect of the laws on transit use.
- **Demographic Travel Distinctions Are Fading:** Travel behavior has long been observed to vary by demographic factors, such as race/ethnicity; while we continue to observe racial/ethnic travel patterns among adults, such distinctions are more muted for youth and appear to be lessening over time.
- **Evidence of Generational Shifts In Travel Behavior:** Our quasi-cohort models suggest moderate generational effects on travel behavior: all things equal, younger generations appear to (a) travel fewer miles and (b) make fewer trips than was the case for previous generations at the same stage in their lives; however, it also appears that younger commuters appear to drive alone to work more frequently than similarly aged workers from earlier generations.
- **Many Findings are Suggestive, but Not Definitive:** While many of our findings are consistent and appear robust, others are merely suggestive due to (a) small sample sizes for some population groups (e.g. 1990 sample, recent birth cohorts, bike travelers, etc.), (b) construct validity questions related to our variables of interest (e.g. reported daily web use as a measure of information and communications technology use) and (c) a lack of true cohort data to allow us to follow the same individuals over time." [40]

NOTES

1 American Public Transit Association (2009) Public Transportation Fact Book, Appendix B: Transit Agency and Urbanized Area Operating Statistics http://www.apta.com/resources/statistics/pages/transitstats.aspx

2 The U.S. Census Bureau defines urbanized areas (UZAs) based on incorporated places (e.g.,cities, towns, villages) and their adjacent areas. The U.S. Census Bureau considers a densely populated area of 50,000 people or more to be an urbanized area. There are 498 UZAs according to the 2010 U.S. Census and while urbanized areas make up 2.5 percent of United States land area, the populations of urbanized areas make up 71.5 percent of United States population. The FTA bases UZA designations on the most current Census. The NTD reporting system assigns a unique number to each of the UZAs in the 50 States and the District of Columbia a numerical ranking by population size. For the purpose of transit grants, the FTA also designates the Virgin Islands and certain areas in Puerto Rico as urbanized areas. National Transit Database (2013) *National Transit Summaries and Trends 2013*

3 California Department of Transportation, Mass Transit Division, *Transit Development Act Statutes and California Codes of Regulations*

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[40] Evelyn Blumenberg, Brian D. Taylor, Michael Smart, Kelcie Ralph, Madeline Wander, Stephen Brumbaugh, (2012) *What's Youth Got To Do With It? Exploring the Travel Behavior of Teens and Young Adults,* University of California Transportation Center Executive Summary page iii

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APPENDIX

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