SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS

50 YEARS

2016 2040 RTPSCS

THE **2016-2040** REGIONAL TRANSPORTATION PLAN/ SUSTAINABLE COMMUNITIES STRATEGY

A Plan for Mobility, Accessibility, Sustainability and a High Quality of Life

ADOPTED

APRIL 2016

MISSION STATEMENT

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POLICY COMMITTEE MEMBERS

PAST REGIONAL COUNCIL & POLICY COMMITTEE MEMBERS

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ADOPTED
APRIL 2016

SOUTHERN CALIFORNIA
ASSOCIATION OF GOVERNMENTS

2016 2040 RTPSCS

U.S. Department of Transportation

Federal Highway Administration

U.S. Department of Transportation

Federal Transit Administration

Caltrans

CALIFORNIA DEPARTMENT OF TRANSPORTATION

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LEADERSHIP | VISION | PROGRESS

Leadership, vision and progress which promote economic growth, personal well-being and livable communities for all Southern Californians.

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS WILL ACCOMPLISH THIS MISSION BY:

- Developing long-range regional plans and strategies that provide for efficient movement of people, goods and information; enhance economic growth and international trade; and improve the environment and quality of life
- Providing quality information services and analysis for the region
- Using an inclusive decision-making process that resolves conflicts and encourages trust
- Creating an educational and work environment that cultivates creativity, initiative and opportunity

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RESOLUTION NO. 16-578-2

A RESOLUTION OF THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS APPROVING THE 2016-2040 REGIONAL TRANSPORTATION PLAN/ SUSTAINABLE COMMUNITIES STRATEGY (2016 RTP/SCS); RELATED CONFORMITY DETERMINATION; AND RELATED CONSISTENCY AMENDMENT #15-12 TO THE 2015 FEDERAL TRANSPORTATION IMPROVEMENT PROGRAM (FTIP)

WHEREAS, the Southern California Association of Governments (SCAG) is a Joint Powers Agency established pursuant to California Government Code Section 6502 et seq.; and

WHEREAS, SCAG is the designated Metropolitan Planning Organization (MPO) for the counties of Los Angeles, Riverside, San Bernardino, Ventura, Orange, and Imperial, pursuant to Title 23, United States Code Section 134(d); and

WHEREAS, SCAG is responsible for maintaining a continuing, cooperative, and comprehensive transportation planning process which involves the preparation and update every four years of a Regional Transportation Plan (RTP) pursuant to Title 23, United States Code Section 134 et seq., Title 49, United States Code Section 5303 et seq., and Title 23, Code of Federal Regulations Section 450 et seq.; and

WHEREAS, SCAG is the multi-county designated transportation planning agency under state law, and as such, is responsible for preparing and adopting the FTIP (regional transportation improvement program, under state law) every two years pursuant to Government Code §§ 14527 and 65082, and Public Utilities Code §130301 et seq.; and

WHEREAS, pursuant to Senate Bill (SB) 375 (Steinberg, 2008) as codified in Government Code §65080(b) et seq., SCAG must also prepare a Sustainable Communities Strategy (SCS) that will be incorporated into the RTP and demonstrates how the region will meet its greenhouse gas (GHG) reduction targets as set forth by the California Air Resources Board (ARB); and

WHEREAS, ARB set the per capita GHG emission reduction targets from automobiles and light trucks for the SCAG region at 8% below 2005 per capita emissions levels by 2020 and 13% below 2005 per capita emissions levels by 2035; and

WHEREAS, pursuant to Government Code §65080(b)(2)(B), the SCS must: (1) identify the general location of uses, residential densities, and building intensities within the region; (2) identify areas within the region sufficient to house all the population of the region, including all economic segments of the population, over the course of the planning period of the regional transportation plan taking into account net migration into the region, population growth, household formation and employment growth; (3) identify areas within the region sufficient to house an eight-year projection of the regional housing need for the region pursuant to Government Code Section 65584; (4) identify a transportation network to service the transportation needs of the region; (5) gather and consider the best practically available scientific information regarding resource areas and farmland in the region as defined in subdivisions (1) and (b) of the Government Code Sections 65080 and 65581; and (6) consider the statutory housing goals specified in Sections 65580 and 65581, (7) set forth a forecasted development pattern for the region which when integrated with the transportation network, and other transportation measures and policies, will reduce the GHG emissions from automobiles and light trucks to achieve the GHG reduction targets, and (8) allow the RTP to comply with air quality conformity requirements under the federal Clean Air Act; and

WHEREAS, through the conduct of a continuing, comprehensive and coordinated transportation planning process in conformance with all applicable federal and state requirement, SCAG developed and prepared its latest RTP/SCS, the Final 2016-2040 RTP/SCS ("2016 RTP/SCS"); and

WHEREAS, the 2016 RTP/SCS sets forth the long-range regional plan, policies and strategies for transportation improvements and regional growth throughout the SCAG region through the horizon year of 2040; and

WHEREAS, the 2016 RTP/SCS includes a regional growth forecast that was developed by working with local jurisdictions using the most recent land use plans and policies and planning assumptions; and

WHEREAS, the 2016 RTP/SCS includes a financially constrained plan and a strategic plan. The constrained plan includes transportation projects that have committed, available or reasonably available revenue sources, and thus are probable for implementation. The strategic plan is an illustrative list of additional transportation investments that the region would pursue if additional funding and regional commitment were secured; and such investments are potential candidates for inclusion in the constrained RTP/SCS through future amendments or updates. The strategic plan is provided for information purposes only and is not part of the financially constrained and conforming Final 2016 RTP/SCS; and

WHEREAS, the 2016 RTP/SCS includes a financial plan identifying the revenues committed, available or reasonably available to support the SCAG region's surface transportation investments. The financial plan was developed following basic principles including incorporation of county and local financial planning documents in the region where available, and utilization of published data sources to evaluate historical trends and augment local forecasts as needed; and

WHEREAS, the 2016 RTP/SCS includes a sustainable communities strategy which sets forth a forecasted development pattern for the region, which, when integrated with the transportation network, and other transportations measures and policies, if implemented, will reduce the GHG emissions from automobiles and light trucks to achieve the regional GHG targets set by ARB for the SCAG region; and

WHEREAS, the 2016 RTP/SCS must be consistent with all applicable provisions of federal and state law including:

(1) The Moving Ahead for Progress in the 21st Century Act (MAP-21, PL 112-141) and the metropolitan planning regulations at 23 U.S.C. §134 et seq., as was amended by the Fixing America's Surface Transportation Act (P.L. 114-94, December 4, 2015);

(2) The metropolitan planning regulations at 23 C.F.R. Part 450, Subpart C;

(3) California Government Code §65080 et seq.; Public Utilities Code §130058 and 130059; and Public Utilities Code §44243.5;

(4) §§174 and 176(c) and (d) of the federal Clean Air Act [(42 U.S.C. §§7504 and 7506(c) and (d)] and Environmental Protection Agency (EPA) Transportation Conformity Rule, 40 C.F.R. Parts 51 and 93;

(5) Title VI of the 1964 Civil Rights Act and the Title VI assurance executed by the State pursuant to 23 U.S.C. §324;

(6) The Department of Transportation's Final Environmental Justice Strategy (60 Fed. Reg. 33896; June 29, 1995) enacted pursuant to Executive Order 12898, which seeks to avoid disproportionately high and adverse impacts on minority and low-income populations with respect to human health and the environment;

(7) Title II of the 1990 Americans with Disabilities Act (42 U.S.C. §§12101 et seq.) and accompanying regulations at 49 C.F.R. §27, 37, and 38; and

(8) SB 375 (Steinberg, 2008) as codified in California Government Code §65080(b) et seq.;

WHEREAS, SCAG is further required to comply with the California Environmental Quality Act (CEQA) (Cal. Pub. Res. Code § 21000 et seq.) in preparing the 2016 RTP/SCS; and

WHEREAS, SCAG prepared a program environmental impact report (PEIR) for the 2016 RTP/SCS. The PEIR serves as a programmatic document that conducts a region-wide assessment of potential significant environmental effects of the 2016 RTP/SCS; and

WHEREAS, in non-attainment and maintenance areas for transportation-related criteria pollutants, the MPO, as well as the Federal Highways Administration (FHWA) and Federal Transit Administration (FTA), must make a conformity determination on any updated or amended RTP in accordance with the federal Clean Air Act to ensure that federally supported highway and transit project activities conform to the purpose of the State Implementation Plan (SIP); and

WHEREAS, transportation conformity is based upon a positive conformity finding with respect to the following tests: (1) regional emissions analysis, (2) timely implementation of Transportation Control Measures, (3) financial constraint, and (4) interagency consultation and public involvement; and

WHEREAS, on April 4, 2012, the SCAG Regional Council found the 2012 RTP/SCS to be in conformity with the State Implementation Plans for air quality, pursuant to the federal Clean Air Act and the EPA Transportation Conformity Rule. Thereafter, FHWA and FTA made a conformity determination on the 2012 RTP/SCS with said determination to expire on June 4, 2016; and

WHEREAS, on September 11, 2014, in accordance with federal and state requirements, the SCAG Regional Council approved the 2015/16 – 2020/21 Federal Transportation Improvement Program (2015 FTIP), which was federally approved on December 15, 2014. The 2015 FTIP represents a staged, multi-year, intermodal program of transportation projects which covers six fiscal years and includes a priority list of projects to be carried out in the first four fiscal years; and

WHEREAS, pursuant to Government Code §65080(b)(2)(F) and federal public participation requirements, including 23 C.F.R. §450.316(b)(1)(iv), SCAG must prepare the RTP/SCS by providing adequate public notice of public involvement activities and time for public review. On April 3, 2014, SCAG approved and adopted a Public Participation Plan, to serve as a guide for SCAG's public involvement process, including the public involvement process to be used for the 2016 RTP/SCS, and included an enhanced outreach program that incorporates the public participation requirements of SB 375 and adds strategies to better serve the underrepresented segments of the region; and

WHEREAS, pursuant to Government Code §65080(b)(2)(F)(iii), during the summer 2015, SCAG held a series of RTP/SCS public workshops throughout the region, including residents, elected officials, representatives of public agencies, community organizations, and environmental, housing and business stakeholders; and

WHEREAS, in accordance with the interagency consultation requirements, 40 C.F.R. 93.105, SCAG consulted with the respective transportation and air quality planning agencies, including but not limited to, extensive discussion of the Draft Conformity Report before the Transportation Conformity Working Group (a forum for implementing the interagency consultation requirements) throughout the 2016 update process; and

WHEREAS, the Transportation Conformity Report contained in the Final 2016 RTP/SCS makes a positive transportation conformity determination. Using the final motor vehicle emission budgets released by ARB and found to be adequate by the EPA, this conformity determination is based upon staff's analysis of the applicable transportation conformity tests; and

WHEREAS, each project or project phase included in the FTIP must be consistent with the approved RTP, pursuant to 23 C.F.R. §450.324(g). Amendment #15-12 to the 2015 FTIP has been prepared to ensure consistency with the Final 2016 RTP/SCS; and

WHEREAS, conformity of Amendment #15-12 to the 2015 FTIP has been determined simultaneously with the Final 2016 RTP/SCS in order to address the consistency requirement of federal law; and

WHEREAS, on November 5, 2015, SCAG Policy Committees (comprising the Community, Economic and Human Development Committee; the Energy and Environment Committee; and the Transportation Committee) recommended that the Regional Council at its December 4, 2015 meeting authorize release of the Draft 2016 RTP/SCS PEIR for a public review and comment period concurrent with the public review and comment period for the Draft 2016 RTP/SCS; and

WHEREAS, on December 3, 2015, the Regional Council approved release of the Draft 2016 RTP/SCS PEIR concurrent with release of the Draft 2016 RTP/SCS for a 60-day public review and comment period; and

WHEREAS, SCAG released the Draft 2016 RTP/SCS and the associated Draft Amendment #15-12 to the 2015 FTIP for a 60-day public review and comment period that began on December 4, 2015 and ended on February 1, 2016; and

WHEREAS, the SCAG also released the Draft 2016 RTP/SCS PEIR concurrently with the release of the Draft 2016 RTP/SCS, and issued a Notice of Availability for the same 60-day public review and comment period of December 4, 2015 to February 1, 2016; and

WHEREAS, SCAG followed the provisions of its adopted Public Participation Plan regarding public involvement activities for the Draft 2016 RTP/SCS and Draft 2016 RTP/SCS PEIR. Public outreach efforts included publication of the Draft 2016 RTP/SCS and Draft 2016 RTP/SCS PEIR on SCAG's website, distribution of public information materials, held four (4) duly-noticed public hearings (three public hearings were video-conferenced to four regional offices in different counties), and 14 elected official briefings within the SCAG region to allow stakeholders, elected officials and the public to comment on the Draft 2016 RTP/SCS and the Draft 2016 RTP/SCS PEIR; and

WHEREAS, during the public review and comment period, SCAG received 162 verbal and written comment submissions on the Draft 2016 RTP/SCS and 81 comment submissions on the Draft 2016 RTP/SCS PEIR; and

WHEREAS, SCAG staff presented an overview of the comments received on the Draft 2016 RTP/SCS and Draft 2016 RTP/SCS PEIR, and a proposed approach to the responses, to the Policy Committees and Regional Council at a joint meeting on March 3, 2016; and

WHEREAS, comment letters and SCAG staff responses on the Draft 2016 RTP/SCS and Draft 2016 RTP/SCS PEIR were posted on the SCAG web page on March 14, 2016, and included as part of the Final 2016 RTP/SCS, Public Participation and Consultation Appendix. SCAG also notified all commenters of the availability of the comments and responses; and

WHEREAS, on March 18, 2016, SCAG posted the proposed Final 2016 RTP/SCS and proposed Final 2016 RTP/SCS PEIR on its website; and

WHEREAS, on March 24, 2016, SCAG's three Policy Committees held a public, special joint meeting to consider a recommendation to the Regional Council to approve and adopt the proposed Final 2016 RTP/SCS and certify the proposed Final 2016 RTP/SCS PEIR at the April 7, 2016 Regional Council meeting; and

WHEREAS, prior to the adoption of this resolution, the Regional Council certified the Final 2016 RTP/SCS PEIR prepared for the 2016 RTP/SCS to be in compliance with CEQA; and

WHEREAS, the Regional Council has had the opportunity to review the Final 2016 RTP/SCS and its related appendices as well as the staff report related to the Final 2016 RTP/SCS, and consideration of the Final 2016 RTP/SCS was made by the Regional Council as part of a public meeting held on April 7, 2016.

NOW, THEREFORE BE IT RESOLVED, the Regional Council hereby approves and adopts the Final 2016 RTP/SCS.

BE IT FURTHER RESOLVED by the Regional Council that:

1. In adopting this Final 2016 RTP/SCS, the Regional Council finds as follows:

a. The Final 2016 RTP/SCS complies with all applicable federal and state requirements, including the metropolitan planning provisions as identified in the Code of Federal Regulations Title 23 Part 450 and Title 49, Part 613, and the SCS and other State RTP requirements as identified in California Government Code Section 65080. Specifically, the Final 2016 RTP/SCS fully addresses the requirements relating to the development and content of metropolitan transportation plans as set forth in 23 C.F.R.§450.322 et seq., including issues relating to: identification of transportation facilities that function as an integrated metropolitan transportation system; operational and management strategies; safety and security; performance measures; environmental mitigation; the need for a financially constrained plan; consultation and public participation; and transportation conformity;

b. The Final 2016 RTP/SCS complies with the emission reduction targets established by the California ARB and meets the requirements of SB 375 (Steinberg, 2008) as codified in Government Code §65080(b) et seq. by achieving per capita GHG emission reductions relative to 2005 of 8% by 2020 and 18% by 2035; and

c. The Final 2016 RTP/SCS's preferred land use scenario and corresponding forecast of population, household and employment growth is adopted at the jurisdictional level, and any corresponding sub-jurisdictional level data and/or maps is advisory only.

2. The Regional Council hereby makes a positive transportation conformity determination of the Final 2016 RTP/SCS and Amendment #15-12 to the 2015 FTIP. In making this determination, the Regional Council finds as follows:

a. The Final 2016 RTP/SCS and Amendment #15-12 to the 2015 FTIP passes the four tests and analyses required for conformity, namely: regional emissions analysis; timely implementation of Transportation Control Measures; financial constraint analysis; and interagency consultation and public involvement;

3. In approving the Final 2016 RTP/SCS, the Regional Council also approves and adopts Amendment #15-12 to the 2015 FTIP, in compliance with the federal requirement of consistency with the RTP;

4. That the foregoing recitals are true and correct and incorporated herein by this reference; and

5. SCAG's Executive Director or his designee is authorized to transmit the Final 2016 RTP/SCS and its conformity findings to the FTA and the FHWA to make the final conformity determination in accordance with the Federal Clean Air Act and EPA Transportation Conformity Rule, 40 C.F.R. Parts 51 and 93.

TO BE PASSED, APPROVED AND ADOPTED by the Regional Council of the Southern California Association of Governments at its regular meeting on the 7th day of April, 2016.

Cheryl Viegas-Walker
President
Council Member, City of El Centro

Attest:

Hasan Ikhrata
Executive Director

Approved as to Form:

Joann Africa
Chief Counsel

EXECUTIVE SUMMARY

Image courtesy of Samer Momani

EXECUTIVE SUMMARY HIGHLIGHTS

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ENVISIONING OUR REGION IN 2040

Transport yourself 25 years into the future. What kind of Southern California do you envision? SCAG envisions a region that has grown by nearly four million people—sustainably. In communities across Southern California, people enjoy increased mobility, greater economic opportunity and a higher quality of life.

OUR VISION

In our vision for the region in 2040, many communities are more compact and connected seamlessly by numerous public transit options, including expanded bus and rail service. People live closer to work, school, shopping and other destinations. Their neighborhoods are more walkable and safe for bicyclists. They have more options available besides driving alone, reducing the load on roads and highways. People live more active and healthy lifestyles as they bike, walk or take transit for short trips. Goods flow freely along roadways, highways, rail lines and by sea and air into and out of the region—fueling economic growth.

Southern California's vast transportation network is preserved and maintained in a state of good repair, so that public tax dollars are not expended on costly repairs and extensive rehabilitation. The region's roads and highways are well-managed so that they operate safely and efficiently, while demands on the regional network are managed effectively by offering people numerous alternatives for transportation.

Housing across the region is sufficient to meet the demands of a growing population with shifting priorities and desires, and there are more affordable homes for all segments of society. With more connected communities, more choices for travel and robust commerce, people enjoy more opportunities to advance educationally and economically. As growth and opportunity are distributed widely, people from diverse neighborhoods across the region share in the benefits of an enhanced quality of life.

With more alternatives to driving alone available, air quality is improved and the greenhouse gas emissions that contribute to global climate change are reduced. Communities throughout Southern California are more prepared to confront and cope with the inevitable consequences of climate change, including droughts and wildfires, heat waves, rising seas and extreme weather. Meanwhile, natural lands and recreational areas that offer people a respite from the busier parts of the region are preserved and protected.

At mid-century, technology has transformed how we get around. Automated cars have emerged as a viable option for people and are being integrated into the overall transportation system. Shared mobility options that rely on instantaneous communication and paperless transactions have matured, and new markets for mobility are created and strengthened.

Above all, people across the region possess more choices for getting around and with those choices come opportunities to live healthier, more economically secure and higher quality lives.

This vision for mid-century, which is built on input received from thousands of people across Southern California, is embodied in the 2016 Regional Transportation Plan/Sustainable Communities Strategy (2016 RTP/SCS, or Plan), a major planning document for our regional transportation and land use network. It balances the region's future mobility and housing needs with economic, environmental and public health goals. This long-range Plan, required by the State of California and the federal government, is updated by SCAG every four years as demographic, economic and policy circumstances change. The 2016 RTP/SCS is a living, evolving blueprint for our region's future.

OUR OVERARCHING STRATEGY

It is clear that the path toward realizing our vision will require a single unified strategy, one that integrates planning for how we use our land with planning for how we get around.

Here is what we mean: we can choose to build new sprawling communities that pave over undeveloped natural lands, necessitating the construction of new roads and highways—which will undoubtedly become quickly overcrowded and contribute to regional air pollution and ever-increasing greenhouse gas emissions that affect climate change.

Or, we can grow in more compact communities in existing urban areas, providing neighborhoods with efficient and plentiful public transit, abundant and safe opportunities to walk, bike and pursue other forms of active transportation, and preserving more of the region's remaining natural lands for people to enjoy. This second vision captures the essence of what people have said they want during SCAG outreach to communities across the region.

SCAG acknowledges that more compact communities are not for everyone, and that many residents of our region prefer to live in established suburban neighborhoods. The agency supports local control for local land use decisions, while striving for a regional vision of more sustainable growth.

Within the 2016 RTP/SCS, you will read about plans for "High Quality Transit Areas," "Livable Corridors" and "Neighborhood Mobility Areas." These are a few of the key features of a thoughtfully planned, maturing region in which people benefit from increased mobility, more active lifestyles, increased economic opportunity and an overall higher quality of life. These features embody the idea of integrating planning for how we use land with planning for transportation.

As we pursue this unified strategy, it will be vital that we ensure that the benefits of our initiatives are widely distributed and that the burdens of development are not carried by any one group disproportionately. Social equity and environmental justice are key considerations of our overall Plan.

CHALLENGES WE FACE

We are living at a time of great change in Southern California. Our region must confront several challenges as we pursue the goals outlined in the 2016 RTP/SCS:

- **We are growing slower:** But our region is projected to grow to 22 million people by 2040—an increase of nearly four million people.
- **Our overall population will be older:** The median age of our region's overall population is expected to rise, with an increasing share of senior citizens. This demographic shift will have major impacts on transportation needs and on our transportation plans. A key challenge for the region will be to provide seniors with more transportation options for maintaining their independence as they age.
- **A smaller percentage of us will be working:** The share of younger people of working age is expected to fall. The ratio of people over the age of 65 to people of working age (15 to 64) is expected to increase. This means that our region could face a labor shortage and a subsequent reduction in tax revenues.
- **A large number of us want more urban lifestyles:** Today's Millennials, born between 1980 and 2000, are expected to demand more compact communities and more access to transit—shifting regional priorities for the overall transportation system and the types of housing that are constructed. Baby Boomers are also expected to increasingly desire these kinds of communities.
- **Many of us will continue to live in the suburbs and drive alone:** Despite the emerging trends discussed above, many people in the region will continue to live in suburban neighborhoods and drive alone to work, school, shopping and other destinations—rather than use public transit and other transportation alternatives. The 2016 RTP/SCS will not change how everyone chooses to get around, but the Plan is designed to offer residents more choices so that we can experience regionwide benefits.
- **Housing prices are increasing:** Housing prices are rising steadily and affordability is declining. As communities are redeveloped to be more compact with new transit options and revitalized urban amenities, existing residents may risk displacement.
- **Our transportation system requires rehabilitation and maintenance:** Southern California's transportation system is becoming increasingly compromised by decades of underinvestment in maintaining and preserving our infrastructure. These investments have not kept pace with the demands placed on the system and the quality of many of our roads, highways, bridges, transit and bicycle and pedestrian facilities is continuing to deteriorate. If we continue on our current path of seriously underfunding system preservation, the cost of bringing our system back to a reasonable state of good repair will grow exponentially.
- **Transportation funding is scarce and insufficient:** Full funding for transportation improvements is currently not sustainable, given the projected needs. Projected revenues from the gas tax, the historic source of transportation funding, will not meet transportation investment needs—and gas tax revenues, in real terms, are actually in decline as tax rates (both state and federal) have not been adjusted in more than two decades while the number of more fuel efficient and alternative powered vehicles continues to grow.
- **Moving goods through the region faces growing pains:** The movement of goods will face numerous challenges as consumer demand for products increases and the region continues to grow as a major exchange point for global trade. Infrastructure for freight traffic will be strained, current efforts to reduce air pollution from goods movement sources will not be sufficient to meet national air quality standards, capacity at international ports will be over-burdened and warehouse space could fall short of demands.
- **Technology is transforming transportation:** Mobility innovations including electric cars, the availability of real-time traveler information, the expansion of car sharing and ridesourcing due to smart phones and other technological advances will require updated planning to smoothly integrate these new travel options into the overall transportation system.
- **Millions suffer from chronic diseases:** Many people in our region suffer from chronic diseases related to poor air quality and physical inactivity. Heart disease, stroke, cancer, chronic lower respiratory disease and diabetes are responsible for 72 percent of all deaths in our region. Nine percent of residents have been diagnosed with diabetes, 27 percent with hypertension and 13 percent with asthma, and more

than 60 percent are overweight or obese, according to the California Health Interview Survey.

- **Climate change demands that we adapt:** The consequences of climate change will continue to impact everyday life for millions of people. The region is expected to experience more droughts and wildfires, water shortages because of drought but also because of declining snowpack in our mountains, rising seas, extreme weather events, and other impacts. Communities will need to make their neighborhoods more resilient to these changes.

OUR PROGRESS SINCE 2012

Although our challenges are great, the region has made significant progress over the past few years.

TRANSIT

Transit service continues to expand throughout the region and the level of service has exceeded pre-recessionary levels—mainly due to a growth in rail service. Significant progress has been made toward completing capital projects for transit, including the Los Angeles County Metropolitan Transportation Authority (Metro) Orange Line Extension and the Metro Expo Line. Meanwhile, five major Metro Rail projects are now under construction in Los Angeles County.

PASSENGER RAIL

Passenger rail is expanding and improving service on several fronts. The Amtrak Pacific Surfliner is now being managed locally by the Los Angeles-San Diego-San Luis Obispo (LOSSAN) Rail Corridor Agency; Riverside County Transportation Commission (RCTC) completed the Perris Valley Line in early 2016; Metrolink became the first commuter railroad in the nation to implement Positive Train Control and purchase fuel-efficient, low-emission Tier IV locomotives; and the California High-Speed Train is under construction in the Central Valley, and planning and environmental work is underway in our region to the Los Angeles/Anaheim Phase One terminus. Several other capital projects are underway or have been completed, including the Anaheim Regional Intermodal Transportation Center (ARTIC) and the Burbank Bob Hope Airport Regional Intermodal Transportation Center, among others.

HIGHWAYS

The expansion of highways has slowed considerably over the last decade because of land, financial and environmental constraints. Still, several projects have been completed since 2012 to improve access and close critical gaps and congestion chokepoints in the regional network. These include the Interstate 10 westbound widening in Redlands and Yucaipa, the Interstate 215 Bi-County HOV Project in Riverside and San Bernardino Counties, and a portion of the Interstate 5 South Corridor Project in Los Angeles County (between North Fork Coyote Creek to Marquardt Avenue), among others.

REGIONAL HIGH-OCCUPANCY VEHICLE (HOV) AND EXPRESS LANE NETWORK

The demands on our region's highways continue to exceed available capacity during peak periods, but several projects to close HOV gaps have been completed. The result has been 39 more lane miles of regional HOV lanes on Interstates 5, 405, 10, 215 and 605, on State Routes 57 and 91, and on the West County Connector Project (direct HOV connection between Interstate 405, Interstate 605 and State Route 22) within Orange County. The region is also developing a regional express lane network. Among the milestones: a one-year demonstration of express lanes in Los Angeles County along Interstate 10 and Interstate 110 was made permanent in 2014; and construction has begun on express lanes on State Route 91 extending eastward to Interstate 15 in Riverside County.

ACTIVE TRANSPORTATION

Our region is making steady progress in encouraging more people to embrace active transportation and more than $650 million in Active Transportation Program investments are underway. Nearly 38 percent of all trips are less than three miles, which is convenient for walking and biking. As a percentage share of all trips, bicycling has increased more than 70 percent since 2007 to 1.12 percent. More than 500 miles of new bikeways have been constructed in the region, and safety and encouragement programs are helping people choose walking and biking.

GOODS MOVEMENT

The region continues to make substantial progress toward completing several major capital initiatives to support freight transportation and reducing harmful emissions generated by goods movement sources. Progress since 2012 has included implementation of the San Pedro Bay Ports Clean Air Action Program (CAAP), which is reducing diesel particulate matter dropping by 82 percent, nitrogen oxides by 54 percent and sulfur oxides by 90 percent; and the San Pedro Bay Ports Clean Truck Program, which has led to an 80 percent reduction in port truck emissions. The region has also shown progress in advanced technology for goods movement, including a one-mile Overhead Catenary System (OCS) in the City of Carson. Construction of the Gerald Desmond Bridge has begun. Seventeen out of 71 planned grade separation projects throughout the region have been completed, and another 21 are expected to be complete in 2016. Double tracking of the Union Pacific (UP) Alhambra Subdivision has been initiated. The Colton Crossing, which physically separated two Class I railroads with an elevated 1.4-mile-long overpass that lifts UP trains traveling east-west, was completed in August 2013.

SUSTAINABILITY IMPLEMENTATION

Since 2012, SCAG's Sustainability Planning Grant Program has funded 70 planning projects (totaling $10 million) to help local jurisdictions link local land use plans with 2012 RTP/SCS goals. Local jurisdictions have updated outmoded General Plans and zoning codes; completed specific plans for town centers and Transit Oriented Development (TOD); implemented sustainability policies; and adopted municipal climate action plans. Thirty of the 191 cities and two of the six counties in the SCAG region report having updated their General Plans since 2012, and another 42 cities have General Plan updates pending. Fifty-four percent of the cities reporting adopted or pending General Plan updates include planning for TOD, 55 percent plan to concentrate key destinations, and 76 percent include policies encouraging infill development. Of the counties reporting updates or pending updates to their General Plans, 75 percent include TOD elements, 100 percent encourage infill development, 75 percent promote concentrated destinations, and 75 percent feature policies to address complete communities. To protect water quality, 91 percent of cities have adopted water-related policies and 85 percent have adopted measures to address water quality. To conserve energy, 86 percent of cities have implemented community energy efficiency policies, with 80 percent of those cities implementing municipal energy efficiency policies and 76 percent implementing renewable energy policies. Of the region's 191 cities, 189 have completed sustainability components, with 184 cities implementing at least ten or more policies or programs and ten cities implementing 20 or more policies or programs. This last group includes Pasadena, Pomona and Santa Monica.

AFFORDABLE HOUSING

The state is offering new opportunities to help regions promote affordable housing. In spring 2015, California's Affordable Housing Sustainable Communities (AHSC) program awarded its first round of funding to applicants after a competitive grant process. Of $122 million available statewide, $27.5 million was awarded to ten projects in the SCAG region. Eight-hundred forty-two affordable units, including 294 units designated for households with an income of 30 percent or less of the area median income, will be produced with this funding. Meanwhile, Senate Bill 628 (Beall) and Assembly Bill 2 (Alejo) provide jurisdictions with an opportunity to establish a funding source to develop affordable housing and supportive infrastructure and amenities.

PUBLIC HEALTH

The SCAG region has several ongoing efforts to promote public health. The Los Angeles County Departments of Public Health and City of Los Angeles Planning Department are developing a Health Atlas that highlights health disparities among neighborhoods. In Riverside County, the Healthy Riverside County Initiative has formed a Healthy City Network to continue to successfully work with the county's 28 cities to enact Healthy City Resolutions and Health Elements into their General Plans. The County of San Bernardino has recently completed the Community Vital Signs Initiative, which envisions a "county where a commitment to optimizing health and wellness is embedded in all decisions by residents, organizations and government."

ENVIRONMENTAL JUSTICE

Since the adoption of the 2012 RTP/SCS, social equity and environmental justice have become increasingly significant priorities in regional plans. For example, plans to promote active transportation, improve public health, increase access to transit, preserve open space, cut air pollution and more are all evaluated for how well the benefits of these efforts are distributed among all demographic groups. The State of California's Environmental Protection Agency (Cal/EPA) developed a new tool, CalEnviroScreen, which helps to identify areas in the state that have higher levels of environmental vulnerability due to historical rates of toxic exposure and certain social factors. Based on this tool,

much of the region can stand to benefit from Cap-and-Trade grants that give priority to communities that are disproportionately impacted.

SETTING THE STAGE FOR OUR PLAN

SCAG began developing the 2016 RTP/SCS by first reaching out to the local jurisdictions to hear directly from them about their growth plans. The next step was to develop scenarios of growth, each one representing a different vision for land use and transportation in 2040. More specifically, each scenario was designed to explore and convey the impact of where the region would grow, to what extent the growth would be focused within existing cities and towns and how it would grow—the shape and style of the neighborhoods and transportation systems that would shape growth over the period. The refinement of these scenarios, through extensive public outreach and surveys, led to a "preferred scenario" that helped guide the strategies, programs and projects detailed in the Plan.

MAJOR INITIATIVES

With the preferred scenario selected, the 2016 RTP/SCS, which includes $556.5 billion in transportation investments, has proposed several major initiatives to strive toward our vision for 2040.

PRESERVING THE TRANSPORTATION SYSTEM WE ALREADY HAVE (FIX-IT-FIRST)

The 2016 RTP/SCS calls for the investment of $275.5 billion toward preserving our existing system. The allocation of these expenditures includes the transit and passenger rail systems, the State Highway System, and regionally significant local streets and roads.

EXPANDING OUR REGIONAL TRANSIT SYSTEM TO GIVE PEOPLE MORE ALTERNATIVES TO DRIVING ALONE

The 2016 RTP/SCS includes $56.1 billion for capital transit projects and $156.7 billion for operations and maintenance. This includes significant expansions of the Metro subway and Light Rail Transit (LRT) system in Los Angeles County. Meanwhile, new Bus Rapid Transit (BRT) routes will expand higher-speed bus service regionally; new streetcar services will link major destinations in Orange County; and new Metrolink extensions will further connect communities in the Inland Empire. Other extensive improvements are planned for local bus, rapid bus, BRT and express service throughout the region. To make transit a more attractive and viable option, the 2016 RTP/SCS also supports implementing and expanding transit signal priority; regional and inter-county fare agreements and media; increased bicycle carrying capacity on transit and rail vehicles; real-time passenger information systems to allow travelers to make more informed decisions; and implementing first/last mile strategies to extend the effective reach of transit.

EXPANDING PASSENGER RAIL

The 2016 RTP/SCS calls for an investment in passenger rail of $38.6 billion for capital projects and $15.7 billion for operations and maintenance. The Plan calls for maintaining the commitments in the 2012 RTP/SCS, including Phase 1 of the California High-Speed Train and the Southern California High-Speed Rail Memorandum of Understanding (MOU), which identifies a candidate project list to improve the Metrolink system and the LOSSAN rail corridor, thereby providing immediate, near-term benefits to the region while laying the groundwork for future integration with California's High-Speed Train project. These capital projects will bring segments of the regional rail network up to the federally defined speed of 110 miles per hour or greater and help lead to a blended system of rail services.

IMPROVING HIGHWAY AND ARTERIAL CAPACITY

The 2016 RTP/SCS calls for investing $54.2 billion in capital improvements and $103.0 billion in operations and maintenance of the State Highway System and regionally significant local streets and roads throughout the region. This includes focusing on achieving maximum productivity by adding capacity, primarily by closing gaps in the system and improving access and other measures including the deployment of new technology. The Plan also continues to support a regional network of express lanes, building on the success of the State Route 91 Express Lanes in Orange County, as well as Interstate 10 and Interstate 110 Express Lanes in Los Angeles County.

MANAGING DEMANDS ON THE TRANSPORTATION SYSTEM

The 2016 RTP/SCS calls for investing $6.9 billion toward Transportation Demand Management (TDM) strategies throughout the region. These strategies focus on reducing the number of drive-alone trips and overall vehicle miles traveled (VMT) through ridesharing, which includes carpooling, vanpooling and supportive policies for ridesourcing services such as Uber and Lyft; redistributing or eliminating vehicle trips from peak demand periods through incentives for telecommuting and alternative work schedules; and reducing the number of drive-alone trips through increased use of transit, rail, bicycling, walking and other alternative modes of travel.

OPTIMIZING THE PERFORMANCE OF THE TRANSPORTATION SYSTEM

The 2016 RTP/SCS earmarks $9.2 billion for Transportation System Management (TSM) improvements. These include extensive advanced ramp metering, enhanced incident management, bottleneck removal to improve flow (e.g., auxiliary lanes), expansion and integration of the traffic signal synchronization network, data collection to monitor system performance, integrated and dynamic corridor congestion management, and other Intelligent Transportation System (ITS) improvements. Recent related initiatives include the Caltrans Advanced Traffic Management (ATM) study for Interstate 105 and the Regional Integration of ITS Projects (RIITS) and Information Exchange Network (IEN) data exchange efforts at Los Angeles Metro.

PROMOTING WALKING, BIKING AND OTHER FORMS OF ACTIVE TRANSPORTATION

The 2016 RTP/SCS plans for continued progress in developing our regional bikeway network, assumes all local active transportation plans will be implemented, and dedicates resources to maintain and repair thousands of miles of dilapidated sidewalks. The Plan invests $12.9 billion in active transportation strategies. The Plan also considers new strategies and approaches beyond those proposed in 2012. To promote short trips, these include improving sidewalk quality, local bike networks and neighborhood mobility areas. To promote longer regional trips, these strategies include developing a regional greenway network and continuing investments in the regional bikeway network and access to the California Coastal Trail. Active transportation will also be promoted by integrating it with the region's transit system; increasing access to 224 rail, light rail and fixed guideway bus stations; promoting 16 regional corridors that support biking and walking; supporting bike share programs; educating people about the benefits of active transportation for students; and promoting safety campaigns.

STRENGTHENING THE REGIONAL TRANSPORTATION NETWORK FOR GOODS MOVEMENT

The 2016 RTP/SCS includes $70.7 billion in goods movement strategies. Among these are establishing a system of truck-only lanes extending from the San Pedro Bay Ports to downtown Los Angeles along Interstate 710; connecting to the State Route 60 east-west segment and finally reaching Interstate 15 in San Bernardino County; working to relieve the top 50 regional truck bottlenecks; adding mainline tracks for the Burlington Northern Santa Fe (BNSF) San Bernardino and Cajon Subdivisions and the Union Pacific Railroad (UPRR) Alhambra and Mojave Subdivisions; expanding/modernizing intermodal facilities; building highway-rail grade separations; improving port area rail infrastructure; reducing environmental impacts by supporting the deployment of commercially available low-emission trucks and locomotives; and, in the longer term, advancing technologies to implement a zero- and near zero-emission freight system.

LEVERAGING TECHNOLOGY

Advances in communications, computing and engineering—from shared mobility innovations to zero-emission vehicles—can lead to a more efficient transportation system with more mobility options for everyone. Technological innovations also can reduce the environmental impact of existing modes of transportation. For example, alternative fuel vehicles continue to become more accessible for retail consumers and for freight and fleet applications—and as they are increasingly used, air pollution can be reduced. Communications technology, meanwhile, can improve the movement of passenger vehicles and connected transit vehicles. As part of the 2016 RTP/SCS, SCAG has focused location-based strategies specifically on increasing the efficiency of Plug-in Hybrid Electric Vehicles (PHEV) in the region. These are electric vehicles that are powered by a gasoline engine when their battery is depleted. The 2016 RTP/SCS proposes a regional charging network that will increase the number of PHEV miles driven on electric power, in addition to supporting the growth of the PEV market generally. In many instances, the additional chargers will create the opportunity to increase the electric range of PHEVs, reducing vehicle miles traveled that produce tail-pipe emissions.

IMPROVING AIRPORT ACCESS

Recognizing that the SCAG region is one of the busiest and most diverse commercial aviation regions in the world and that air travel is an important contributor to the region's economic activity, the 2016 RTP/SCS includes strategies for reducing the impact of air passenger trips on ground transportation congestion. Such strategies include supporting the regionalization of air travel demand; continuing to support regional and inter-regional projects that facilitate airport ground access (e.g., High-Speed Train); supporting ongoing local planning efforts by airport operators, county transportation commissions and local jurisdictions; encouraging the development and use of transit access to the region's airports; encouraging the use of modes with high average vehicle occupancy; and discouraging the use of modes that require "deadhead" trips to/from airports (e.g., passengers being dropped off at the airport via personal vehicle).

FOCUSING NEW GROWTH AROUND TRANSIT

The 2016 RTP/SCS plans for focusing new growth around transit, which is supported by the following policies: identifying regional strategic areas for

infill and investment; structuring the Plan on centers development; developing "Complete Communities"; developing nodes on a corridor; planning for additional housing and jobs near transit; planning for changing demand in types of housing; continuing to protect stable, existing single-family areas; ensuring adequate access to open space and preservation of habitat; and incorporating local input and feedback on future growth. These policies support the development of:

- **High Quality Transit Areas (HQTAs):** areas within one-half mile of a fixed guideway transit stop or a bus transit corridor where buses pick up passengers at a frequency of every 15 minutes or less during peak commuting hours. While HQTAs account for only three percent of total land area in SCAG region, they are planned and projected to accommodate 46 percent of the region's future household growth and 55 percent of the future employment growth.
- **Livable Corridors:** arterial roadways where jurisdictions may plan for a combination of the following elements: high-quality bus frequency; higher density residential and employment at key intersections; and increased active transportation through dedicated bikeways.
- **Neighborhood Mobility Areas (NMAs):** strategies are intended to provide sustainable transportation options for residents of the region who lack convenient access to high-frequency transit but make many short trips within their urban neighborhoods. NMAs are conducive to active transportation and include a "Complete Streets" approach to roadway improvements to encourage replacing single- and multi-occupant automobile use with biking, walking, skateboarding, neighborhood electric vehicles and senior mobility devices.

IMPROVING AIR QUALITY AND REDUCING GREENHOUSE GASES

It is through integrated planning for land use and transportation that the SCAG region, through the initiatives discussed in this section, will strive toward a more sustainable region. The SCAG region must achieve specific federal air quality standards. It also is required by state law to lower regional greenhouse gas emissions. California law requires the region to reduce per capita greenhouse gas emissions in the SCAG region by eight percent by 2020—compared with 2005 levels—and by 13 percent by 2035. The strategies, programs and projects outlined in the 2016 RTP/SCS are projected to result in greenhouse gas emissions reductions in the SCAG region that meet or exceed these targets.

PRESERVING NATURAL LANDS

Many natural land areas near the edge of existing urbanized areas do not have plans for conservation and are vulnerable to development pressure. The 2016 RTP/SCS recommends redirecting growth from high value habitat areas to existing urbanized areas. This strategy avoids growth in sensitive habitat areas, builds upon the conservation framework and complements an infill-based approach.

FINANCING OUR FUTURE

To accomplish the ambitious goals of the 2016 RTP/SCS through 2040, SCAG forecasts expenditures of $556.5 billion—of which $275.5 billion is budgeted for operations and maintenance of the regional transportation system and another $246.6 billion is reserved for transportation capital improvements.

Forecasted revenues comprise both existing and several new funding sources that are reasonably expected to be available for the 2016 RTP/SCS, which together total $556.5 billion. Reasonably available revenues include short-term adjustments to state and federal gas excise tax rates and the long-term replacement of gas taxes with mileage-based user fees (or equivalent fuel tax adjustment). These and other categories of funding sources were identified as reasonably available on the basis of their potential for revenue generation, historical precedence and the likelihood of their implementation within the time frame of the Plan.

WHAT WE WILL ACCOMPLISH

Overall, the transportation investments in the 2016 RTP/SCS will provide a return of $2.00 for every dollar invested. Compared with an alternative of not adopting the Plan, the 2016 RTP/SCS would accomplish the following:

- The Plan would result in an eight percent reduction in greenhouse gas emissions per capita by 2020, an 18 percent reduction by 2035 and a 21 percent reduction by 2040—compared with 2005 levels. This meets or exceeds the state's mandated reductions, which are eight percent by 2020 and 13 percent by 2035.
- Regional air quality would improve under the Plan, as cleaner fuels and new vehicle technologies help to significantly reduce many of the pollutants that contribute to smog and other airborne contaminants that impact public health in the region.
- The combined percentage of work trips made by carpooling, active transportation and public transit would increase by about four percent,

with a commensurate reduction in the share of commuters traveling by single occupant vehicle.

- The number of Vehicle Miles Traveled (VMT) per capita would be reduced by more than seven percent and Vehicle Hours Traveled (VHT) per capita by 17 percent (for automobiles and light/medium duty trucks) as a result of more location efficient land use patterns and improved transit service.
- Daily travel by transit would increase by nearly one-third, as a result of improved transit service and more transit-oriented development patterns.
- The Plan would reduce delay per capita by 39 percent and heavy-duty truck delay on highways by more than 37 percent. This means we would spend less time sitting in traffic and our goods would move more efficiently.
- More than 351,000 additional new jobs annually would be created, due to the region's increased competitiveness and improved economic performance that would result from congestion reduction and improvements in regional amenities as a result of implementing the Plan.
- The Plan would reduce the amount of previously undeveloped (greenfield) lands converted to more urbanized uses by 23 percent. By conserving open space and other rural lands, the Plan provides a solid foundation for more sustainable development in the SCAG region.
- The Plan would result in a reduction in our regional obesity rate from 26.3 percent to 25.6 percent in areas experiencing land use changes, and a reduction in the share of our population that suffers with high blood pressure from 21.5 percent to 20.8 percent.

HOW WE WILL ENSURE SUCCESS

Our Plan includes several performance outcomes and measures that are used to gauge our progress toward meeting our goals. These include:

- Location Efficiency, which reflects the degree to which improved land use and transportation coordination strategies impact the movement of people and goods.
- Mobility and Accessibility, which reflects our ability to reach desired destinations with relative ease and within a reasonable time, using reasonably available transportation choices.
- Safety and Health, which recognize that the 2016 RTP/SCS has impacts beyond those that are exclusively transportation-related (e.g., pollution-related disease).
- Environmental Quality, which is measured in terms of criteria pollutants and greenhouse gas emissions.
- Economic Opportunity, which is measured in terms of additional jobs created as a result of the transportation investments provided through the 2016 RTP/SCS.
- Investment Effectiveness, which indicates the degree to which the Plan's expenditures generate benefits that transportation users can experience directly.
- Transportation System Sustainability, which reflects how well our transportation system is able to maintain its overall performance over time in an equitable manner with minimum damage to the environment and without compromising the ability of future generations to address their transportation needs.

The 2016 RTP/SCS is designed to ensure that the regional transportation system serves all segments of society. The Plan is subject to numerous performance measures to monitor its progress toward achieving social equity and environmental justice. These measures include accessibility to parks and natural lands, roadway noise impacts, air quality impacts and public health impacts, among many others.

LOOKING BEYOND 2040

The 2016 RTP/SCS is based on a projected budget constrained by the local, state and federal revenues that SCAG anticipates the region receiving between now and 2040. The Strategic Plan discusses projects and strategies that SCAG would pursue if new funding were to become available. The Strategic Plan discussion includes long-term emission reduction strategies for rail and trucks; expanding the region's high-speed and commuter rail systems; expanding active transportation; leveraging technological advances for transportation; addressing further regional reductions in greenhouse gas emissions; and making the region more resilient to climate change—among other topics. We anticipate that these projects and strategies may inform the development of the next Plan, the 2020 RTP/SCS.

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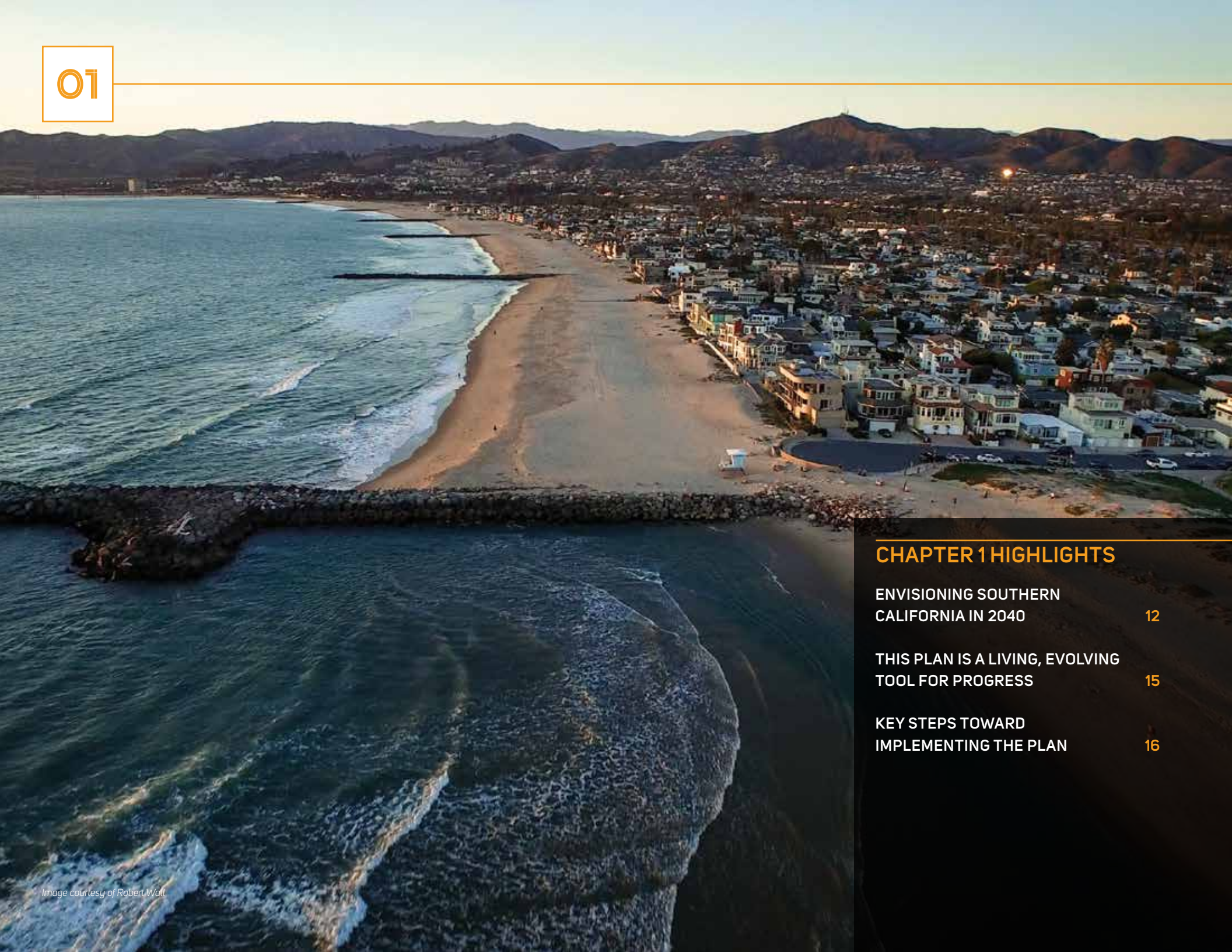

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INTRODUCTION

Southern California is one of the most dynamic and beautiful places on the planet. A global center for entertainment and culture, commerce, tourism and international trade, our region is graced by a temperate climate, a spectacular coastline, rolling hills and inland valleys, towering mountain ranges, and expansive deserts. It is no wonder Southern California has become home to more than 18 million people.

ENVISIONING SOUTHERN CALIFORNIA IN 2040

OUR CHANGING REGION

Today, our region is in the midst of great changes. Our population continues to increase and demographics are shifting. In the coming years, Baby Boomers, born between 1946 and 1964, and Millennials, born between 1980 and 2000, will have an increasingly greater impact on how and where we live and how we travel. Overall, our region will continue to grow more racially and ethnically diverse in the coming decades. These and other changes will transform the character of Southern California over the next 25 years as people choose different places to live and more efficient ways to get around. People will have new expectations for the health and vibrancy of their communities. They will want a greater degree of mobility with transportation options that are more accessible and flexible. People will also expect to have more options for recreational space. They will want cleaner air. How our region responds to growth and the evolving priorities and desires of the people who live here will significantly shape our overall quality of life.

This 2016 RTP/SCS charts a course for closely integrating land use and transportation in certain areas of the region—so that we as a whole can grow smartly and sustainably. It outlines $556.5 billion in transportation system investments through 2040. The Plan was prepared through a collaborative, continuous and comprehensive (3 Cs) process by SCAG, the largest Metropolitan Planning Organization (MPO) in the nation. It serves as an update to SCAG's 2012 RTP/SCS.

It might seem obvious that as a region we should coordinate decisions about where people live, work, go to school, shop and spend their free time with decisions about the transportation system that serves them. But in a region as large and complex as ours, closely integrating strategies for land use and transportation is a huge undertaking. This Plan, more than just a list of projects and initiatives, tells an important story about our future. It is a story about how we will meet complex and daunting challenges in one of the biggest and most influential metropolitan regions in the world, and ultimately how working together we can integrate decisions about transportation and using land to realize a regional transportation system that promotes economic growth and sustainability.

CHALLENGES WE FACE

As we look to the future, we will confront many challenges, some of which we already face today and others that will emerge as we continue to grow. We are living now with the consequences of growth: more people, more houses, more jobs, more freight traffic and more cars. The six counties that encompass our region—Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura—have all experienced the consequences of that growth. In our urban and suburban areas, roads and highways have grown increasingly congested. As a result, regional air pollution has worsened and greenhouse gas emissions that contribute to climate change have increased. Everyday trips to work, school, shopping and more have become more time consuming and in some cases more costly.

Neighborhoods that many people once considered affordable are now priced out of reach—particularly in established urban communities that have seen major public and private investments such as new transit access and new developments that mix upscale housing with popular stores and restaurants.

As our region's demographics change, there will be a greater desire for housing situated closer to jobs, healthcare, shopping and other amenities, and more public transportation options. The region will have to find ways to meet these demands.

Maintaining and enhancing a transportation system that can tackle these challenges will require adequate funding, and securing that funding for a better transportation system will be perhaps the region's biggest challenge. Our overall transportation system is aging rapidly and deteriorating. Deferring maintenance because of a lack of funding will continue to strain the system.

As our economy grows, freight traffic will increase on our roadways, along rail lines, and at our airports and seaports. This will place new demands on general transportation infrastructure such as highways and surface streets, as well as infrastructure specific to international trade and domestic commerce. This growth in goods movement also will contribute to air pollution, making it harder for the region to attain federal standards for air quality and comply with new state rules for lowering greenhouse gas emissions.

Meanwhile, our region faces huge public health challenges, as people suffer from chronic diseases associated with poor air quality and a lack of physical activity. This is why it is so critical to integrate decisions about where we live and work with decisions about how we travel. It matters how neighborhoods

SUSTAINABILITY

The practice of analyzing the impacts of decisions, policies, strategies and development projects on the Environment, the Economy and Social Equity

are laid out and linked to bus lines, bike and walking paths, and other transportation options.

Finally, our region faces the huge challenge of confronting and coping with the consequences of climate change. Making communities more resilient to heat waves, wildfires, rising seas, extreme rainstorms and other projected impacts will depend on smart planning. We'll review these challenges in more depth in Chapter 3.

REALIZING OUR VISION FOR A BETTER FUTURE

The 2016 RTP/SCS outlines concrete steps for meeting these challenges, and creating the conditions and infrastructure that result in increased mobility, easier access to destinations, and more transportation options. The Plan also analyzes the impacts of its decisions, policies, strategies and development projects on the environment, the economy and social equity. By doing this, the 2016 RTP/SCS promotes a sustainable future in which the environment is protected, economic growth is supported and the Plan's benefits are widely distributed.

The 2016 RTP/SCS envisions vibrant, livable communities that are healthy and safe with transportation options that provide easy access to schools, jobs, services, health care and other basic needs. These communities will be conducive to walking and bicycling and will offer residents improved access to amenities such as parks and natural lands. Collectively, these communities will support opportunities for business, investment and employment and fuel for a more prosperous economy. This vision recognizes the region's tremendous diversity, and that no single solution will work everywhere.

SCAG worked closely with local jurisdictions to develop the Plan, which incorporates local growth forecasts, projects and programs and includes complementary regional policies and initiatives. Because SCAG encompasses six counties, it is important that the 2016 RTP/SCS reflect the region's diverse needs and priorities. Every effort was made to ensure that this happened.

Since 2009, every MPO in California has been required to develop a Sustainable Communities Strategy as part of its Regional Transportation Plan—therefore the name "RTP/SCS." This SCS is a vital part of the overall Plan. It charts a course for how the SCAG region will reach state-mandated reductions in greenhouse gas emissions from cars and light trucks, which contribute to climate change. This SCS will be discussed extensively in the coming pages. The SCS is a driving force of this Plan, although not the only one. Once implemented along with the rest of the Plan, it will improve the overall quality of life for all residents of the region.

While our region faces great challenges, we are living at a time of technological and economic innovation that will help us meet those challenges. New mobility innovations can help the region meet the challenges of growth and increasing demands on our transportation system. Automated vehicles, drivers available on demand, data-driven infrastructure, and vehicles that respond to both their passengers and the environment are among the new mobility innovations that will reshape how we travel throughout the region. Many people, particularly Millennials, are already embracing some of these mobility innovations and are likely to be early adopters as new ones emerge. But these advances in mobility also have the potential to help all generations maintain their independence as they age.

The Plan considers new patterns of development as the regional economy continues to recover and grow, the composition of our population changes, the housing market responds to evolving needs, and demands and mobility innovations emerge. The Plan also includes a long-term strategic vision for the region that will help guide decisions for transportation and how we use land, as well as the public investments in both, through 2040.

MAJOR THEMES IN THE 2016 RTP/SCS

Throughout this Plan you will read about important themes that resonate throughout the document and help define its focus. A few have already been introduced. These themes include:

Integrating strategies for land use and transportation. The Plan recognizes that transportation investments and future land use patterns are inextricably linked,

and continued recognition of this close relationship will help the region make choices that sustain our existing resources and expand efficiency, mobility and accessibility for people across the region. In particular, the Plan draws a closer connection between where we live and work, and it offers a blueprint for how Southern California can grow more sustainably.

Striving for sustainability. Creating a more sustainable region means growing and living in ways that use our resources efficiently to survive and prosper—from the water we drink, to the air we breathe, to the energy we consume. It is essential that we strive for regional environmental sustainability as we also confront the potential impacts of continued climate change on our transportation infrastructure and communities. In Southern California, striving for sustainability includes achieving state-mandated targets for reducing greenhouse gas emissions from cars and light trucks and federal air quality conformity requirements, and also adapting wisely to a changing environment and climate.

Protecting and preserving our existing transportation infrastructure. The Plan places a priority on investing in the transportation system we already have, to maintain and extend its life and utility. It recognizes that deferring maintenance of infrastructure leads to costlier repairs in the future.

Increasing capacity through improved systems management. Pouring new concrete is not the only way to add capacity to our roadways. Transportation Systems Management, or TSM, is a powerful strategy that aims to improve the capacity and efficiency of the existing transportation system without resorting to large-scale and expensive capital improvements. Examples of TSM projects include coordinating traffic signals along a corridor; deploying changeable message signs that display real-time road information; and ramp meters that control the timing of vehicles driving onto highways.

Giving people more transportation choices. The Plan will provide people with more options for transportation and mobility, offering them various alternatives to driving alone. This will be accomplished by enhancing public transit capacity and increasing its viability by making it more accessible; completing critical road connections; providing greater opportunities for biking and walking, particularly for short trips; exploring how people might use alternative fuel vehicles within their neighborhoods and beyond; increasing telecommuting and flexible work schedules; encouraging new mobility innovations; and improving safety. These Transportation Demand Management, or TDM, strategies will help us better manage the demand we place on the roadway network by reducing the number of people who drive alone and encouraging them to use alternative modes of travel.

Leveraging technology. Advances in communications, computing and engineering—from shared mobility innovations to zero-emissions vehicles—can lead to a more efficient transportation system with more mobility options for everyone. Technological innovations also can reduce the environmental impact of existing modes of transportation. For example, alternative fuel vehicles continue to become more accessible for retail consumers and for freight and fleet applications—and as they are increasingly used, air pollution can be reduced. Communications technology, meanwhile, can improve the movement of passenger vehicles and connected transit vehicles. Moreover, the way urban and suburban areas are shaped can support and encourage shared mobility and other new forms of transportation.

Responding to demographic and housing market changes. The region's demographics and housing market are fluid and dynamic. The housing market has rebounded since the 2012 RTP/SCS was adopted, and the number of Millennials and empty nesters has continued to increase with many seeking smaller housing and a more walkable lifestyle. For many households in the region, minimizing transportation and housing costs remains a priority. The Plan includes strategies focused on compact infill development, superior placemaking (the process of creating public spaces that are appealing), and expanded housing and transportation choices. The goal is to create a region that can respond to changing demographics and markets.

Supporting commerce, economic growth and opportunity. The Plan supports economic growth by building the infrastructure the region needs to promote the smooth flow of goods and easier access to jobs, services, educational facilities, healthcare and more. The Plan also preserves natural lands, improves air quality and creates vibrant urban centers—all of which are critical for attracting and retaining the people and jobs Southern California needs to thrive.

Promoting the links among public health, environmental protection and economic opportunity. The Plan places a priority on implementing the integration of transportation and land use strategies to improve our overall health. The Plan will result in improved air quality, provide more opportunities for people to be physically active, and protect natural lands and habitats. The result: communities will become healthier places to live, allowing people and businesses to thrive.

Building a Plan based on the principles of social equity and environmental justice. The Plan is designed to create regionwide benefits that are distributed equitably, while avoiding having any one group carrying the burdens of development disproportionately. It is particularly important that the Plan

consider the consequences of transportation projects on low-income and minority communities and minimize negative impacts. In striving for environmental justice, the Plan provides specific measures to lessen the negative environmental impacts of transportation projects on these communities, as well as metrics to monitor how successful these measures are throughout the communities.

THIS PLAN IS A LIVING, EVOLVING TOOL FOR PROGRESS

WHY SCAG UPDATES THIS PLAN

The State of California and the federal government require that SCAG and other regional planning agencies update their respective Regional Transportation Plan/Sustainable Communities Strategy every four years. Key laws and requirements drive our work. Two primary mandates include:

- SCAG is required by federal law to prepare and update a long-range (minimum of 20 years) RTP (23 U.S.C.A. §134 et seq). Most areas within the SCAG region have been designated as nonattainment or maintenance areas for one or more transportation-related criteria pollutants. Pursuant to the federal Clean Air Act, SCAG's 2016 RTP/SCS is required to meet all federal transportation conformity requirements, including: regional emissions analysis, financial constraint, timely implementation of transportation control measures, and interagency consultation and public involvement (42 U.S.C. §7401 et seq).
- California Senate Bill 375 (SB 375) requires that the RTP also include an SCS, which outlines growth strategies that better integrate land use and transportation planning and help reduce the state's greenhouse gas emissions from cars and light trucks (California Government Code §65080 (b)(2)(B). The RTP is combined with the SCS to form the RTP/SCS, which is further detailed in Chapter 5. For the SCAG region, the California Air Resources Board (ARB) has set greenhouse gas reduction targets at eight percent below 2005 per capita emissions levels by 2020, and 13 percent below 2005 per capita emissions levels by 2035. As we will discuss in this Plan, the region will meet or exceed these targets, lowering greenhouse gas emissions (below 2005 levels) by eight percent by 2020; 18 percent by 2035; and 21 percent by 2040.

While SCAG is required to meet these statutory requirements, all good long-term plans are routinely re-evaluated and updated. SCAG is committed to ensuring that the RTP/SCS is a living document that evolves as the region's demographics, priorities, desires and economy change.

BENEFITS BEYOND CLEANER AIR

This Plan, of course, is about much more than cleaner air and reduced greenhouse gas emissions, although those are primary goals. SCAG must plan for accommodating another 3.8 million residents in its region. The region also expects to add another 2.4 million jobs and 1.5 million new households by the Plan horizon of 2040. The strategies contained in the 2016 RTP/SCS are expected to produce numerous benefits. Among them are:

MOBILITY AND ACCESSIBILITY

MOBILITY refers to how quickly and efficiently people can travel from one location to another. ACCESSIBILITY refers to how connected people's destinations are to transportation options.

Direct improvements to the transportation system can increase mobility. Two examples are speeding up train service and relieving congestion on highways. Improving accessibility requires better coordinating our investments for how we use land with our investments for transportation. Developing housing, businesses and other "Transit Oriented Development" around train stations, for example, improves accessibility.

GREENHOUSE GASES

Components of the atmosphere (carbon dioxide, methane, nitrous oxide and fluorinated gases) that contribute to the greenhouse effect

- **Better Placemaking:** The Plan will promote the development of better places to live and work through measures that encourage more compact development in certain areas of the region, varied housing options, bicycle and pedestrian improvements, and efficient transportation infrastructure.
- **Improved Access and Mobility:** The Plan will encourage strategic transportation investments that add appropriate capacity and improve critical road conditions in the region, increase transit capacity and expand mobility options. Meanwhile, the Plan outlines strategies for developing land in coming decades that will place destinations closer together, thereby decreasing the time and cost of traveling between them.
- **Households save more money:** The Plan is expected to result in less energy and water consumption across the region, as well as lower transportation costs for households.
- **Improved Public Health and a Healthier Environment:** Improved placemaking and strategic transportation investments will help improve air quality; improve health as people have more opportunities to bicycle, walk and pursue other active alternatives to driving; and better protect natural lands as new growth is concentrated in existing urban and suburban areas.

These benefits add up to a simple and powerful idea: a more efficient transportation network and more livable and sustainable communities throughout our region.

KEY STEPS TOWARD IMPLEMENTING THE PLAN

To move forward on the Plan, SCAG needs to take some critical steps. Here are a few of them:

1. **Funding the Plan**

   The 2016 RTP/SCS includes a $556.5 billion financial plan, discussed in Chapter 6 and detailed further in the Transportation Finance Appendix, that identifies how much money will be available to support the region's capital, operating, maintenance and transportation system preservation needs over the life of the Plan. It includes a core revenue forecast of existing local, state and federal funding sources, along with new funding sources that are reasonably expected to be available through 2040.

   These new sources of funding include anticipated adjustments to state and federal gas tax rates based on historical trends and recommendations from two national commissions created by Congress; efforts to further leverage existing local sales tax measures; value capture strategies (e.g., tax increment financing); potential national freight program/freight fees; and passenger and commercial vehicle tolls for specific facilities. Other reasonably expected revenues in the future will come from innovative financing strategies, such as private equity participation. The Plan includes strategies to ensure that these sources of revenue are available, in accordance with federal guidelines.

   There is also a need to identify and secure funding to support deployment and implementation of the land use policies and strategies contained in the Plan to fully realize a sustainable regional vision. It will be essential to secure resources from the California Greenhouse Gas Reduction Fund, also know as Cap-and-Trade, in order to support the Plan's objectives. Additionally, innovative and emerging financing options such as Enhanced Infrastructure Finance Districts will need to be explored and implemented by local jurisdictions.

2. **Collaborating with Local Jurisdictions and Stakeholders**

   Implementing the Plan will require SCAG to continue working closely with all jurisdictions, just as it did during its development. In particular, SCAG will need to work with the six county transportation commissions responsible for managing and prioritizing the portfolio

of transportation investments in their respective counties. SCAG also must work with the California Department of Transportation (Caltrans), transit operators, port and airport authorities, and other implementing agencies. In addition, the agency will have to work with the local jurisdictions and counties responsible for land use and transportation planning, and the air quality management districts in charge of monitoring conditions throughout the region. The agency will also have to work with key stakeholders including local public health departments to ensure that the Plan benefits the economy and promotes social equity. To ensure that the region makes progress on its goals, SCAG will monitor its own progress toward achieving its targets and will share this information with its partners and the public.

3. **Looking Ahead Beyond 2040**

To fully address our region's long-term needs, SCAG must consider strategies and investments beyond what is contained in the financially constrained portion of the 2016 RTP/SCS—that is, the investment plan built on revenues that are reasonably expected over the life of the Plan. Chapter 9 provides an overview of potential programs and policies that may be implemented if additional funding becomes available in the future. These include:

- Long-term emission-reduction investments for trucks and rail
- Unfunded operational improvements
- Unfunded capital improvements
- Expansion of our region's high-speed rail and commuter rail systems
- Increased use of active transportation
- Technology and new mobility innovations
- Expansion of the regional network of express lanes

SCAG expects that the 2016 RTP/SCS Strategic Plan will influence the next update to the RTP/SCS in 2020, and the strategies detailed above will eventually be incorporated into future investment plans.

Chapter 2 discusses the current transportation system in the region, how we use land today and also a graphic overview of progress achieved since the 2012 RTP/SCS was adopted. It will be followed in Chapter 3 with a review of challenges we face as a region. The first three chapters of the 2016 RTP/SCS set the stage for a discussion of the Plan's development in Chapter 4 and a comprehensive review of the Plan's strategies, programs and projects in Chapter 5.

THE RTP/SCS

WHAT'S REQUIRED

- Long-term vision of how the region will address regional transportation and land use challenges and opportunities
- Investment framework

FEDERAL

- Updated every four years to maintain eligibility for federal funding
- Long-range: 20+ years into the future
- Demonstrate transportation conformity
  - Regional emissions analysis
  - Financially-constrained (revenues = costs)
  - Timely implementation of transportation control measures
  - Interagency consultation and public involvement
- Must be developed in consultation/coordination with key stakeholders

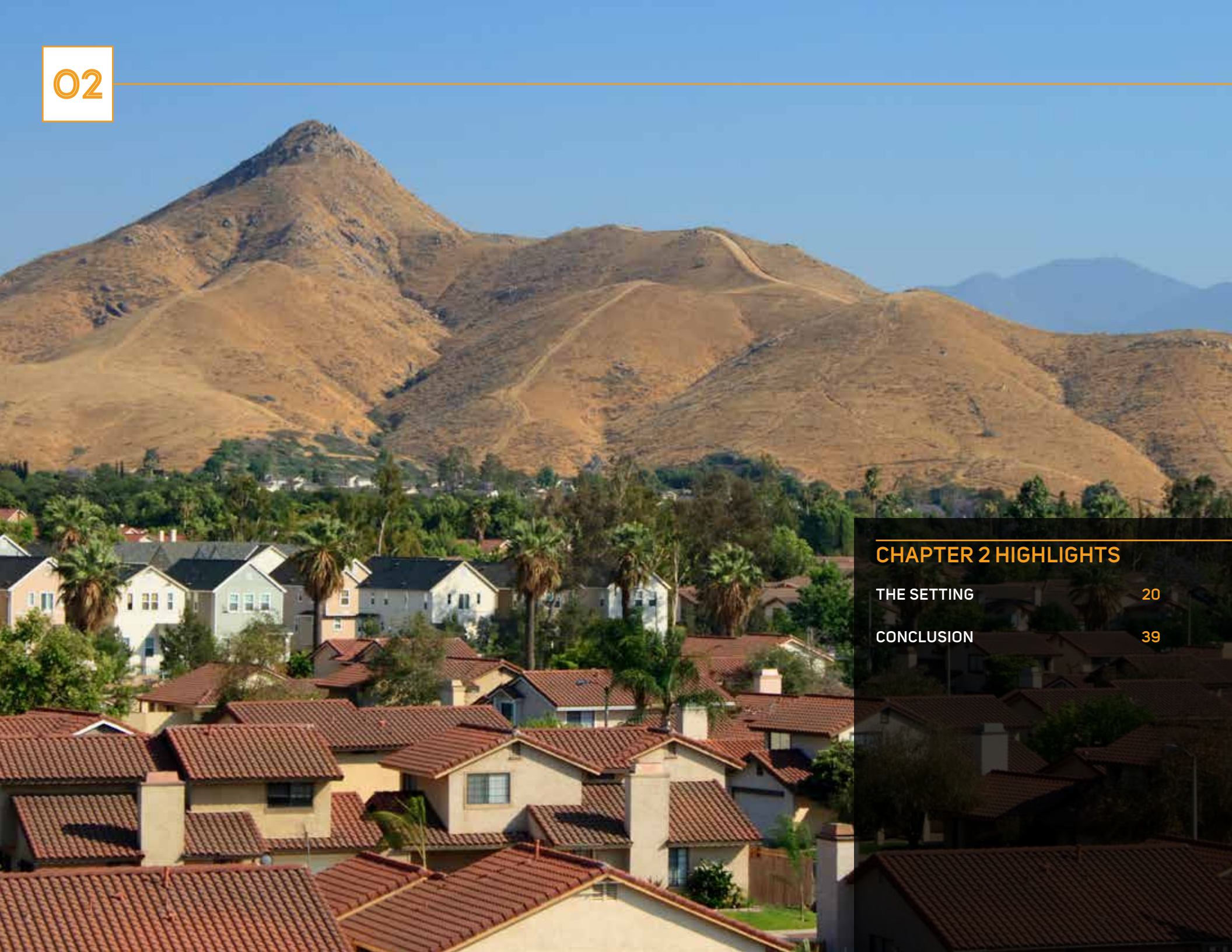
STATE

- Achieve SB 375 requirements (reduce greenhouse gas emissions from cars and light trucks)

WHAT'S INCLUDED

- Vision, policies and performance measures
- Forecasts (e.g., population, households, employment, land use and housing needs)
- Financial plan
- List of projects (to be initiated and/or completed by 2040)
- Analysis of priority focus areas (e.g., goods movement and active transportation)

02



CHAPTER 2 HIGHLIGHTS

THE SETTING 20

CONCLUSION 39

WHERE WE ARE TODAY

To plan effectively for the future, it is important to understand the current conditions of land use and transportation throughout our large and complex region. This chapter reviews those current conditions.

THE SETTING

HOW WE USE LAND TODAY

SCAG recognizes that decisions by local jurisdictions about how land is used can impact the regional transportation system, and decisions about regional transportation investments can impact land use. The agency also understands that most land use planning is typically conducted by local jurisdictions, while regional and state agencies often make major decisions about transportation investments.

This is why it is critical for the region to integrate strategies for our transportation system with strategies for how we use land. Only by doing this can we achieve sustainable growth and a high quality of life for our region. This first section of Chapter 2 offers an overview of how we use land in the SCAG region, and its relevance to improving our regional transportation system as we head toward 2040.

CATEGORIZING LAND USE

Of the 38,000 square miles of total land in the SCAG region, only 21 percent is suitable for development. Of this limited developable land, more than half has already been fully developed. However, of the remaining developable land, only a small portion of it can be developed as sustainable transit-ready infill—meaning it can be reached via planned transit service and that it can readily access existing infrastructure (water resources, sewer facilities, etc.). According to regional land use data, only two percent of the total developable land in the region is located in High Quality Transit Areas (HQTAs), defined as areas within one-half mile of a well-serviced fixed guideway transit stop, and including bus transit corridors where buses pick up passengers every 15 minutes or less during peak commute hours. A more compact land development strategy is needed, which will be discussed in Chapter 5. Please note that this limited remaining land for future development does not account for potential reductions of developable acreage resulting from conservation efforts currently underway.

As the agency prepared the 2016 RTP/SCS, it needed to organize the many different types and classifications of land uses in the region for required technical analyses. The SCAG region is diverse and large, and the types and classifications of land use used by one jurisdiction often differ from those used by another. The result is that there are many different land use types and classifications that SCAG must organize for its own analyses.

To accurately represent land uses throughout the region, SCAG aggregated information from jurisdictions and simplified the types and classifications of land use into a consolidated set of land use types. The agency then converted these consolidated land uses into 35 "Place Types" to reflect the diversity of land use planning. Descriptions, standards and graphic examples of each Place Type can be found in the Reference Documents section of the SCS Background Documentation Appendix. These Place Types were used in an urban setting design tool known as the Urban Footprint Scenario Planning Model (SPM), to demonstrate urban development in the Plan in terms of form, scale and function in the built environment.

SCAG then classified the Place Types into three Land Development Categories (LDCs). A table of how the 35 Place Types were categorized into the three LDCs can be found in the Reference Documents section of the SCS Background Documentation Appendix. The agency used these categories to describe the general conditions that exist and/or are likely to exist within a specific area. They reflect the varied conditions of buildings and roadways, transportation options, and the mix of housing and employment throughout the region. The three Land Development Categories that SCAG used are:

1. **Urban:** These areas are often found within and directly adjacent to moderate and high density urban centers. Nearly all urban growth in these areas would be considered infill or redevelopment. The majority of housing is multifamily and attached single-family (townhome), which tend to consume less water and energy than the larger types found in greater proportion in less urban locations. These areas are supported by high levels of regional and local transit service. They have well-connected street networks, and the mix and intensity of uses result in a highly walkable environment. These areas offer enhanced access and connectivity for people who choose not to drive or do not have access to a vehicle.
2. **Compact:** These areas are less dense than those in the Urban Land Development Category, but they are highly walkable with a rich mix of retail, commercial, residential and civic uses. These areas are most likely to occur as new growth on the urban edge, or as large-scale redevelopment. They have a rich mix of housing, from multifamily and attached single-family (townhome) to small- and medium-lot single-family homes. These areas are well served by regional

and local transit service, but they may not benefit from as much service as urban growth areas and are less likely to occur around major multimodal hubs. Streets in these areas are well connected and walkable, and destinations such as schools, shopping and entertainment areas can typically be reached by walking, biking, taking transit, or with a short auto trip.

3. **Standard:** These areas comprise the majority of separate-use, auto-oriented developments that have characterized the American suburban landscape for decades. Densities in these areas tend to be lower than those in the Compact Land Development Category, and they are generally not highly mixed. Medium- and larger-lot single-family homes comprise the majority of this development form. Standard areas are not typically well served by regional transit service, and most trips are made by automobile.

NATURAL LANDS AND FARM LAND

Southern California is one of the most biodiverse areas on the planet, with an enormous wealth of natural habitats, and flora and fauna that include species that only exist in Southern California. Our iconic mountain ranges, chaparrals, numerous rivers and expansive deserts make up our regional identity. Additionally, Southern California has a rich agricultural history and continues to be a food producer for the rest of the country. However, issues such as infrastructure needs, continuing development pressure, climate change and limited financial resources present significant challenges in protecting and maintaining the quality and quantity our natural lands and farm lands.

A considerable amount of the region's natural lands, including some key habitat areas, are already protected.[1] Some areas, especially near the edge of existing urbanized areas, do not have plans for conservation and are susceptible to development. These include lands that are important and unique habitats and have high per-acre habitat values, such as riparian habitat (i.e., areas adjacent to bodies of water such as streams or rivers). These habitat types tend to have high per-acre habitat values—meaning these areas are home to a high number of species and serve as highly functional habitats. Some key habitat types are underrepresented within areas of the region already under protection.

Local land use decisions play a pivotal role in the future of some of the region's most valuable habitat and farm lands. Many local governments have taken steps toward planning comprehensively for conserving natural lands and farm lands, while also meeting demands for growth. Across the region, transportation agencies and local governments have used tools, such as habitat conservation plans, to link land use decisions with comprehensive conservation plans in order to streamline development.

To support those and other comprehensive conservation planning efforts and to inform the local land use decision making process, SCAG has studied regional-scale habitat values (see EXHIBIT 2.1), developed a conservation framework and assembled a natural resource database.[2] Over the past several years, SCAG and regional partners such as county transportation commissions (CTCs), environmental organizations and local governments have supported natural land restoration, conservation and acquisition in ways that could contribute to reducing greenhouse gas emissions, streamlining projects and addressing climate change impacts to natural habitats. Please see the Natural & Farm Lands Appendix for additional details.

SHIFTING HOUSING TYPES

In the postwar era that shaped the physical landscape and popular image of Southern California, most households consisted of parents with children—often residing on large suburban lots with single-family houses. But in the 21st century, the region is witnessing demographic shifts that are influencing housing choices. Today, a smaller percentage of households have younger children at home, and the number of households without children is dramatically increasing. The housing market is expected to reflect these trends with an increased demand for smaller-lot single-family houses, as well as multifamily housing close to shopping, transit services and other amenities. Currently, 55 percent of the region's homes are detached single-family houses. Over the next 20 years, the region is projected to add another 1.5 million homes, and much of this increase will be homes on smaller lots and multifamily housing (33 percent single-family housing to 67 percent multifamily housing). Though new housing will tend to be multifamily housing, the region's overall housing stock will remain similar to the existing housing stock, with a breakdown of 49 percent single-family housing and 51 percent multifamily housing (see FIGURE 2.1).

OUR HOUSING NEEDS

As a Council of Governments, SCAG is required by California housing law to

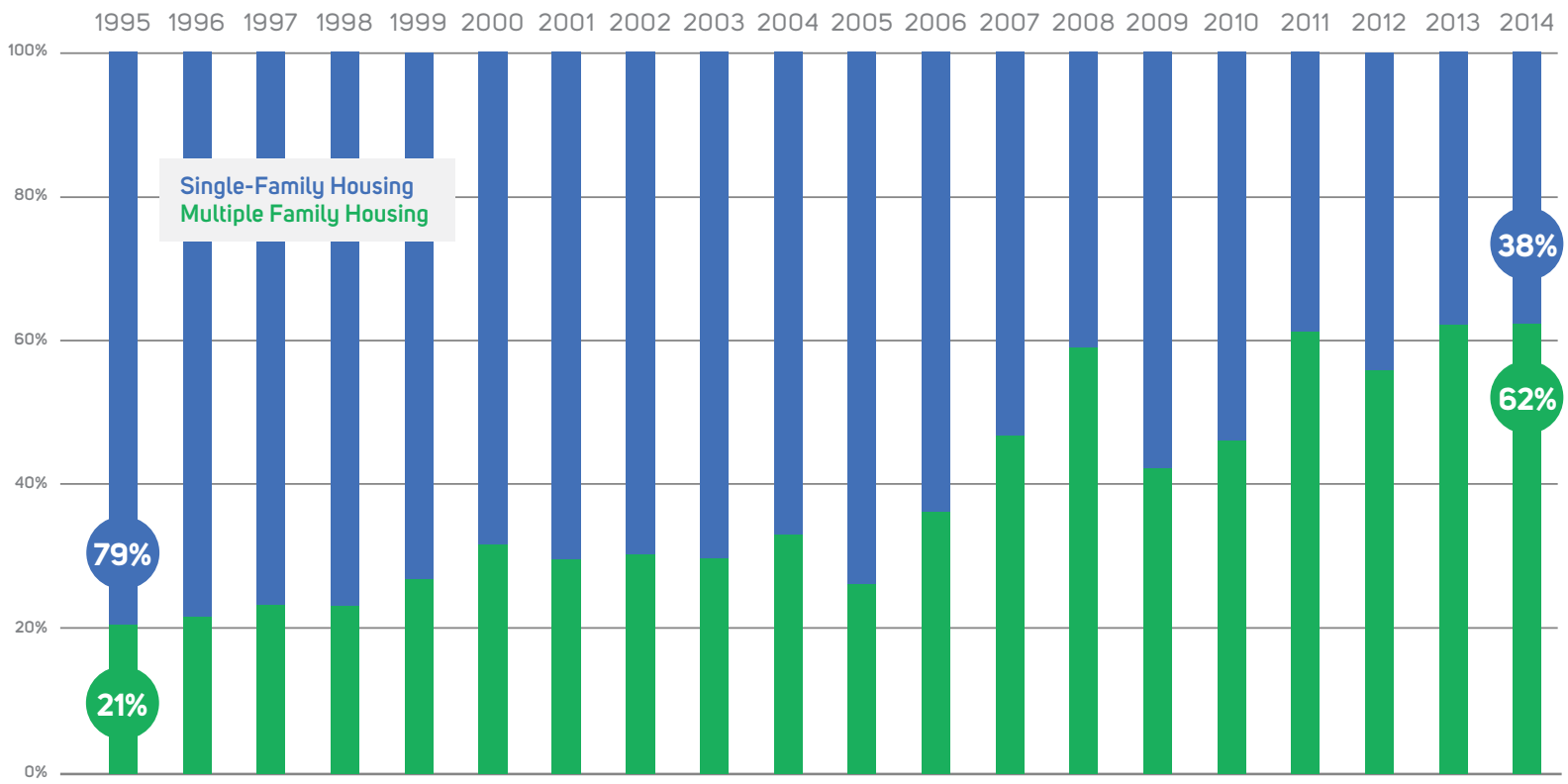
[1] O'Neill, T., & Bohannon, J. (2015). Conservation Framework and Assessment. SCAG.

[2] These documents can be found at: http://sustain.scag.ca.gov/Pages/LinksResources.aspx.

conduct a Regional Housing Needs Assessment (RHNA) every eight years. This assessment determines future housing needs for every jurisdiction in a given region for a specific time period. This determination is referred to as the RHNA allocation, which represents projected housing needs for an eight-year period, as required by state law. For our region, the most recent RHNA allocation, also known as the fifth RHNA cycle, was adopted by the SCAG's Regional Council in October 2012 and it covers a projection period between January 2014 and October 2021. The RHNA allocation breaks down housing needs into four income categories: very low (less than 50 percent of the county's median income); low (50 to 80 percent of the median); moderate (80 to 120 percent); and above moderate (more than 120 percent). For the fifth RHNA cycle, the regional RHNA allocation was 412,137 units, broken down as follows: 100,632 very low; 64,947 low; 72,053 moderate; and 174,505 above moderate.

However, although these housing units are planned and zoned for, available data sources indicate that the supply of affordable housing has not met needs, despite strong building activity for market rate housing. For example, during the last RHNA cycle (2006–2014), nearly 22,000 units were constructed using Low Income Housing Tax Credits (LIHTC), a rough benchmark in affordable housing building activity for households with very low income. This building activity represents about 12 percent of the 165,457 units in this category regionally. In contrast, more than 150,000 single-family homes, most likely

FIGURE 2.1 SCAG REGION SHARE OF MULTIPLE/SINGLE BUILDING PERMITS ISSUED



Source: U.S. Census Bureau, Security Pacific National Bank (Prior to 1987) and Construction Industry Research Board (1988 to present)
Single-family housing units include detached, semi-detached, row house and town house units. Multifamily housing includes duplexes, 3-4 unit structures, and apartment type structures with five units or more.

EXHIBIT 2.1 HABITAT VALUE

Per-Acre Habitat Value

Urban/Agricultural (2.39 to 8.75) | Low (8.76 to 14.20) | Medium (14.21 to 17.48) | High (17.49 to 20.28) | Very High (20.29 to 24.43) | Basin | County Boundaries

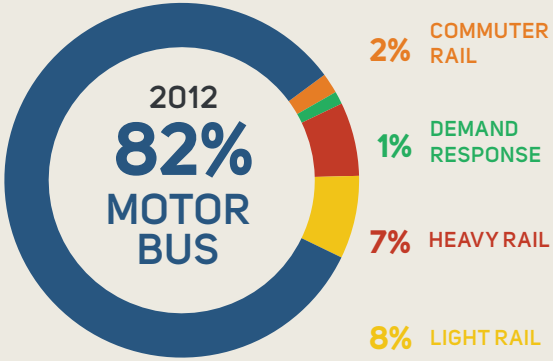
Habitat value refers to the numeric value of a site or area based on an assessment that takes into account species, habitat and functional relationship. The assessment tool aims to spatially capture biodiversity and complexity based on peer-reviewed informational data sets. Please see the Natural & Farm Lands Appendix for a more detailed description of the assessment used to develop the Habitat Value map.

(Source: SCAG)

FOCUS TRANSIT

Transit Trips by Mode

The share of bus trips in the region has decreased over time but buses still represent the majority of all transit modes.



Public Transportation Benefits

Enhances personal mobility and access to opportunities.

SAVES MONEY
$13,000
saved per year for 2-person household

REDUCES GASOLINE CONSUMPTION & GHG EMISSIONS

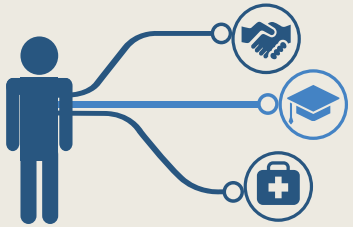
10%–30%
LESS GREENHOUSE GAS EMISSIONS
per household

4,000
FEWER MILES DRIVEN
reduced gas consumption

$4
RETURN FOR EVERY $1 INVESTED IN TRANSIT

42%
PROPERTY VALUES PERFORM BETTER WHEN NEAR TRANSIT

PROVIDES ECONOMIC OPPORTUNITIES

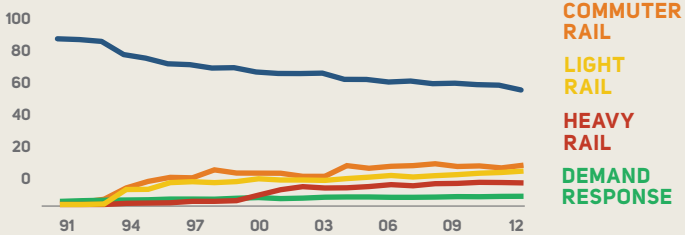


Source: American Public Transportation Association

Passenger Miles by Mode

(percent)

Rail usage has increased, reflecting significant investments in a regional rail network.



Transit Passenger Miles

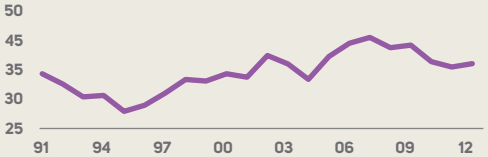
(millions)

Transit use has increased over the last 20 years. In 2012, transit riders took 711 million trips, traveling more than 3.6 billion miles. Growth in passenger miles was driven by a 15% increase in average transit trip length.

Transit Trips

(per capita)

Growth in transit use has not always kept up with population. The number of transit trips per person is about the same as it was 20 years ago.



suitable for the above moderate income category, representing more than 52 percent of the 293,547 above moderate units needed, were built over the same period. A similar trend can be seen in the first two years after the adoption of the fifth cycle RHNA (2013 and 2014), with barely 2,000 units of new construction reporting use of LIHTC while nearly 30,000 single-family units have been built during this time. No new construction using LIHTC was reported in 2014. Although LIHTC has historically been used in about one out of five new multifamily construction, this data suggests that market rate building activity is far stronger than building activity for very low income housholds and that the need for affordable housing continues to increase.

Within the housing elements of their General Plans, each jurisdiction in our region is required to show how it would accommodate its RHNA allocation for the designated period. This is accomplished through a sites and inventory analysis that evaluates zoning and land use policies. SCAG is tasked with providing the regional RHNA allocation, but housing elements are reviewed and approved by the California Department of Housing and Community Development. Since the fifth cycle adoption due date of October 2013, 84 percent of the region's jurisdictions have housing elements in compliance with state housing law. The next RHNA allocation for our region is anticipated to be adopted by SCAG in October 2020, with housing elements due by October 2021.

TABLE 2.1 2012 HQTA

COUNTY	WITHIN HQTA			
	HOUSEHOLDS	%	EMPLOYMENT	%
Imperial	0	-	0	-
Los Angeles	1,552,900	48%	2,357,400	56%
Orange	173,500	17%	392,900	26%
Riverside	3,200	0.50%	24,500	4%
San Bernardino	17,200	3%	39,600	6%
Ventura	6,800	3%	22,400	7%
SCAG	1,753,600	30%	2,836,800	38%

HIGH QUALITY TRANSIT AREAS (HQTAs) AND TRANSIT PRIORITY AREAS (TPAs)

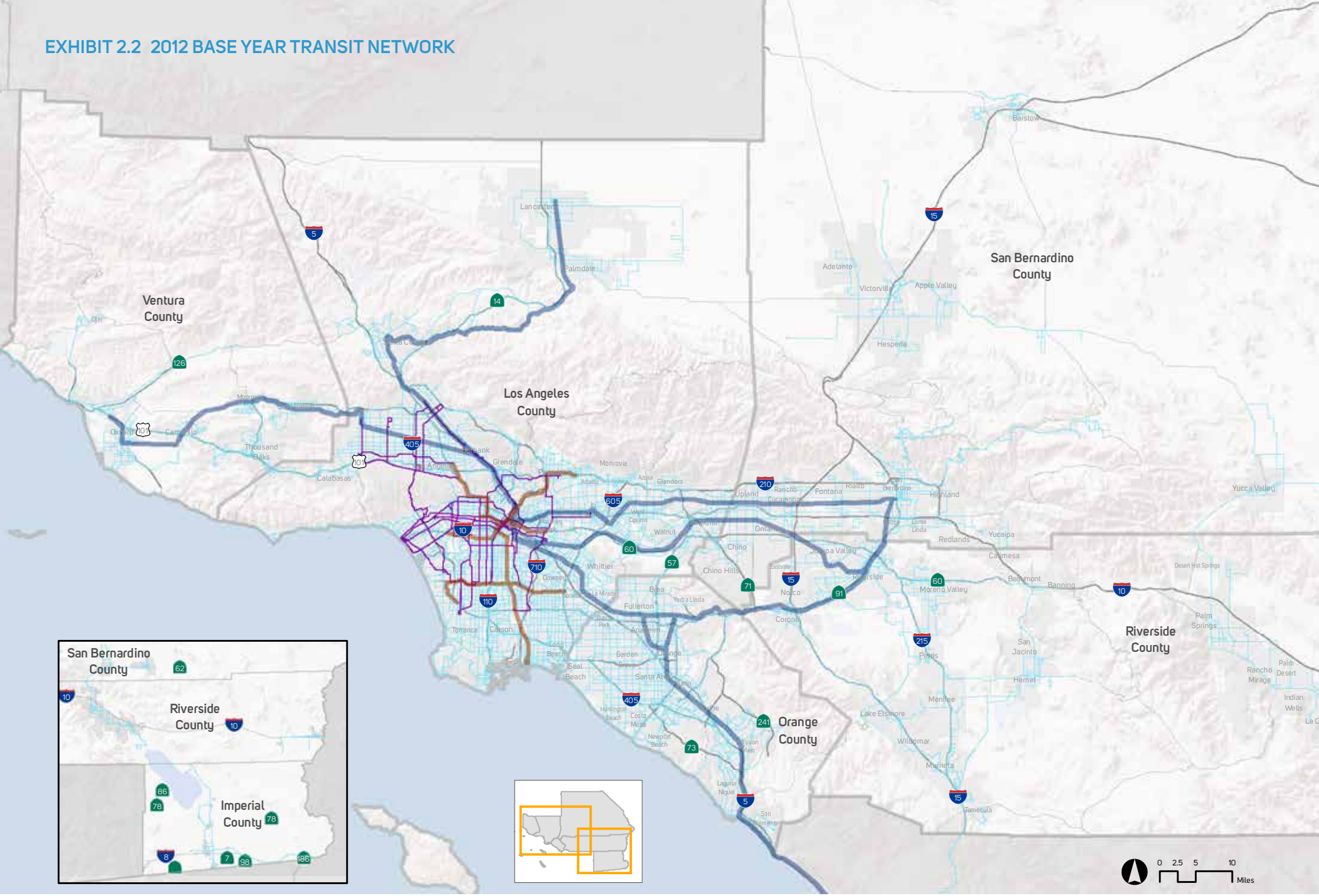
The overall land use pattern detailed in the 2012 RTP/SCS reinforced the idea of focusing new housing and employment within the region's HQTAs. For planning purposes, an HQTA, as we have mentioned, is defined as an area within one-half mile of a well-serviced fixed guideway transit stop, and it includes bus transit corridors where buses pick up passengers every 15 minutes or less during peak commute hours. The 2012 RTP/SCS also identified Transit Priority Areas (TPAs), which are defined as locations where two or more high-frequency transit routes intersect. Currently, more than five million residents in the region live within HQTAs. These HQTAs currently accommodate 2.8 million jobs (see TABLE 2.1).

High density development could also produce high quality housing with consideration of urban design, construction and durability, and result in increased ridership on important public transit investments. Local jurisdictions throughout the region are applying more sophisticated planning practices in the specific plans and zoning codes that govern these areas in order to promote this kind of development. As housing density increases in cities and HQTAs, local governments are investing in pedestrian and bike infrastructure and reducing parking requirements to support people who choose not to have a car or cannot afford one. Local jurisdictions are also creating and retaining affordable housing near transit, helping to increase connectivity to employment opportunities and reducing reliance on automobile ownership.

The positive effects on real estate values, retail sales and property taxes, as well as the social benefits of developing within HQTAs are also well documented.[3] For example, less automobile-dependent settings, like HQTAs, spur volunteerism, social interaction and community engagement with more opportunities for face-to-face contact. Creating active places that are busy throughout the day and evening also improves safety and reduces crime rates within the surrounding neighborhood. Increased retail sales and easy transit accessibility translate into higher business profits, rent, commercial real estate values and government property taxes. Similarly, housing value premiums associated with being near a transit station (usually expressed as being within one-quarter to one-half mile of a station) average 17 percent to 30 percent higher than comparable properties located elsewhere.

[3] Center for Neighborhood Technology. (2013). The New Real Estate Mantra: Location Near Public Transportation. Washington, D.C.

EXHIBIT 2.2 2012 BASE YEAR TRANSIT NETWORK



Bus | Rapid Bus and Bus Rapid Transit | Urban Rail | Commuter Rail

(Source: SCAG)

HQTAs and TPAs are powerful examples of how integrating strategies for land use and transportation can help us achieve our long-term goals for greater mobility, a strong economy and sustainable growth. In the next section of this chapter, we will discuss the state of our overall transportation system today. That will help us set the stage for Chapter 5, where we will review our strategies, programs and projects for our transportation system and explain how we will integrate them with how we use land. Efficient use of our land is the basis for an efficient transportation system.

HOW WE TRAVEL TODAY

TRANSIT

Our regional transit system today is comprised of an extensive network of services provided by dozens of operators. This network includes fixed-route local bus lines, community circulators, express and rapid buses, Bus Rapid Transit (BRT), demand response,[4] light rail transit, heavy rail transit (subway) and commuter rail.[5] The region's providers of transit offer the second largest amount of service in the country, after that of the New York City metropolitan area (see EXHIBIT 2.2).

Transit plays an important role in Southern California's integrated transportation system. It provides an alternative to driving for many and provides mobility to people who do not have cars. The transit network is the region's largest non-automotive passenger transportation mode by trip volume, by a huge degree. Riders of transit took more than eight times as many trips as air travelers in FY2011-12 and nearly 267 times as many trips as passenger rail travelers.

Transit use provides external benefits to the region's transportation system, through investment, reduced traffic congestion and air pollution emissions reductions. The American Public Transportation Association (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.[6] Were this rate to have held constant into FY2011-12, transit spending in the SCAG region would have resulted in the creation or maintenance of roughly 150,000 jobs.

The Texas Transportation Institute (TII), in its annual Urban Mobility Report, estimates traffic congestion delay averted due to the use of the region's public transportation system. In 2011, using transit helped residents of the SCAG region avoid 10 hours of delay per person, and saved the region more than $250 million in averted traffic delay costs.

Each of the region's residents take an average of 39 transit trips each year, at an operating and maintenance cost of $3.46 per trip (this amount increases to roughly $5.05 when both operations and capital expenditures are accounted for). Transit users typically pay 25 percent of the operating and maintenance cost of their travel, with the remaining 75 percent paid for by state and local public subsidies. Most capital expenditures are also funded with public subsidies, including a larger share of federal grants. Despite recent service cuts, the region's total combined capital and operations spending exceeded $3.59 billion in FY2011-12.

The past eight years have been tough economically for Southern California's transit agencies. Although bus service accounted for 82 percent of the region's transit trips in FY2011-12, the agencies that provide it have been hit particularly hard. Many have had to cut service. Total bus service provided by the Los Angeles County Metropolitan Transportation Authority (Metro) has declined by 10 percent, Orange County providers have cut bus service by 11 percent, and Los Angeles County Municipal Operators bus service has fallen by three percent.

These declines in service are tied to the Great Recession, as total ridership and per-capita ridership have stagnated. In FY2011-12, ridership of just under 711 million trips was up 1.7 percent compared with the prior year, but it represented a six percent decline from a pre-recession high of more than 750 million trips. The per-capita trip total of nearly 39 for FY2011-12 represents a loss of seven percent from the pre-recession high of more than 42 per-capita trips. Preliminary data for FY2014-15 show that total ridership and per capita ridership have continued to decline. Total transit trips are expected to fall below 700 million for the first time since FY2003-04.

4 "Demand response" is 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.

5 Commuter rail is discussed separately in more detail, along with intercity passenger rail such as Amtrak and CA High-Speed Train, as part of "Passenger Rail."

6 American Public Transportation Association, 2009, "Job Impacts of Spending on Public Transportation: An Update." White Paper.

Since 1991, transit agencies in the region have provided about 13.22 billion transit trips. In that time, urban rail and commuter rail have grown from 1.3 percent of transit trips to 16.1 percent of trips in 2012. Bus trips have declined from 98.6 percent of trips to about 83 percent. Urban and commuter rail together supply 11.6 percent of all Vehicle Revenue Miles because the per vehicle capacity is much higher than that of buses. Urban and commuter rail services are 20.9 percent of all transit operating expenses in our region.

PASSENGER RAIL

Southern California is served by an ever expanding passenger rail network, including intercity, commuter and freight services, and this network is expanding and improving in terms of capacity, efficiency and safety. Many capital, operational and safety improvements are underway and planned throughout this existing network, including transportation corridors currently not served by rail.

The region's passenger rail network, along with the number of passengers and service levels, has steadily grown since 1990, except for a dip during the Great Recession. In 1990, the only passenger rail service operating in the region was the Pacific Surfliner and Amtrak's long-distance trains such as the Coast Starlight and Southwest Chief. Metrolink began commuter rail service in October 1992, and it continues to expand its network and levels of service. The Pacific Surfliner, which carried 2.7 million passengers in FY2013-14, operates 11 daily round-trips between Los Angeles and San Diego, five round-trips between Los Angeles and Santa Barbara/Goleta, and two round-trips north to San Luis Obispo. The Pacific Surfliner is Amtrak's second busiest corridor, behind the Northeast Corridor between Washington, D.C. and Boston. The line's average speed is 46 miles per hour (mph).

The Southern California Regional Rail Authority (SCRRA), the operator of Metrolink, operates 165 weekday trains on seven lines and the system carried 11.7 million passengers in FY2013-14. Weekend service provides 34 trains on Saturdays and 28 on Sundays. Metrolink operates two round-trip express trains: one round-trip on the San Bernardino Line and one round-trip on the Antelope Valley Line (to Palmdale only). System-wide average speed is 37 mph.

Notable recent efforts include the first Metrolink e-ticketing program rollout in 2016. Also, the LOSSAN Rail Corridor (Los Angeles–San Diego–San Luis Obispo Rail Corridor) received a Cap-and-Trade Transit and Intercity Rail Capital Program grant in the spring of 2015 to re-establish a cooperative fare agreement with local connecting transit agencies for free transfers to and from the Pacific Surfliner. This program had never been fully developed by Caltrans Division of Rail (DOR), and recently it had been discontinued.

These cooperative fare agreements and media efforts include effective marketing across passenger rail markets and transit riders. Metrolink has been successful with its special service trains for both Dodgers' and Angels' games and other special events. These types of services introduce passenger rail to the general public and can lead to new regular customers.

In July 2015, Metrolink started a pilot fare project on the Antelope Valley Line. It included a 25-percent reduction in fares (except for the weekend day pass) and allowed station-to-station travel for just $2.00. Due to the success of this pilot program, on January 1, 2016 Metrolink implemented a $3.00 station-to-station fare system-wide. (The $2.00 station-to-station program was discontinued on the Antelope Valley Line, however the 25 percent fare reduction was extended to June 30, 2016.) Since 2012, Metrolink has offered its successful weekend pass, allowing unlimited travel throughout the entire Metrolink system on both Saturday and Sunday for just $10.00. (The fare has since increased to $10.00 per weekend day.) Monthly pass holders can take unlimited trips on the weekend.

The renaissance of rail travel in our region is exciting. However, significant challenges are keeping our commuter and intercity rail networks from realizing their full potential to help reduce highway congestion, and cut air pollution and lower greenhouse gas emissions. Among these challenges:

More than half of the commuter and intercity rail network operates on one track, some of which is owned by freight railroads that maintain priority for their own operations. Passenger trains are assigned "slots," meaning that they are allowed to move in a particular direction for a fixed time period. This results in the relatively slow average speeds noted above, reducing the incentive for commuters to use the train system (and instead prompting them to commute by car), as well as reducing the number of passenger trains that can serve our region.

One-track operations present other challenges. Even a minor delay can lead to a train losing its slot, thereby causing cascading delays throughout the network and throughout the day. Commuter and intercity rail networks in Chicago and on the East Coast have much higher service frequencies than we do in our region, mainly because they have fewer single-track segments and fewer conflicts with freight railroads. Our region has a large list of rail improvements either in the planning phases or which are ready for construction. These

improvements include adding double-tracking, sidings, station improvements and grade separations to increase speed and service levels. However, there is no dedicated long-term funding for commuter and intercity rail to move these projects forward.

ACTIVE TRANSPORTATION

Our region has made steady progress in encouraging people to embrace active transportation, that is, human-powered transportation such as walking and biking. Across our region today, many people live and work in areas where trips are short enough to be completed by walking or biking. Walking and biking as a share of all trips is more than 18 percent in our most urban areas where there are abundant nearby destinations/land uses, yet still reaches 11 percent in rural areas where land uses are less diverse.[7] There is a strong relationship between land use and travel behavior. Land use characteristics play a key role in determining the conditions for and feasibility of walking and biking in a community, due to the sensitivity of these modes to trip length.

[7] California Department of Transportation (2012). California Household Travel Survey.

HOW WE GET TO WORK

14% CARPOOL

76% DRIVE ALONE

5% TRANSIT *(Bus/Rail)*

5% NON-MOTORIZED *(Walk/Bike)*

Source: SCAG Regional Travel Demand Model

The regional bike network is expanding but remains fragmented. Nearly 500 additional miles of bikeways were built since SCAG's 2012 RTP/SCS, but only 3,919 miles of bikeways exist regionwide, of which 2,888 miles are bike paths/lanes (see EXHIBIT 2.3).

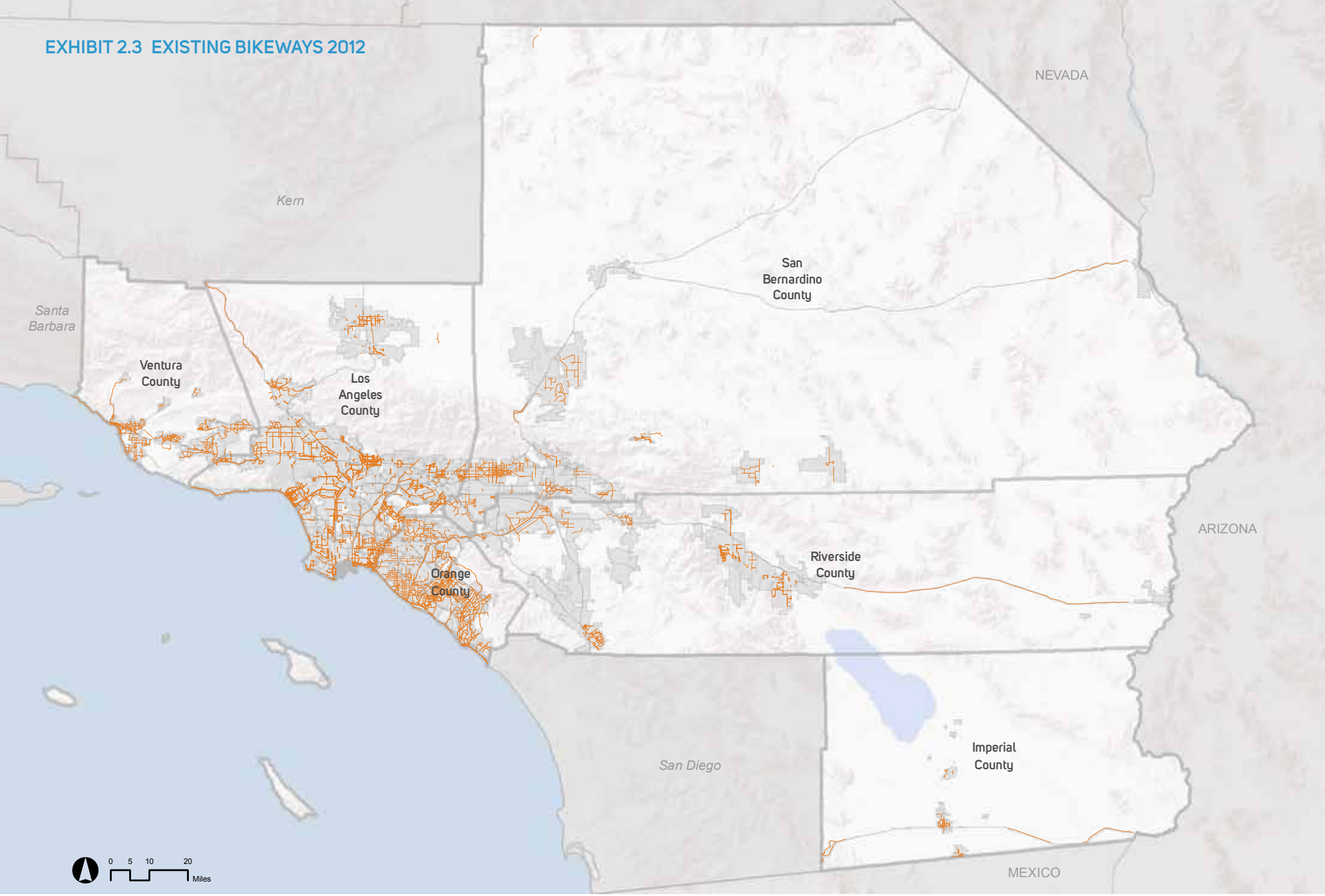
Walking represents nearly 17 percent of all trips in the SCAG region, with the largest share in Los Angeles County. It is how most transit riders reach their station. Most walk trips (83 percent) are less than one half mile; walkers are less likely to travel further because of a lack of pedestrian friendly infrastructure. Routes to stops and stations are often circuitous and/or obstructed, increasing the time it takes to complete a trip by transit and therefore making the choice to use transit less attractive. A study in Los Angeles County found that the most common barriers to station access on foot or bicycle include: long blocks, highway over/underpasses, concerns about safety and security, sidewalk maintenance, legibility/lack of signage and right-of-way constraints leading to limited space for safe walking and biking.[8] Currently, all six counties in the SCAG region are pursuing first/last mile solutions to make transit or border crossing stations more accommodating to active transportation. Their efforts are aided by the Federal Transit Administration (FTA), which has extended the "walk-shed" (the area encircling a destination point) from transit stations from a quarter mile to a half mile, enabling transit funding to be used for larger areas around transit stations.[9] The "bike-shed," as defined through FTA guidance, extends three miles in all directions from a station.

While the number of bicyclists and pedestrians is increasing, so are injuries and fatalities—although not as fast as the growth overall in active transportation. Nevertheless, injuries among those who bike and walk are increasing at a time when the total number of traffic-related injuries and fatalities is dropping regionwide. Improving safety will likely require pursuing innovative strategies (as described in the following sections) to reduce conflicts among bicyclists, pedestrians and automobiles. In 2015, the City of Los Angeles began its Vision Zero Campaign. Vision Zero is a road safety policy that promotes smart behaviors and roadway design that anticipates mistakes, so that collisions do not result in severe injury or death.

[8] Los Angeles County Metropolitan Transportation Authority (2014) First Last Mile Strategic Plan & Planning Guidelines.

[9] Department of Transportation (Friday, August 19, 2011): Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements Under Federal Transit Law. Federal Register Volume 76, Number 161 Pages 52046-52053.

EXHIBIT 2.3 EXISTING BIKEWAYS 2012



Bikeways

(Source: SCAG)

HIGHWAYS AND ARTERIALS

Our region's highways and arterials continue to be the backbone of our overall transportation network, and they are vital to moving people and goods throughout the region. Across the Southern California region, our highway and arterial system covers about 70,000 roadway lane miles and accommodates 66 million trips per day. Our roadways are not only used by automobiles and freight trucks, they are also used for transit and for those who choose to walk, bike and use other forms of active transportation. According to SCAG's Regional Travel Demand Model (RTDM), more than nine out of 10 trips rely either entirely or in part on the highway and arterial system. Based on currently available data, there are 3.6 million person-hours of daily delay and 11.8 minutes of daily delay per capita along our region's highways and local arterials.

Maintaining the operational efficiency of our roadways is crucial if we are to maintain the mobility of our region. Unfortunately, traffic congestion continues to adversely affect our highway and arterial system every day. Although we have made improvements, the increasing travel demands that will come with a growing population in coming years will lead to increased congestion. This traffic congestion will not only make life difficult for commuters, it will also degrade our region's air quality and our overall quality of life. To address congestion and to improve our transportation network's efficiency, the region has been investing in Transportation Systems Management and Transportation Demand Management projects as described in the following sections.

TRANSPORTATION SYSTEMS MANAGEMENT (TSM) AND TRANSPORTATION DEMAND MANAGEMENT (TDM)

For our regional transportation system to operate efficiently and smoothly, operators must manage the system effectively, as well as the demands placed on it. To do so, they implement TSM and TDM strategies.

TSM employs a series of techniques designed to maximize the capacity and efficiency of the existing transportation system and its facilities. One of these techniques deploys Intelligent Transportation Systems (ITS), which will be discussed below. TDM involves a variety of strategies to manage the demand placed on our roadway network and to reduce our dependence on driving alone. These include promoting ridesharing, value pricing,[10] telecommuting or alternative work schedules and alternative modes of travel such as transit, passenger rail and active transportation.

[10] Value pricing is a user fee applied during peak demand periods on congested roadways to improve the reliability and efficiency of the transportation system and provide travelers with greater choices.

The common goals of TSM and TDM are to improve the productivity of our transportation system, reduce traffic congestion, improve air quality and reduce or eliminate the need to construct new and expensive transportation infrastructure.

Transportation Systems Management (TSM)

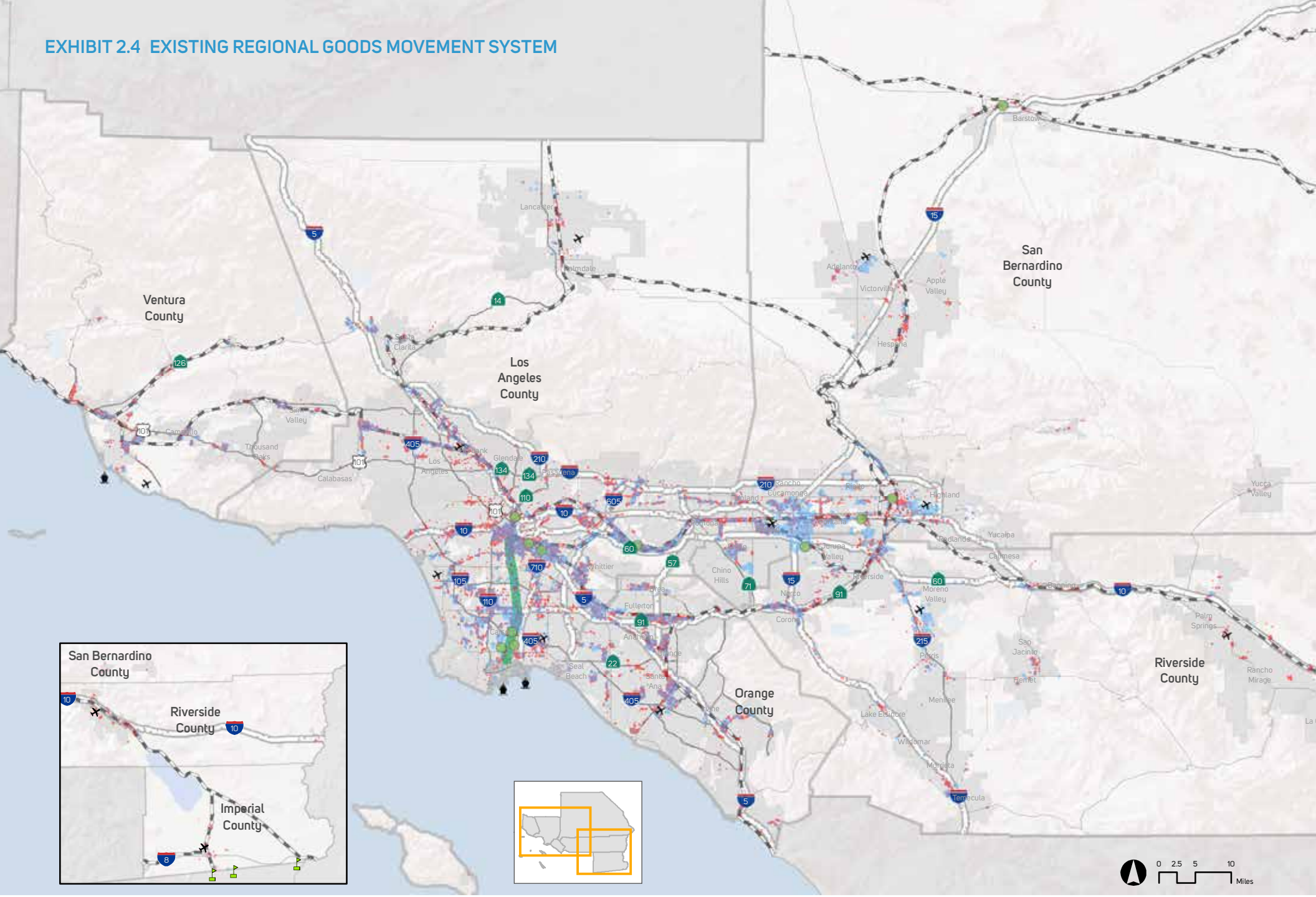
A critical TSM technique is Intelligent Transportation Systems, or ITS, which makes use of advanced detection, communications and computing technologies to improve the safety and efficiency of our surface transportation network. These systems allow system operators and users to better manage and optimize the capacity of the region's transportation system. Data is collected about the status of our highways, traffic signals, transit vehicles, freight vehicles, passenger trains and shared-ride vehicles and is integrated in ways that improve the efficiency of the overall transportation system.

SCAG has a critical role to play in the development and management of ITS in the region. As the region's Metropolitan Planning Organization, SCAG is charged with developing and maintaining the Southern California Regional ITS Architecture. This architecture is the regional planning tool for ensuring a cooperative process to prioritize and deploy ITS technologies and for identifying critical data connections between institutional stakeholders (e.g., connecting two transit operators). This architecture helps the region deploy ITS systems that are truly integrated. Stakeholders are able to share information among many agencies in consistent and compatible formats to achieve improved safety and efficiency. SCAG works closely with the CTCs, local governments and Caltrans Districts to update and maintain the regional architecture and assure the use of required systems, engineering requirements and applicable standards—which is required when federal funds are used on ITS projects.

The Southern California highway system has an extensive ITS system that covers most of the urbanized portion of our region. Loop detectors in the pavement and video cameras provide information on speed and volume, and identify congestion and incidents that are fed to Caltrans/California Highway Patrol (CHP) Transportation Management Centers (TMCs). Arterial ITS systems are in place throughout the region as well. Local arterial systems include advanced signal synchronization capabilities to increase the flow of traffic and also to detect and respond to changes in traffic volume or direction of travel and manage incidents. Like the highway network, these systems include loop and video detection and also rely on wireless data such as that provided by Google.

Most medium- to large-scale, fixed-route and Dial-a-Ride operators in our region have implemented transit ITS components. These include automatic

EXHIBIT 2.4 EXISTING REGIONAL GOODS MOVEMENT SYSTEM



(Source: SCAG, CoStar Realty Information Inc.)

vehicle location (AVL) and transit signal priority (TSP) systems. Automatic vehicle location systems have greatly increased the effectiveness of real-time scheduling information, increasing convenience for transit passengers. TSP gives transit vehicles signal priority to improve passenger throughput and bus speed. The TSP system is an integral part of Metro's Rapid Bus program, which has 20 routes. Santa Monica's Big Blue Bus, Culver City Bus and Torrance Transit are others that employ TSP systems as well. Using a combination of hard-wired loop technology and wireless technology, they reduce travel times by up to 25 percent.

Transportation Demand Management (TDM)

Our region employs an array of TDM strategies to better manage the demand placed on our roadway network by reducing the number of people who drive alone as well as encouraging them to use alternative modes. As a consequence, these strategies have helped reduce air pollution and greenhouse gas emissions. These strategies include promoting carpooling and vanpooling; biking and walking; car sharing and bike sharing; telecommuting; flexible work schedules; and intelligent parking, among other strategies. The region has a long history of investing in a comprehensive High-Occupancy Vehicle (HOV) or carpool lane system, supported by investments in park-and-ride facilities, rideshare matching and vanpooling services. A 2014 national study of employers by the Families and Work Institute and the Society for Human Resource Management showed that employers are becoming more willing to provide employees with flexible work arrangements and more choices in managing work time, without loss of pay. As Baby Boomers continue to retire in increasing numbers and are replaced by younger, more tech-savvy workers, and as employers continue to embrace technology and remote access capabilities, we expect to see increases in the percentage of workers who telecommute or have flexible work schedules.

A significant amount of travel in the region is still by people who choose to drive alone (42 percent of all trips and nearly 76 percent of work trips). So, the challenge of getting individuals to seek alternative modes of travel remains.

GOODS MOVEMENT

Our region's transportation network for moving goods, referred to as our "goods movement" system, relies today on multiple modes of transportation and complex infrastructure. Whether carrying imported goods from the ports to regional distribution centers, supplying materials for local manufacturers, or delivering consumer goods to residents, our goods movement system sustains regional industries and consumer needs every day. This system includes deep-water marine ports, international border crossings, Class I rail lines, interstate highways, state routes and local connector roads, air cargo facilities, intermodal facilities, and distribution and warehousing centers. EXHIBIT 2.4 depicts our region's multimodal goods movement system.

Major Elements of the Goods Movement System:

- **Seaports (Ports of Los Angeles, Long Beach and Hueneme):** Serving as the largest container port complex in the U.S., the Ports of Los Angeles and Long Beach (together called the San Pedro Bay Ports) handled about 117 million metric tons of imports and exports in 2014—for a total value of about $395.7 billion.[11] The Port of Hueneme in Ventura County specializes in the import and export of automobiles, fresh fruit and produce and serves as the primary support facility for the offshore oil industry. In 2014, two-way trade activities through the Port of Hueneme were valued at nearly $9.2 billion and generated $1.1 billion in economic activities in the immediate region.[12]
- **Land Ports:** The international border crossings in Imperial County are busy commercial land ports, and they were responsible for more than $8 billion in imports and $6 billion in exports in 2014. This cross-border commerce was driven by the maquiladora trade, as well as the movement of agricultural products. [13]
- **Air Cargo Facilities:** The region is home to numerous air cargo facilities, including Los Angeles International Airport (LAX) and Ontario International Airport (ONT). Together they handled more than 99 percent of the region's air cargo, valued at more than $96 billion,[14] in 2014.
- **Highways and Local Roads:** Our region has more than 70,000 roadway lane miles.[15] Sections of Interstate 710, Interstate 605, State Route 60 and State Route 91 carry the highest volumes of truck traffic in the region and averaged more than 25,000 trucks per day in 2013. Other major components of the regional highway network also serve significant numbers of trucks. These include Interstates 5, 10, 15 and 210. More than 20,000 trucks per day travel on some sections.

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[11] American Association of Port Authorities and U.S. Trade Online, U.S. Census.
[12] U.S. Trade Online, U.S. Census and Port of Hueneme.
[13] The term maquiladora refers to a manufacturing operation in Mexico. The majority of them are located along the US border and within the Foreign Trade Zones (FTZs) to capitalize on duty-free and tariff-free provisions for assembly and material processing.
[14] U.S. Trade Online, U.S. Census.
[15] Highway Performance Monitoring System, California Department of Transportation, http://www.dot.ca.gov/hq/tsip/hpms/.

FOCUS GOODS MOVEMENT

THE SCAG REGION IS THE LARGEST INTERNATIONAL GATEWAY IN THE U.S.

supported by AIRPORTS, LAND PORTS OF ENTRY, SEAPORTS, RAILWAYS, HIGHWAYS and WAREHOUSE & DISTRIBUTION CENTERS

REGIONAL AIRPORTS HANDLED NEARLY

$96 BILLION

IN INTERNATIONAL AIR CARGO IN 2014

#1 SOUTHERN CALIFORNIA has the **LARGEST CONTAINER PORT COMPLEX** in the UNITED STATES

#9 and has the **NINTH LARGEST CONTAINER PORT COMPLEX** in the WORLD

SOUTHERN CALIFORNIA HAS

3,747 MILES

OF HIGHWAYS

(that is 41% of all the highway road miles in California)

2 CLASS 1 RAILROADS

6 INTERMODAL RAIL YARDS**

** Not including carload and automobile terminals

CLOSE TO **1.2 BILLION SQ. FT.** OF WAREHOUSING & DISTRIBUTION SPACE

CLOSE TO **750 MILLION SQ. FT.** ARE FACILITIES >50K SQ. FT. IN SIZE

(2014)

In 2014, the VALUE OF INTERNATIONAL TRADE that moved through the SCAG region was over

$515 BILLION

includes maritime and cross-border trade and air freight

In 2014, Goods Movement dependent industries generated

2.9 MILLION

HOW CAN WE GROW WITH LESS IMPACT?

$2.6 BILLION

COST OF WASTED LABOR HOURS & FUEL from Truck Congestion on Highways

ANNUAL COST OF AIR POLLUTION in the SCAG region is at least

$14.6 BILLION

371% GROWTH

in VEHICLE HOURS OF DELAY per day at rail-highway grade crossings across the region by 2040

These roads carry a mix of cargo loads, including local, domestic and international. The arterial roadway system also plays a critical role in goods movement, providing first/last mile connections to regional ports, manufacturing facilities, intermodal terminals, warehousing and distribution centers, and retail outlets.

- **Class I Railroads:** Critical to the growth of the region's economy, the Burlington Northern Santa Fe Railway (BNSF) and Union Pacific (UP) carry international and domestic cargo to and from distant parts of the country. The BNSF mainline operates on the Transcontinental Line (and San Bernardino Subdivision). The UP operates on the Coast Line, Saugus Line through Santa Clarita, Alhambra and Los Angeles Subdivisions and Yuma Subdivision to El Paso. Both railroads operate on the Alameda Corridor, which connects directly to the San Pedro Bay Ports. The San Pedro Bay Ports also provide several on-dock rail terminals, along with the six major intermodal terminals operated by the BNSF and UP.
- **Warehouse and Distribution Centers:** The SCAG region is home to one of the largest clusters of logistics activity in North America. In 2014, the region had close to 1.2 billion square feet of facility space for warehousing, distribution, cold storage and truck terminals.[16] Nearly 750 million square feet of this space, in 4,900 buildings, were facilities larger than 50,000 square feet. An estimated ten percent of the occupied warehouse space served port-related uses, while the remaining 90 percent supported domestic shippers.[17] Many of these warehouses are clustered along key goods movement corridors. Port-related warehousing is concentrated in the Gateway Cities subregion, while national and regional distribution facilities tend to be located in the Inland Empire.

Key Goods Movement Functions and Markets

Our region's goods movement system serves a wide range of markets including international, domestic and local trade. Although the international trade market has a significant presence in the region, most freight activities are generated by local businesses moving goods to local customers and supporting national domestic trade. These businesses are sometimes referred to as "goods movement-dependent industries." In 2014, these industries, including manufacturing, wholesale and retail trade, construction, and warehousing, employed nearly three million people throughout the region and contributed $291 billion to the regional gross domestic product (GDP). These industries are anticipated to grow substantially, with manufacturing projected to increase its GDP contribution 130 percent by 2040 and wholesale trade growing 144 percent.[18]

Growth of E-Commerce and Goods Movement

The retail industry provided nearly $30 billion in wages and salaries for the region in 2014.[19] This industry includes a wide variety of subsectors such as motor vehicles, furniture, electronics and appliances, building materials, health and personal care products, clothing, sporting goods, and books. One of the most notable changes in the retail industry is the strong growth in e-commerce sales. E-commerce sales for U.S. retailers totaled $261 billion in 2013, an increase of 13.6 percent from 2012. Total retail sales increased by 3.8 percent in the same period. Within the e-commerce sales merchandise category, clothing and clothing accessories had the largest sales at $40 billion, followed by electronics and appliances at nearly $23 billion. E-commerce provides consumers with a broad range of shopping options, including the ability to compare product prices instantaneously from mobile devices and to opt for home delivery or store pick-up of merchandise. Simultaneously, e-commerce has changed how traditional distribution centers and retail outlets are operating to meet customer demand. Distribution centers in the past delivered bulk size goods to their customers or vendors. Because e-commerce orders tend to be smaller in size (i.e., a single item order as compared to a bulk-case order), many retailers and distribution center/warehouse operators are upgrading their facilities, or developing new facilities, to meet surging e-commerce orders. These changes are also generally characterized by the use of smaller trucks and integrator delivery vans (such as UPS, FedEx and DHL) due to overnight or two-day delivery requirements of e-commerce customers.

Same-Day Delivery Demands

Consumers are increasingly demanding quicker fulfillment of their orders. More recent developments include same-day delivery options. To meet the same-day delivery promise, distribution or fulfillment center proximity to population centers becomes critical. This is exemplified by large-scale e-commerce fulfillment center developments at the periphery of urban population centers. At the same time, small to medium size buildings that are narrow, but with ample loading doors and docks in urban cores, have also been attractive as they provide even quicker access to dense population centers than those in the outskirts. Additionally, retailers are increasingly using products available

[16] CoStar Reality Information, Inc. www.costar.com, based on November 2014 data downloads.
[17] Industrial Warehousing in the SCAG Region Study, SCAG, based on the Avison-Young methodology for port-related and non-port related warehousing needs.
[18] REMI TranSight SCAG, CA, USv3.6.5.
[19] Regional Economic Model Inc. TranSight SCAG, CA, US v3.6.5.

at their stores to fulfill e-commerce orders. Parcel hubs, delivery centers and accessibility to local streets and highways throughout the region will continue to be critical to e-commerce growth.[20 21 22]

[20] E-commerce Evolutions – Element 4: Distribution and Fulfillment Centers, NAIOP, May 2015, http://www.naiop.org/en/E-Library/Business-Trends/Distribution-and-Fulfillment-Centers.aspx.

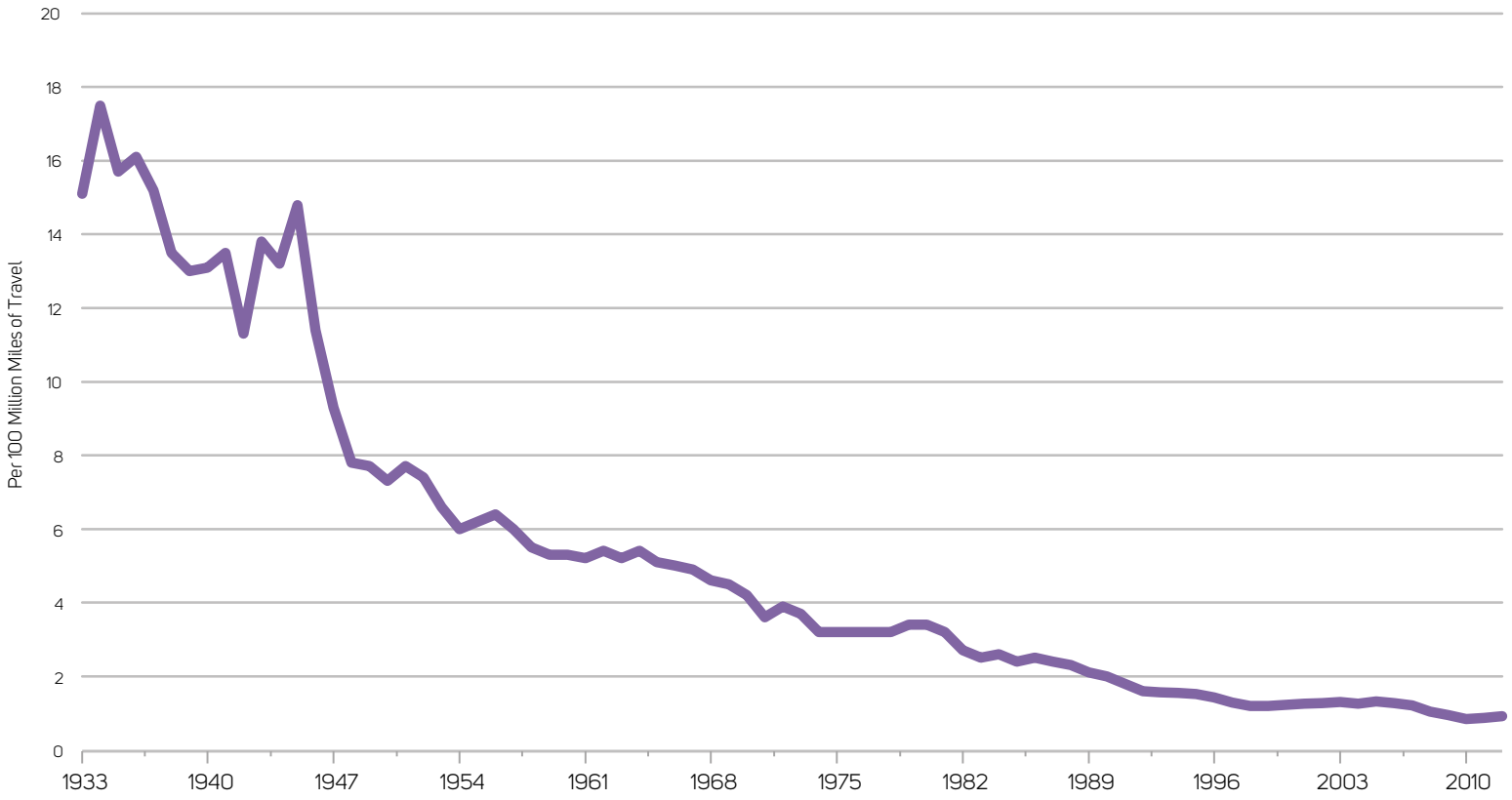
[21] Retailers must overcome logistics lag for same-day delivery, Kris Bjornson, JLL, April 2014, http://www.joneslanglasalleblog.com/investor/retailers-must-overcome-logistics-lag-for-same-day-delivery/.

[22] Same-day delivery is transforming the CRE industry, Kris Bjornson, JLL, June 2015, http://www.joneslanglasalleblog.com/investor/same-day-delivery-is-transforming-the-cre-industry/?utm_source=us-retail-ecom&utm_medium=jll-website&utm_campaign=featured-post.

STATE OF SAFETY

The safety of people and goods is one of the most important considerations in developing, maintaining and operating our diverse transportation system. Throughout California, the rate of fatal and injury collisions on highways has declined dramatically since the California Highway Patrol began keeping such data in the 1930s (see FIGURE 2.2). California has led the nation in roadway safety for many of the past 20 years. Only recently have roadways nationally become as safe as those in California. California's most recently recorded mileage death rate (MDR)—defined as fatalities per 100 million vehicle miles traveled (VMT)—was 0.91, while the MDR within the SCAG region was slightly lower at 0.83. Both MDRs for the state and SCAG region are lower than the national MDR of 1.09.

FIGURE 2.2 MAKING OUR ROADWAYS SAFER: CALIFORNIA MILEAGE DEATH RATE (1933–2012)



Source: https://www.chp.ca.gov/InformationManagementDivisionSite/Documents/2012-sec1.pdf

Our region has an extensive transportation system, with more than 70,000 lane miles of highway and arterial lanes and 3,900 miles of bikeways. As of 2014, the region had 14.9 million licensed drivers and 11.8 million registered vehicles. As of 2012 (the most recent year that data was available), more than 1,300 people died and 121,000 were injured (of which 6,800 were considered severe) in traffic collisions in the region.

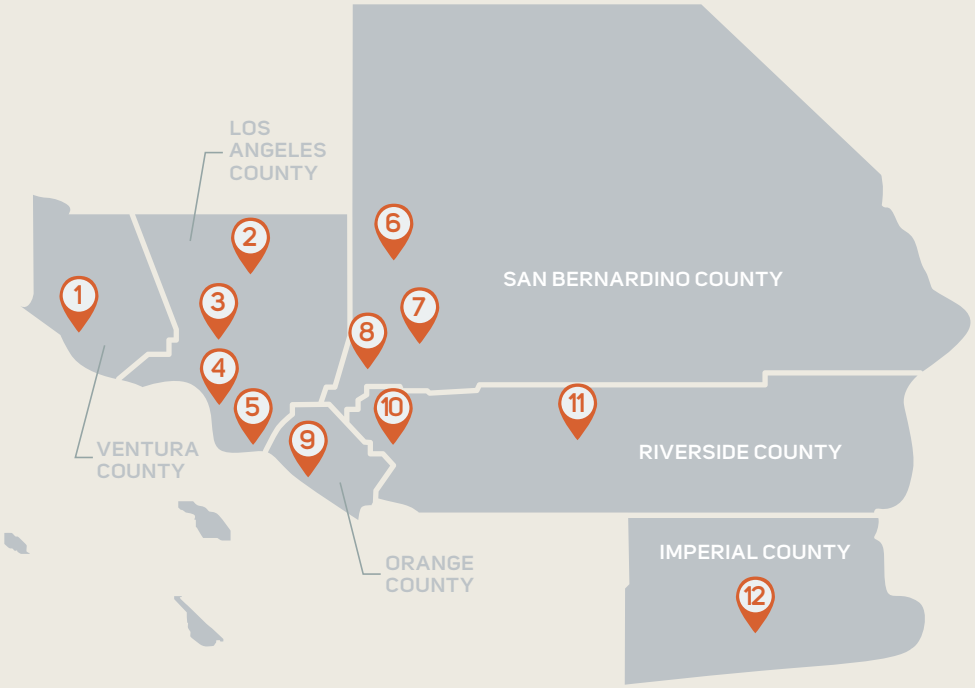
In 2012 President Obama signed into law MAP-21, the Moving Ahead for Progress in the 21st Century Act, which funded surface transportation programs and required states to develop Strategic Highway Safety Plans (SHSPs).[23] The California Department of Transportation (Caltrans) responded by developing an updated SHSP through a participatory process. Throughout 2014, Caltrans conducted an extensive outreach effort to more than 50 agencies and organizations throughout the state—including SCAG—to gather feedback on improving the overall SHSP. This effort led to the release of the final California SHSP in 2015. California's ultimate goal is to reach zero deaths on our highways—a concept known as "Toward Zero Deaths" (TZD). Specifically, California aims to achieve a three percent per year reduction for the number

[23] In December 2015, the Fixing America's Surface Transportation Act, or "FAST Act," was signed into law, which authorizes funding for surface transportation programs. SCAG expects to work with Caltrans to monitor the rulemaking process to implement FAST Act provisions.

Map of Airports

12

EXISTING & PLANNED COMMERCIAL AIRPORTS SERVING THE SCAG REGION



1. Oxnard
2. Palmdale
3. Burbank Bob Hope
4. Los Angeles International
5. Long Beach
6. Southern California Logistics
7. San Bernardino International
8. Ontario International
9. John Wayne
10. March Inland Port
11. Palm Springs International
12. Imperial County

AIRLINE PASSENGER VOLUME

71 MILLION IN 1994

91 MILLION IN 2014

and rate of fatalities and a 1.5 percent per year reduction for the number and rate of severe injuries. Although the SHSP and previous California SHSPs set various actions that state agencies can take to reduce fatalities, there are complementary strategies that local governments can pursue, such as Vision Zero initiatives. For additional details regarding strategies, please see the Safety &Security Appendix.

As we continue to work to improve safety for motorists, we also must tackle the alarming fatality rates of those who use other modes of transportation. Safety is a priority for all modes of transportation, and improving safety for people who walk and bike is critical. Based on currently available data, about 27 percent of all traffic-related fatalities in our region involved pedestrians and five percent of traffic-related fatalities involved bicyclists, according to data from the Statewide Integrated Traffic Records System (SWITRS).

AVIATION AND GROUND ACCESS

The SCAG region is one of the busiest and most diverse commercial aviation regions in the world. In 2014, more than 60 airlines offered scheduled service to one or more of our region's airports, providing more than 1,200 daily commercial departures—one every 70 seconds. These departing flights travel all over the United States and to every corner of the globe; a total of 169 destinations in 37 countries had non-stop service from our region in 2014. Our airports also play a critical role in the region's goods movement network, and they impact the operations of our ground transportation network as well. The passengers arriving at or departing from our airports generate more than 200,000 daily trips on our region's ground transportation system.

Passenger and cargo air travel in the region is supported by a multiple airport system that spans six counties. There are seven commercial airports with scheduled passenger service, five additional facilities with the infrastructure to accommodate scheduled service, seven active military air fields and more than forty general aviation airports. Worldwide, few other regions have as many commercial airports within a comparable geographic area, making Southern California one of the world's most complex aviation systems.

In 2014, the airports in our region handled more than 1.5 million aircraft operations (take-offs and landings), nearly 800,000 of which were commercial operations. In the face of this huge number of air travelers and aircraft, our airports work efficiently. Flights to our region arrive on schedule more than 80 percent of the time. Thanks to favorable weather conditions, lengthy tarmac delays that occur in other regions are virtually unheard of here. The size of the regional market for air travel and the absence of a single dominant air carrier in the region result in healthy competition among airlines, so air travelers enjoy some of the lowest average airfares in the country.

Air travel is an important contributor to the region's economic activity. Nearly half of the air travel in the region consists of visitors from other parts of the country and the world traveling here to conduct business, enjoy a vacation or visit friends and relatives. About one-third of air travel to the region is business related. Therefore, any passenger who arrives at or departs from an airport in our region is good for the region as a whole. Spending by passengers who used our airports to visit the region in 2012 contributed nearly $27.4 billion to the regional economy. The money spent by visitors on meals, lodging, entertainment, transportation and other purchases supported nearly 275,000 jobs.

As with other modes of transportation, the demand for air travel was impacted heavily by the recession that began in 2007. In 2014, the airports in our region served 91.2 million total passengers, surpassing the previous peaks of 89.4 million in 2007 and 88.7 million in 2000.

The demand for air cargo was even more sharply impacted by the recessions of 2001 and 2007. The 2.4 million metric tons of cargo transported through the airports in our region in 2014 remained ten percent below the pre-recession peak of 2.7 million metric tons in each year from 2004–2006 and five percent below year 2000 levels.

In addition to its commercial airports, the SCAG region is also home to a large general aviation (GA) system. Included in this segment are airports serving non-commercial corporate jets, single engine planes, helicopters, emergency and firefighting operations, and flight training activity. General aviation airport facilities also act as relievers to commercial airports and provide diversionary locations for commercial planes that require emergency landings.

There are more than 40 general aviation airports in the SCAG region, and they are as diverse in size and market area as the commercial facilities. Van Nuys Airport (VNY), the second busiest general aviation facility in the United States, serves several important functions for the region, including serving as the base for many corporate jets. As of May 2015, Van Nuys Airport began offering U.S. Customs and Border Protection services for international general aviation flights to benefit business travelers and reduce airspace congestion.

CONCLUSION

Today we face numerous challenges on the road toward greater mobility, a stronger economy and sustainable growth that maintains a high quality of life regionwide. In the Chapter 3, we'll review some of these challenges.

OUR PROGRESS SINCE 2012

THE 2012 RTP/SCS WAS THE FIRST REGIONAL PLAN THAT SCAG DEVELOPED WITH A SUSTAINABLE COMMUNITIES STRATEGY, a new state requirement following the passage of SB 375, the Sustainable Communities and Climate Protection Act of 2008. The legislation required that land use and transportation planning be integrated to achieve its prescribed greenhouse gas reduction targets and air quality requirements. At its core, the 2012 RTP/SCS envisioned a future in which an abundance of safe and efficient transportation choices provide ready access to jobs, education and healthcare—and the region's economy, public health and overall quality of life are strong. Since 2012, the region has made considerable progress. Here are some highlights:

TRANSIT

Transit service continues to expand throughout the region and the level of service has exceeded pre-recessionary levels—mainly due to a growth in rail service. Significant progress has been made toward completing capital projects for transit, including the Metro Orange Line Extension and the Metro Expo Line. Meanwhile, five major Metro Rail projects are now under construction in Los Angeles County.

PASSENGER RAIL

Passenger rail is expanding and improving service on several fronts. The Amtrak Pacific Surfliner is now being managed locally by the Los Angeles-San Diego-San Luis Obispo (LOSSAN) Rail Corridor Agency; Riverside County Transportation Commission (RCTC) completed the Perris Valley Line in early 2016; Metrolink became the first commuter railroad in the nation to implement Positive Train Control and purchase fuel-efficient, low-emission Tier IV locomotives; and the California High-Speed Train is under construction in the Central Valley, and planning and environmental work is underway in our region to the Los Angeles/Anaheim Phase One terminus. Several other capital projects are underway or have been completed, including the Anaheim Regional Intermodal Transportation Center (ARTIC) and the Burbank Bob Hope Airport Regional Intermodal Transportation Center, among others.

HIGHWAYS

The expansion of highways has slowed considerably over the last decade because of land, financial and environmental constraints. Still, several projects have been completed since 2012 to improve access and close critical gaps and congestion chokepoints in the regional network. These include the Interstate 10 westbound widening in Redlands and Yucaipa, the Interstate 215 Bi-County HOV Project in Riverside and San Bernardino Counties, and a portion of the Interstate 5 South Corridor Project in Los Angeles County (between North Fork Coyote Creek to Marquardt Avenue), among others.

REGIONAL HIGH-OCCUPANCY VEHICLE (HOV) AND EXPRESS LANE NETWORK

The demands on our region's highways continue to exceed available capacity during peak periods, but several projects to close HOV gaps have been completed. The result has been 39 more lanes miles of regional HOV lanes on Interstates 5, 405, 10, 215 and 605, on State Routes 57 and 91 and on the West County Connector Project (direct HOV connection between Interstate 405, Interstate 605 and State Route 22) within Orange County. The region is also developing a regional express lane network. Among the milestones: a one-year demonstration of express lanes in Los Angeles County along Interstate 10 and Interstate 110 was made permanent in 2014; and construction has begun on express lanes on State Route 91 extending eastward to Interstate 15 in Riverside County.

ACTIVE TRANSPORTATION

Our region is making steady progress in encouraging more people to embrace active transportation and more than $650 million in Active Transportation Program investments are underway. Nearly 38 percent of all trips are less than three miles, which is convenient for walking or biking. As a percentage share of all trips, bicycling has increased more than 70 percent since 2007 to 1.12 percent. More than 500 miles of new bikeways have been constructed in the region and safety and encouragement programs are helping people choose walking and biking as options.

GOODS MOVEMENT

The region continues to make substantial progress toward completing several major capital initiatives to support freight transportation and reducing harmful emissions generated by goods movement sources. Progress since 2012 has included implementation of the San Pedro Bay Ports Clean Air Action Program (CAAP), reducing diesel particulate matter by 82 percent, nitrogen oxide by 54 percent and sulfur dioxide by 90 percent; and the San Pedro Bay Ports Clean Truck Program has led to an 80 percent reduction in port truck emissions. The region has also shown progress in advanced technology for goods movement, including a one-mile Overhead Catenary System (OCS) in the City of Carson. Construction of the Gerald Desmond Bridge has begun. Seventeen out of 71 planned grade separation projects throughout the region have been completed, and another 21 should be completed in 2016. Double tracking of the Union Pacific (UP) Alhambra Subdivision has been initiated. The Colton Crossing, which physically separated two Class I railroads with an elevated 1.4-mile-long overpass that lifts UP trains traveling east-west, was completed in August 2013.

SUSTAINABILITY IMPLEMENTATION

Since 2012, SCAG's Sustainability Planning Grant Program has funded 70 planning projects (totaling $10 million) to help local jurisdictions link local land use plans with 2012 RTP/SCS goals. Local jurisdictions have updated outmoded General Plans and zoning codes; completed specific plans for town centers and Transit Oriented Development (TOD); implemented sustainability policies; and adopted municipal climate action plans. Thirty of the 191 cities and two of the six counties in the SCAG region report having updated their General Plans since 2012, and another 42 cities have General Plan updates pending. Fifty-four percent of the cities reporting adopted or pending General Plan updates include planning for Transit Oriented Development (TOD), 55 percent plan to concentrate key destinations, and 76 percent include policies encouraging infill development. Of the counties reporting updates or pending updates to their General Plans, 75 percent include TOD elements, 100 percent encourage infill development, 75 percent promote concentrated destinations, and 75 percent feature policies to address complete communities. To protect water quality, 91 percent of cities have adopted water-related policies and 85 percent have adopted measures to address water quality. To conserve energy, 86 percent of cities have implemented community energy efficiency policies, with 80 percent of those cities implementing municipal energy efficiency policies and 76 percent implementing renewable energy policies. Of the region's 191 cities, 189 have completed sustainability components, with 184 cities implementing at least ten or more sustainability policies or programs and ten cities implementing 20 or more sustainability policies or programs. This last group includes Pasadena, Pomona and Santa Monica.

AFFORDABLE HOUSING

The state is offering new opportunities to help regions promote affordable housing. In spring 2015, California's Affordable Housing Sustainable Communities (AHSC) program awarded its first round of funding to applicants after a competitive grant process. Of $122 million available statewide, $27.5 million was awarded to ten projects in the SCAG region. Eight-hundred forty-two affordable units, including 294 units designated for households with an income of 30 percent or less of the area median income, will be produced with this funding. Meanwhile, Senate Bill 628 (Beall) and Assembly Bill 2 (Alejo), provide jurisdictions with an opportunity to establish a funding source to develop affordable housing and supportive infrastructure and amenities.

PUBLIC HEALTH

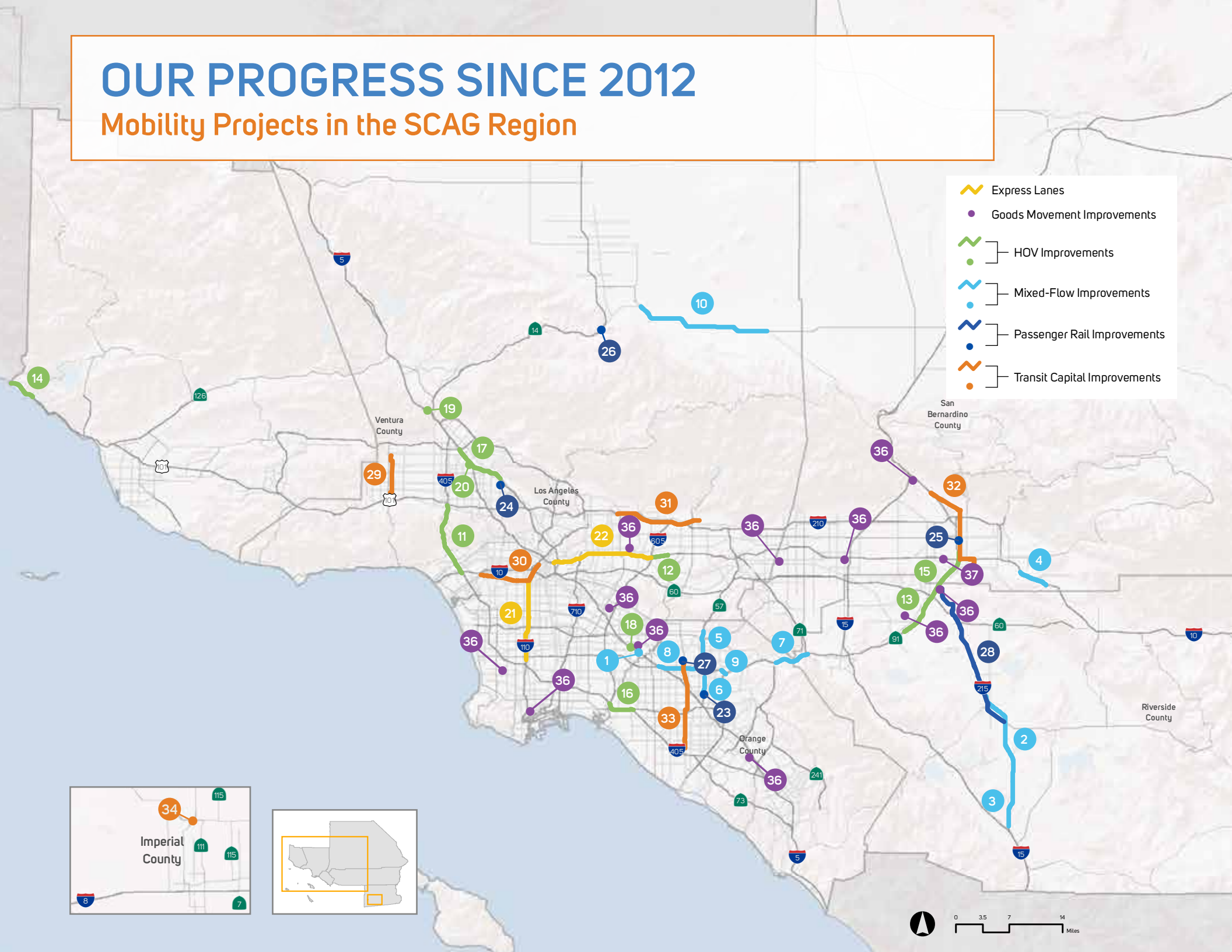
The SCAG region has several ongoing efforts to promote public health. The Los Angeles County Departments of Public Health and the City of Los Angeles Planning Department are developing a Health Atlas that highlights health disparities among neighborhoods. In Riverside County, the Healthy Riverside County Initiative has formed a Healthy City Network to continue to successfully work with the county's 28 cities to enact Healthy City Resolutions and Health Elements into their General Plans. The County of San Bernardino has recently completed the Community Vital Signs Initiative, which envisions a "county where a commitment to optimizing health and wellness is embedded in all decisions by residents, organizations and government."

ENVIRONMENTAL JUSTICE

Since the adoption of the 2012 RTP/SCS, social equity and environmental justice have become increasingly significant priorities in regional plans. For example, plans to promote active transportation, improve public health, increase access to transit, preserve open space, cut air pollution and more are all evaluated for how well the benefits of these efforts are distributed among all demographic groups. The State of California's Environmental Protection Agency (Cal/EPA) developed a new tool, CalEnviroScreen, which helps to identify areas in the state that have higher levels of environmental vulnerability due to historical rates of toxic exposure and certain social factors. Based on this tool, much of the region can stand to benefit from Cap-and-Trade grants that give priority to communities that are disproportionately impacted.

OUR PROGRESS SINCE 2012

Mobility Projects in the SCAG Region



1 **I-5 South Corridor**
One mixed-flow lane on I-5 from OC line to I-605 (currently in construction, however portion between North Fork Coyote Creek to Marquardt Avenue is complete).

2 **I-215 Central**
One mixed-flow lane in each direction between Scott Road and Nuevo Road.

3 **I-215 South**
One mixed-flow lane in each direction between Murrieta Hot Springs Road and Scott Road.

4 **I-10 Widening**
One westbound mixed flow lane on I-10 between Live Oak Canyon Road in Yucaipa and Ford Street in Redlands.

5 **State Route 57 Widening (Northern Segment)**
One northbound mixed-flow lane on SR-57 between Orangethorpe Avenue and Lambert Road.

6 **State Route 57 Widening (Southern Segment)**
One northbound mixed-flow lane on SR-57 between Katella Avenue and Lincoln Avenue.

7 **SR-91 Lane Addition (Eastern Segment)**
One mixed-flow lane on SR-91 between SR-241 and SR-71.

8 **SR-91 Lane Addition (Western Segment)**
One westbound mixed-flow lane on SR-91 between SR-57 and I-5.

9 **SR-91 Lane Extension and Reconstruction**
Addition of a Tustin Avenue exit bypass lane, reconstructing the auxiliary lane and modifying the number one and two lanes of the connector to serve as two general purpose lanes that merge into one general purpose lane just west of Tustin Avenue off- ramp.

10 **SR-138 Corridor Improvements**
Lane widening on SR-138 between Avenue T and SR-18.

11 **I-405 Sepulveda Pass Improvements**
Addition of northbound HOV lane on I-405 between I-10 and US-101.

12 **I-10 HOV Lane (Phase I)**
Addition of HOV lane on I-10 between I-605 and Puente Avenue as permanent facility.

13 **SR-91 HOV Lane**
Addition of HOV lane on SR-91 from Adams Street to SR-60/I-215 Interchange.

14 **US-101 HOV Lane**
Addition of HOV lane on US-101 from Mobil Pier Road to Casitas Pass Road.

15 **I-215 Bi-County HOV Gap Closure**
Addition of HOV lane on I-215 from Orange Show Road to SR-91/SR-60 Interchange.

16 **West County Connector**
Direct HOV connector between I-405/I-605/SR-22.

17 **I-5 HOV Lane**
Addition of HOV lane on I-5 from Hollywood Way to SR-118.

18 **I-5 South Corridor**
Addition of HOV lane on I-5 from OC line to I-605 (currently in construction, however portion between North Fork Coyote Creek to Marquardt Avenue is complete).

19 **I-5/SR-14 HOV Connector**
Addition of HOV connector between I-5 and SR-14.

20 **SR-170/I-5 HOV Connector**
Addition of HOV connector between SR-170 and I-5.

21 **I-110 Express Lanes**
Conversion of the I-110 Harbor Transitway HOV lanes (Harbor Gateway Transit Center to Adams Blvd.) to permanent Express Lanes.

22 **I-10 Express Lanes**
Conversion of the I-10 El Monte Busway HOV lanes (I-605 to Alameda St.) to permanent Express Lanes.

23 **Anaheim Regional Intermodal Transportation Center (ARTIC)**
An Intermodal transportation center in Orange County serving Orange County Transportation Authority (OCTA) buses and various intercity buses, as well as Metrolink and the Amtrak Pacific Surfliner.

24 **Burbank Bob Hope Airport Regional Intermodal Transportation Center**
A multimodal transportation center which includes a consolidated rental car center, bike storage and a bus transit center. A pedestrian bridge to the existing Amtrak and Metrolink station is in the planning stage.

25 **Downtown San Bernardino Transit Center and Metrolink Extension**
One-mile Metrolink extension to downtown San Bernardino, from the previous terminus at the Santa Fe Depot. This multimodal center serves Metrolink, sbX (bus rapid transit), the future Redlands Rail and local Omnitrans bus lines.

26 **Vincent Grade/Acton Siding and Platform**
Adds significant capacity to the northern portion of the Antelope Valley Line, which is mostly single track.

27 **Fullerton Metrolink Station Parking Structure**
Construction of a parking structure providing an additional 814 parking spaces serving Metrolink and OCTA patrons.

28 **Metrolink Perris Valley Line**
A 24-mile extension of existing Metrolink service from downtown Riverside to south Perris, with four new stations constructed at Riverside Hunter Park, Moreno Valley/March Field, Downtown Perris and South Perris.

29 **Metro Orange Line Extension**
A four-mile northward extension of the Metro Orange Line from Canoga Station to the Chatsworth Station.

30 **Metro Exposition Line**
An 8.6 mile light rail corridor connecting Downtown LA and Culver City, including ten new light rail stations.

31 **Metro Gold Line Foothill Extension Phase 2A**
An 11.5-mile light rail extension between Pasadena and Azusa serving six new stations.

32 **Omnitrans E Street sbX**
A 16-mile bus rapid transit project including 6-miles of dedicated bus lanes on E Street, providing service between California State University San Bernardino and the City of Loma Linda.

33 **OCTA Bravo! Route 543**
A new 12-mile limited-stop bus service along Harbor Boulevard, from the Fullerton Transportation Center through the cities of Anaheim, Garden Grove, Santa Ana and terminating at MacArthur Boulevard in Costa Mesa.

34 **The Brawley Transit Transfer Center**
Transit transfer station in Imperial County serving various Imperial Valley Transit routes including the new Gold Line circulator shuttle.

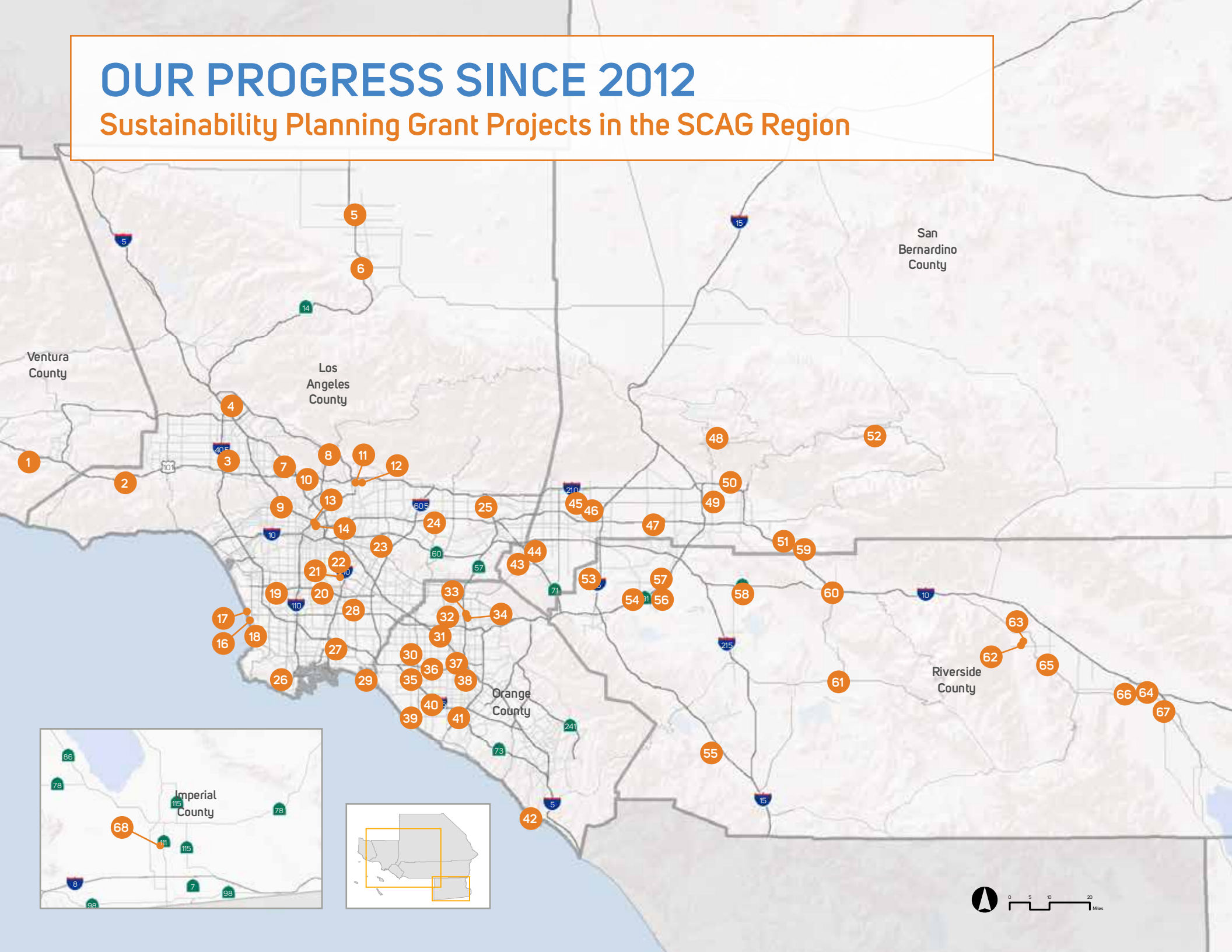
35 **SunLine Transit Administrative Facility**
New SunLine Transit administrative building in Coachella Valley.

36 **Grade Separations**
Various grade separation improvements throughout the region.

37 **Colton Crossing**
A rail to rail grade separation project that physically separated two Class I mainline rail tracks with an elevated 1.4 mile-long overpass that lifts UP trains traveling east-west. This project removed the chokepoint that existed where the Burlington Northern Santa Fe (BNSF) mainline crossed UP tracks in Colton.

OUR PROGRESS SINCE 2012

Sustainability Planning Grant Projects in the SCAG Region



VENTURA COUNTY

1. Ventura County Connecting Newbury Park Multi-Use Pathway Plan

LOS ANGELES COUNTY

2. Las Virgenes-Malibu Council of Governments Multi-Jurisdictional Regional Bicycle Plan
3. Los Angeles Van Nuys & Boyle Heights Modified Parking Requirements
4. Los Angeles Northeast San Fernando Sustainability & Prosperity Strategy
5. Lancaster Complete Streets Master Plan
6. Palmdale Avenue Q Feasibility Study
7. Burbank Mixed-Use Development Standards
8. La Cañada Flintridge Climate Action Plan
9. Los Angeles Hollywood Central Park
10. Glendale Space 134
11. Pasadena Form-Based Street Design Guidelines
12. Pasadena GHG Emission Reduction Evaluation Protocol
13. Los Angeles CEQA Streamlining Assessment
14. Los Angeles Park 101 District
15. Los Angeles Bicycle Plan Performance Evaluation
16. Hermosa Beach Carbon Neutral Plan
17. South Bay Bicycle Coalition Mini-Corral Plan
18. South Bay COG Neighborhood-Oriented Development Graphics
19. Hawthorne Crenshaw Station Area Active Transportation Plan
20. Lynwood Safe and Healthy Community Element
21. South Gate Gateway District/Eco Rapid Transit Station Specific Plan
22. Bell General Plan Update
23. Pico Rivera Kruse Rd. Open Space Study
24. West Covina Downtown Central Business District
25. San Dimas Downtown Specific Plan
26. Rancho Palos Verdes/Los Angeles Western Ave. Corridor Design Implementation Guidellines
27. Long Beach Willow Springs Wetland Habitat Creation Plan
28. Paramount/Bellflower Regional Bicycle Connectivity - West Santa Ana Branch Corridor

ORANGE COUNTY

29. Seal Beach Climate Action Plan
30. Stanton Green Planning Academy
31. Anaheim Bicycle Master Plan Update
32. Fullerton East Wilshire Avenue Bicycle Boulevard
33. Orange County Parks OC Bicycle Loop
34. Placentia General Plan/Sustainability Element & Development Code
35. Westminster General Plan Update - Circulation Element
36. Garden Grove Re:IMAGINE Pedals & Feet
37. Orange County "From Orange to Green" Zoning Code Update
38. Santa Ana Complete Streets Plan
39. Huntington Beach Neighborhood Electric Vehicle Plan
40. Fountain Valley Euclid/I-405 Overlay Zone
41. Costa Mesa Implementation Plan for Multi-Purpose Trails
42. Dana Point General Plan Update

SAN BERNARDINO COUNTY

43. Chino Hills Climate Action Plan and Implementation Strategy
44. Chino Bicycle & Pedestrian Master Plan
45. Rancho Cucamonga Healthy RC Sustainability Action Plan
46. Rancho Cucamonga Metrolink Station and TOD Feasibility Report
47. San Bernardino Bloomington Area Valley Blvd. Specific Plan Health & Wellness Element
48. SANBAG Climate Action Plan Implementation Tools
49. SANBAG Countywide Bicycle Route Mobile Application
50. SANBAG Countywide Complete Streets Strategy and Safe Routes to School Study
51. Yucaipa College Village/Greater Dunlap Neighborhood Sustainable Community
52. Big Bear Lake Rathbun Corridor Sustainability Plan

RIVERSIDE COUNTY

53. Eastvale Bicycle & Pedestrian Master Plan
54. WRCOG Public Health: Implementing the Sustainability Framework
55. WRCOG Land Use, Transportation and Water Quality Planning Framework
56. WRCOG Climate Action Plan Implementation
57. Riverside Restorative Growthprint
58. Moreno Valley Nason St. Corridor Plan
59. Calimesa Wildwood & Calimesa Creek Trail Master Plan
60. Beaumont Climate Action Plan
61. Hemet Downtown Specific Plan
62. Palm Springs Urban Forestry Initiative
63. Palm Springs Sustainablility Master Plan Update
64. Indio General Plan Sustainability & Mobility Elements
65. Cathedral City General Plan Update - Sustainability
66. CVAG CV Link Health Impact Assessment
67. Coachella La Plaza East Urban Development Plan

IMPERIAL COUNTY

68. Imperial County Transportation Commission Safe Routes to School Plan

03

CHAPTER 3 HIGHLIGHTS

RECESSION, RECOVERY AND CURRENT ECONOMIC CHALLENGES 49

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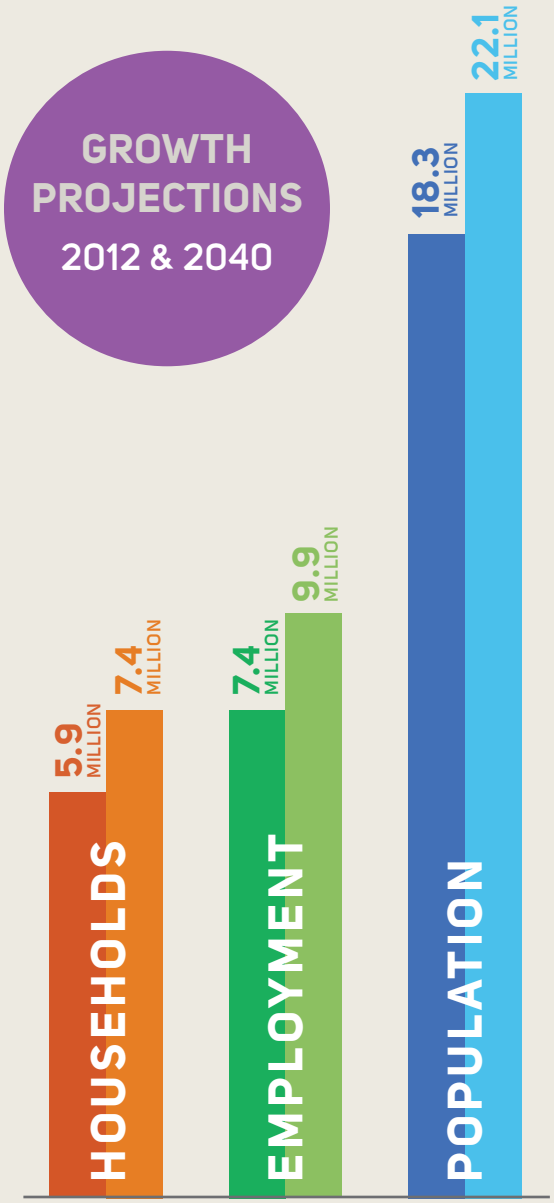
CHALLENGES IN A CHANGING REGION

The challenges facing our region are formidable and require that we strategically plan now. This chapter explores some of our more pressing challenges as we head toward 2040.

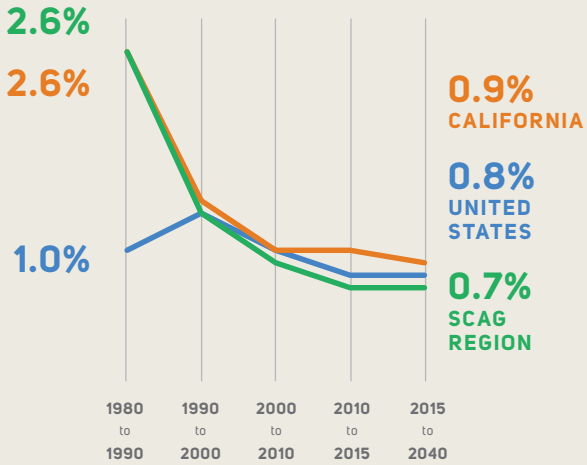
FOCUS DEMOGRAPHICS

GROWTH PROJECTIONS 2012 & 2040



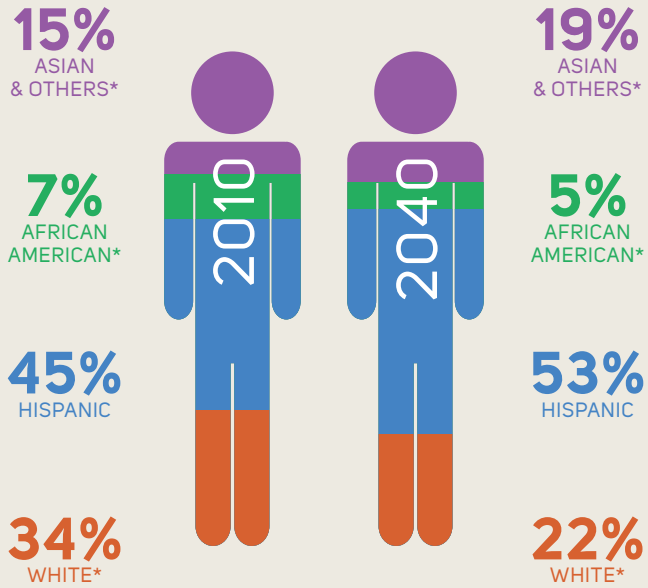
Source: CA DOF, CA EDD, SCAG

Average Annual Population Growth Rate



Source: US Census Bureau, CA DOF, SCAG

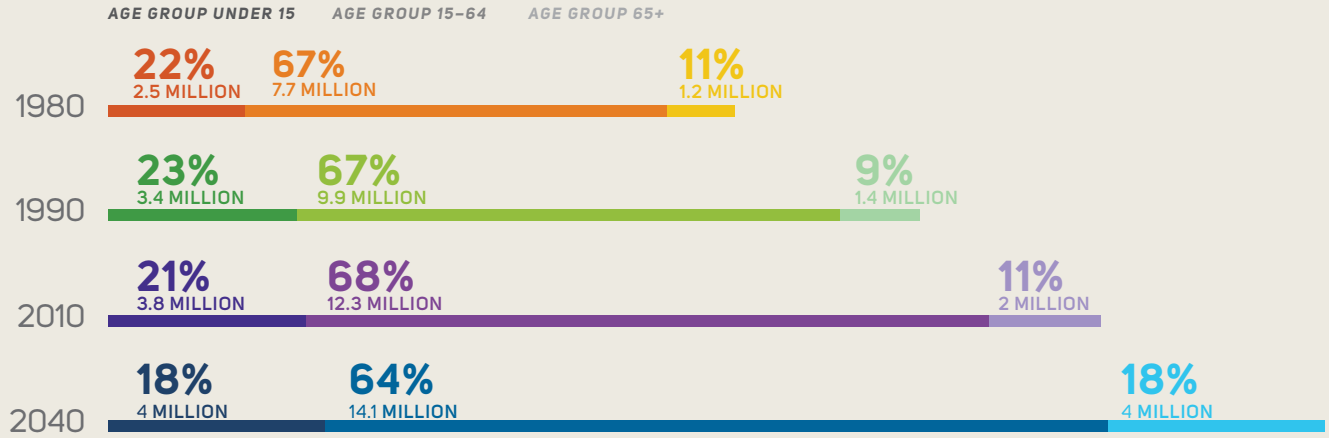
Changes in Ethnic Composition of Population



Due to rounding total may not be 100 percent

* Non-Hispanic | Source: US Census Bureau, SCAG

More Baby Boomers Will Age & Retire



Source: US Census Bureau, SCAG

RECESSION, RECOVERY AND CURRENT ECONOMIC CHALLENGES

The Great Recession, which lasted from December 2007 through June 2009, caused massive job losses and had a devastating impact on our region's economic well-being and population growth. Now that the recession is behind us and our region has experienced a decline in unemployment and housing foreclosures, challenges still remain. Though the region's employment levels are now where they were in 2007, our population continues to grow slowly. Also, the region's median household income (adjusted for inflation) has declined as wages have stagnated for a larger population base. This is because of not only the lack of high income jobs for the median household, but the inability to access higher paying jobs that are available but require higher education and/or technical skills. An increase in the number of low-paying jobs, and the resulting lower income, has contributed to more people slipping into poverty.

The health of Southern California's economy depends on the well-being of businesses and households, and a strong and efficient regional transportation system can go a long way in helping businesses and households succeed. An efficient transportation system can lead to an increase in productivity, personal income and ultimately public tax revenues. Businesses depend on a reliable transportation network to create products and services that reach their customers at a reasonable cost. Households depend on an integrated, accessible and dependable transportation network to provide reliable access to education, jobs, shopping and recreational activities. A sustainable, time-efficient and cost-effective transportation system can help neighborhood businesses compete more effectively with those in neighboring jurisdictions. Relieving congestion contributes greatly to future employment growth. For our region to remain a competitor in the global economy, SCAG must continue to invest strategically in transportation infrastructure, while ensuring that it obtains the maximum return on those investments.

CURRENT DEMOGRAPHIC TRENDS

The six counties that comprise our region have experienced significant demographic changes and they can expect even more changes over the next 25 years. The overall population will continue to grow more slowly than in the past, and it will also change in terms of its age distribution and racial and ethnic breakdown. Where people choose to live will also change. More people in our region will increase the demands on our already strained transportation system, as well as on available land for development.

According to the California Department of Finance, our region is now home to 18.9 million people, or about 5.9 percent of the U.S. population and 48.3 percent of California's population. The region is the second-largest metropolitan area in the country, after the New York metropolitan area. If it were a state, our region would rank fifth in the U.S. in terms of the size of its population, just behind New York and ahead of Illinois.

By 2040, the region's population is expected to grow by more than 20 percent to 22 million people—an increase of 3.8 million people. Importantly, we expect the region to grow differently than in the past. Before 1990, population growth was driven largely by both a natural increase and migration. That is, people moved into Southern California from other states and countries and there was additional population growth due to a net increase in the existing population (births minus deaths). Since 1990, however, any gains from immigration have been offset by domestic migration losses and Southern California's population growth has been fueled mostly by a natural increase (more births than deaths)—despite declining fertility rates. This continuing trend is expected to account for most of the Southern California's future population growth by 2040.

As we approach the middle of the century, Southern California's population will still remain racially and ethnically diverse. Currently, we are 47 percent Hispanic, 31 percent non-Hispanic White, 16 percent non-Hispanic Asian/Other and six percent non-Hispanic African American. In particular, the rapid growth of the region's Hispanic population is expected to continue; by 2040 it is projected that 53 percent of the region's residents will be Hispanic. The region's non-Hispanic Asian/Other population is also expected to increase, growing to 19 percent of the population.

Notably, the median age of our region's overall population is projected to rise, with more older people throughout Southern California as we approach the middle of the century. As the Baby Boomer generation continues to age, our region will experience a significant increase in its senior population—a trend expected nationwide. Today, people who are 65 and older represent around 12 percent of the region's total population. But by 2040, the number of seniors will increase to 18 percent (i.e., nearly one in five people in our region). This demographic shift will have major impacts on the locations and types of housing we build and our plans for transportation. This demographic group of seniors covers a wide range of needs; residents in their late sixties and early seventies will have different needs than those in their eighties and nineties. Nonetheless, a key challenge for the region will be to help seniors maintain their independence in their homes and communities.

STATE HIGHWAY SYSTEM PRESERVATION

TOTAL NEEDS =

$65.8 BILLION

EXISTING FUNDS =

$26.7 BILLION

GAP =

$39.0 BILLION

Note: Numbers may not sum to total due to rounding.

As the number and share of seniors are projected to increase, the percentage share of younger people of working age is expected to fall. The ratio of people older than 65 to people of working age (15 to 64) is expected to increase to 28 seniors per 100 working age residents by 2040—up from 16 in 2010. This means that our region could face a labor shortage and a subsequent reduction in tax revenues.

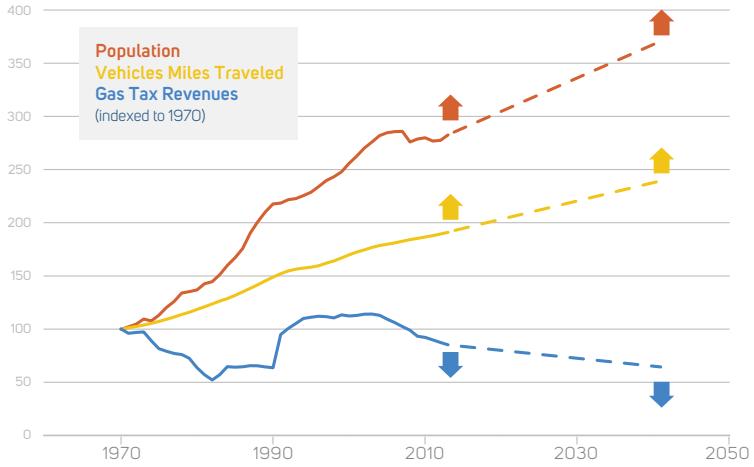
As we plan for the future and face these challenges, we also expect an interesting convergence of interests between two distinct population groups—namely Millennials, who today range in age from 20 to 35, and aging Baby Boomers, who range in age from 51 to 70. Millennials represent 22.4 percent of our region's total population and rely less on automobiles than have previous generations; they are less apt to acquire drivers licenses, drive fewer miles and conduct fewer overall trips. Research also shows that Millennials often prefer to live in denser, mixed-use urban areas well served by transit, rather than decentralized suburban areas. This trend could explain why there has been increasing demand for new multifamily housing.[1] Millennials also are more likely than other groups to embrace a range of mobility options, including shared cars, biking, transit and walking. These evolving preferences for transportation and housing are significant because Millennials will account for a large part of Southern California's overall population in 2040. In the near term, their housing and transportation preferences, when combined with the need of Baby Boomers to maintain their independence, could significantly change how Southern California develops.

FINANCING TRANSPORTATION

Perhaps our most critical challenge is securing funds for a transportation system that promotes a more sustainable future. The cost of a multimodal transportation system that will serve the region's projected growth in population, employment and demand for travel surpasses the projected revenues expected from the gas tax—our historic source of transportation funding. The purchasing power of our gas tax revenues is decreasing and will continue on a downward trajectory as tax rates (both state and federal) have not been adjusted in more than two decades while transportation costs escalate, fuel efficiency improves and the number of alternative-fuel vehicles continues to grow. FIGURE 3.1 highlights the decline in gas tax revenues, in relation to the growing population and demand for travel.

To backfill limited state and federal gas tax revenues, our region has continued to rely on local revenues to meet transportation needs. In fact, 71 percent of SCAG's core revenues are local revenues. Seven sales tax measures have been adopted throughout the region since the 1980s, so the burden of raising tax dollars has shifted significantly to local agencies. In reality, we need a stronger state and federal commitment to raising tax dollars for the Southern California transportation system—given its prominence and importance to the state and national economy, particularly when it comes to the movement of goods. Our region's transportation system should be able to rely on more consistent tax revenues raised at all levels of government.

FIGURE 3.1 CALIFORNIA POPULATION, TRAVEL AND GAS TAX REVENUE TRENDS



Source: Caltrans, California Department of Finance, California State Board of Equalization, White House Office of Management and Budget

[1] Dutzik, T., Inglis, J., & Baxandall, Ph.D., P. (2014). Millennials in Motion: Changing Travel Habits of Young Americans and the Implications for Public Policy. U.S. PIRG Education Fund.

TABLE 3.1 PROPOSED 2016–2040 RTP/SCS GROWTH FORECAST

	POPULATION				HOUSEHOLDS				EMPLOYMENT			
REGION	2012	2020	2035	2040	2012	2020	2035	2040	2012	2020	2035	2040
IMPERIAL	180,000	234,000	272,000	282,000	49,000	72,000	89,000	92,000	59,000	102,000	121,000	125,000
LOS ANGELES	9,923,000	10,326,000	11,145,000	11,514,000	3,257,000	3,494,000	3,809,000	3,946,000	4,246,000	4,662,000	5,062,000	5,226,000
ORANGE	3,072,000	3,271,000	3,431,000	3,461,000	999,000	1,075,000	1,135,000	1,152,000	1,526,000	1,730,000	1,870,000	1,899,000
RIVERSIDE	2,245,000	2,480,000	3,055,000	3,183,000	694,000	802,000	1,009,000	1,055,000	617,000	849,000	1,112,000	1,175,000
SAN BERNARDINO	2,068,000	2,197,000	2,638,000	2,731,000	615,000	687,000	825,000	854,000	659,000	789,000	998,000	1,028,000
VENTURA	835,000	886,000	945,000	966,000	269,000	285,000	306,000	312,000	332,000	375,000	409,000	420,000
SCAG	18,322,000	19,395,000	21,486,000	22,138,000	5,885,000	6,415,000	7,172,000	7,412,000	7,440,000	8,507,000	9,572,000	9,872,000

Source: SCAG
Note: All figures are rounded to the nearest 1,000. The County numbers may not sum to the region total due to rounding.

FOCUS

IMPORTANCE OF SYSTEM PRESERVATION

We Will Pay More–If We Do Not Fix-it-First

EACH $1 SPENT HERE...
Seals, Thin Overlays (Preventive Maintenance)
SURFACE DAMAGE
4–7 Years

DELAYS SPENDING $3 HERE...
Thicker Overlays
MINOR DAMAGE
6–7 Years

DELAYS SPENDING $8 HERE...
Rehabilitation/Reconstruction
MAJOR DAMAGE
10+ Years

Source: 2013 State of the Pavement Report

The State of Disrepair

17% OF HIGHWAYS ARE **DISTRESSED**

6% OF LOCAL ROADS IN **FAILED CONDITION IN 2012**

25% OF LOCAL ROADS WILL BE IN **FAILED CONDITION** IN 2022 UNDER CURRENT (2012) FUNDING

18% OF BRIDGES RATED AS **FUNCTIONALLY OBSOLETE**

10% OF BRIDGES RATED AS **STRUCTURALLY DEFICIENT**

$103 BILLION

of all **proposed expenditures** through **2040** are allocated to highway & arterial system operations & maintenance in the **2016 RTP/SCS**

Source: Federal Highway Administration National Bridge Inventory & 2014 State Highway Operation & Protection Program

A Bumpy & Costly Ride

Annual Vehicle Maintenance Costs by Metropolitan Area Due to Poor Road Conditions

LOS ANGELES/ ORANGE COUNTY	$832	$542	MISSION VIEJO
HEMET	$738	$534	VENTURA COUNTY
TEMECULA/MURRIETA	$664	$501	INDIO-CATHEDRALCITY-PALM SPRINGS
INLAND EMPIRE	$638	$421	LANCASTER-PALMDALE

Bumpy Roads Ahead Study & TRIP, A National Transportation Research Group, 2013

PRESERVING OUR TRANSPORTATION SYSTEM

Southern California's transportation system is in an unfortunate state of disrepair due to decades of underinvestment. Quite simply, investments to preserve the system have not kept pace with the demands placed on it. The inevitable consequence of this deferred maintenance is poor road pavement, which is particularly evident on our highways and local arterials. The rate of deterioration is expected to accelerate significantly as maintenance continues to be deferred. And as maintenance is deferred, the cost of bringing these assets back to a state of good repair is projected to grow exponentially. SCAG estimates that the cost to maintain our transportation system at current conditions, which is far from ideal, will be in the tens of billions of dollars beyond what is currently committed. For instance, the gap between needs and existing funding for the State Highway System through 2040 is now estimated at $39.0 billion. It should be noted that Caltrans is the owner and operator of the State Highway System and is responsible for funding the operation and maintenance of state highways, while local jurisdictions are responsible for the funding of operations and maintenance of local arterials.

Moving forward, the region needs to continue to "Fix-it-First" as a top priority—that is, focusing the necessary funds on preserving the existing transportation network while strategic investments are made in system expansions. Failing to adequately invest in the preservation of Southern California's roads, highways, bridges, railways, bicycle and pedestrian facilities, and transit infrastructure will only lead to further deterioration, which has the potential to worsen our congestion challenges. In addition, potholes and other imperfections in the roadway come with real costs to motorists, estimated by one study at more than $700 per household each year. The region's transportation system represents billions of dollars of investments that must be protected in order to serve current and future generations. The loss of even a small fraction of these assets could significantly compromise the region's overall mobility.

Preservation of the region's transit system, for example, is more important than ever as Baby Boomers, one of the fastest growing groups requiring transportation services, age. The region needs to plan for this projected increase in seniors with increased funding for transit and paratransit maintenance and preservation. Preserving infrastructure that encourages active transportation, such as walking and biking, is also important for maintaining mobility for those unable or uninterested in driving. It is also a cost-effective way to increase the number of roadway users without increasing roadway congestion.

MOVING GOODS EFFICIENTLY IN A HUGE AND COMPLEX REGION

The smooth and efficient movement of goods is critical to our regional economy, particularly as our region continues to recover from the recession. A number of key trends and drivers are expected to impact our region's goods movement system. Some of these, along with associated challenges, are highlighted below.

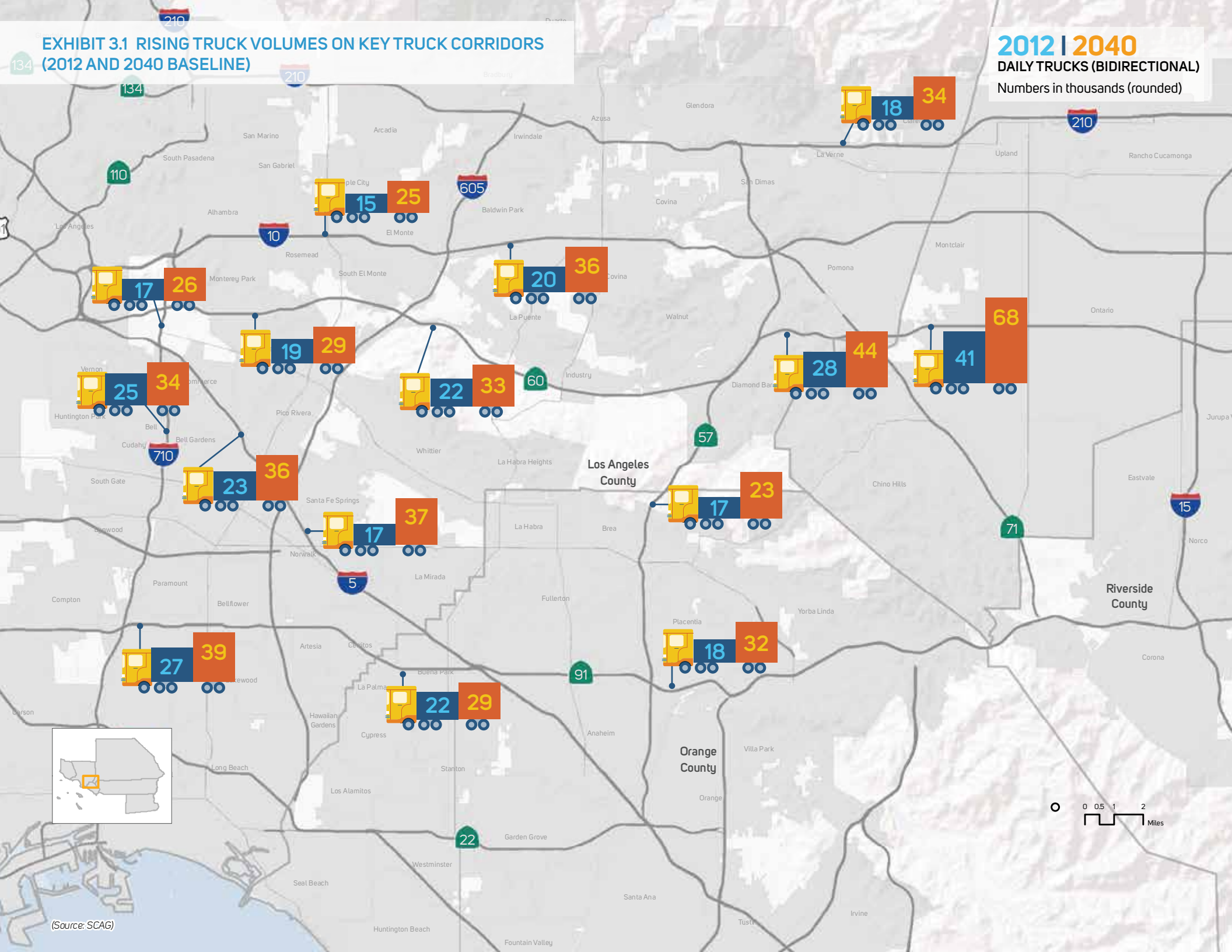
Population and Employment Growth: The regional population and rate of employment in our region are key indicators of economic health, and both are projected to grow rapidly over the next two decades. Our region's population growth is expected to fuel consumer demand for products and the goods movement services that provide them. This increased demand will drive stronger growth in freight traffic on already constrained highways and rail lines. Truck volumes on many key corridors are anticipated to grow substantially, as shown in EXHIBIT 3.1. Truck and auto delays will increase, as will truck-involved accidents. Levels of harmful emissions also will rise. The increase in rail volumes is expected to exacerbate vehicle hours of delay at rail and highway crossings.[2] Moreover, growing demand for commuter rail services on rail lines owned by the freight railroads will create additional capacity challenges.

Continued Growth in International Trade: The San Pedro Bay Ports anticipate cargo volumes to grow to 36 million containers by 2040—despite increasing competition with other North American ports, the expansion of the Panama Canal and more recent delays at port terminals due to labor negotiations. Port of Hueneme in Ventura County is also positioned to grow as a preferred port for specialized cargo such as automobiles, break bulk and military cargo. This growth will place further demands on marine terminal facilities, highway connections and rail intermodal terminals. If port-related rail traffic and commuter demands are to be met, mainline rail capacity improvements will be required as well. Meanwhile, mitigating the impacts of increased train traffic in communities will continue to be a challenge.

Logistics Epicenter: Southern California is the nation's epicenter for distribution and logistics activity, and it will continue to be a significant source of well-paying jobs in the region through 2040. The region has close to 1.2 billion square feet of facility space for warehousing, distribution, cold storage and truck terminals.[2] Nearly 1.1 billion square feet of this space is occupied. By 2040,

[2] CoStar Realty Information, Inc. www.costar.com, based on November 2014 data downloads.

EXHIBIT 3.1 RISING TRUCK VOLUMES ON KEY TRUCK CORRIDORS (2012 AND 2040 BASELINE)



the region may experience a shortfall of more than 527 million square feet of warehouse space, relative to demand.[3]

Air Quality Issues: Goods movement emissions contribute to regional air pollution problems (e.g., NOx and PM 2.5) and pose public health challenges. Emissions generated by the movement of goods are being reduced through efforts such as the San Pedro Bay Ports Clean Air Action Plan, as well as regulations such as the statewide Heavy Duty Truck and Bus Rule. But these reductions alone are unlikely to be sufficient to meet regional air quality goals.

Currently, much of the SCAG region does not meet federal ozone and fine particulate air quality standards as mandated by the federal Clean Air Act. The South Coast Air Basin has a deadline to reduce ozone concentrations to 80 parts per billion (ppb) by 2023 under the revoked 1997 eight-hour ozone standards, and further down to 75 ppb by 2031 under the current 2008 eight-hour ozone standards. Moreover, new federal ozone standards are expected to be finalized by the Environmental Protection Agency (EPA) in the 2015/2016 time frame, with an expected new attainment deadline of 2037. This means that NOx emissions in the South Coast Air Basin must be reduced 65 percent by 2023 and 75 percent (beyond projected 2023 emissions) by 2032 in order to attain federal ozone standards.[4] Additional attainment deadlines are in effect for PM 2.5.

Reducing greenhouse gas emissions is also a priority, as determined by the landmark California legislation Assembly Bill 32 and Senate Bill 375, and the more recent Executive Order B-30-15 signed by Governor Brown in April 2015. Several state measures have been implemented to reduce greenhouse gas emissions, with some implications for freight. These include the Low Carbon Fuel Standard and the inclusion of greenhouse gas emissions from transportation fuels under the California's Cap-and-Trade Program. Additional state programs are under development as part of the state's Sustainable Freight Strategy (SFS).

[3] Industrial Warehousing in the SCAG Region Study, Task 4 Warehousing Demand Forecast.
[4] Preliminary Draft AQMD Air Quality Management Plan White Paper, Goods Movement, June 2015.

HOUSING AFFORDABILITY, GENTRIFICATION AND DISPLACEMENT

The cost of housing in Southern California is among the highest in the nation. Across our region, home prices and rents continue to rise, and the region continues to experience a shortage of affordable housing. The California Association of Realtors' (CAR) affordability index, which measures the percentage of households that can afford to purchase a median priced home in the state, remains around 35 percent for the SCAG region. Nearly 55 percent of renters and 45 percent of homeowners spend more than 30 percent of their income on rent or mortgage payments.

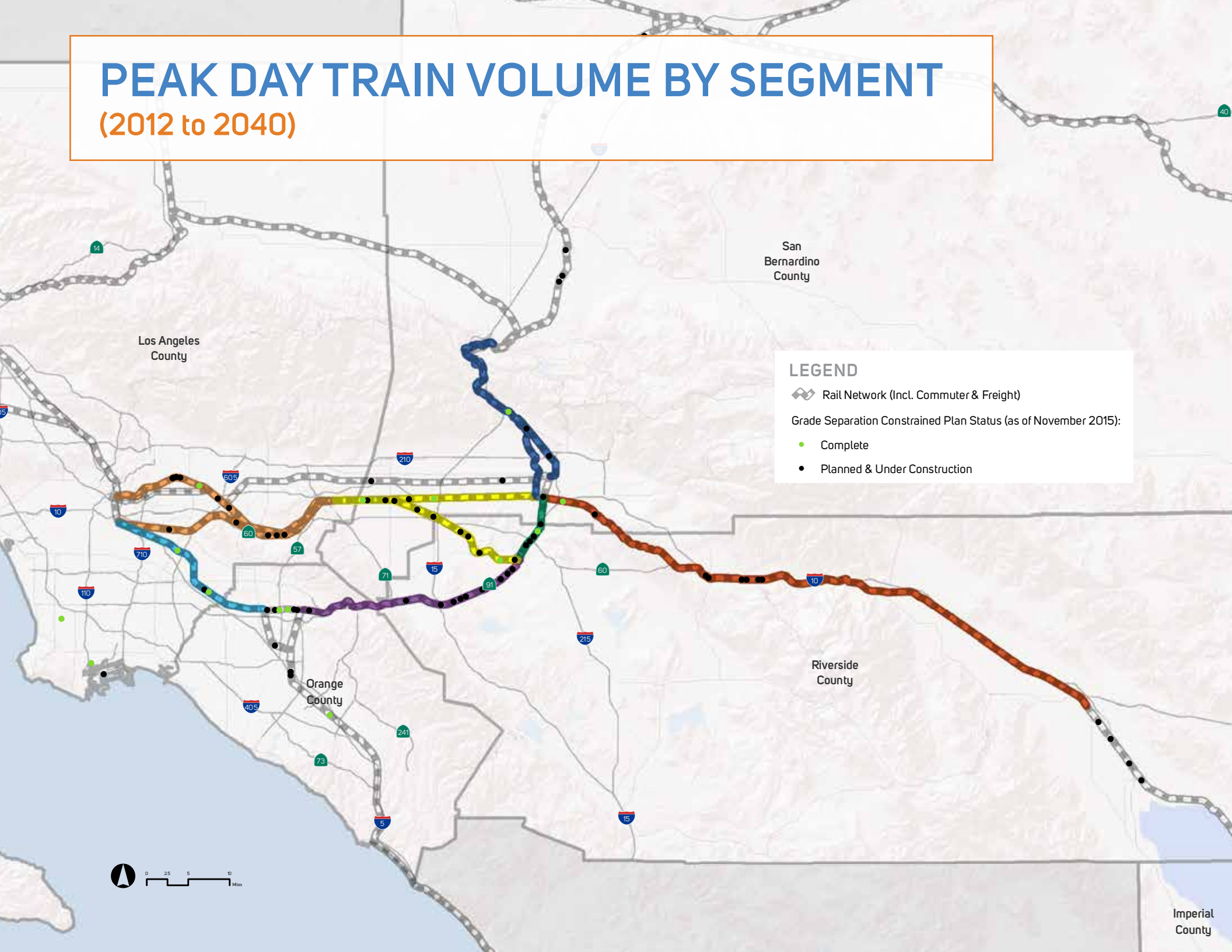
Affordability is becoming a significant issue in many communities, particularly in urban areas after the implementation of a new rail line, transit station or other major public investment. Housing unaffordability can undermine the overall goals of the RTP/SCS because it can contribute to suburban sprawl, longer job commutes and higher greenhouse gas emissions. As wealthier "outsiders" move into established communities, the increased demand for housing and business/retail space can lead to escalating costs for residential and commercial real estate. Many traditionally low-income, urban core communities at risk for gentrification are seeing dramatic changes in housing, retail stores, schools and other neighborhood amenities.

The region's overall affordability issues are particularly troubling because the region has a disproportionately high concentration of low-income and minority populations that are unemployed, live under the poverty line, have lower educational attainment, and live in close proximity to environmentally stressed areas. The region accounts for 67 percent of Californians who live in disadvantaged communities, as defined by Senate Bill 535, which requires investment in disadvantaged communities from California's Cap-and-Trade revenues. This represents more than 6.36 million people. Investments in transportation and other public infrastructure, affordable housing, economic development and job creation can help these communities in need.

As our region builds communities that are more compact and more transit-oriented, regional greenhouse gas emissions are anticipated to decline and residents from a variety of income levels will continue to make housing choices that allow them to use an increasing number of mobility options. The overall quality of life is expected to increase for many people. Transit investments and strategies will be most effective if coordinated with land use strategies,

PEAK DAY TRAIN VOLUME BY SEGMENT

(2012 to 2040)



RAIL SEGMENTS

BNSF Cajon Subdivision
San Bernardino-Silverwood PLUS

UPRR Mojave Subdivision
W. Colton-Silverwood

	PASSENGER TRAINS PER DAY	FREIGHT TRAINS PER DAY
2012	2	89
2040	2	167

UPRR LA Subdivision
East LA-Pomona PLUS

UP Alhambra Subdivision
Yuma Jct. - Pomona

	PASSENGER TRAINS PER DAY	FREIGHT TRAINS PER DAY
2012	54	37
2040	98	100

UP LA Subdivision
Pomona-W. Riverside PLUS

UPRR Alhambra Subdivision
Pomona-W. Colton

	PASSENGER TRAINS PER DAY	FREIGHT TRAINS PER DAY
2012	13	43
2040	48	112

UPRR Yuma Subdivision
Colton - Indio

	PASSENGER TRAINS PER DAY	FREIGHT TRAINS PER DAY
2012	1	40
2040	2	95

BNSF San Bernardino Subdivision
Atwood-W. Riverside

	PASSENGER TRAINS PER DAY	FREIGHT TRAINS PER DAY
2012	27	40
2040	62	91

BNSF San Bernardino Subdivision
Hobart-Fullerton

	PASSENGER TRAINS PER DAY	FREIGHT TRAINS PER DAY
2012	49	36
2040	110	80

BNSF San Bernardino Subdivision
W. Riverside-Colton

	PASSENGER TRAINS PER DAY	FREIGHT TRAINS PER DAY
2012	39	60
2040	108	139

GRADE SEPARATION PROJECTS

24
CURRENTLY UNDER CONSTRUCTION

+

42
PLANNED

WOULD **SAVE** AN ESTIMATED

5,500
DAILY VEHICLE HOURS OF DELAY
IN 2040

AFFORDABLE HOUSING TOOLBOX FOR LOCAL JURISDICTIONS

1. Streamline the residential project permitting process
2. Reduced fees or waivers for affordable housing development
3. Reduce parking requirements, especially in transit-rich areas
4. Adopt an affordable housing overlay zone
5. Preservation of mobile homes
6. Establish a housing trust fund
7. Add inclusionary zoning to the housing ordinance
8. Density Bonus ordinance
9. Increase density in transit-rich areas
10. Link a housing program with other policies such as active transportation and public health
11. Consider new building types and models, such accessory dwelling units or small units
12. Establish a Community Revitalization and Investment Authority (per AB 2) or Enhanced Infrastructure Financing District (per SB 628)

including transit-oriented development and providing affordable housing. However, people from low-income communities near new transit infrastructure may face displacement. Generally, displacement refers to a situation in which gentrification places pressure (through eviction or because of market forces) on people from existing communities to relocate to more affordable places. If those communities are priced out and move away from newly constructed transit facilities, those facilities lose the very people who are more likely to use them. Research suggests that lower income residents generate fewer vehicle miles traveled (VMT) and demonstrate the largest relative VMT reductions with location efficiency.[5]

This Plan's vision and goals include ensuring that regionwide benefits improve social equity—that is, the benefits of our Plan are realized by all populations in our Southern California region while its burdens are not carried disproportionately by one group over another. Providing people throughout our region with access to high quality transit and ensuring that they also have access to more affordable housing are related objectives. Currently, SCAG is partnering with the state and other regional agencies to study issues related to displacement and travel behavior near transit. Those results will inform future regional policies. Community advocates and other housing stakeholders are working to ensure that investments in traditionally low-income communities benefit existing residents and businesses instead of dividing communities. SCAG encourages municipalities to pursue strategies that avoid displacement, especially near transit stations, and ensure that existing communities retain their housing options.

The integration of affordable housing development with the goals of Senate Bill 375 has been the focus of several recently enacted state legislative bills. Bills such as Assembly Bill 2222 (Nazarian) and Assembly Bill 313 (Atkins) aim to preserve affordable housing in rapidly changing development environments, such as in projects that apply for local density bonuses and within Enhanced Infrastructure Financing Districts, respectively. Other bills, such as Assembly Bill 744 (Chau), reduce parking requirements for housing designed for low income households and seniors and meet certain thresholds for transit access, which not only lower the cost of building affordable housing but also encourages the development of affordable housing near transit—a clear goal of Senate Bill 375.

On a local level, there are a variety of tools available for jurisdictions to consider to increase the supply of affordable housing available (please see Affordable Housing Toolbox graphic). These tools are designed to reduce the cost of building affordable housing or establish a funding source for preserving or building affordable housing. While there is not a "one size fits all" approach, SCAG encourages jurisdictions to consider these strategies in order to address local housing affordability challenges.

[5] Newmark, Ph.D, G., & Haas Ph.D., P. (2015). Income, Location Efficiency, and VMT: Affordable Housing as a Climate Strategy. San Francisco: California Housing Partnership.

Additionally, there are a number of statewide programs and resources to assist local jurisdictions in funding the production of affordable housing. As mentioned in earlier chapters, there are several new funding opportunities to help regions and jurisdictions promote affordable housing. California's Affordable Housing Sustainable Communities (AHSC) program, funded by the statewide Greenhouse Gas Reduction Fund created by Assembly Bill 32, provides funding to certain projects that provide affordable housing through a competitive grant process. Moreover, other programs such as the California Department of Housing and Community Development (HCD)'s Housing-related Parks Program, provides funds to local jurisdictions to maintain and rehabilitate parks and open space based on the number of affordable housing units built. Other opportunities to build housing also include Senate Bill 628 (Beall) and Assembly Bill 2 (Alejo), which allow jurisdictions to establish special reinvestment districts to develop affordable housing and supportive infrastructure and amenities. As the regional MPO, SCAG is committed to providing jurisdictions and stakeholders applying for funding opportunities with data, technical and policy support in order to further the progress of establishing more affordable housing in the region aligned with the goals of the RTP/SCS.

IMPROVING PUBLIC HEALTH

Today, many people in our region suffer from poor health due to chronic diseases related to poor air quality and physical inactivity. Chronic diseases including heart disease, stroke, cancer, chronic lower respiratory disease and diabetes are responsible for 72 percent of all deaths in our region, according to the California Department of Public Health. Furthermore, more than 60 percent of residents are overweight or obese, more than eight percent have diabetes, 27 percent suffer from hypertension and more than 12 percent suffer from asthma, according to the California Health Interview Survey. Health care costs resulting from being physically inactive, obese and overweight and from asthma cost our Southern California region billions of dollars annually in medical expenses, lost life and lost productivity, research shows.[6] For example, one study showed that health care costs resulting from physical inactivity and obesity reached an estimated $41.2 billion in 2006 in California.

A growing body of evidence shows that how a neighborhood is laid out and linked to transportation options can shape the lifestyles that people have—how physically active they are and how safe their everyday lives can be.[7] As a result, regional planning for land use and transportation across the U.S. has increasingly incorporated strategies to improve public health. MPOs such as SCAG are focusing on improving transportation safety, offering people more opportunities to walk, bike and embrace other forms of active transportation, improve first/last mile connections to transit, and improve access to natural lands. They are also pursuing strategies to make neighborhoods more walkable, improve air quality, help people cope with climate change impacts such as extreme heat events, improve accessibility to essential destinations such as hospitals and schools, and work overall toward a transportation system and land use patterns that promote regional economic strength.

One of the challenges that SCAG faces as it strives to improve public health is the sheer size and diversity of our region. Public health varies widely by geographic location, income and race. There is no one size fits all approach to meeting this complex challenge. It requires flexibility and creativity to ensure that initiatives are effective in both rural and urban areas.

To gain more insight on the connection between how we use land and public health, SCAG has identified seven focus areas for further analysis: access to essential destinations, affordable housing, air quality, climate adaptation, economic opportunity, physical activity and transportation safety. For more details, see the Plan's Public Health Appendix.

CONFRONTING A CHANGING ENVIRONMENT

The consequences of continued climate change already are impacting California and more intensified changes are expected. Ongoing drought conditions, water shortages due to less rainfall as well as declining snowpack in our mountains, and an agriculture industry in crisis have become hard realities in recent years. Climate change is transforming the state's natural habitats and overall biodiversity. Continued changes are expected to impact coastlines as sea levels rise and storm surges grow more destructive. Forests will continue to be impacted by drought and wildfire. Climate change also will impact how we use energy and the quality of public health. Our statewide transportation

[6] Peck, C., Logan, J., Maizlish, N., & Van Court, J. (2013). The Burden of Chronic Disease and Injury: California. 2013. California Department of Public Health.

[7] Frank, L. D., Schmid, T. L., Sallis, J. F., Chapman, J., & Saelens, B. E. (2005). "Linking Objectively Measured Physical Activity with Objectively Measured Urban Form: Findings from SMARTRAQ." American Journal of Preventive Medicine, 28(2S2), 117-125.

system will experience new challenges as well as the global and regional climate continues to change.[8]

Researchers project that both coastal and inland Southern California will see many more days of extreme heat, with temperatures exceeding 95 degrees Fahrenheit.[9] This is expected to increase heat-related mortality, lower labor productivity and boost demands for energy. Meanwhile, changing patterns of rain and snowfall—including the amount, frequency and intensity of precipitation across the state—will have serious long-term impacts on the supply and quality of water in Southern California.

It is clear that our region needs to prepare for these projected challenges and a big part of that effort is to make individual communities and the region as a whole more resilient to the consequences of climate change. "Climate resiliency" can be defined as the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization and the capacity to adapt to stress and change.[10] Without advance planning and effective action, the consequences of climate change will negatively impact our transportation system, our economy and our everyday lives.

The state's Adaptive Planning Guide encourages our region and others across California to evaluate the local impacts of climate change. These impacts include increased temperatures, reduced precipitation, rising sea levels, a fall in tourism, reduced water supplies, a heightened risk of wildfire, threats to public health related to degraded air quality and heat, stresses on endangered and threatened species, diminished snowpack and coastal erosion.[11] Our region is still facing a serious drought that began in 2012 and its length and severity has led to mandatory water restrictions for the first time in state history. At the same time, state programs designed to meet future climate challenges proactively are underway. These include initiatives such as the Safeguarding California[12] plan, as well as Governor Brown's Executive Order calling for new actions to mitigate and adapt to the impacts of climate change. These initiatives present regional agencies such as SCAG with opportunities to show leadership as the state confronts climate change challenges.

Continued climate change will impact our region in various ways and we are now getting a clearer picture of how it will impact the day-to-day lives of those of us who are most vulnerable—such as the poor, the elderly and the disabled. Responding effectively to climate change requires us to cooperate more with one another, to use limited resources more wisely, and to think more creatively to align our goals. The impacts of climate change, like other environmental challenges, are expected to hit hardest those communities that are least equipped to handle them. Particularly in Southern California, public agencies must focus on safeguarding people who are most vulnerable to extreme heat and air pollution. The elderly and children under five years old are most vulnerable to heat-related illness.[13] As our demographics change, proactive planning that ensures the health of these distinct populations will be increasingly important.

Our region certainly cannot fight climate change alone. It will be a global effort. However, it is up to us to make sure we can adapt to climate change and mitigate its impacts in our own region. We cannot expect anyone else to do this work for us. Long-range regional planning inherently recognizes the relationship between today's investments and tomorrow's outcomes. Confronting climate change and building climate resilient communities is, at its core, an exercise in smart planning. We will need to build on actions we have already taken by integrating considerations of climate and sustainability into the approaches we take to grow our economy, protect the environment and public health, and plan for the future.

8 California Resources Agency. (n.d.) Fact Sheets on California Climate Risks [Fact Sheet]. Retrieved from http://resources.ca.gov/docs/climate/Safeguarding_Handout_All.pdf.

9 Rogers, J., Barba, J., & Kinniburgh, F. (2015). From Boom to Bust? Climate Risk in the Golden State. Risky Business Project. Accessed at http://riskybusiness.org/uploads/files/California-Report-WEB-3-30-15.pdf.

10 Safeguarding California: Reducing Climate Risk. (2014). California Natural Resources Agency. Accessed at http://resources.ca.gov/docs/climate/Final_Safeguarding_CA_Plan_July_31_2014.pdf.

11 California Adaptation Planning Guide: Planning for Adaptive Communities. (2012). California Emergency Management Agency & California Natural Resources Agency. Accessed at http://resources.ca.gov/docs/climate/01APG_Planning_for_Adaptive_Communities.pdf.

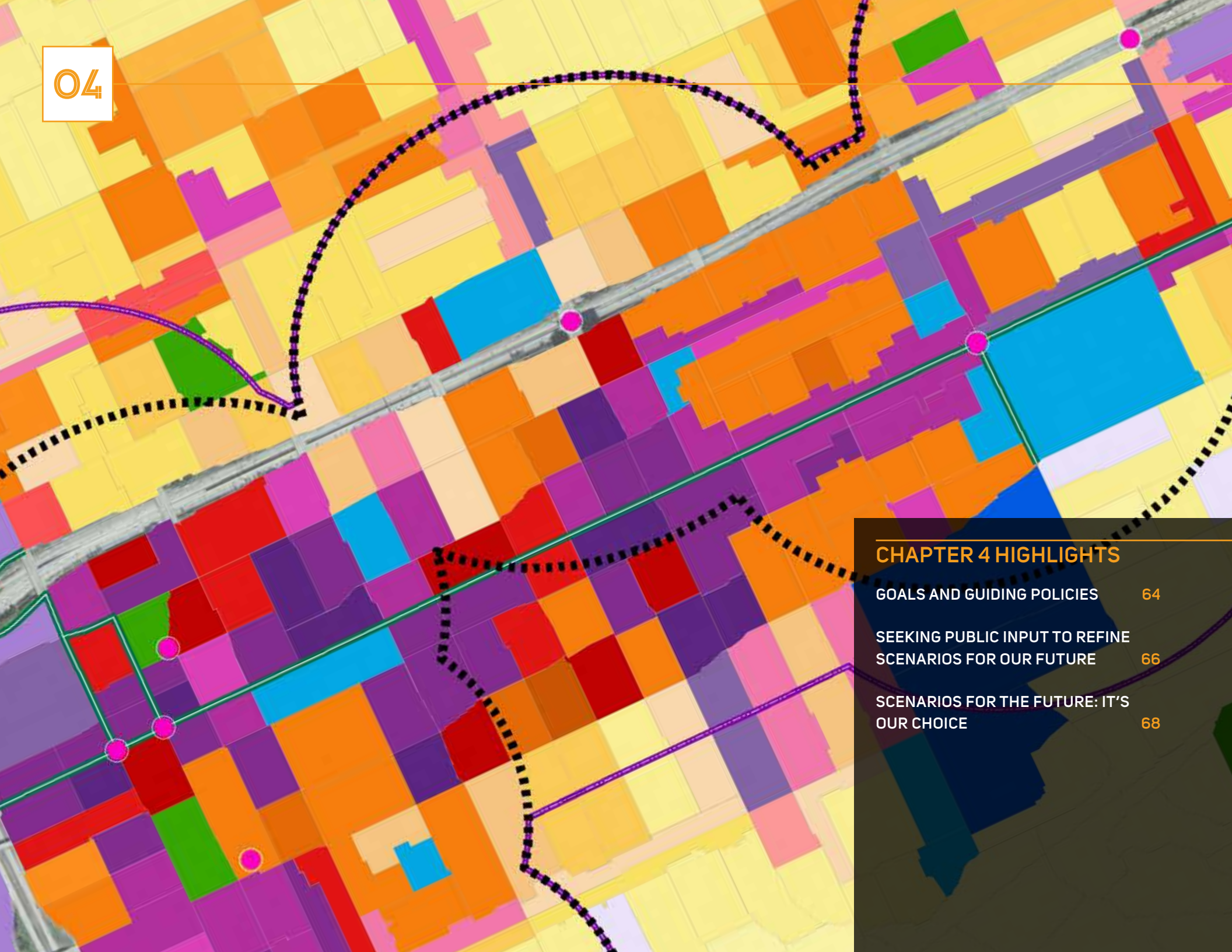
12 California Adaptation Planning Guide: Planning for Adaptive Communities. (2012). California Emergency Management Agency & California Natural Resources Agency. Accessed at http://resources.ca.gov/docs/climate/01APG_Planning_for_Adaptive_Communities.pdf.

13 California Adaptation Planning Guide: Planning for Adaptive Communities. (2012). California Emergency Management Agency & California Natural Resources Agency.

CONCLUSION

We will now turn to a discussion of how SCAG developed the 2016 RTP/SCS, with a particular emphasis on the extensive public outreach that SCAG conducted to develop the best Plan possible to address our challenges. The 2016 RTP/SCS, after all, is the region's Plan for the future. By design, it reflects the region's needs, priorities and desires—as well as the statutory requirements of the State of California and the federal government.

04



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CREATING A PLAN FOR OUR FUTURE

The RTP/SCS is a long-range visioning plan that balances future mobility and housing needs with goals for the environment, the regional economy, social equity and environmental justice, and public health. Ultimately, the Plan is intended to help guide transportation and land use decisions and public investments.

This update, the 2016 RTP/SCS, reflects goals and guiding policies and a vision developed through extensive outreach to the general public and numerous stakeholders across our region. SCAG values the region's tremendous diversity and acknowledges that it cannot tackle challenges in the same way everywhere. This chapter discusses how the Plan was developed, and it offers an overview of SCAG's "preferred scenario" for land use and transportation in our region in 2040. SCAG developed this preferred scenario to guide its update of the 2012 RTP/SCS and then settle on a final set of strategies, programs and projects that will place the region more firmly on the road toward achieving its goals. Those strategies, programs and projects are reviewed in Chapter 5.

GOALS AND GUIDING POLICIES

As SCAG updated the 2012 RTP/SCS, it evaluated its existing goals, guiding policies and performance measures to determine whether they should be refined. Since the adoption of the 2012 RTP/SCS, several developments have occurred that influenced the development of the 2016 RTP/SCS. These include:

- A surface transportation funding and authorization bill known as "Moving Ahead for Progress in the 21st Century Act" (MAP-21) was signed into law by President Obama on July 6, 2012. MAP-21 includes specific goals for safety; improving the condition of transportation infrastructure; reducing congestion and making the transportation system more reliable; freight movement and economic vitality; and environmental sustainability. MAP-21 now requires that Metropolitan Planning Organizations such as SCAG set performance targets for improving transportation safety and system preservation in coordination with state departments of transportation.

  At the time this document was being prepared, the federal rulemaking process to implement MAP–21 was not yet complete. SCAG will continue to monitor rulemaking to understand the implications for the Plan, and take the necessary steps to fully evaluate the final rule. Also, in December 2015, the Fixing America's Surface Transportation Act, or "FAST Act," was signed in to law. The FAST Act is a five-year transportation funding and authorization bill that maintains many of the MAP-21 provisions, but also has new provisions including a national freight program. As with MAP-21, SCAG will monitor the rulemaking process to implement FAST Act provisions.

2016 RTP/SCS GOALS

1. Align the plan investments and policies with improving regional economic development and competitiveness.
2. Maximize mobility and accessibility for all people and goods in the region.
3. Ensure travel safety and reliability for all people and goods in the region.
4. Preserve and ensure a sustainable regional transportation system.
5. Maximize the productivity of our transportation system.
6. Protect the environment and health of our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking).
7. Actively encourage and create incentives for energy efficiency, where possible.
8. Encourage land use and growth patterns that facilitate transit and active transportation.
9. Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies.*

**SCAG does not yet have an agreed-upon security performance measure.*

2016 RTP/SCS GUIDING POLICIES

1. Transportation investments shall be based on SCAG's adopted regional Performance Indicators.
2. Ensuring safety, adequate maintenance and efficiency of operations on the existing multimodal transportation system should be the highest RTP/SCS priorities for any incremental funding in the region.
3. RTP/SCS land use and growth strategies in the RTP/SCS will respect local input and advance smart growth initiatives.
4. Transportation demand management (TDM) and active transportation will be focus areas, subject to Policy 1.
5. HOV gap closures that significantly increase transit and rideshare usage will be supported and encouraged, subject to Policy 1.
6. The RTP/SCS will support investments and strategies to reduce non-recurrent congestion and demand for single occupancy vehicle use, by leveraging advanced technologies.
7. The RTP/SCS will encourage transportation investments that result in cleaner air, a better environment, a more efficient transportation system and sustainable outcomes in the long run.
8. Monitoring progress on all aspects of the Plan, including the timely implementation of projects, programs, and strategies, will be an important and integral component of the Plan.

- The rapid advancement of new technologies such as real-time traveler information, on-demand shared mobility services enabled by smartphone applications, car sharing and bike sharing is influencing how households travel and their choices about vehicle ownership. New technologies are encouraging more efficient transportation choices, which help public agencies manage the multimodal transportation system more efficiently.
- There is a continuing emphasis on reducing greenhouse gas emissions, even after the adoption of Senate Bill 375. On April 29, 2015, Governor Brown issued Executive Order B-30-15, which establishes a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030. Because the transportation sector is the largest contributor to California's greenhouse gas emissions (more than 36 percent), SCAG anticipates updated and more stringent regional emissions reduction targets.

This Plan's goals are intended to help carry out our vision for improved mobility, a strong economy and sustainability. Based on our assessment of these developments, the goals of the 2016 RTP/SCS, which are represented graphically in this chapter, remain unchanged from those adopted in the 2012 RTP/SCS.

The guiding policies for the 2016 RTP/SCS are intended to help focus future investments on the best-performing projects and strategies to preserve, maintain and optimize the performance of the existing transportation system. Two additional guiding policies have been added since 2012. The first addition (Guiding Policy 6) addresses emerging technologies and the potential for such technologies to lower the number of collisions, improve traveler information, reduce the demand for driving alone and lessen congestion related to road incidents and other non-recurring circumstances (a car collision, for example). The second addition (Guiding Policy 7) recognizes the potential for transportation investments to improve both the efficiency of the transportation network and the environment.

SEEKING PUBLIC INPUT TO REFINE SCENARIOS FOR OUR FUTURE

To develop a preferred scenario for the region at 2040, SCAG first generated four preliminary scenarios for our region's future—each one representing a different vision for land use and transportation in 2040. More specifically, each scenario was designed to explore and convey the impact of where the region would grow, to what extent the growth would be focused within existing cities and towns, and how it would grow—in other words, the shape and style of the neighborhoods and transportation systems that would shape growth over the period. To help the agency refine these four scenarios, SCAG reached out extensively to the general public and numerous stakeholders to seek their views and input. Refining the scenarios was an important step on the road toward settling on a preferred scenario—which offers a comprehensive picture of what kind of future we want. The scenarios and the selected preferred scenario proved to be powerful planning tools to solidify our vision for our region at the middle of the century. These preliminary scenarios are not the ones modeled in the Program Environmental Impact Report (PEIR).

Public outreach was integral to the development of the entire RTP/SCS, but particularly during the refinement of scenarios. To ensure that the 2016 RTP/SCS was developed openly and inclusively, the agency implemented a comprehensive public outreach and involvement program. This was based on a Public Participation Plan adopted by SCAG's Regional Council in April 2014. Specific public engagement strategies used during the development of the Draft 2016 RTP/SCS included:

- Developing materials for public outreach in a variety of formats to reach broad audiences, including a short video, fact sheets, surveys, PowerPoint presentations and poster boards.
- Centralizing RTP/SCS information on a new easy-to-use microsite, developed to be mobile/tablet friendly and compliant with the 1990 Americans with Disabilities Act.
- Supporting multiple committees, task forces and working groups made up of SCAG partners, stakeholders and interested groups to develop the key components of the Plan.
- Holding multiple public open houses before the release of the Draft RTP/SCS, to allow direct and interactive participation with interested parties.

OUR COUNTY TRANSPORTATION COMMISSIONS

The SCAG region includes a total of six county transportation commissions (CTCs), one for each county—Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura. Each CTC is responsible for planning and implementing countywide transportation improvements, allocating locally-generated transportation revenues, state and federal funding, and, in some cases, operating transit services. During each RTP/SCS update, the CTCs provide SCAG with extensive project lists that are then incorporated into the Plan. The projects included on these lists are regarded as regionally significant and/or anticipated to receive (or already receiving) federal and state funds. In addition, the CTCs anticipate that these projects will be initiated or completed by the Plan's horizon year (in this case, 2040). The 2016 RTP/SCS includes more than 4,000 projects—ranging from highway improvements, railroad grade separations, bicycle lanes, new transit hubs and replacement bridges. CTCs are a valuable resource for learning more about projects that are coming to your community by 2040.

ICTC Imperial County Transportation Commission
Metro
OCTA
RCTC Riverside County Transportation Commission
Governments SANBAG Working Together
Ventura County VCTC Transportation Commission

CALIFORNIA TRANSPORTATION PLAN 2040

INTEGRATING CALIFORNIA'S TRANSPORTATION FUTURE

The State of California, with direction from the California Department of Transportation (Caltrans), developed a statewide, long-range transportation plan with a 25-year planning horizon, the California Transportation Plan 2040 (CTP 2040). The Draft CTP 2040 provides a long-range policy framework to meet California's future mobility needs and reduce greenhouse gas emissions. Caltrans is required to develop this plan per Senate Bill 391 (2009). Specifically, emissions must be reduced to 1990 levels from current levels by 2020, and 80 percent below the 1990 levels by 2050 as described by Assembly Bill 32 (2006) and Executive Order S-03-05 (2015). The CTP 2040 will demonstrate how major metropolitan areas, rural areas, and state agencies can coordinate planning efforts to achieve critical statewide goals. Like the CTP 2040, the 2016 RTP/SCS aims to motivate the development of an integrated, multi-modal transportation system that is sustainable, improves mobility and enhances our quality of life. Though the CTP 2040 is not yet finalized (anticipated approval in the next year), it helped inform the goals, policies and strategies included in the 2016 RTP/SCS.

California 2040
TRANSPORTATION PLAN
Integrating California's Transportation Future

- Announcing the schedule for the open houses through a wide variety of means, including community calendars, distributing flyers at local events and libraries, email newsletters, social media and ethnic media.
- Seeking the assistance of transit agencies, stakeholder organizations and their communication channels to maximize outreach opportunities.
- Reaching out to traditionally underrepresented and/or underserved audiences.
- Evaluating public participation activities to continually improve the outreach process.

The overall Plan was developed with input from local governments, county transportation commissions (CTCs), tribal governments, non-profit organizations, businesses and local stakeholders within Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura counties. Outreach and coordination efforts also included work with providers of public transportation, county transportation commissions, and designated Consolidated Transportation Services Agencies (CTSAs) to ensure consistency with the plans and programs of these agencies, including short and long range plans of Coordinated Public Transit Human Services Transportation Plans. A fuller discussion of these plans can be found on pages 61–65 of the Transit Appendix.

From past plan development cycles, SCAG had heard from many participants about the need for early engagement during the development of the RTP/SCS. For members of the public, SCAG conducted public engagement activities between May and July 2015, with 23 open house events held across six counties. These events helped educate residents on the goals of the Plan, explore topics included in the Plan and gather input on priorities with an electronic survey. Participants reviewed poster boards showing projected changes in population and demographics within their county and the region, and then were asked for their input on how the region could accommodate growth in a variety of areas. These include providing transportation options, improving public health, preserving natural lands and supporting economic opportunities.

During discussion of the scenarios, major components were presented with maps, charts and figures. SCAG presented results associated with each scenario at public open houses held throughout the region to help stakeholders understand regional growth options. Participants learned about:

- The impact that different options for growth would have on transportation, land use, the economy and the environment
- The degree to which growth could be focused within the region's local jurisdictions over the next 25 years
- The potential shape and style of neighborhoods and transportation systems
- How varying combinations of land use and transportation strategies lead to different land consumption, travel, energy, water and pollutant impacts

Specific details on the scenarios can be found in the SCS Background Documentation Appendix.

Recognizing that not all members of the public could attend the open houses, SCAG provided an opportunity to participate virtually by providing workshop materials and a survey online. Hundreds of Southern Californians participated online and gave input on transit accessibility, transportation investments and other topics. A summary report from the survey was presented at a special joint meeting of SCAG's Regional Council and Policy Committees, and this report is also included in the Public Participation & Consultation Appendix.

In addition to these outreach efforts, all regular and special meetings of SCAG's Transportation Committee; Community, Economic and Human Development Committee; Energy and Environment Committee; Legislative/Communications and Membership Committee; Executive Administration Committee; and Regional Council were publicly noticed and opportunities for public comment were provided at each meeting. Federally required interagency consultation was done through the monthly meetings of the Transportation Conformity Working Group. Additional outreach strategies that were implemented are outlined in Public Participation & Consultation Appendix.

SCAG is not an implementing agency, so it is not directly involved in the construction or operation of transportation projects and other infrastructure improvements discussed in this Plan. The significance of the 2016 RTP/SCS is that the vision contained within the Plan sets the tone for policy development by other government agencies throughout the region. The public involvement discussed in this chapter helped the SCAG board and staff members understand the needs and concerns of stakeholders, leading to a more meaningful collective vision for the region's future.

SCENARIOS FOR THE FUTURE: IT'S OUR CHOICE

To refine the scenarios and ultimately develop a preferred scenario, SCAG gathered a large amount of feedback at the public meetings we have discussed. An important part of this process involved conducting comprehensive surveys.

SURVEY PARTICIPATION

Participants at public workshops were asked to complete a 37-question survey to provide input on their priorities, and open-ended feedback was encouraged. The survey was also available for completion on SCAG's website. Survey questions and a summary of responses are included in Public Participation & Consultation Appendix. Between the 2016 RTP/SCS Open Houses and the 2016 RTP/SCS website, more than 650 residents from throughout the SCAG region participated in the survey. About 75 percent of open house attendees participated in the survey, indicating that stakeholders were engaged during the workshops and wanted to participate in a meaningful way. The majority of survey participants resided in Los Angeles County, making up 51 percent of the total, followed by Orange County at 15 percent and Riverside, San Bernardino and Ventura Counties at nine percent each. Five percent of online participants did not state in which county they reside.

SURVEY RESULTS

Expanding transportation choices was clearly a priority for survey participants. Whether it is through public transportation, express lanes, bicycles or personal vehicles, our region wants as wide a range of choices as possible. When asked what our top priority should be for managing our regional highway and road system, the top two responses were almost evenly split. Most respondents wanted to protect and preserve existing transportation infrastructure—supporting a "Fix-it-First" policy—and they wanted to achieve maximum productivity through system management and demand management.

Moreover, the general open-ended comments received suggested there should be less focus on constructing new roads and lanes to build capacity. When asked about transportation budget priorities, survey respondents primarily favored creating more public transportation options, followed closely

by constructing bikeways and then improving traffic flow. Regarding transit, feedback received from comment cards was particularly helpful. The most prevalent comments stated a desire for:

- More efficient posting of time schedules
- More accurate system maps
- Better integration of fare systems
- Increasing space for bicycles on public transit
- Creating a comprehensive, efficient and regional-scale bus system
- Exploring opportunities such as double-decker highways that explicitly allow transit operations on one level
- Expanding transit commuter options

Open-ended written comments provided helpful direction in the area of active transportation. Many commenters preferred enhancing non-motorized infrastructure such as bike lanes and sidewalks to improve access to transit and increasing transportation options for all. Suggested strategies included:

- Simultaneously funding road improvements and prioritizing pedestrian infrastructure
- Increasing resources for Complete Streets and protected bike lanes
- Providing public education for motorists, cyclists and pedestrians to help everyone understand how roads are to be shared

Survey participants recognized the connection between public health, active transportation and the environment. When asked about which areas of public health they were most concerned about, air quality was the top health concern among respondents. Having safe areas for walking, biking and physical activity was also a concern, as was access to healthy food.

There is no "one size fits all" type of land use or density in a region as diverse as ours. However, it is fair to say that survey participants generally favored infill development rather than expanding our urban footprint into natural areas or farmland; 80 percent of respondents preferred development in existing areas. For example, when asked where future residential development should mostly occur, the majority of participants said they preferred part mixed-use, part urban areas. Some suburban mixed-use areas were also desired, but strictly urban or suburban areas were least favored. When asked what type of housing should be built to accommodate our region's future population, multifamily attached housing was the leading response. Small-lot detached homes and townhouses were somewhat favored, and large lot detached housing was least favored. About 90 percent of survey participants found protecting natural habitat areas to be important or very important.

Collectively, the survey responses offered an invaluable guide to help finalize the Plan's investments, strategies and priorities. They reflect how regional stakeholders want us to address priority areas such as transit and roadway investments, system management, active transportation, land use and public health.

OUR PREFERRED SCENARIO

The extensive public outreach, coupled with detailed analysis of each scenario and coordination with technical and policy committees, led to our selection of a preferred scenario for the 2016 RTP/SCS based upon SCAG's "Policy Growth Forecast." This preferred scenario also incorporated inputs from local jurisdictions, including the land use and transportation strategies, investments and policies reflected in the 2012 RTP/SCS.

The preferred scenario envisions future regional growth that is well coordinated with the transportation system improvements of the approved 2012 RTP/SCS, as well as anticipated new transportation projects planned by the region's CTCs and transit providers. It also incorporates best practices for increasing transportation choices; reducing our dependence on personal automobiles; allowing future growth in walkable, mixed-use communities and in High-Quality Transit Areas (HQTAs); and further improving air quality.

Regional investments in making transit trips quicker and easier are expanded to increase transit ridership. New land use concepts such as "Livable Corridors" and "Neighborhood Mobility Areas" are also introduced. These are described in more detail later in the Plan. In the preferred scenario for the 2016 RTP/SCS, new residential growth from 2012 to 2040 is split between multifamily housing (66 percent) and detached single-family homes (34 percent). The preferred scenario is the result of an investment plan that is assumed to be financially constrained.

To help our regional partners envision how the preferred scenario fosters development on the ground, SCAG built upon its earlier outreach and solicited feedback from local jurisdictions on the distribution of new households and employment at the neighborhood level, through 2040. During the review of the draft policy growth forecast in summer 2015, jurisdictions were asked to provide input on the growth scenario, including information on specific planned development projects with entitlements, other planned projects, or recently completed developments. Accordingly, the following core principles provided the framework for the preferred scenario:

- **Principle #1:** The preferred scenario will be adopted at the jurisdictional level, thus directly reflecting the population, household and employment growth projections derived from the local input process and previously reviewed and approved by local jurisdictions. The preferred scenario maintains these projected jurisdictional growth totals, meaning future growth is not reallocated from one local jurisdiction to another.
- **Principle #2:** The preferred scenario at the Transportation Analysis Zone (TAZ) level is controlled to be within the density ranges* of local general plans or input received from local jurisdictions.
- **Principle #3:** For the purpose of determining consistency for California Environmental Quality Act (CEQA), lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the 2016 RTP/SCS.
- **Principle #4:** TAZ level data or any data at a geography smaller than the jurisdictional level has been utilized to conduct required modeling analyses and is therefore advisory only and non-binding given that sub-jurisdictional forecasts are not adopted as part of the 2016 RTP/SCS. TAZ level data may be used by jurisdictions in local planning as it deems appropriate. There is no obligation by a jurisdiction to change its land use policies, General Plan, or regulations to be consistent with the 2016 RTP/SCS.
- **Principle #5:** SCAG will maintain communication with agencies that use SCAG sub-jurisdictional level data to ensure that the "advisory and non-binding" nature of the data is appropriately maintained.

Consistent with the above stated principles, the preferred scenario and corresponding forecast of population, household and employment growth is adopted at the jurisdictional level as part of the 2016 RTP/SCS and sub-jurisdictional level data and/or maps associated with the 2016 RTP/SCS is advisory only. For purposes of qualifying for future funding opportunities and/or other incentive programs, sub-jurisdictional data and/or maps used to determine consistency with the Sustainable Communities Strategy shall only be used at the discretion and with the approval of the local jurisdiction. However, this does not otherwise limit the use of the sub-jurisdictional data and/or maps by SCAG, CTCs, Councils of Governments, SCAG Subregions, Caltrans and other public agencies for transportation modeling and planning purposes. Any other use of the sub-jurisdictional data and/or maps not specified herein, shall require agreement from the Regional Council, respective policy committees and local jurisdictions.

The preferred scenario improves the reduction of greenhouse gas emissions in the region and enhances public health and other co-benefits from large transportation investments and improvements in technology—particularly those that focus on transit and first/last mile strategies.

Furthermore, the preferred scenario offers a vision for how we want our region to grow over the next quarter century and it gives us a clear-eyed view of what we want to achieve. Guided by goals and policies, built through analysis and refined with extensive public input, developing the preferred scenario set the stage for the hard work of building a comprehensive plan of land use and transportation strategies, programs and projects designed to confront our many challenges and move our region toward the vision embodied in the preferred scenario.

**With the exception of the six percent of TAZs that have average density below the density range of local general plans. The TAZs showing lower densities than GP designations are consistent with existing conditions and future land use and growth projections provided by local jurisdictions. SCAG did not lower the growth.*

Chapter 5 reviews those strategies, programs and projects that collectively will move the region toward realizing the outcomes seen in the preferred scenario—including more livable, healthy and economically strong communities and a more sustainable future.

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CHAPTER 5 HIGHLIGHTS

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THE ROAD TO GREATER MOBILITY & SUSTAINABLE GROWTH

At the beginning of Chapter 1, we reviewed several themes that resonate throughout the 2016 RTP/SCS. The first of these was: "Integrating strategies for land use and transportation." This is SCAG's overarching strategy for achieving its goals of regional economic development, maximized mobility and accessibility for all people and goods in our region, safe and reliable travel, a sustainable regional transportation system, a protected natural environment, health for our residents, and more.

INTEGRATING TRANSPORTATION AND LAND USE PLANNING: THE KEY TO ACHIEVING OUR GOALS

By integrating our strategies for transportation with our strategies for using land—in other words, considering in tandem how we grow and how we get around—we can build the communities that we want. Planning that does not strive for this close integration can result in sprawling suburbs connected haphazardly to poorly managed highways and isolated communities that lack easy access to public transportation connecting people from home to work, school and other destinations. Precious resources are squandered: time, energy, money, productivity, clean air and good health, among others.

As the region's transportation planning agency, SCAG has long promoted the concept of integrating transportation planning and land use planning. Since 2002, with the Southern California Compass and Shared Growth Vision for the region and the subsequent Compass Blueprint program (now the Sustainability Planning Grant Program), SCAG has promoted integrated planning tools for local governments that want their residents to have more mobility options, make their communities more livable, increase prosperity among all people and strive for sustainability. Subsequent policies adopted at the regional level in 2004, 2008 and 2012 have supported and advanced the integration of transportation and land use planning.

With the passage of Senate Bill 375 in 2008, the State of California formalized the idea of integrating planning statewide when the California Air Resources Board (ARB) set regional targets for reducing greenhouse gas emissions and required every Metropolitan Planning Organization (MPO) in the state to develop an SCS that charted a course toward reduced emissions and a more sustainable future. A central tenet of the SCS requirement is for MPOs to integrate land use and transportation planning.

Here is one example: High Quality Transit Areas (HQTAs) are places where people live in compact communities and have ready access to a multitude of safe and convenient transportation alternatives to driving alone—including walking and biking, taking the bus, light rail, commuter rail, the subway and/or shared mobility options. Along high quality bus corridors, for instance, a bus arrives at least every 15 minutes. Residential and commercial development is integrated with plans for transit, active transportation and other alternatives to driving alone.

The integrated strategies, programs and projects reviewed in this chapter are designed to improve a region with very specific changes underway: Over the next 25 years, our region's population is projected to grow by more than 20 percent, from about 18 million people to more than 22 million people. Diverse households will reside in all types of communities, including urban centers, cities, towns, suburban neighborhoods and rural areas. Much of the region will continue to be populated by households living in detached single-family dwellings located in lower-density suburban areas. However, 67 percent of new residences will be higher density multifamily housing, built as infill development within HQTAs. Households will demand more direct and easier access to jobs, schools, shopping, healthcare and entertainment, especially as Millennials mature and seniors grow in number. Concurrently, our Southern California region will remain a vital gateway for goods and services, an international center for innovation in numerous industries and a place that offers its residents a high standard of living. We know that our future growth will add new pressures to our transportation system and to our communities. However, through long-term planning that integrates strategies for transportation and land use, we can ensure that our region grows in ways that enhance our mobility, sustainability and quality of life.

OUR STRATEGIES FOR TRANSPORTATION AND LAND USE

In the discussion that follows, transportation and land use strategies are grouped separately, but it will nevertheless become clear how closely they are related to one another. The section that follows is the heart of the 2016 RTP/SCS, and by the end of the chapter our region's course toward a more mobile and sustainable future should be evident.

Serving as an MPO, Regional Transportation Planning Agency and Council of Governments, SCAG has an essential responsibility to develop an RTP/SCS that is dedicated to detailing recommended regional transportation investments and strategies. The agency has developed these transportation strategies in the context of how we are projected to grow and live as a region in coming decades. In this chapter we will first review regional strategies for growth and land use and then move into a comprehensive review of the agency's plans for the region's multi-faceted transportation system.

LAND USE STRATEGIES

The land use strategies included in this Plan are built on a foundation of contributions from communities, cities, counties and other local agencies across our region. The land use patterns reviewed here, for example, are based on local general plans as well as input from local governments. For this Plan update, SCAG was committed to preserving the growth forecasts provided by local jurisdictions at the jurisdictional level.

At the same time, Senate Bill 375 requires that SCAG, as the region's MPO, strive to develop a vision of regional development patterns that integrate with and support planned transportation investments. As part of that mandate, an overall land use pattern has been developed that respects local control, but also incorporates best practices for achieving state-mandated reductions in greenhouse gas emissions through decreases in per capita vehicle miles traveled (VMT) regionally.

2016 RTP/SCS LAND USE POLICIES

The 2016 RTP/SCS reaffirms the 2008 Advisory Land Use Policies that were incorporated into the 2012 RTP/SCS. These foundational policies, which have guided the development of this Plan's strategies for land use, are:

- Identify regional strategic areas for infill and investment
- Structure the plan on a three-tiered system of centers development[1]
- Develop "Complete Communities"
- Develop nodes on a corridor
- Plan for additional housing and jobs near transit
- Plan for changing demand in types of housing
- Continue to protect stable, existing single-family areas
- Ensure adequate access to open space and preservation of habitat
- Incorporate local input and feedback on future growth.

2016 RTP/SCS LAND USE STRATEGIES

For this Plan, land use strategies are described in this section.

[1] Complete language: "Identify strategic centers based on a three-tiered system of existing, planned and potential relative to transportation infrastructure. This strategy more effectively integrates land use planning and transportation investment." A more detailed description of these strategies and policies can be found on pps. 90–92 of the SCAG 2008 Regional Transportation Plan, adopted in May 2008.

Reflect The Changing Population And Demands

The SCAG region, home to about 18.3 million people in 2012, currently features 5.9 million households and 7.4 million jobs. By 2040, the Plan projects that these figures will increase by 3.8 million people, with nearly 1.5 million more homes and 2.4 million more jobs. HQTAs will account for three percent of regional total land, but will accommodate 46 percent and 55 percent of future household and employment growth respectively between 2012 and 2040. The 2016 RTP/SCS land use pattern contains sufficient residential capacity to accommodate the region's future growth, including the eight-year regional housing need, as shown in TABLE 5.1. The land use pattern accommodates about 530,000 additional households in the SCAG region by 2020 and 1.5 million more households by 2040. The land use pattern also encourages improvement in the jobs-housing balance by accommodating 1.1 million more jobs by 2020 and about 2.4 million more jobs by 2040.

This 2016 RTP/SCS reflects a continuation of the shift in demographics and household demand since 2012. This shift is apparent in the land use development pattern, which assumes a significant increase in small-lot, single-family and multifamily housing that will mostly occur in infill locations near bus corridors and other transit infrastructure. In some cases, the land use pattern assumes that more of these housing types will be built than currently anticipated in local General Plans. This shift in housing type—especially the switch from large-lot to small-lot single-family homes—is already occurring as developers respond to new demands. In 2008, 45 percent of all housing units were multifamily homes. From 2012 through 2040, the Plan projects that 66 percent of the 1.5 million new homes expected to be built in the SCAG region will be multifamily units, reflecting demographic shifts and anticipated market demand. This will result in an increase of multifamily units in the region to 49 percent of all housing units in the region.

Combating Gentrification and Displacement

The 2012 RTP/SCS discussed strategies to combat gentrification and displacement, a continuing challenge that we discussed in Chapter 3. Jurisdictions in the SCAG region should continue to be sensitive to the possibility of gentrification and work to employ strategies to mitigate its potential negative community impacts. Generally, the SCAG region will benefit from higher-density infill development, which means that neighborhoods will be adding to the local housing stock rather than maintaining the current stock and simply changing the residential population. In addition, local jurisdictions are encouraged to pursue the production of permanent affordable housing through deed restrictions or development by non-profit developers, which will ensure that some units will remain affordable to lower-income households. SCAG will

work with local jurisdictions and community stakeholders to seek resources and provide assistance to address possible gentrification impacts of new development on existing communities and vulnerable populations.

Focus New Growth Around Transit

The 2016 RTP/SCS overall land use pattern reinforces the trend of focusing new housing and employment in the region's HQTAs (see EXHIBIT 5.1). While maintaining jurisdictional totals, the overall land use pattern moves new development from areas outside of HQTAs into these areas. SCAG incorporated land use plans provided by local jurisdictions into this pattern. While many residents and employees within half a mile of a transit stop or corridor can walk or bike to transit, not all of these areas are targeted for new growth and/or land use changes. The 2016 RTP/SCS assumes that 46 percent of new housing and 55 percent of new employment locations developed between 2012 and 2040 will be located within HQTAs, which comprise only three percent of the total land area in the SCAG region. Since adoption of the 2012 RTP/SCS, jurisdictions have referenced HQTAs in their planning documents and have positioned themselves to compete for California's Cap-and-Trade auction proceeds to support Transit Oriented Development (TOD) and active transportation infrastructure.

HQTAs are a cornerstone of land use planning best practice in the SCAG region because they concentrate roadway repair investments, leverage transit and active transportation investments, reduce regional life cycle infrastructure costs, improve accessibility, avoid greenfield development, create local jobs, and have the potential to improve public health and housing affordability. Here, households have expanded transportation choices with ready access to a multitude of safe and convenient transportation alternatives to driving alone—including walking and biking, taking the bus, light rail, commuter rail, the subway and/or shared mobility options. Households have more direct and easier access to jobs, schools, shopping, healthcare and entertainment, especially as Millennials form households and the senior population increases. Moreover, focusing future growth in HQTAs can provide expanded housing choices that nimbly respond to trends and market demands, encourage adaptive reuse of existing structures, revitalize main streets and increase Complete Street investments.

Additional local policies that ensure that development in HQTAs achieve the intended reductions in VMT and greenhouse gas emissions include:

TABLE 5.1 REGIONAL HOUSING NEEDS ASSESSMENT, ADOPTED 2012

Projection period 2014–2021

COUNTY	NUMBER OF VERY LOW INCOME HOUSEHOLDS	NUMBER OF LOW INCOME HOUSEHOLDS	NUMBER OF MODERATE INCOME HOUSEHOLDS	NUMBER OF ABOVE MODERATE INCOME HOUSEHOLDS	TOTAL
Imperial	4,194	2,553	2,546	7,258	16,551
Los Angeles	45,672	27,469	30,043	76,697	179,881
Orange	8,734	6,246	6,971	16,015	37,966
Riverside	24,117	16,319	18,459	42,479	101,374
San Bernardino	13,399	9,265	10,490	24,053	57,207
Ventura	4,516	3,095	3,544	8,003	19,158
SCAG	100,632	64,947	72,053	174,505	412,137

EXHIBIT 5.1 HIGH QUALITY TRANSIT AREAS IN THE SCAG REGION FOR 2040 PLAN

High Quality Transit Areas (including rail stations and qualifying bus corridors, see glossary for definition)

- 2012 Base Year
- 2040 Plan (Note: 2040 Plan Rail Station Alternatives shown as ⊙)

(Source: SCAG)

- Affordable housing requirements
- Reduced parking requirements
- Adaptive reuse of existing structures
- Density bonuses tied to family housing units such as three- and four-bedroom units
- Mixed-use development standards that include local serving retail
- Increased Complete Streets investments around HQTAs. Complete Streets are streets designed, funded and operated to enable safe access for roadway users of all ages and abilities, including pedestrians, bicyclists, motorists and transit riders.

The State of California is also trying to encourage growth around transit with the passage of Senate Bill 743 (SB 743), which seeks to facilitate transit-oriented projects in existing urbanized areas. The bill creates a new exemption from CEQA for certain projects that are residential or employment centers or mixed-used projects located within a Transit Priority Area (TPA), a part of a specific plan with a certified EIR and consistent with the SCS or APS.

Transit Oriented Development, HQTAs and Local Air Quality Impacts

The 2016 RTP/SCS recognizes guidance from the 2005 ARB air quality manual, which recommends limiting the siting of sensitive uses within 500 feet of highways and urban roads carrying more than 100,000 vehicles per day. This ARB guidance is carefully applied in areas that support Transit Oriented Development. Less than 10 percent of HQTAs planned in the 2016 RTP/SCS would fall within 500 feet of highways and highly traveled corridors, according to geographic information system (GIS) analyses. While density is increased in some areas of HQTAs, growth remains constant in areas within 500 feet of highways and urban roads to reflect local input, thereby balancing the growth distribution.

Plan for Growth Around Livable Corridors

The Livable Corridors strategy seeks to revitalize commercial strips through integrated transportation and land use planning that results in increased economic activity and improved mobility options. Since 2006, SCAG has provided technical assistance for 19 planning efforts along arterial roadway corridors. These corridor planning studies focused on providing a better understanding of how corridors function along their entire length. Subsequent research has distinguished the retail density and the specific kinds of retail needed to make these neighborhood nodes destinations for walking and biking.

From a land use perspective, Livable Corridors strategies include a special emphasis on fostering collaboration between neighboring jurisdictions to encourage better planning for various land uses, corridor branding, roadway improvements and focusing retail into attractive nodes along a corridor.

Livable Corridors Network

SCAG identified 2,980 miles of Livable Corridors along arterial roadways discussed in corridor planning studies funded through the Sustainability Planning Grant program and along enhanced bus transit corridors identified by regional partners. However, the land use strategies proposed in the 2016 RTP/SCS are not tied to a specific corridor. Livable Corridors are predominately a subset of the HQTAs, however 154 miles are not designated as HQTAs. These miles were identified in Sustainability Planning Grant projects and are proposed for active transportation improvements and the land use planning strategies described below.

Livable Corridors Strategies

The Livable Corridors concept combines three different components into a single planning concept to model the VMT and greenhouse gas emission reduction benefits:

- **Transit improvements:** The associated county transportation commissions (CTCs) have identified some of these corridors for on-street, dedicated lane Bus Rapid Transit (BRT) or semi-dedicated BRT-light. The remaining corridors have the potential to support other features that improve bus performance. These other features include enhanced bus shelters, real-time travel information, off-bus ticketing, all door boarding and longer distances between stops to improve speed and reliability.
- **Active transportation improvements:** Livable Corridors should include increased investments in Complete Streets to make these corridors and the intersecting arterials safe for biking and walking.
- **Land use policies:** Livable Corridor strategies include the development of mixed-use retail centers at key nodes along the corridors, increasing neighborhood-oriented retail at more intersections and zoning that allows for the replacement of under-performing auto-oriented strip retail between nodes with higher density residential and employment. These strategies will allow more context sensitive density, improve retail performance, combat blight and improve fiscal outcomes for local communities.

Provide More Options For Short Trips

Thirty-eight percent of all trips in the SCAG region are less than three miles. The 2016 RTP/SCS includes land use strategies, Complete Streets integration and a set of state and local policies to encourage the use of alternative modes of transportation for short trips in new and existing Neighborhood Mobility Areas (NMAs) and Complete Communities. In addition to the active transportation strategies that will be discussed below, land use strategies include pursuing local policies that encourage replacing motor vehicle use with Neighborhood Electric Vehicle (NEV) use. NEVs are a federally designated class of passenger vehicle rated for use on roads with posted speed limits of 35 miles per hour or less.

Neighborhood Mobility Areas

NMAs have a high intersection density, low to moderate traffic speeds and robust residential retail connections. These areas are suburban in nature, but can support slightly higher density in targeted locations. The land use strategies include shifting retail growth from large centralized retail strip malls to smaller distributed centers throughout an NMA. This strategy has shown to improve the use of active transportation or NEVs for short trips. Steps needed to support NEV use include providing state and regional incentives for purchases, local planning for charging stations, designating a local network of low speed roadways and adopting local regulations that allow smaller NEV parking stalls. NMAs are applicable in a wide range of settings in the SCAG region. The strategies associated with this concept are intended to provide sustainable transportation options for residents of the region who do not have convenient access to high-frequency transit options.

Complete Communities

Development of "complete communities" can provide households with a range of mobility options to complete short trips. The 2016 RTP/SCS supports the creation of these mixed-use districts through a concentration of activities with housing, employment, and a mix of retail and services, located in close proximity to each other. Focusing a mix of land uses in strategic growth areas creates complete communities wherein most daily needs can be met within a short distance of home, providing residents with the opportunity to patronize their local area and run daily errands by walking or cycling rather than traveling by automobile.

Support Local Sustainability Planning

To implement the SCS, SCAG supports local planning practices that help lead to a reduction of greenhouse gas emissions. Many local governments in the SCAG region serve as models for implementing the SCS. Sustainable Planning & Design, Zoning Codes and Climate Action Plans are three methods that local agencies have been adopting and implementing to help meet the regional targets for greenhouse gas emission reductions outlined in the SCS.

Sustainable Planning & Design

Many of the local policy documents that SCAG has reviewed are based on best practices that encourage infill and mixed-use development. Mixed-use design guidelines embrace and encourage increased densities and a mixing of uses, while also reflecting community character. For example, numerous suburban specific plans in the SCAG region encourage the revitalization of traditional main streets, downtowns and corridors. Other plans provide guidance for converting single-use office parks and industrial districts into mixed employment, retail and residential districts.

Sustainable Zoning Codes

Many cities and counties in the SCAG region have adopted form-based zoning codes that are tailored to local conditions, such as specifying building size and design parameters but allowing for more flexibility regarding use. Moreover, several cities and counties are updating their zoning codes to make development standards more environmentally friendly and equitable. One example is the City of San Gabriel's "Greening the Code" strategy, which identifies ways for the city's existing development code to facilitate more sustainability. New policies can involve coordinating landscaping practices with water conservation, best management practices for stormwater management and capture, creating better pedestrian connectivity, allowing more flexibility for mixed-use development and promoting energy efficient designs.

Climate Action Plans

SCAG is supporting several local governments throughout the region in the formation of Climate Action Plans (CAP). CAPs outline strategies for reducing greenhouse gas emissions in a cost effective manner. This is done by creating greenhouse gas inventories so that local governments can efficiently target their emission reduction practices to sources that pollute the most. Strategies outlined by CAPs in the SCAG region include Green Building guidelines for municipal buildings and facilities, implementing public electric vehicle charging stations and establishing energy retrofit incentive programs for residents.

2016 RTP/SCS Strategy

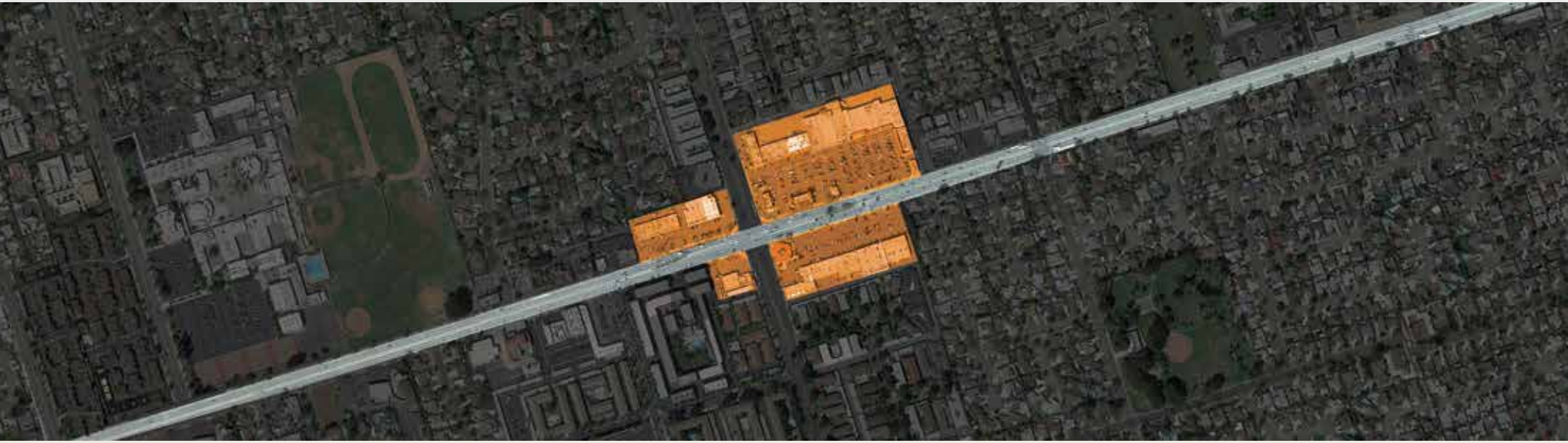
LIVABLE CORRIDORS

Enhancing the Connection Between Transit and Land Use

The SCAG region is crisscrossed by long arterial corridors, many of which are a legacy of Spanish colonial routes that linked the early missions and post-colonial ranchos. The suburban communities that developed rapidly after World War II were formed between these corridors, on a large (often one square mile) grid system. The inland portions of the South Bay, the Gateway Cities, the San Fernando and San Gabriel valleys, as well as the northern portions of Orange County follow this pattern. SCAG's Livable Corridors Strategy considers these suburban development patterns and proposes to encourage development along the boulevards that not only serve as major travel routes, but also destinations.

As the region transitions to higher investments in infill development and high quality, high frequency transit, these arterials are well suited to connect the region. The Livable Corridor Strategy specifically advises local jurisdictions to plan and zone for increased density at key nodes along the corridor and replacement of single-story under-performing strip retail with well-designed higher density housing and employment centers. This development along key corridors, when coordinated with improvements to the frequency and speed of buses along the corridors, will make transit a more convenient and viable option. Additionally, enhanced roadway designs to accommodate active transportation will also increase the vibrancy along these boulevards.

Several important transit investments in the SCAG region will help encourage this land use strategy. The Santa Ana Harbor Blvd Specific Plan incorporates the improved Orange County Transportation Authority (OCTA) Bravo! Route 543 and the planned OC Streetcar into its vision of the future. In Rancho Cucamonga, the City received a SCAG grant to reconcile the various specific plans along Foothill Blvd in anticipation of a future extension of the Omnitrans SbX. Across Los Angeles County, the Los Angeles County Metropolitan Transportation Authority (Metro) is planning for a high frequency network of buses with fewer stops. And the City of Los Angeles incorporated a "Transit Enhanced Network" as part of its General Plan Mobility Element to complement these investments.



Example of a Livable Corridor

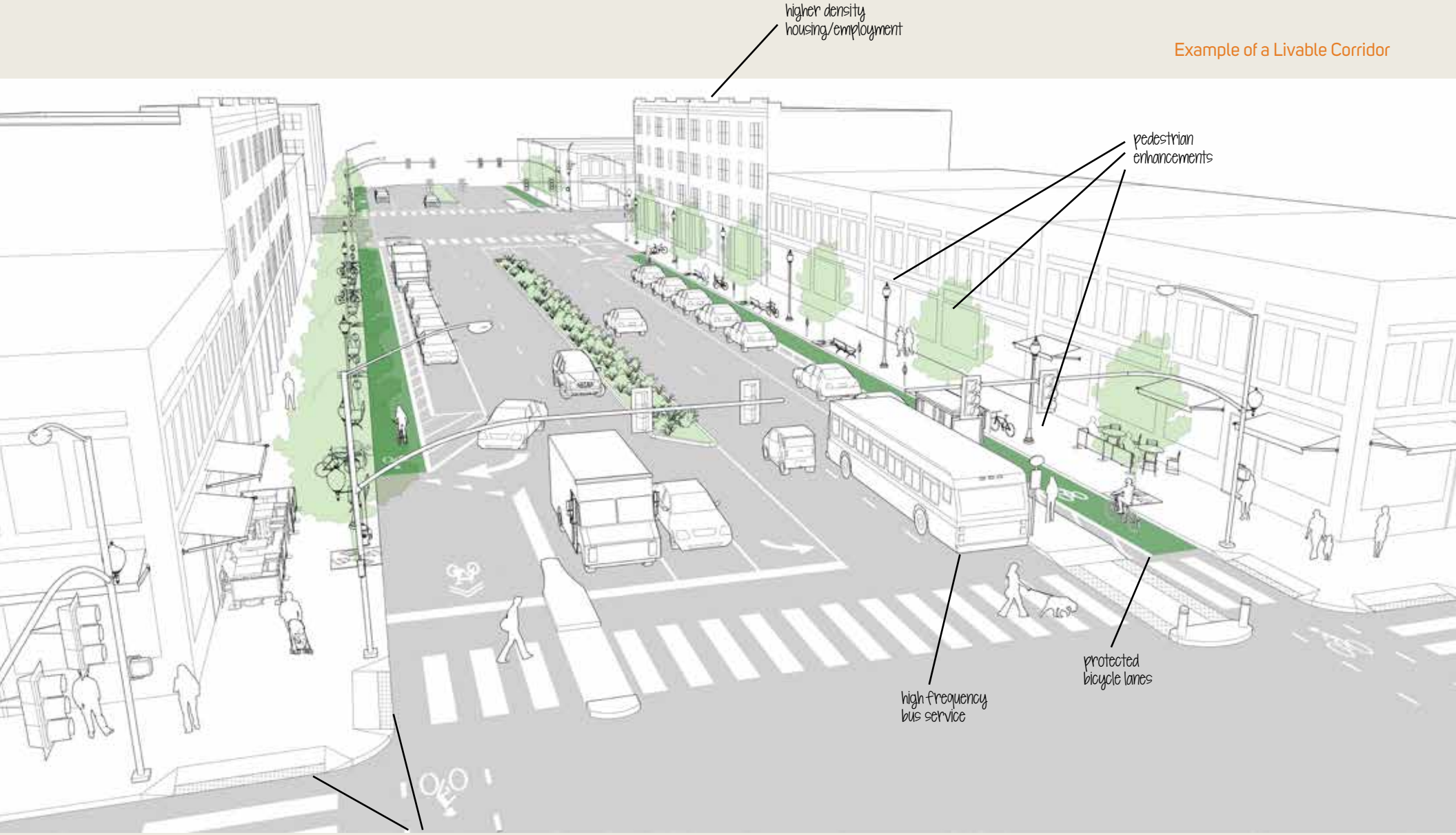


Image courtesy of National Association of City Transportation Officials

2016 RTP/SCS Strategy

NEIGHBORHOOD MOBILITY AREAS

Encouraging Active Transportation for Short Trips

About 38 percent of all trips in the region are three miles or less. That is a short enough distance that can be covered by walking or biking, but more than 78 percent of these trips are made by driving. While convenient, driving for short trips can cause unnecessary congestion and pollution. What can be done to make it more convenient for people to walk, bike or even skate instead of driving, when practical?

The Neighborhood Mobility Areas strategy represents a set of state and local policies to encourage the use of active and other non-automobile modes of transportation, particularly for short trips in many suburban areas in Southern California developed between the late 1890s and the early 1960s. These suburban developments often were designed for streetcars and walking, in addition to automobiles and are characterized by small to medium lot single-family homes, a denser grid network of local roads, a higher density of intersections and accessibility to neighborhood retail establishments. By employing Complete Streets strategies, such as bike lanes, roundabouts, wider sidewalks or better lighting, the neighborhood design could encourage a return to greater active transportation use for those short trips. Similarly, planning a connected network of dedicated lanes and roadways with speed limits 35 mph and under can encourage more use of Neighborhood Electric Vehicles (NEV) for short trips. NEVs produce negligible greenhouse gas missions (based on energy production) and zero local pollution. In addition, NEVs take up less roadway capacity, less parking area at both the origin and destination and reduce the probability of an injury or fatality in the event of a collision with a pedestrian or bicyclist.

The Neighborhood Mobility Area concept is not new. Across the country, they are referred to as streetcar suburbs, first generation suburbs or suburban villages. But its application here in Southern California, when coupled with the renaissance some parts of the region are experiencing with transit and active transportation, would provide residents with greater mobility choices and an alternative to driving short distances.

Example of a Neighborhood Mobility Area

Image courtesy of National Association of City Transportation Officials

Protect Natural and Farm Lands

Many natural and agricultural land areas near the edge of existing urbanized areas do not have plans for conservation and they are susceptible to the pressures of development. Many of these lands, such as riparian areas, have high per-acre habitat values and are host to some of the most diverse yet vulnerable species that play an important role in the overall ecosystem.

Developing Conservation Strategies

Local land use decisions play a pivotal role in the fate of some of the region's most valuable habitat and farm lands. Many local governments have taken steps toward planning comprehensively for conserving natural lands and farm lands, while also meeting demands for growth. Across the region, transportation agencies and local governments have used habitat conservation plans and other tools to link land use decisions with comprehensive conservation plans in order to streamline development.

To support those and other comprehensive conservation planning efforts and to inform the local land use decision making process, SCAG studied regional scale habitat values, developed a conservation framework and assembled a natural resource database.[2] To coordinate with and support the viability of the Livable Corridors and HQTA land use strategies, this Plan suggests redirecting growth away from high value habitat areas to existing urbanized areas.

SCAG is engaging numerous stakeholders as it creates a Natural Lands Conservation Plan. Building on this effort may lead to a regional conservation program that CTCs, jurisdictions, agencies and non-profits can align with and support. This strategic and comprehensive approach allows the region to meet its housing and transportation needs, while ensuring that important natural lands, farm lands and water resources are protected. The 2012 RTP/SCS committed to a regional mitigation plan for inclusion in the 2016 RTP/SCS. With that as the foundation, the following are next steps for further developing a conservation strategy. More information can be found in the Natural & Farm Lands Appendix.

- Expanding upon the Open Space Conservation Database and Framework by incorporating strategic mapping layers to build the database and further refine the priority conservation areas
- Encouraging CTCs to develop advanced mitigation programs and/or include them in future transportation measures
- Aligning with funding opportunities and pilot programs to begin implementation of the Natural Lands Conservation Plan through acquisition and restoration
- Providing incentives to jurisdictions that cooperate across county lines to protect and restore natural habitat corridors, especially where corridors cross county boundaries.

TRANSPORTATION STRATEGIES

The strategies for land use are tightly integrated with considerations for transportation, and that relationship is vital for our region to achieve its long-term regional goals. The same applies to our discussion of transportation strategies. The success of strategies related to transportation can only be achieved if they are tied closely to how we use land—how and where we grow, where we live, work, go to school, shop and so on. SCAG is pursuing numerous strategies divided into two broad categories: Maximizing Our Current System and Completing Our System. In all, the 2016 RTP/SCS includes $556.5 billion in transportation system investments through 2040.

MAXIMIZING OUR CURRENT SYSTEM

Working to make sure our existing transportation system is operating at maximum efficiency is a leading regional priority—and doing this is critical for the land use strategies discussed above to be effective. Over the past half century, the SCAG region has invested hundreds of billions of dollars into building and expanding the multimodal transportation system that we rely on today. Our investments must be protected and properly maintained to ensure that maximum productivity and efficiency are gained from the system. Under the system management approach, priority is given to maintaining and preserving the system, as well as ensuring that it is being operated as safely, efficiently and effectively as possible. This approach is illustrated in the system management pyramid (FIGURE 5.1). Protecting our previous investments and getting the most out of every component is the highest priority for our region.

Preserve Our Existing System

Southern California's transportation system is becoming increasingly compromised by decades of underinvestment in maintaining and preserving our infrastructure. These investments have not kept pace with the demands placed on the system and the quality of many of our roads, highways, bridges, transit, and bicycle and pedestrian facilities are continuing to deteriorate. Unfortunately, the longer they deteriorate the more expensive they will be to fix in the future. Even worse, deficient conditions compromise the safety of users throughout the

[2] SCAG 2014 Inventory of Natural Resources Databases in SCAG region. Accessed at http://sustain.scag.ca.gov/Sustainability%20Portal%20Document%20Library/SCAG%20Inventory%20Natural%20Resources%20GIS%20Databases.pdf.

network. For all of these reasons, system preservation and achieving a state of good repair are top priorities of the 2016 RTP/SCS.

About $275.5 billion, or nearly half of all of the 2016 RTP/SCS proposed expenditures through 2040, is allocated to system preservation and operation (see FIGURE 5.2). Chapter 6 reflects the allocation of these expenditures for the transit and passenger rail systems, the State Highway System, and regionally significant local streets and roads within the 2016 RTP/SCS. Note that the allocation for the State Highway System includes bridges; the allocation for transit includes funding to both preserve and operate the transit system; and the allocation for regionally significant local streets and roads includes bridges and active transportation safety improvements. The 2016 RTP/SCS system preservation strategies include:

- Protecting and preserving what we have first, supporting a "Fix-it-First" principle.
- Considering life-cycle costs beyond construction.
- Continuing to work with stakeholders to identify and support new sustainable funding sources and/or increased funding levels for preservation and maintenance.

Manage Congestion

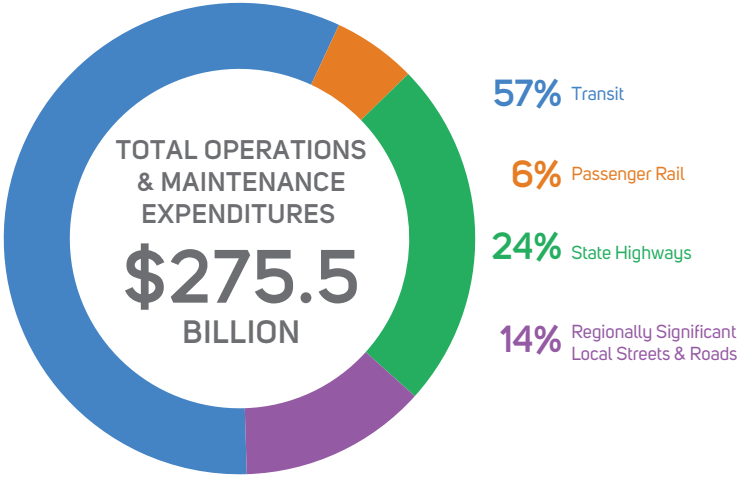
Congestion Management Process (CMP)

Federal regulations for Metropolitan Transportation Planning and Programming require the development, establishment and implementation of a CMP that is fully integrated into the regional planning process.[3] The Federal Highway Administration (FHWA) defines the CMP as a "systematic approach . . . that provides for effective management and operation, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under title 23 U.S.C. and title 49 U.S.C., through the use of operational management strategies." In compliance

[3] 23 CFR 450.320.

FIGURE 5.1 SYSTEM MANAGEMENT PYRAMID

FIGURE 5.2 PRESERVATION AND OPERATIONS EXPENDITURES



Note: Numbers may not sum to total due to rounding.

with federal law,[4] SCAG has made the CMP an integral part of the regional transportation planning process, including the 2016 RTP/SCS and the Federal Transportation Improvement Program (FTIP). The CMP is part of SCAG's integrated approach to improving and optimizing the transportation system, to provide for the safe and effective management of the regional transportation system through the use of monitoring and maintenance, demand reduction, land use, operational management strategies and strategic capacity enhancements. SCAG undertakes eight actions that are considered by FHWA to be the core of the CMP. These include developing regional objectives for congestion management; using performance measures and monitoring to understand the causes of congestion; identifying problems and needs; developing alternative strategies; and evaluating effectiveness. A more complete discussion of SCAG's CMP is provided in the Congestion Management Appendix.

The CMP requires that roadway projects that significantly increase the capacity for single-occupancy vehicles (SOVs) be addressed through a CMP that provides appropriate analysis of reasonable, multimodal travel demand reduction and operational management strategies for the corridor. If alternative strategies are neither practical nor feasible, appropriate management strategies must be considered in conjunction with roadway capacity improvement projects that would increase SOV capacity. SCAG previously used a $50 million threshold to identify SOV capacity-enhancing projects, but the agency is replacing this criterion with a project distance-based length criterion of one mile or more for the 2017 FTIP. Further details of this process are included in the upcoming 2017 FTIP.

Transportation Demand Management (TDM)

The 2016 RTP/SCS commits $6.9 billion toward TDM strategies throughout the region. There are three main areas of focus:

- Reducing the number of SOV trips and overall vehicle miles traveled (VMT) through ridesharing, which includes carpooling, vanpooling and supportive policies for shared ride services such as Uber and Lyft.
- Redistributing or eliminating vehicle trips from peak demand periods through incentives for telecommuting and alternative work schedules.
- Reducing the number of SOV trips through the use of other modes of travel such as transit, rail, bicycling and walking.

In addition, the following strategies expand and encourage the implementation of TDM strategies to their fullest extent:

- Rideshare incentives and rideshare matching.
- Parking management and parking cash-out policies.
- Preferential parking or parking subsidies for carpoolers.
- Intelligent parking programs.
- Promotion and expansion of Guaranteed Ride Home programs.
- Incentives for telecommuting and flexible work schedules.
- Integrated mobility hubs and first/last mile strategies.
- Incentives for employees who bike and walk to work.
- Investments in active transportation infrastructure.
- Investments in Safe Routes to School programs and infrastructure.

Transportation Systems Management (TSM)

The 2016 RTP/SCS includes $9.2 billion for TSM improvements. These include extensive advanced ramp metering, enhanced incident management, bottleneck removal to improve flow (e.g., auxiliary lanes), expansion and integration of the traffic signal synchronization network, data collection to monitor system performance, and other Intelligent Transportation System (ITS) improvements.

The 2016 RTP/SCS identifies a comprehensive set of strategies that work in concert to optimize the performance of the transportation system. This set of strategies does not focus solely on expanding the system, but also considers how we operate the system; how we coordinate land use planning with transportation planning; how we deal with incidents such as collisions or special events; how we provide information to the traveling public so people can make informed decisions about how, where and when to travel; and how we maintain the system. All of these strategies are based on a foundation of comprehensive system monitoring so that we can understand how the transportation system is performing and where we need improvement. This approach is based in part on work that California Department of Transportation (Caltrans) has done for many years to optimize the performance of the State Highway System. Two important categories for TSM strategies are:

1. **Corridor Mobility and Sustainability Improvement Plans:** Caltrans, SCAG and county partners in the past have worked together to improve the efficiency of our highways and arterials through the development of Corridor System Management Plans (CSMPs). Since the passage of Proposition 1B in November 2006 and with the creation Corridor Mobility Improvement Account (CMIA), which

[4] 23 USC 134 and 49 USC 5303-5305.

served to improve mobility on the State Highway System, several CSMPs have been developed for various corridors throughout the SCAG region. Historically, the response to congestion has been to add additional capacity. However, CSMPs have provided a lower cost, higher benefit option toward making highways and parallel arterial systems, transit and incident response management more efficient and were designed to focus primarily on operational strategies to optimize corridor performance through ITS strategies, in conjunction with operational and capacity improvements towards improving productivity along highway corridors. SCAG recognizes the efforts taken thus far under the current CSMP framework to improve mobility, but believes that CSMPs can be further improved upon. SCAG encourages the development of Corridor Sustainability Studies (CSS) which will build upon the existing CSMP framework by analyzing the corridor from a multimodal perspective. More specifically, these studies will include a focus on newer planning priorities such as Complete Streets and a Smart Mobility Framework (not addressed by current CSMPs). SCAG recognizes that the region could benefit from a site specific CSS focused on improving mobility for all modes of travel throughout the region.

2. **Integrated Corridor Management (ICM):** The ICM Initiative was first introduced by the U.S. Department of Transportation (U.S. DOT) back in 2006. Under the ICM approach, all elements within a corridor are considered to evaluate opportunities that move people and goods in the most efficient manner possible, while simultaneously ensuring that the greatest operational efficiencies are achieved. Since the introduction of ICM, great progress has been made. In Los Angeles, Caltrans (in coordination with Los Angeles County Metropolitan Transportation Authority or Metro) and various cities have embarked on the first Integrated Corridor Management pilot project on Interstate 210. This project aims to minimize congestion due to collisions and is also referred to as the Connected Corridors initiative. Over the next ten years, Caltrans plans to implement similar projects on 25 additional congested corridors statewide. ICM strategies to be considered as part of the Interstate 210 project include:

   - Integration of highway ramp meters and arterial signal systems
   - Arterial signal coordination
   - Traffic re-routing due to incidents or events
   - Transit signal priority on arterials and on-ramps
   - Parking management
   - Traveler communication (via changeable message signs, 511, radio, social networks, mobile app) of traffic conditions, transit services, parking, alternate route/trip/mode options
   - System coordination/communication between Caltrans (highway operator) and local jurisdictions (arterial operators).

Additional System Management Initiatives include:

- Arterial Signal Synchronization projects that have been completed on various arterials through the region to optimize traffic flow
- The Dynamic Corridor Congestion Management (DCCM) initiative in Los Angeles County, in which Caltrans is developing a corridor management initiative on Interstate 110 to coordinate highway ramp metering with arterial signals. Various efforts have been completed to inform the traveling public of expected travel times to various destinations and in some cases provide travel time comparisons with transit.
- The Caltrans Advanced Traffic Management (ATM) study for Interstate 105 and the Regional Integration of ITS Projects (RIITS) and IEN data exchange efforts at Los Angeles Metro.

Promote Safety and Security

Ensuring the safety and security of our transportation network for residents and visitors is a top priority. SCAG supports the implementation of the Strategic Highway Safety Plan (SHSP), which has an overarching goal of Toward Zero Deaths. The state's short-term goals are to reduce the number and rate of fatalities by three percent per year and to reduce the number and rate of severe injuries by 1.5 percent per year. SCAG is continuing to work with Caltrans and the CTCs toward identifying other means of improving the safety and security of our transportation system.

Regarding our transportation network's security, there are numerous agencies that participate in the response to incidents and assist with hazard preparations for individual jurisdictions. These include the California Emergency Management Agency, county offices of emergency management, fire departments, police departments and the California Highway Patrol. Collaboration among many of these agencies is essential when addressing incidents regionwide. The Federal Emergency Management Agency (FEMA) oversees this coordination. However, FEMA defines metropolitan areas differently than the U.S. DOT, so this limits SCAG's ability to participate at an agency level. Nevertheless, SCAG seeks to use its strengths and organization to assist first responders, recovery teams and planners alike in a supporting role.

FOCUS

BENEFITS OF TRANSPORTATION SYSTEMS MANAGEMENT/ TRANSPORTATION DEMAND MANAGEMENT (TSM/TDM)

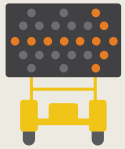
Enhanced Incident Management
Reduces incident-related congestion, which is estimated to represent half of the total congestion in urban areas

Transit Automatic Vehicle Location
Enables monitoring of transit vehicles and ensures on-time performance

Advanced Ramp Metering
Alleviates congestion and reduces collisions at on-ramps and highway-to-highway interchanges

Traffic Signal Synchronization
Minimizes wait times at traffic signals and therefore reduces travel time

Improved Data Collection
Allows implementing agencies and operators to monitor system performance and optimize the impact of transportation investments



Advanced Traveler Information
Provides real-time traffic conditions and alternative routing, and therefore allows the public to make more informed travel decisions

Universal Transit Fare Cards (Smart Cards)
Reduces time required to purchase transit tickets and allows interoperability among transit providers

Case Study: Interstate 210 Pilot Project

Historically, efforts to reduce congestion have focused solely on individual networks, in which underutilized capacity in parallel highway lanes, arterial lanes and transit services were often not considered. In recent years, TSM/TDM strategies have been developed to increase efficiency through the use of technologies. The application of these technologies, such as intelligent transportation systems (ITS), and a commitment by Caltrans and its partner agencies to work together have the potential to transform the ways that corridors are currently operated.

In 2012, Caltrans, with assistance from Metro and California Partners for Advanced Transportation Technology (PATH) at UC Berkeley, developed the first Integrated Corridor Management (ICM) pilot project within the SCAG region along the Interstate 210 (I-210) corridor. The purpose of the pilot is to look at all opportunities to move people and goods in the most efficient manner possible, to ensure the greatest potential gains in operational performance. This includes seeking ways to improve how arterials, highways, transit and parking systems work in conjunction with one another.

Strategies to be considered as part of the project include:

- Integration of highway ramp meters and arterial signal systems
- Arterial signal coordination
- Traffic re-routing due to incidents or events
- Transit signal priority on arterials and on-ramps
- Parking management (e.g., smart parking—locating available parking spaces at transit stations and private parking garages)
- Variable lane configuration systems
- Traveler communication (via changeable message signs, 511, radio, social networks, mobile app) of traffic conditions, transit services, parking, alternate route/trip/mode options
- System coordination/communication between Caltrans and local jurisdictions

The pilot is still under development, but it has already changed the way state and local transportation agencies work together in managing transportation systems. Caltrans aims to eventually expand the application of ICM concepts to other corridors over the next ten years. In this context, the Interstate 210 Pilot is a test bed to demonstrate how an ICM project can be developed by engaging and building consensus among corridor stakeholders, to address congestion for the betterment of an entire network.

Caltrans

CALIFORNIA PATH

SCAG continues to pursue the following strategies toward ensuring safety and security:

- Ensure transportation safety, security and reliability for all people and goods throughout the region.
- Prevent, protect, respond to and recover from major human-caused or natural events in order to minimize the threat and impact to lives, property, the transportation network and the regional economy.
- Provide a policy forum to help develop regional consensus and education on security policies and emergency responses.
- Assist in expediting the planning and programming of transportation infrastructure repairs from major disasters.
- Encourage the integration of transportation security measures into transportation projects early in the development process by leveraging SCAG's relevant plans, programs and processes (including regional Intelligent Transportation Systems (ITS) architecture).

For more details on safety and security and additional policies and strategies, please review the Transportation Safety & Security Appendix.

COMPLETING OUR SYSTEM

Strategies for improving and expanding the many modes of transportation that make up the regional network must be integrated closely with our strategies for how we use land. The success of transit; passenger rail; walking, biking and other forms of active transportation; our highways and arterials; the efficient movement of goods; and our regional airport system all depend on a close relationship with how our region uses land and how we grow. This is particularly true when it comes to improving and building a transit system that can best serve people in communities throughout our region. It is the first transportation category for which numerous strategies are reviewed.

Transit

Since 1991, the SCAG region has spent more than $50 billion dollars on public transportation. This includes high profile investments in rail transit and lower profile, vital investments in operations and maintenance. Looking toward 2040, the 2016 RTP/SCS maintains a significant investment in public transportation across all transit modes and also calls for new household and employment growth to be targeted in areas that are well served by public transportation to maximize the improvements called for in the Plan. This investment package includes a selection of major capital investments described in TABLE 5.2, which displays all locally notable transit capital projects and additional capital investment packages totaling more than $500 million. These investments include new rail transit facilities, vehicle replacements, bus system improvements and capitalized maintenance projects.

When these projects are completed, the region will have a greatly expanded urban rail network, including ten light rail projects and three heavy rail projects on the Metro Rail system. New BRT and rapid bus routes will provide additional higher speed bus service in Los Angeles and Orange Counties and the Inland Empire. Orange County will add new streetcar services to link major destinations in Anaheim, Santa Ana and Garden Grove to the Metrolink system. Riverside County will extend Metrolink to San Jacinto and San Bernardino County will connect Metrolink to Ontario International Airport and to Redlands via Downtown San Bernardino.

In addition, the 2016 RTP/SCS includes extensive local bus, rapid bus, BRT and express service improvements. An expanded point-to-point express bus network will take advantage of the region's carpool and express lane network. New BRT service, limited-stop service and increased local bus service along key corridors, in coordination with transit-oriented development and land use, will encourage greater use of transit for short local trips. See EXHIBIT 5.2.

Also included in the investment package are renewed commitments to asset management and maintaining a state of good repair. TABLE 5.3 describes all transit operations and maintenance investments over $500 million. This list includes bus, urban rail and paratransit operations, the implementation of the Orange County Transportation Authority's (OCTA's) Short Range Transit Plan, expanded bus service on targeted corridors, preventative maintenance and an increased commitment on asset preservation funded from innovative revenue sources.

Aside from capital projects, there are many improvements that can help make transit operate more efficiently and effectively, make it more accessible to more travelers and increase ridership. The 2016 RTP/SCS recommends additional transit initiatives. Among them:

TABLE 5.2 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	OC 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 RTP/SCS Project List

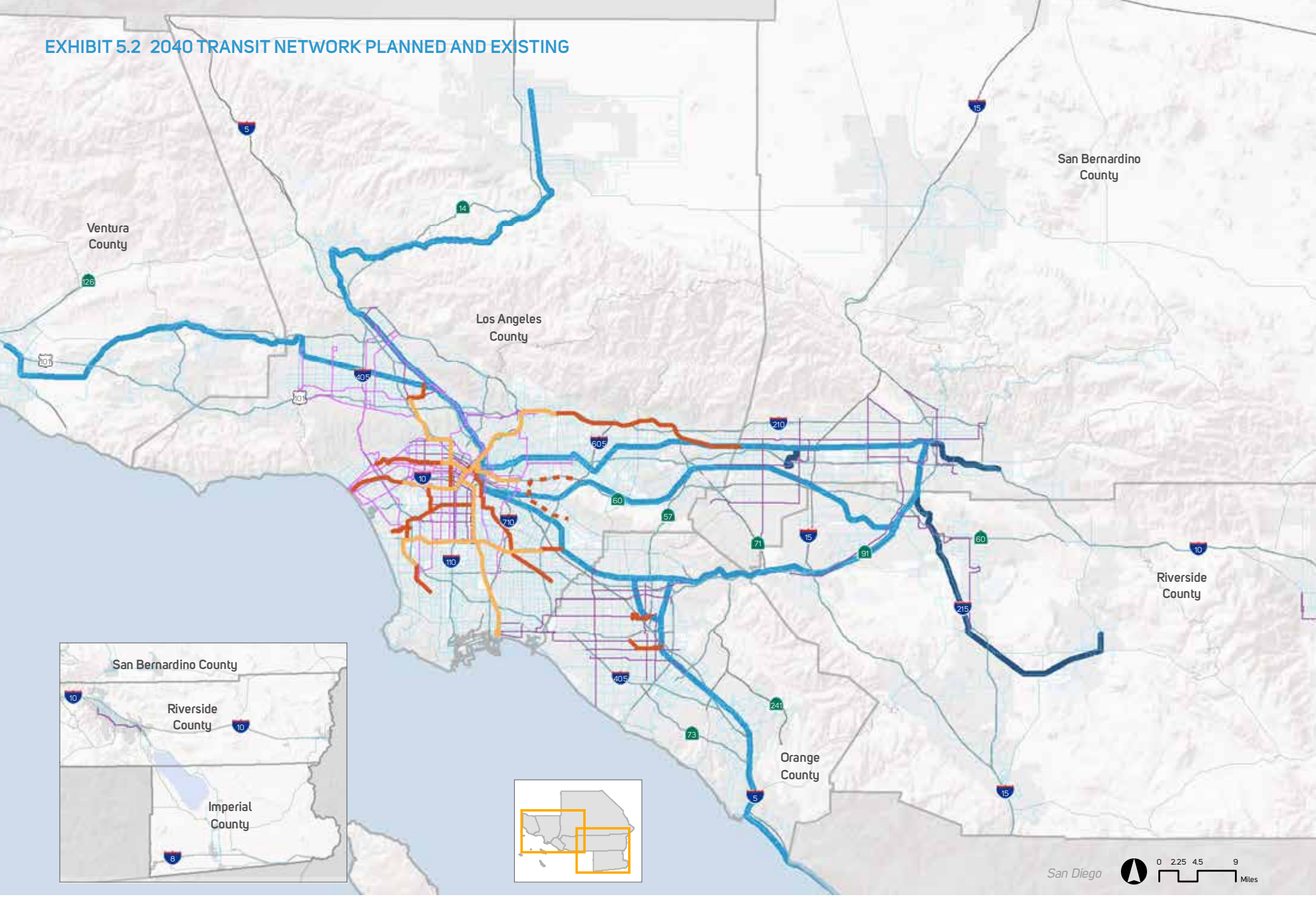
TABLE 5.3 MAJOR TRANSIT OPERATIONS AND MAINTENANCE PROJECTS AND INVESTMENTS

(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 RTP/SCS Project List

EXHIBIT 5.2 2040 TRANSIT NETWORK PLANNED AND EXISTING



Commuter Rail
- 2012 Base Year
- 2040 Plan

Urban Rail
- 2012 Base Year
- 2040 Plan

Urban Rail Alternatives

Rapid Bus and Bus Rapid Transit
- 2012 Base Year
- 2040 Plan

Bus Routes (2012 Base Year & 2040 Plan)

(Source: SCAG)

Implement and Expand Transit Priority Strategies: 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 Los Angeles 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. SCAG encourages transit agencies and local jurisdictions to implement them, where appropriate.

Implement Regional and Inter-County Fare Agreements and Media: Implementing additional inter-jurisdictional fare agreements and media, such as Los Angeles County's EZ Pass, will make transit more attractive and accessible. A pass that would cover all transit services in Los Angeles and Orange counties, or the whole SCAG region, is an example. OCTA, the LOSSAN Managing Agency, recently secured a California Cap-and-Trade grant to establish fare agreements between the Pacific Surfliner and local transit operators along its corridor where an Amtrak ticket will be good for a connecting transit fare.

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 about 20 percent faster than traditional local bus service. It is 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 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.

Increase Bicycle Carrying Capacity on Transit 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.

Expand and Improve 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.

Implement 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 use and reduce air pollution and 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.

Implement Local Circulators: Many jurisdictions 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.

Passenger Rail

The 2016 RTP/SCS proposes three main passenger rail strategies that will improve speed, service and safety and provide an attractive alternative to driving alone. They are:

- Improving the Los Angeles–San Diego–San Luis Obispo Rail Corridor (LOSSAN Corridor)
- Improving the existing Metrolink system
- Implementing Phase One of the California High-Speed Train

The state's High-Speed Train will provide an additional intrastate transportation option in California, offering an alternative to air and auto travel and providing new capacity for travel on the state's highways and airports. The California High-Speed Rail Authority (CHSRA), in partnership with the Federal Railroad Administration (FRA), which has provided $3.6 billion in High-Speed and Intercity Passenger Rail funding, have chosen to begin construction in the San Joaquin Valley. The system will then be built south to our region, connecting to Palmdale, Burbank Bob Hope Airport, Los Angeles Union Station and Anaheim by 2029. This is consistent with the CHSRA's adopted 2014 Business Plan and Draft 2016 Business Plan.

Existing passenger rail facilities in Southern California and the Bay Area (the "bookends" of the Phase One system) will also be improved to provide immediate, near-term benefits while laying the groundwork for future integration with High-Speed Train. This "blended approach" to deliver the full integrated system, through phased implementation over time, will help reduce costs and environmental impacts. With the adoption of the 2012 RTP/SCS, the region and the CHSRA committed to spending $1 billion in Prop. 1A funds and other fund sources on these early investments in the "bookends."

This commitment by CHSRA and the transportation agencies was formalized in the memorandum of understanding (MOU) between CHSRA, Metrolink, SCAG, San Diego Association of Governments (SANDAG), Metro, Riverside County Transportation Commission (RCTC) and the City of Anaheim. The MOU includes a candidate project list to which $1 billion will be programmed in order to provide interconnectivity to the California High-Speed Train project and improve the speed, capacity and safety of our existing passenger rail network. The list includes 74 projects totaling nearly $4 billion and it shows the need for capital investments to improve the speed and service of the existing rail network regionwide. The top six projects on this list are each of the five county's (Los Angeles, Orange, Riverside, San Bernardino and San Diego) top projects—plus the Southern California Regional Interconnector Project (SCRIP, formerly called the Los Angeles Union Station Run-Through Tracks). See TABLE 5.4.

TABLE 5.4 TOP SIX MOU PROJECTS

Los Angeles	Southern California Regional Interconnector Project
Los Angeles	CP Brighton to CP Roxford Double Track
Orange	State College Blvd. Grade Separation
Riverside	McKinley St. Grade Separation
San Bernardino	CP Lilac to CP Rancho Double Track
San Diego	San Onofre to Pulgas Double Track

CP = A track switch, or the location of a track signal or other marker with which dispatchers can specify when controlling trains.

SCRIP is number one on the list because it will deliver regional benefits for all counties. Los Angeles Union Station was originally designed as a "stub" rail facility, with tracks only leaving the station in a northerly direction and no through-train operation capability. Up to six tracks will be built to extend out of the south of Union Station and across U.S. Route 101 to connect with the main tracks along the Los Angeles River. These additional tracks will increase Union Station's capacity by 40 to 50 percent, enabling the scheduling of many more through trains with improved running times. They will also result in sharply reduced air pollution and greenhouse gas emissions from idling locomotives.

Several additional strategies are designed to increase rail ridership in our region by making rail travel more attractive as an alternative to commuting alone by car. These strategies will serve three distinct rail markets: commuter, intercity and interregional. The first is served by Metrolink, the second by Amtrak and the third will be served by California High-Speed Train service. However, the three carriers can be attractive to multiple rail travel markets. Passenger rail strategies for these markets include:

Increase Speed and Service: As noted above, the high-speed rail system MOU partners are in the process of planning and implementing the MOU capital projects to improve capacity, speed and service, bringing at least some segments of our rail network up to the federally defined high speed of 110 miles per hour or greater and to implement a blended system of rail services. In addition to the MOU project list, these projects are detailed in the LOSSAN Strategic Implementation Plan for 2030 and the Metrolink 2015 Strategic Assessment that looks out 10 years to 2025. As speeds and service levels improve, these services will become more competitive with SOV travel and as a result ridership will continue to grow. Further, their schedules should be adjusted once the state's High-Speed Train project is implemented, so that all rail services complement and feed one another.

Improve Accessibility and Connectivity: This strategy includes establishing rail connections to our region's airports, and improving transit, bicycling and walking accessibility and connectivity to rail stations. Burbank Bob Hope Airport is presently the region's best-served airport by rail, and will soon host two rail stations in the near future with service provided by two Metrolink lines, Amtrak and the state's High-Speed Train in the future. Ontario International Airport (ONT) is not directly served by rail, although SCAG together with Metro, SANBAG and CHSRA are studying various options to provide direct rail service

to the airport. LAX is also currently not served by any rail, but will be within the next decade via the Crenshaw Line and the Airport Metro Connector. Improving transit bicycling and walking accessibility to our region's passenger rail stations is also critical. Increasing rail feeder bus services in our region to passenger rail stations would reduce the incentive for SOV travel. Establishing more transit services such as OCTA's Stationlink service would provide this incentive. Finally, there is still little BRT or BRT-Lite service in our region outside of Los Angeles County, and establishing more BRT routes to serve rail stations such as the current Omnitrans sbX Green Line and the Riverside Transit Agency's future RapidLink Line 1 will help meet this goal.

Secure Increased Funding and Dedicated Funding Sources: Passenger rail has traditionally lacked dedicated funding streams. Amtrak is funded annually by the U.S. Congress, usually resulting in funding amounts insufficient to meet state of good repair needs or to increase Amtrak's levels of service and expand the network. With local control of the Pacific Surfliner now complete, the State of California has guaranteed funding levels to maintain current service levels (but not to increase service levels) for the first three years. One new funding source is California's Cap-and-Trade Transit and Intercity Rail Capital Program, which received $25 million in FY2014-15 and 10 percent of annual Cap-and-Trade auction proceeds beginning in FY2015-16. This FY2015-16 allocation is currently estimated to be more than $200 million. Similarly, the CHSRA has been given a dedicated Cap-and-Trade funding stream of 25 percent of funds, beginning in FY2015-16 (for FY2014-15 CHSRA received $250 million). FY2015-16 funding is estimated at more than $600 million.

Support Increased TOD and First/Last Mile Strategies: Increased TOD and first/last mile planning and investments are crucial to passenger rail station area planning. Increased and effective TOD improves our region's jobs/housing balance, and it reduces VMT, air pollution and greenhouse gas emissions. First/last mile investments also reduce VMT, air pollution and greenhouse gas emissions and encourage rail users to access rail stations with options other than driving alone.

Implement Cooperative Fare Agreements and Media: Cooperative fare agreements and media also offer opportunities for increasing rail ridership and attracting new riders. For example, the Rail2Rail pass allows Metrolink monthly pass riders who have origin and destination points along the LOSSAN corridor to ride Amtrak. In 2014, the North County Transit District (NCTD) reached an agreement with Caltrans Division of Rail (DOR), in which five daily Pacific Surfliner trains stop at all non-Pacific Surfliner Amtrak (Coaster) stops in San Diego County. This service has proven quite popular and successful. Agreements like this one could be expanded once the California High-Speed Train is built.

Active Transportation

The 2016 RTP/SCS includes $12.9 billion for active transportation improvements, including $8.1 billion in capital projects and $4.8 billion as part of the operations and maintenance expenditures on regionally significant local streets and roads. The Active Transportation portion of the 2016 Plan updates the Active Transportation portion of the 2012 Plan, which has goals for improving safety, increasing active transportation usage and friendliness, and encouraging local active transportation plans. It proposes strategies to further develop the regional bikeway network, assumes that all local active transportation plans will be implemented, and dedicates resources to maintain and repair thousands of miles of dilapidated sidewalks. To accommodate the growth in walking, biking and other forms of active transportation regionally, the 2016 Active Transportation Plan also considers new strategies and approaches beyond those proposed in 2012. Among them:

- Better align active transportation investments with land use and transportation strategies to reduce costs and maximize mobility benefits
- Increase the competitiveness of local agencies for federal and state funding
- Develop strategies that serve people from 8–80[5] years old to reflect changing demographics and make active transportation attractive to more people
- Expand regional understanding of the role that short trips play in achieving RTP/SCS goals and performance objectives, and provide a strategic framework to support local planning and project development geared toward serving these trips
- Expand understanding and consideration of public health in the development of local plans and projects.

[5] 8–80 years old is an age span that is used as a shorthand to refer to expanding the potential for all people to use active transportation. The term refers to addressing the needs school aged children who would be conceivably allowed to walk or bike to school unaccompanied if the environment were safer and older senior citizens who prefer physical separation from the noise and speed of vehicles.

Active Transportation has 11 specific strategies to maximize active transportation in the SCAG region. These are grouped into four broad categories: regional trips, transit integration, short trips and education/encouragement. All 11 strategies are based on a comprehensive local bikeway and pedestrian network that uses Complete Streets principles. These strategies include:

Regional Trips Strategies:

1. Regional Greenway Network
2. Regional Bikeway Network
3. California Coastal Trail Access

Transit Integration Strategies:

4. First/last mile (to transit)
5. Livable Corridors
6. Bike Share Services

Short Trips Strategies:

7. Sidewalk Quality
8. Local Bikeway Networks
9. Neighborhood Mobility Areas

Education/Encouragement Strategies:

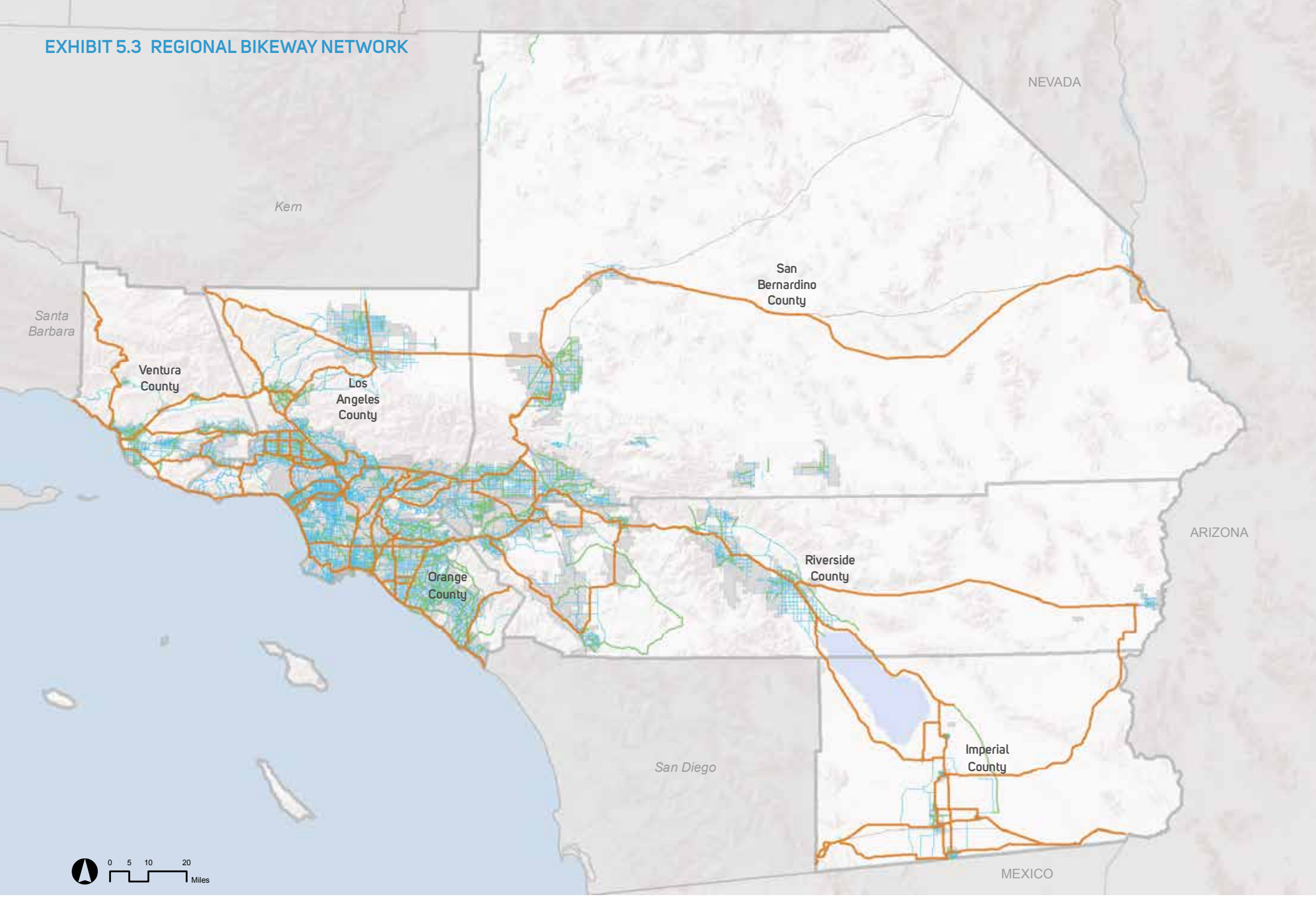
10. Safe Routes to School
11. Safety/Encouragement Campaigns

Regional Trips Strategies

Developing the following networks will serve those longer trips that people make less frequently, but add to total miles traveled. They are primarily biking trips for commuting and recreation. Although trips covering the full length of these corridors may be a small percentage of active transportation travel, the networks provide a backbone for shorter trips, much in the way the Interstate Highway System is used by many people as a bypass for short trips from one on-ramp to the next off-ramp. Completing the following networks are key strategies for promoting regional trips:

1. **Regional Greenway Network (RGN):** The planned RGN is a 2,200-mile system of separated bikeways mostly using riverbeds, drainage channels and utility corridors. The RGN connects to the regional bikeway network. This strategy provides the opportunity to better integrate urban green space, active transportation and watershed management, providing new urban green space for residents to go to for travel and recreation, including low-stress access to the California Coastal Trail. Benefits include increased health, improved safety and enhanced quality of life. These low-stress bikeways, connected to the regional bikeway network and local bikeways, should provide an attractive option for those bicyclists who do not wish to ride along roadways with motor vehicles. They include the High Desert Corridor; Santa Ana River Trail; OC Loop; Los Angeles River; San Gabriel River; San Jose Creek; Rio Hondo River; Ballona Creek; Bike Route 33; and CVLink.
2. **Regional Bikeway Network (RBN):** The planned RBN consists of 2,220 miles of interconnected bikeways that connect to jurisdictions, local bikeways and destinations. It connects to the RGN and has designated routes and wayfinding signage that help bicyclists easily understand the route structure and destinations. The primary purpose is to serve regional trips, commuting and recreational bicycling. Using locally existing and planned local bikeways as the foundation, the RBN closes gaps, connects jurisdictions, and provides a regional backbone for local bikeways and greenways. By having assigned route names/numbers, bicyclists can more easily travel across jurisdictions without having to frequently consult maps or risk having bikeways end on busy streets. It is anticipated that trips longer than three miles will likely be used in part on the RBN. SCAG has identified 12 regionally significant bikeways that connect the region. These include Bike Route 66; Bike Route 10; Bike Route 126; Pacific Coast Bike Route; Bike Route 5; Santa Ana River Trail; High Desert Corridor; Bike Route 33; Los Angeles River; San Gabriel River; Bike Route 86; and Bike Route 76 (see EXHIBIT 5.3).
3. **California Coastal Trail (CCT)Access:** Trails along the coast of California have been utilized as long as people have inhabited the region. The CCT was established by the Coastal Act of 1976 to develop a "continuous public right-of-way along the California coastline; a trail designed to foster appreciation and stewardship of the scenic and natural resources of the coast through hiking and other complementary modes of non-motorized transportation." The 2016 RTP/SCS Active Transportation Appendix identifies the improvements necessary to help complete the portions of the CCT in Ventura, Los Angeles and Orange counties and to provide biking and walking access to the CCT.

EXHIBIT 5.3 REGIONAL BIKEWAY NETWORK



Regional Bikeway Network Regional Greenway Network Local Bikeway Networks

(Source: SCAG)

Transit Integration Strategies

Transit Integration refers to a suite of strategies designed to better integrate active transportation and transit by improving access for pedestrians, bicyclists and other people traveling under their own power around transit stations. Active transportation projects that fall within this suite of strategies are particularly competitive for Cap-and-Trade funding programs. Cap-and-Trade funding programs include the Affordable Housing and Sustainable Communities Program (AHSC), which aims to better link housing, transit and active transportation to reduce greenhouse gas emissions. With this in mind, the strategies detailed below will be most successful if they are coordinated with land use strategies such as TOD and providing affordable housing.

4. **First/Last Mile (to rail):** This strategy uses a Complete Streets approach to maximize the number of people walking or biking to rail. By 2040, 11 percent of people will live within one half mile of a rail station, and 27 percent will live within one mile of a rail station. By increasing the comfort and removing barriers to walking or biking, more people will walk or bike to transit stations. These stations include all Los Angeles County light rail, subway and fixed guideway bus stations and Metrolink stations; all Orange County Metrolink Stations and OC Bravo busways; all San Bernardino County Metrolink stations and SBx busways; all Riverside County Metrolink stations; and all Ventura County Metrolink stations.

   The existing transit access "shed" is considered the half-mile radius around a station (requiring a 10-minute walk), although in many cases the access shed is much smaller due to barriers in the built environment (a lack of crosswalks, long blocks, unsafe overpasses or underpasses). The strategy of developing first/last mile solutions will increase the number of people walking within and beyond one half mile, by creating the conditions that allow people to travel a longer distance in the same amount of time (10 minutes). The number of bicyclists accessing transit is also anticipated to increase, both within the one-mile bike access shed and beyond to a new bike access shed of three miles (requiring a 15-minute bike ride). Infrastructure improvements may include dedicated bike routes, sidewalk enhancements, mid-block crossings (short-cuts), reduced waiting periods at traffic signals, bicycle parking, signage and wayfinding, and others.

   In Los Angeles County, Metro has proposed an extensive active transportation network to support first/last mile access, including pathways that extend one half mile around each of the Metro stations. The pathways are envisioned to provide facilities and design elements that are consistent across the transit system, enabling seamless and intuitive door-to-door journeys. Pathways will be established along the most heavily traveled routes to transit stations, connecting riders to and from population and employment centers and other major destinations. They will improve and shorten the time it takes to access transit, enhancing the overall transit experience. The pathways will also facilitate transfers between modes, including traditional modes such as buses and park and ride lots, as well as new mobility options such as bike share and car share that can be integrated throughout active transportation networks.

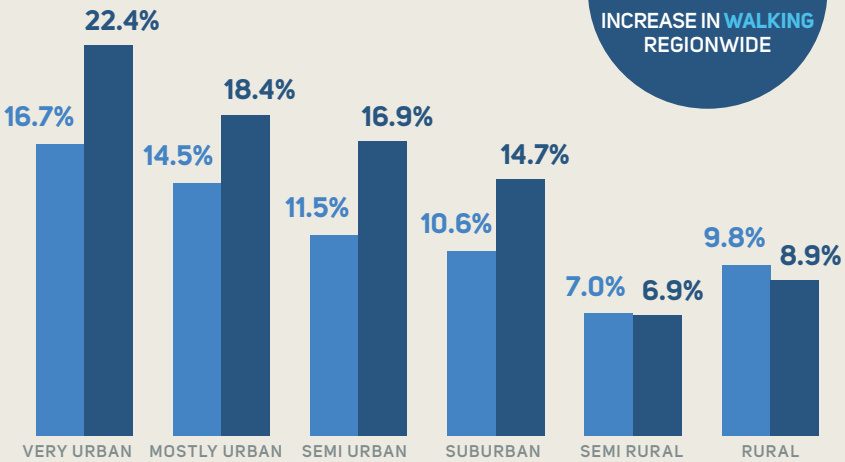
   First/last mile plans that include many of the same investments as outlined in Metro's first/last mile plan have been completed in Orange and San Bernardino counties as well. The regional strategy builds upon these planned investments, proposing enhancements at 224 rail stations by 2040.

5. **Livable Corridors:** From an active transportation standpoint, this strategy is similar to the first/last mile strategy noted above, but it targets high-quality bus corridors rather than the rail and fixed guideway system. (Planning for growth around Livable Corridors is also an important land use strategy) Livable Corridors share many of the same characteristics as transit-oriented rail corridors, but they have lower density development. Active transportation investments focus on sidewalk maintenance/enhancement, intersection improvements, bicycle lanes and bicycle boulevards to facilitate safe and easy access to mixed-use commercial nodes where residents can meet most of their daily needs and access bus service. In addition, this strategy promotes the inclusion of bike lanes, shared bus-bike lanes or separated bikeways. These run along or parallel to the main corridor to promote inter-regional connectivity. In developing the 2016 RTP/SCS, SCAG identified just under 3,000 miles of potential Livable Corridors. However, the investments proposed in the Plan under this strategy are not tied to a specific corridor; rather, the Plan assumes resources to support 670 miles accessing and along 154 miles of corridor. The Plan also provides policy language to support a much broader rollout of Livable Corridors to inspire and support local planning for projects. Having plans prepared with shovel-ready projects will allow our region to effectively compete for Affordable Housing and Sustainable Communities Program Inter-Connected Projects.

FOCUS ACTIVE TRANSPORTATION

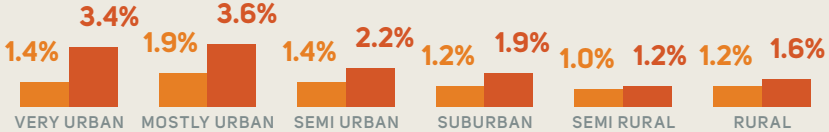
Biking & Walking in the Region

WALK TRIPS 2012 BASE YEAR 2040 PLAN



28% INCREASE IN WALKING REGIONWIDE

BIKE TRIPS 2012 BASE YEAR 2040 PLAN



71% INCREASE IN BIKING REGIONWIDE

Go Human and Traffic Safety

Across the SCAG region, the nature of streets and types of travel on them is changing dramatically. Bicycling is growing in popularity and the expansion of transit and explosion of new mobility services, like Uber and Lyft, means more people are walking and biking to make connections. However, as more people bicycle and walk, safety for these modes becomes increasingly important. In the SCAG region in 2012, 27 percent and five percent of all traffic fatalities were pedestrians and bicyclists, respectively.

Funded by a $2.3 million grant from the 2014 California Active Transportation Program, SCAG and its partners launched Go Human, a campaign to promote traffic safety and encourage people to walk or bike. Go Human is a reminder to all that people on the road are not just objects that get in our way—they are human beings. In late September 2015, messaging encouraging drivers to slow down and look for pedestrians and cyclists was distributed across all six counties in both English and Spanish. Advertisements appeared on local transit buses, bus shelters, Facebook, Pandora and local radio stations throughout the region. The launch date coincided with the decline in daylight hours, a period when pedestrian collisions begin to peak.

Go Human is a collaborative effort with county transportation commissions, county health departments and local cities and jurisdictions across the region. SCAG has worked with partners to expand the initial advertising purchases through partner newsletters, advertisements on websites, posters in local facilities and on social media. For example, the Los Angeles County Department of Public Works donated advertising space at 100 bus shelters. SCAG's funding also includes the production of toolkits and trainings to promote active transportation and the implementation of open streets and temporary events starting in spring 2016. For more information on the campaign, visit **www.gohumansocal.org**.

go human

6. **Bike Share Services:** Bike share is a point-to-point service combining the convenience of a bicycle with the accessibility of public transportation.[6] Using closely packed bike rental kiosks in heavily urbanized areas, bike share is designed to replace short-distance motor vehicle trips, reduce parking demand and complement local bus services such as DASH in the City of Los Angeles. Most importantly, bike share acts as a first/last mile strategy and it will be closely integrated with high quality transit stations. Los Angeles Metro, Santa Monica and Long Beach are currently implementing bike share within Los Angeles County. Bike share is anticipated to grow beyond these initial areas over the course of the Plan. A pilot program was recently completed in the City of Fullerton, in Orange County. The University of California, Irvine already has a bike share system in place for students and faculty. The regional bike share system will be comprised of about 8,800 bikes and 880 stations/kiosks.

Short Trips Strategies

For the purposes of this RTP/SCS, SCAG considers short trips as any trip less than three miles. These trips are primarily the utilitarian trips we take every day to the store, school or a restaurant. Planning policy objectives, including reducing VMT and greenhouse gas emissions and improving public health, depend highly on our region's ability to address these short trips. That's because trips less than three miles account for 38 percent of all trips in the region. Short trips can easily be taken by walking or biking.

The land use strategies described earlier in this chapter and promoted by the 2016 RTP/SCS seek to improve location efficiency—in other words, minimize the distance between origins and destinations to create even more short trips in the future. The short trip strategies described below aim to ensure that the roadway network evolves to help realize the walkable/bikeable vision advanced by land use strategies in regional and local plans, and improve mobility and reduce travel times in locations that are already considered location-efficient.

7. **Sidewalk Quality:** The Plan calls for 10,500 miles of sidewalks to be repaired or improved. This includes making them Americans with Disabilities Act (ADA) compliant and adding amenities such as exercise spots (logs or other no-maintenance objects that can be used for sitting, stretching or mild exercise) and rest seats for older walkers. These improvements are in addition to sidewalk enhancements incorporated into the other active transportation strategies.

8. **Local Bikeway Networks:** The region's Local Bikeway Networks promote local mobility, while also providing the needed bikeway density to interconnect with the regional bikeway network. The Plan proposes expanding the local bikeway network by an additional 6,016 miles. This is in addition to the 2,760 additional bikeway miles incorporated into other active transportation strategies, bringing total regional, local and greenway bikeway mileage to 12,700.

9. **Neighborhood Mobility Areas:** This strategy is targeted to locations that have a high proportion of short trips due to the mix of land uses, a fairly dense street grid pattern and the presence of locally serving retail destinations. These locations, however, do not benefit from high quality transit. Where Livable Corridors focus on connections to a corridor, Neighborhood Mobility Areas focus on connections within the neighborhood—to schools, places of worship, parks or greenways, and other destinations. SCAG has identified potential locations in the region to establish Neighborhood Mobility Areas. However, the investments proposed in the Plan under this strategy are not tied to a specific community. Some of the practices that inform this concept include: Level of Traffic Stress (LTS) bicycle planning, NEV planning, Plug-in Vehicle (PEV) readiness planning and a geographic analysis of commute trip lengths. These planning practices are based on the idea that non-auto trips increase as the perceived danger and anxiety for the user decreases.

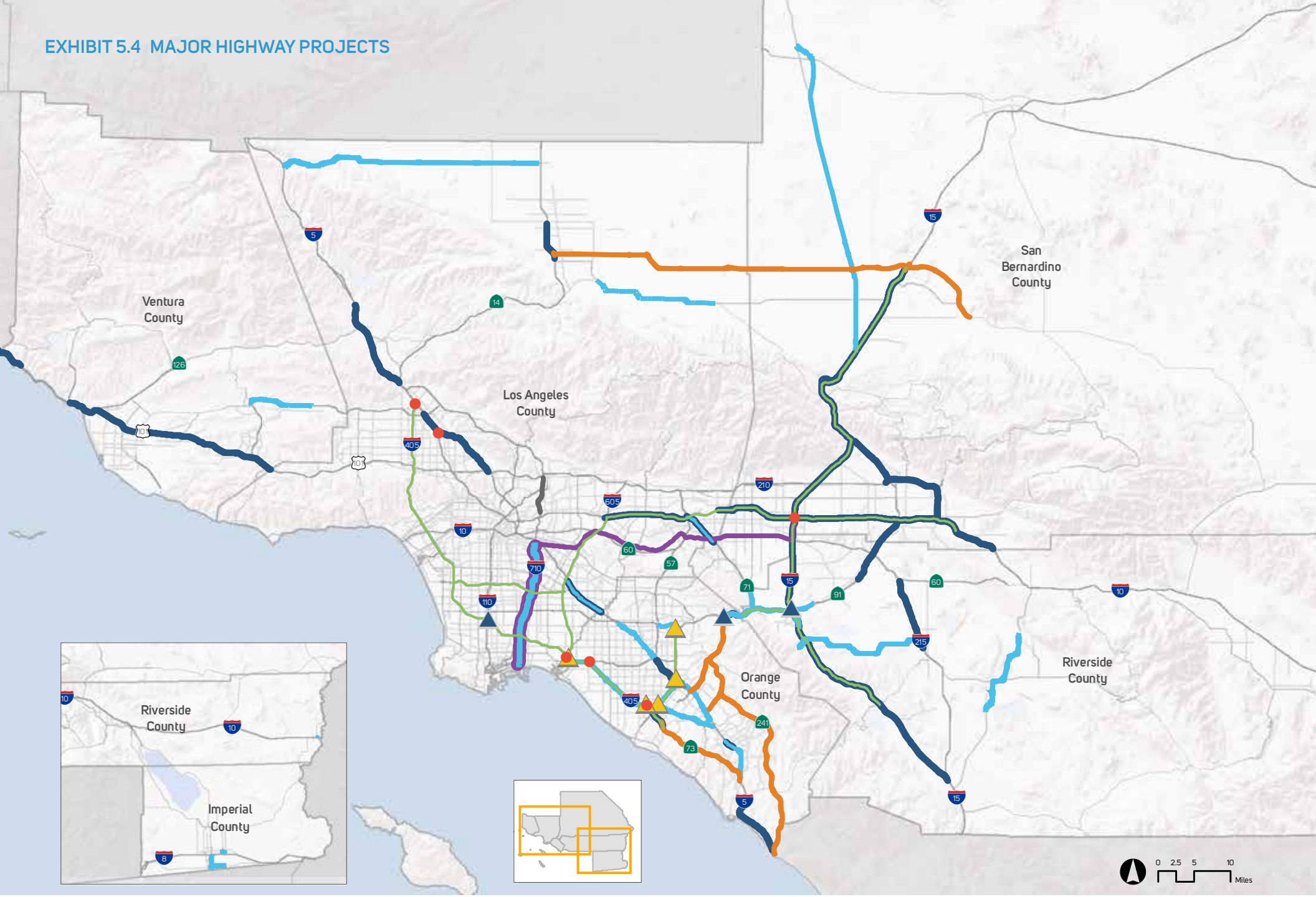
Education/Encouragement Strategies

Getting more people to bike and walk is not just about building the infrastructure. Individuals must feel safe biking and walking. The 2016 RTP/SCS Safety campaigns have two strategies: Safe Routes to School, which focuses on instilling safe habits at a young age while encouraging walking and biking to school; and a Safety/Encouragement campaign, which aims to reach all roadway users through a mix of education and training seminars and encouragement strategies.

10. **Safe Routes to School:** Safe Routes to School is a comprehensive TDM strategy aimed at encouraging children to walk and bicycle to school. It includes a wide variety of implementation strategies centered on the "6 Es"—Education, Encouragement, Engineering,

[6] King County Bike Share Business Plan. (2012). The Bike Share Partnership. Accessed at http://altaplanning.com/wp-content/uploads/King_County_Bike_Share_Business_Plan_0.pdf.

EXHIBIT 5.4 MAJOR HIGHWAY PROJECTS



Express Lanes | Toll Lanes | Mixed-Flow Lanes | Freight Corridors | HOV Lanes | Improvement TBD

Planned/Proposed Express Lane Direct Connectors | Proposed HOV-to-Express Lane Direct Connector Conversions | HOV Lane Connectors

(Source: SCAG)

Enforcement, Evaluation and Equity. When implemented, the 6 Es improve safety, reduce congestion and VMT, improve air quality and increase the physical activity of students and their parents—which improves public health outcomes. SCAG works with each county through SCAG's sustainability joint work programs, which are collaborative planning programs designed to support regional sustainability goals through local projects. Each joint-work program includes a Safe Routes to School program component.

11. **Education/Encouragement Campaigns:** Safety campaigns that employ advertising, public service announcements and media kits are designed to educate the public on the importance of safety. Other efforts aim to educate bicyclists, pedestrians and motorists on the rights and responsibilities of sharing the road. The 2016 RTP/SCS anticipates that these campaigns will be conducted every five years during the course of the Plan.

Highways and Arterials

The majority of trips in our region today is still made on our region's highways and arterials. Yet, the expansion of our highways and arterials has slowed down over the last decade. Revenue from traditional sources to fund transportation improvements is declining and costly expansions to address congestion may not be financially feasible. However, given that critical gaps and congestion chokepoints still exist within the network, improvements beyond TSM and TDM strategies need to be considered. Closing these gaps to complete the system will allow residents and visitors alike to enjoy improved access to opportunities such as jobs, education, recreation and healthcare.

Our highways and arterials serve as a crucial backbone of our overall regional transportation network. As part of the 2016 RTP/SCS, SCAG continues to advocate for a comprehensive solution based on a system management approach to manage and maintain our highway and arterial network. Although we recognize that we can no longer rely on system expansion alone to address our mobility needs, critical gaps and congestion chokepoints in the network still hinder access to certain parts of the region. County transportation plans have identified projects to close these gaps, eliminate congestion chokepoints and complete the system. Such improvements are included in the 2016 RTP/SCS. EXHIBIT 5.4 and TABLE 5.5 highlight some of the proposed highway completion projects. For projects that are currently or will be going through environmental clearance, SCAG would update the list as part of future RTP amendments if warranted by the nature of the project changes. A comprehensive list of projects is provided in the Project List Appendix.

Our region boasts one of the most comprehensive High Occupancy Vehicle (HOV) systems in the nation and heavy investments have been made to expand it. As part of the Plan, strategic HOV gap closures, highway-to-highway direct HOV connectors, and HOV direct access ramps need to be proposed as a strategy to complete the system. In addition, it should be noted that various highways within Orange County feature continuous access on certain HOV lanes. Studies have shown that continuous access HOV lanes do not perform any worse compared with limited access HOV lanes. TABLE 5.6 highlights some of the Plan's major HOV projects.

Our region's arterial system is comprised of local streets and roads that serve many different functions. One is to link our region's residents with schools, jobs, healthcare, recreation, retail and other destinations. Our region's arterials account for more than 80 percent of the total road network and they carry a majority of overall traffic. A number of arterials run parallel to major highways and they can provide alternatives to them. Beyond motor vehicles, our arterials serve other modes of travel, including transit and active transportation. The 2016 RTP/SCS proposes a variety of arterial projects and improvements throughout the region. Operational and technological improvements can maximize system productivity through various cost-effective and non-labor intensive means—beyond improvements to expand capacity. These include signal synchronization, spot widening and adding grade separations at major intersections. In addition, as part of the Complete Streets Deputy Directive[7] (DD-64-R2), improvements such as bicycle lanes, lighting, landscaping, sidewalk widening and ADA compliance measures have shifted the focus of arterials toward considering multiple users—while also providing a greater sense of place. The 2016 RTP/SCS highways and local arterials framework and guiding principles are summarized here:

- Focus on achieving maximum productivity through strategic investments in system management and demand management.
- Focus on adding capacity primarily (but not exclusively) to:
  - Close gaps in the system.
  - Improve access where needed.
- Support policies and system improvements that will encourage the seamless operation of our roadway network from a user perspective.

[7] Complete Streets – Integrating the Transportation System. (2014) [Deputy Directive]. California Department of Transportation. Accessed at: http://www.dot.ca.gov/hq/tpp/offices/ocp/docs/dd_64_r2.pdf.

TABLE 5.5 SAMPLE MAJOR HIGHWAY PROJECTS COMMITTED BY THE COUNTIES

	COUNTY	ROUTE	DESCRIPTION	COMPLETION YEAR	COST ($1,000s)
MIXED-FLOW LANES	Imperial	SR-98	Widen and improve SR-98 or Jasper Rd to 4/6 lanes	2025	$1,170,483
	Imperial	SR-111	Widen and improve to a 6-lane highway with interchanges to Heber, McCabe, and Jasper, and overpass at Chick Rd	2030	$999,136
	Los Angeles	SR-57/SR-60	Improve the SR-57/SR-60 interchange	2029	$475,000
	Orange	I-5	Add one mixed-flow lane in each direction from SR-57 to SR-91	2040	$305,924
	Orange	SR-55	Add one mixed-flow lane in each direction and fix chokepoints from I-405 to I-5 and add one auxiliary lane in each direction between select on/off ramps and operational improvements through project limits	2030	$274,900
	Orange	SR-91	Add one eastbound mixed-flow lane on SR-91 from SR-57 to SR-55 and one westbound mixed-flow lane from Kraemer to State College	2030	$425,000
	Orange	I-405	Add one mixed-flow lane in each direction from I-5 to SR-55	2030	$374,540
	Orange	I-405	Add one mixed-flow lane in each direction from SR-73 and I-605	2022	$1,300,000
	Ventura	SR-118	Add one mixed-flow lane in each direction from Tapo Canyon Rd to LA Avenue	2025	$216,463
EXPRESS LANES	Los Angeles	I-110	Construct express lane off-ramp connector from 28th St to Figueroa St	2023	$55,000
	Riverside	I-15	Add one express lane in each direction from Cajalco Rd to SR-7	2029	$453,174
	San Bernardino	I-15	Add two express lanes in each direction from US-395 to I-15/I-215 interchange	2030	$687,994
HOV LANES	Los Angeles	I-5	Add one HOV lane in each direction from Weldon Canyon Rd to SR-14	2017	$410,000
	Los Angeles	SR-14	Add one HOV lane in each direction from Ave P-8 to Ave L	2027	$120,000
	Los Angeles	SR-71	Convert expressway to highway-add one HOV lane and one mixed-flow lane	2028	$13,392
	Orange	I-5	Add one HOV lane in each direction from Pico to SD County Line	2040	$237,536
	Riverside	I-15	Add one HOV lane in each direction from SR-74 to I-15/I-215 interchange	2039	$375,664
	San Bernardino	I-10	Add one HOV lane in each direction from Ford to RV County Line	2030	$126,836
	San Bernardino	I-215	Add one HOV lane in each direction from SR-210 to I-15	2035	$249,151
	San Bernardino	I-210	Add one HOV lane in each direction from I-215 to I-10	2040	$178,780
	Ventura	US-101	Add one HOV lane in each direction from LA/VEN County Line to SR-33	2029	$132,000

TABLE 5.6 MAJOR HOV LANE PROJECTS

COUNTY	ROUTE	FROM	TO	COMPLETION YEAR
Los Angeles	I-5	Weldon Canyon	SR-14	2017
Los Angeles	I-5	Pico Canyon	Parker Rd	2025
Los Angeles	SR-14	Ave P-8	Ave L	2027
Los Angeles	SR-71	Mission Blvd	Rio Rancho Rd	2028
Orange	I-5	Pico	SD County Line	2040
Orange	I-5	SR-55	SR-57	2018
Orange	SR-73	I-405	MacArthur	2040
Riverside	I-15	SR-74	I-15/I-215 Interchange	2039
Riverside	I-215	Nuevo Rd	Box Springs Rd	2030
San Bernardino	I-10	Ford St	RV/SB County Line	2030
San Bernardino	I-215	SR-210	I-15	2035
San Bernardino	I-210	I-215	I-10	2040
Ventura	US-101	Moorpark Rd	SR-33	2029
HIGHWAY TO HIGHWAY HOV CONNECTORS				
Los Angeles	I-5/I-405	Connector (partial)		2029
Los Angeles	I-405/I-110	Connector Improvements		2021
Orange	I-405/SR-73	Connector		2040
San Bernardino	I-10/I-15	Connector (partial)		2035

TABLE 5.7 REGIONAL EXPRESS LANE NETWORK

	COUNTY	ROUTE	FROM	TO
EXPRESS LANE ADDITIONS	Los Angeles	I-10	I-605	San Bernardino County Line
	Los Angeles	I-105*	I-405	I-605
	Los Angeles	I-405**	I-5	Orange County Line
	Los Angeles	I-605	I-10	Orange County Line
	Orange	SR-55	SR-91	I-405
	Orange	SR-73	I-405	MacArthur Boulevard
	Orange	I-405**	Los Angeles County Line	SR-55
	Orange	I-605	Los Angeles County Line	I-405
	Riverside	I-15**	San Bernardino County Line	SR-74
	Riverside	SR-91*	Orange County Line	I-15
	San Bernardino	I-10**	Los Angeles County Line	Ford Street
	San Bernardino	I-15**	High Desert Corridor	Riverside County Line
EXPRESS LANE DIRECT CONNECTORS	Los Angeles	I-405/I-110	I-405 NB to I-110 NB and I-110 SB to I-405 SB	
	Orange	I-5/SR-55	Existing HOV to proposed express lane direct connector	
	Orange	SR-91/SR-55	Existing HOV to proposed express lane direct connector	
	Orange	SR-91/SR-241	SR-241 NB to SR-91 EB and SR-91 WB to SR-241 SB	
	Orange	I-405/SR-55	Existing HOV to proposed express lane direct connector	
	Orange	I-405/SR-73	Planned HOV to proposed express lane direct connector	
	Orange	I-405/I-605	Existing HOV to proposed express lane direct connector	
	Riverside	SR-91/I-15	SR-91 EB to I-15 SB and I-15 NB to SR-91 WB	

*Notes: * Dual express lanes for entire length ** Dual express lanes for a section*

- Any new roadway capacity project must be developed with consideration and incorporation of congestion management strategies, including demand management measures, operational improvements, transit and ITS, where feasible.
- Focus on addressing non-recurring congestion with new technology.
- Support Complete Streets opportunities where feasible and practical.

Regional Express Lane Network

Consistent with our regional emphasis on the system management pyramid, recent planning efforts have focused on enhanced system management, including the integration of value pricing to better use existing capacity and offer users greater travel time reliability and choices. Express lanes that are appropriately priced to reflect demand can outperform non-priced lanes in terms of throughput, especially during congested periods. Moreover, revenue generated from priced lanes can be used to deliver the needed capacity provided by the express lanes sooner and to support complementary transit investments.

The regional express lane network included in the 2016 RTP/SCS builds on the success of the State Route 91 express lanes in Orange County, as well as the Interstate 10 and Interstate 110 express lanes in Los Angeles County. Additional efforts underway include the extension of the State Route 91 express lanes to Interstate 15, as well planned express lanes on Interstate 15 in Riverside County. Express lanes are also planned for Interstate 15 and Interstate 10 in San Bernardino County and Interstate 405 in Orange County. TABLE 5.7 displays the segments in the proposed regional express lane network.

Goods Movement

Recent regional efforts have focused on strategies to develop a coherent, refined and integrated regional goods movement system that would address expected growth trends. Key strategies are highlighted below.

Regional Clean Freight Corridor System

The 2016 RTP/SCS continues to envision a system of truck-only lanes extending from the San Pedro Bay Ports to downtown Los Angeles along Interstate 710, connecting to the State Route 60 east-west segment and finally reaching Interstate 15 in San Bernardino County. Such a system would address the growing truck traffic and safety issues on core highways through the region and serve key goods movement industries. Truck-only lanes add capacity in congested corridors, improve truck operations and safety by separating trucks and autos, and provide a platform for the introduction of zero- and near zero-emission technologies. Ongoing evaluation of a regional freight corridor system is underway, including recent work on an environmental impact report (expected to be recirculated in 2016) for the Interstate 710 segment. Additionally, as a part of the 2016 RTP/SCS, SCAG continues to refine the east-west corridor component of the system along the State Route 60 corridor. Current efforts have focused on working to identify an initial operating segment. Additional study is underway to evaluate the East-West Freight Corridor project concept.

The East-West Freight Corridor would carry between 58,000 and 78,000 clean trucks per day that would be removed from adjacent general-purpose lanes and local arterial roads. The corridor would benefit a broad range of goods movement markets, both port-related and local goods movement-dependent industries. Truck delay would be reduced by up to 11 percent. Truck traffic on State Route 60 general purpose lanes would be reduced by 42 to 82 percent, depending on location; it would be reduced by as much as 33 percent on Interstate 10 and as much as 20 percent on adjacent arterials. Separating trucks and autos would also reduce truck-involved collisions on east-west highways that currently have some of the highest collision levels in the region (20–30 collisions a year on certain segments).

The regional freight corridor system also includes an initial segment of Interstate 15 that would connect to the East-West Freight Corridor, reaching just north of Interstate 10. Additional study is anticipated for this segment.

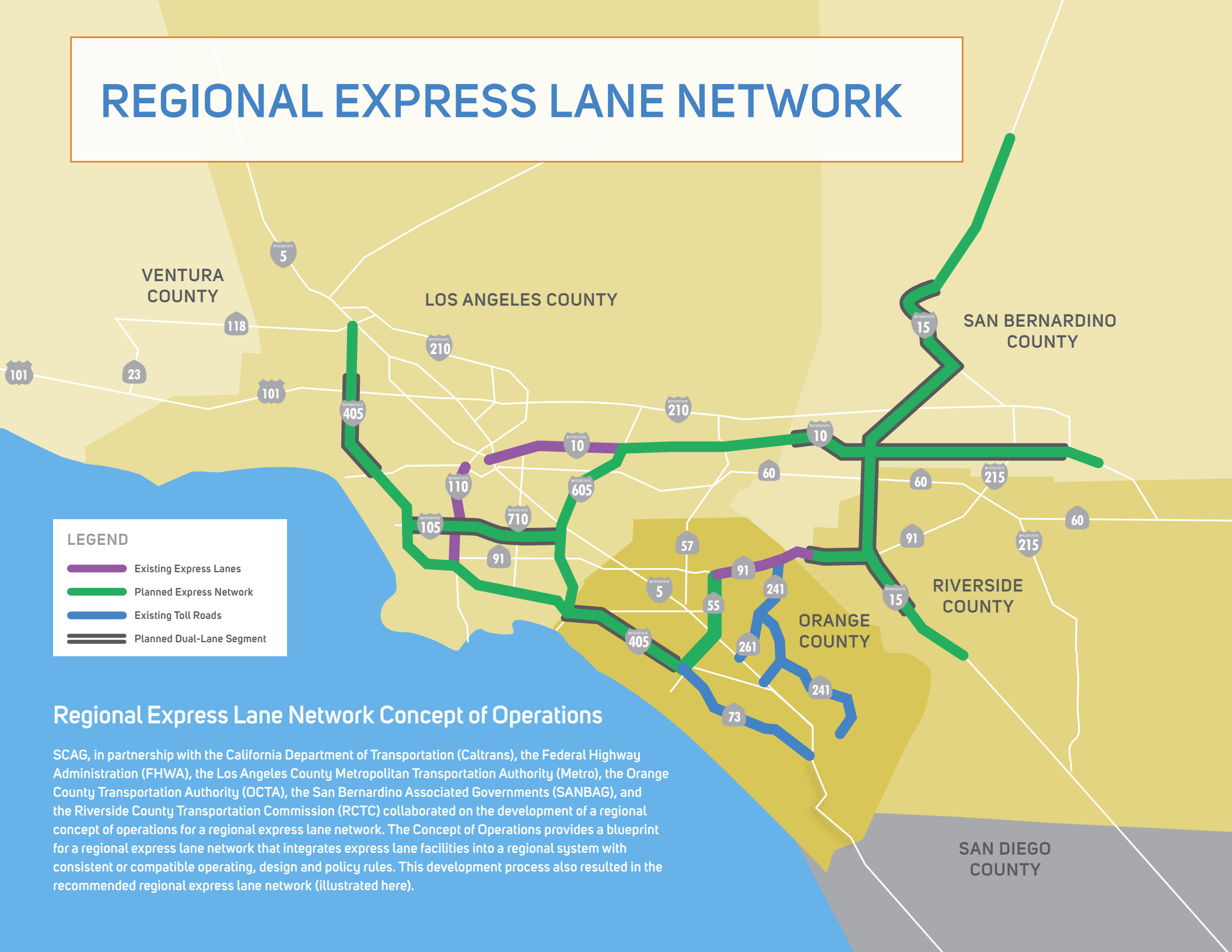
Truck Bottleneck Relief Strategy

In 2013, the American Transportation Research Institute (ATRI) identified the Los Angeles Metropolitan Area as leading the nation in costs to the trucking industry caused by traffic congestion, with nearly $1.1 billion in added operational costs to truckers.[8] The SCAG region had five of the top 100 truck bottlenecks in the U.S. in 2014—identified by ATRI as follows:

#8	State Route 60 at State Route 57 in Los Angeles County
#17	Interstate 710 at Interstate 105 in Los Angeles County
#37	Interstate 10 at Interstate 15 in San Bernardino County
#39	Interstate 15 at State Route 91 in Riverside County
#55	Interstate 110 at Interstate 105 in Los Angeles County.[9]

[8] Cost of Congestion to the Trucking Industry. (2014). American Transportation Research Institute.
[9] Congestion Impact Analysis of Freight Significant Highway Locations. (2014). American Transportation Research Institute.

REGIONAL EXPRESS LANE NETWORK



Regional Express Lane Network Concept of Operations

SCAG, in partnership with the California Department of Transportation (Caltrans), the Federal Highway Administration (FHWA), the Los Angeles County Metropolitan Transportation Authority (Metro), the Orange County Transportation Authority (OCTA), the San Bernardino Associated Governments (SANBAG), and the Riverside County Transportation Commission (RCTC) collaborated on the development of a regional concept of operations for a regional express lane network. The Concept of Operations provides a blueprint for a regional express lane network that integrates express lane facilities into a regional system with consistent or compatible operating, design and policy rules. This development process also resulted in the recommended regional express lane network (illustrated here).

With driver wages and fuel costs representing more than 50 percent of total motor carrier costs, truck congestion has major impacts on the bottom line of the trucking industry. Truck bottlenecks are also emission "hot spots" that generally have significantly degraded localized air quality because of increased idling from passenger vehicles and trucks.

In past RTPs, SCAG directly addressed truck bottlenecks by developing a coordinated strategy to identify and mitigate the top-priority truck bottlenecks. This analysis has been updated for the 2016 RTP/SCS and includes a "refresh" of truck bottleneck delays for the locations where congestion data were available. It also identifies potential new truck bottlenecks.

The 2016 RTP/SCS allocates an estimated $5 billion toward strategies to relieve goods movement bottlenecks. Examples of bottleneck relief strategies include ramp meterings, extending merging lanes, improving ramps and interchanges, improving capacity and adding auxiliary lanes. Additional information is provided in the Goods Movement Appendix.

Rail Strategy

The region's railroad system provides critical connections between the largest port complex in the country and producers and consumers throughout the U.S. More than half of the international cargo arriving at the San Pedro Bay Ports uses rail. Railroads also serve domestic industries, predominantly for long-haul freight leaving the region. The extensive rail network in the SCAG region offers shippers the ability to move large volumes of goods over long distances at lower costs, compared with other transportation options. The 2016 RTP/SCS continues to incorporate the following rail strategies for goods movement:

- **Mainline Rail Improvements and Capacity Expansion:** This includes double or triple tracking certain rail segments, implementing new signal systems, building universal crossovers and constructing new sidings. These improvements would benefit both freight rail and passenger rail service, depending on their location.
- **Rail Yard Improvements:** This includes upgrades to existing rail yards, as well as construction of new yards to handle the projected growth in cargo volumes.
- **Grade Separations of Roads From Rail Lines:** These projects reduce vehicular delay, improve emergency vehicle access, reduce the risk of accidents and lower emissions levels.
- **Rail Operation Safety Improvements:** This includes technology such as Positive Train Control (PTC) that can greatly reduce the risk of rail collisions.

The benefits of the rail strategies to the region are considerable and include mobility, safety and environmental gains. These strategies could eliminate nearly 5,500 hours of vehicle delay per day at grade crossings, decrease emissions (NOx, CO2 and PM 2.5) by nearly 44,000 lb. per day, and reduce overall train delay to the year 2000 level.

Goods Movement Environmental Strategy

Along with growth in the region's population and economy comes a growing demand to deliver goods in areas where people live and work. As a result, goods movement transportation has been a major source of emissions that contributes to regional air pollution problems, as well as localized air pollution "hot spots" that can have adverse health impacts. Moreover, much of the SCAG region (and nearly all of the urbanized area) does not meet federal ozone and fine particulate (PM 2.5) air quality standards. The transportation of goods is also a major source of greenhouse gas emissions that contribute to global climate change. Because of the need to maintain and improve our quality of life, economically and environmentally, SCAG proposes the environmental strategy below to address the air quality impacts of goods movement, while also allowing for the efficient and safe goods movement flow throughout the region. A critical component of this strategy, as described below, is the integration of advanced technologies that have co-benefits such as air quality, energy security and economic growth opportunities.

The 2016 RTP/SCS focuses on a two-pronged approach for achieving an efficient freight system that reduces environmental impacts. For the near term, the regional strategy supports the deployment of commercially available low-emission trucks and locomotives while centering on continued investments into improved system efficiencies. For example, the region envisions increased market penetration of technologies already in use, such as heavy-duty hybrid trucks and natural gas trucks. Applying ITS solutions to improve operational efficiency is also recommended. In the longer term, the strategy focuses on advancing technologies—taking critical steps now toward the phased implementation of a zero- and near zero-emission freight system. SCAG is cognizant of the need to incorporate evolving technologies with plans for new infrastructure. These include technologies to fuel vehicles, as well as to charge batteries and provide power.

The plan to develop and deploy advanced technologies includes phased implementation, during which technology needs are defined, prototypes are tested and developed, and efforts are scaled up. FIGURE 5.3 illustrates this process. The phases are summarized as follows:

FIGURE 5.3 PHASES OF TECHNOLOGY DEVELOPMENT AND DEPLOYMENT

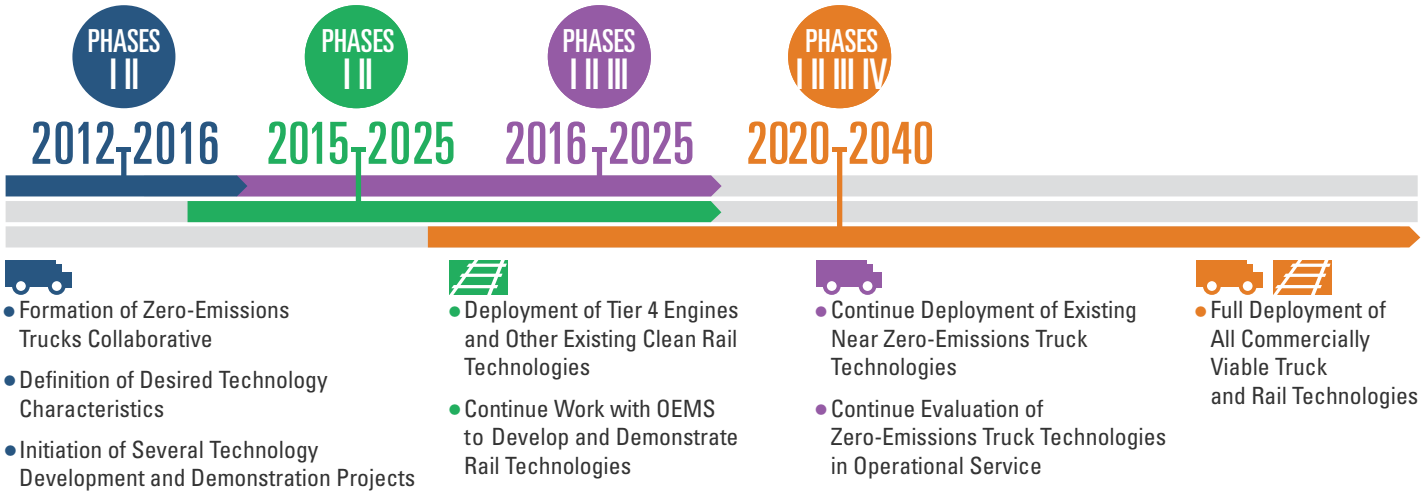
PHASE I Project Scoping and Evaluation of Existing Work: Continue to build on current regional research and technology testing efforts to further define the needs that the new technology must provide and to better understand the current capabilities, costs and stage of development of potential technologies.

PHASE II Evaluation, Development and Prototype Demonstrations: Evaluate, develop and test initial vehicle prototypes. Work with public and private sector partners to secure funding commitments for the development of new technology prototypes and demonstrations.

PHASE III Initial Deployment and Operational Demonstration: Initially deploy potential technologies, preferably with industry partners who can evaluate and report on their performance in the real world. Funding may be used for incentives for initial deployment and the continued evaluation and development of technologies.

PHASE IV Full-Scale Demonstrations and Commercial Deployment: Scale up deployment of viable technologies and implement needed regulatory and market mechanisms to launch them commercially. The Phase IV time frame accommodates the readiness of different levels of technology for various applications.

FIGURE 5.4 TRUCK AND RAIL TECHNOLOGY DEVELOPMENT AND DEPLOYMENT TIMELINE



Phases of New Technology Development and Deployment

The time frames illustrated in FIGURE 5.4 suggest a path toward implementing the phases described above. This cycle of technology development is continuous, and it will renew itself as new innovations emerge and technologies continue to evolve. The timelines presented are broad, to capture the breadth of technologies in various stages of development and to allow for further innovation in this sector. This path is discussed in greater detail in the Goods Movement Appendix.

Since SCAG adopted the 2012 RTP/SCS, the region has attracted outside funding and committed its own funding to support research and development efforts. Several studies have been conducted to date that contribute to "project scoping" by providing a greater understanding of the regional truck market and how truck use defines key performance parameters such as range and power needs. To evaluate and develop prototypes, three large-scale research and development efforts are underway to develop and test zero-emission trucks and charging infrastructure. These projects require continuing collaboration between original equipment manufacturers and public sector agencies.

Meeting Airport Demand

As discussed in Chapter 2, our region is served by a multiple airport system that includes commercial airports, military airfields and general aviation airports. All of these airports function as part of a system that provides a high level of air service to our residents and to visitors. Services that are not practical or financially viable at one airport in the system can be provided at an alternative facility. In addition, many of our airports function as relievers for other airports in case of emergencies or irregular operations due to inclement weather or other unusual events.

The commercial passenger and cargo airports in our region, especially those in the urbanized areas, each face constraints on their operations. At each airport, these constraints may include airspace conflicts, runway configurations, terminal capacity, ground access congestion and legal restrictions such as noise control ordinances. Because of the varying constraints on individual airports, it is important to maintain a diverse group of airports to serve the overall air travel demand of the region extending into the future.

Accommodating the future demand for air passenger and air cargo is critical to the economic health of the region. The economic impact of air travel to the region is expected to increase from $27.4 billion in 2012 to $43.8 billion in 2040 (in 2012 dollars), an increase of nearly 60 percent. The number of jobs supported by visitors arriving by air is expected to increase from 275,000 to 452,000. If the region's aviation system and supporting ground access network cannot accommodate the expected demand, some of this potential economic activity could be lost to other regions.

Forecasting Air Passenger Demand Based on the historical relationship between economic activity and the demand for air travel, as well as expected future economic conditions in our and other regions, total air passenger demand in our region is expected to increase from 91.2 million annual passengers (MAP) in 2014 to 136.2 MAP in 2040. This represents a 1.6 percent annual growth rate over the forecast period. This regional demand forecast for air passenger travel is strong and reflects the potential for the region to have long-term economic recovery and growth. More detail about the forecast methodology is presented in the Aviation & Airport Ground Access Appendix.

Some of the airports in our region benefit from having long runways, uncongested airspace and spacious, modern terminals. Airports with these benefits are expected to be able to accommodate any growth in demand foreseeable through 2040. However, four of the commercial airports in urban parts of the region face physical or policy constraints that may limit their capacity to accommodate increases in demand by 2040. The individual airport demand forecasts reflect the following constraints:

- Burbank Bob Hope Airport: 7.3 MAP (airfield capacity)
- Los Angeles International Airport: 82.9–96.6 MAP (airfield capacity)
- Long Beach Airport: 5.0 MAP (noise compatability ordinance)
- John Wayne Airport: 12.5 MAP (settlement agreement adopted by Board of Supervisors)

An analysis of these constraints is included in the Aviation & Airport Ground Access Appendix.

Several recent trends in the airline industry were considered in the capacity analyses. For example, the average number of seats on commercial flights in and out of airports in our region increased from 107 in 2007 to 119 in 2014, so each "operation" (take-off or landing) on the airfield and each "turn" (arrival and departure) of a gate can include more passengers. Therefore, as a result of airline industry trends, the estimated capacity of several constrained airports has increased compared to prior analyses, although there may not have been any physical change at the airport itself.

2040 AIR PASSENGER FORECAST

Airport Specific Demand, *Million Annual Passengers (MAP)*

Midpoint of 2040 Total
Regional Aviation Demand:

136.2 MAP

Based on the overall forecast regional demand for air travel, the origins and destinations of trips within the region and the capacity constraints of individual airports, the figure "2040 Airport Demand Forecasts" on the previous page presents the anticipated air travel demand at each commercial airport in our region in 2040.

Forecasting Air Cargo

The development of the air cargo demand forecasts is similar to that of the air passenger forecasts. The demand for air cargo is driven largely by the economic interrelationship of our region and other regions around the world. Because of its high cost, shipment by air is used primarily for time-sensitive and high-value goods. Total air cargo transported through our region's airports has experienced an uneven recovery since the recession of 2007, but remained below year 2000 levels even in 2014. Based on the historical relationship between economic activity and the demand for air cargo, as well as expected future economic conditions in our and other regions, total air cargo demand in our region is expected to increase from 2.43 million metric tons in 2014 to 3.78 million metric tons in 2040. This represents a 1.8 percent annual growth rate over the forecast period.

In 2014, more than 99 percent of air cargo in our region was handled at five airports: Los Angeles International Airport (77 percent), Ontario International Airport (19 percent), Burbank Bob Hope Airport (2 percent), John Wayne Airport (0.7 percent) and Long Beach Airport (0.6 percent). Air cargo can be classified as "belly" cargo (carried in the bellies of passenger airplanes) or full-freighter cargo (carried in dedicated freighter aircraft). LAX handled nearly 99 percent of the region's belly cargo and 70 percent of the full-freighter cargo.

Following the 2012 RTP/SCS, the air cargo forecasts assume some redistribution of air cargo across the airports in the region. Cargo carried on passenger airlines or by their cargo divisions is unlikely to be redistributed because these carriers benefit from consolidation of their passenger and cargo facilities at the same airport. Cargo carried by integrated delivery services, such as FedEx and UPS, is also unlikely to be redistributed because of the major investments these companies have made in facilities at individual airports (primarily, Ontario International Airport). Therefore, only cargo carried by charter airlines or all-cargo airlines would potentially diversify to other airports and, of the cargo that could potentially diversify, only some actually will.

Airport Ground Access

The ground access network serving the region's airports is critical to both the aviation system and the ground transportation system. Passengers' choice of airports is based in part on the travel time to the airport and the convenience of access, so facilitating airport access is essential to the efficient functioning of the aviation system. In addition, airport related ground trips can contribute to local congestion in the vicinity of the airports.

Currently, more than 200,000 air passengers arrive at or depart from the region's airports every day. By 2040, this number is forecast to increase to more than 330,000. Passenger surveys indicate that three percent of passengers take transit to LAX and one percent take transit to Burbank Bob Hope Airport. Surveys are not available at other airports, but because these two airports have the best transit access in the region it is likely that the transit share at the remaining airports is significantly below one percent.

The large majority of air passengers use a motor vehicle, either their own or a rental vehicle, to get to and from the airport. About half of all air passengers in the region are picked up or dropped off at the airport by a friend or relative. Each end of these pick-up/drop-off air trips results in two ground trips: one to the airport followed by one returning from the airport. Therefore, taking steps to encourage travelers to use transit or other modes of shared transportation is vital.

To reduce ground transportation congestion related to air passenger travel, the 2016 RTP/SCS includes the following strategies:

- Support the regionalization of air travel demand
- Continue to support regional and inter-regional projects that facilitate airport ground access (e.g., High-Speed Train, High Desert Corridor)
- Support ongoing local planning efforts by airport operators, CTCs and local jurisdictions
- Encourage the development and use of transit access to the region's airports
- Encourage the use of modes with high average vehicle occupancy (AVO)
- Discourage the use of modes that require "deadhead" trips to/from airports

In recent years, airport operators, CTCs and SCAG have all undertaken their own initiatives to improve ground access at the region's aviation facilities. The sections below discuss recent efforts and recommended strategies to improve ground access at three existing commercial airports in the region that have invested considerably in improving ground access. A more detailed discussion

of ground access improvement strategies at airports across the region is included in the Aviation & Airport Ground Access Appendix.

Burbank Bob Hope Airport

Burbank Bob Hope Airport is the only airport in the region with a direct rail-to-terminal connection, via the recently completed Regional Intermodal Transportation Center (RITC). The RITC serves multiple modes, including public parking, a consolidated rental car facility, regional bus service and bicycles, and commuter rail at the Metrolink Ventura line station. A pedestrian bridge currently in design will further facilitate access between the train station and the airport. In addition, a second rail station is currently planned on the Metrolink Antelope Valley line. BurbankBus has recently begun operating all-day bus service between the North Hollywood Metro Red Line Station and the airport, utilizing the RITC.

Key 2016 RTP/SCS projects for Burbank Bob Hope Airport include:

- Increased Metrolink service systemwide
- Metro Red Line extension from North Hollywood to Burbank Bob Hope Airport
- New east-west BRT service from Orange Line/North Hollywood to Pasadena (no direct connection to Burbank Bob Hope Airport)

Additional strategies include:

- Construct new Metrolink Station on Antelope Valley Line
- Support increased Metrolink service to stations on Ventura Line and Antelope Valley Line
- Support recommendations of recent Ground Transportation and Land Use Study:
  - Improve transit connection to North Hollywood Red/Orange Line Station
  - Improve transit connection to Pasadena and Glendale
- Support the development of a High-Speed Train station on Hollywood Way and provide convenient access between the station and the airport

Los Angeles International Airport

LAX is owned and operated by Los Angeles World Airports (LAWA), a proprietary department of the City of Los Angeles. In December 2014, LAWA's Board of Airport Commissioners approved a plan to overhaul and modernize LAX's ground access and transportation connections for arriving and departing passengers. The approved program includes:

- The LAX Train (Automated People Mover System)
- Intermodal Transportation Facilities (ITF)
- Consolidated Rent-A-Car Center (CONRAC)
- Central terminal area improvements
- Connection with the under-construction Metro Crenshaw Line

The CONRAC will consolidate the numerous off-site rental car facilities in the surrounding area into one convenient location 1.5-miles east of LAX and adjacent to Interstate 405 for convenient regional highway access. Two ITFs are included in the program offering airport travelers locations for parking, passenger pick-up and drop off, and flight check-in outside the terminal and away from the congested World Way roadway within LAX. The eastern ITF will include Metro facilities to connect with Metro's planned 96th Street/Aviation Boulevard Station serving the under-construction Metro Crenshaw/LAX Transit Project and existing Metro Green Line, as well as a bus plaza for Metro and municipal buses. The LAX Train will be an elevated automated people mover system with six stations connecting the CONRAC, both ITFs and Metro facilities to the LAX passenger terminals. The environmental review process for this project began in 2015 and construction is expected to begin in 2017.

Key 2016 RTP/SCS projects for LAX include:

- New Crenshaw/Green Line station at 96th/Aviation
- Automated People Mover

Additional strategies include:

- Support construction of Automated People Mover (APM) with connection to Metro Crenshaw Line
- Support construction of Consolidated Rental Car facility and Intermodal Transportation Facilities to reduce private vehicles and shuttles in Central Terminal Area
- Support expansion of FlyAway service to new markets
- Support ability of ride-hailing services to pick up passengers, to reduce deadhead trips in the central terminal area

Ontario International Airport

The 2014 SANBAG Ontario Airport Rail Access Study examined six alternatives to connect Ontario Airport to the regional rail system. One of these alternatives is the Metro Gold Line Foothill Extension Phase 2C that would extend the eastern terminus of the Metro Gold Line to the airport. However, Phase 2C is not funded at this time. Improved transit access from the Rancho Cucamonga Metrolink Station is included in the 2016 RTP/SCS project list.

Key 2016 RTP/SCS projects for Ontario Airport include:

- New Rancho Cucamonga Metrolink to ONT rail connection
- Numerous local highway interchange, arterial and grade separation improvements

Additional strategies include:

- Support recommendations of SANBAG Ontario Airport Rail Access Study to initiate transit connection to Metrolink and build transit market
- Continue analysis of transit options in upcoming SCAG Inter-County Transit and Rail Study
- Support development of intermodal transportation center
- Explore possibility of direct access from future Interstate 10 Express Lanes
- Consider focus on tourist charters that can attract passengers and use high-capacity vehicles for ground access
- Continue improvements to highways and arterials

For more details on how the region is expected to meet demands for airport service in the future, see the Aviation & Airport Ground Access Appendix.

TECHNOLOGICAL INNOVATION AND 21ST CENTURY TRANSPORTATION

Since SCAG adopted the 2012 RTP/SCS, technology and innovation have emerged as major themes of this Plan update. Technology as a concept is a very broad topic. The term has myriad connotations and encompasses products such as smart phones and electric cars; advancements in software development such as real-time travel information and online banking; and new service paradigms such as ride sourcing and peer-to-peer home sharing. Some of these so-called "new" concepts have actually been around for a long time, but only recently have they scaled up because of technological innovations. For example, car sharing and bike sharing concepts have been in development since the 1980s, but only in recent years has the ubiquity of cellular phones with Internet access, precise geographic mapping and the ability to instantly approve payments between users and providers made these systems more useful to a wider audience. The 2016 RTP/SCS uses the term "mobility innovations" to characterize the new technologies that help us move about the region.

MOBILITY INNOVATIONS

The 2016 RTP/SCS includes policies and analyzes the market growth of four key new mobility innovations: Zero-Emissions Vehicles, Neighborhood Electric Vehicles, Car sharing services and Ridesourcing (also known as Transportation Network Companies or TNCs). Please see the Mobility Innovations Appendix for policy recommendations and additional information.

Zero-Emissions Vehicles

While SCAG's policies are technology neutral with regard to supporting zero- and/or near zero-emissions vehicles, this section will focus on zero-emissions vehicles. Since SCAG adopted the 2012 RTP/SCS, the Governor's Office released the Zero Emissions Vehicle (ZEV) Action Plan for 2013 and 2015. These plans identified state level funding to support the implementation of Plug-in Electric Vehicle (PEV) and Hydrogen Fuel Cell refueling networks. As part of the 2016 RTP/SCS, SCAG modeled PEV growth specific to Plug-in Hybrid Electric Vehicles (PHEV) in the SCAG region. These are electric vehicles that are powered by a gasoline engine when their battery is depleted. The 2016 RTP/SCS proposes a regional charging network that will increase the number of PHEV miles driven on electric power. In many instances, these chargers may double the electric range of PHEVs. A fully funded regional charging network program would result in a reduction of one percent per capita greenhouse gas emissions.

Neighborhood Electric Vehicles (NEVs)

Neighborhood Mobility Areas reflect state and local policies to encourage the use of alternative modes of transportation for short trips. In the SCAG region, about 38 percent of all trips are three miles or less, but nearly 78 percent of these trips are made by driving full-sized cars. These short trips can easily be taken using an NEV. Policies to increase the purchase and roadway designs that increase the use of NEVs for short trips in Neighborhood Mobility Areas would result in a reduction of 0.1 percent per capita greenhouse gas emissions.

Shared Mobility (Includes the concept of Ridesourcing)

Shared Mobility refers to new mobility paradigms as well as old models that

GHG REDUCTIONS FROM MOBILITY INNOVATIONS 2040

ZERO-EMISSIONS VEHICLE (ZEV)

1.0%

NEIGHBORHOOD ELECTRIC VEHICLE (NEV)

0.1%

CARSHARING/ RIDESOURCING

0.9%

are finding new markets and methods of delivery, thanks to new technology platforms. Shared Mobility encompasses a wide range of services including:

- Return Trip Car Sharing
- Point-to-Point Car Sharing
- Peer-to-Peer Car Sharing
- Ridesourcing (also known as Transportation Network Companies)
- Dynamic On-Demand Private Transit
- Vanpool and Private Employer Charters

For all these services, mobile computing and payment systems are reducing transaction costs and opening up traditional mobility services to a wider population of producers and consumers. The net effect of these services on transportation mode choices and per capita VMT is still to be determined. However, preliminary research shows that the availability and use of these services correlates with a reduction in individual vehicle ownership. This reduction in ownership, meanwhile, results in an increase in non-motor vehicle modes for discretionary trips. In other words, people who no longer own a car will be more selective in their car trips.

In developing the 2016 RTP/SCS, SCAG looked at areas in which shared mobility services are expected to increase. The Plan anticipates robust growth in car sharing and ridesourcing. Ridesourcing is a term coined by researchers to refer to mobile phone-based applications that put riders in touch with drivers for a fee. Some drivers on one platform are professionals, while many other drivers are non-professionals earning income from giving rides. Policies to increase the use of car sharing and ridesourcing would result in a combined reduction of 0.9 percent greenhouse gas emissions.

ANTICIPATING CAR-TO-CAR COMMUNICATION AND AUTOMATED VEHICLE TECHNOLOGIES

Automakers already are manufacturing and installing advanced driver assist systems that can automatically center, reduce speed and brake in anticipation of vehicles ahead. Trucking companies are road testing automated driving and "platooning"—in which automated trucks safely follow or draft each other at very close distances to conserve fuel. Global corporations and research labs are testing small, fully automated vehicles on public roads. Certain automakers have begun experimenting with new service models like "fractional ownership" in which targeted customers collectively lease and share a vehicle. Locking and ignition packages are being offered to simplify the use of peer-to-peer car sharing platforms. These developments point to a very different vehicle ownership paradigm 25 years from now.

Automated/Connected Vehicle (ACV) innovations cover a range of enabling advancements that allow vehicles to operate with less driver input and coordinate with other vehicles to achieve improvements in safety, throughput and user experience. The term ACV covers on-board sensing capabilities, data integration and vehicle-to-vehicle (V2V) communication. ACV covers two distinct innovation paths: autonomous operation, where vehicles rely on digital maps and on-board sensing to operate without any driver input; and connected vehicle operation, where vehicles communicate with one another as well as the roadways they are traveling on. However, these two paths are being developed simultaneously and they may need to be integrated to achieve full benefits in terms of safety and reducing congestion, as promised by researchers. Vehicle to Infrastructure (V2I) communication is another aspect that is covered under roadway ITS operations. It is important to note that vehicles capable of partially automated operation, such as the top-of-the-line Mercedes S-Class and Infiniti Q35, are already available to the public. The California and Nevada Departments of Motor Vehicles (DMV) have already licensed manufacturers for on-road testing and those agencies will be releasing consumer model permitting rules by 2016.

Due to the uncertainty of deployment timelines and operational characteristics, initial research shows inconsistent impacts on travel behavior and locational choice. Some traffic simulations show that in the initial phases ACVs may increase congestion, especially if safety features are mandated at the expense of system operational efficiency. On the other hand, if fully automated vehicles change the vehicle ownership paradigm, they may facilitate more on-demand transportation services and an increased reduction in household vehicle ownership. In the long term, ACVs have the ability to dramatically increase the carrying capacity of the regional roadway network.

PROTECTING THE ENVIRONMENT

Integrating the many transportation and land use strategies discussed in this chapter will help protect the region's natural environment—in numerous ways. SCAG has been committed to this integration, as well as protecting the environment, for years. However, environmental protection is now a major requirement of Moving Ahead for Progress in the 21st Century Act (MAP-21). Pursuant to Section 23 U.S. Code Section 134, "a long-range transportation plan shall include a discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including

activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan." The 2016 RTP/SCS also considers and is consistent with the provisions of the Fixing America's Surface Transportation Act (FAST Act).

The 2016 RTP/SCS, therefore, includes a discussion of mitigation measures consistent with these requirements. As a public agency in California, SCAG first and foremost fulfills mitigation requirements by complying with the California Environmental Quality Act (CEQA), so this section of the Plan includes a summary of mitigation as laid out in the Program Environmental Impact Report (PEIR) accompanying the 2016 RTP/SCS.

In addition, as part of the planning process, MPOs "shall consult, as appropriate, with State and local agencies responsible for land use management, natural resources, environmental protection, conservation and historic preservation concerning the development of the transportation plan." They also must consider, if available, "State conservation plans or maps" and "inventories of natural or historic resources."

California law requires SCAG to prepare and certify a PEIR prior to adopting the 2016 RTP/SCS. The PEIR evaluates potential environmental impacts of the 2016 RTP/SCS when compared with existing conditions, and proposes measures at the program level to mitigate impacts to the maximum extent feasible for those resource areas that would be affected by the Plan (and associated induced growth). These impact areas include Aesthetics; Agriculture and Forestry Resources; Air Quality; Biological Resources; Cultural Resources; Energy; Geology and Soils; Greenhouse Gas Emissions and Climate Change; Hazards and Hazardous Materials; Hydrology and Water Quality; Land Use and Planning; Mineral Resources; Noise; Population, Housing and Employment; Public Services; Recreation; Transportation, Traffic and Safety; and Utilities and Service Systems. The 2016 RTP/SCS also acts as a "self-mitigating" plan in certain impact areas, in that its policies and strategies lead to improved environmental outcomes for air quality, greenhouse gas emissions, public health, congestion and other indicators, while accommodating existing and projected population growth. The section below summarizes the mitigation program contained within the PEIR for this Plan. The general purpose of the mitigation measures included in the PEIR is to identify how to protect the environment, and natural and cultural resources; improve the linkage between transportation and environmental planning; and enhance public health in concert with the proposed transportation improvements and related land use planning strategies.

It should be clearly noted that the 2016 RTP/SCS itself leads to improved environmental outcomes for per capita greenhouse gas emissions, the preservation of natural lands, recreational and active transportation opportunities and improved public health, among other key environmental indicators compared to the No Project Alternative. Nevertheless, the implementation of Plan programs, policies and strategies may lead to environmental impacts compared to the existing conditions. As such, program-level performance-based mitigation measures designed to offset any identified potentially significant adverse programmatic level environmental effects are summarized below. Project-level environmental mitigation should be appropriately identified and prepared by implementing agencies on a project-by-project or site-by-site basis as projects proceed through the design and decision-making process. Transportation project implementation and development decisions are subject to their own environmental review process and are expected to implement project-specific mitigation measures to minimize environmental impacts. This section, along with more detailed information in the PEIR, provides a framework that identifies feasible measures as resources which lead agencies can and should implement when they identify and mitigate project-level environmental impacts.

MITIGATION STRATEGIES

The PEIR provides a list of mitigation measures, which would be implemented by SCAG on a regional level, in order to assist in reducing environmental impacts related to implementation of the 2016 RTP/SCS. SCAG is also responsible for developing a plan to monitor mitigation activities to track progress on implementation of these measures at the regional level. SCAG's mitigation is consistent with the general role played by a Metropolitan Planning Organization, including developing and sharing information, collaborating with partners and developing regional policies. SCAG works with member agencies and stakeholders but it does not identify, evaluate or implement projects or project-specific mitigation.

In addition, the PEIR includes a "catch-all" mitigation measure for each of the CEQA resource categories, stating that lead agencies "can and should" comply with generally applicable performance standards that are linked to existing statutes, regulations and adopted general plans, where available and appropriate. They are not intended to supersede compliance with existing law, regulations and adopted general plans. Instead, they help explain to lead agencies that the existing regulatory framework that could assist in mitigating potential environmental impacts at the project level.

CONSERVATION PLANNING POLICY

Long-range transportation plans are required to discuss the types of potential environmental mitigation activities and potential areas to carry out these activities. This includes activities that may have the greatest potential to restore and maintain the environmental functions affected by the Plan [23 U.S. Code Sec. 134]. As such, this is being addressed in the 2016 RTP/SCS and is separate and distinct from the mitigation measures addressed in the PEIR.

SCAG could approach federal requirements for mitigation by continuing and expanding the efforts already undertaken since the adoption of the 2012 RTP/SCS. Those efforts included mapping potential priority conservation areas, engaging partners, and developing regional mitigation policies and approaches for this plan. As outlined in the 2012 RTP/SCS, the goal of these efforts is the development of a program of large-scale acquisition and management of important habitats lands to mitigate impacts related to future transportation projects. In the 2016 RTP/SCS, regional goals also include supporting local land use strategies that reduce the demand for building outside of the existing development footprint, especially in important habitat areas. Building on this effort has the potential to create a regional conservation program that stakeholders such as CTCs, local jurisdictions, agencies, and non-profits can align with and support. SCAG has already engaged many of these stakeholders by convening a working group. This strategic and comprehensive approach allows for regional growth and progress, while at the same time ensuring that important natural and working lands and water resources are protected in perpetuity. With that as the foundation, the following suggested next steps for further development of a conservation policy could include the following:

• Expanding on the Natural Resource Inventory Database and Conservation Framework and Assessment by incorporating strategic mapping layers to build the database and further refine the priority conservation areas

• Encouraging CTCs to develop advance mitigation programs or include them in future transportation measures

• Aligning with funding opportunities and pilot programs to begin implementation of the Conservation Plan through acquisition and restoration

• Providing incentives to jurisdictions that cooperate across county lines to protect and restore natural habitat corridors, especially where corridors cross county boundaries

Please see the Natural & Farm Lands Appendix for additional detail.

SUMMARY OF THE ENVIRONMENTAL MITIGATION PROGRAM

The 2016 RTP/SCS includes an environmental mitigation program that links transportation planning to the environment. Building on its strong commitment to the environment as demonstrated in the 2012 RTP/SCS, SCAG's mitigation program is intended to function as a resource for lead agencies to consider in identifying mitigation measures to reduce impacts anticipated to result from future projects as deemed applicable and feasible by such agencies. This mitigation discussion also utilizes documents created by federal, state and local agencies to guide environmental planning for transportation projects. The following discussion focuses on specific resource areas and example mitigation measures to avoid or substantially reduce the significant environmental impacts in these areas.

AESTHETICS

The SCAG region includes several highway segments that are recognized by the State as designated scenic highways or are eligible for such designation. Construction and implementation of projects in the 2016 RTP/SCS could impact designated scenic highways and restrict or obstruct views of scenic resources such as mountains, ocean, rock outcroppings, etc. In addition, some transportation projects could add urban visual elements, such as transportation infrastructure (highways, transit stations) to previously natural areas.

Mitigation measures developed by SCAG to minimize impacts to Aesthetics include, but are not limited to, information sharing regarding the locations of designated scenic vistas, and regional program development as part of SCAG's ongoing regional planning efforts, such as web-based planning tools for local government and direct technical assistance efforts such as the Toolbox Tuesday Training series and the sharing of associated online training materials.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines and review of county and city general plans and Caltrans designated scenic vistas, aesthetics performance standards-based mitigation measures may include, but are not limited to:

- Encourage the implementation of design guidelines by counties and cities, local policies, and programs aimed at protecting views of scenic corridors and avoiding visual intrusions in design of projects to minimize contrasts in scale and passing between the project and surrounding natural forms and developments.
- Design landscaping along highway corridors to add significant natural elements and visual interest to soften the hard-edged, linear transportation corridors.

- Remove blight or nuisances that compromise visual character or visual quality of project areas including graffiti abatement, trash removal, landscape management, maintenance of signage and billboards in good condition, and replacing compromised native vegetation and landscape.

AGRICULTURE AND FORESTRY RESOURCES

Approximately 2.6 million acres of important agricultural lands in the SCAG region currently exists. Out of the 2.6 million acres, 1.1 million acres are designated as Important Farmland and the other 1.5 million acres are designated as grazing land. With respect to forests and timberlands, forest lands include the Angeles National Forest, Cleveland National Forest, Los Padres National Forest, and San Bernardino National Forest, as well as forest lands with open space zones in Imperial and Los Angeles counties. No Timberland Production Zone exists within the SCAG region. However, the harvesting of timberland is only permitted in two agricultural zones, with one limited to Christmas tree harvesting. The 2016 RTP/SCS includes transportation projects and strategies that would have the potential to convert some Prime Farmland, Farmland of Statewide Importance, and Unique Farmland in all six counties and affect Local Farmland and Grazing land in five of the six counties. Forest and timberland zones would result in less than significant impacts.

SCAG-developed mitigation measures include, but are not limited to, coordination among applicable resource agencies, information sharing, and regional program development as part of SCAG's ongoing regional planning efforts, such as web-based planning tools for local government including CA LOTS, and other GIS tools and data services, including, but not limiting to, Map Gallery, GIS library, and GIS applications; and direct technical assistance efforts such as the Toolbox Tuesday Training series and sharing of associated online Training materials. Lead agencies, such as county and city planning departments, shall be consulted during this update process.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, review of county and general plans and consistent with the Farmland Protection Policy Act of 1981 and the Farmland Mapping and Monitoring Program of the California Resources Agency, agriculture and forestry resource performance standards-based mitigation measures may include, but are not limited to:

- Encourage enrollments of agricultural lands that have Williamson Act programs.
- Develop project relocation realignment to avoid lands in Williamson Act contracts.
- Establish conservation easements consistent with the recommendations of the Department of Conservation, Farmland Security Zones, Williamson Act contracts, or other conservation tools.

AIR QUALITY

The 2016 RTP/SCS includes programs, policies and measures to address air emissions. Measures that help mitigate air emissions are comprised of strategies that reduce congestion, increase access to public transportation, improve air quality, and enhance coordination between land use and transportation decisions. In order to disclose potential environmental effects of the 2016 RTP/SCS, SCAG has prepared an estimated inventory of the region's emissions, and identified mitigation measures. The mitigation measures seek to achieve the maximum feasible and cost-effective reductions in emissions.

Mitigation measures developed by SCAG to minimize impacts to Air Quality include, but are not limited to, the determination as part of its conformity findings, pursuant to the federal CAA, that the Plan and its subsequent updates provided for the timely implementation of transportation control measures (TCM). Demonstration of TCM timely implementation including a list of these TCMs is documented in the Transportation Conformity Analysis Appendix. Additionally, during the 2016 to 2040 planning period, SCAG shall pursue activities to reduce the impacts associated with health risks for sensitive receptors within 500 feet of highways and high-traffic volume roadways.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, and within the responsibility and jurisdiction of ARB, air quality management districts and other regulatory agencies, air quality performance standards-based mitigation measures may include, but are not limited to:

- Reduce emissions with the use of clean fuels and reducing petroleum dependency.
- Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas.
- Revegetate disturbed lands, including vehicular paths created during construction to avoid future off-road vehicular activities.
- As appropriate, require that portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, obtain ARB Portable Equipment Registration with the state or local district permit.

BIOLOGICAL RESOURCES

The 2016 RTP/SCS seeks to minimize transportation-related impacts on wildlife, and also better integrate transportation infrastructure into the environment.

Impacts to biological resources generally include displacement of native vegetation and habitat on previously undisturbed land; habitat fragmentation and decrease in habitat connectivity; and displacement and reduction of local, native wildlife including sensitive species. Building new transportation routes and facilities through undisturbed land or expanding facilities and increasing the number of vehicles traveling on existing routes will directly injure wildlife species, cause wildlife fatalities, and disturb natural behaviors such as breeding and nesting. Without appropriate mitigation, this will result in the direct reduction or elimination of species populations (including sensitive and special-status species) and native vegetation (including special-status species and natural communities) as well as the disruption and impairment of ecosystem services provided by native habitat areas.

Mitigation measures developed by SCAG to minimize impacts to biological resources include, but are not limited to, consultation with resource agencies, as well as local jurisdictions to incorporate any local HCPs or other similar planning documents. Development of a conservation strategy with local jurisdictions and agencies and maintaining a list/map of potential conservation opportunity areas based on the most recent land use data.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, within county and city general plans, the responsibility and jurisdiction of the USFWS, the CDFW, and other applicable agencies, biological resources performance standards-based mitigation measures may include, but are not limited to:

- Design projects to avoid sensitive natural communities and riparian habitats.
- Install fencing and/or mark sensitive habitat to be avoided during construction activities.
- Salvage and stockpiling topsoil and perennial plants for use in restoring native vegetation to all areas of temporary disturbance within the project area.

CULTURAL RESOURCES

Impacts to cultural resources, inclusive of tribal cultural resources, generally include substantial adverse changes to historical and archaeological resources and direct or indirect changes to unique paleontological resources or sites or unique geological features. These impacts can occur at the localized scale and in relation to existing conditions, as the Plan itself does not affect the total amount of growth in the region. Adverse changes include the destruction of culturally and historically (recent or geologic time) significant and unique historical, archaeological, paleontological, and geological features.

Mitigation measures developed by SCAG to minimize impacts to Cultural resources include, but are not limited to, sharing of information and SCAG's ongoing regional planning efforts such as web-based planning tools for local government including CA LOTS, and direct technical assistance efforts such as the Toolbox Tuesday series. Resource agencies, such as the Office of Historic Preservation shall be consulted during this process.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, and review of county and city general plans, cultural resources performance standards-based mitigation measures may include, but are not limited to:

- Comply with Section 106 of the National Historic Preservation Act (NHPA) including, but not limited to, projects for which federal funding or approval is required for the individual project.
- Employ design measures to avoid historical resources and undertake adaptive reuse where appropriate and feasible. If resources are to be preserved, as feasible, project sponsors should carry out the maintenance, repair, stabilization, rehabilitation, restoration, preservation, conservation or reconstruction in a manner consistent with the Secretary of the Interior's Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings.
- Comply with California Health and Safety Code, Section 7050 and Sections 18950–18961, in the event of discovery or recognition of any human remains during construction or excavation activities associated with the project, in any location other than a dedicated cemetery, ceasing further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until the coroner of the county has been informed and has determined that no investigation of the cause of death is required.

ENERGY

California consumes more energy than any other state except Texas. However, in terms of energy consumption per person, California ranks 49th among the 50 states and District of Columbia. Current annual energy consumption in

California (including transportation) is approximately 7,641 trillion Btu, which represents approximately 7.9 percent of the nation's energy consumption. Transporting water into California is also a very energy intensive process. The California State Water Project (SWP) is the single largest user of energy in the state. The SWP uses approximately 5 billion kWh/year of electricity which is equal to 2 to 3 percent of the total electricity consumed in California. Water-related energy consumes approximately 20 percent of the total electricity in California. Implementation of the 2016 RTP/SCS would result in an increase in energy use due to the increase in households and transportation projects in the SCAG region.

SCAG developed mitigation measures include, but are not limited to, working with local jurisdictions and energy providers, through its Energy and Environment Committee, and administration of the Clean Cities program, Sustainability Planning grants program, and other SCAG energy-related planning activities, to encourage energy efficient building development. Additional measures include, pursuing partnerships with Southern California Edison, municipal utilities, and the California Public Utilities Commission to promote energy efficient development in the SCAG region, through coordinated planning, data and information sharing activities

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, county and city form-based zoning codes and future updated zoning codes, energy performance standards-based mitigation measures may include, but are not limited to:

- Using energy efficient materials in building design, construction, rehabilitation, and retrofit.
- Reduce lighting, heating, and cooling needs by taking advantage of light colored roofs, trees for shade, and sunlight.

GEOLOGY AND SOILS

Impacts to geological resources generally include the disturbance of unstable geologic units (rock type) or soils, causing the loss of topsoil and soil erosion, slope failure, subsidence, project-specific seismic activity and structural damage from expansive soils. These activities, in addition to building projects on and around Alquist-Priolo Fault Zones and other local faults, could expose people and/or structures to the risk of loss, injury, or death.

Mitigation measures developed by SCAG to minimize impacts to Geology and Soils include, but are not limited to, sharing of information, and regional program development as part of SCAG's ongoing regional planning efforts, such as web-based planning tools for local government including CA LOTS, and direct technical assistance efforts such as the Toolbox Tuesday series. Resource agencies, such as the U.S. Geology Survey shall be consulted during this update process.

Based on County and City General Plans, geology and soils performance standards-based mitigation measures may include, but are not limited to:

- Comply with Section 4.7.2 of the Alquist-Priolo Earthquake Fault Zoning Act, requiring a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.
- Comply with the CBC and local regulatory agencies with oversight of development associated with the project, ensuring that projects are designed in accordance with county and city code requirements for seismic ground shaking.
- Adhere to design standards described in the California Building Code and all standard geotechnical investigation, design, grading, and construction practices to avoid or reduce impacts from earthquakes, ground shaking, ground failure, and landslides.

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

California is the fifteenth largest emitter of greenhouse gases on the planet. The transportation sector, primarily cars and trucks that move goods and people, is the largest contributor with 37 percent of the state's total greenhouse gas emissions in 2013. On road emissions (from passenger vehicles and heavy duty trucks) constitute 90 percent of the transportation sector total. In order to disclose potential environmental effects of the 2016 RTP/SCS, SCAG has prepared an estimated inventory of the region's existing greenhouse gas emissions, identified mitigation measures, and compared alternatives in the PEIR. Although the 2016 RTP/SCS demonstrates a reduction in per capita greenhouse gas emissions and meets Senate Bill 375 targets, mitigation is identified here in summary form, and in the PEIR, to provide information on how greenhouse gas emissions can be reduced from other sectors as well as through subsequent planning and implementation.

SCAG developed mitigation measures include, but are not limited to, updating any future RTP/SCS to incorporate polices and measures that lead to reduced greenhouse gas emissions in accordance with Assembly Bill 32; coordination with ARB and air districts in efforts to implement the Assembly Bill 32 plan; continuing the coordination with other metropolitan planning organizations regarding statewide strategies to reduce greenhouse gas emissions and facilitate the implementation of Senate Bill 375. Additional measures include,

working with utilities, sub-regions, and other stakeholders to promote an accelerated penetration of zero (and/or near zero) emission vehicles in the region, including developing a strategy for the deployment of public charging infrastructure.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, and within the responsibility and jurisdiction of ARB, local air districts, and/or lead agencies, greenhouse gas emissions and climate change standards-based mitigation measures may include, but are not limited to:

- Reduce emissions resulting from a project through implementation of project features, project design, or other measures.
- Incorporate Best Available Control Technology (BACT) during design, construction and operation of projects to minimize greenhouse gas emissions.
- Adopt plan or mitigation program for the reduction of emissions that are required as part of the Lead Agency's decision.
- Use energy and fuel efficient vehicles and equipment.
- Use the minimum feasible amount of greenhouse gas emitting construction materials that is feasible.
- Incorporate design measures to reduce greenhouse gas emissions from solid waste management through encouraging solid waste recycling and reuse.
- Incorporate design measures to reduce energy consumption and increase use of renewable energy.
- Plant shade trees in or near construction projects where feasible.
- Construct buildings to Leadership in Energy and Environmental Design (LEED) certified standards.

HAZARDS AND HAZARDOUS MATERIALS

Implementation of the 2016 RTP/SCS would affect the transportation and handling of hazardous materials in the SCAG region. Expected significant impacts include risk of accidental releases due to an increase in the transportation of hazardous materials and the potential for such releases to reach neighborhoods and communities adjacent to transportation facilities. The hazardous materials mitigation program aims to minimize the significant hazard to the public or the environment that involves the release of hazardous materials into the environment.

SCAG developed mitigation measures include, but are not limited to, coordination efforts with the United States Department of Transportation (U.S. DOT), the Office of Emergency Services, California Department of Transportation (Caltrans) and the private sector to continue to conduct driver safety training programs. Additionally, SCAG shall encourage the U.S. DOT and the California Highway Patrol to continue to enforce speed limits and existing regulations governing goods movement and hazardous materials transportation.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, provisions of the Hazardous Waste Control Act, the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program, the Hazardous Waste Source Reduction and Management Review Act of 1989, and the California Vehicle Code, hazards and hazardous materials standards-based mitigation measures may include, but are not limited to:

- Provide a written plan of proposed routes of travel demonstrating use of roadways designated for the transport of hazardous materials.
- Follow the manufacturer's recommendations on use, storage, and disposal of chemical products used during construction.
- During routine maintenance of construction equipment, properly contain and remove grease and oils.

HYDROLOGY AND WATER QUALITY

Impacts to hydrology and water quality from the 2016 RTP/SCS include potential water quality impairment from increased impervious surfaces. Increased impervious surfaces in water recharge areas potentially impact groundwater recharge and groundwater quality. Cumulative impacts include increased impervious surfaces; increased development in alluvial fan floodplains; and increased water demand and associated impacts, such as drawdown of groundwater aquifers. These impacts can occur at the localized scale and in relation to existing conditions, as the Plan itself does not affect the total amount of growth in the region. Increased output of greenhouse gases from the region's transportation system impacts the security and reliability of the imported water supply.

SCAG developed mitigation measures include, but are not limited to, working with local jurisdictions and water quality agencies, to encourage regional-scale planning for improved water quality management/demand and pollution prevention, providing opportunities for information sharing with respect to wastewater treatment and regional program development to promote Low Impact Development (LID) and reduce hydromodification.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, and within the jurisdiction and authority of the Regional Water Quality Control Boards and other regulatory agencies, hydrology and water quality standards-based mitigation measures may include, but are not limited to:

- Complete, and have approved, a Stormwater Pollution Prevention Plan (SWPPP) prior to initiation of construction.
- Complete, and have approved, a Standard Urban Stormwater Management Plan, prior to occupancy of residential or commercial structures.
- Incorporate as appropriate, treatment and control features such as detention basins, infiltration strips, and porous paving, other features to control surface runoff and facilitate groundwater recharge into the design of new projects early on in the process to ensure that adequate acreage and elevation contours are provided during the right-of-way acquisition process.

LAND USE AND PLANNING

The 2016 RTP/SCS contains transportation projects to help more efficiently distribute population, housing, and employment growth, as well as a forecasted Land Development Category pattern of development described in detail in the SCS. These transportation projects and land use strategies are generally consistent with the county- and regional-level general plan data available to SCAG; however, general plans are not updated consistently. The Plan includes a projected Land Development Category pattern of development that, in order to maximize the effectiveness of the transportation system differs from local General Plan land uses beyond 2020.

SCAG developed mitigation measures include, but are not limited to, coordinate with member cities and counties to encourage that general plans consider and reflect as appropriate RTP/SCS policies and strategies. Other measures include infill, mixed-use, higher density and other sustainable development, and work with partners to identify incentives to support the creation of affordable housing in mixed-use zones. Additionally, SCAG shall work with its member cities and counties to encourage that transportation projects and growth are consistent with the RTP/SCS and general plans.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines and review of county and city general plans, land use and planning standards-based mitigation measures may include, but are not limited to:

- Ensure that the project is consistent with the applicable goals and policies of the adopted general plan where the project is located.
- Where an inconsistency is identified, determine if the environmental, social, economic, and engineering benefits of the proposed land use strategy or transportation improvement warrant a variance from adopted zoning or an amendment to the general plan.
- Wherever feasible incorporate direct crossings, overcrossings, or undercrossings at regular intervals for multiple modes of travel (e.g., pedestrians, bicyclists, vehicles).

MINERAL RESOURCES

Transportation projects as well as Land Development Category development patterns influenced by land use strategies identified in the 2016 RTP/SCS would require substantial amounts of aggregate resources to construct facilities. This would result in a significant impact. The six-county and 191 cities SCAG region has about 1,446 million tons of permitted aggregate reserves. The California Geological Survey (CGS) estimates that the SCAG region would need about 4,728 million tons of aggregate over the next 50 years. The difference of 3,282 million tons in demand could result in a shortage of aggregate supply. Based on this anticipated shortage of aggregate supply over the next 50 years, there would be an anticipated shortage during the next 25 years during implementation of the 2016 RTP/SCS.

SCAG developed mitigation measures include, but are not limited to, the coordination with the Department of Conservation, the CGS to maintain a database of (1) available mineral resources in the SCAG region including permitted and un-permitted aggregate resources and (2) the anticipated 50-year demand for aggregate and other mineral resources. Based on the results of this survey, SCAG shall work with local agencies on strategies to address anticipated demand, including identifying future sites that may seek permitting and working with industry experts to identify ways to encourage and increase recycling to reduce the demand for aggregate.

Based on County and City General Plans, mineral resources standards-based mitigation measures may include, but are not limited to:

- Recycle and reuse building materials resulting from demolition, particularly aggregate resources, to the maximum extent practicable.
- Identify and use building materials, particularly aggregate materials, resulting from demolition at other construction sites in the SCAG region, or within a reasonable hauling distance of the project site.

- Design transportation network improvements in a manner (such as buffer zones or the use of screening) that does not preclude adjacent or nearby extraction of known mineral and aggregate resources following completion of the improvement and during long-term operations.

NOISE

Some of the principal noise generators within the SCAG region are associated with transportation (i.e., airports, highways, arterial roadways, seaports, and railroads). Additional noise generators include stationary sources, such as industrial manufacturing plants and construction sites. Noise impacts resulting from the 2016 RTP/SCS generally include exposure of sensitive receptors to noise in excess of normally acceptable noise levels or substantial increases in noise as a result of the operation of expanded or new transportation facilities.

SCAG developed mitigation measures include, but are not limited to, the coordination with member agencies as part of SCAG's outreach and technical assistance to local governments under Toolbox Tuesday Training series, to encourage that projects involving residential and commercial land uses are encouraged to be developed in areas that are normally acceptable to conditionally acceptable, consistent with the Governor's Office of Planning and Research Noise Element Guidelines.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines and review of county and city general plans, noise standards-based mitigation measures may include, but are not limited to:

- Install temporary noise barriers during construction.
- Include permanent noise barriers and sound-attenuating features as part of the project design.
- Schedule construction activities consistent with the allowable hours pursuant to applicable general plan noise element or noise ordinance where construction activities are authorized outside the limits established by the noise element of the general plan or noise ordinance; notify affected sensitive noise receptors and all parties who will experience noise levels in excess of the allowable limits for the specified land use, of the level of exceedance and duration of exceedance; and provide a list of protective measures that can be undertaken by the individual, including temporary relocation or use of hearing protective devices.

POPULATION, HOUSING AND EMPLOYMENT

Transportation projects and land use strategies including new and expanded infrastructure are necessary to improve travel time and can enhance quality of life for those traveling throughout the region. The package of transportation improvements in the 2016 RTP/SCS is designed to accommodate total growth while maintaining or improving for mobility. The Plan would not affect the total growth in population in the region. The 2016 RTP/SCS can affect the distribution of that growth. Land use and housing impacts associated with transportation projects and development influenced by land use strategies, such as dividing established communities through right-of-way acquisition, can occur at a localized scale.

SCAG developed mitigation measures include, but are not limited to, working with member agencies to encourage and assist growth strategies to create an urban form designed to focus development in HQTAs in accordance with the polices, strategies and investments contained in the 2016 RTP/SCS, enhancing mobility and reducing land consumption.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines and review of county and city general plans, population, housing and employment standards-based mitigation measures may include, but are not limited to:

- Evaluate alternate route alignments and transportation facilities that minimize the displacement of homes and businesses. Use an iterative design and impact analysis where impacts to homes or businesses are involved to minimize the potential of impacts on housing and displacement of people.
- Prioritize the use of existing ROWs, wherever feasible.
- Develop a construction schedule that minimizes potential neighborhood deterioration from protracted waiting periods between right-of-way acquisition and construction.
- Construct affordable housing units, deed restricted to remain affordable for an appropriate period of time, as feasible or payment of fee, with the appropriate nexus to the impact, where such fees were established to address loss of affordable housing.

PUBLIC SERVICES

Any impacts to public services are identified only in relation to existing conditions or at a localized scale. These impacts generally include additional

demands on fire and police services, schools and landfills. Additional police and fire personnel would be needed to adequately respond to emergencies and routine calls, particularly on new or expanded transportation facilities. Other potential impacts at a localized scale could entail demands on public schools, solid waste facilities and disposal facilities.

SCAG developed mitigation measures include, but are not limited to, supporting local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines and review of county and city general plans, public services standards-based mitigation measures may include, but are not limited to:

- Coordinate with local public protective security services to ensure that the existing public protective security services would be able to handle the increase in demand for their services. If the current levels of services at the project site are found to be inadequate, provide fair share contributions towards infrastructure improvements and/or personnel requirements for the appropriate public services
- Identify projects that have the potential to generate the need for expanded emergency response services. Where such services and related staffing needs exceed the capacity of existing facilities, provide for the construction of new facilities directly as an element of the project or through a dedicated fair share contributions toward infrastructure improvements.

RECREATION

Impacts to recreation from the 2016 RTP/SCS would result from an increase in population. The use of regional parks and other recreational facilities are expected to increase and result in a substantial physical deterioration of facilities at an accelerated rate. Additionally, transportation projects included in the 2016 RTP/SCS could result in potentially significant impacts to recreational facilities which include closures to gaps in the highway network through areas that currently service as open space lands.

SCAG developed mitigation measures include, but are not limited to, facilitating the reduction of impacts as a result of increased use in recreational facilities through cooperation with member agencies, information sharing, and program development in order to ensure consistency with planning for expansion of new neighborhood parks within or in nearby accessible locations to HQTAs in funding opportunities and programs administered by SCAG.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines and review of county and city general plans, recreation standards-based mitigation measures may include, but are not limited to:

- Where projects require the construction or expansion of recreational facilities or the payment of equivalent Quimby fees, consider increasing the accessibility to natural areas and lands for outdoor recreation from the proposed project area, in coordination with local and regional open space planning or management agencies.
- Where construction or expansion of recreational facilities is included in the project or required to meet public park service ratios, apply necessary mitigation measures to avoid or reduce significant environmental impacts associated with the construction or expansion of such facilities, through the imposition of conditions required to be followed to avoid or reduce impacts associated with air quality, noise, traffic, biological resources, greenhouse gas emissions, hydrology and water quality, and others that apply to specific construction or expansion of new or expanded public service facilities.

TRANSPORTATION, TRAFFIC AND SAFETY

The 2016 RTP/SCS takes into account the population, households, and employment projected for 2040, and therefore the largest demand on the transportation system expected during the lifetime of the plan. In accounting for the effects of regional population growth, the model output provides a regional, long-term and cumulative level of analysis for the impacts of the 2016 RTP/SCS on transportation resources. The regional growth, and thus, cumulative impacts, is captured in the vehicle miles traveled (VMT), vehicle hours traveled (VHT), and heavy-duty truck VHT data. Consistent with Senate Bill 375 Regional Target Advisory Committee's final report to the California Air Resources Board, the 2016 RTP/SCS includes projects and strategies to reduce congestion and promote friendly speeds on the roadways. A subset of projects included in the 2016 RTP/SCS reduces greenhouse gas emissions by providing relief of existing and projected congestion. Those include toll roads, express lanes, high occupancy vehicle lanes, and dedicated truck toll lanes. Congestion pricing is a transportation demand management tool incorporated into the 2016 RTP/SCS that would reduce greenhouse gas emissions in addition to more efficient utilization of existing facilities. The SCAG region is vulnerable to

numerous threats that include both natural and human caused incidents. As such, a mitigation program related to safety is included in the PEIR.

SCAG developed mitigation measures include, but are not limited to, the facilitation of minimizing impacts to emergency access through ongoing regional planning efforts such as meetings with local member agencies, maintain forums with policy makers, and workshops with local, regional, and state partners such as Department of Transportation, Congestion Management Agencies, Fire Department, and other local enforcement agencies during consultation on development and maintenance of the Regional Transportation Plan.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, county and city general plans and congestion management programs, transportation standards-based mitigation measures may include, but are not limited to:

- Promote ride sharing programs e.g., by designating a certain percentage of parking spaces for high-occupancy vehicles, providing larger parking spaces to accommodate vans used for ride-sharing, and designating adequate passenger loading and unloading and waiting areas.
- Encourage bicycling to transit facilities by providing additional bicycle parking, locker facilities, and bike lane access to transit facilities when feasible.
- Encourage the use of public transit systems by enhancing safety and cleanliness on vehicles and in and around stations, providing shuttle service to public transit, offering public transit incentives and providing public education and publicity about public transportation services.
- Encourage bicycling and walking by incorporating bicycle lanes into street systems in regional transportation plans, new subdivisions, and large developments, creating bicycle lanes and walking paths directed to the location of schools and other logical points of destination and provide adequate bicycle parking, and encouraging commercial projects to include facilities on-site to encourage employees to bicycle or walk to work.
- Build or fund a major transit stop within or near transit, or transit-oriented development.

UTILITIES AND SERVICE SYSTEMS

Impacts to utilities and service systems from the 2016 RTP/SCS include the potential for the construction of new utility infrastructure or expansion of existing infrastructure. Additional impacts could result in an increased amount of pollutants in urban runoff attributed to landscape irrigation, highway runoff, and illicit dumping. As mentioned previously, implementation of the Plan would increase impervious surfaces in the SCAG region through a combination of transportation projects and development influenced by land use strategies. Additional impacts such as insufficient water supply, strain to wastewater and solid waste treatment plants could also occur.

SCAG developed mitigation measures include, but are not limited to, working with local jurisdictions and water quality agencies, to encourage regional-scale planning for improved water quality management/demand and pollution prevention, providing opportunities for information sharing with respect to wastewater treatment and program development in the region.

Consistent with the provisions of Section 15091 of the State CEQA Guidelines, and within the responsibility of local jurisdictions including the Imperial, Riverside, San Bernardino, Los Angeles, Ventura and Orange Counties Flood Control District, utilities and service systems standards-based mitigation measures may include, but are not limited to:

- Reduce exterior consumptive uses of water in public areas, and should promote reductions in private homes and businesses, by shifting to drought-tolerant native landscape plantings (xeriscaping), using weather-based irrigation systems.
- Reuse and minimize construction and demolition (C&D) debris and diversion of C&D waste from landfills to recycling facilities.
- Implement or expand city or county-wide recycling and composting programs for residents and businesses.

CONCLUSION

These transportation and land use strategies, programs and projects are ambitious, but based on our history SCAG is confident that together they will advance our movement toward a more mobile and sustainable region that achieves our long-term goals for people across our region. By closely integrating transportation and land use planning, the 2016 RTP/SCS places the region firmly on that path. For more details on the planned investments reviewed in this chapter, including a project list, please see the Project List Appendix.

The following chapter, "Paying for Our Plan," presents a review of how we expect to fund our ambitious list of transportation investments—that is, where the money will come from and what economic and policy developments could impact the availability of public funds needed to realize our goals.

06

Image courtesy of Samer Momani

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PAYING FOR THE PLAN

In accordance with federal fiscal constraint requirements, this chapter and a more detailed appendix on our financial plan identify how much money SCAG reasonably expects will be available to support our region's surface transportation investments.

INTRODUCTION

The financially constrained 2016 RTP/SCS includes both a "traditional" core revenue forecast comprised of existing local, state and federal sources and more innovative but reasonably available sources of revenue to implement a program of infrastructure improvements that keeps freight and people moving. As in the past, the financial plan describes steps we can take to obtain needed revenues to implement the region's transportation vision.

The financial plan highlights the importance of finding new and innovative ways to pay for transportation, including our ever-expanding backlog of projects to preserve our existing transportation system. Nationally, we continue to face an insolvency crisis with the Federal Highway Trust Fund, as fuel tax receipts have declined precipitously. Similarly, the viability of California's State Highway Account remains in question, as only a fraction of our needs are funded through state sources. Our region continues to rely heavily on local sources of tax revenue. Seven sales tax measures in the region generate 71 percent of core revenues for transportation improvements.

It is vital that we find new ways to make transportation funding more sustainable in the long term, and efforts are underway to explore how we can transition from our current system based on fuel taxes to a more direct system based on user fees. Recent action by the state Legislature to launch the California Road Charge Pilot Program is a critical step in this transition.

In our region, numerous policy and technical studies have been conducted on the subject and more work is planned to examine and demonstrate the viability of user fee systems, including toll networks. Our region has successfully implemented toll systems in the past, with the Transportation Corridor Agencies' network of privately financed toll roads, the State Route 91 Express Lanes in Orange County and more recently with the express lanes along Interstate 10 and Interstate 110 in Los Angeles County.

The SCAG region has secured the necessary resources to support transportation investments detailed in past RTPs, and our current financial plan will continue to meet necessary milestones to implement the 2016 RTP/SCS. The following sections describe the financial assumptions and methodologies used for forecasting revenues and expenditures for transportation investments. Other SCS implementation costs are not included in this analysis.

ECONOMIC OUTLOOK AND KEY FINANCIAL ASSUMPTIONS

SCAG's financial model reflects historical growth trends and reasonable future expectations for key revenue sources. The inability of existing excise taxes to keep pace with increasing transportation needs and the impacts of increasing fuel efficiency on traditional revenue sources are key considerations in the financial plan.

INFLATION

Inflation can have a profound impact over the long-term time horizon of our Plan. SCAG's revenue model accounts for historical inflation trends, as measured by the Gross Domestic Product (GDP) Price Deflator.

FIGURE 6.1 shows the trends in inflation by the GDP Price Deflator. Although inflation rates have varied considerably over time, they have generally trended between two and four percent. Accordingly, a 2.4 percent inflation rate is used to adjust constant dollar (revenue) forecasts into nominal (year-of-expenditure) dollars.

CONSTRUCTION COST INCREASES

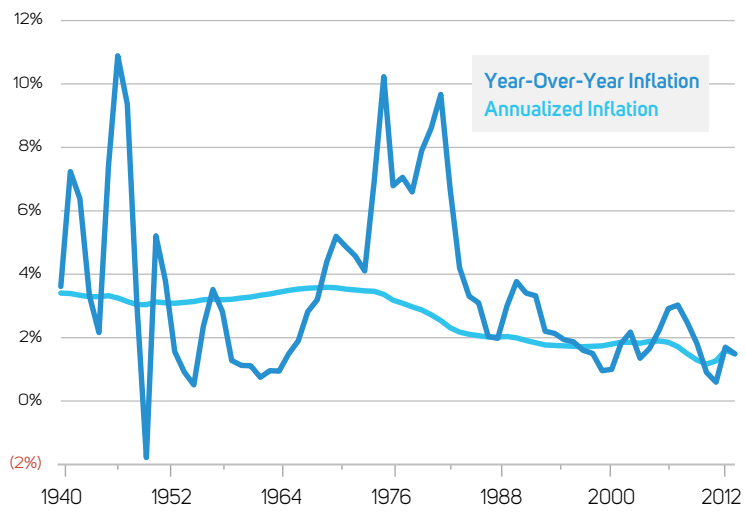
The rise in construction costs can further erode the purchasing power of transportation revenues. FIGURE 6.2 shows the increase and decline in California highway construction costs since the early 1970s. While recent corrections have slowed the longer-term increase in costs, the growth still remains above general inflation. The financial plan uses a 3.2 percent annual inflation factor to estimate future and nominal (year-of-expenditure) costs.

RETAIL SALES GROWTH

Changes in personal consumption patterns and the overall population are main contributors to the growth in retail sales. Over the 30-year period from FY1981-82 to FY2011-12, statewide retail sales grew by 1.8 percent in real terms (when the effects of inflation are eliminated). The financial plan assumes retail sales growth ranging from 1.8 percent to 3.9 percent in real terms.

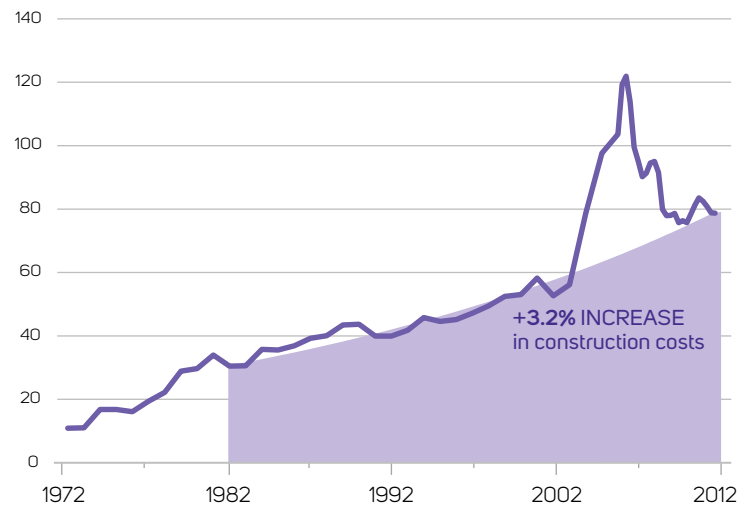
Growth in construction costs (3.2%) outpaces general inflation (2.4%)

FIGURE 6.1 HISTORICAL INFLATION TRENDS (ANNUAL INFLATION)



Source: Office of Management and Budget, Budget of the United States Government, FY 2016 Budget

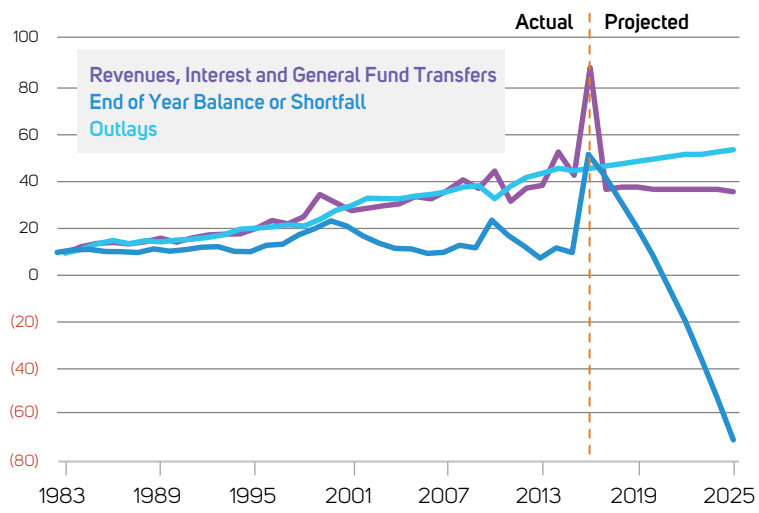
FIGURE 6.2 GROWTH IN HIGHWAY CAPITAL COSTS (INDEX VALUE)



Source: California Department of Transportation

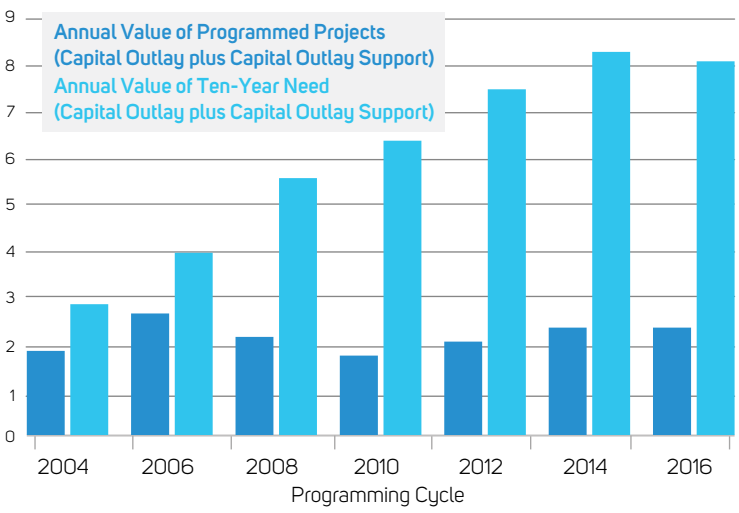
The viability of the state and federal revenue sources is of concern

FIGURE 6.3 STATUS OF THE FEDERAL HIGHWAY TRUST FUND ($ BILLIONS)



Source: Congressional Budget Office and Federal Highway Administration

FIGURE 6.4 STATUS OF THE STATE HIGHWAY OPERATION AND PROTECTION PROGRAM (SHOPP) ($ BILLIONS)



Source: California Department of Transportation, 2015 Ten-Year SHOPP Plan

FUEL CONSUMPTION

Excise taxes on gasoline and diesel fuels are the basis of most federal and state transportation funding sources. Since these taxes are based on cents-per-gallon purchased, they depend solely on fuel consumption and are not indexed to inflation or construction costs. While changes in vehicle miles traveled (VMT) will continue to play a role during the Plan period, increases in conventional fuel efficiency and the adoption of alternative fuel vehicles will reduce overall fuel consumption. The financial plan assumes that increases in vehicle fuel efficiency will reduce fuel consumption by 0.9 percent per year during the Plan period.

STATUS OF THE FEDERAL HIGHWAY TRUST FUND

The Federal Highway Trust Fund provides federal highway and transit funding from a nationally-imposed 18.3 cent-per-gallon gasoline excise tax. Since 2008, the Trust Fund has failed to meet its obligations and has required the United States Congress to authorize $141.1 billion in transfers from the General Fund to keep it solvent. The negative balances shown on FIGURE 6.3 illustrate the projected inability of the Trust Fund to pay its obligations into the highway account.

At the time of the 2016 RTP/SCS, nearly a decade has passed without substantive Congressional agreement on a long-term solution to provide adequate funding for the Trust Fund. The recently passed transportation reauthorization known as the FAST Act relies on $70 billion of one-time, non-user fees to keep the Trust Fund solvent through 2020. It does not address the present, long-term structural deficiency that exists in funding the Trust Fund. Although the financial plan assumes that Congress will reach agreement on reauthorizing federal spending for transportation programs over the Plan horizon, the core revenues available from the Trust Fund are expected to decline due to increasing fuel efficiency and other factors.

STATUS OF THE STATE HIGHWAY ACCOUNT

Despite the "Gas Tax Swap," the effective state gas excise tax rate of 18 cents-per-gallon has remained unadjusted for more than 20 years. Gas tax revenues remain the only source of funding for the State Highway Operation and Protection Program (SHOPP), which funds projects to maintain the State Highway System. As shown in FIGURE 6.4, previous levels of funding have been considerably less than actual needs. Statewide, the 2015 Ten-Year SHOPP Plan identifies $8.0 billion in statewide annual needs, while expenditures programmed for the next four years are only $2.3 billion annually. Continued underinvestment in the maintenance needs of the State Highway System will only increase the cost of bringing our highway assets back to a state of good repair.

LOCAL SALES TAX MEASURES

The SCAG region continues to rely heavily on local sales tax measures for the timely delivery of transportation projects. While most counties impose a 0.5 percent sales tax to fund transportation projects, Los Angeles County levies a 1.5 percent tax—a combination of two permanent half-cent sales taxes and Measure R at 0.5 percent. Measure R is not permanent and expires in 2039. Riverside County's Measure A also expires in 2039. Measure I in San Bernardino County expires in 2040, followed by Orange County's Measure M in 2041. Measure D in Imperial County expires in 2050. Ventura County is the only county in the region without an existing dedicated sales tax for transportation. However, Ventura County is in the process of seeking voter approval on a half-cent sales tax, which is reflected as part of the reasonably available revenues.

TRANSIT OPERATING AND MAINTENANCE (O&M) COSTS

Future transit O&M costs depend on a variety of factors, such as future revenue-miles of service, labor contracts and the age of rolling stock. For the 2016 RTP/SCS, transit O&M costs are estimated based upon historical increases. The regional average increase of 2.7 percent is used for most operators. For Los Angeles County, the financial plan relies on detailed forecasts from the county transportation commission, which is also consistent with historical data.

MULTIMODAL SYSTEM PRESERVATION AND MAINTENANCE

The 2016 RTP/SCS identifies $275.5 billion in total system preservation and maintenance needed to bring transit, passenger rail, regionally significant local streets and roads, and the State Highway System to a state of good repair. While the Plan includes core revenue sources for system preservation, these sources are limited due to restrictions on the use of funds and voter-approved commitments to major capital initiatives.

REVENUE & EXPENDITURE CATEGORIES

CORE AND REASONABLY AVAILABLE REVENUES

The 2016 RTP/SCS financial plan includes two types of revenue forecasts. Both are included in the financially constrained plan:

- Core revenues
- Reasonably available revenues

The *core revenues* identified are existing transportation funding sources projected to FY2039-40. The core revenue forecast does not include future increases in state or federal gas excise tax rates (other than the adjustments reflecting the state gasoline sales tax swap) or adoptions of regional gasoline taxes, mileage-based user fees and new tax measures. These revenues provide a benchmark from which additional funding can be identified.

MULTIMODAL SYSTEM PRESERVATION & MAINTENANCE NEEDS

(in nominal dollars)

TOTAL $275.5 BILLION

TRANSIT	$156.7 BILLION
STATE HIGHWAYS	$65.8 BILLION
REGIONALLY SIGNIFICANT LOCAL STREETS & ROADS	$37.3 BILLION
PASSENGER RAIL	$15.7 BILLION

Note: Numbers may not sum to total due to rounding.

The region's *reasonably available revenues* include new sources of transportation funding likely to materialize within the 2016 RTP/SCS time frame. These sources include adjustments to existing state and federal gas tax rates, value capture strategies, potential national freight program funds, tolls for specific facilities and private equity participation. Federal guidelines on fiscal constraint permits the inclusion of revenues that are reasonably available. In accordance with federal guidelines, the Plan includes strategies for ensuring the availability of these sources.

EXPENDITURE CATEGORIES

Transportation expenditures in the SCAG region are summarized into three main categories:

- Capital costs for transit, state highways and regionally significant arterials (local streets and roads)
- Operating and maintenance costs for transit, state highways and regionally significant arterials (local streets and roads)
- Debt service payments (for current and anticipated bond issuances)

CORE REVENUES

SCAG's regional core revenue model forecasts transportation revenues over the entire 2016 RTP/SCS time horizon. The revenue model is comprehensive and supports analysis by county or funding source. The revenue forecast was developed using the following framework:

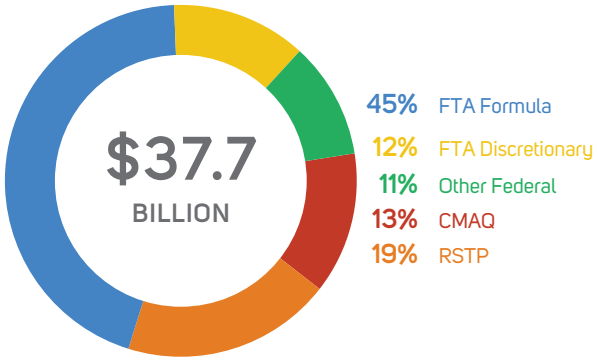
- Incorporate financial planning documents developed by local county transportation commissions and transit operators in the region, where available
- Ensure consistency with both local and state planning documents
- Utilize published data sources to evaluate historical trends
- Conduct sensitivity testing of assumptions to augment local forecasts, as needed

The region's revenue forecast horizon for the financial plan is FY2015-16 through FY2039-40. Consistent with federal guidelines, the plan takes into account inflation and reports statistics in nominal (year-of-expenditure) dollars. TABLE 6.1 shows these core revenues in five-year increments by county.

FIGURE 6.5 CORE REVENUES (IN NOMINAL DOLLARS)

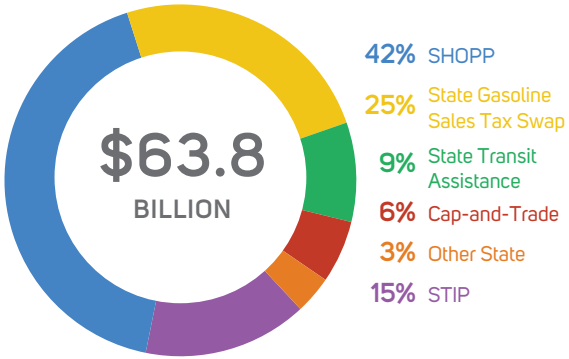
FEDERAL

Federal sources are expected to comprise a small portion of overall transportation funds ($37.7 billion). Federal Transit Administration (FTA) funds account for 57 percent of federal funding in the SCAG region. The financial plan also assumes that CMAQ funding will decline in 2022, 2031 and 2036 due to the region achieving attainment for a number of criteria pollutants and reducing the severity level of others.



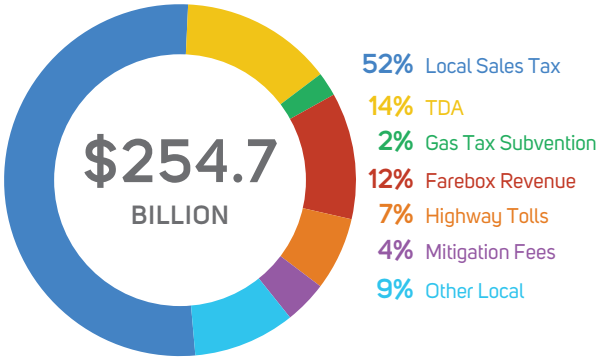
STATE

The State Transportation Improvement Program (STIP), the State Highway Operations and Protection Program (SHOPP) and the State Gasoline Sales Tax Swap account for the bulk of the state funding available.



LOCAL

Local sales taxes provide the largest single source of local funding. When local sales taxes in all five counties with such measures are included, these taxes account for more than half (52 percent) of local sources.



The majority of revenues in the SCAG region come from local sources. The share of state sources (18 percent) has increased since the last RTP as a result of Cap-and-Trade Auction Proceeds.

LOCAL + STATE + FEDERAL= **$356.1 BILLION**

TABLE 6.1 CORE REVENUE FORECAST FY 2016–2040

(in Nominal Dollars, Billions)

COUNTY	FY 2016–2020	FY 2021–2025	FY 2026–2030	FY 2031–2035	FY 2036–2040	TOTAL
Imperial	$0.5	$0.5	$0.6	$0.7	$0.8	**$3.2**
Los Angeles	$34.3	$38.0	$45.4	$53.1	$55.0	**$225.8**
Orange	$8.5	$8.5	$10.1	$12.1	$14.2	**$53.4**
Riverside	$5.4	$6.3	$7.6	$9.3	$10.0	**$38.6**
San Bernardino	$4.2	$4.8	$5.6	$6.5	$7.5	**$28.6**
Ventura	$1.0	$1.1	$1.3	$1.5	$1.7	**$6.5**
TOTAL	**$53.9**	**$59.2**	**$70.6**	**$83.1**	**$89.3**	**$356.1**

Source: SCAG Revenue Model 2015 Note: Numbers may not sum to total due to rounding.

REASONABLY AVAILABLE REVENUES

There are several new funding sources that are reasonably expected to be available for the 2016 RTP/SCS. The following guiding principles were used for identifying reasonably available revenues:

- Establish a user fee-based system that better reflects the true cost of transportation, provides firewall protection for new and existing transportation funds, and ensures an equitable distribution of costs and benefits.
- Promote national and state programs that include return-to-source guarantees, while maintaining flexibility to reward regions that continue to commit substantial local resources.
- Leverage locally available funding with innovative financing tools (e.g., tax credits and expansion of the Transportation Infrastructure Finance and Innovation Act [TIFIA]) to attract private capital and accelerate project delivery.
- Promote funding strategies that strengthen the federal commitment to the nation's goods movement system, recognizing the pivotal role that our region plays in domestic and international trade.

TABLE 6.2 identifies eight categories of funding sources that are considered to be reasonably available and are included in the financially constrained plan. These sources were identified on the basis of their potential for revenue generation, historical precedence and the likelihood of their implementation within the time frame of the 2016 RTP/SCS. For each funding source, SCAG has examined the policy and legal context of implementation and has prepared an estimate of the potential revenues generated. Additional documentation of funding sources included in the financial plan are provided in the Transportation Finance Appendix.

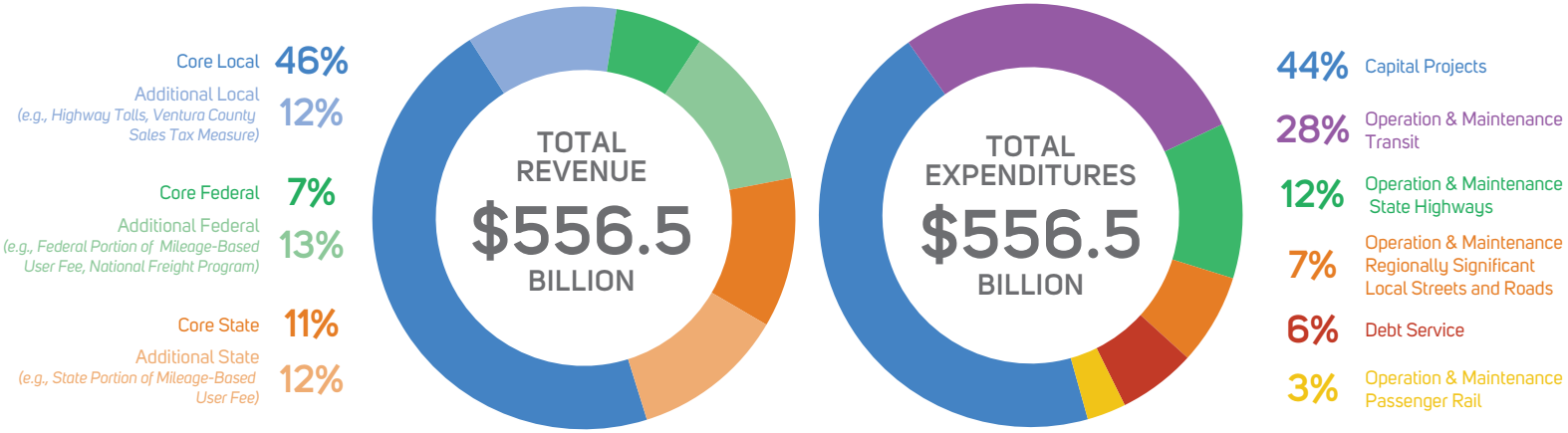
SUMMARY OF REVENUE SOURCES AND EXPENDITURES

The SCAG region's financially constrained 2016 RTP/SCS includes revenues from both core and reasonably available revenue sources, which together total $556.5 billion from FY2015-16 through FY2039-40 (see TABLE 6.3). The Plan is funded 57 percent by local sources, 23 percent by state sources and 19 percent by federal sources, as illustrated in FIGURE 6.6.

Capital projects total $246.6 billion in nominal dollars. Operating and maintenance (O&M) costs total $275.5 billion, while debt service obligations total $34.5 billion. Transit-related costs comprise the largest share of O&M costs for the region, totaling $156.7 billion.

TABLE 6.4 presents the SCAG region's revenue forecast by source in five-year increments, from FY2015-16 through FY2039-40. This is followed by TABLE 6.5, which provides details of the region's expenditures by category in five-year increments.

FIGURE 6.6 FY 2016–2040 SUMMARY OF REVENUE AND EXPENDITURES (IN NOMINAL DOLLARS)



Source: SCAG Revenue Model 2015 Note: Numbers may not sum to total due to rounding.

TABLE 6.2 NEW REVENUE SOURCES AND INNOVATIVE FINANCING STRATEGIES

(in Nominal Dollars, Billions)

REVENUE SOURCE	DESCRIPTION	AMOUNT	ACTIONS TO ENSURE AVAILABILITY	RESPONSIBLE PARTY(IES)
State and Federal Gas Excise Tax Adjustment to Maintain Historical Purchasing Power	Additional $0.10 per gallon gasoline tax imposed at the state and the federal levels starting in 2020 to 2024 to maintain purchasing power.	$6.0	Requires action of state Legislature and Congress. Strategy is consistent with recommendations from two national commissions to move immediately with augmenting fuel tax resources through conventional Highway Trust Fund mechanisms. Rate is also consistent with proposals introduced in state Legislature during 2015–2016 session.	State Legislature, Congress
Mileage-Based User Fee (or equivalent fuel tax adjustment)	Mileage-based user fees would be implemented to replace gas taxes—estimated at about $0.04 (in 2015 dollars) per mile starting in 2025 and indexed to maintain purchasing power.	$124.8 (est. increment only)	Requires action of state Legislature and Congress. Strategy is consistent with recommendations from two national commissions to move toward a mileage-based user fee system. In 2014, state Legislature passed Senate Bill (SB) 1077 (DeSaulnier) directing California to conduct a pilot program to study the feasibility of a road charge as a replacement to the gas tax beginning no later than January 1, 2017. The FAST Act establishes the Surface Transportation System Funding Alternatives program, which provides grants to states to demonstrate alternative user-based revenue mechanisms that could maintain the long-term solvency of the Trust Fund.	State Legislature, Congress
Highway Tolls (includes toll revenue bond proceeds)	Toll revenues generated from East-West Freight Corridor and regional express lane network.	$23.5	Assembly Bill (AB) 1467 (Nunez) Chapter 32, Statutes of 2006 authorized Caltrans and regional transportation agencies to enter into comprehensive development lease agreements with public and private entities or consortia of those entities for certain types of transportation projects. Further, AB 521 (Runner) Chapter 542, Statutes of 2006 modified provisions in AB 1467. Senate Bill Second Extraordinary Session 4 (SBX2 4) Chapter 2, Statutes of 2009 (Cogdill) established the legislative authority until January 1, 2017, allowing for regional transportation agencies and Caltrans to enter into an unlimited number of public-private partnerships (PPP) and deleted the restrictions on the number and type of projects that may be undertaken. Chapter 474, Statutes of 2009 (AB 798) established the California Transportation Financing Authority (CTFA). Highway projects that meet planning and environmental review requirements are eligible for tolling subject to meeting requirements of the CTFA. AB 798 also lifted the requirement for express lane projects authorized under AB 1467 to have separate legislative approval. SB 1316 (Correa) enabled RCTC to impose tolls along SR-91 Express Lanes. The I-15 Express Lanes in Riverside County were authorized by AB 1954 (Jeffries). SB 1298 (Hernandez) authorized continued tolling along the I-10 and I-110 Express Lanes in Los Angeles County. AB 914 (Brown) allowed express lanes along I-10 and the I-15 in San Bernardino County. AB 194 (Frazier) allowed the California Transportation Commission to authorize additional express lane projects.	MPO, CTCs, Caltrans, CTFA, and FHWA as may be applicable

TABLE 6.2 CONTINUED

REVENUE SOURCE	DESCRIPTION	AMOUNT	ACTIONS TO ENSURE AVAILABILITY	RESPONSIBLE PARTY(IES)
Private Equity Participation	Private equity share as may be applicable for key initiatives: e.g., toll facilities; also, freight rail package assumes railroads' share of costs for main line capacity and intermodal facilities.	$3.4	Region has authority as noted above. Current funding plans for specific intermodal facilities assume private sources.	MPO, CTCs, private consortium, state Legislature, and Union Pacific/ BNSF as appropriate for specific facilities
Freight Fee/National Freight Program	The recent reauthorization of the federal surface transportation act (the FAST Act) provides dedicated federal funding for infrastructure improvements supporting the national freight network through the newly created National Highway Freight Program and the Nationally Significant Freight and Highway Projects program. These programs are funded at approximately $2.1 billion per year nationally. Regional estimate assumes a conservative percentage of national totals.	$5.4	Current efforts at the local/regional level continue to endorse a federal program for freight. Other mechanisms to ensure the establishment of a funding program for freight may entail working with local/regional, state, and federal stakeholders to assess a national freight fee. Freight fees could be assessed in proportion to relative impacts on the transportation system.	Congress and potentially state Legislature as well as local/regional stakeholders
State Bond Proceeds, Federal Grants & Other for California High-Speed Rail Program	State general obligation bonds authorized under the Bond Act approved by California voters as Proposition 1A in 2008; federal grants authorized under American Recovery and Reinvestment Act and High-Speed Intercity Passenger Rail Program; Cap-and-Trade Auction Proceeds; potential use of qualified tax credit bonds; and private sources.	$34.0	Estimate for Southern California segments based on statewide system total per 2014 California High-Speed Rail Business Plan. Further coordination anticipated with the California High-Speed Rail Authority in finalizing business plan; additionally, the High-Speed Rail Authority will pursue private-sector participation as a source of system financing.	MPO, California High-Speed Rail Authority, local/regional stakeholders, private-sector partners
Value Capture Strategies	Assumes formation of special districts (Enhanced Infrastructure Financing Districts) including use of tax increment financing for specific initiatives.	$1.2	Pursue necessary approvals for special districts by 2020. Benefit assessment districts require majority approval by property owners; community facility districts require two-thirds approval; work with private entities for joint development opportunities as may be applicable.	MPO, CTCs, local jurisdictions, property owners along project corridors, developers
Local Option Sales Tax	Half-cent sales tax measure for Ventura County	$2.1	Local sales tax measure to be placed on ballot by 2020	Ventura County

TABLE 6.3 SUMMARY OF REVENUE SOURCES

TABLE 6.3.1 CORE AND REASONABLY AVAILABLE REVENUE PROJECTIONS—LOCAL REVENUE SOURCES

(in Nominal Dollars, Billions)

REVENUE SOURCE	REVENUE PROJECTION ASSUMPTIONS	REVENUE ESTIMATE
Local Option Sales Tax Measures	**Description:** Locally imposed ½ percent sales tax in four counties (Imperial, Orange, Riverside, and San Bernardino). Permanent 1 percent (combination of two ½ cent sales taxes) plus Measure R through 2039 in Los Angeles County. Measure D in Imperial County expires in 2050; Measure M in Orange County expires in 2041; Measure A in Riverside County expires in 2039; and Measure D in San Bernardino County expires in 2040. **Assumptions:** Sales taxes grow consistent with county transportation commission forecasts and historical trends.	$132.7
Transportation Development Act (TDA)—Local Transportation Fund	**Description:** The Local Transportation Fund (LTF) is derived from a ¼ cent sales tax on retail sales statewide. Funds are returned to the county of generation and used mostly for transit operations and transit capital expenses. **Assumptions:** Same sales tax growth rate as used for local option sales tax measures.	$35.6
Gas Excise Tax Subventions (to Cities and Counties)	**Description:** Subventions to counties and local jurisdictions in region from the California state gas tax. Revenues for the forecast are proportionate to the percentage of streets and roads that are regionally significant. **Assumptions:** Gasoline fuel consumption declines in real terms by 1.6 percent due to increasing fuel efficiency in conventional vehicles and adoption of electric and hybrid vehicles. Regionally significant streets and roads (28 to 48 percent of total roads) are classified as either arterials or collectors.	$5.6
Transit Farebox Revenue	**Description:** Transit fares collected by transit operators in the SCAG region. **Assumptions:** Farebox revenues increase consistent with historic trends, planned system expansions, and operator forecasts.	$29.7
Highway Tolls (in core revenue forecast)	**Description:** Revenues generated from toll roads operated by the Transportation Corridor Agencies (TCA), from the SR-91 Express Lanes operated by the Orange County Transportation Authority (OCTA) and Riverside County Transportation Commission (RCTC), and from the express lanes along I-10 and I-110 in Los Angeles County. **Assumptions:** Toll revenues grow consistent with county transportation commission forecasts and historical trends.	$17.2
Mitigation Fees	**Description:** Revenues generated from development impact fees. The revenue forecast includes fees from the Transportation Corridor Agency (TCA) development impact fee program, San Bernardino County's development impact fee program and Riverside County's Transportation Uniform Mitigation Fee (TUMF) for both the Coachella Valley and Western Riverside County. **Assumptions:** The financial forecast is consistent with revenue forecasts from TCA, Riverside County Transportation Commission (RCTC), and the San Bernardino Associated Governments (SANBAG).	$10.1
Other Local Sources	**Description:** Includes committed local revenue sources such as transit advertising and auxiliary revenues, lease revenues, and interest and investment earnings from reserve funds. **Assumptions:** Revenues are based on financial data from transit operators and local county transportation commissions.	$23.8
LOCAL SUBTOTAL		$254.7

Note: Numbers may not sum to total due to rounding.

TABLE 6.3.2 CORE AND REASONABLY AVAILABLE REVENUE PROJECTIONS—STATE REVENUE SOURCES

(in Nominal Dollars, Billions)

REVENUE SOURCE	REVENUE PROJECTION ASSUMPTIONS	REVENUE ESTIMATE
State Transportation Improvement Program (STIP)	**Description:** The STIP is a five-year capital improvement program that provides funding from the State Highway Account (SHA) for projects that increase the capacity of the transportation system. The SHA is funded through a combination of state gas excise tax, the Federal Highway Trust Fund, and truck weight fees. The STIP may include projects on state highways, local roads, intercity rail, or public transit systems. The Regional Transportation Planning Agencies (RTPAs) propose 75 percent of STIP funding for regional transportation projects in Regional Transportation Improvement Programs (RTIPs). Caltrans proposes 25 percent of STIP funding for interregional transportation projects in the Interregional Transportation Improvement Program (ITIP). **Assumptions:** Funds are based upon the 2014 Report of STIP Balances County and Interregional Shares, August 1, 2014. Fuel consumption declines in real terms by 0.9 percent due to increasing fuel efficiency in conventional vehicles and adoption of electric and hybrid vehicles.	$9.6
State Highway Operation and Protection Plan (SHOPP)	**Description:** Funds state highway maintenance and operations projects. **Assumptions:** Short-term revenues are based on overlapping 2012 and 2014 SHOPP programs. Long-term forecasts are consistent with STIP forecasts and assume decline in fuel consumption.	$26.7
State Gasoline Sales Tax Swap	**Description:** Prior to 2010, state sales tax on gasoline funded discretionary projects through the Transportation Investment Fund, which distributed revenues to the STIP, local streets and roads, and transit. In 2010, the sales tax revenues were "swapped" for an increased excise tax (initially 17.3 cents) recalculated each year to ensure revenue neutrality. **Assumptions:** The forecast is based on current funding levels as reported by the State Controller. Future revenues grow by 1.8 percent (in real terms) to be revenue neutral consistent with the gasoline sales tax swap.	$15.7
State Transit Assistance Fund (STA)	**Description:** STA is funded from the diesel sales tax and is distributed by population share and revenue share of the transit operators. **Assumptions:** The forecast is based on current funding levels reported by the State Controller. Future funding declines with fuel consumption using assumptions consistent with other sources.	$5.8
Cap-and-Trade Auction Proceeds	**Description:** The Global Warming Solutions Act of 2006 (AB 32) established the goal of reducing greenhouse gas (GHG) emissions statewide to 1990 levels by 2020. In order to help achieve this goal, the California Air Resources Board (ARB) adopted a regulation to establish a Cap-and-Trade program that places a "cap" on the aggregate GHG emissions from entities responsible for roughly 85 percent of the state's GHG emissions. As part of the Cap-and-Trade program, ARB conducts quarterly auctions where it sells emission allowances. Revenues from the sale of these allowances fund projects that support the goals of AB 32, including transit and rail investments. Funds associated with non-transportation investments and High-Speed Rail are not included in this amount. Funds associated with High-Speed Rail are address under Innovative Financing and New Revenue Sources. **Assumptions:** The forecast is based on current revenue estimates from the Legislative Analyst's Office (LAO). The LAO projects statewide revenues to reach a cumulative program total of $15 billion by 2020. Given the uncertainty about future allowance prices, annual growth is assumed to be flat beyond 2020. SCAG's revenue projection for Cap-and-Trade Auction Proceeds is conservative and represents a bottom floor estimate for the region. Proceeds for transportation could be significantly greater.	$3.7
Other State Sources	**Description:** Other state sources include remaining Highway Safety, Traffic, Air Quality, and Port Security Bond Act of 2006 (Proposition 1B), Active Transportation Program, and other miscellaneous state grant apportionments for the SCAG region. **Assumptions:** Short-term revenues are based on actual apportionments. Future Active Transportation Program funding declines with fuel consumption using assumptions consistent with other sources.	$2.2
STATE SUBTOTAL		$63.8

Note: Numbers may not sum to total due to rounding.

TABLE 6.3.3 CORE AND REASONABLY AVAILABLE REVENUE PROJECTIONS—FEDERAL REVENUE SOURCES

(in Nominal Dollars, Billions)

REVENUE SOURCE	REVENUE PROJECTION ASSUMPTIONS	REVENUE ESTIMATE
FHWA Non-Discretionary Congestion Mitigation and Air Quality (CMAQ) Program	**Description:** Program to reduce traffic congestion and improve air quality in non-attainment areas. **Assumptions:** Short-term revenues are based upon the Caltrans apportionment estimates. Long-term revenues assume that fuel consumption declines by 0.9 percent (in real terms) annually. CMAQ funding is assumed to be reduced by 25 percent in 2022, an additional 25 percent in 2031, and an additional 25 percent in 2036 due to improved air quality.	$4.9
FHWA Non-Discretionary Regional Surface Transportation Program (RSTP)	**Description:** Projects eligible for RSTP funds include rehabilitation and new construction on any highways included in the National Highway System (NHS) and Interstate Highways (including bridges). Also, transit capital projects, as well as intracity and intercity bus terminals and facilities, are eligible. **Assumptions:** Short-term revenues are based upon the Caltrans apportionment estimates. Long-term revenues assume that fuel consumption declines by 0.9 percent (in real terms) annually.	$7.3
FTA Formula Programs 5307 Urbanized Area Formula, 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Formula, 5311 Rural Formula, 5337 State of Good Repair Formula, and 5339 Bus and Bus Facilities Formula	**Description:** This includes a number of FTA programs distributed by formula. 5307 is distributed to state urbanized areas with a formula based upon population, population density, number of low-income individuals, and transit revenue and passenger miles of service. Program funds capital projects, planning, job access and reverse commute projects, and operations costs under certain circumstances. 5310 funds are allocated by formula to states for projects providing enhanced mobility to seniors and persons with disabilities. 5311 provides capital, planning, and operating assistance to states to support public transportation in rural areas with populations less than 50,000. 5337 is distributed based on revenue and route miles and provides funds for repairing and upgrading rail transit systems, high-intensity bus systems that use High-Occupancy Vehicle (HOV) lanes, including bus rapid transit (BRT). 5339 provides capital funding to replace, rehabilitate, and purchase buses and related equipment and to construct bus-related facilities. **Assumptions:** Formula funds are assumed to decline in proportion with the Federal Highway Trust Fund. As with the FHWA sources, fuel consumption declines by 0.9 percent (in real terms) annually.	$16.8
FTA Non-Formula Program 5309 Fixed Guideway Capital Investment Grants ("New Starts")	**Description:** Provides grants for new fixed guideways or extensions to fixed guideways (projects that operate on a separate right-of-way exclusively for public transportation, or that include a rail or a catenary system), bus rapid transit projects operating in mixed traffic that represent a substantial investment in the corridor, and projects that improve capacity on an existing fixed guideway system. **Assumptions:** Operators are assumed to receive FTA discretionary funds in rough proportion to what they have received historically. As with the FHWA sources, fuel consumption declines by 0.9 percent (in real terms) annually.	$4.7
Other Federal Sources	**Description:** Includes other federal programs, such as Transportation Investment Generating Economic Recovery (TIGER) competitive grant program, Highway Safety Improvement Program, Federal Safe Routes to School, Highway Bridge Program, and earmarks. **Assumptions:** Short-term revenues are based on actual apportionments. Long-term revenues assumes a 0.9 percent (in real terms) annual decline in fuel consumption as used for other federal funding sources.	$4.0
FEDERAL SUBTOTAL		$37.7

Note: Numbers may not sum to total due to rounding.

TABLE 6.3.4 CORE AND REASONABLY AVAILABLE REVENUE PROJECTIONS—INNOVATIVE FINANCING AND NEW REVENUE SOURCES

(in Nominal Dollars, Billions)

REVENUE SOURCE	REVENUE PROJECTION ASSUMPTIONS	REVENUE ESTIMATE
State and Federal Gas Excise Tax Adjustment to Maintain Historical Purchasing Power	**Description:** Additional 10-cents-per-gallon gasoline tax imposed by the state and federal government starting in 2020 through 2024. **Assumptions:** Forecast consistent with historical tax rate adjustments for both state and federal gas taxes.	$6.0
Mileage-Based User Fee (or equivalent fuel tax adjustment)	**Description:** Mileage-based user fees would be implemented to replace existing gas taxes (state and federal) by 2025. **Assumptions:** Consistent with recommendations from two national commissions established under SAFETEA-LU, it is assumed that a national mileage-based user fee system would be established during the latter years of the RTP/SCS. An estimated $0.04 per mile (in 2015 dollars) is assumed starting in 2025 to replace existing gas tax revenues.	$124.8 (est. increment only)
Highway Tolls (includes toll revenue bond proceeds)	**Description:** Toll revenues generated from regional toll facilities (e.g., East-West Freight Corridor and regional express lane network). **Assumptions:** Toll revenues based on recent feasibility studies for applicable corridors. Also includes toll revenue bond proceeds.	$23.5
Private Equity Participation	**Description:** Private equity share as may be applicable for key initiatives. **Assumptions:** Private capital is assumed for a number of projects, including toll facilities; also, freight rail package assumes railroads' share of costs for main line capacity and intermodal facilities.	$3.4
Freight Fees/National Freight Program	**Description:** Establishment of a national freight program consistent with federal surface transportation reauthorization (FAST ACT) and/or establishment of freight fees imposed nationally. **Assumptions:** The recently passed federal transportation reauthorization bill provides dedicated freight funding of approximately $2.1 billion per year nationally. Regional estimate assumes a conservative percentage of proposed national program.	$5.4
State Bond Proceeds, Federal Grants & Other for California High-Speed Rail Program	**Description:** Estimated total per 2014 California High-Speed Rail Business Plan. **Assumptions:** State general obligation bonds authorized under the Bond Act approved by California voters as Proposition 1A in 2008; federal grants authorized under ARRA and the High-Speed Intercity Passenger Rail Program (HSIPR); Cap-and-Trade Auction Proceeds; potential use of qualified tax credit bonds; and private sources.	$34.0
Value Capture Strategies	**Description:** Formation of special districts—Enhanced Infrastructure Financing Districts. **Assumptions:** This strategy refers to capturing the incremental value generated by transportation investments. Specifically, SCAG assumes the formation of special districts, including Enhanced Infrastructure Financing Districts (EIFDs) for specific projects (e.g., East-West Freight Corridor).	$1.2
Local Option Sales Tax	**Description:** Locally imposed ½ percent sales tax measure for Ventura County. **Assumptions:** Sales tax grows consistent with historical trends in county retail sales.	$2.1
NEW REVENUE SOURCE SUBTOTAL		$200.4
GRAND TOTAL		$556.5

Note: Numbers may not sum to total due to rounding.

TABLE 6.4 FY 2016–2040 RTP/SCS REVENUES

(in Nominal Dollars, Billions)

	REVENUE SOURCES	FY 2016–2020	FY 2021–2025	FY 2026–2030	FY 2031–2035	FY 2036–2040	TOTAL
LOCAL	Sales Tax	$21.1	$26.6	$32.8	$40.9	$46.8	$168.3
	• Local Option Sales Tax Measures	$16.8	$21.2	$26.1	$32.4	$36.3	$132.7
	• Transportation Development Act (TDA)—Local Transportation Fund	$4.3	$5.4	$6.8	$8.5	$10.6	$35.6
	Gas Excise Tax Subventions (to Cities and Counties)	$1.0	$1.1	$1.1	$1.2	$1.2	$5.6
	Transit Farebox Revenue	$3.9	$4.9	$5.9	$6.9	$8.2	$29.7
	Highway Tolls (in core revenue forecast)	$2.0	$2.6	$3.3	$4.2	$5.2	$17.2
	Mitigation Fees	$1.7	$1.9	$2.1	$2.3	$2.1	$10.1
	Other Local Sources	$7.0	$3.6	$5.3	$5.6	$2.4	$23.8
	Local Total	$36.7	$40.5	$50.5	$61.0	$65.9	$254.7
STATE	State Transportation Improvement Program (STIP)	$1.4	$1.8	$2.0	$2.1	$2.3	$9.6
	• Regional Transportation Improvement Program (RTIP)	$1.1	$1.4	$1.5	$1.6	$1.7	$7.2
	• Interregional Transportation Improvement Program (ITIP)	$0.4	$0.5	$0.5	$0.5	$0.6	$2.5
	State Highway Operation and Protection Plan (SHOPP)	$4.3	$5.0	$5.4	$5.8	$6.2	$26.7
	State Gasoline Sales Tax Swap	$2.0	$2.4	$3.0	$3.7	$4.6	$15.7
	State Transit Assistance Fund (STA)	$0.9	$1.0	$1.2	$1.3	$1.4	$5.8
	Cap-and-Trade Auction Proceeds	$0.7	$0.8	$0.8	$0.8	$0.8	$3.7
	Other State Sources	$0.7	$0.3	$0.4	$0.4	$0.4	$2.2
	State Total	$10.0	$11.4	$12.6	$14.1	$15.7	$63.8
FEDERAL	Federal Transit	$4.0	$4.1	$4.2	$4.7	$4.3	$21.5
	• Federal Transit Formula	$2.9	$3.1	$3.3	$3.6	$3.9	$16.8
	• Federal Transit Non-Formula	$1.2	$1.0	$0.9	$1.1	$0.5	$4.7
	Federal Highway & Other	$3.1	$3.1	$3.3	$3.3	$3.3	$16.2
	• Congestion Mitigation and Air Quality (CMAQ)	$1.2	$1.1	$1.1	$0.9	$0.7	$4.9
	• Regional Surface Transportation Program (RSTP)	$1.2	$1.3	$1.4	$1.6	$1.7	$7.3
	• Other Federal Sources	$0.7	$0.7	$0.8	$0.9	$0.9	$4.0
	Federal Total	$7.2	$7.3	$7.5	$8.0	$7.7	$37.7
INNOVATIVE FINANCING & NEW REVENUE SOURCES	State and Federal Gas Excise Tax Adjustment	$1.3	$4.8	$0.0	$0.0	$0.0	$6.0
	Mileage-Based User Fee	$0.0	$5.5	$31.9	$39.6	$47.9	$124.8
	Highway Tolls (includes toll revenue bond proceeds)	$0.2	$9.0	$4.2	$4.6	$5.5	$23.5
	Private Equity Participation	$1.1	$0.1	$2.1	$0.1	$0.0	$3.4
	Freight Fee/National Freight Program	$0.7	$0.9	$1.0	$1.2	$1.5	$5.4
	State Bond Proceeds, Cap-and-Trade Auction Proceeds, & Other for California High-Speed Rail Program	$6.0	$10.0	$8.0	$5.0	$5.0	$34.0
	Value Capture Strategies	$0.0	$1.2	$0.0	$0.0	$0.0	$1.2
	Local Option Sales Tax (Ventura County)	$0.1	$0.4	$0.5	$0.6	$0.7	$2.1
	Innovative Financing & New Revenue Sources Total	$9.4	$31.8	$47.6	$51.1	$60.5	$200.4
REVENUE TOTAL		$63.3	$91.1	$118.2	$134.2	$149.8	$556.5

Note: Numbers may not sum to total due to rounding.

TABLE 6.5 FY 2016–2040 RTP/SCS EXPENDITURES

(in Nominal Dollars, Billions)

RTP COSTS	FY 2016–2020	FY 2021–2025	FY 2026–2030	FY 2031–2035	FY 2036–2040	TOTAL
CAPITAL PROJECTS:	$27.6	$46.7	$56.0	$57.0	$59.2	$246.6
Arterials	$3.3	$2.2	$2.4	$5.0	$5.4	$18.4
Goods Movement (includes Grade Separations)	$8.0	$18.9	$19.5	$12.2	$12.1	$70.7
High-Occupancy Vehicle/Express Lanes	$2.7	$2.2	$2.5	$3.7	$4.1	$15.2
Mixed-Flow and Interchange Improvements	$2.2	$1.4	$2.6	$2.9	$3.0	$12.2
Toll Facilities	$1.8	$3.2	$2.3	$0.6	$0.5	$8.4
Transportation Systems Management (including ITS)	$0.9	$1.1	$1.4	$2.9	$2.9	$9.2
Transit	$6.4	$8.6	$11.0	$14.4	$15.7	$56.1
Passenger Rail	$0.8	$6.3	$10.3	$10.4	$10.8	$38.6
Active Transportation	$0.8	$1.7	$1.7	$2.0	$2.0	$8.1
Transportation Demand Management	$0.2	$0.2	$1.6	$2.3	$2.6	$6.9
Other (includes Environmental Mitigation, Landscaping, and Project Development Costs)	$0.5	$0.6	$0.7	$0.7	$0.2	$2.7
OPERATIONS AND MAINTENANCE:	$30.8	$38.0	$54.9	$69.3	$82.5	$275.5
State Highways	$9.0	$10.5	$12.4	$15.7	$18.2	$65.8
Transit	$18.5	$23.3	$29.4	$38.6	$46.9	$156.7
Passenger Rail	$1.6	$2.3	$3.0	$3.8	$5.0	$15.7
Regionally Significant Local Streets and Roads*	$1.7	$1.9	$10.1	$11.1	$12.5	$37.3
DEBT SERVICE	$4.9	$6.4	$7.3	$7.9	$8.0	$34.5
COST TOTAL	$63.3	$91.1	$118.2	$134.2	$149.8	$556.5

Note: Numbers may not sum to total due to rounding.
** Includes $4.8 billion for active transportation in addition to capital project investment level of $8.1 billion for a total of $12.9 billion for active transportation improvements*

07

Image courtesy of Alameda Corridor-East Construction Authority

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A PLAN THAT CREATES ECONOMIC OPPORTUNITY: THE BIG PICTURE

Southern California is a huge geographic region. Often, employers in one area cannot easily access workers living in another. A more efficient transportation system, with increased public transit, will create a more efficient and competitive labor market and add economic activity and jobs into the economy.

The 2016 RTP/SCS outlines strategies for investing in transportation infrastructure that will benefit Southern California, the state and the nation in terms of economic development, job creation, economic growth and poverty reduction—as well as overall business and economic competitive advantages in the global economy. Over the 2016–2040 period, the 2016 RTP/SCS calls for spending more than $556.5 billion on transportation improvement projects. The economic analysis prepared for the 2016 RTP/SCS, shown in more detail in the Economic & Job Creation Analysis Appendix, shows that significant employment will be generated throughout our region over the 25-year period of the Plan. The 2016 RTP/SCS boosts employment in two ways—providing jobs for people in highway and rail construction, operation and maintenance; and boosting the economic competitiveness of the region by making it a more attractive place to do business.

Even though we have gained back many of the jobs lost in the Great Recession, the region is contending with a larger population base and stagnant wages, which has resulted in even more of Southern California's population slipping into poverty. More concerning is the fact that a staggering one in four children live below the poverty line in the region. The 2016 RTP/SCS is a major job creation engine, and the types of jobs created by the Plan, coupled with improved access to those jobs, have the potential to provide greater economic opportunity throughout the region. With jobs that can help sustain people in need, we can rebuild our infrastructure, rebuild our middle class and move citizens throughout Southern California from poverty to prosperity.

The economic analysis shows that construction, maintenance and operations expenditures specified in the 2016 RTP/SCS, as well as the indirect and induced jobs that flow from those expenditures, will generate an average of more than 188,000 new jobs annually on average.

When investments are made in the transportation system, the economic benefits go far beyond the jobs created building, operating and maintaining it. Unlike spending to satisfy current needs, infrastructure delivers benefits for decades. The infrastructure, once built, can enhance the economic competitiveness of a region. Projects that reduce congestion may help firms produce at lower cost, or allow those firms to reach larger markets or hire more capable employees. An economy with a well-functioning transportation system is a more attractive place for firms to do business, enhancing the economic competitiveness of our region. An additional 351,000 annual jobs will be created by the SCAG region's increased competitiveness and improved economic performance that will result from congestion reduction and improvements in regional amenities due to implementation of the 2016 RTP/SCS.

THE ECONOMIC BENEFITS OF INVESTING IN TRANSPORTATION

As we mentioned briefly above, the 2016 RTP/SCS will lead to more jobs in at least two ways:

1. Providing direct jobs in highway and rail construction, transportation, and transit operations and maintenance
2. Enhancing economic competitiveness in the region by making it a more attractive place to do business and to live

These two impacts are summarized below.

- **Providing direct jobs in highway and rail construction, transportation, and transit operations and maintenance:** The 2016 RTP/SCS will employ people to build, operate and maintain transportation projects as a result of the Plan's regional infrastructure investments. Economists refer to these jobs as the "direct effect" of the investments. Direct effects ripple through the economy, creating additional jobs in two ways:
  - **Indirect Effects:** Indirect effects are the jobs in companies that support the direct jobs created by the RTP/SCS spending. The firms and agencies that build and maintain the transportation system with RTP/SCS funding buy materials, office supplies and business services. All of those supply purchases that are necessitated by the RTP/SCS spending are indirect effects.
  - **Induced Effects:** Additionally, employees of the firms and agencies that build, operate and maintain the Southern California regional transportation system use their wages to buy all kinds of goods—housing, food, clothing, entertainment and more—and that supports additional jobs. This ripple effect creates what economists call "induced effects." Employees who build, operate and maintain the RTP/SCS will earn wages to buy goods and services associated with daily living.
- **Enhancing economic competitiveness in the region by making it a more attractive place to do business:** Academic scholars have long understood that public infrastructure investments create direct jobs and additional multiplier effects from those jobs. But recently, economic research has illuminated how transportation spending also improves the viability and productivity of firms in regions, by increasing economic competitiveness through the increased

efficiency of a transportation system. A well-planned, well-functioning transportation system and integrated land use pattern can allow firms to communicate and conduct business with one another more quickly, draw workers from larger labor market pools, and ship and receive goods and services at lower costs. All of this can contribute to enhanced regional economic competitiveness, raising the productivity of firms in the region and leading to more jobs than those generated to build, operate and maintain the RTP/SCS.

WHY TRANSPORTATION ACCESS IS IMPORTANT FOR THE REGIONAL ECONOMY

Two economic transformations have occurred over the past two to three decades that have made transportation access an increasingly important element of regional economies. First, metropolitan economies increasingly rely on the value of proximity—what urban economists call "agglomeration economies," or the propensity of successful local economies to cluster. Second, congestion has risen to levels that limit economic growth, research shows.

- **Agglomeration Economies and the Need for Access:** Firms benefit from being near other firms. Santa Monica's "Silicon Beach" is a location where technology firms have easy access to other nearby peer firms, creating an environment of shared ideas, talent and interaction. Yet, that access is not always as readily available as it might seem. A video gaming company in Santa Monica might benefit from access to talent at Caltech or movie studios in Burbank, but both are easily an hour away during much of the day because of traffic congestion. So, the benefit of agglomeration—nearby access to business partners, customers and ideas—is diminished by a congested transportation system.

  The benefits of local concentrations of firms are increasingly based on face-to-face communication. Research has shown that firms have higher productivity when locating near other firms, and those productivity benefits are often short-distance phenomena. Good transportation access "shrinks distance" by allowing businesses to more quickly access knowledge, suppliers and customers. Well-performing transportation systems, by contributing to dense, lively, walkable neighborhoods, can also create communities that are conducive to serendipitous meetings and face-to-face communication. This is particularly important in knowledge-intensive or creative industries.

- **Congestion and Employment:** Traffic congestion has been increasing in nearly all U.S. metropolitan areas. Research shows that traffic delays inhibit job growth. In the Los Angeles metropolitan area, actual employment growth from 1990 to 2003 was 567,983 new jobs, but researchers have estimated that with a 50 percent reduction in congestion in the region's metropolitan areas, employment growth from 1990 to 2003 would have been 700,235 new jobs. Research suggests that the employment enhancing effect of reducing congestion by implementing the 2016 RTP/SCS investments is larger in more congested urban areas. This is intuitive; the "distance shrinking" effect of managing congestion is more important in more congested urban areas. This is also a non-linear effect; congestion relief grows more important for the economy as congestion levels rise.

This sets the background and context for the economic impact study of the 2016 RTP/SCS. Metropolitan economies are increasingly relying on agglomeration benefits, as knowledge-based firms desire to locate near other similar firms. This phenomenon has long been familiar in Silicon Valley, and evidence suggests that the need to locate near similar firms is becoming pervasive in many segments of modern economies. At the same time, congestion has increased the "effective distance" within metropolitan areas and the evidence suggests that the negative economic effects of congestion are largest (and growing) in our most congested cities. Creating better access and mobility, a key goal of 2016 RTP/SCS, can be a clear pathway toward stimulating economic growth.

There are five possible paths through which transportation improvements can increase regional economic competitiveness. Each of these is described in the following sections.

1. **Improved labor market matching:** Reducing travel time allows firms to hire from a larger geographic area. This effectively increases the firm's labor market—particularly in a large urban area like the SCAG region where reductions in commuting time can yield access to many more potential employees. Increasing the size of the labor pool allows firms to find a better employee match for its needs. By hiring employees who better suit their needs, the firm can produce more (i.e., employees are more productive) for the same cost. This allows the firm to be more competitive and capture a larger market share. And that, in turn, can lead to increased hiring if the increase in market share overcomes

the tendency of firms to produce more with fewer employees due to improved employer-employee job matches.

2. **Firms move into the region in response to enhanced economic competitiveness:** This effect flows in part from the first effect. If the region's transportation system supports more efficient commutes, then employers will be encouraged to draw from larger labor market pools. And if that larger employee pool allows firms to hire better employees, eventually those firms will move into the region in response to those improved hiring prospects. This is especially true for firms that rely on a skilled workforce. The increases in firm productivity that initially come from improved labor market matching will result in firms moving into the SCAG region from other locations over longer periods of time.

3. **Reduced congestion increases labor supply:** Metropolitan regions compete for mobile labor. That means that those regions with lower traffic congestion will (when all else is equal) lure more migrants—simply due to the value of offering commuters lower traffic congestion. This increases the supply of available labor. In metropolitan areas with high traffic congestion and longer commutes, the labor pool will have to be compensated either in the form of higher wages, lower house prices or both. These two related effects are, in fact, one and the same—the higher wages in high congestion metropolitan areas reflect the need to lure in a labor pool that otherwise might choose to locate in lower congestion locales. Reduced congestion can attract more workers to a region, allowing a firm to hire quality workers at reasonable wages.

4. **Increased market for firms' products:** Reductions in travel time also can allow firms to supply a larger market area, leading to increased economic competitiveness and regional job growth. One example is the goods movement/freight traffic that moves through the Ports of Los Angeles and Long Beach. Larger ports can build infrastructure that speeds up the processing of shipments, therefore lowering costs. Supply chain managers favor Southern California because of the speed and reliability that goods can be moved around the region and to the rest of the nation. As the economy expands, congestion robs the area of this competitive advantage. Reducing shipping times for landside freight, from the ports to points within and beyond the region, can help increase shipping volumes and lead to lower costs. This ultimately can add up to higher productivity, making the region's ports more cost effective than other competitive points of entry.

5. **Learning:** In a growing knowledge-based economy, cities are increasingly engines of economic innovation. Nearly all economic advances—in consumer products, technology, medicine, consumer services, retailing and logistics, and entertainment and fine arts—are created in metropolitan areas. A large and growing body of literature argues that much of the economic advantage of cities is the learning that is possible when individuals and firms are in close proximity. Engineers in Silicon Valley interact regularly, within and across different firms, creating a world-class hub of knowledge and innovation that is unrivaled in the computing, advanced electronics and software industries. The movie industry in Los Angeles provides the same center for knowledge and learning in the entertainment industry. Such learning effects are central to many industries, including manufacturing processes and services that increasingly rely on innovations to remain competitive. Transportation investments that reduce traffic congestion can allow people to interact more readily with a larger pool of like-minded experts, increasing the learning and innovation in a regional economy. That can allow local firms to innovate in ways that lowers costs, improves products and leads to larger market share. Over time, that improved innovation environment will attract mobile labor and capital (workers and firms) from other regions, further boosting economic activity.

QUANTIFYING THE ECONOMIC IMPACT OF THE PLAN

To quantify the economic impact of the Plan's implementation, the SCAG economic team used data and software from Regional Economic Models, Inc. (REMI). The REMI TranSight model is an advanced economic analysis model that combines input-output approaches, coupled with a model of resident and firm migration into and out of our region to model the direct, indirect and induced effects of the 2016 RTP/SCS spending. REMI also includes a general equilibrium model combined with New Economic Geography approaches to model changes in economic competitiveness. REMI TranSight is the most advanced tool commercially available for analysis that forecasts the total economic effects of changes to transportation systems. All of the economic analysis of the Plan was conducted using REMI models. More details on the REMI models and the methodologies that SCAG used can be found in the Economic & Job Creation Analysis Appendix.

THE RESULTS OF OUR ANALYSIS

Results are reported in two parts:

1. Jobs that result from the 2016 RTP/SCS investment spending (direct, indirect and induced effects)
2. Additional jobs that flow from the improvements to the transportation network, resulting in network efficiencies and related increases in regional economic and business competitiveness

JOBS THAT RESULT FROM THE RTP/SCS INVESTMENT SPENDING (DIRECT, INDIRECT AND INDUCED EFFECTS)

TABLE 7.1 shows the annual average new jobs from the 2016 RTP/SCS financial plan spending. The job impact is reported as annual average jobs in five-year periods (starting with 2016–2020), for each county and for the entire region. The last column in TABLE 7.1 shows jobs, averaged over all Plan years, from 2016 RTP/SCS construction, operations and maintenance spending.

REMI TranSight model outputs predicted that jobs from transit operations and maintenance (O&M) expenditures in the region grow from an annual average of 119,000 in 2016–2020 to 173,000 in the last five years of the Plan (2036–2040). As a fraction of the total jobs from the Plan's spending (construction and O&M), transit O&M jobs grow from half of the jobs in 2016–2020 to nearly two-thirds of all jobs in 2036–2040. Transit O&M spending, as a fraction of the total Plan spending, was virtually constant across those two time periods—increasing from 37 percent of total Plan spending in 2016–2020 to 39 percent of Plan spending in 2036–2040. The large increase in the share of the Plan's jobs from transit O&M while the share of the Plan's spending from transit O&M stays constant is not consistent.

Upon examination, the research team concluded that the size of the SCAG region's transit spending is outside of what REMI can accurately model in the later years of the Plan. In the years 2036–2040, the region will spend $7.5 billion per year on transit O&M, while REMI's baseline forecast of the size of the transit industry in the region during that same time period is about $2 billion per year. The large difference is not due to any fault of the REMI model, but rather is due to the fact that the SCAG region is building the largest transit public works project in the history of the U.S.—an investment at a scale well beyond what has been experienced in other similar metropolitan areas during recent decades and even of a magnitude unprecedented compared to prior SCAG RTPs. The scale of the transit investment and the resulting magnitude of the increase in transit O&M are beyond what the research team believes the REMI TranSight model can reliably forecast at this point in time, therefore, the growth in jobs from transit O&M spending was adjusted downward.

TABLE 7.1 2016 RTP/SCS EMPLOYMENT IMPACT FROM CONSTRUCTION, OPERATIONS AND MAINTENANCE SPENDING

Annual Average Jobs Relative to Baseline (Thousands)

REGION	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040	AVG PER YEAR
Imperial	1.68	2.14	4.54	4.55	4.55	3.49
Los Angeles	110.74	112.71	99.16	86.01	93.78	100.48
Orange	52.99	21.17	16.75	17.41	20.05	25.67
Riverside	31.99	19.33	25.09	28.84	24.90	26.03
San Bernardino	32.53	26.41	26.98	27.11	25.13	27.63
Ventura	7.13	6.00	6.02	3.71	4.04	5.38
SCAG REGION	237.06	187.76	178.53	167.63	172.45	188.69

Source: SCAG calculations from 2016 RTP/SCS financial plan input into REMI model. Note that the REMI model reports full and part-time jobs and the job numbers include both full-time and part-time jobs. Figures may not add up due to rounding.

ADDITIONAL JOBS THAT FLOW FROM THE IMPROVEMENTS TO THE TRANSPORTATION NETWORK, RESULTING IN NETWORK EFFICIENCIES AND RELATED INCREASES IN REGIONAL ECONOMIC AND BUSINESS COMPETITIVENESS

Network efficiency in the form of improved transportation access is a second source of job growth. TABLE 7.2 shows the jobs from improved economic competitiveness that result from decreases in travel times and less costly trip-making relative to the baseline. Note that the economic competitiveness jobs grow over time, as the effect of the 2016 RTP/SCS relative to baseline results in increasingly larger transportation improvements and resulting cumulative network efficiencies over the course of the Plan.

FULL RESULTS

The full economic results of the 2016 RTP/SCS investment are summarized in the table, with millions of new jobs (annual average) resulting from the Plan in five-year time periods and an annual average shown for 2016-2040. The total combined jobs from the two effects—Plan investment (construction, operations and maintenance spending) and network efficiency/economic competitiveness—are shown summed together in the table to highlight the total economic impact of the 2016 RTP/SCS.

TABLE 7.2 2016 RTP/SCS JOBS FROM ENHANCED ECONOMIC COMPETITIVENESS, REMI ESTIMATES OF JOBS FROM NETWORK EFFICIENCY PLUS AMENITIES AND OPERATIONS

Annual Average Jobs Relative to Baseline (Thousands)

REGION	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040	AVG PER YEAR
Imperial	0.1	0.4	0.73	1.19	1.73	0.83
Los Angeles	40.62	137.22	225.15	292.13	320.1	203.04
Orange	7.43	25.6	42.42	65.98	99	48.09
Riverside	9.11	31.37	48.78	66.25	83.43	47.78
San Bernardino	6.36	25.56	47.08	65.72	79.91	44.93
Ventura	0.81	3.6	7.33	10.1	10.7	6.51
SCAG REGION	64.4	223.74	371.49	501.38	594.87	351.19

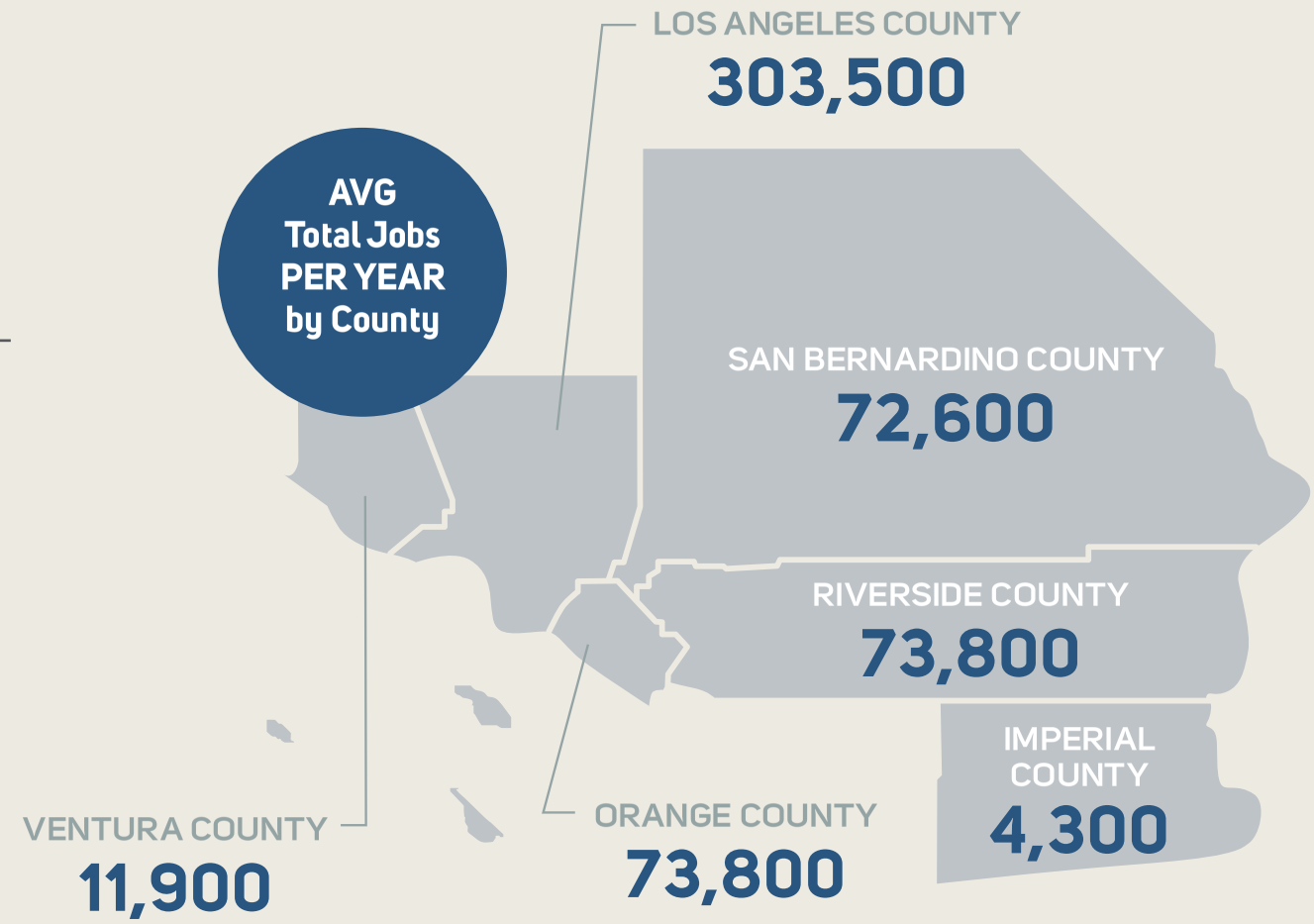
Source: SCAG calculations from 2016 RTP/SCS travel model results input into REMI TranSight model.
Figures may not add up due to rounding.

CREATING JOBS IN THE SCAG REGION

539,900

AVG Total JOBS
per year
in the SCAG region

Total jobs, all sources, construction, operations and maintenance, network benefits, from 2016 RTP/SCS. In comparison, the 2012 RTP/SCS would create 528,500 average total jobs during the life of the plan.



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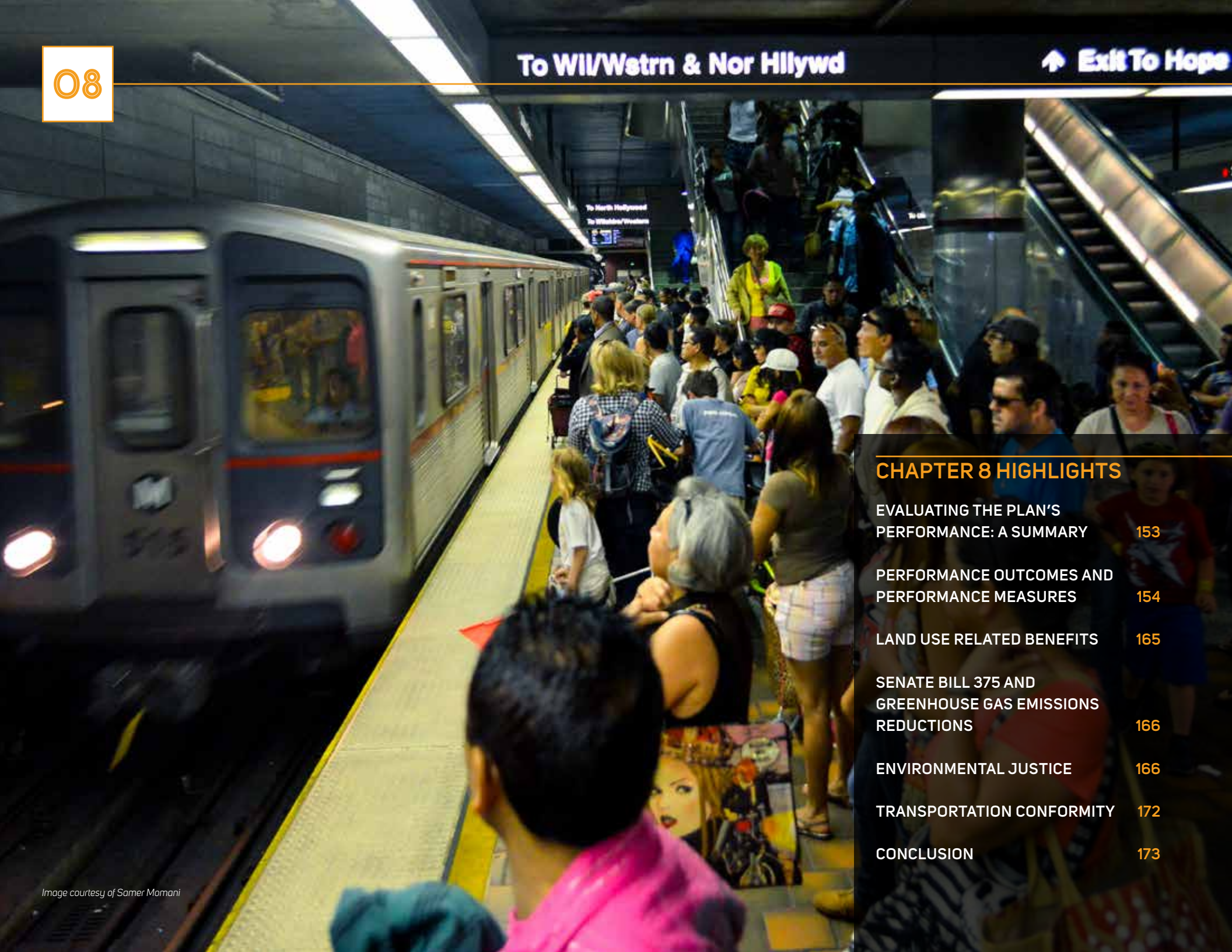

Image courtesy of Samer Momani

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MEASURING OUR PROGRESS FOR THE FUTURE

The 2016 RTP/SCS uses a number of performance measures to help gauge progress toward meeting the goals and objectives of our region, as well as how the Plan meets federal requirements, including the intent of the current federal transportation authorization. The measures also address state requirements for reducing greenhouse gas emissions and planning for a more sustainable future. The 2016 RTP/SCS is expected to result in significant benefits to our region with respect to mobility and accessibility, air quality, economic growth and job creation, sustainability, and environmental justice. An extended discussion on how the Plan performs, along with the outcomes it achieves, is the topic of this chapter.

FOCUS PLAN PERFORMANCE RESULTS

This graphic highlights the key benefits of implementing the 2016 RTP/SCS in terms of mobility, economy, efficiency and air quality.

Spending Less Time on the Road

20.5 miles
average daily vehicle miles driven per person

7.4% ↓

9.2 mins
daily delay per capita (extra time spent in traffic)

39% ↓

More Economic Opportunities

$1.00 = **$2.00**
INVESTMENT BENEFIT

351,000
additional jobs supported by improving competitiveness

Efficiency Cost Savings

HOUSEHOLD COSTS
(transportation/energy/water use)
$14,000/yr

12% ↓

REDUCTION IN BUILDING ENERGY COSTS

4% ↓

PASSENGER VEHICLE FUEL USE

10% ↓

Improved Air Quality

ROG
49.1 TONS
↓ **8%**
45.0 TONS

CO
338.6 TONS
↓ **9%**
307.7 TONS

NOx
96.4 TONS
↓ **9%**
88.2 TONS

PM2.5
13.3 TONS
↓ **5%**
12.6 TONS

GHG REDUCTIONS

2020	↓ 8%
2035	↓ 18%
2040	↓ 21%

EVALUATING THE PLAN'S PERFORMANCE: A SUMMARY

COMPARING THE PLAN VS. NO PLAN

Implementation of the 2016 RTP/SCS will secure a safe, efficient, sustainable and prosperous future for our region. To demonstrate how effective the Plan would be toward achieving our regional goals, SCAG conducted a "Plan vs. No Build" (or Baseline) analysis—essentially comparing how the region would perform with and without implementation of the Plan. This analysis is summarized in this chapter. More details on this analysis and its results can be found in the Performance Measures Appendix.

First and foremost, the 2016 RTP/SCS meets all of the federal and state requirements. It meets all provisions for transportation conformity under the federal Clean Air Act. Cleaner fuels and new vehicle technologies will help significantly reduce many of the pollutants that contribute to smog and other airborne contaminants that may impact public health in the region. The Plan also performs well when it comes to meeting state-mandated targets for reducing greenhouse gas emissions from cars and light trucks. The state-determined targets for the SCAG region are an eight percent per capita reduction in greenhouse gas emissions from automobiles and light trucks by 2020, and a 13 percent reduction by 2035 (compared with 2005 levels). The Plan would result in an eight percent reduction in emissions by 2020, an 18 percent reduction by 2035, and a 21 percent reduction by 2040 as compared to 2005 levels.

Overall, the analysis clearly demonstrates that implementing the 2016 RTP/SCS would result in a regional transportation network that improves travel conditions and air quality, while also promoting an equitable distribution of benefits—that is, social equity. Trips to work, schools and other key destinations would be quicker and more efficient under the Plan. The 2016 RTP/SCS integrates multiple transportation modes, leading to increases in carpooling, demand for transit and use of active transportation modes for trips during peak travel hours and at other times. More specifically, our analysis found that, in comparison to the Baseline, the Plan will:

- Increase the combined percentage of work trips made by active transportation and public transit by about four percent, with a commensurate reduction in the share of commuters traveling by single occupant vehicle.
- Reduce Vehicle Miles Traveled (VMT) per capita by 7.4 percent and Vehicle Hours Traveled (VHT) per capita by about 17 percent (for automobiles and light/medium duty trucks) as a result of more location efficient land use patterns and improved transit service.
- Increase daily transit travel by nearly one-third, as a result of improved transit service and more transit-oriented development patterns.
- Reduce delay per capita by 39 percent.
- Reduce total heavy duty truck delay by 40 percent.
- Create an estimated 351,000 (or more) additional new jobs annually, due the region's increased competitiveness and improved economic performance that will result from congestion reduction and improvements in regional amenities with implementation of the Plan.
- Reduce the amount of previously undeveloped (greenfield) lands converted to more urbanized use by 23 percent. Conservation of open space and other rural lands is achieved by focusing new residential and commercial development in higher density areas. Through this strategy of conservation, the Plan provides a solid foundation for more sustainable development in the SCAG region.

The 2016 RTP/SCS also focuses on improving public health outcomes in the SCAG region. Some key performance results include a reduction in our regional obesity rate and reductions in the share of our population that suffers with hypertension and type 2 diabetes. The total annual health costs for respiratory disease will be reduced under the Plan more than 13 percent compared with the Baseline. These public health improvements are the result of investments in active transportation, more walkable communities and improved regional air quality as promoted in the 2016 RTP/SCS.

PERFORMANCE OUTCOMES AND PERFORMANCE MEASURES

This section summarizes how well the 2016 RTP/SCS is expected to perform when fully implemented. TABLE 8.1 lists the 2016 RTP/SCS performance outcomes and the associated measures used to evaluate performance, using the SCAG Regional Travel Demand Model (RTDM) and other tools. The table also includes specific performance results for both the Baseline and the Plan for each of the measures. Additional performance measures that will be used for ongoing regional monitoring are discussed in the Performance Measures Appendix.

In the discussion of performance outcomes, three scenarios are referenced: Base Year, Baseline and Plan.

- **Base Year** represents existing conditions as of 2012—that is, our region as it was in 2012: our transportation system, land use patterns and socio-economic characteristics (e.g., households and employment). The year 2012 was selected as the Base Year for this analysis because it is the year of the previous RTP/SCS.
- **Baseline** assumes a continuation of the development trends of recent decades, with local General Plans not including the intensified policies regarding growth distribution as promoted in the Plan. This scenario represents a future in 2040 in which only the following have been implemented: transportation projects currently under construction or undergoing right-of-way acquisition; those transportation programs and projects programmed and committed to in the 2015 Federal Transportation Improvement Program (FTIP); and/or transportation projects that have already received environmental clearance.
- **Plan** represents future conditions in 2040, in which the transportation investments and strategies detailed in the 2016 RTP/SCS are fully realized.

The Base Year, Baseline and Plan scenarios discussed in this chapter were developed to help evaluate the performance of the strategies, programs and projects presented in Chapter 5—the core of the 2016 RTP/SCS—and to meet various state and federal requirements.

On the following pages, a summary is provided of the Plan's performance outcomes, along with their associated performance measures. Some of the significant co-benefits provided by the Plan are summarized in TABLE 8.2.

LOCATION EFFICIENCY

The Location Efficiency outcome reflects the degree to which improved coordination of land use and transportation planning impacts the movement of people and goods in the SCAG region. This outcome has several associated performance measures that will be used for monitoring the degree to which the region is advancing toward our Location Efficiency goals:

1. Share of Growth in High Quality Transit Areas (HQTAs)
2. Land Consumption
3. Vehicle Miles Traveled (VMT)
4. Transit Mode Share
5. Average Distance for Work and Non-Work Trips
6. Percent of Trips Less than Three Miles
7. Work Trip Length Distribution

In addition to these seven metrics, measures of mobility and accessibility also serve to further reinforce the importance of the location efficiency outcome. Measures supporting the Mobility and Accessibility outcome are discussed in the next section of this chapter.

The following is a summary of the Location Efficiency performance measures:

SHARE OF GROWTH IN HIGH QUALITY TRANSIT AREAS (HQTAS)

Between 2012 and 2040, growth in the regional share of both households and employment in the HQTAs is projected to increase from the Baseline scenario to the Plan scenario.

LAND CONSUMPTION

The land consumption metric measures the amount of agricultural land that has changed from rural to more intensive development patterns to accommodate new growth. Greenfield land consumption refers to development that occurs on land that has not previously been developed for, or otherwise impacted by, urban uses, including agricultural lands, forests, deserts and other undeveloped sites. As shown in TABLE 8.2, new land consumption under the Plan would be substantially less than what would occur under the Baseline.

PLAN PERFORMANCE RESULTS IN THE SCAG REGION

Daily Vehicle Miles Traveled (VMT)
per capita

2012 BASE YEAR	2040 BASELINE	2040 PLAN
22.8 MILES	22.1 MILES	20.5 MILES

Baseline to Plan Comparison **-7.4%**

Base Year to Plan Comparison **-10.2%**

Daily Minutes of Delay
per capita

2012 BASE YEAR	2040 BASELINE	2040 PLAN
11.8 MINUTES	15.0 MINUTES	9.2 MINUTES

Baseline to Plan Comparison **-39%**

Base Year to Plan Comparison **-22%**

	2012 BASE YEAR	2040 BASELINE	2040 PLAN
IMPERIAL COUNTY			
DAILY VMT *per capita*	24.8 MILES	26.3 MILES	25.1 MILES
DAILY DELAY *per capita*	0.7 MINUTES	2.7 MINUTES	2.0 MINUTES
LOS ANGELES COUNTY			
DAILY VMT *per capita*	21.5 MILES	20.2 MILES	18.4 MILES
DAILY DELAY *per capita*	14.7 MINUTES	16.4 MINUTES	11.5 MINUTES
ORANGE COUNTY			
DAILY VMT *per capita*	23.8 MILES	22.8 MILES	21.4 MILES
DAILY DELAY *per capita*	11.9 MINUTES	13.2 MINUTES	7.9 MINUTES
RIVERSIDE COUNTY			
DAILY VMT *per capita*	23.3 MILES	23.7 MILES	21.7 MILES
DAILY DELAY *per capita*	5.9 MINUTES	12.3 MINUTES	5.6 MINUTES
SAN BERNARDINO COUNTY			
DAILY VMT *per capita*	26.6 MILES	27.1 MILES	25.9 MILES
DAILY DELAY *per capita*	7.6 MINUTES	17.1 MINUTES	7.4 MINUTES
VENTURA COUNTY			
DAILY VMT *per capita*	22.4 MILES	21.9 MILES	20.2 MILES
DAILY DELAY *per capita*	7.0 MINUTES	11.5 MINUTES	5.7 MINUTES

TABLE 8.1 2016 RTP/SCS PERFORMANCE MEASURES AND RESULTS (IN THOUSANDS OF HOURS)

PERFORMANCE MEASURE	DEFINITION	OBJECTIVE	CATEGORY	2040 BASELINE	2040 PLAN	INDICATOR
OUTCOME: LOCATION EFFICIENCY						
Share of growth in High Quality Transit Areas (HQTAs)	Share of the region's growth in households and employment in HQTAs	Improvement (increase) over No Project Baseline	Percent of households in HQTAs	36%	46%	↑
			Percent of jobs in HQTAs	44%	55%	↑
Land consumption	Greenfield land consumed and refill land consumed	Improvement (decrease) over No Project Baseline	Greenfield land consumed	154 sq miles	118 sq miles	↓
Vehicle Miles Traveled (VMT) per capita	Average daily vehicle miles driven per person	Improvement (decrease) over No Project Baseline	Automobiles and light-duty trucks	22.1 miles	20.5 miles	↓
Transit mode share	The share of total trips that use transit for work and non-work trips	Improvement (increase) over No Project Baseline	All Trips	2.2%	3.1%	↑
			Work Trips	5.6%	8.2%	↑
Average distance traveled for work and non-work trips	The average distance traveled for work or non-work trips	Improvement (decrease) over No Project Baseline	Work Trips	15.1 miles	15.5 miles	↑
			Non-Work Trips	7.8 miles	7.9 miles	
Percent of trips less than 3 miles	The share of work and non-work trips which are fewer than 3 miles	Improvement (increase) over No Project Baseline	Work Trips	20.4%	20.3%	↑
			Non-Work Trips	41.7%	41.9%	↑
Work trip length distribution	The statistical distribution of work trip length in the region	Improvement (increase) over No Project Baseline	Trip Length: 10 miles or Less	51.6%	50.9%	↓
			Trip Length: 25 miles or Less	81.8%	81.0%	↓
OUTCOME: MOBILITY AND ACCESSIBILITY						
Person delay per capita*	Delay per capita can be used as a supplemental measure to account for population growth impacts on delay	Improvement (decrease) over No Project Baseline	Daily minutes of delay per capita	15.0 mins	9.2 mins	↓
Person delay by facility type*	Delay: Excess travel time resulting from the difference between a reference speed and actual speed	Improvement (decrease) over No Project Baseline	Highway	3,035,105 hrs	2,023,417 hrs	↓
			HOV	251,547 hrs	42,590 hrs	↓
			Arterial	2,254,896 hrs	1,327,235 hrs	↓
Truck delay by facility type*	Delay: Excess travel time resulting from the difference between a reference speed and actual speed	Improvement (decrease) over No Project Baseline	Highway	274,456 hrs	171,828 hrs	↓
			Arterial	47,561 hrs	20,998 hrs	↓
Travel time distribution for transit, SOV and HOV modes for work and non-work trips*	Travel time distribution for transit, SOV and HOV for work and non-work trips	Improvement (increase) over No Project Baseline	% of PM peak transit trips <45 minutes	22%	26%	↑
			% of PM peak HOV trips <45 minutes	72%	79%	↑
			% of PM peak SOV trips <45 minutes	82%	89%	↑

TABLE 8.1 CONTINUED

PERFORMANCE MEASURE	DEFINITION	OBJECTIVE	CATEGORY	2040 BASELINE	2040 PLAN	INDICATOR
OUTCOME: SAFETY AND HEALTH						
Collision rates by severity by mode (per 100 million vehicle miles)*	Collision rate per 100 million vehicle miles by mode and number of fatalities and serious injuries by mode (all, bicycle/pedestrian)	Improvement (decrease) over No Project Baseline	Serious injuries	N/A	1.60	
			Fatalities	N/A	0.31	
Criteria pollutants emissions (tons per day)	CO, NOx, PM 2.5, PM 10 and VOC	Meet Federal air quality conformity requirements (FR)	Reactive organic gases (ROG)	49.1 tons	45.0 tons	↓
			Carbon monoxide (CO)	338.6 tons	307.7 tons	↓
			Oxides of nitrogen (NOx)	96.4 tons	88.2 tons	↓
			Particulate matter (PM 10)	32.6 tons	30.8 tons	↓
			Particulate matter (PM 2.5)	13.3 tons	12.6 tons	↓
			Nitrogen dioxide (NO2)	94.6 tons	86.8 tons	↓
Air pollution-related health measures	Pollution-related respiratory disease incidence and cost	Improvement (decrease) over No Project Baseline	Pollution-related health incidences (annual)	270,328	234,363	↓
			Pollution-related health costs (annual)	$4.48 billion	$3.88 billion	↓
Physical activity-related health measures	Physical activity/weight related health issues and costs	Improvement over No Project Baseline	Daily per capita walking	12.1 mins	16.0 mins	↑
			Daily per capita biking	1.6 mins	2.0 mins	↑
			Daily per capita driving	64.8 mins	61.9 mins	↓
			Obese population (%)**	26.3%	25.6%	↓
			High blood pressure (%)**	21.5%	20.8%	↓
			Heart disease (%)**	4.4%	4.2%	↓
			Diabetes Type 2 (%)**	6.1%	6.0%	↓
Mode share of walking and bicycling	Mode share of walking and biking for work trips, non-work trips and all trips	Improvement (increase) over No Project Baseline	Walk share (Work)	4.4%	5.6%	↑
			Bike share (Work)	0.5%	0.7%	↑
			Walk share (Non-Work)	12.0%	15.0%	↑
			Bike share (Non-Work)	1.8%	2.5%	↑
			Walk share (All Trips)	10.7%	13.5%	↑
			Bike share (All Trips)	1.6%	2.2%	↑

TABLE 8.1 CONTINUED

PERFORMANCE MEASURE	DEFINITION	OBJECTIVE	CATEGORY	2040 BASELINE	2040 PLAN	INDICATOR
OUTCOME: ENVIRONMENTAL QUALITY						
Greenhouse gas emissions	CO, NOx, PM 2.5, PM 10 and VOC emissions; and per capita greenhouse gas emissions (CO2)	Meet state greenhouse gas reduction targets (SR)	Reduction in per capita greenhouse gas emissions from 2005 levels	N/A	8% in 2020 18% in 2035 21% in 2040	
OUTCOME: ECONOMIC OPPORTUNITY						
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 economically competitive	Improvement (increase) over No Project Baseline	Annual number of new jobs generated	N/A	351,000+	
Additional jobs supported by transportation investments	Total number of jobs supported in the economy as a result of transportation expenditures	Improvement (increase) over No Project Baseline	Annual number of new jobs generated	N/A	188,000+	
OUTCOME: INVESTMENT EFFECTIVENESS						
Benefit/Cost Ratio	Ratio of monetized user and societal benefits to the agency transportation costs	Greater than 1.0	Benefit ratio per $1 investment	N/A	2.0	
OUTCOME: TRANSPORTATION SYSTEM SUSTAINABILITY						
Cost to preserve multimodal system to current and state of good repair	Annual cost per capita required to preserve the regional multimodal transportation system to current conditions	Improvement (decrease) over Base Year	Cost per capita (per year)	N/A	$368	
OUTCOME: ENVIRONMENTAL JUSTICE						
See Table 8.4: Performance Measures: Environmental Justice		Meet Federal requirements. No unaddressed disproportionately high and adverse effects for low income or minority communities (FR)				

Notes:
(FR) Federal requirement
(SR) State requirement
* MAP-21 calls for performance measures and targets associated with congestion, safety, reliability, freight movement, infrastructure condition, environment and project delivery. However, federal rule-making in support of MAP-21 performance measures in still in progress.
** Results are for areas experiencing land use and population changes not the entire SCAG region.

Acronyms
HOV: High-Occupancy Vehicle
SOV: Single-Occupancy Vehicle

TABLE 8.2 2016 RTP/SCS KEY BENEFITS

BENEFIT CATEGORIES	BASELINE	RTP/SCS	SAVINGS	% SAVINGS
Local Infrastructure and Services Costs: Capital and Operations and Maintenance Costs to Support New Growth, 2012–2040[1]	$40.6 billion	$37.3 billion	$3.3 billion	8.1%
Household Costs: Transportation and Home Energy/Water Use, All Households, Annual (2040)	$16,000	$14,000	$2,000	12.3%
Land Consumption: New (greenfield) Land Consumed to Accommodate New Growth 2012–2040	154 sq miles	118 sq miles	36 sq miles	23.4%
Building Energy Use: Residential and Commercial Buildings, Cumulative, 2012–2040 (measured in British Thermal Units (BTUs))	20,311 trillion	19,563 trillion	748 trillion	3.7%
Building Energy Costs: Residential and Commercial Buildings, Cumulative, 2012–2040	$762 billion	$735 billion	$27 billion	3.5%
Building Water Use: Residential and Commercial Buildings, Cumulative, 2012–2040 (measured in Acre Feet (AF))	134 million	133.2 million	0.8 million	0.6%
Building Water Costs: Residential and Commercial Buildings, Cumulative, 2012–2040	$186 billion	$185 billion	$1 billion	0.5%
Household Driving: Annual Passenger VMT, 2040	177.7 billion	150 billion	27.7 billion	15.6%

Note: [1] Operations and maintenance costs referenced here include costs beyond those for transportation (e.g., sewer and water operations and maintenance costs).

VEHICLE MILES TRAVELED (VMT) PER CAPITA

This measure is new to the 2016 RTP/SCS. VMT (for automobiles and light trucks) per capita has become an increasingly significant metric since the passage of Senate Bill 375, which led to state-determined reduction targets for regional greenhouse gas emissions from automobiles and light trucks. Automobiles and light duty trucks are a major contributor to greenhouse gas emissions, producing more than 60 percent of transportation sector emissions. Therefore, VMT reduction is a critical component of a comprehensive regional strategy for reducing greenhouse gas emissions. By monitoring progress in reducing per capita VMT through implementation of the various transportation investments and land use strategies outlined in this Plan, we will be better able to accurately gauge our momentum toward achieving our goals for reducing regional greenhouse gas emissions. Daily per capita VMT in the SCAG region is projected to decrease significantly in 2040 under the Plan.

TRANSIT MODE SHARE

Transit mode share is another new metric for the 2016 RTP/SCS. It measures the share of transit trips made throughout the region for work and non-work purposes. This new measure will help us to identify how well the transit strategies and improvements proposed in the 2016 RTP/SCS are working toward providing better and more diverse commuting options for the traveling public. Ideally, with better transit service, more commuters will choose that option over driving alone, further reducing VMT and regional greenhouse gas emissions. TABLE 8.3 shows transit mode share by county for work trips and for all trips in 2040 as projected under the Plan.

TABLE 8.3 TRANSIT MODE SHARE BY COUNTY

(Plan 2040)

COUNTY	WORK TRIPS	ALL TRIPS
Imperial	0.6%	0.3%
Los Angeles	12.0%	4.7%
Orange	3.8%	1.7%
Riverside	1.1%	0.5%
San Bernardino	2.1%	0.7%
Ventura	1.6%	0.7%
SCAG Region	8.2%	3.1%

AVERAGE DISTANCE FOR WORK AND NON-WORK TRIPS

The average distance for work trips in 2040 is projected to increase slightly under the Plan. The average distance traveled for non-work trips in 2040 is projected to remain relatively constant between the Baseline and the Plan.

PERCENT OF TRIPS LESS THAN THREE MILES

The vast majority of trips in Southern California today are made by people driving alone. As the length of trips becomes shorter, particularly to within a few miles, people are more likely to use transit, bike, walk or choose other alternatives to driving alone. By 2040, the share of work trips and non-work trips less than three miles is projected to remain relatively unchanged.

WORK TRIP LENGTH DISTRIBUTION

The share of trips less than ten miles in 2040 is projected to be just over 50 percent under both the Baseline and the Plan. Likewise, the share of trips under 25 miles would be about 81 percent for both the Baseline and the Plan.

MOBILITY AND ACCESSIBILITY

The Mobility and Accessibility outcome is defined as the ability to reach desired destinations with relative ease and within a reasonable time, using reasonably available transportation choices. This section discusses the mobility and accessibility performance measures for the 2016 RTP/SCS.

MOBILITY

The Mobility performance measure relies on the commonly used measure of delay. Delay is defined as the difference between actual travel time and the travel time at a pre-defined reference or optimal speed for each modal alternative. It is measured in vehicle-hours of delay (VHD), which can then be used to derive person-hours of delay. The mobility measures used to evaluate alternatives for this outcome include:

- Person Delay by Facility Type (Highway, High Occupancy Vehicle (HOV) Lanes, Arterials)
- Person Delay per Capita
- Truck Delay by Facility Type (Highway, Arterial)

One additional measure for delay that is readily available for ongoing monitoring, but which cannot be readily forecast, is non-recurrent delay. Recurrent delay is the day-to-day delay that occurs because too many vehicles are on the road at the same time. Non-recurrent delay is the delay that is caused by collisions, weather, special events or other atypical incidents. Non-recurrent delay can be mitigated or reduced by improving incident management strategies. Other uses of intelligent transportation technologies, such as traffic signal coordination and the provision of real-time information about unexpected delays, allow travelers to make better informed decisions regarding the availability of transportation alternatives, including transit. Non-recurrent delay as an on-going regional monitoring measure is discussed in greater detail in the Performance Measures Appendix.

Person Delay by Facility Type (Highway, High Occupancy Vehicle (HOV) Lanes, Arterials)

Since the 2012 RTP/SCS, the person delay measure has been expanded to differentiate between single-occupancy vehicle (SOV) and HOV delay. Person delay on our highways under the Plan would improve on Baseline conditions, while delay on HOV facilities will be reduced more dramatically. Delay on our regional arterial roadways would also improve between the Baseline and the Plan. FIGURE 8.1 shows total person hours of delay by facility type.

Person Delay Per Capita

Normalizing delay by the number of people living in an area provides insight as to how well the region is mitigating traffic congestion in light of increasing population growth. Delay per capita is expected to grow considerably, particularly in the Inland Empire counties of Riverside and San Bernardino, under Baseline conditions. However, implementation of the Plan would reduce per capita delay substantially to below 2012 levels.

Truck Delay by Facility Type (Highway, Arterial)

This measure estimates the average daily truck delay by facility type for highways and arterials. The 2016 RTP/SCS includes significant investments in a regional freight corridor and other improvements to facilitate goods movement. It is estimated that the Plan would reduce heavy-duty truck delay on the highway and arterial systems. However, truck delay under the Plan would still be above Base Year levels, partly due to the projected growth in trade and associated truck traffic.

Highway Non-Recurrent Delay

As indicated previously, this measure will be used only for ongoing regional monitoring, not for evaluation of alternatives for the 2016 RTP/SCS. Non-recurrent delay refers to the share of congestion that is considered to be atypical. FIGURE 8.2 shows the relative proportion of highway congestion that is estimated to be caused by non-recurrent events by county.

Highway Speed Maps

Maps illustrating highway speed conditions during the afternoon peak period (3 PM to 7 PM) based upon the SCAG RTDM results for the Base Year, Baseline and Plan are provided in the Performance Measures Appendix. Additional speed maps are provided in the Highways & Arterials Appendix.

ACCESSIBILITY

The Accessibility outcome is used to evaluate how well the transportation system performs in providing people access to opportunities. Opportunities may include jobs, education, medical care, recreation, shopping or any other activities that may help enhance a person's quality of life. For the 2016 RTP/SCS, accessibility is simply defined as the distribution of trips by mode by travel time.

As with the 2012 RTP/SCS, accessibility is measured by taking afternoon or PM peak period travel demand model results for the base and forecast years and identifying the percentage of commute or home-based work trips that are completed within 45 minutes. Peak periods are those times during the weekday when commuting travel on regional roadways reaches its highest levels. Typically, peak periods occur twice daily, first during the morning commute when people are traveling to their workplaces and again in the late afternoon when people are returning home from work. FIGURE 8.3 shows these results. In all cases, the 2040 Plan would improve accessibility for home-based work trips over the Baseline.

The 2016 RTP/SCS provides a comprehensive measure of accessibility, including the transit, SOV, and HOV modes, for both work and non-work trips. The results of these mode-specific accessibility analyses can be found in the Performance Measures Appendix.

FIGURE 8.1 DAILY PERSON-HOURS OF DELAY BY FACILITY TYPE (IN THOUSANDS)

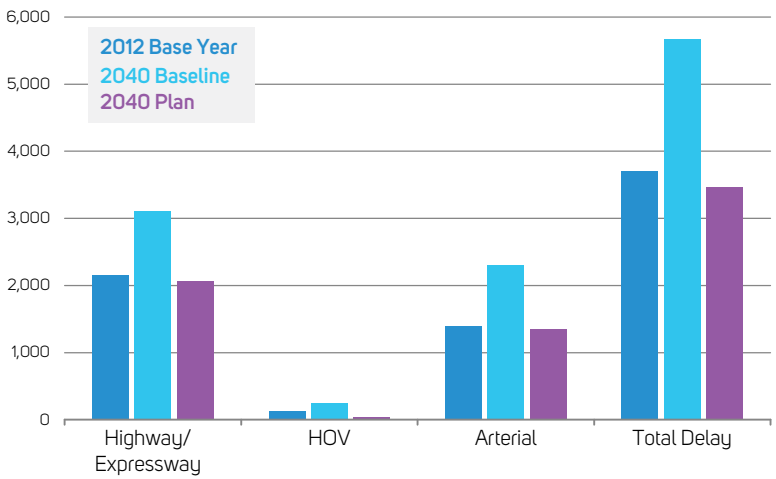


FIGURE 8.3 WORK TRIPS COMPLETED WITHIN 45 MINUTES

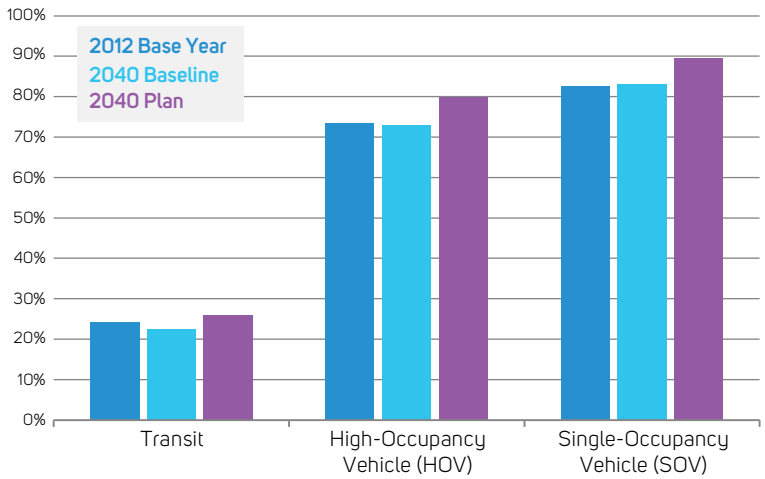
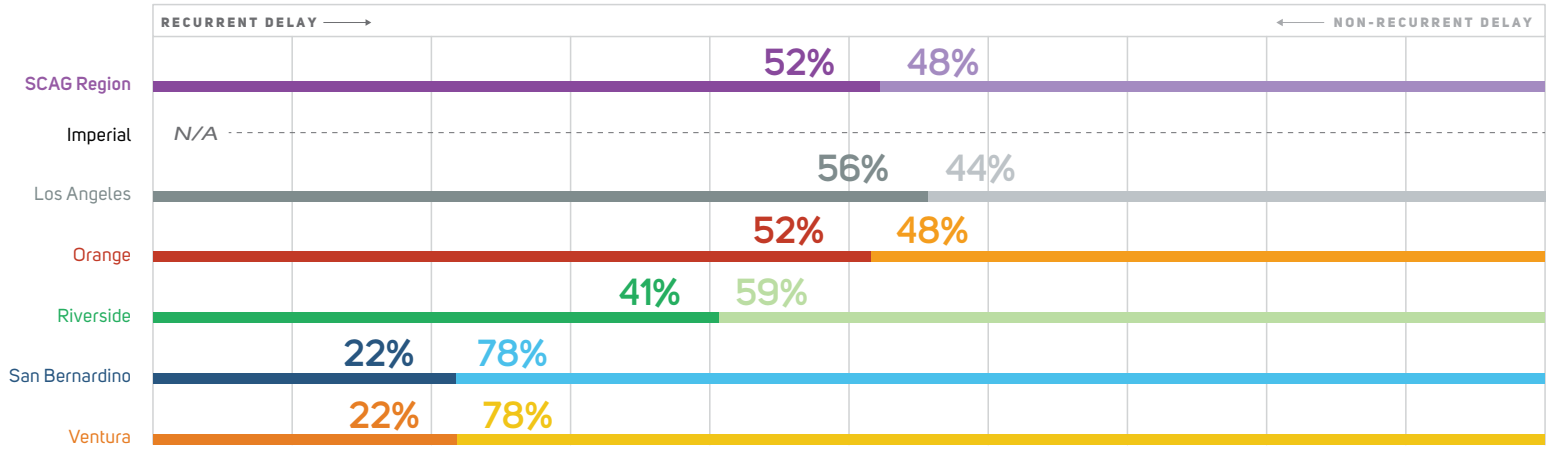


FIGURE 8.2 RECURRENT AND NON-RECURRENT CONGESTION (2011)



SAFETY AND HEALTH

The Safety and Health outcomes have been carried over from the 2012 RTP/SCS. In addition, the 2016 RTP/SCS includes new measures to evaluate the health outcomes of the Plan, including three new measures discussed below. The safety and health impacts of regional transportation improvements cannot be easily forecast, but total collisions can show a reduction in future years, particularly if people shift from travel modes with higher collision risk to modes with lower collision risk. The total number of collisions is generally used as the performance measure for safety and it can be partially projected by using mode and facility specific collision rates (highways, arterials and transit). This approach is used for the 2016 RTP/SCS, but it is important to note that this methodology does not take into account safety improvements specific to each mode. It only reflects changes based on modal or facility shifts. For monitoring, this measure can be reported historically by time period (month) and by mode (including for active transportation). Safety and Health outcome trends are discussed in greater detail in the Performance Measures Appendix.

Recognizing that the RTP/SCS integrates transportation and land use and has impacts beyond those exclusively transportation-related, the 2016 RTP/SCS includes three new health-related measures: mode share for walking and biking, rates of physical activity and weight-related disease, and incidence of respiratory/pollution-related disease.[1]

The health benefits of an active lifestyle have become increasingly apparent in recent years, and there is growing support for improving the walkability and bikability of the communities where we live and work. The linkage between obesity and disease has been well documented, and providing the appropriate community design and infrastructure to support a more active lifestyle is an important first step toward promoting healthy communities. Walking and biking mode shares can be used to evaluate the 2016 RTP/SCS alternatives, while the disease-focused measures may also be useful for on-going regional monitoring.

A health measure carried over from the 2012 RTP/SCS is tons of criteria air pollutants, which is highly correlated to public health concerns such as asthma. There are six common air pollutants that are monitored in accordance with federal air quality regulations.[2] These criteria pollutants include particulate matter (PM 10 and PM 2.5), carbon monoxide (CO), nitrogen oxides (NOx), and nitrogen dioxide (NO2). These pollutants require careful monitoring because of their known adverse effects on human health. While children, older residents and persons with existing respiratory illnesses are most vulnerable to the effects of air pollutants, the health effects of long-term exposure are a concern for everyone in the region. Some of the major health concerns of exposure to high levels of these criteria pollutants include respiratory irritation, reduced lung capacity, chest pain, and aggravation of asthma and other respiratory illnesses.[3]

Airborne particulate matter comes in all sizes. However, particles smaller than ten micrometers in diameter are considered the most dangerous to human health because they are small enough to be absorbed into the lungs. The finer the particle size, the more dangerous they are. Particulate matter smaller than 2.5 micrometers is a particularly serious concern for people with existing heart or lung disease, as even short-term exposure to high levels of PM 2.5 may aggravate symptoms. High levels of carbon monoxide (CO) is also considered a health hazard, especially for people with compromised respiratory or coronary function, as CO is known to reduce the flow of oxygen through the human body. Long-term exposure to high levels of nitrogen dioxide, which is produced primarily through the burning of fossil fuels, may cause a narrowing of the bronchial airways, resulting in chronic bronchitis or aggravation of asthma symptoms.[4] The criteria pollutant performance measure supports both the Safety and Health outcome and the Environmental Quality outcome.

The 2016 RTP/SCS would improve physical activity outcomes through improved location efficiency, which increases the share of short trips and through the provision of additional investments in active transportation networks including first/last mile improvements, Safe Routes to School projects and regional bikeway infrastructure. It would also increase access to natural lands and parks, which would further increase opportunities for physical activity.

New to the 2016 RTP/SCS is the development of a new Public Health module for the Urban Footprint/Scenario Planning Model to measure the Plan's impact on physical activity. The model was evaluated by a statewide review panel consisting of representatives of state, regional and local agencies. The Plan is expected to result in 4.3 additional minutes of physical activity per capita over the Baseline in areas experiencing changes in land use, which would improve

1 Ogden, Ph.D., C., & Carroll, M.S.P.H, M. (2010). Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults: United States, Trends 1960–1962 Through 2007–2008. Center for Disease Control and Prevention. Accessed at http://www.cdc.gov/nchs/data/hestat/obesity_adult_07_08/obesity_adult_07_08.htm.

2 For more information on Federal air quality standards, see U.S. Environmental Protection Agency, National Ambient Air Quality Standards (NAAQS): http://www3.epa.gov/ttn/naaqs/criteria.html.

3 For more information on the health impacts of criteria air pollutants, see U.S. Environmental Protection Agency, Six Common Air Pollutants: http://www3.epa.gov/airquality/urbanair/.

4 For more information on the health impacts of particulate matter, see U.S. Environmental Protection Agency, Particle Matter (PM) Health, Last Accessed October 7, 2015: http://www3.epa.gov/pm/health.html.

health outcomes related to obesity by 2.7 percent and high blood pressure by 3.3 percent for residents in those areas. For a broader discussion of the Scenario Planning Model, please see the SCS Background Documentation Appendix. For more detailed information on the connection between physical activity and health outcomes, please see the Public Health Appendix.

ENVIRONMENTAL QUALITY

This outcome is measured in terms of criteria pollutant and greenhouse gas emissions. Emissions are estimated using the SCAG RTDM results, which are used as input to the California Air Resources Board's (ARB) Emission Factors (EMFAC) model. Pollutant emissions are reported in detail as part of the Transportation Conformity Analysis Appendix. The impact of air quality on public health is discussed in the Safety and Health outcome section of this chapter. Monitoring of regional greenhouse gas emissions is discussed in the Performance Measures Appendix.

ECONOMIC OPPORTUNITY

The economic opportunity outcome is measured in terms of additional jobs created through improved regional economic competitiveness as a result of the transportation investments provided through the 2016 RTP/SCS. An annual average of more than 188,000 new jobs would be generated by the construction and operations expenditures in the 2016 RTP/SCS, in addition to more than 351,000 annual jobs that would be created in a broad cross-section of industries by the region's increased competitiveness and improved economic performance—as a result of the improved transportation system. Additional economic benefits of the 2016 RTP/SCS are discussed in Chapter 7.

INVESTMENT EFFECTIVENESS

The investment effectiveness outcome indicates the degree to which the Plan's expenditures generate benefits that transportation users can experience directly. This outcome is important because it describes how the Plan's transportation investments make productive use of increasingly scarce funds.

The benefit/cost ratio is the measure used to evaluate the cost-effectiveness outcome, as it compares the incremental benefits with the incremental costs of multimodal transportation investments. The benefits are divided into several categories, including:

- Savings resulting from reduced travel delay
- Air quality improvements
- Safety improvements
- Reductions in vehicle operating costs

For these categories, travel demand and air quality models are used to estimate the benefits of the Plan compared with the Baseline. Most of these benefits are a function of changes in VMT and VHT. Not all impacts are linear, so reductions in congestion can increase or decrease vehicle operating costs and emissions. Delay savings are reflected directly in the VHT statistics. To estimate the benefit/cost ratio, the benefits in each category are converted into dollars and added together. These are divided by the total incremental costs of the Plan's transportation improvements to produce a ratio. The investments in the 2016 RTP/SCS would provide a return of $2.00 for every dollar invested, for a benefit/cost ratio of 2.0. For this analysis, all benefits and costs are expressed in 2012 dollars. Benefits are estimated over the RTP/SCS planning period through 2040. The user benefits are estimated using California's Cal-B/C framework and incorporate SCAG's RTDM outputs. The costs include the incremental public expenditures over the entire 2016 RTP/SCS planning period.[5]

TRANSPORTATION SYSTEM SUSTAINABILITY

A transportation system is sustainable if it maintains its overall performance over time in an equitable manner with minimum damage to the environment, and at the same time does not compromise the ability of future generations to address their transportation needs. Sustainability, therefore, pertains to how our decisions today impact future generations. One of the measures used to evaluate system sustainability is the total inflation-adjusted cost per capita to maintain our overall multimodal transportation system performance at current conditions. The 2016 RTP/SCS includes two additional new measures to support this outcome: State Highway System pavement condition and local roads pavement condition. These additional performance measures will strengthen the transportation system sustainability outcome and further support implementation of MAP-21.

[5] California Department of Transportation. (2009). California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C) User's Guide (Version 4.0). Accessed at http://www.dot.ca.gov/hq/tpp/offices/eab/benefit_files/CalBC_User_Guide_v8.pdf.

The 2016 RTP/SCS is committed to maintaining a sustainable regional transportation system by allocating $275.5 billion toward maintaining and operating the system in a state of good repair over the period of the Plan. This amounts to an average annual per capita investment of about $368 (in 2015 dollars) for each year of the Plan period. More details on performance measures for the Transportation System Sustainability outcome are presented in the Performance Measures Appendix.

LAND USE RELATED BENEFITS

Unlike the Plan, the Baseline scenario relies more heavily on growth in undeveloped lands at the edges of cities and beyond and focuses more new housing toward single-family developments in suburban settings. Using a different modeling process from that used for the mobility-based performance measures, additional land use related performance results were derived using the single framework model as described in the SCS Background Documentation Appendix.

RTP/SCS GREENHOUSE GAS REDUCTIONS

Percent Reduction from 2005 Levels Per Capita

	2020	2035	2040
ARB TARGET	8%	13%	N/A
2016 RTP/SCS	8%	18%	21%
% DIFFERENCE	0%	5%	N/A

* ARB has set GHG emissions reduction targets for 2020 and 2035, but not for 2040

The land use strategy of the 2016 RTP/SCS promotes location efficiency by orienting new housing and job growth in areas served by high quality transit and in other targeted opportunity areas including existing main streets, downtowns and corridors where infrastructure already exists. This more compact land use pattern, combined with the transportation network improvements and strategies identified in the 2016 RTP/SCS, would result in improved pedestrian and bicycle access to community amenities, shorter average trip lengths and reduced vehicle miles traveled. This strategy also supports the development of more livable communities that provide more housing choices, conserve natural resources, offer more and better transportation options, and promote an overall better quality of life.

The more focused land use pattern promoted in the Plan also reduces the need for significant capital investments. Because new development is focused in areas where infrastructure already exists, there is not as much need to extend or build new local roads, water and sewer systems, and parks. However, in other instances, modernization of utilities needs to be considered and completed to accommodate the additional use.There are also operations and maintenance (O&M) cost savings. O&M costs include the ongoing local expenditures required to operate and maintain the infrastructure serving new residential growth. It is important to note the O&M costs referred to in this section are not the same O&M costs discussed in other sections of the 2016 RTP/SCS.

The 2016 RTP/SCS land use strategy also reduces the average household costs associated with driving and residential energy and water use. A land use pattern that contains more mixed-use/walkable and urban infill development accommodates a higher proportion of growth in more energy-efficient housing types like townhomes, apartments and smaller single-family homes, as well as more compact commercial building types. It should be noted that location is also an important factor in determining energy costs: buildings located in the warmer areas of the region use more energy each year, in part because they require more energy for cooling during the summer months.

As California is facing major constraints on water supplies due to ongoing drought conditions throughout the state, there is a strong emphasis on reducing residential water use. Residential water use is a function of both indoor and outdoor water needs, with outdoor use (landscape irrigation) accounting for the majority of the difference among housing types. Because homes with

larger yards require more water for landscape irrigation, lot size is generally highly correlated with a household's overall water consumption. Therefore, a land use pattern with a greater proportion of large lot single-family homes will require more water than a land use pattern that features a larger share of compact and urban infill development, which includes more attached and multifamily homes. And, as is the case for energy use, the location and type of new development has a significant bearing on water use: homes in the warmer and more arid locations of the region will consume more water to maintain lawns and other landscaping.

SENATE BILL 375 AND GREENHOUSE GAS EMISSIONS REDUCTIONS

As discussed previously in this Plan, Senate Bill 375 requires that SCAG and other Metropolitan Planning Organizations (MPOs) throughout the state develop a Sustainable Communities Strategy to reduce per capita greenhouse gas emissions through integrated transportation, land use, housing and environmental planning.

Pursuant to Senate Bill 375, ARB set per capita greenhouse gas emissions reduction targets from passenger vehicles for each of the state's 18 MPOs. For the SCAG region, the targets are set at eight percent below 2005 per capita emissions levels by 2020 and 13 percent below 2005 per capita emissions levels by 2035. Although ARB has not adjusted SCAG's regional targets since the 2012 RTP/SCS, SCAG anticipates that the region's targets could change—considering the Governor's recent Executive Order.[6] Because the transportation sector is the largest contributor to California's greenhouse gas emissions (more than 36 percent), SCAG anticipates updated and more stringent regional greenhouse gas reduction targets may be forthcoming.[7]

In the meantime, the 2016 RTP/SCS achieves per capita greenhouse gas emissions reductions relative to 2005 of eight percent in 2020, 18 percent in 2035, and 21 percent in 2040—exceeding the reductions that ARB currently requires. For more detailed information and analysis regarding monitoring of air quality and greenhouse gas emissions in the SCAG region, please see the Transportation Conformity Analysis Appendix.

[6] California Air Resources Board. (2015). Frequently Asked Questions About Executive Order B-30-15 2030 Carbon Target and Adaptation. [Fact Sheet]. Retrieved from http://www.arb.ca.gov/newsrel/2030_carbon_target_adaptation_faq.pdf

[7] California Air Resources Board. California Greenhouse Gas Emission Inventory. (2015) [Website]. Retrieved from http://www.arb.ca.gov/cc/inventory/data/data.htm.

ENVIRONMENTAL JUSTICE

The concept of environmental justice is about equal and fair access to a healthy environment, with the goal of protecting minority and low-income communities from incurring disproportionate negative environmental impacts. SCAG's environmental justice program includes two main elements: technical analysis and public outreach. In the regional transportation-planning context, SCAG's role is to 1) ensure that when transportation decisions are made, low-income and minority communities have ample opportunity to participate in the decision-making process, and 2) identify whether such communities receive an equitable distribution of benefits and not a disproportionate share of burdens.

As such, SCAG adheres to all federal and state directives on environmental justice. All public agencies that use federal funding must make environmental justice part of their mission and adhere to three fundamental environmental justice principles:

1. To avoid, minimize or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

The 2016 RTP/SCS program of environmental justice public outreach and analysis, described in detail in the Environmental Justice Appendix, reviews federal legislation pertaining to environmental justice; major equity issues specific to our region; SCAG policies and programs related to this important topic; outreach efforts in communities across the region; and SCAG's efforts to identify demographic groups to ensure environmental justice in all of our communities.

TABLE 8.4 2016 RTP/SCS PERFORMANCE MEASURES: ENVIRONMENTAL JUSTICE

PERFORMANCE MEASURE	DEFINITION	PERFORMANCE TARGET	SUMMARY OF IMPACTS
2016 RTP/SCS revenue sources in terms of tax burdens[1]	Proportion of 2016 RTP/SCS revenue sources (taxable sales, income, and gasoline taxes) for low income and minority populations	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—households in poverty will not contribute disproportionately to the overall funding of the Plan. Minority households will not pay a higher proportion of taxes to fund the 2016 RTP/SCS than their relative representation in the region as a whole
Share of transportation system usage[1]	Comparison of transportation system usage by mode for low income and minority households vs each group's population share in the greater region	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—low income and minority groups show a higher usage of transit and active transportation modes and positions these communities to benefit from the investments in the 2016 RTP/SCS
2016 RTP/SCS investments[1]	Allocation of Plan investments by mode (bus, HOV lanes, commuter/high speed rail, highways/arterials, and light/heavy rail transit)	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the share of transportation investments for low income and minority communities outpaces these groups' financial burdens for the 2016 RTP/SCS
Distribution of travel time savings and travel distance reductions[1]	Details what groups are overall benefiting as a result of the Plan in terms of travel time and distance savings	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the Plan's travel time and person-mile savings for low income households and minority communities is in line with each group's usage of the transportation system
Geographic distribution of transportation investments	Examination of transit, roadway and active transportation infrastructure investments in various communities throughout the region	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the Plan's transportation infrastructure investments are distributed throughout the region in proportion to population density
Jobs-housing imbalance[1]	Comparison of median earnings for intra-county vs inter-county commuters for each county in the SCAG region; analysis of relative housing affordability and jobs throughout the region	Establish existing conditions (not a performance measure for the Plan)	Existing conditions show that higher wage workers tend to commute longer distances than lower wage workers. Inland counties show a lower job-to-worker ratio than coastal counties, indicating that there are more long distance commuters in inland counties. Please refer to the Environmental Justice Appendix for potential strategies to improve conditions at the local level
Accessibility to employment and services[1]	Percentage of employment and shopping destinations within a one- and two-mile travel buffer from each neighborhood; also, share of employment and shopping destinations that can be reached within 30 minutes by auto or 45 minutes by bus or all transit modes during the evening peak period	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the Plan will improve the number of accessible destinations within 45 minutes of travel and within short distances for low income and minority communities both by auto and transit
Accessibility to parks and schools	Share of population within a one- and two-mile travel buffer from a regional park or school; also, share of park acreage that can be reached within 30 minutes by auto or 45 minutes by bus or all transit modes during the evening peak period	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the Plan will improve the number of destinations accessible within 45 minutes of travel and short distances for low income and minority communities both by auto and transit
Gentrification and displacement[1]	Examination of historical demographic and economic trends for areas surrounding rail transit stations	Establish existing conditions (not a performance measure for the Plan)	Historic trends from 2000 to 2012 show that population living in areas within a half mile of rail transit stations are not strongly influenced by the larger region's demographic and economic trends. For example, the growth of Hispanics and seniors (age 65 and above) in these areas has not kept pace with regional trends. Patterns in residents' income and housing prices suggest that gentrification may be happening and low income and minority households are at risk for displacement. Refer to the Environmental Justice Appendix for potential strategies to reduce impacts at the local level
Emissions Impact Analysis[1]	Comparison of Plan and Baseline scenarios; identification of areas that are lower performing as a result of the Plan, along with a breakdown of demographics for those areas	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the Plan will result in reductions in carbon monoxide and particulate matter emissions for on-road vehicles and benefits will be experienced both by minority and low income households and in communities with a high concentration of minority and low income groups

TABLE 8.4 CONTINUED

PERFORMANCE MEASURE	DEFINITION	PERFORMANCE TARGET	SUMMARY OF IMPACTS
Air quality health impacts along highways and highly traveled corridors[1]	Comparison of Plan and Baseline scenarios and demographic analysis of communities in close proximity to highways and highly traveled corridors	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the Plan will result in an overall reduction in emissions in areas that are near roadways, which have been seen to have a higher concentration of minority and low income groups than the region as a whole
Aviation noise impacts[1]	Comparison of Plan and Baseline scenarios; breakdown of population by race and ethnicity for low performing airport noise impacted areas	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the Plan will result in aviation noise areas that are geographically smaller than the Baseline scenario, and will benefit minority and low income households as a result
Roadway noise impacts[1]	Comparison of Plan and Baseline scenarios, identification of areas that are low performing as a result of the Plan; breakdown of population for these impacted areas by race/ethnicity and income	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—the Plan results in a reduction of roadway noise when compared to the Baseline scenario, which has a benefit to minority and low income households who represent a higher share of population who live in close proximity to major roadways
Active transportation hazard	Breakdown of population by demographic group for areas that experience the highest rates of bicycle and pedestrian collisions	Establish existing conditions (not a performance measure for the Plan)	Collision data from 2012 shows that low income and minority communities incur a higher rate of bicycle and pedestrian risk. Improvements in active transportation infrastructure and Complete Streets measures, such as those proposed in the Plan, have been shown to reduce hazard to bicyclists and pedestrians. Refer to the Environmental Justice Appendix for potential strategies to reduce risk at the local level
Rail-related impacts[1]	Breakdown of population by demographic group for areas in close proximity to rail corridors and planned grade separations	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—there is no significant difference between the Plan and the Baseline in the concentration of minority and low income communities in areas directly adjacent to commercial and passenger railways
Public health analysis	Historical emissions and health data summarized for areas that have high concentrations of minority and low income population	Establish existing conditions (not a performance measure for the Plan)	Recent trends indicate that air quality is improving throughout the region. For select areas that show increase, there is sometimes a higher proportion of minority and low income population. When examining public health indicators from the CalEnviroScreen tool, it appears that areas with the highest concentrations of minority and low income population incur some of the highest risks in the region. Refer to the Environmental Justice Appendix for potential strategies to improve conditions at the local level
Climate vulnerability	Breakdown of population by demographic group for areas potentially impacted by substandard housing, sea level rise and wildfire risk	Establish existing conditions (not a performance measure for the Plan)	Existing conditions indicate that minority and low income populations are at a greater risk for experiencing negative impacts of climate change. Refer to the Environmental Justice Appendix for potential strategies to reduce impacts at the local level.
Proposed mileage-based user fee impacts	Examination of potential impacts from implementation of a mileage-based user fee on low income households in the region	No unaddressed disproportionately high and adverse effects for low income or minority communities	No unaddressed disproportionate impacts—results show that the mileage-based user fee is less regressive to low income residents than the current gasoline tax.

Note: [1] Performance measures used in the Environmental Justice Analysis for the 2012 RTP/SCS

ENVIRONMENTAL JUSTICE PERFORMANCE MEASURES

In the development of the analysis, SCAG identified 18 performance measures to analyze existing environmental justice parameters in the region and to address any potential impacts of the 2016 RTP/SCS on the various environmental justice population groups. SCAG also examined potential impacts at various geographies and specifically employed a community-based approach for the 2016 RTP/SCS based on guidance from stakeholders. A brief description of the environmental justice performance measures is provided in this section. A more detailed presentation of the results of the 2016 RTP/SCS environmental justice analysis can be found in the Environmental Justice Appendix. TABLE 8.4 describes the 2016 RTP/SCS environmental justice performance measures and provides a summary of impacts for each of the measures.

PERFORMANCE MEASURE 1: 2016 RTP/SCS REVENUE SOURCES IN TERMS OF TAX BURDENS

Different funding sources (i.e., income, property, sales and fuel taxes) can impose disproportionate burdens on lower-income and minority groups. Sales and gasoline taxes, which are the primary sources of funding for the region's transportation system, were evaluated for the purposes of this analysis. The amount of taxes paid was broken down to demonstrate how tax burdens fall on various demographic groups. As in previous RTP environmental justice reports, the 2016 RTP/SCS environmental justice analysis examined in detail the incidence, distribution and burden of taxation.

PERFORMANCE MEASURE 2: SHARE OF TRANSPORTATION SYSTEM USAGE

SCAG analyzed the use of various transportation modes by race/ethnicity and by income quintile (an income quintile is a category into which 20 percent of households ranked by income fall).

PERFORMANCE MEASURE 3: 2016 RTP/SCS INVESTMENTS

The strategy that public agencies pursue to invest in transportation has a huge impact on environmental justice. In short, it can determine what transportation choices will be available to low-income and minority communities. A disproportionate allocation of resources for various transit investments, for example, can indicate a pattern of discrimination.

PERFORMANCE MEASURE 4: DISTRIBUTION OF TRAVEL TIME SAVINGS AND TRAVEL DISTANCE REDUCTIONS

SCAG assessed both the distribution of travel time and distance savings that are expected to result from implementing the 2016 RTP/SCS, by analyzing demographic data and the associated mode usage statistics for each Transportation Analysis Zone (TAZ) in the region. With this input, an estimate for the time savings for each income group and ethnic group can be identified for trips involving transit (bus and rail) and automobiles.

PERFORMANCE MEASURE 5: GEOGRAPHIC DISTRIBUTION OF TRANSPORTATION INVESTMENTS

This section is a new addition to the environmental justice analysis for the 2016 RTP/SCS and examines where transportation investments are planned throughout the region. Building on the new community-based approach for the overall effort, a summary of investments for areas with a high concentration of minority population and/or low income population is included for roadway, transit and active transportation investments.

PERFORMANCE MEASURE 6: JOBS-HOUSING IMBALANCE

An imbalance or mismatch between employment and housing in a community is considered to be a key contributor to local traffic congestion. Some argue that these imbalances and mismatches are also impediments to environmental justice. Driving is expensive and people who can't afford to own a car generally need to live near to their jobs so they can get to work using transit, or by walking or biking.

PERFORMANCE MEASURE 7: ACCESSIBILITY TO EMPLOYMENT AND SERVICES

Accessibility is vital for social and economic interactions. As a measure, accessibility is determined by the spatial distribution of potential destinations; the ease of reaching each destination by various transportation modes; and the magnitude, quality and character of the activities at the destination sites. Travel costs are central: the lower the costs of travel, in terms of time and money, the more places people can reach within a certain budget—that is, the greater the accessibility. The number of destination choices that people have is equally crucial: the more destinations and the more varied the destinations, the higher the level of accessibility.

PERFORMANCE MEASURE 8: ACCESSIBILITY TO PARKS AND NATURAL LANDS

Similar to the method used for measuring accessibility to jobs, accessibility to parks is defined as the percentage of park acreage reachable within a 30-minute travel time by auto and 45-minute travel time by local bus and all transit options. For this round of SCAG's environmental justice effort, analysis was included that measured accessibility to the recently designated San Gabriel Mountains National Monument. Also included in our accessibility analysis (for employment and services) is a measurement of the share of population within a one- and two-mile travel distance of all regional parks and open space under the Plan and Baseline scenario, based on the principle that shorter trips should be encouraged through implementation of the 2016 RTP/SCS.

PERFORMANCE MEASURE 9: GENTRIFICATION AND DISPLACEMENT

The integration of transportation and land use planning has been recognized for its ability to reduce VMT, air pollution and greenhouse gases, while also increasing opportunities for physical activity. However, there has been some criticism of smart growth strategies in relation to housing affordability, specifically in regard to Transit-Oriented Development (TOD). In response to these concerns, SCAG developed a methodology to monitor demographic trends in and around transit-oriented communities. For the 2016 RTP/SCS, recent indicators show that emerging trends for areas in close proximity to rail transit stations (one half mile surrounding a rail transit stop) are not consistent with those for the greater region. From 2000 to 2012, the region experienced huge growth for certain cohorts, specifically the Hispanic population and seniors aged 65 and over. This same trend was also seen in areas near rail transit stations, but to a much lesser degree. At the same time, median household income has decreased less, and median gross rent has increased more, in these transit oriented communities than has been the trend for the greater region. These divergent growth patterns represent evidence indicating likely gentrification, which may lead to displacement for low income households.[8]

SCAG will continue to monitor growth in TOD areas and is committed to promoting affordable housing throughout the region. Additional tools that local jurisdictions may use to combat displacement of low income and minority residents are provided in the Environmental Justice Toolbox, located in the Plan's Environmental Justice Appendix.

PERFORMANCE MEASURE 10: EMISSIONS IMPACT ANALYSIS

Air pollution comes from many different sources and can be classified into two types: ozone and particulate matter. Ozone pollution takes a gaseous form and is generated as vapor emitted from fuels commonly used in motor vehicles and industrial processes. Ozone is formed by the reaction between volatile organic compounds (VOC) and oxides of nitrogen (NOx) in the presence of sunlight. Ozone negatively impacts the respiratory system. Particulate matter (PM 10 and PM 2.5) are very fine particles made up of materials such as soot, ash, chemicals, metals and fuel exhaust that are released into the atmosphere. Particulate pollution has been linked to significant health problems, including aggravated asthma, respiratory disease, chronic bronchitis, decreased lung function and premature death.

Transportation projects can have both positive and negative impacts on the environment. Conversely, appropriate transportation investments can motivate travelers to shift to less polluting modes (e.g., bus, train, carpooling or commuter rail). On the other hand, investments that increase traffic on a particular facility typically degrade air quality in the immediate vicinity of that facility. Low-income and minority groups may be at particular risk for health hazards resulting from air pollution, and the objective for this analysis is to assess impacts for these groups as a result of the Plan versus Baseline (no-build) scenario.

PERFORMANCE MEASURE 11: AIR QUALITY HEALTH IMPACTS ALONG HIGHWAYS AND HIGHLY TRAVELED CORRIDORS

Exposure to air pollutants is considered an environmental justice issue due to the disproportionate share of minority and low-income populations living in close proximity to heavily traveled corridors, particularly near port and logistics activities. This exposure to unhealthy air results in nearly 5,000 premature deaths annually in the SCAG region, as well as 140,000 children with asthma and other respiratory symptoms. More than half of Americans exposed to PM 2.5 pollution that exceeds the national standard live in the SCAG region.[9] This measure examines the potential emissions impacts of the RTP/SCS for PM and ozone emissions that result from on-road vehicles both at the TAZ level and for areas in close proximity to highways and highly traveled corridors.

[8] Environmental Justice Emerging Trends and Best Practices Guidebook, Document Number: FHWAHEP-11-024 (2011). U.S. Department of Transprtation, Federal Highway Administration.

[9] California Air Resources Board, South Coast Air Quality Management District, and SCAG. (2011). Powering the Future: A Vision for Clean Energy, Clear Skies, and a Growing Economy. [Fact Sheet]. http://www.arb.ca.gov/newsrel/2011/powering_the_future.pdf.

PERFORMANCE MEASURE 12: AVIATION NOISE IMPACTS

The SCAG region supports the nation's largest regional airport system, in terms of the number of airports and overall aircraft operations operating in a very complex airspace environment. This system has six established air carrier airports, including Los Angeles International (LAX), Burbank Bob Hope, John Wayne, Long Beach, Ontario and Palm Springs. There are also four emerging air carrier airports within the Inland Empire and in North Los Angeles County. These include San Bernardino International Airport, March Inland Port (joint use with March Air Reserve Base), Southern California Logistics Airport and Palmdale Airport (joint use with Air Force Plant 42).

The regional aviation system also includes more than 40 general aviation airports and two commuter airports—for a total of more than 55 public use airports. Although the projected demand for airport capacity has decreased in comparison with what was projected in the 2012 RTP/SCS, there is still moderate growth expected in the future. The challenge is striking a balance between the aviation capacity needs of Southern California and the quality of life for people living near airports. This measure evaluates the impact of aviation noise on neighborhoods close to airports and examines the potential impacts on environmental justice populations specifically.

PERFORMANCE MEASURE 13: ROADWAY NOISE IMPACTS

The SCAG region has an extensive roadway system consisting of more than 70,000 lane miles. It includes one of the country's most extensive HOV lane systems and a growing network of toll lanes, as well as express lanes. The region also has a vast network of arterials and other minor roadways and noise may cause significant environmental concerns. Noise associated with highway traffic depends on a number of factors that include traffic volumes, vehicle speed, vehicle fleet mix (cars, trucks) and the location of the highway with respect to schools, daycare facilities, parks and other "sensitive receptors." According to FHWA guidance, noise impacts occur when noise levels increase substantially in comparison with existing levels. Impacts are assessed in this section by examining how the RTP/SCS affects roadway noise and by determining the population groups that could potentially be most impacted by roadway noise.

PERFORMANCE MEASURE 14: ACTIVE TRANSPORTATION HAZARDS

Encouraging a healthier, more active lifestyle in all of our communities is one of the featured goals of this Plan. Making walking and bicycling safer transportation options is key to attracting more people to choose these alternatives. Bicycling or walking along roadways in close proximity with motor vehicles is often perceived as dangerous, and reducing hazards in the pedestrian and cycling environment is a primary strategy toward achieving our goal of promoting healthier, more active communities.

As a new environmental justice indicator for the 2016 RTP/SCS, Active Transportation Hazards seeks to evaluate incidences of motor vehicle collisions involving bicyclists and pedestrians in our communities, with the goal of promoting an improved environment for active transportation users and encouraging more residents to make the choice to walk or bicycle in their communities. As with other environmental justice performance measures, this indicator will be used to identify patterns of active transportation hazards and potential disparities among our various communities.

PERFORMANCE MEASURE 15: RAIL-RELATED IMPACTS

Freight rail emissions account for five percent of all NOx emissions and four percent of all PM emissions generated by regional goods movement activities, as described in the Goods Movement Appendix. When compared with all regional PM and NOx sources, the contributions by freight rail emissions is even lower. However, environmental pollution from locomotives, rail yards and other rail facilities must be considered, as concentrations of rail activities can cause localized rail-related pollution. In response to input from our federal partners, SCAG developed a summary analysis to address potential environmental justice impacts in areas adjacent to railroads and rail facilities, although further discussion and analysis is recommended. This outcome analyzes environmental justice communities adjacent to railroads and rail facilities, rail impacts to sensitive receptors, and examines environmental justice concerns that may potentially be alleviated by grade separation projects.

PERFORMANCE MEASURE 16: PUBLIC HEALTH IMPACT

A new environmental justice indicator for the 2016 RTP/SCS, the Public Health measure seeks to evaluate the potential disparity among communities in the SCAG region in terms of public health issues that may be associated with historical toxic exposure and local transportation infrastructure. Like the Active Transportation Hazards measure discussed previously, inclusion of this new analysis is intended to further the goal of fostering healthier lifestyle choices in all of our communities. It is a key goal of this Plan to provide more and better opportunities for physical activity and other healthy lifestyle choices throughout the SCAG region.

PERFORMANCE MEASURE 17: CLIMATE VULNERABILITY

This is another new environmental justice performance indicator that seeks to identify regional disparities in regard to vulnerability to the consequences of climate change among the various communities in the SCAG region. Of particular interest in this analysis will be relative risk for sea level rise, wildfires, and flooding. It is understood that climate change is expected to impact different regions in different ways. In Southern California, we may expect development of a general trend of warmer temperatures, less precipitation and higher sea levels along our coasts.

This combination of climatic changes will likely result in increased wildfire danger, particularly in the foothill areas where our cities adjoin our local mountains. Due to melting ice caps in the polar regions, a steady rise in global sea level is expected. This may impact the coastal regions of Southern California. This new measure will allow SCAG to obtain a better understanding of how these anticipated changes in our local climate may impact our more vulnerable communities.[10]

PERFORMANCE MEASURE 18: PROPOSED MILEAGE-BASED USER FEE IMPACTS

This analysis is based on a proposed transportation improvement funding strategy that recommends implementation of a user fee based on VMT. If implemented, the mileage-based user fee would replace the current gasoline tax and is estimated to cost about four cents (2015 value) per mile and would be indexed to maintain its purchasing power beginning in 2025. Implementation of this financing strategy would require action by the California State Legislature and/or the U.S. Congress. This measure examines the impact of the gasoline tax on low income households and assesses the mileage-based user fee as a replacement option.

[10] For more information on potential climate change impact in Southern California, see Southern California Association of Governments and Dan Cayan, Climate Change: What Should Southern California Prepare for?: http://www.scag.ca.gov/documents/climat-echange_dancayan.pdf.

TRANSPORTATION CONFORMITY

REQUIREMENTS

The Federal Clean Air Act (CAA) establishes the National Ambient Air Quality Standards (NAAQS) and planning requirements for certain air pollutants. To comply with the CAA in achieving the national air quality standards, the ARB develops a State Implementation Plan (SIP) for each federal designated non-attainment and maintenance area within California. SIP development is a joint effort of the local air agencies and ARB working with federal, state and local agencies, including regional MPOs.

Transportation conformity is required under the CAA section 176(c) to ensure that federally supported highway and transit project activities "conform" to, or are consistent with, the purpose of the applicable SIP. Conformity for the purpose of the SIP means that transportation activities including regional transportation plans, transportation improvement programs and transportation projects will not cause new air quality violations, worsen existing air quality violations, or delay timely attainment of the relevant NAAQS. Conformity applies to areas that are designated by the U.S. Environmental Protection Agency (EPA) as being in non-attainment or maintenance for the following transportation related criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO2), ozone, and particulate matter (PM 2.5 and PM 10).

Under the U.S. Department of Transportation Metropolitan Planning regulations and the EPA's Transportation Conformity regulations, the 2016 RTP/SCS is required to pass the following four conformity tests in order to demonstrate transportation conformity:

- Regional Emissions
- Timely Implementation of Transportation Control Measures (TCMs)
- Financial Constraint
- Interagency Consultation and Public Involvement

The Regional Council adopts the initial transportation conformity determination, while FHWA/Federal Transit Administration (FTA) approves the final transportation conformity determination for the 2016 RTP/SCS.

CONFORMITY ANALYSIS AND FINDINGS

As documented in the Transportation Conformity Analysis Appendix, the 2016 RTP/SCS meets all federal transportation conformity requirements and demonstrates transportation conformity. The findings associated with the conformity tests are described in detail in the Transportation Conformity Analysis Appendix.

TRANSPORTATION CONFORMITY AND GREENHOUSE GAS EMISSION REDUCTION TARGETS

Although transportation conformity is a federal requirement and reducing greenhouse gas emissions is a state mandate, both requirements are highly interrelated. First of all, each of the 2016 RTP/SCS policies, strategies, programs and projects that contribute to transportation conformity are the same policies, strategies, programs and projects that help to meet state targets for reducing greenhouse gas emissions—and vice versa. Secondly, although transportation conformity addresses emissions of criteria pollutants and their precursors, such emissions originate from the same source as greenhouse gas emissions: the combustion of fossil fuels in motor vehicles.

Any strategies that result in reduction or elimination of use of fossil fuels in motor vehicles may help the 2016 RTP/SCS meet both federal transportation conformity requirements and state greenhouse gas emissions reduction targets. In addition, the regional emissions analysis used for transportation conformity and the emissions analysis conducted for meeting greenhouse gas reduction targets use the same regional transportation model and ARB's Emission Factors (EMFAC) model. Finally, there is greater awareness of the need for more concerted efforts at the federal, state and local levels to integrate the SIP development process with planning and actions to address climate change. As a result, transportation conformity and greenhouse gas emissions reductions will become even more interconnected and more mutually supportive.

CONCLUSION

As we look toward mid-century, it is important to consider what the region can do beyond the transportation projects for which we expect to have funding. In our final chapter, 'Looking Ahead,' additional strategies and investments will be presented that would bring the SCAG region closer to achieving our goals for improved mobility and accessibility, a strong economic future, sustainable growth, and ultimately an enhanced quality of life for everyone in our region.

09

Image courtesy of Allan Crawford

CHAPTER 9 HIGHLIGHTS

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LOOKING AHEAD

This Plan has discussed many long-term needs for our region's transportation system. Despite $556.5 billion in investments reviewed in the 2016 RTP/SCS, this still will not be enough to address all of our needs as we head toward mid-century. In addition, as noted earlier, state policies will continue to push the region to achieve sustainability goals beyond the horizon of the plan.

INTRODUCTION

The implication of the Governor's Executive Order B-30-15, referenced earlier, is that state-mandated targets to reduce greenhouse gas emissions will likely become more ambitious and will be extended to target years beyond 2040. The first part of this chapter describes the 2016 Regional Strategic Plan, a list of projects without identified funding that would benefit mobility in the region. The second part of this chapter, which concludes this presentation of the 2016 RTP/SCS, provides insight into developments that will impact the region beyond 2040.

THE 2016 STRATEGIC PLAN

This chapter serves as a Strategic Plan for discussing what strategies, programs and projects the region should pursue in coming decades if and when additional funding becomes available. This Strategic Plan is intended to help inform future updates to SCAG's RTP/SCS, beyond the 2016 RTP/SCS. Back in 2008, SCAG first developed a Strategic Plan to guide long-term decisions for transportation investments and strategies. The Strategic Plan in the agency's 2008 RTP helped inform what kinds of investments to include in the 2012 RTP/SCS—as part of that Plan's financially constrained transportation network.

Not surprisingly, the Strategic Plan included in the 2012 RTP/SCS played a large role in informing the investments and strategies detailed in the Financially Constrained Plan of the 2016 RTP/SCS (also referred to as the "Constrained Plan"). Among these are:

- **Promoting Active Transportation:** The 2012 Strategic Plan called for further enhancements to the active transportation system, including an increased focus on first/last mile connections to and from public transit, increasing the density of bikeways, incorporating Complete Streets practices that make streets friendlier to pedestrians and bicyclists, and increasing connectivity for pedestrians and bicyclists between jurisdictions. As part of the 2012 RTP/SCS, $6.7 billion was allocated for active transportation. Since the 2012 RTP/SCS was adopted, active transportation has been recognized as a regional priority, not just a local priority. Orange County began work on a strategic bikeway network and completed the first portion in 2012, and it is fully incorporated into the 2016 RTP/SCS. Meanwhile, Los Angeles County is developing its own Active Transportation Strategic Plan.
- **Expanding the High-Occupancy Vehicle (HOV) Lanes System:** The 2012 Strategic Plan recommended expanding our regionwide HOV lane network, although these improvements were unfunded. The 2016 RTP/SCS now fully funds an HOV expansion project within Orange County as part of its Constrained Plan.
- **Improving Local Highway Grade Separations:** The 2012 Strategic Plan recommended constructing grade separations on our local highways, although these improvements were unfunded as well. The 2016 RTP/SCS fully funds several grade separation projects throughout the region as part of its Constrained Plan.

It is clear that the 2012 Strategic Plan played a large role in influencing the 2016 Constrained Plan, as intended. Moving forward, we expect the Strategic Plan discussed in this chapter will help inform future RTP/SCS updates. Should additional funding become available to pursue projects beyond our Constrained Plan, more consensus would be needed and in some cases further studies would be warranted before specific projects could move forward.

LONG-TERM EMISSIONS-REDUCTION STRATEGIES FOR RAIL

As part of our current Strategic Plan, we will continue ongoing work with railroads, air quality management agencies and other stakeholders to reach our goal of a zero-emissions rail system.

FREIGHT RAIL

Achieving a rail system with zero emissions will be challenging because freight rail operates as a national system and locomotives cannot remain captive to our region. Any new technology will require an operational strategy to change out locomotive types, or it will require compatible infrastructure nationwide to provide new types of cleaner power and/or fuel to locomotives.

These challenges are formidable, but several near zero- and zero-emissions rail technologies are actually under development. A zero-emissions rail system would require full electrification and such a system could be powered by electric catenary or linear synchronous motors. There are also options for a hybrid-electric engine or a battery tender car, which provide additional power, allowing locomotives to operate in zero-emissions mode while battery power is available.

Opportunities for near zero-emissions include incorporating liquid natural gas tender cars and after treatment systems. Tier 4 engines and earlier engine types can be retrofitted to operate with natural gas, though safety and operational issues remain challenging. Additional after-treatment options are in the conceptual stage, which could go beyond Tier 4 standards.

Please see the Goods Movement Appendix for more detail on these technologies, as well as a plan to deploy these technologies as they become commercially viable.

CALIFORNIA HIGH-SPEED TRAIN

The California High-Speed Train will be electrified and will therefore produce no emissions along its operating corridors. Furthermore, the California High-Speed Rail Authority (CHSRA) has committed to using 100 percent renewable energy to power its trains. Because of the expected reduction in air and auto travel, the CHSRA estimates its service will save 2.0 million to 3.2 million barrels of oil annually, beginning in 2030.[1] With plans for a zero-emissions high-speed rail system in Southern California, and as the freight rail sector makes advances in near zero- and zero-emissions technologies, the region's passenger and commuter rail systems should pursue a similar strategic vision.

LONG-TERM EMISSIONS-REDUCTION STRATEGIES FOR TRUCKS

The reduction or elimination of emissions from heavy-duty trucking is equally important to our long-term vision of a zero-emissions goods movement system. In the near term, our 2016 RTP/SCS proposes an aggressive program to bring into service more clean fuel trucks and hybrid trucks that are now available. For the longer term, we provide a detailed plan to advance zero-emissions truck technologies, as described in the Goods Movement Appendix.

The trucking market offers unique challenges because of heavy vehicle and load weights, operational performance requirements, and high incremental costs. However, several reduced-emissions trucks are commercially available now and many zero- and near zero-emissions trucks are under development. Reduced-emissions natural gas trucks already have been deployed at our region's ports and several hundred hybrid electric trucks are on the road due to the Hybrid Truck and Bus Voucher Incentive Project (HVIP) at the California Air Resources Board.

Other promising technologies include plug-in hybrid-electric trucks, which have batteries that are charged through an external power source; battery-electric trucks, which can generate their own power or receive power from an outside source; and hydrogen fuel cell electric trucks. The South Coast Air Quality Management District (SCAQMD) is leading several ongoing demonstration programs, with funding from regional partners and state and federal agencies that are developing prototype zero-emissions trucks. These programs are also accessing the compatibility of these trucks with wayside power charging infrastructure. These demonstration programs rely on partnerships with original equipment manufacturers that can develop truck prototypes and with private sector partners that can test and evaluate prototypes in real world operating conditions.

For more information on the steps toward development and deployment of these technologies and more detail about potential technologies, please see the Goods Movement Appendix.

UNFUNDED OPERATIONAL IMPROVEMENTS

Well-targeted investments to improve our roadways can yield numerous benefits. Adding auxiliary lanes and managed lanes; improving interchanges; deploying on-ramp metering devices and adaptive signals; and other ITS enhancements can make the entire roadway system more efficient, increase capacity and help reduce congestion. Caltrans Corridor System Management Plans (CSMPs) have identified a number of improvements throughout the State Highway System (SHS) to improve productivity. The future development of corridor mobility and sustainability improvement plans (i.e., Corridor Sustainability Studies) for various corridors throughout the SCAG region may also identify future operational improvements not only within the SHS, but for all modes of travel throughout the region.

UNFUNDED CAPITAL IMPROVEMENTS

Regionally significant major corridor improvements and strategies described in the Strategic Plan are identified in TABLE 9.1. A complete list is contained in the 2016 RTP/SCS Project List contained as part of Project List Appendix.

[1] California High Speed Rail Authority. Environmental Fact Sheet, August 2014.

EXPANDING OUR REGION'S HIGH-SPEED TRAIN SYSTEM

CALIFORNIA HIGH-SPEED TRAIN

The California High-Speed Train will provide people with an additional option for traveling within the state, offering an alternative to flying and driving. This will be especially important as highways and airports continue to become more congested and constrained as California's population continues to grow. Phase One of the system, approved by voters, extends from the Kern County line in our region through Palmdale and Burbank to Los Angeles Union Station and Anaheim. Phase Two, extending from downtown Los Angeles to San Diego, will link many urban areas and other destinations within our Southern California region via the San Gabriel Valley and the Inland Empire. This corridor is about 160 miles long and it traverses Los Angeles, Riverside, San Bernardino and San Diego counties. With more than 21 million residents, these four counties make up about 56 percent of the state's current population. And they're projected to grow significantly by 2050.

Upon completion, Phase Two will provide important access to planned and existing regional centers, including Ontario International Airport, the March Inland Port, and potentially San Bernardino International and Corona airports—helping to meet SCAG's long-term goal of regionalizing air travel in Southern California. Eventually, Phase Two is expected to be the basis for further high-speed rail extensions into Nevada and Arizona.

Phase One and Two of the California High-Speed Train will provide excellent regional connectivity to our region by connecting with a robust network of intercity and commuter rail, subway, light rail, modern streetcars and fixed-route transit systems. Integrated planning will allow these regional and local transportation networks to complement the High-Speed Train. Commuter, intercity and interregional rail services and transit serve distinct travel markets, but coordinating their schedules will further increase the region's rail and transit ridership by attracting new and crossover passengers to these different market segments.

XPRESSWEST

In addition to the California High-Speed Train, our region has other important high-speed rail projects in development. XpressWest is a high-speed rail service that will connect Victorville and Las Vegas along the Interstate 15 corridor and connect via the High Desert Corridor to Palmdale and California High-Speed Train Phase One. It will use "steel wheel on steel rail" electric multiple unit train technology, at speeds of up to 150 miles per hour (mph).

TABLE 9.1 MAJOR STRATEGIC PLAN PROJECTS
IMPERIAL COUNTY
SR-111 Corridor Improvements
LOS ANGELES COUNTY
Metro Blue Line Extension to California State University Long Beach
Metro Gold Line Eastside Extension Beyond Phase II Terminus
Metro Green Line Extension to San Pedro, Long Beach and LA/Orange County Line
Metro Orange Line Extension to Burbank Bob Hope Airport
Orangeline High-Speed Transit (Union Station to Santa Clarita)
I-605 HOV lanes from I-10 to I-210
ORANGE COUNTY
Additional Transit Station Improvements to Fullerton Transportation Center and Santa Ana Regional Transportation Center
Fullerton College Connector
SR-133 Multimodal Corridor Improvements
RIVERSIDE COUNTY
Coachella Valley Daily Rail Service between Downtown Los Angeles and Indio
CETAP - Riverside County to Orange County
Perris Valley Line Extension to Temecula
SAN BERNARDINO COUNTY
San Bernardino Mountain-Valley Railway System between San Bernardino/Highland and Big Bear Lake
VENTURA COUNTY
Santa Paula Branch Line
VARIOUS COUNTIES
Cordon Pricing Demonstration Projects (locations to be determined)
California High-Speed Train System Phase 2
California/Nevada Super-Speed Train Anaheim to Las Vegas
Expanded Express Lane Network (beyond Constrained Plan)
Long-Term Goods Movement Emission-Reduction Strategies for Rail and Trucks
Mileage-Based User Fee Demonstration Projects and Implementation Strategy
Additional Metrolink and LOSSAN Improvements (beyond financially constrained plan)
XpressWest High-Speed Rail Between Palmdale-Victorville-Las Vegas

That would result in a trip between Victorville and Las Vegas lasting only 80 minutes. XpressWest has secured federal environmental Records of Decision and authorization to construct and operate. In November 2015, XpressWest was awarded the franchise to construct and operate high-speed rail service within Nevada between Southern California and Las Vegas by the Nevada High Speed Rail Authority.

SOUTHWEST HIGH-SPEED RAIL

In September 2014, the Federal Railroad Administration (FRA) released the *Southwest Multi-State Rail Planning Study*. This study analyzed candidate high-speed rail corridors in several southwest states. California, Nevada and Arizona are included as the "primary" area and New Mexico, Utah and Colorado are included as the "extended" area. The study includes:

1. "Core Express" with top speeds greater than 125 mph
2. "Regional" with top speeds of 90 mph to 125 mph
3. "Emerging/Feeder" with top speeds up to 90 mph

The California High-Speed Train and XpressWest corridors were identified as Core Express corridors in the study. The study also recommended a particular emphasis on the Phoenix to Southern California corridor as a future high-speed rail market to be studied.

EXPANDING OUR REGION'S COMMUTER RAIL SYSTEM

METROLINK AND PACIFIC SURFLINER

Both the Amtrak Pacific Surfliner and Metrolink are forecast to significantly increase their ridership and number of daily trains through 2040. The Constrained Plan of this 2016 RTP/SCS includes funding the first $1 billion of the Southern California High-Speed Rail Memorandum of Understanding (MOU). However, this $1 billion investment only funds the top 12 projects on the project list, which contains 74 projects totaling $4 billion. Metrolink recently completed its long-range Strategic Assessment in 2016 and it forecasts growth in the number of daily trains from 165 current weekday trains today to 240 weekday trains by 2025. In addition, the 2012 Los Angeles–San Diego–San Luis Obispo Rail Corridor (LOSSAN) Strategic Implementation Plan (SIP) forecasts up to 310 weekday Metrolink trains by 2040. For the Amtrak Pacific Surfliner, the SIP forecasts up to 18 daily round trips between downtown Los Angeles and San Diego, and additional round trips between downtown Los Angeles and Santa Barbara and San Luis Obispo. Additionally, the SIP includes:

- New East Ventura to Santa Barbara commuter service with four round trips per day
- New Los Angeles to San Diego commuter service with five round trips per day (operations split between Metrolink and Coaster)
- New express service with four round trips per day (operations split between Metrolink and the Pacific Surfliner)
- New Metrolink service to San Jacinto with eight round trips per day

Today, the average speed for Metrolink is about 37 mph, and the average speed for the Pacific Surfliner is 46 mph. Average speeds vary by line, and while top speeds are 79 mph (and a segment of 90 mph through Camp Pendleton), predominant one-track operations in our region greatly reduce the average system speed. Even if all 74 of the MOU projects are built, our region will still have large portions of its rail network constrained by one-track operations. This reinforces the need to fund capital projects in order to speed up service and make passenger rail more attractive to the commuter who drives alone. SCAG's Strategic Plan vision for speed and service improvements to Metrolink and Pacific Surfliner calls for an intensive investment in capital projects to further increase speed and service levels over and above the Constrained Plan. The Strategic Plan results in even more segments of the network operating at speeds of 110 mph or more. These projects include additional double tracking, sidings, station improvements, grade separations and grade crossings. Not only will this benefit commuter rail trips in our region, it will benefit Amtrak intercity and California High-Speed Train interregional trips also, as the three systems feed and complement one another. While these rail networks serve three distinct travel markets, improving all three will encourage people to consider and use all three in their travel decisions, rather than be limited to any single mode of transportation.

In addition to capital improvements, our strategic vision calls for considerably more express trips, regular special event services, and implementation of new Bus Rapid Transit (BRT) services that directly connect with Metrolink and the Pacific Surfliner.

EXPANDING ACTIVE TRANSPORTATION

There is great potential for walking, biking and other forms of active transportation to expand beyond what is proposed in this 2016 RTP/SCS. Policies designed to reduce greenhouse gas emissions will continue to highlight active transportation as a key step toward a more sustainable region. As transit service expands and a wider range of shared-mobility options become available, active transportation will serve regional mobility, ensuring that people can quickly, easily and safely transfer from one mode of transportation to the next. Active transportation also plays a critical role in helping the region to realize its vision for how it uses land, which includes accommodating more people in vibrant, mixed-use communities and urban centers. Sidewalks and active transportation networks contribute to the attractiveness and economic vitality of mixed-use communities. They also play an important role in reducing congestion and increasing mobility.

EXPANDED REGIONAL GREENWAY NETWORK

New active transportation plans by local jurisdictions will aspire beyond what is considered in the 2016 RTP/SCS Constrained Plan, and as a result new innovative strategies will be tested and proven effective throughout our region. One expected innovation is to create greater physical separations between bicyclists and motor vehicles, particularly on higher-speed streets. Separated bikeways and Class 1 bikeways are considerably more expensive options than installing bike lanes or sharrows, but these more expensive options have been shown to increase ridership.[2] The SCAG region currently has four miles of separated bikeways and these now operate on an "experimental" basis in local jurisdictions such as Long Beach and Redondo Beach. Caltrans is developing guidelines to incorporate separated bikeways into the California Manual for Uniform Traffic Control Devices (MUTCD). Once incorporated, local governments will be able to freely incorporate separated bikeways without incurring liability. In this Strategic Plan, SCAG assumes that our region will have about 230 miles of new separated bikeways converted from bike lanes on arterial streets. As part of the effort to develop separated bikeways, this Strategic Plan envisions greater integration of watershed planning, river rehabilitation, and access for bicyclists and pedestrians. It further envisions the use of open area drainage channels that were once creeks, and the maintenance roads next to them for walking and biking. It envisions greater coordination of rights of way under utility lines.

[2] Chapter 3: Why Choose Separated Bike Lanes? (2015). In Separated Bike Lane Planning and Design Guide. Federal Highway Administration.

EXPANDED BIKE SHARE

Bike Share, an innovative program in which people can share bicycles, can be expanded beyond the 880 stations regionwide that are envisioned in the Constrained Plan. Because it is such a new service, more local jurisdictions may wish to deploy bike share facilities where they can. This Strategic Plan anticipates an additional 1,084 stations regionwide, should funding become available.

FIRST/LAST MILE

The first/last mile challenge, which deters many people from using transit, can be alleviated as more than 200 high quality transit stations identified in the Strategic Plan Project List increases to nearly 700 stations as urban areas become more developed and more bus routes offer people higher quality transit choices.

LIVABLE CORRIDORS

Pedestrian travel will also increase substantially as a consequence of higher density development. New treatments installed as part of routine roadway maintenance, such as bulb-outs, sanctuary islands and innovative midblock crossing signals such as the high-intensity activated crosswalk beacon (commonly referred to as "HAWK") will increase pedestrian safety. These treatments will expand livable corridors by 93 percent beyond the 16 areas in the Constrained Plan into new areas focusing on transit growth and new "village" development along new corridors. Funding for some of these treatments will come during the development process, through focused developer fees, or by pursuing other innovative funding strategies. Meanwhile, bicycle treatments such as bike racks and long-term secure bike parking will increase the convenience of biking.

NEIGHBORHOOD MOBILITY AREAS

Utilizing Complete Streets principles and applying them aggressively in the planning and implementation of neighborhood roadway improvements will increase mobility further. Traffic calming, combined with land use changes, will provide more opportunities for bicycling and walking in less urban settings such as local "village areas" with sidewalk café seating and local farmers markets. Connections to these villages will be promoted by strategies that tackle the first/last mile challenge that transit faces. Bicycle boulevards and other lower-speed streets that give bicycles priority have been shown to be effective at calming traffic, while increasing safety and bicyclist connectivity. This Strategic Plan sees local governments increasing the use of Complete Streets principles in their roadway improvements, expanding these areas beyond what is in the

Constrained Plan, increasing bikeway density and improving the quality of life for even more residents.

STRATEGIC FINANCE

VALUE PRICING STRATEGY

Following the adoption of the 2008 RTP, SCAG initiated a comprehensive study of value pricing strategies, which has come to be known as the Express Travel Choices Study. The emerging regional value pricing strategy is structured to help the region meet its transportation demand management and air quality goals, while also providing a reliable and dedicated source of revenue. The value pricing strategy could allow users of the transportation system to know the true cost of their travel, resulting in informed decision-making and a more efficient use of the transportation system. Value pricing strategies evaluated through the Express Travel Choices Study include a regional express lane network, cordon pricing and a mileage-based user fee. Although some of these pricing concepts have been incorporated into the Constrained Plan as elements are pursued as pilot initiatives or are under construction for implementation (e.g., segments of the regional express lane network), these strategies still face a number of significant hurdles before their full benefits can be realized. A second phase of the Express Travel Choices Study, initiated after the adoption of the 2012 RTP/SCS and ongoing, continues to establish an implementation plan for the regional value pricing strategy.

As we discussed in Chapter 6, SCAG will also continue to participate in state and national efforts to address the long-term transition of excise fuel taxes to mileage-based user fees.

OUR REGION BEYOND 2040

TECHNOLOGY AND NEW MOBILITY INNOVATIONS BEYOND 2040

Technological innovations have the potential to make existing transportation choices more widely available and easier to use throughout the region. By providing more options for local and regional trips, technological innovations have the potential to shift travel to less environmentally damaging modes, lessen the negative environmental impacts associated with current vehicle use, increase system efficiency, improve safety, and reduce auto-related collisions and fatalities. However, realizing the potential benefits (and potential negative impacts) depends on the rate of development and the adoption of a wide range of public and private sector innovations. Although SCAG and its partners should be prepared for the widest possible range of technological advancements related to the transportation system, quantifying the benefits of certain new mobility innovations may be premature due to uncertain fluctuations in future market demand.

Many of these new applications and transportation services are being discussed in the media, and there are some reservations about how long they will last. Although they may have limited applicability in many parts of our region today, there is little doubt that certain technological innovations in transportation will grow significantly during the time frame of the 2016 RTP/SCS and beyond. The population in 2040 will have an entirely different expectation of the role of technology in their everyday lives than generations past. Changing demographics and broad economic trends have led to a demand for more flexible transportation options, the expansion of the sharing economy and calls for communities where people can live, work and play within a small area. This Plan reflects the ever-expanding portfolio of new mobility innovations that advanced technologies can enable and considers their long-term, regional impacts.

Currently, the clean technology industry and application developers outpace government in delivering technological innovation to the transportation sector. In light of this, SCAG continues to research the impacts of transportation innovation in terms of scale and longevity, looking at things such whether a technology or innovation will be amenable to only a small segment of the population and/or last for 10, 15 or 30 years? Or, are we at the outset of a major paradigm shift? Are tipping points just around the corner? Will the longstanding trend of the majority of trips taken by automobile persist?

The 2012 RTP/SCS identified policies to support a number of best practices and technological innovations that were not fully modeled at the time, such as alternative fuel vehicles and neighborhood electric vehicles. This 2016 RTP/SCS addresses new transportation innovations that have been planned and deployed since 2012, such as neighborhood electric vehicles (NEV), car sharing, bike sharing and ridesourcing (identified by the California Public Utilities Commission (CPUC) as Transportation Network Companies). SCAG has developed modeling assumptions and methodologies to analyze these mobility innovations and local land use regulations.

In addition to the new mobility innovations mentioned above, the region can expect to see significant growth in the deployment and use of automated vehicles. By some estimates, automation features being introduced within the next five years could be available in up to 70 percent of the vehicles on the road in 2040. The following are some examples of automated driving features that need to be considered and supported. There are a wide range of demonstration projects that could be pursued by SCAG and its partners, in collaboration with private sector organizations with increased federal, state and local funding:

- **Jam-Assist and Advanced Collision Avoidance:** Combining advanced collision detection and avoidance technology currently in development, vehicles will operate "hands-off" and "feet-off" on highways. These features could also improve operation in low-speed environments. Equipping transit vehicles with jam assist could dramatically improve vehicle throughput in congested transit-only corridors, or in Bus Rapid Transit systems.
- **Semi-Automated Mode Vehicles:** Vehicles will operate without driver input under certain limited conditions, while requiring driver input for most portions of the trip. This is the current state of technology with the Google car. However, safety and traffic benefits will begin to spread throughout the roadway network as this technology advances. Vehicles will be able to operate without driver input, although the driver will need to monitor the vehicle's operation. These features could be available in both consumer and commercial vehicles as early as 2018–2020 and could represent a sizable minority of the fleet mix as early as 2030–2035.
- **Fully Automated Mode Vehicles:** Vehicles will operate without driver input in certain conditions, requiring driver input for other portions of the trip. Most researchers agree that this will be the mid-term state of vehicle automation. In highway driving conditions, drivers will turn over full control of the vehicle and vehicle systems will communicate with one another. Vehicles will be able to form "platoons" in order to operate at closer distances (less than 1.8 seconds apart in one Japanese study) in order to improve fuel consumption and traffic flows. Freight industry representatives are interested in whether the National Highway Traffic Safety Administration (NHTSA) will waive driver work hour limits for following vehicles under platooning conditions. In low-speed conditions, "platooning" could improve transit bus operations and automation could improve bus/curb alignment. To some researchers, this could facilitate a new business model of mobility—as a service similar to the way cellphone plans are priced, especially in dense urban areas.
- **Fully Automated Vehicles:** Vehicles will operate without driver input, but will still require a driver to monitor the vehicle. The vehicle will navigate trips from beginning to end and possibly self-park within low-speed environments. This technology could potentially be available as early as 2025–2030, but it will not be used in a significant share of vehicles until 2035–2040.
- **Fully Autonomous Vehicles:** Passenger vehicles will operate with or without drivers, resulting in radical changes to urban form. Cars will park themselves, attend to maintenance and refueling, or alter ownership patterns so that they stay in constant circulation. Driverless taxi, freight and transit vehicles could have a dramatic impact on various professional driving careers.

ADDRESSING SUSTAINABILITY AND GREENHOUSE GAS EMISSIONS BEYOND 2040

In addition to Governor Brown's Executive Order discussed earlier, a number of policy trends are converging that will continue to push the state and region toward increasing de-carbonization of the transportation and energy sectors. Over the past 20 years, the international community has outlined a goal of limiting global warming to two degrees Celsius above pre-industrial levels. In the context of California, these trends include advancing beyond the Governor's Executive Order goal of reducing greenhouse gas emissions by 80 percent below 1990 levels by 2050 to reducing greenhouse gas emissions by 100 percent later in the century. This could be accomplished in stages through various market and regulatory tools such as the Cap-and-Trade program and updates to the Assembly Bill 32 Scoping Plan. Electrification of the transportation sector over the next few decades is likely to be one outcome of these trends. The California Energy Commission (CEC) is also developing net zero energy building policies. Caltrans has prepared a new state transportation plan to significantly reduce vehicle miles traveled. Through the Senate Bill 375 target setting process, ARB will likely propose higher greenhouse gas reduction targets for metropolitan planning organizations through the continued integration of transportation and land use planning. Finally, Cap-and-Trade Triennial Investment Plans will continue to be updated to fund the implementation of greenhouse reduction goals.

However, the international science community is increasingly concerned that the two degrees Celsius goal is not stringent enough to avoid significant and perhaps irreversible climate damage to the planet, and serious discussions are occurring to reduce the international goal to 1.5 degrees Celsius. Whether

or not a consensus develops to intensify the climate change goals, California policymakers recognize the incredibly significant role of local jurisdictions and regions in taking climate action. Local jurisdictions and regions should expect to face new regulations and targets to significantly reduce greenhouse gas emissions for many decades ahead.

PREPARING THE REGION FOR RESILIENCY AGAINST CLIMATE CHANGE

In addition to creating a low-carbon sustainable future, the state and region will also be facing the human and infrastructure costs of adapting to climate change impacts that already are occurring. These include growing wildfire threats, sea-level rise and coastal flooding, increased mudslides and flooding, extreme heat waves and large reductions in water supplies.

Our region must prepare to confront these changes, and an important objective of this Strategic Plan is to build a region that is more resilient to these and other consequences of climate change. The twin policy goals of mitigation and adaptation will dominate state, regional and local planning for energy, water and transportation for the rest of this century. New collaborative programs and partnerships between businesses, academia, community groups, residents and all levels of government will be required.

Here is a simple but compelling example of how our region can become more resilient to the consequences of climate change: first/last mile strategies call for steps to make it easier for people to get to and from transit stops, such as building sidewalks and bike paths and installing places where people can lock up their bicycles near transit stations. These investments make transit more accessible while helping the region meet its goal of reducing the number of miles that people travel alone in their cars. But to make first/last mile strategies effective as our region faces more frequent days of extreme heat and intense rainstorms, they have to be refined. A more climate resilient strategy would be to design sidewalks and bike paths with native drought tolerant shade trees, as well as adding shade features at transit stations. Also, as pedestrian infrastructure is built, it should include adequate drainage and other storm water management features, to ensure access and safety during heavy rainstorms.

Looking to the state for recommendations on how to mitigate and adapt to climate change is challenging because its policies are evolving. Still, they come with a sense of urgency.[3] The State of California recognizes the increasingly significant role that regional planning and local actions can play in meeting the state-level goals related to climate change. SCAG will continue to help the region further develop into a hub for local and regional government innovation, leadership and collaboration. For example, SCAG funded the Green Region Initiative category of projects, as part of the Sustainability Planning Grant Program. These grants provide local governments with technical expertise so they can develop local climate action plans, energy plans, water plans, open space strategies and public health plans. Working to make our region more resilient to the inevitable consequences of continued climate change is a major priority of this Plan, and it will continue to resonate in future updates as we head toward 2040 and well beyond.

CONCLUSION

As our region continues to grow in the coming years, we must ensure that effective strategies are in place toward fulfilling the needs of our growing population. With the understanding that our Constrained Plan can only get us so far, additional strategies must be considered to truly address the diverse needs of everyone who uses the regional transportation network.

The challenges ahead as we strive toward increased mobility, more livable and healthy communities and a more sustainable region are significant. But this Plan, the 2016 RTP/SCS, charts a course toward progress. It serves as a roadmap toward 2040 and a vision for a better future. It is a living document and it will change as circumstances change as we progress toward mid-century.

Above all, our RTP/SCS is a collective and inclusive effort—one that aims for a bright future for all of us.

[3] See California State Executive Order B-30-15.

GLOSSARY

AASHTO American Association of State Highway and Transportation Officials – A nonprofit, non-partisan association representing highway and transportation departments in the 50 states, the District of Columbia and Puerto Rico.

AB 32 Assembly Bill 32 – Signed into law on September 26, 2006, it requires that the state's global warming emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on global warming emissions that will be phased in starting in 2012 in addition to other measures. In order to effectively implement the cap, AB 32 directs the California Air Resources Board (ARB) to develop appropriate regulations and establish a mandatory reporting system to track and monitor global warming emissions levels.

AB 169 Assembly Bill 169 – Provides for the sixteen federally recognized tribes in the SCAG region to join the SCAG Joint Powers Authority (JPA) to participate in the Southern California Association of Governments by voting at the SCAG General Assembly.

ACE Alameda Corridor East – A 35-mile corridor extending through the San Gabriel Valley between East Los Angeles and Pomona and connecting the Alameda Corridor to the transcontinental railroad network.

Active Transportation A mode of transportation that includes walking, running, biking, skateboarding and other human powered forms of transportation. It can also include low-speed electrical devices such as motorized wheel chairs, Segways, electric-assist bicycles and neighborhood electric vehicles, such as golf carts.

ADA Americans with Disabilities Act of 1990 – Guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services and telecommunications. It prescribes federal transportation requirements for transportation providers.

Agricultural Lands Land designated for farming; specifically the production of crops and rearing of animals to provide food and other products.

AHSC Affordable Housing and Sustainable Communities – A state grant program from the Greenhouse Gas Reduction Fund that addresses land-use, housing, transportation and land preservation projects to support infill and compact development to reduce greenhouse gas emissions.

AJR 40 Assembly Joint Resolution No. 40 – Introduced on August 23, 2007, the resolution calls upon the governor to declare a state of emergency in respect to the air quality health crisis in the South Coast Air Quality Basin related to emissions of PM 2.5 and to direct steps necessary to address the emergency.

ANCA Federal Airport Noise and Capacity Act of 1990 – Establishes a national aviation noise policy that reviews airport noise and access restrictions on operations for Stage 2 and Stage 3 aircraft.

Antelope Valley AQMD Antelope Valley Air Quality Management District – The air pollution control agency for the portion of Los Angeles County north of the San Gabriel Mountains.

AQMP Air Quality Management Plan – Regional plan for air quality improvement in compliance with federal and state requirements.

ARB Air Resources Board – State agency responsible for attaining and maintaining healthy air quality through setting and enforcing emissions standards, conducting research, monitoring air quality, providing education and outreach and overseeing/assisting local air quality districts. ARB is also responsible for implementing AB 32 and establishing regional greenhouse gas emission reduction targets for automobile and light trucks under SB 375.

ATIS Advanced Traveler Information Systems – Technology used to provide travelers with information, both pre-trip and in-vehicle, so they can better utilize the transportation system.

ATMS Advanced Transportation Management Systems – Technology used to improve the operations of the transportation network.

ATP Active Transportation Program – Provides state funds for city and county projects that improve safety and convenience for bicycle commuters, recreational riders and safe routes to school programs. Replaces the Bicycle Transportation Account (BTA).

Automated Vehicle U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) has defined five increasing levels of vehicle automation at five levels:
0. No-Automation: The driver is in complete and sole control of the primary vehicle controls .
1. Function-Specific Automation: Automation at this level involves one or more specific control functions.
2. Combined Function Automation: This level involves automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions.
3. Limited Self-Driving Automation: Vehicles at this level of automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions.
4. Full Self-Driving Automation: The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip.

Autonomous Vehicle Vehicles in which operation of the vehicle occurs without direct driver input to control the steering, acceleration and braking and are designed so that the driver is not expected to constantly monitor the roadway while operating in self-driving mode.

AVO Average Vehicle Occupancy – Calculated by dividing the total number of travelers by the total number of vehicles.

Base Year The year 2012, used in the RTP/SCS performance analysis as a reference point for current conditions.

Baseline Future scenario which includes only those projects that are existing, undergoing right-of-way acquisition or construction, come from the first year of the previous RTP or RTIP, or have completed the NEPA process. The Baseline is based upon the adopted 2015 FTIP. The Baseline functions as the "No Project" alternative used in the RTP/SCS Program EIR.

BEV Battery Electric Vehicle – An electric drive vehicle powertrain that is powered by an on-board battery. A BEV is a sub-class of Plug-in Electric Vehicle.

Bikeway Common term for any designated bicycle facility, such as a bike path, bike lane, bike route, sharrow, bicycle boulevard or cycle-track.

Bike Share An integrated network of bicycle rental kiosks in heavily urbanized areas. The bike share network is intended to reduce short-distance driving by providing low-cost bicycle rentals at regular intervals (200 yards apart) throughout the heavily urbanized area.

BLS Bureau of Labor Statistics – The principal fact-finding agency for the federal government in the broad field of labor economics and statistics.

BNSF Burlington Northern and Santa Fe Railway Company.

BTA Bicycle Transportation Account – Provides state funds for city and county projects that improve safety and convenience for bicycle commuters. Replaced by the California Active Transportation Program (ATP).

Bus A transit mode comprised of rubber-tired passenger vehicles operating on fixed-routes and schedules over roadways.

BRT Bus Rapid Transit – Bus transit service that seeks to reduce travel time through measures such as traffic signal priority, automatic vehicle location, dedicated bus lanes, limited-stop service and faster fare collection policies.

CAA Clean Air Act – 1970 federal act that authorized EPA to establish air quality standards to limit levels of pollutants in the air. EPA has promulgated such standards (or NAAQS) for six criteria pollutants sulfur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), ozone, lead and particulate matter (PM 10). All areas of the United States must maintain ambient levels of these pollutants below the ceilings established by the NAAQS; any area that does not meet these standards is a "non-attainment" area. States must develop SIPs to explain how they will comply with the CAA. The act was amended in 1977 and again in 1990.

CAFR Comprehensive Annual Financial Report – Official annual financial report that encompasses all funds and financial components associated with any given organization.

Cal B/C Model California Life-Cycle Benefit/Cost Analysis Model – Developed for the California Department of Transportation (Caltrans) as a tool for benefit-cost analysis of highway and transit projects. It is an Excel (spreadsheet) application structured to analyze several types of transportation improvement projects in a corridor where there already exists a highway facility or a transit service (the base case).

Caltrans California Department of Transportation – State agency responsible for the design, construction, maintenance and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries.

Cap-and-Trade A market based regulation that is designed to reduce greenhouse gases (GHGs) from multiple sources. Cap-and-Trade sets a firm limit or cap on GHGs and minimize the compliance costs of achieving California's AB 32 goals. The cap will decline approximately 3 percent each year beginning in 2013. Trading creates incentives to reduce GHGs below allowable levels through investments in clean technologies. With a carbon market, a price on carbon is established for GHGs. Market forces spur technological innovation and investments in clean energy. Cap-and-Trade is an environmentally effective and economically efficient response to climate change.

Car Share An integrated network of passenger vehicles available for short-term rental in heavily urbanized areas. Car share can take the form of return systems in which a vehicle must be returned to the parking space from which it was rented. Alternatively, it can take the form of point-to-point systems in which the car can be returned to another space, or left anywhere within a pre-determined geographic zone.

Catalytic Demand Additional aviation demand that is created by companies that locate in the proximity of expanding airports with developable land around them to reduce airport ground access time and costs for their employees and clients. Catalytic demand is greatest for large hub airports, particularly international airports.

CEHD Community, Economic and Human Development Committee – A SCAG committee that studies the problems, programs and other matters which pertain to the regional issues of community, economic and human development and growth. This committee reviews projects, plans and programs of regional significance for consistency and conformity with applicable regional plans.

CEQA California Environmental Quality Act – State law providing certain environmental protections that apply to all transportation projects funded with state funds.

CETAP Community Environmental and Transportation Acceptability Process – Part of the Riverside County Integrated Project that is examining where to locate possible major new multimodal transportation facilities to serve the current and future transportation needs of Western Riverside County, while minimizing impacts on communities and the environment.

CHSRA California High-Speed Rail Authority – Agency responsible for planning, designing, constructing and operating a state-of-the-art high-speed rail system in California.

CIP Capital Improvement Program – Long-range strategic plan that identifies capital projects; provides a planning schedule and financing options.

CMAQ Congestion Mitigation and Air Quality Program – Federal program initiated by ISTEA to provide funding for surface transportation and other related projects that contribute to air quality improvements and reduce congestion.

CMIA Corridor Mobility Improvement Account – These funds would be allocated by the California Transportation Commission to highly congested travel corridors in the state. Projects in this category must be a high priority; be able to start construction by 2012; improve mobility in a highly congested corridor by improving travel times and reducing vehicle hours of delay; connect the State Highway System; and improve access to jobs, housing, markets and commerce.

CMP Congestion Management Program – Established by Proposition 111 in 1990, requires each county to develop and adopt a CMP that includes highway and roadway system monitoring, multimodal system performance analysis, transportation demand management program, land-use analysis program and local conformance.

CNSSTC California-Nevada Super-Speed Train Commission – Public-private partnership developed to promote a high-speed link between California and Nevada.

CO Carbon Monoxide – A colorless, odorless, poisonous gas formed when carbon in fuels is not burned completely. It is a byproduct of highway vehicle exhaust, which contributes about 60 percent of all CO emissions nationwide.

COG Council of Governments – Under state law, a single or multi-county council created by a joint powers agreement.

Complete Streets Streets designed and operated to enable safe access for all roadway users of all ages and abilities, including pedestrians, bicyclists, motorists and transit riders.

Complete Streets Approach An approach to funding for planning, designing and maintaining roadways that incorporates Complete Streets implementation as the variable costs in larger road construction or rehabilitation projects. This approach can dramatically reduce the costs of Complete Streets as compared to implementation of stand-alone projects.

Commuter Bus (CB) Fixed-route bus systems that are primarily connecting outlying areas with a central city through bus service that operates with at least five miles of continuous closed-door service. This service typically operates using motorcoaches (aka over-the-road buses) and usually features peak scheduling, multiple-trip tickets and multiple stops in outlying areas with limited stops in the central city.

Commuter Rail (CR) 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 urbanized areas (UZAs), or between urbanized areas and outlying areas. Such rail service, using either locomotive hauled or self-propelled railroad passenger cars, is generally characterized by multi-trip tickets, specific station to station fares, railroad employment practices and usually only one or two stations in a central business district. Commuter Rail does not include heavy rail rapid transit, or light rail/streetcar transit service, or intercity rail service.

Congestion Management Process Systematic approach required in transportation management areas (TMAs) that provides for effective management and operation, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under Title 23 U.S.C. and Title 49 U.S.C., through the use of operational management strategies.

Connected/ Automated Vehicles Refers to the interrelated nature of connectivity and automation in new vehicle technology. Connected vehicles are vehicles that use any of a number of different communication technologies to communicate with the driver, other cars on the road (vehicle-to-vehicle [V2V]), roadside infrastructure (vehicle-to-infrastructure [V2I]) and the "Cloud" to improved safety, user experience and collision avoidance.

Constant Dollars Dollars expended/received in a specific year adjusted for inflation/deflation relative to another time period.

Corridor In planning, a broad geographical band that follows a general directional flow or connects major sources of trips. It may contain a number of streets and highways, as well as transit lines and routes.

CSMP Corridor System Management Plans.

CTC California Transportation Commission – Eleven voting members and two non-voting ex-officio members. Nine of the members are appointed by the Governor, one is appointed by the Senate Rules Committee and one is appointed by the Speaker of the Assembly, to oversee and administer state and federal transportation funds and provide oversight on project delivery.

CTIPS California Transportation Improvement Program System – A project programming database system used to efficiently and effectively develop and manage various transportation programming documents as required under state and federal law.

CTP California Transportation Plan – A statewide, long-range transportation policy plan that provides for the movement of people, goods, services and information. The CTP offers a blueprint to guide future transportation decisions and investments that will ensure California's ability to compete globally, provide safe and effective mobility for all persons, better link transportation and land-use decisions, improve air quality and reduce petroleum energy consumption.

CVO Commercial Vehicle Operations – Management of commercial vehicle activities through ITS.

Deficiency Plan Set of provisions contained in a Congestion Management Plan to address congestion when unacceptable levels of congestion occur. Projects implemented through the Deficiency Plan must, by statute, have both mobility and air quality benefits.

Demand Response A transit mode comprised of automobiles, 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. A demand response (DR) operation is characterized by vehicles that do not operate over a fixed route or on a fixed schedule except on a temporary basis.

Displacement The process that occurs when the increasing property values brought about through gentrification drive out the existing residents and business operators and attract a new and different demographic population to an area. Lower income residents may also become unable to access housing in certain areas due to increasing housing prices. Please also see Gentrification.

DTIM Direct Travel Impact Model – A vehicle emissions forecasting model.

EDF Environmental Defense Fund – A national non-profit organization that seeks to protect the environmental rights of all people, including future generations.

EIR Environmental Impact Report – An informational document, required under CEQA, which will inform public agency decision-makers and the public generally of the significant environmental effects of a project, possible ways to minimize significant effects and reasonable alternatives to the project.

EIS Environmental Impact Statement (federal) – National Environmental Policy Act (NEPA) requirement for assessing the environmental impacts of federal actions that may have a significant impact on the human environment.

EMFAC Emission Factor – Model that estimates on-road motor vehicle emission rates for current year as well as backcasted and forecasted inventories.

Enabling Technology This term refers to a technological innovation which lays the foundation or creates a platform that allows a separate unrelated technology to achieve commercialization. For example, car share and bike share systems have been under development since the early 1970s. However the explosion of smart phone usage and the convergence of mobile banking and GPS location services have made these systems viable for a larger portion of the population.

Environmental Justice (EJ) The concept of Environmental Justice is about equal and fair access to a healthy environment, with the goal of protecting minority and low-income communities from incurring disproportionate negative environmental impacts.

EPA Environmental Protection Agency – Federal agency established to develop and enforce regulations that implement environmental laws enacted by Congress to protect human health and safeguard the natural environment.

Executive Order B-30-15 Executive Order signed by Governor Brown on April 29, 2015, which establishes a California Greenhouse Gas (GHG) reduction target of 40 percent below 1990 levels by 2030.

Express Lane An HOV lane that single-occupant drivers can pay to drive in, also referred to as "High Occupancy Toll Lanes."

EWFC An east-west segment of the Regional Clean Freight Corridor System that connects I-710 to the west and I-15 to the east.

EV Electric Vehicle – A vehicle fully or partially powered by an electric engine. Synonymous with Plug-In Electric Vehicle (PEV).

EV Charging Station A location where a vehicle can be parked and the electric storage or battery can be recharged. EV Charging Stations can be private or publicly accessible and can be free to the user or used for a fee. EV Charging Stations are configured in three different levels defined by the amount of electricity that can be transmitted to the vehicle. Level 1 provides energy through a 120 Volt AC Plug comparable to a household product. Based on the battery type and vehicle, AC Level 1 charging adds about 2 to 5 miles of range to a PEV per hour of charging time. Level 2 equipment offers charging through 208 or 240 V AC electrical connection comparable to a household appliance such as a washing machine. AC Level 2 adds about 10 to 20 miles of range

per hour of charging time. Direct-current (DC) fast charging equipment, or Level 3 (typically 208/480 V AC three-phase input), enables rapid charging along heavy traffic corridors and can add 50 to 70 miles of range in about 20 minutes.

FAA Federal Aviation Administration – Federal agency responsible for issuing and enforcing safety regulations and minimum standards, managing air space and air traffic and building and maintaining air navigation facilities.

FAST Act Fixing America's Surface Transportation Act (H.R. 22) – Signed into law by President Obama on December 4, 2016. Funding surface transportation programs at over $305 billion for five years through 2020.

FCV Fuel Cell Vehicle – Electric vehicles that are powered by hydrogen fuel cells.

FHWA Federal Highway Administration – Federal agency responsible for administering the Federal-Aid Highway Program, which provides federal financial assistance to the states to construct and improve the National Highway System, urban and rural roads and bridges.

Financially Constrained Expenditures are said to be financially constrained if they are within limits of anticipated revenues.

First Mile/Last Mile Strategies designed to increase transit usage by making it more convenient and safe to walk or bike to transit stations. Includes such strategies as wayfinding, bikeways, sidewalk repair and bike share.

FRA Federal Railroad Administration – Federal agency created to promulgate and enforce rail safety regulations, administer railroad assistance programs, conduct research and development in support of improved railroad safety and national rail transportation policy and consolidate government support of rail transportation activities.

FTA Federal Transit Administration – The federal agency responsible for administering federal transit funds and assisting in the planning and establishment of areawide urban mass transportation systems. As opposed to FHWA funding, most FTA funds are allocated directly to local agencies, rather than to Caltrans.

FTIP Federal Transportation Improvement Program – A six-year comprehensive listing of transportation projects proposed for federal funding, that require a federal action, or are regionally significant and are within the planning area of an MPO. The last two years are for informational purposes only.

FTZ Foreign Trade Zones.

FY Fiscal Year – The twelve-month period on which the budget is planned. The state fiscal year begins July 1 and ends June 30 of the following year. The federal fiscal year begins October 1 and ends September 30 of the following year.

GAO Government Accountability Office – Congressional agency responsible for examining matters related to the receipt and payment of public funds.

Gentrification While holding many definitions, is commonly understood as a change process in historically low-wealth communities that results in rising real estate values coupled with shifts in the economic, social and cultural demographics and feel of the communities. Please also see Displacement.

GHG Greenhouse Gases – Components of the atmosphere that contribute to the greenhouse effect. The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxide and fluorinated gases.

GGRF Greenhouse Gas Reduction Funds are administered by state and local agencies for a variety of greenhouse gas (GHG) emission reductions programs, including energy efficiency, public transit, low-carbon transportation and affordable housing.

GIS Geographic Information System – Powerful mapping software that links information about where things are with information about what things are like. GIS allows users to examine relationships between features distributed unevenly over space, seeking patterns that may not be apparent without using advanced techniques of query, selection, analysis and display.

GNP Gross National Product – An estimate of the total value of goods and services produced in any specified country in a given year. GNP can be measured as a total amount or an amount per capita.

Grade Crossing A crossing or intersection of highways, railroad tracks, other guideways, or pedestrian walks, or combinations of these at the same level or grade.

Greenfield Also known as "raw land," land that is privately owned, lacks urban services, has not been previously developed and is located at the fringe of existing urban areas.

GRP Gross Regional Product.

HCP Habitat Conservation Plan – Established under Section 10 of the federal Endangered Species Act to allow development to proceed while protecting endangered species. A federal Habitat Conservation Plan is typically accompanied by a state Natural Communities Conservation Plan or NCCP.

HDT Heavy-Duty Truck – Truck with a gross vehicle weight of 8,500 pounds or more.

Heavy Rail A transit mode that is an electric railway with the capacity for a heavy volume of traffic. It is characterized by high speed and rapid acceleration passenger rail cars operating singly or in multi-car trains on fixed rails, separate rights-of-way (ROW) from which all other vehicular and foot traffic are excluded, sophisticated signaling and raised platform loading.

HiAP Health in All Policies – HiAP is a collaborative strategy that aims to improve public health outcomes by including health considerations in the decision-making process across sectors and policy areas. HiAP addresses the social determinants of health by encouraging transportation practitioners to work with nontraditional partners who have expertise related to public health outcomes, such as city and county public health departments.

HQTA High-Quality Transit Areas – Generally a walkable transit village or corridor, consistent with the adopted RTP/SCS and is within one half-mile of a well-serviced transit stop or a transit corridor with 15-minute or less service frequency during peak commute hours. The definition that SCAG has been using for the HQTA is based on the language in SB 375 which defines:

> **Major Transit Stop** A site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods (CA Public Resource Code Section 21064.3).
>
> **HQTC** High-Quality Transit Corridor – A corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.

HICOMP Highway Congestion Monitoring Program (Caltrans) – A report that measures the congestion that occurs on urban area highways in California.

Home-Based Work Trips Trips that go between home and work, either directly or with an intermediate stop. Home-based work trips include telecommuting, working at home and non-motorized transportation work trips.

HOT Lane High-Occupancy Toll Lane – An HOV lane that single-occupant drivers can pay to drive in, also referred to as "Express Lanes."

HOV Lane High-Occupancy Vehicle Lane – A lane restricted to vehicles with two (and in some cases three) or more occupants to encourage carpooling. Vehicles include automobiles, vans, buses and taxis.

HPMS Highway Performance Monitoring System – A federally mandated program designed by FHWA to assess the performance of the nation's highway system.

HSIPR High-Speed Intercity Passenger Rail Program – A Federal Railroad Administration program created to invest in new high-speed rail corridors and existing rail corridors to improve speed and service.

HST High-Speed Train – Intercity passenger rail service that is reasonably expected to reach speeds of at least 110 mile per hour.

HUD U.S. Department of Housing and Urban Development – Federal agency charged with increasing homeownership, supporting community development and increasing access to affordable housing free from discrimination.

ICAPCD Imperial County Air Pollution Control District – Local air pollution control agency mandated by state and federal regulations to implement and enforce air pollution rules and regulations.

ICE Internal Combustion Engine – Refers traditional vehicle engines that are powered by the burning of fuel sources, including gasoline, diesel and natural gas.

ICTC Imperial County Transportation Commission – Agency responsible for planning and funding countywide transportation improvements and administering the county's transportation sales tax revenues.

ICTF Intermodal Container Transfer Facility – a near-dock intermodal rail facility owned and operated by Union Pacific Rail Road, adjacent to the SPB ports.

IGR Intergovernmental Review Process – The review of documents by several governmental agencies to ensure consistency of regionally significant local plans, projects and programs with SCAG's adopted regional plans.

Infrastructure The basic facilities, equipment, services and installations needed for the growth and functioning of a community.

IOS Initial Operating Segment.

ISTEA Intermodal Surface Transportation Efficiency Act – Signed into federal law on December 18, 1991, it provided authorization for highways, highway safety and mass transportation for FYs 1991–1997 and served as the legislative vehicle for defining federal surface transportation policy.

ITIP Interregional Transportation Improvement Program – The portion of the STIP that includes projects selected by Caltrans (25 percent of STIP funds).

ITS Intelligent Transportation Systems – Systems that use modern detection, communications and computing technology to collect data on system operations and performance, communicate that information to system managers and users and use that information to manage and adjust the transportation system to respond to changing operating conditions, congestion, or accidents. ITS technology can be applied to arterials, highways, transit, trucks and private vehicles. ITS include Advanced Traveler Information Systems (ATIS), Advanced Public Transit Systems (APTS), Advanced Traffic Management Systems (ATMS), Advanced Vehicle Control Systems (AVCS) and Commercial Vehicle Operations (CVO).

JPA Joint Powers Authority – Two or more agencies that enter into a cooperative agreement to jointly wield powers that are common to them. JPAs are a vehicle for the cooperative use of existing governmental powers to finance and provide infrastructure and/or services in a cost-efficient manner.

LACMTA Los Angeles County Metropolitan Transportation Authority, also referred to as "Metro" – Agency responsible for planning and funding countywide transportation improvements, administering the county's transportation sales tax revenues and operating bus and rail transit service.

LAWA or LAX Los Angeles World Airports – Aviation authority of the City of Los Angeles. LAWA owns and operates Los Angeles International (LAX), Ontario International, Van Nuys and Palmdale Airports.

LCV Longer-Combination Vehicles – Includes tractor-trailer combinations with two or more trailers that weigh more than 80,000 pounds.

LEM Location Efficient Mortgage – Allows people to qualify for larger loan amounts if they choose a home in a densely populated community that is well served by public transit and where destinations are located close together so that they can also walk and bike instead of driving everywhere.

LRT Light Rail Transit – A mode of transit that operates on steel rails and obtains its power from overhead electrical wires. LRT may operate in single or multiple cars on separate rights-of-way or in mixed traffic.

Livable Communities Any location in which people choose may be viewed as "livable." However, communities that contain a healthy mix of homes, shops, workplaces, schools, parks and civic institutions coupled with a variety of transportation choices, give residents greater access to life's daily essentials and offer higher quality of life to a wider range of residents. In 2009, the U.S. DOT, EPA and HUD established the following 6 Principles of Livability:

1. Provide more transportation choices
2. Expand location- and energy-efficient housing choices
3. Improve economic competitiveness of neighborhoods
4. Target federal funding toward existing communities
5. Align federal policies and funding
6. Enhance the unique characteristics of all communities

Livable Corridors Arterial roadways where local jurisdictions may plan for a combination of the following elements: high-quality bus frequency; higher density residential and employment at key intersections; and increased active transportation through dedicated bikeways. Most, but not all Livable Corridors would be located within HQTAs. Livable Corridor land-use strategies include development of mixed use retail centers at key nodes along corridors, increasing neighborhood-oriented retail at more intersections, applying a "Complete Streets" approach to roadway improvements and zoning that allows for the replacement of underperforming auto-oriented strip retail between nodes with higher density residential and employment.

LTF Local Transportation Fund – A fund which receives TDA revenues.

MAP Million Annual Passengers – Used to quantify airport activity.

MAP-21 Moving Ahead for Progress in the 21st Century – Signed into law by President Obama on July 6, 2012. Funding surface transportation programs at over $105 billion for fiscal years (FY) 2013 and 2014, MAP-21 was the first long-term highway authorization enacted since 2005. To allow more time for development and consideration of a long-term reauthorization of surface transportation programs, Congress has enacted short term extensions of the expiring law, MAP-21.

Market Incentives Measures designed to encourage certain actions or behaviors. These include inducements for the use of carpools, buses and other HOVs in place of single-occupant automobile travel. Examples include HOV lanes, preferential parking and financial incentives.

MCGMAP Multi-County Goods Movement Action Plan

MDAB Mojave Desert Air Basin – Area defined by state law as comprising the desert portions of Los Angeles, Kern, Riverside and San Bernardino Counties.

MDAQMD Mojave Desert Air Quality Management District – Local air agency mandated by state and federal regulations to implement and enforce air pollution rules and regulations; encompasses the desert portion of San Bernardino County from the summit of the Cajon Pass north to the Inyo County line, as well as the Palo Verde Valley portion of Riverside County.

Measure A Revenues generated from Riverside County's local half-cent sales tax.

Measure D Revenues generated from Imperial County's local half-cent sales tax.

Measure I Revenues generated from San Bernardino County's local half-cent sales tax.

Measure M Revenues generated from Orange County's local half-cent sales tax.

Measure R Revenues generated from Los Angeles County's local half-cent sales tax. Los Angeles County has two permanent local sales taxes (Propositions C and A) and one temporary local sales tax (Measure R).

Metrolink Regional commuter rail system connecting Los Angeles, Orange, Riverside, San Bernardino and Ventura Counties and operated by SCRRA.

MIS Major Investment Study – The preliminary study, including preliminary environmental documentation, for choosing alternative transportation projects for federal transportation funding. An MIS is a requirement, which is conducted cooperatively by the study sponsor and the MPO.

Mixed Flow Traffic movement having autos, trucks, buses and motorcycles sharing traffic lanes.

Mode A particular form of travel (e.g., walking, traveling by automobile, traveling by bus, or traveling by train).

Mode Split The proportion of total person trips using various specified modes of transportation.

Model A mathematical description of a real-life situation that uses data on past and present conditions to make a projection.

MPO Metropolitan Planning Organization – A federally required planning body responsible for transportation planning and project selection in a region.

MTS Metropolitan Transportation System – Regional network of roadways and transit corridors.

Multimodal A mixture of the several modes of transportation, such as transit, highways, non-motorized, etc.

NAAQS National Ambient Air Quality Standards – Targets established by the U.S. Environmental Protection Agency (EPA) for the maximum contribution of a specific pollutant in the air.

NAFTA North American Free Trade Agreement – An agreement between the governments of Canada, Mexico and the United States to eliminate barriers to trade and facilitate the cross-border movement of goods and services.

NCCP Natural Communities Conservation Plan – Program under the Department of Fish and Game that uses a broad-based ecosystem approach toward planning for the protection of plants, animals and their habitats, while allowing compatible and appropriate economic activity.

NEPA National Environmental Protection Act – Federal environmental law that applies to all projects funded with federal funds or requiring review by a federal agency.

NGV Natural Gas Vehicle – Vehicles that are powered by internal combustion engines that burn compressed or liquid natural gas.

NIMS National Incident Management System – Nationwide template that enables all government, private-sector and non-governmental organizations to work together during a domestic incident.

Nominal Dollars Actual dollars expended/received in a specific year without adjustments for inflation/deflation.

Non-Reportable TCM The following de minimis committed TCMs are defined in the Final 2015 FTIP Guidelines as non-reportable TCMs for the purpose of TCM timely implementation reporting:
1. Bus/shuttle/paratransit fleet expansion projects with fewer than 5 vehicles
2. Bus stop improvement projects
3. Bicycle facility less than 1 mile and pedestrian facility less than 1/4 mile
4. Intelligent transportation systems/control system computerization projects with fewer than 3 traffic signals,
5. Changeable message sign projects with fewer than 5 signs
6. Bike parking facilities, new or expansion, with nine or fewer bike lockers/slots
7. Expansion of bus station/shelter/transfer facilities with nine or fewer bike lockers/slots and
8. Rail station expansion with addition of nine or fewer bike lockers/slots.

NOx Nitrogen oxides – A group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. NOx are a major component of ozone and smog and they are one of six principal air pollutants tracked by the EPA.

NMA Neighborhood Mobility Areas – Areas Neighborhood Mobility Areas with roadway networks where Complete Streets and sustainability policies support and encourage replacing single and multi-occupant automobile use with biking, walking, skateboarding and slow speed electric vehicles (such as e-bikes, senior mobility devices and neighborhood electric vehicles.) Complete Streets strategies can include traffic calming, bicycle priority streets (bicycle boulevards) and pedestrian connectivity to increase physical activity, improve connectivity to the regional bikeway/greenway networks, local businesses and parks. NEV strategies include network identification, signage, intersection treatments and shared NEV/bike lanes to connect low speed roadway areas.

NTD National Transit Database – The Federal Transit Administration's (FTA) national database for transit statistics.

O&M Operations and Maintenance – The range of activities and services provided by the transportation system and for the upkeep and preservation of the existing system.

OCS Overhead Catenary System – A type of wayside power where vehicles may connect to and draw power from overhead wires.

OCTA Orange County Transportation Authority – Agency responsible for planning and funding countywide transportation improvements, administering the county's transportation sales tax revenues and operating bus transit service.

OEM Original Equipment Manufacturer.

OLDA Orangeline Development Authority – Joint exercise of powers authority developed by the cities located along the Orangeline corridor.

OnTrac Orange-North America Trade Rail Access Corridor – Formed in April of 2000 to build and support the Orangethorpe Avenue Grade Separation and Trade Corridor project, a 5-mile-long railroad-lowering project that will completely grade separate 11 rail crossings in the cities of Placentia and Anaheim.

Open Space Generally understood as any area of land or water which, for whatever reason, is not developed for urbanized uses and which therefore enhances residents' quality of life. However, note that each county and city in California must adopt an open space element as part of its general plan. The element is a statement of local planning policies focusing on the use of unimproved land or water for 1) the preservation or managed production of natural resources, 2) outdoor recreation and 3) the promotion of public health and safety. Therefore, open space will be defined by each jurisdiction based on their own unique resources and environment.

OWP Overall Work Program – SCAG develops an OWP annually, describing proposed transportation planning activities for the upcoming fiscal year, including those required by federal and state law.

Parking Cash-Out Program An employer-funded program under which an employer offers to provide a cash allowance to an employee equivalent to the parking subsidy that the employer would otherwise pay to provide the employee with a parking space.

Parking Subsidy The difference between the out-of-pocket amount paid by an employer on a regular basis in order to secure the availability of an employee parking space not owned by the employer and the price, if any, charged to an employee for use of that space.

PMT Passenger Miles Traveled – The cumulative sum of the distances ridden by each public transportation passenger.

PATH Partners for Advanced Transit and Highways – Joint venture of Caltrans which includes the University of California and other public and private academic institutions and industries.

PEIR Program Environmental Impact Report – An information document that analyzes and discloses potential environmental effects of large-scale plans or programs in accordance with provisions of the California Environmental Quality Act (CEQA).

PeMS Highway Performance Measurement System – A service provided by the University of California, Berkeley, to collect historical and real-time highway data from highways in the state of California in order to compute highway performance measures.

Person Trip A trip made by a person by any mode or combination of modes for any purpose.

PEV Plug-in Electric Vehicle – Refers to all vehicles that can be plugged into an external source of electricity in order to recharge an on-board battery which will provide some or all power to an electric engine.

PHEV Plug-in Hybrid Electric Vehicle – A vehicle powertrain that combines an electric engine with a traditional internal combustion engine. The two engines can operate in parallel with the electric engine operating at certain speeds, or the engines can operate sequentially, with all power being provided by the electric engine until the battery power is exhausted.

PHL Pacific Harbor Line, Inc.

PM 10 Particulate Matter – A mixture of solid particles and liquid droplets found in the air 10 micrometers or less in size (a micrometer is one-millionth of a meter). These coarse particles are generally emitted from sources such as vehicles traveling on unpaved roads, materials handling and crushing and grinding operations, as well as windblown dust.

PM 2.5 Particulate Matter – A mixture of solid particles and liquid droplets found in the air 2.5 micrometers or less in size (a micrometer is one-millionth of a meter). These fine particles result from fuel combustion from motor vehicles, power generation and industrial facilities, as well as from residential fireplaces and wood stoves.

PMD LA/Palmdale Regional Airport – Regional airport located in Palmdale.

POLA Port of Los Angeles.

POLB Port of Long Beach.

PPP Public-Private Partnership – Contractual agreements formed between a public agency and private-sector entity that allow for greater private-sector participation in the delivery of transportation projects.

PRC Peer Review Committee – An "informal" committee of technical experts usually organized and invited to review and comment on various technical issues and processes used in the planning process.

Proposition 1A Passed by voters in 2006, Proposition 1A protects transportation funding for traffic congestion relief projects, safety improvements and local streets and roads. It also prohibits the state sales tax on motor vehicle fuels from being used for any purpose other than transportation improvements and authorizes loans of these funds only in the case of severe state fiscal hardship.

Proposition 1B Highway Safety, Traffic Reduction, Air Quality and Port Security State of California – Passed in November 2006, Proposition 1B provides $19.9 billion to fund state and local transportation improvement projects to relieve congestion, improve movement of goods, improve air quality and enhance safety and security of the transportation system.

Proposition A Revenues generated from Los Angeles County's local half-cent sales tax. Los Angeles County has two permanent local sales taxes (Propositions C and A) and one temporary local sales tax (Measure R).

Proposition C Revenues generated from Los Angeles County's local half-cent sales tax. Los Angeles County has two permanent local sales taxes (Propositions C and A) and one temporary local sales tax (Measure R).

PSR Project Study Report – Defines and justifies the project's scope, cost and schedule. PSRs are prepared for state highway projects and PSR equivalents are prepared for projects not on the State Highway System. Under state law, a PSR or PSR equivalent is required for STIP programming.

PTA Public Transportation Account – The major state transportation account for mass transportation purposes. Revenues include a portion of the sales tax on gasoline and diesel fuels.

Public Transportation As defined in the Federal Transit Act, "Transportation by a conveyance that provides regular and continuing general or special transportation to the public, but does not include school bus, charter, or intercity bus transportation or intercity passenger rail transportation provided by the entity described in chapter 243 (Amtrak or a successor to such entity)."

PUC Public Utilities Commission – Regulates privately owned telecommunications, electric, natural gas, water, railroad, rail transit and passenger transportation companies.

Railroad Siding A short stretch of railroad track used to store rolling stock or enable trains on the same line to pass; also called sidetrack.

RBN Regional Bikeway Network – A system of regionally interconnected bikeways linking cities and counties in the SCAG region.

RC Regional Council – Conducts the affairs of SCAG; implements the General Assembly's policy decisions; acts upon policy recommendations from SCAG policy committees and external agencies; appoints committees to study specific problems; and amends, decreases or increases the proposed budget to be reported to the General Assembly.

RCP Regional Comprehensive Plan – Developed by SCAG, the RCP is a vision of how Southern California can balance resource conservation, economic vitality and quality of life. It will serve as a blueprint to approach growth and infrastructure challenges in an integrated and comprehensive way.

RCTC Riverside County Transportation Commission – Agency responsible for planning and funding countywide transportation improvements and administering the county's transportation sales tax revenues.

RGN Regional Greenway Network – A regional system of bikeways physically separate from traffic. It makes use of riverbeds and under-utilized utility corridors. It is part of the Regional Bikeway Network (RBN).

RHNA Regional Housing Needs Assessment – Quantifies the need for housing within each jurisdiction of the SCAG region based on population growth projections. Communities then address this need through the process of completing the housing elements of their General Plans.

Ridesourcing A generic term coined by researchers at University of California, Berkeley for the act of using a Transportation Network Company such as Lyft or Uber. The term distinguishes this mode from car sharing and from taxi use. A user is "sourcing" a ride from an online community, in exchange for a brokered payment.

Riparian Area Habitats, vegetation, and ecosystems adjacent to or part of rivers and streams.

Robust Flight Portfolio Providing a range of flight offerings in different haul length categories including short-haul, medium-haul, long-haul and international flights.

ROG Reactive Organic Gas – Organic compounds assumed to be reactive at urban/regional scales. Those organic compounds that are regulated because they lead to ozone formation.

RSTIS Regionally Significant Transportation Investment Study – Involves identifying all reasonable transportation options, their costs and their environmental impacts. RSTIS projects are generally highway or transit improvements that have a significant impact on the capacity, traffic flow, level of service, or mode share at the transportation corridor or sub-area level.

RSTP Regional Surface Transportation Program – Established by California state statute utilizing federal Surface Transportation Program funds. Approximately 76 percent of the state's RSTP funds must be obligated on projects located within the 11 urbanized areas of California with populations of 200,000 or more.

RTMS Regional Transportation Monitoring System – Internet-based transportation monitoring system. The RTMS will be the source for real-time and historical transportation data collected from local, regional and private data sources.

RTP Regional Transportation Plan – Federally required 20-year plan prepared by metropolitan planning organizations and updated every four years. Includes projections of population growth and travel demand, along with a specific list of proposed projects to be funded.

RTSS Regional Transit Security Strategy – Strategy for the region with specific goals and objectives related to the prevention, detection, response and recovery of transit security issues.

Rural Areas Rural locales consist of all of the areas within the SCAG region that are not within Urban Areas (please see definition).

SAFETEA-LU Safe, Accountable, Flexible, Efficient Transportation Equity Act A Legacy for Users – Signed into law by President Bush on August 10, 2005, it authorized the federal surface transportation programs for highways, highway safety and transit for the 5-year period of 2005–2009.

SANBAG San Bernardino Associated Governments – The council of governments and transportation planning agency for San Bernardino County. SANBAG is responsible for cooperative regional planning and developing an efficient multimodal transportation system countywide.

SANDAG San Diego Association of Governments.

SB 45 Senate Bill 45 (Chapter 622, Statutes of 1997, Kopp) – Established the current STIP process and shifted control of decision-making from the state to the regional level.

SB 375 Senate Bill 375 (Chapter 728, Steinberg) – Established to implement the state's greenhouse gas (GHG) emission-reduction goals, as set forth by AB 32, in the sector of cars and light trucks. This mandate requires the California Air Resources Board to determine per capita GHG emission-reduction targets for each metropolitan planning organization (MPO) in the state at two points in the future—2020 and 2035. In turn, each MPO must prepare a Sustainable Communities Strategy (SCS) that demonstrates how the region will meet its GHG reduction target through integrated land use, housing and transportation planning.

SB 535 Senate Bill 535 (Chapter 830, De León) – Established that a quarter of the proceeds from the Greenhouse Gas Reduction Fund must also go to projects that provide a benefit to disadvantaged communities. A minimum of 10 percent of the funds must be for projects located within those communities. The legislation gives the California Environmental Protection Agency responsibility for identifying those communities.

SB 974 Senate Bill 974 – Introduced by Senator Alan Lowenthal, SB 974 would impose a $30 fee on each shipping container processed at the Ports of Los Angeles, Long Beach and Oakland for congestion management and air quality improvements related to ports.

SBD San Bernardino International Airport – International airport located in San Bernardino.

SCAB South Coast Air Basin – Comprises the non–Antelope Valley portion of Los Angeles County, Orange County, Riverside County and the non-desert portion of San Bernardino County.

SCAG Southern California Association of Governments – The metropolitan planning organization (MPO) for six counties including Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura.

SCAQMD South Coast Air Quality Management District – The air pollution control agency for Orange County and major portions of Los Angeles, Riverside and San Bernardino Counties in Southern California.

SCCAB South Central Coast Air Basin – Comprises San Luis Obispo, Santa Barbara and Ventura Counties.

SCIG Southern California International Gateway, a proposed rail near-dock facility for the BNSF adjacent to the SPB ports.

SCRIFA Southern California Railroad Infrastructure Financing Authority.

Scrip A form of fare payment transferrable among transportation providers, often issued by Dial-A-Ride transit service providers to be used on taxis.

SDOH Social Determinants of Health – Includes the circumstances in which people are born, grow up, live, work, play and age. Economic opportunities, government policies and the built environment all play a role in shaping these circumstances and influencing public health outcomes.

SED Socioeconomic Data – Population, employment and housing forecast.

SFS Sustainable Freight Strategy – A new plan underway by ARB.

SGC The Strategic Growth Council is a state agency tasked with encouraging the development of sustainable communities.

SHA State Highway Account – The major state transportation account for highway purposes. Revenues include the state excise taxes on gasoline and diesel fuel and truck weight fees.

Shared Mobility Services Refers to a wide variety of new mobility services and encompasses bike share, car share, app-based transit services and ridesourcing. This term refers to the way in which these modes are offered as services brokered by a mobile application and each vehicle is shared amongst multiple users.

SHOPP State Highway Operation and Protection Program – A four-year capital improvement program for rehabilitation, safety and operational improvements on state highways.

SHSP Strategic Highway Safety Plan – A statewide, coordinated safety plan that provides a comprehensive framework for reducing fatalities and severe injuries to motorists, pedestrians, and bicyclists on all public roads. SHSP goals and objectives are data-driven and results are measured. Actions designed to achieve the objectives are developed by hundreds of safety stakeholders from the four E's of highway safety: engineering, education, enforcement and emergency medical services. In California, Caltrans coordinates the effort to develop the plan.

SIP State Implementation Plan – State air quality plan to ensure compliance with state and federal air quality standards. In order to be eligible for federal funding, projects must demonstrate conformity with the SIP.

Smart Growth Principles The following principles developed by the Smart Growth Network, a partnership of government, business and civic organizations created in 1996:
1. Mix land uses
2. Take advantage of compact building design
3. Create a range of housing opportunities and choices
4. Create walkable neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty and critical environmental areas
7. Strengthen and direct development towards existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair and cost effective
10. Encourage community and stakeholder collaboration in development decisions

Social Equity Equal opportunity in a safe and healthy environment.

SOV Single-Occupant Vehicle – Privately operated vehicle that contains only one driver or occupant.

SOx Sulfur oxide – Any of several compounds of sulfur and oxygen, formed from burning fuels such as coal and oil.

SPB Ports San Pedro Bay Ports.

SRTS Safe Routes to School – Part of a nationwide/region-wide program to increase students walking or biking to school. Includes engineering, educational and enforcement activities. Funded through the State Active Transportation Program (ATP).

SSAB Salton Sea Air Basin – Comprises the Coachella Valley portion of Riverside County and all of Imperial County.

STA State Transit Assistance – State funding program for mass transit operations and capital projects. Current law requires that STA receive 50 percent of PTA revenues.

STIP State Transportation Improvement Program – A five-year capital outlay plan that includes the cost and schedule estimates for all transportation projects funded with any amount of state funds. The STIP is approved and adopted by the CTC and is the combined result of the ITIP and the RTIP.

STP Surface Transportation Program – Provides flexible funding that may be used by states and localities for projects on any federal-aid highway, bridge projects on any public road, transit capital projects and intracity and intercity bus terminals and facilities. A portion of funds reserved for rural areas may be spent on rural minor collectors.

Sustainability The practice of analyzing the impact of decisions, policies, strategies and development projects on the Economy, the Environment and Social Equity (commonly referred to as the three E's). In the 2008 Agency Strategic Plan, SCAG adopted the following definition of Sustainability as one of its core operational values: "We work with our partners and local governments to achieve a quality of life that provides resources for today's generation while preserving an improved quality of life for future generations."

TANN Traveler Advisory News Network – Provides real-time traffic and transportation information content to communications service providers and consumer media channels both nationally and internationally.

TAZ Traffic Analysis Zone – Zone system used in travel demand forecasting.

TC Transportation Committee – Committee used to study problems, programs and other matters which pertain to the regional issues of mobility, air quality, transportation control measures and communications.

TCM Transportation Control Measure – A project or program that is designed to reduce emissions or concentrations of air pollutants from transportation sources. TCMs are referenced in the State Implementation Plan (SIP) for the applicable air basin and have priority for programming and implementation ahead of non-TCMs.

TCWG Transportation Conformity Working Group – Forum used to support interagency coordination to help improve air quality and maintain transportation conformity.

TDA Transportation Development Act – State law enacted in 1971 that provided a 0.25 percent sales tax on all retail sales in each county for transit, bicycle and pedestrian purposes. In non-urban areas, funds may be used for streets and roads under certain conditions.

TDM Transportation Demand Management – Strategies that result in more efficient use of transportation resources, such as ridesharing, telecommuting, park-and-ride programs, pedestrian improvements and alternative work schedules.

TEA-21 Transportation Equity Act for the 21st Century – The predecessor to SAFETEA-LU, it was signed into federal law on June 9, 1998. TEA-21 authorized the federal surface transportation programs for highways, highway safety and transit for the six-year period of 1998–2003. TEA-21 builds upon the initiatives established in ISTEA.

TEU Twenty-Foot Equivalent Unit – A measure of shipping container capacity.

TIFIA Transportation Infrastructure Finance and Innovation Act of 1998 – Established a new federal credit program under which the U.S. DOT may provide three forms of credit assistance—secured (direct) loans, loan guarantees and standby lines of credit—for surface transportation projects of national or regional significance. The program's fundamental goal is to leverage federal funds by attracting substantial private and other non-federal co-investment in critical improvements to the nation's surface transportation system. Sponsors may include state departments of transportation, transit operators, special authorities, local governments and private entities.

TNC Transportation Network Companies – This is the technical term for ridesourcing companies used by the California Public Utilities Commission in order to create a new class of mobility provider distinguished from taxi companies and limousines.

TOD Transit-Oriented Development – A planning strategy that explicitly links land-use and transportation by focusing mixed housing, employment and commercial growth around bus and rail stations (usually within ½ mile). TODs can reduce the number and length of vehicle trips by encouraging more bicycle/pedestrian and transit use and can support transit investments by creating the density around stations to boost ridership.

TP&D Transportation Planning and Development Account – A state transit trust fund that is the funding source for the STA program.

TSP Transit Signal Priority – A set of operational improvements that use technology to facilitate the movement of transit vehicles and reduce their dwell time at traffic signals by holding green lights longer or shortening red lights. TSP may be implemented at individual intersections or across corridors or entire street systems. Objectives of TSP include improved schedule adherence and improved transit travel time efficiency while minimizing impacts to normal traffic operations.

Trantrak RTIP Database Management System.

TSWG Transportation Security Working Group – Advises the operating organizations on transportation safety matters associated with the transfer or shipment of hazardous materials.

TUMF Transportation Uniform Mitigation Fee – Ordinance enacted by the Riverside County Board of Supervisors and cities to impose a fee on new development to fund related transportation improvements.

TZEV Transitional Zero Emissions Vehicles – Terminology used by the Air Resources Board (ARB) to refer to Plug-in Hybrid Electric Vehicles, since these vehicles produce emissions when they are powered by the internal combustion engine.

Union Station Los Angeles Union Station is the main railway station in Los Angeles.

UPT Unlinked Passenger Trips – The number of passengers who board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination.

UP Union Pacific Railroad.

Urban Areas Urban Areas in the SCAG region represent densely developed territory, and encompass residential, commercial and other non-residential urban land uses where population is concentrated over 2,500 people in a given locale.

Urban Growth Boundary A regional boundary that seeks to contain outward urban expansion by limiting development outside of the boundary, while focusing new growth within the boundary. Urban growth boundaries lead to the preservation of natural and agricultural lands, redevelopment and infill in existing communities and optimization of existing infrastructure and transportation investments.

U.S. DOT U.S. Department of Transportation – Federal agency responsible for the development of transportation policies and programs that contribute to providing fast, safe, efficient and convenient transportation at the lowest cost consistent with those and other national objectives, including the efficient use and conservation of the resources of the United States. U.S. DOT is comprised of ten operating administrations, including FHWA, FTA, FAA and FRA.

Value Pricing A user fee applied during peak demand periods on congested roadways to improve the reliability and efficiency of the transportation system and provide travelers with greater choices.

VCTC Ventura County Transportation Commission – Agency responsible for planning and funding countywide transportation improvements.

Vehicle Hours of Delay The travel time spent on the highway due to congestion. Delay is estimated as the difference between vehicle hours traveled at a specified free-flow speed and vehicle hours traveled at a congested speed.

VRH Vehicle Revenue Hours – The hours that a public transportation vehicle actually travels while in revenue service. Vehicle revenue hours include layover/recovery time, but exclude deadheading, operator training, vehicle maintenance testing and school bus and charter services.

VRM Vehicle Revenue Miles – The miles that a public transportation vehicle actually travels while in revenue service. Vehicle revenue miles include layover/recovery time, but exclude deadheading, operator training, vehicle maintenance testing and school bus and charter services.

VHDD Vehicle Hours of Daily Delay – Hours of delay attributed to congestion for vehicles each day.

VMT Vehicle Miles Traveled – On highways, a measurement of the total miles traveled by all vehicles in the area for a specified time period. It is calculated by the number of vehicles times the miles traveled in a given area or on a given highway during the time period. In transit, the number of vehicle miles operated on a given route or line or network during a specified time period.

VOC Volatile Organic Compounds – Organic gases emitted from a variety of sources, including motor vehicles, chemical plants, refineries, factories, consumer and commercial products and other industrial sources. Ozone, the main component of smog, is formed from the reaction of VOCs and NOx in the presence of heat and sunlight.

ZEV Zero Emissions Vehicles – Vehicles that produce no tailpipe emissions of criteria pollutants. Generally, ZEVs feature electric powertrains. Technically, ZEVs are still responsible for some greenhouse gas (GHG) emissions, as the GHG content from the electricity generation must be accounted for.

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