



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 development¹
- 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.

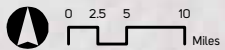
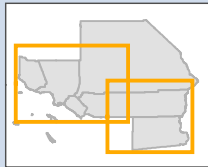
Additional local policies that ensure that development in HQTAs achieve the intended reductions in VMT and greenhouse gas emissions include:

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

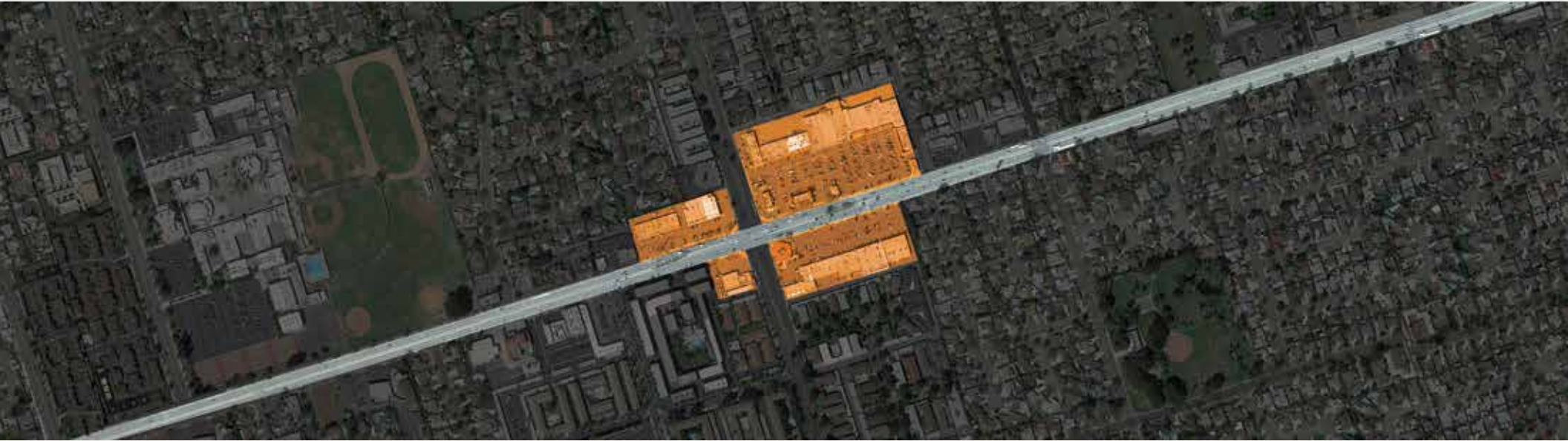
LIVABLE CORRIDORS

Enhancing the Connection Between Transit and Land Use

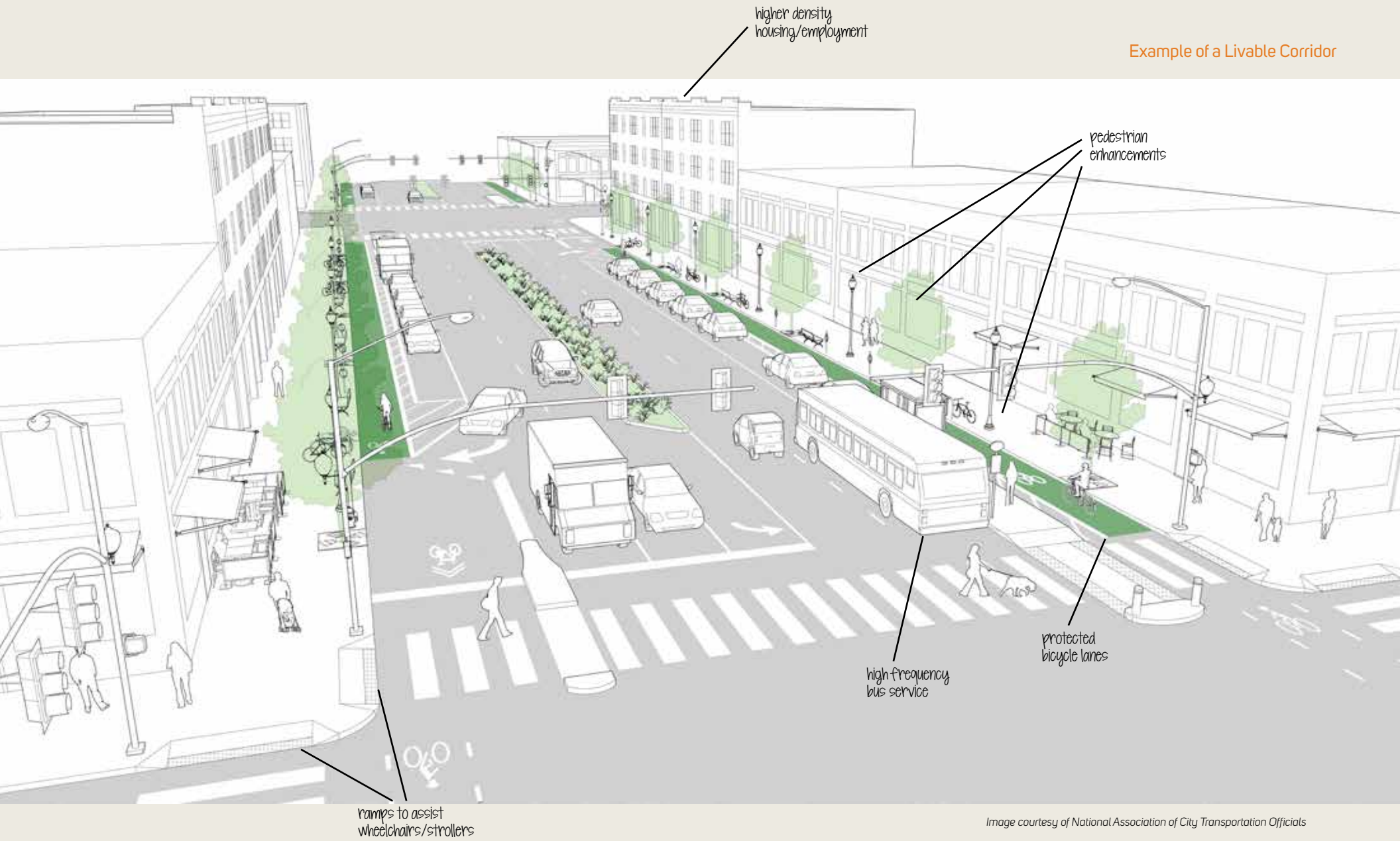
The SCAG region is crisscrossed by long arterial corridors, many of which are a legacy of Spanish colonial routes that linked the early missions and post-colonial ranchos. The suburban communities that developed rapidly after World War II were formed between these corridors, on a large (often one square 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



higher density housing/employment

pedestrian enhancements

high-frequency bus service

protected bicycle lanes

ramps to assist wheelchairs/strollers

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 emissions (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 HQTAs 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.

FIGURE 5.1 SYSTEM MANAGEMENT PYRAMID



- Continuing to work with stakeholders to identify and support new sustainable funding sources and/or increased funding levels for preservation and maintenance.

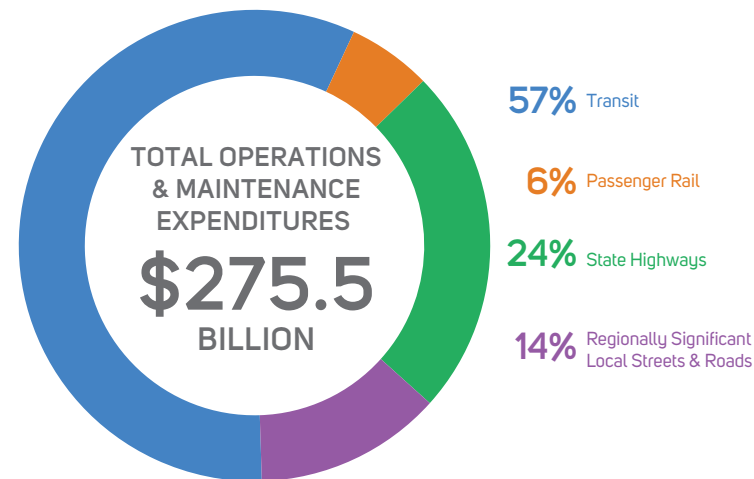
Manage Congestion

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 5.2 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



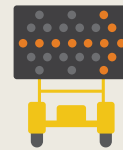
Improved Data Collection

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



Transit Automatic Vehicle Location

Enables monitoring of transit vehicles and ensures on-time performance



Advanced Traveler Information

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



Advanced Ramp Metering

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



Universal Transit Fare Cards (Smart Cards)

Reduces time required to purchase transit tickets and allows interoperability among transit providers

Traffic Signal Synchronization

Minimizes wait times at traffic signals and therefore reduces travel time

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.



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

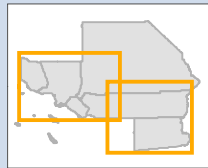
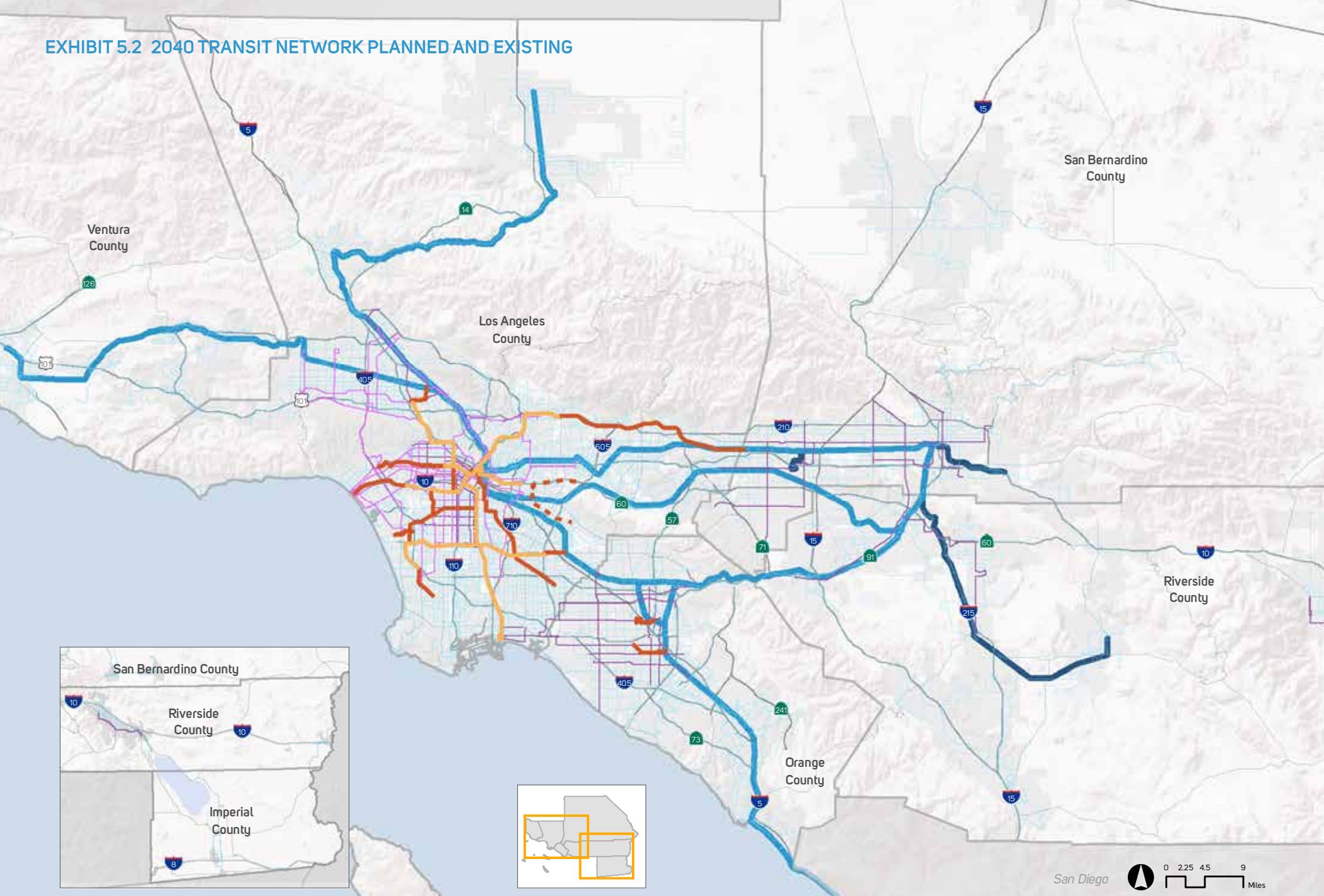
TABLE 5.3 MAJOR TRANSIT OPERATIONS AND MAINTENANCE PROJECTS AND INVESTMENTS

(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
 - Urban Rail
 - Urban Rail Alternatives
 - Rapid Bus and Bus Rapid Transit
 - Bus Routes (2012 Base Year & 2040 Plan)
- 2012 Base Year
 - 2012 Base Year
 - Urban Rail Alternatives
 - 2012 Base Year
 - 2040 Plan
 - 2040 Plan
 - 2040 Plan
 - 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 8–80⁵ 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

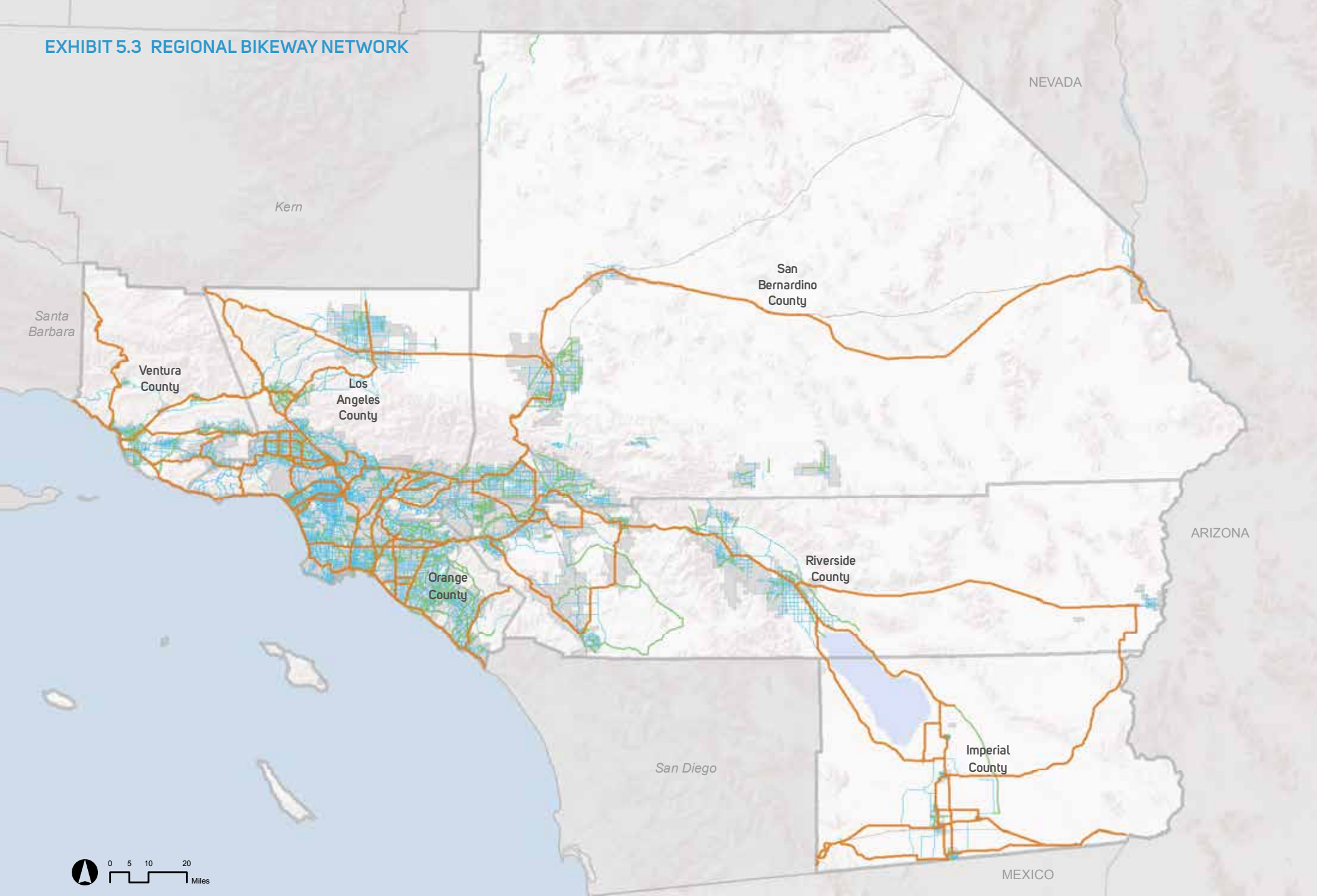
Developing the following networks will serve those longer trips that people make less frequently, but add to total miles traveled. They are primarily biking trips for commuting and recreation. Although trips covering the full length of these corridors may be a small percentage of active transportation 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.

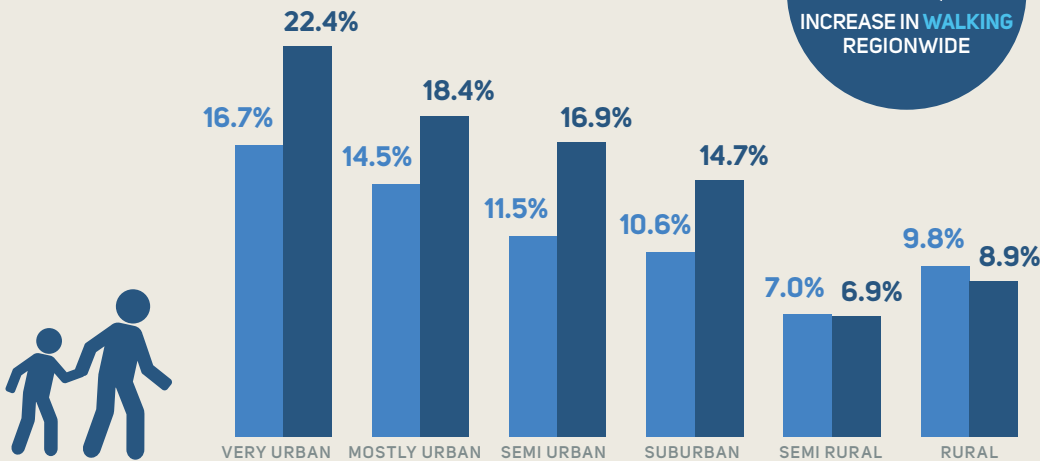
The pathways are envisioned to provide facilities and design elements that are consistent across the transit system, enabling seamless and intuitive door-to-door journeys. Pathways will be established along the most heavily traveled routes to transit stations, connecting riders to and from population 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.

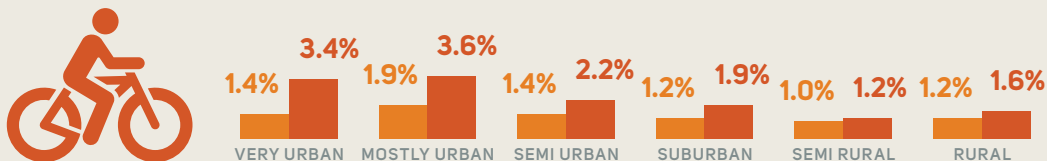
5. **Livable Corridors:** From an active transportation standpoint, this strategy is similar to the first/last mile strategy noted above, but it targets high-quality bus corridors rather than the rail and fixed guideway system. (Planning for growth around Livable Corridors is also an important land use 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.

Biking & Walking in the Region

WALK TRIPS 2012 BASE YEAR 2040 PLAN



BIKE TRIPS 2012 BASE YEAR 2040 PLAN



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.



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.

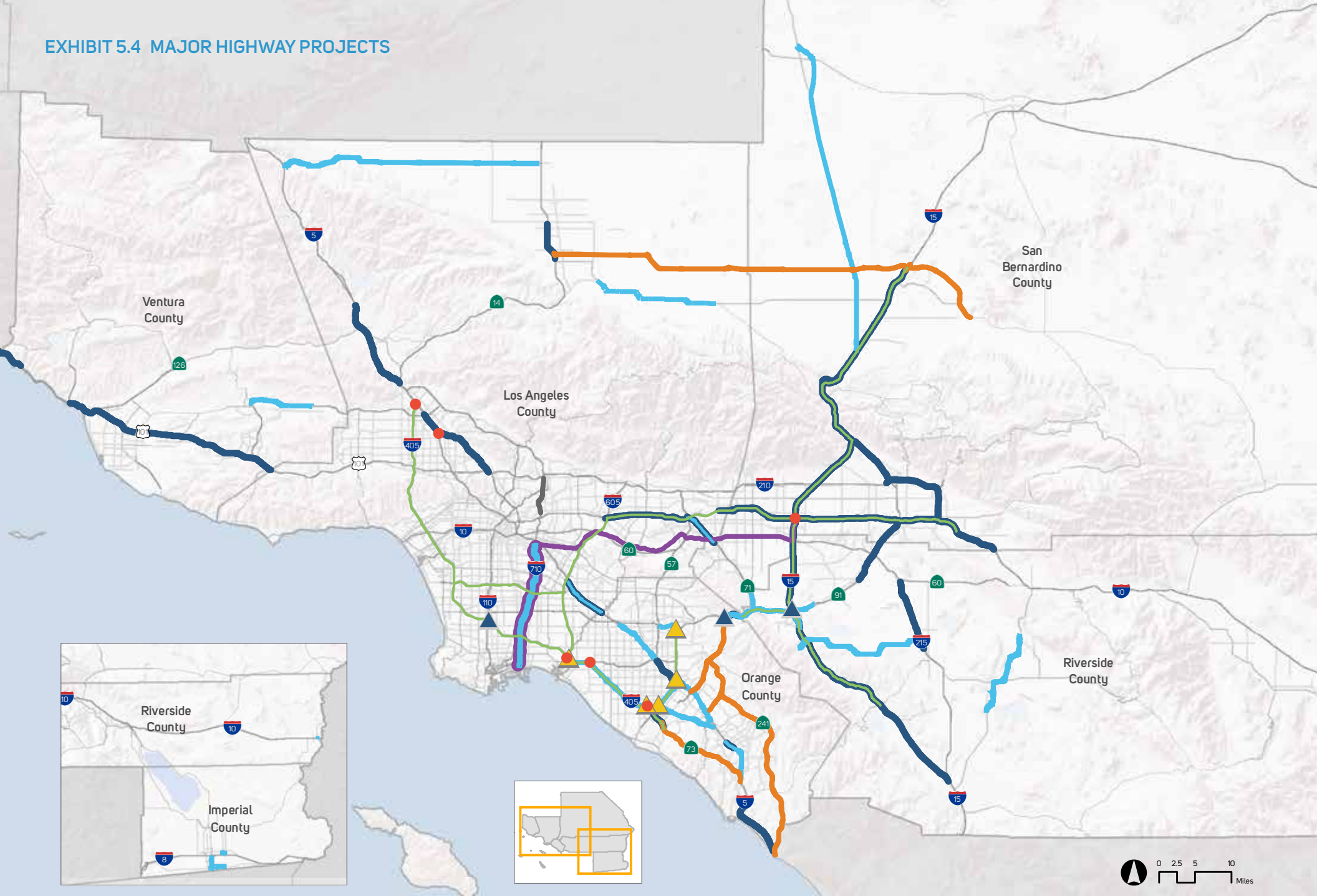
Education/Encouragement Strategies

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 Directive⁷ (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/tp/ 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

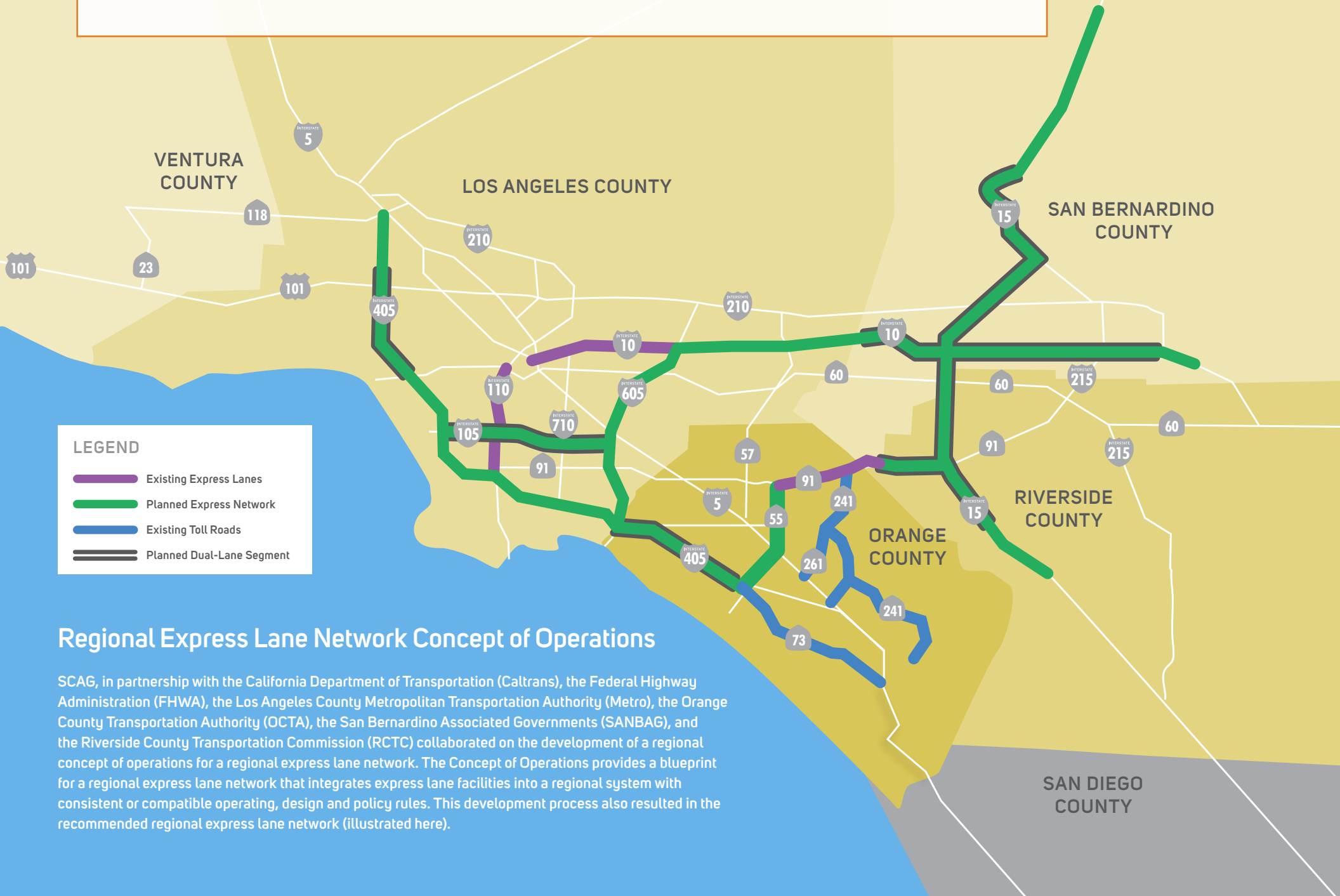
In 2013, the American Transportation Research Institute (ATRI) identified the Los Angeles Metropolitan Area as leading the nation in costs to the trucking industry caused by traffic congestion, with nearly \$1.1 billion in added operational costs to truckers.⁸ The SCAG region had five of the top 100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



LEGEND

- Existing Express Lanes
- Planned Express Network
- Existing Toll Roads
- Planned Dual-Lane Segment

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 (NO_x, 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



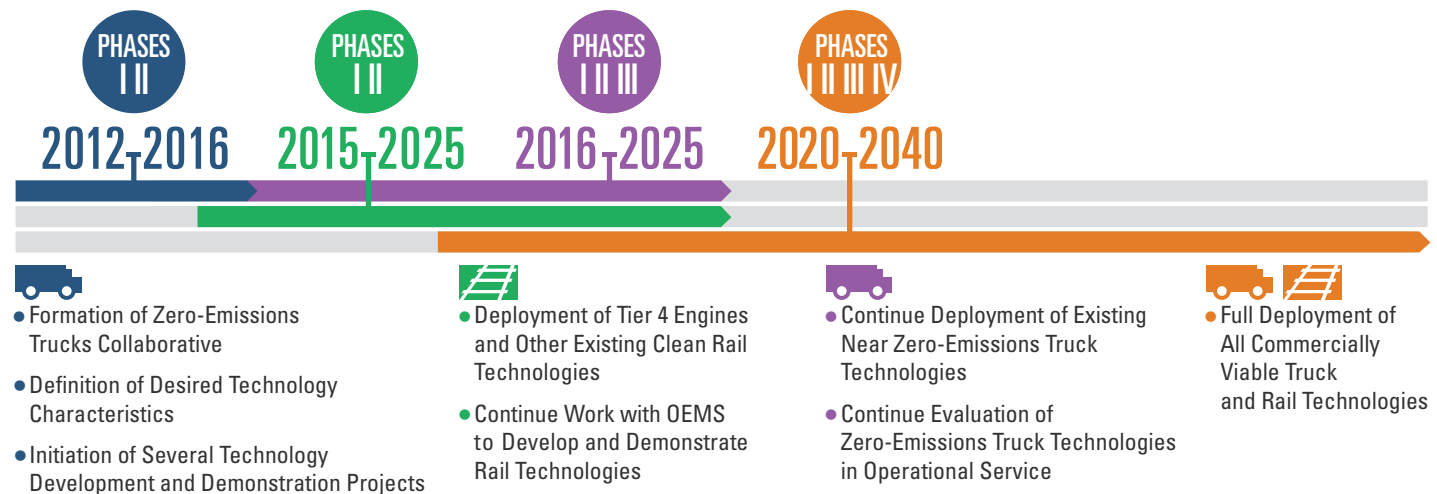
PHASE I Project Scoping and Evaluation of Existing Work: Continue to build on current regional research and technology testing efforts to further define the needs that the new technology must provide and to better understand the current capabilities, costs and stage of development of potential technologies.

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 compatibility 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.

GEOLGY 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 policies, 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.