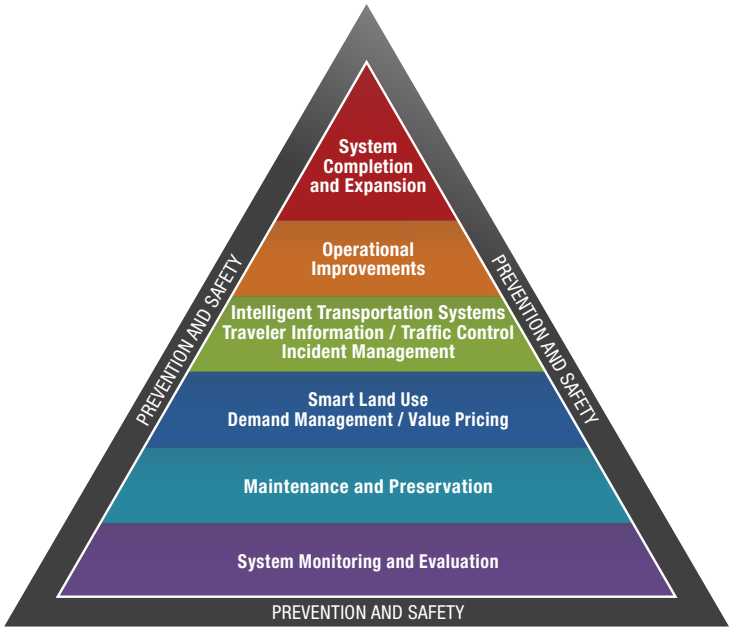
02 TRANSPORTATION INVESTMENTS

Introduction

SCAG has consistently advocated a system management approach that aims to protect, maximize the productivity of, and strategically expand our region's transportation system. This approach recognizes that we can no longer afford to rely on system expansion alone to address our mobility needs. Rather, an integrated approach is needed, based upon comprehensive system monitoring and evaluation and the use of performance measures to ensure that the best-performing projects and strategies are included in the RTP. This approach is depicted as the mobility pyramid shown in **FIGURE 2.1**.

FIGURE 2.1 Mobility Pyramid



Over the course of developing the plan, we have heard from our stakeholders that we need to make sure we are investing our scarce transportation dollars more efficiently and effectively before we expect our taxpayers to pay more. Making sure that every dollar

available is spent wisely is at the heart of this philosophy. At the bottom of this pyramid is System Monitoring and Evaluation. In order to be effective system managers, we must have an in-depth understanding of how our system performs and why it performs the way it does. Only by understanding these causes can we identify the optimal mix of strategies and projects that yield the highest returns on our investments. Next, we must take care of what we have, and make sure that what we have is performing at the most efficient level possible. So, the basic idea as you move up the 'mobility pyramid' is to implement less capital intensive strategies or less invasive strategies before we consider implementing more drastic measures to deal with our challenges. At the same time, we must be realistic about our ability to address our challenges with 'soft solutions' alone in the face of tremendous growth that we anticipate over the next 25 years. Therefore, at the top of the pyramid are the capital improvement projects that will allow us to expand our system strategically to accommodate such future growth and maintain and improve our economic prosperity.

Following the system management philosophy, this chapter sets forth the investments and strategies that constitute the 2012 RTP/SCS. First, transportation investments should seek to optimize the performance of the existing system, and this includes system maintenance and preservation, integrated land use, operational improvements, transportation demand management, and transportation systems management strategies. Second, investments should seek to complete the system by addressing gaps. Finally, our investments should expand the system strategically. As a result, Southern Californians will enjoy more and better travel choices via an efficient multimodal transportation system with improved access to the vast opportunities this region has to offer.

Getting the Most Out of Our System

Over the past half-century, the SCAG region has invested billions of dollars into building and expanding the multi-modal transportation system that we have and rely on today. This investment must be protected. Under the system management approach, priority should be given to maintaining and preserving this system, as well as ensuring that it is being operated as safely, efficiently and effectively as possible. Protecting our previous investments in developing the region's transportation system and getting the most out of every one of its components is the highest priority for this RTP/SCS.

Safety and Security First

SCAG recognizes how important the safety and security of our transportation system is to our residents. The good news is we have made significant progress in improving safety, particularly highway safety, which accounts for the majority of transportation related accidents, around the State and in our region. But, we can do more. SCAG continues to support the implementation of the State Highway Safety Plan (SHSP) and work in partnership with Caltrans and the CTCs around the region to improve Safety and Security of our transportation system.

Safety improvements are intricately woven into the RTP/SCS at all levels. Many of the strategy and investment categories in this RTP/SCS aim to improve the safety of our multi-modal transportation system. For instance, enhancing maintenance and preservation of the region's buses, rail track, bridges, and roadway pavements will contribute towards reduced accidents and improved safety. Similarly, expanding the network of bike lanes and sidewalks, and bringing them into ADA (American with Disabilities Act) compliance will reduce accidents directly related to these modes. Furthermore, deploying technology such as advanced ramp metering to manage traffic flow also reduces collisions at on-ramps and critical freeway-to-freeway interchanges. In short, almost every category of investments discussed in this chapter leads to safety benefits.

SCAG has two main safety and security goals:

- Ensure transportation safety, security, and reliability for all people and goods in 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.

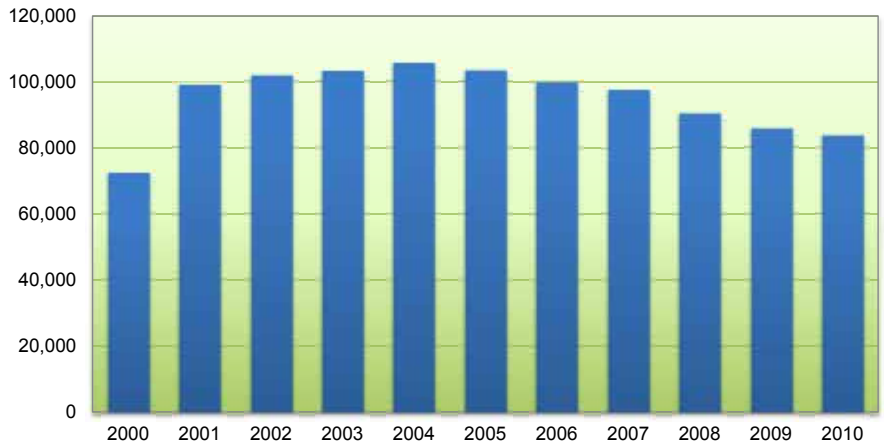
SAFETY

The rate of fatal and injury collisions on California's highways has declined dramatically since the California Highway patrol began keeping such data in the 1930's. California has led the nation in roadway safety for much of the past 20 years. Only recently have roadways nationally become as safe as those in California. **FIGURE 2.2** shows the improvement in roadway accidents in the SCAG region over the last 10 years.

While the trend indicates a long-term decline in fatalities compared to VMT, it remains an unacceptable personal burden to those involved. In 2008, over 1,500 people died on roadways in the SCAG region, and just under 125,000 were injured. The average costs for each traffic death, traffic injury, or property damage crash were (in 2005):

- Death – $1,150,000
- Nonfatal Disabling Injury – $52,900
- Property Damage, including non-disabling injuries – $7,500

FIGURE 2.2 Annual Collisions on the State Highway System in the SCAG Region



SAFETEA-LU required states to develop Strategic Highway Safety Plans (SHSPs). The California Department of Transportation (Caltrans) responded by developing its SHSP through a participatory process with over 300 stakeholders throughout California. The overarching goal was to reduce the California roadway fatality rate to less than 1.0 fatality per 100 million vehicle miles traveled (VMT) by 2010. The efforts culminated with 17 challenge areas and over 150 actions designed to reduce fatalities in each challenge area. The State achieved its goal in 2009, and is now focusing on reducing transportation fatalities further with a new SHSP in development.

SECURITY

Currently, there are numerous agencies that participate in the response to incidents and assist with hazard preparedness for individual jurisdictions. Collaboration occurs between many of these agencies. The Federal Emergency Management Agency (FEMA) oversees coordination. However, FEMA defines metropolitan areas and coordination differently than the U.S. Department of Transportation, limiting SCAG's ability to participate at an agency level. SCAG seeks to utilize its strengths and organization to assist planners, first responders and recovery teams in a supporting role.

There are three areas in which SCAG can assist both before a major emergency and during the recovery period:

- Provide a policy forum to help develop regional consensus and education on security policies and emergency response
- Assist in expediting the planning and programming of transportation infrastructure repairs from major disasters
- Encourage integration of transportation security measures into transportation projects early in the project development process by leveraging SCAG's relevant plans, programs and processes, including regional ITS architecture

Beginning in 2008, SCAG participated in the development of the draft Southern California Catastrophic Earthquake Preparedness Plan. The Plan was based on the 2007 Operation Golden Guardian scenario, which SCAG also assisted in developing, and envisioned a 7.8 earthquake starting in the Salton Sea area and travelling across the SCAG region to the Grapevine area where I-5 meets SR-138.

The Plan examines the initial impacts, inventory of resources, care for the wounded and homeless, and developed a long-term recovery process. The process of Long-Term Regional Recovery (LTRR) provides a mechanism for coordinating federal support to state, tribal, regional, and local governments, nongovernmental organizations (NGOs), and the private sector to enable recovery from the long-term consequences of extraordinary disasters. The LTRR process accomplishes this by identifying and facilitating availability and use of sources of recovery funding, and providing technical assistance (such as impact analyses) for recovery and recovery planning support. "Long-Term" refers to the need to re-establish a healthy, functioning region that will sustain itself over time.

Long-term recovery is NOT debris removal and restoration of utilities, which are considered immediate or short-term recovery actions.

Once a disaster has been proclaimed, the LTRR process may be activated for incidents that require a coordinated federal, state, tribal, regional, and local government response to address significant long-term impacts (e.g., impacts on housing, government operations, agriculture, businesses, employment, regional infrastructure, the environment, human health, and social services) to foster sustainable recovery. The three main focus areas of LTRR are:

- Housing,
- Infrastructure, and
- Economic Development.

When a disaster occurs, the initial operational focus is centered on response activities. This effort may last from a few hours to an extended period of time (several days or longer) depending on the situation. As response activities begin to taper off and non-life safety issues begin to be addressed, the operational focus begins to shift from response to recovery. Federal and state support will be heaviest during the beginning phase of the recovery effort when:

- Long-term impact analyses are performed,
- Necessary technical support to establish local long-term recovery strategies and/or plans is provided, and
- Coordination of long-term recovery resources needed by the region to launch its recovery efforts are complete.

Federal and state support lessens by the later stages of the LTRR process once the region has sufficient capacity to implement its long-term recovery plan.

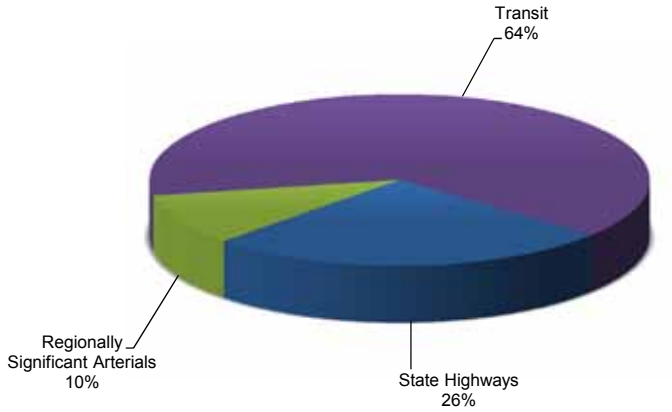
System Preservation

Recognizing that deferring the maintenance of our transportation system will only result in much costlier repairs in the future, preserving our assets now is a critical priority of this RTP/SCS. Approximately $217 billion, or almost half of all of its proposed expenditures through 2035, is allocated to system preservation and maintenance. As indicated in Chapter 1, to a great extent, this high cost is a result of three decades of preservation

underinvestment. Deficient road conditions are all too familiar to the region's drivers, and without a renewed commitment to improving the condition of our transportation infrastructure, costs will increase even more dramatically. Therefore, SCAG will continue to work with its stakeholders, particularly county transportation commissions and Caltrans, to prioritize funding for preservation and maintenance.

FIGURE 2.3 presents the allocation of these expenditures among the transit system, the state highway system, and arterials of regional significance within the 2012 RTP. Note that the allocation for the state highway system includes bridges and the allocation for transit includes funding to both preserve and operate the transit system.

FIGURE 2.3 Preservation and Operations Funding



Smart Land Use

Since initiating one of the nation's first large-scale regional growth visioning efforts in 2000, SCAG has sought to integrate land use and transportation by working with subregions and local communities to increase development densities and improve the jobs/housing balance. Implementing such smart land use strategies encourages walking, biking, and transit use, and therefore reduces vehicular demand. This saves travel time, reduces pollution, and leads to improved health. The SCS (in Chapter 2) describes the successes of the previous and smart land use efforts in the region, and lays the foundation for significant further improvements moving forward.

Transportation Demand Management

Transportation Demand Management (TDM) strategies reduce vehicular demand and thereby congestion, particularly during peak periods. Successful TDM combines two complementary strategies: "soft" or "pull" strategies—such as vanpool subsidies and preferential parking for carpools, with "hard" or "push" strategies—such as congestion pricing.

The first encourages or incentivizes travelers to reduce automobile use by making alternatives more desirable. The second discourages travelers from using automobiles by increasing out-of-pocket travel costs.

The RTP financial plan (Chapter 3) identifies reasonably available revenue sources that provide much needed funding for infrastructure preservation and critical regional projects. Increasing driving costs over the RTP time frame will also encourage some to look for more cost-effective travel options. In total, the RTP/SCS allocates $4 billion to TDM strategies to target such drivers and others and incentivize them in three ways:

- **Increase carpooling and vanpooling.**
  Carpooling is supported by a host of strategies. High Occupancy Vehicle (HOV) lanes and convenient Park-and-Ride Lots increase carpool usage. Other strategies include vanpool services for larger employers and rideshare matching services. Los Angeles, Orange, Riverside and San Bernardino Counties jointly sponsor a regional "Guaranteed Ride Home Program," which provides transportation for carpoolers and transit users in emergency situations.
- **Increase the use of transit, bicycling, and walking.**
  The RTP/SCS extends the reach of transit by focusing on "first mile/last mile" solutions. One of the biggest challenges in attracting new riders to transit is providing a reasonable and practical means of accessing transit at the origin and destination. "First mile/last mile" strategies are TDM strategies that offer reasonable and practical solutions to this problem, resulting in higher ridership for our transit services. Specific first mile/

Image courtesy of the Riverside Transit Agency

last mile strategies include development of mobility hubs around major transit stations to provide easier access to destinations. Other strategies include integrating bicycling and transit through folding bikes on buses programs, triple racks on buses, and dedicated racks on light and heavy rail vehicles. A study by the Los Angeles County Metropolitan Authority (Metro) indicates that 1.3 percent of all annual Metro Rail riders access transit stations via bicycle. The percentage of bicyclists accessing transit is likely to increase as investments are made.

The RTP/SCS also commits $6 billion to active transportation, which will expand bikeways, improve local streets, and address ADA requirements. Additional strategies include traffic calming and Complete Streets strategies, particularly near transit stations and schools, so as to further reduce vehicle trips by improving safety and desirability of active transportation.

- **Redistribute vehicle trips from peak demand periods to non-peak periods by shifting work times/days/locations.**
  The TDM investments also aim to reduce peak-hour congestion by promoting flexible work schedules and telecommuting, where applicable. Flexible work schedules allow employees to work fewer days in exchange for longer hours on the days they do work. For example, many employers offer a 9/80 schedule, where employees work 9 hours each day and have one day off every two weeks.

Telecommuting has increased dramatically over the past decade. Nearly 2.6 percent of all workers in the SCAG region telecommute most of the time, and an even greater number telecommute at least one day per month. Strategic investments that would remove barriers associated with telecommuting are expected to increase the number of full-time (equivalent) telecommuters to 5 percent in 2020, and 10 percent in 2035.

Congestion Management Process

The federal requirement for a Congestion Management Process (CMP) was initially enacted in the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, and continued in the Transportation Equity Act for the 21st Century (TEA-21) in 1998 and subsequently in SAFETEA-LU. CMP requires monitoring, performance measures, and, in certain cases, mitigation measures. Above all, CMP requires and ensures that highway capacity projects that significantly increase the capacity for single occupancy vehicles (SOV) be developed in a comprehensive context that considers all possible alternatives, including transit, TDM and TSM strategies. Furthermore, if alternative strategies are demonstrably neither practical nor feasible, appropriate mitigation strategies must be considered in conjunction with significant roadway capacity improvement projects that would increase SOV capacity.

Each county transportation commission (CTC) in the SCAG region, with the exception of Imperial County, is also designated Congestion Management Agency (CMA) and are required to develop Congestion Management Plans (CMPs) pursuant to California Government Code Section 65089, and update it every two years. Imperial County, the least populated county in the region, has not reached the population threshold that would require them to opt in or out of the state CMP process at present. Nevertheless, Imperial County has embraced the spirit of CMP and is actively seeking to incorporate its key elements into their next long range transportation plan update. So, effectively SCAG's CMP is comprised of the CMPs developed by each of the CTCs integrated into the RTP and FTIP process as a unified response to reducing congestion in our region.

SCAG is proposing two critical improvements to our current CMP process, partly in response to the federal certification review that was concluded in the Spring of 2010. First, SCAG will incorporate a requirement in the FTIP Guidelines that calls for submittal of documentation by the sponsoring agencies associated with significant roadway capacity projects (greater than $50 million) to ensure documentation of all the alternatives considered in defining the project as well as identifying appropriate mitigations that would be implemented in conjunction with the project.

Second, this RTP/SCS recognizes the importance of addressing non-recurring congestion (collisions, stalled cars, severe weather). Non-recurring congestion accounts for almost 50 percent of all congestion on our roadway system. So, for the first time, this RTP identifies non-recurring congestion delay on the state highway system, both for general purpose lanes and carpool lanes, as a key performance metric that will be monitored and reported over time to ensure we are making progress towards addressing this critical issue.

A more complete discussion of our regional CMP is provided in a separate technical report.

Transportation Systems Management

Transportation Systems Management (TSM) increases the productivity of the existing multi-modal transportation system, thereby reducing the need for costly system expansion. TSM relies in part on intelligent transportation system (ITS) technologies to increase traffic flow and reduce congestion. This RTP/SCS dedicates up to $6.8 billion to TSM. Examples of TSM categories and their associated benefits are described in **TABLE 2.1**.

TABLE 2.1 TSM Categories and Benefits

Category	Benefit
Enhanced Incident Management	Reduces incident related congestion which is estimated to represent half of the total congestion in urban areas
Advanced Ramp Metering	Alleviates congestion and reduces accidents at on-ramps and freeway to freeway interchanges
Traffic Signal Synchronization	Minimizes wait times at traffic signals and therefore reduces travel time
Advanced Traveler Information	Provides real-time traffic conditions, alternative routing, and transportation choices to the public
Improved Data Collection	Allows agencies to monitor system performance and optimize the impact of transportation investments
Universal Transit Fare Cards (Smart Cards)	Reduces time required to purchase transit tickets and allows inter-operability among transit providers
Transit Automatic Vehicle Location (AVL)	Enables monitoring of transit vehicles and ensuring on-time performance

TSM will also play an increasingly larger role in regional goods movement improvements. The Ports of Los Angeles and Long Beach have identified ITS technologies, specifically automated vehicle location (AVL), as a major component in their proposed air quality mitigation strategies. Advanced monitoring will assist in achieving system efficiencies in ports and intermodal operations, reducing delays and wait times at gates and destinations, and allowing for more flexible dispatching, all of which reduce emissions. Weigh-in motion systems and enhanced detection will allow for better enforcement of commercial vehicles rules, reducing pavement damage, and identifying critical paths for goods movement planning in the future.

Corridor System Management Plans

With the passage of Proposition 1B by California voters in November 2006, a program of funding called the Corridor Mobility Improvement Account (CMIA) was created to improve mobility on the state highway system. The California Transportation Commission adopted guidelines for the CMIA program that required the development of Corridor System Management Plans (CSMPs) for those projects receiving CMIA funding, to ensure that mobility improvements would be maintained over time. In the SCAG region, CSMPs were developed by Caltrans for the following corridors:

- I-5 and I-405 in Los Angeles County;
- SR-57, SR-91, and SR-22/I-405/I-605 in Orange County;
- SR-91 and I-215 in Riverside County;
- I-10 and I-215 in San Bernardino County; and
- US-101 in Ventura County.

The CSMPs include several key components: a comprehensive corridor description and understanding; a performance assessment and bottleneck identification; identification of operational and minor infrastructure improvements to relieve congestion; and development of simulation models to estimate improvements from those projects and strategies. The recommended improvements include TSM investments such as ramp metering and enhanced incident management. The recommendations also include small infrastructure improvements such as auxiliary lanes and ramp and interchange improvements. The RTP/SCS includes $840 million of funding for the CSMP-recommended improvements.

Completing Our System

Southern California's highways and arterials extend for almost 22,000 center-line miles and 67,000 lane-miles and serve 53 million travelers each weekday. However, there are still critical gaps in the network that hinder access to certain parts of the region. Closing these gaps to complete the system will allow our residents to enjoy improved access to opportunities such as jobs, education, healthcare, and recreation.

Highways and Local Arterials

The expansion of highways and local arterials has slowed down over the last decade. This has occurred in part due to increasing costs and environmental concerns. However, there are still critical gaps in the network that hinder access to certain parts of the region. Locally-developed county transportation plans have identified projects to close these gaps and complete the system, and they are included in the RTP. **TABLE 2.2** highlights some of these highway completion projects. The full list of RTP projects is provided in the Project List technical appendix.

TABLE 2.2 Major Highway Completion Projects

County	Project	Completion Year*
Imperial	SR-115 Limited Access Expressway	2018
Los Angeles	SR-710 Gap Closure	2030
Los Angeles, San Bernardino	High Desert Corridor	2020
Orange	SR-241 Improvements	2020–2030
Orange, Riverside	CETAP Intercounty Corridor A	2035
Ventura	US-101 and SR-118 Improvements	2018

*Represents the Plan network year for which the project was analyzed for the RTP modeling and regional emissions analysis

Image courtesy of the Orange County Transportation Authority

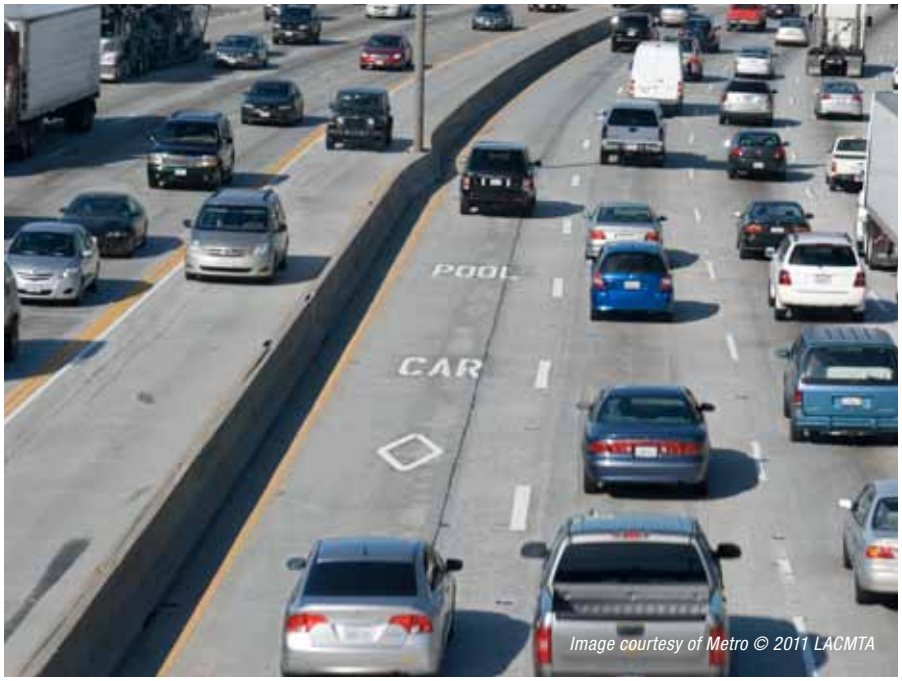


Image courtesy of Metro © 2011 LACMTA

Southern California's heavy investment in high-occupancy vehicle (HOV) lanes has given it one of the nation's most comprehensive HOV networks and highest rideshare rates. The Plan proposes strategic HOV gap closures and freeway-to-freeway direct HOV connectors to complete the system. The HOV lane network will serve as the backbone of the regional HOT lane system proposed in the "HOT Lanes Network" section later in this chapter. Another key HOV strategy in the Plan is the conversion of certain HOV lanes in the region to allow for continuous access. Orange County has taken a leadership role on this over the past few years, and their recent studies have concluded that continuous-access HOV lanes do not perform any worse than limited-access HOV lanes. At the same time, they provide carpoolers with greater freedom of movement in and out of HOV lanes. As a result, nearly every HOV lane in Orange County will be converted to allow for continuous access by the year 2013. **TABLE 2.3** highlights some of the Plan's major HOV projects and **EXHIBIT 2.1** provides a glance of major highway improvements proposed by the Plan.

TABLE 2.3 Major HOV Projects

County	Route	From	To	Completion Year*
HOV Lane Additions				
Los Angeles	I-10	I-605	Puente Ave	2014
Los Angeles	I-10	Puente Ave	SR-57/I-210	2018
Los Angeles	I-5	LA/OC County Line	I-605	2018
Los Angeles	I-5	Pico Canyon	Parker Rd	2030
Los Angeles	I-405	I-10	US-101	2018
Los Angeles	SR-14	Ave P-8	Ave L	2030
Orange	I-5	Avenida Pico	San Juan Creek Rd	2020
Orange	I-5	SR-55	SR-57	2035
Orange	SR-73	I-405	MacArthur	2035
Riverside	I-215	Nuevo Rd	Box Springs Rd	2030
Riverside	SR-91	Adams St	SR-60/I-215	2018
Riverside	I-15	Riv/SB County Line	I-15/I-215	2020
San Bernardino	I-10	Haven Ave	Ford St	2020
San Bernardino	I-10	Ford St	Riv/SB County Line	2030
San Bernardino	I-215	Spruce St	Orange Show Rd	2014
San Bernardino	I-215	SR-210	I-15	2030
San Bernardino	I-15	Riv/SB County Line	SR-18/Mojave River	2020
Freeway-to-Freeway HOV Connectors				
Los Angeles	I-5/SR-14	Connector		2014
Los Angeles	I-5/I-405	Connector (partial)		2030
Orange	I-405/SR-73	Connector		2035
San Bernardino	I-10/I-15	Connector (partial)		2020
San Bernardino	I-10/I-215	Connector		2030

*Represents the Plan network year for which the project was analyzed for the RTP modeling and regional emissions analysis

Our region's local streets and roads account for over 80 percent of the total road network and carry almost 50 percent of total traffic. They serve different purposes in different parts of the region, or even in different parts of the same city. Many streets serve as major thoroughfares or even alternate parallel routes to congested freeways. At the same time, within our urban areas, where a street right-of-way can account for as much as 40 percent of the total land area, streets shape the neighborhoods they pass through and often support different modes of transportation besides the automobile, including bicycles, pedestrians, and transit. The RTP contains a host of arterial projects and improvements to achieve different purposes in different areas. In all parts of the region, it includes operational and technological improvements to maximize system productivity in a more cost-effective way than simply adding capacity. Such strategic improvements include spot widening, signal prioritization, driveway consolidation and relocation, and grade separations at high-volume intersections. Finally, in a quickly growing number of areas, street improvement projects include new bicycle lanes and other design features such as lighting, landscaping, and modified roadway, parking, and sidewalk widths that work in concert to achieve both functional mobility for multiple modes of transportation, and a great sense of place.

TABLE 2.4 Arterial Investment Summary (in Nominal Dollars, Billions)

County	Investment*
Imperial	$ 1.6
Los Angeles	$ 6.7
Orange	$ 4.4
Riverside	$ 6.1
San Bernardino	$ 2.6
Ventura	$ 0.7
Total	**$ 22.1**

Strategically Expanding Our System

While the RTP/SCS's multimodal strategy aims to reduce per capita vehicle miles traveled (VMT) over the next 25 years, total demand to move people and goods will continue to grow due to the region's population increase. A strategic expansion of our transportation system is needed in order to provide the region with the mobility it needs. The RTP targets this expansion around transportation systems that have room to grow, including transit, high-speed rail, active transportation, Express/HOT lanes, and goods movement. Some of these systems, such as transit, active transportation, and Express/HOT lanes, have proven over the years to be a reliable and convenient form of transportation for those who are able to easily access it. However, these systems must be improved and expanded in order to provide the accessibility and connectivity needed to become a truly viable alternative for the region as a whole. Other systems, such as high-speed rail, are new to the region and are needed to expand the number of choices available to our residents for convenient longer-haul travel. In addition, to address both the need to move more goods throughout the region for our growing population and maintain regional economic benefits of our goods movement industry, we must strategically expand our goods movement system in a way that addresses the associated quality of life issues.

Transit

The Plan calls for an impressive expansion of transit facilities and service over the next 25 years. The local county sales tax programs, most recently Measure R in Los Angeles County, are providing for most of this expansion in facilities and services.

The region should be proud of what it has accomplished so far and what it plans to accomplish beyond that by 2035. **EXHIBITS 2.2, 2.3,** and **2.4** demonstrate this point. All three exhibits present passenger rail system in the region. In 1990, as shown in **EXHIBIT 2.2**, the region did not have any passenger rail service at all. **EXHIBIT 2.3** shows how successful the region has been in building an extensive passenger rail network by 2010, a mere 20 years later. This RTP/SCS builds upon this success and proposes to strategically expand our rail system over the next 25 years. A more robust network in 2035 is depicted in the **EXHIBIT 2.4**.

EXHIBIT 2.1 Major Highway Projects

EXHIBIT 2.2 Rail Transit System (1990)

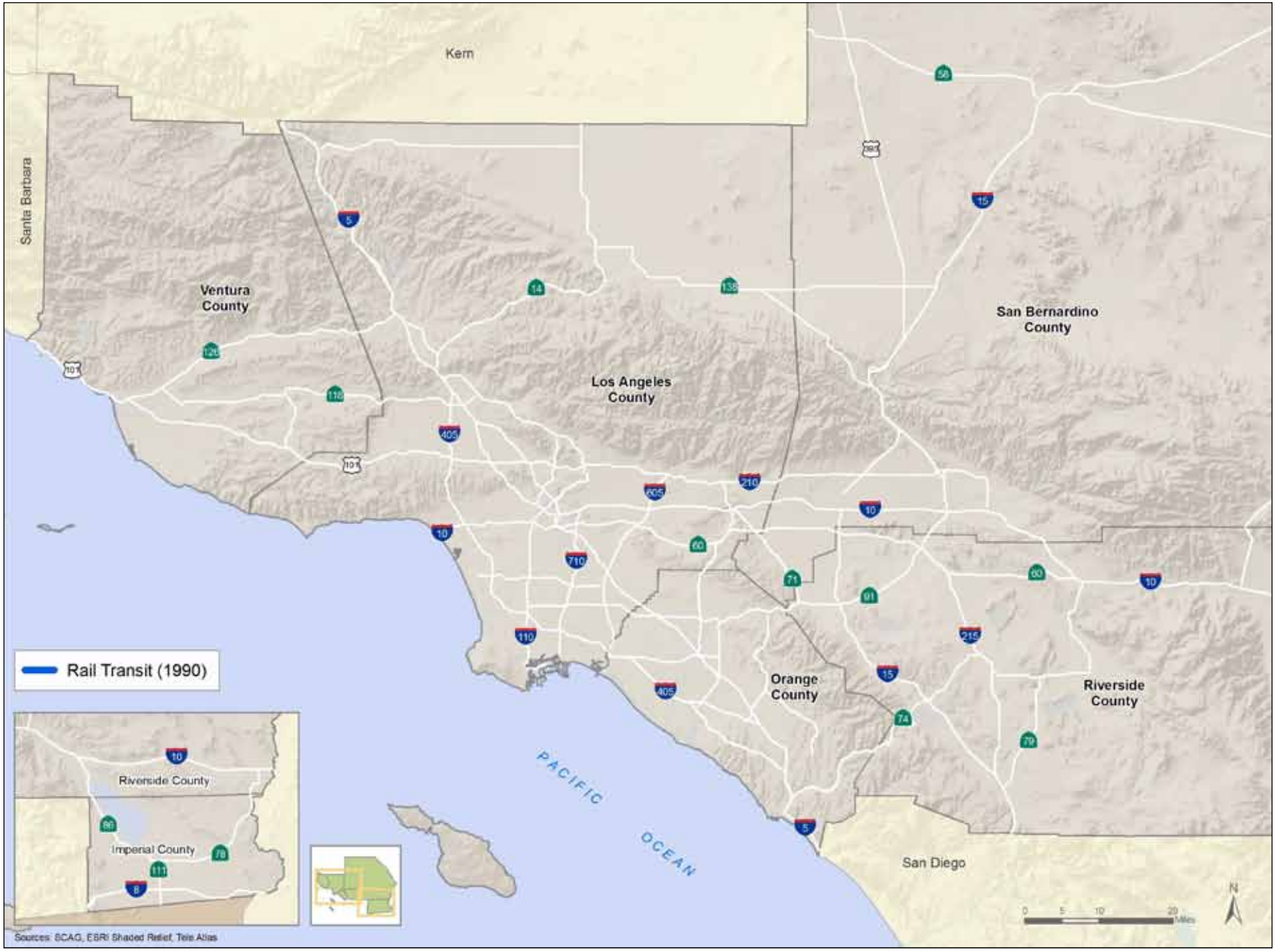


EXHIBIT 2.3 Rail Transit System (2010)

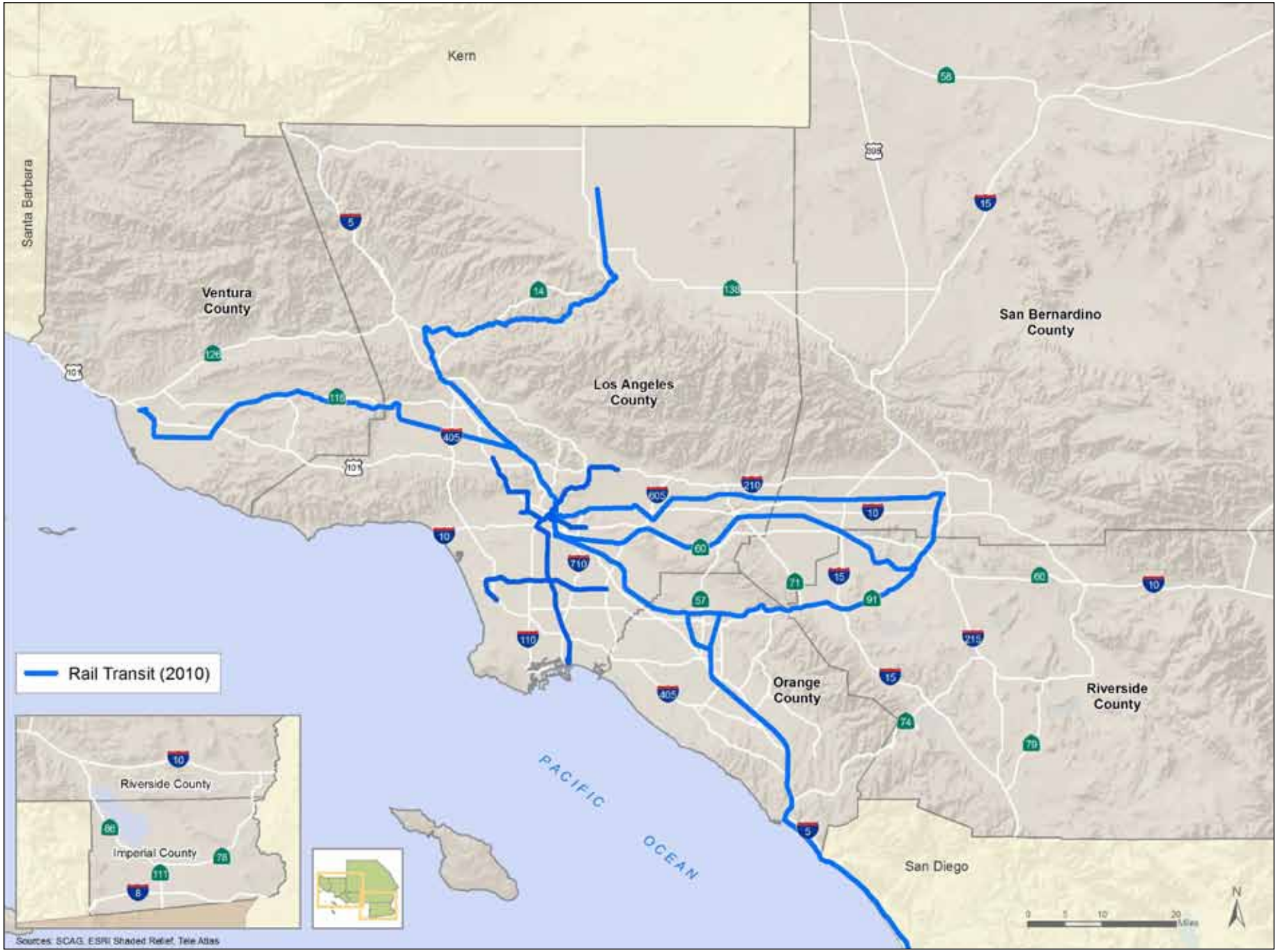
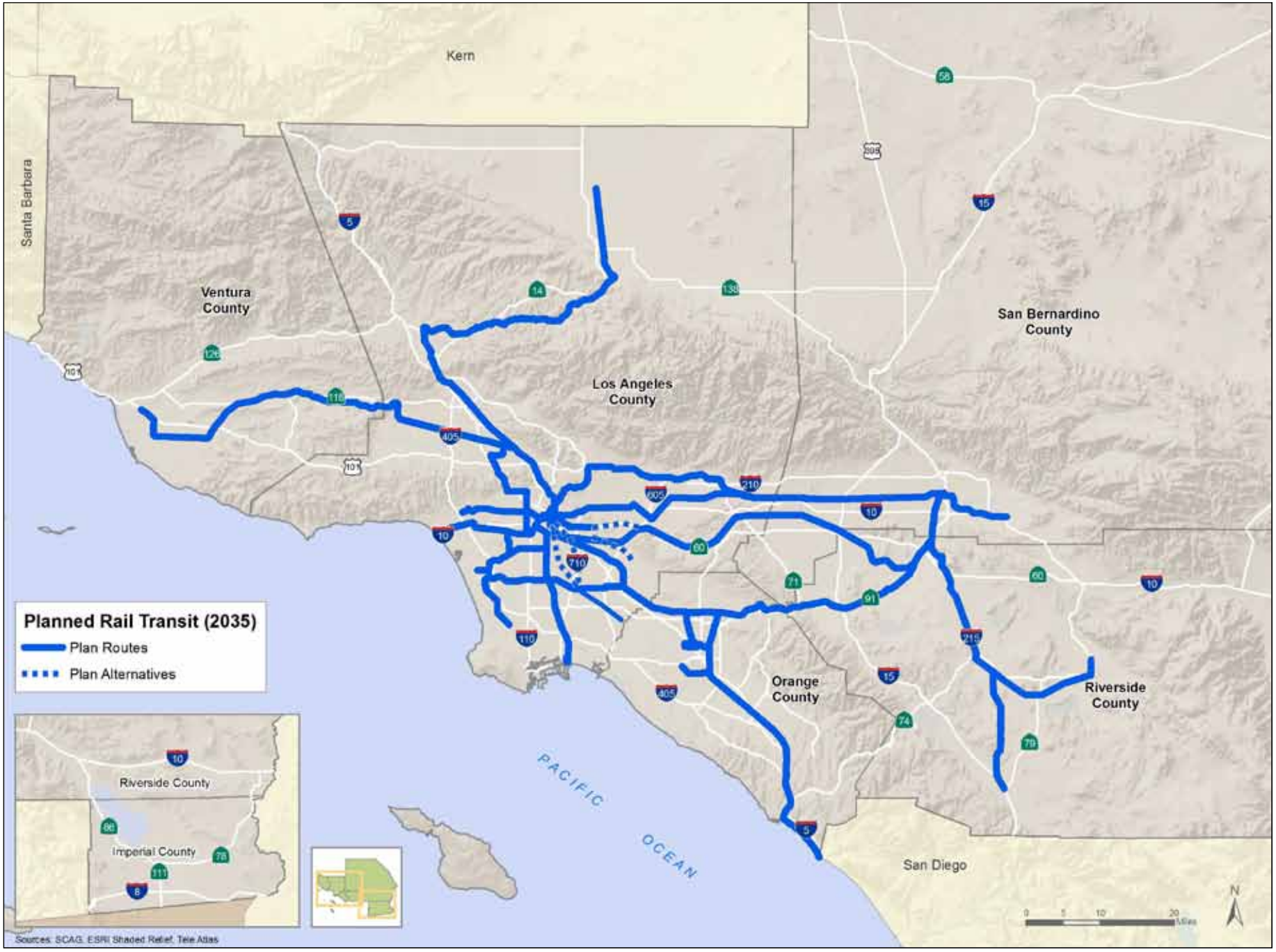


EXHIBIT 2.4 Rail Transit System (2035)



Once built out, Los Angeles County will have a greatly-expanded rail network, adding entire new corridors and lengthening existing ones. Orange County will greatly improve its Metrolink service and implement a slew of new bus rapid transit (BRT) routes, Riverside County will introduce various extensions to its Metrolink line, and San Bernardino County will introduce Redlands Rail.

TABLE 2.5 Major Transit Projects

County	Project	Completion Year*
Los Angeles	Crenshaw/LAX Transit Corridor	2018
Los Angeles	Gold Line Eastside Transit Corridor–Phase 2	2035
Los Angeles	Exposition Line–Phase 2 to Santa Monica	2018
Los Angeles	Gold Line Extension to Glendora	2018
Los Angeles	Gold Line Extension to Montclair	2035
Los Angeles	Green Line LAX Extension	2030
Los Angeles	South Bay Green Line Extension	2035
Los Angeles	Regional Connector	2020
Los Angeles	San Fernando Valley (East) North/South Rapidways	2018
Los Angeles	San Fernando Valley Orange Line Canoga Extension	2014
Los Angeles	West Santa Ana Branch Corridor	2030
Los Angeles	Westside Subway Extension to La Cienega	2023
Los Angeles	Westside Subway Extension to Century City	2030
Los Angeles	Westside Subway Extension to Westwood	2035
Orange	Anaheim Rapid Connection	2020
Orange	Bristol/State College, Harbor, and Westminster BRT	2030
Orange	Santa Ana/Garden Grove Fixed Guideway	2020
Riverside	Metrolink Perris Valley Line Extensions to San Jacinto and Temecula	2035
San Bernardino	E Street BRT (sbX)	2014
San Bernardino	Redlands Rail–Phase 1	2018
San Bernardino	Redlands Rail–Phase 2	2020

*Represents the Plan network year for which the project was analyzed for the RTP modeling and regional emissions analysis

While these capital projects will provide our region with a much more mature public transportation system, operational improvements and new transit programs and policies will also contribute greatly to attracting more trips to transit and away from single-occupant vehicle (SOV) travel. First, the expanding HOV and Express/HOT lane networks calls for the development of an extensive express bus point-to-point network. Second, transit oriented and land use developments call for increasing the frequency and quality of fixed-route bus service by virtue of adding new BRT service, limited-stop service, increased frequencies along targeted corridors, and the introduction of local community circulators to provide residents of smart growth developments with the option of taking transit over using a car to make short, local trips.

Another emphasis on transit network improvements includes transit priority facilities, such as bus lanes and traffic signal priority. Our region has virtually no bus lanes, especially compared to other major metropolitan areas. The Los Angeles County Metro Rapid Bus network employs bus signal priority that gives buses up to 10 percent more green light time from the normal green light phase. This should be expanded to other counties in our region.

Additional enhancements to our region's transit services include expanding bike-carrying capacity on transit vehicles, implementing regional and inter-county fare agreements and media, such as LA County's EZ Pass, and expanding and improving real-time passenger information systems.

TRANSIT POLICIES

In addition to the specific transit plans, projects and programs proposed, the 2012 RTP/SCS also supports the following policies and actions:

- Encourage the development of new transit modes in our subregions, such as BRT, rail, limited-stop service, and point-to-point express services utilizing the HOV and Express/HOT lane networks,
- Encourage transit providers to increase frequency and span-of-service in TOD and High Quality Transit Areas (HQTAs) and along targeted corridors where there is latent demand for transit service,
- Collaborate with local jurisdictions to provide a network of local community circulators that serve new TOD and HQTAs, providing an incentive for residents and employees to make trips on transit,

- Develop first mile/last mile strategies on a local level to facilitate access to the transit system via local circulators, active transport, scrip, or vehicle sharing. Continue partnering with member cities and subregions to do localized first mile/last mile planning,
- Encourage transit fare discounts and local vendor product and service discounts for residents and employees of TOD/HQTAs, or for a jurisdiction's local residents in general who have fare media,
- Advocate for increased operational funding for transit service from the state sources,
- Encourage transit properties to pursue cost containment strategies,
- Work with cities to identify and mitigate choke points in the regional transportation system that affect transit, and
- Work with county transportation commissions, municipalities, and transit operators to develop dedicated bus facilities.

Image courtesy of Metro © 2011 LACMTA

Passenger and High-Speed Rail

The Plan proposes three Passenger Rail strategies that will provide additional travel options for long-distance travel within our region and to neighboring regions. These are improvements to the LOSSAN Corridor, improvements to the existing Metrolink system, and the implementation of Phase I of the California High-Speed Train (HST) project.

The recent release of the draft CA HST Business Plan confirmed the funding and implementation challenges of the project. The plan now estimates a statewide Phase I cost of $98.5 billion (in year of expenditure dollars) with service extended to our region in 2033. Within the draft Business Plan, there are a variety of strategies to connect Northern and Southern California to the state network. This plan assumes that Southern California will be connected to the network in 2033, but that incremental improvements can be made in advance of and in preparation for that connection. Therefore, stakeholders throughout Southern California are seeking to implement a phased and blended implementation strategy for high-speed rail by employing state and federal high-speed rail funds to improve existing services, eventually meeting the Federal Rail Administration's (FRA) 110 MPH definition of high-speed service. These speed and service improvements to the existing LOSSAN and Metrolink corridors will deliver the California High-Speed Rail Authority's (Authority) new blended approach, and at the same time permanently improve our region's commuter and intercity rail services.

IMPLEMENTATION OF PHASE I OF THE CALIFORNIA HIGH-SPEED TRAIN (HST) PROJECT

The Authority has worked since 1996 to plan and build a HST system linking Northern and Southern California. In 2005, the Authority issued a Programmatic Environmental Impact Report (EIR) selecting a Phase I alignment that would travel from Anaheim to Los Angeles, on to the Antelope Valley via the San Fernando Valley, along SR-99 through the San Joaquin Valley, and into the Bay Area via San Jose and along the San Francisco Peninsula. Phase II would add connections to the Inland Empire, San Diego, Sacramento, and possibly the East Bay. In November of 2008, California voters approved Proposition 1A (Prop 1A), allocating $9 billion in bond funds for the project. In 2009 and 2010, the FRA awarded the Authority $3.6 billion in High-Speed and Intercity Passenger Rail discretionary grants, which will be used in the San Joaquin Valley as per FRA direction. As mentioned above, the new business plan has put total statewide Phase I construc-

tion costs at $98.5 billion (in nominal dollars). Prop 1A also included $950 million for upgrading and improving connectivity for current rail services that will connect with the HST project, so the need to make speed and service improvements for our current rail services, coupled with the CHSRA's new blended implementation approach, calls for the need to spend these funds in the next few years.

The primary benefits of Phase I will be realized on a statewide level; however, our region's interregional travel facilities will also benefit. If successful, the HST system will attract many interregional trips now made by car or airplane, providing an alternative to congested interregional highways and relieving ground congestion near local airports. The Los Angeles to the Bay Area travel market is currently the nation's seventh busiest aviation corridor, and our region's second busiest. Phase I has the potential to free up gate space at regional airports for more international and long haul routes, and relieve some airfield congestion. Similarly, when both Phase I and II are complete, the system will offer connectivity to Palmdale, Bob Hope (Burbank), Los Angeles, Ontario International and San Bernardino International Airports, helping to meet SCAG's long-term goal of regionalizing air travel in Southern California. Phase I will also provide excellent regional connectivity. The planned HSR stops at Sylmar, Burbank Airport, Los Angeles Union Station, Norwalk and Anaheim will readily connect with a robust network of inter-city and commuter rail, subway and light-rail, and fixed-route transit systems. All these connections will complement and feed each other, thereby boosting rail and transit ridership across our region.

IMPROVEMENTS TO THE LOS ANGELES TO SAN DIEGO (LOSSAN) RAIL CORRIDOR

Currently the SCAG region is served by a network of intercity passenger and commuter rail services. These services operate on the region's rail network, often sharing facilities with freight rail. They operate at higher speeds and have less frequent station stops than traditional transit services, and are more likely to serve intercity and interregional trips.

As discussed in Chapter 1, intercity passenger rail service is operated by Amtrak, and commuter services are operated by the Southern California Regional Rail Authority (Metrolink). Amtrak's Pacific Surfliner traverses the 351 mile long Los Angeles-San Diego-San Luis Obispo (LOSSAN) corridor. The Pacific Surfliner is the second most-used service in Amtrak's national fleet, moving nearly nine percent of the system's total national ridership. Surfliner ridership is growing over eight percent a year. While Amtrak service remains a small portion of all transit trips in the region, it does provide a significant option for travel between regions.

Since the 1990s, stakeholders along the LOSSAN corridor have been participating in the LOSSAN Rail Corridor Agency, a Joint Powers Authority (JPA) that coordinates planning along the corridor with the goal of increasing safety, ridership, revenue, and reliability. In early 2010, the agency released a Strategic Assessment, which found that capital investment in speed and capacity improvements could serve latent demand along the corridor.

As such, the LOSSAN JPA partners have begun work on a Strategic Implementation Plan, which will guide service and business planning and provide a corridor wide implementation plan for capital improvement projects. Strategies in the LOSSAN program will include grade closures, the installation of quad gates and raised medians, grade separations, the installation of sidings and double tracks, electronic and positive train control technologies, track straightening, and other speed capacity improvements. Ultimately, it is hoped that express services in the corridor will travel between San Diego and Los Angeles in under two hours.

Image courtesy of the Southern California regional Rail Authority (Metrolink)

IMPROVEMENTS TO THE EXISTING METROLINK SYSTEM

Similarly, the Southern California Regional Rail Authority is currently the sole operator of the Metrolink system, which serves primarily as a commuter rail service in our region. Metrolink operates 512 track miles of service along seven routes in Ventura, Orange, Los Angeles, San Bernardino, Riverside and San Diego Counties. Metrolink passengers travel much further than most transit passengers, having an average trip length of 36.9 miles. In Fiscal Year 2008–2009, Metrolink reported serving 12,241,830 passenger boardings. Four routes, the Ventura County Line, the Orange County Line, the Inland Empire/Orange County Line, and the SR-91 Line, share portions of the LOSSAN Corridor with the Pacific Surfliner.

Metrolink's service will also share a corridor with Phase I of the California High-Speed Train Project. By 2035, this project will provide a high-speed travel option to the Bay Area and the Central Valley via the existing valley subdivision, which is currently used by the Metrolink Antelope Valley Line (AVL). A recent express service demonstration project revealed the Metrolink AVL travel time between Palmdale and Los Angeles Union Station could be shortened by 33 percent simply by skipping less used station stops. An aggressive program of track straightening, grade separations, and track and siding expansion is expected to reduce express travel times to roughly one hour.

When Phase I of the State HST project is completed, Metrolink and Amtrak routes will serve as feeders, providing access to a new long distance travel mode. Travelers expected to access the State project at stations in the cities of Los Angeles, Burbank, San Fernando, Palmdale, Norwalk and Anaheim. The Authority's 2009 Business Plan posits that passengers will travel between Los Angeles and San Francisco in less than three hours, for about 80 percent of comparable airfare.

RAIL POLICIES

In addition to the specific plans, projects, and programs proposed, the 2012 RTP/SCS supports the following policies and actions related to our passenger and high-speed rail program:

- Implement cooperative fare agreements and media between Amtrak and LOSSAN, and CA HST when it begins revenue service,
- Implement cooperative marketing efforts between Amtrak and LOSSAN, and CA HST when it begins revenue service,
- Encourage regional and local transit providers to develop rail interface services at Metrolink, Amtrak and high-speed rail stations, and
- Work with the California High-Speed Rail Authority and local jurisdictions to plan and develop optimal levels of retail, residential and employment development that fully takes advantage of new travel markets and rail travelers.

Bus Transit

The RTP/SCS allocates additional funding to bus transit in the region. Fixed route bus lines in the region are continuously evaluated and adjusted. Los Angeles County also offers Rapid Bus Transit on many of its core corridors. In addition, new services are planned across the region, including:

- Orange County's first bus rapid transit (BRT) services and new trolley systems in Santa Ana, Anaheim, and Garden Grove,
- Riverside and San Bernardino Counties' first BRT services,
- Development of an extensive express bus point-to-point network based on the expanding HOV and Express/HOT lane networks,

Image courtesy of the Victor Valley Transit Authority

- Increasing the frequency and quality of fixed-route bus service and the introduction of local community circulators to provide residents of smart growth developments with the option of taking transit over using a car to make short, local trips, and
- The implementation of transit priority facilities, such as bus lanes and traffic signal priority.

Active Transportation

Active transportation refers to transportation such as walking or using a bicycle, tricycle, velomobile, wheelchair, scooter, skates, skateboard, push scooter, trailer, hand cart, shopping car, or similar electrical devices. For the purposes of the RTP, active transportation generally refers to bicycling and walking, the two most common methods. Walking and bicycling are essential parts of the SCAG transportation system, are low cost, do not emit greenhouse gases, can help reduce roadway congestion, and increase health and the quality of life of residents. As the region works towards reducing congestion and air pollution, walking and bicycling will become more essential to meet the future needs of Californians.

The majority of commuters within the SCAG region commute via car, truck, or van. According to the American Community Survey, in 2009, more than 85 percent of all commuters traveled to work by car, truck, or van; and less than 4 percent traveled to work via an active transportation mode (0.7 percent bicycled and 2.5 percent walked to work). In addition, the National Household Travel Survey (NHTS) data indicate that approximately 20.9 percent of all trips were conducted by walking (19.2 percent) or bicycling (1.7 percent). This represents an approximately 75 percent increase from the 11.9 percent active transportation mode share in 2000. In addition, NHTS data indicate that 75.0 percent of all trips in 2009 were conducted by driving, and this is an approximately 10.6 percent decrease from the 83.9 percent mode share in 2000.

Additional analysis regarding active transportation needs to be conducted in order to develop a better understanding of the users and their needs. The current level of data is extremely limited and does not provide a comprehensive overview of the current active transportation community. Active transportation users have differing levels of experience and confidence, which influences their decision to utilize active transportation. SCAG recognizes that there are a number of factors that motivate them to use active transportation. Increased data collection may provide a clearer understanding of the needs and deficiencies associated with active transportation.

Active transportation is not only a form of transportation in itself; it is also a means by which to access rail and bus service. Accessibility is one of the primary performance measures used to evaluate active transportation, by measuring how well the current infrastructure provides individuals with the opportunity to access destinations or facilities.

Using a two-mile buffer for bicyclists and a half-mile buffer for pedestrians, we found that our current transit infrastructures provides 97 percent of our residents access to transit via bicycle, and 86 percent access to transit by walking. While many individuals have access to transit stations by biking or walking, numerous other factors may influence an individual's decision to use active transportation.

Safety is an important factor that individuals consider when determining whether or not they should walk or bike to their destination. Based on data from the Statewide Integrated Traffic Records System (SWITRS), in 2008, 4.0 percent of all traffic-related fatalities in the SCAG region involved bicyclists, and 4.3 percent of all traffic-related injuries involved bicyclists. In addition, 20.9 percent of all traffic-related fatalities in the SCAG region involved a pedestrian, and 5.7 percent of traffic-related injuries involved pedestrians.

While each of the counties in the SCAG region currently have their own active transportation plan, the RTP/SCS aims at developing a regional active transportation system that closes the gap and provides connectivity between counties and local jurisdictions. While bicyclists are legally allowed to use any public roadway in California unless specifically prohibited, many bicyclists may be more inclined to utilize bikeways. Currently, 42.6 percent of the region's residents have easy access to 4,315 miles of bikeways. Local jurisdictions in the region have proposed an additional 4,980 miles of bikeways in this RTP/SCS that would increase this access to 62.4 percent of all residents. In order to close the remaining gaps in the bikeway network, this RTP/SCS goes a step further to include an additional 827 miles of bikeways to complete the SCAG Regional Bikeway Network.

In order to make active transportation a more attractive and feasible mode of travel for the different users in our region, additional infrastructure improvements need to be made. The 2012 RTP/SCS calls for improvements that would bring 12,000 miles of deficient sidewalks into compliance with the Americans with Disabilities Act (ADA). Given that all trips, including vehicular trips, start with walking, it is important to ensure that the sidewalks and streets are accommodating to all users. In all, the RTP's active transportation improvements exceed $6 billion.

COASTAL TRAILS

In addition to bikeways, local trails have played an important role to increase accessibility and provide opportunities for active transportation. Trails along the coast of California have been utilized as long as people have inhabited the region. In an effort 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 coastal trekking through hiking and other complementary modes of non-motorized transportation," the California Coastal Trail (CCT) was established. SCAG proposes the completion of the CCT to increase active transportation access to the coast. Completion of the CCT would provide 183 miles of multi-purpose trails.

SAFE ROUTES TO SCHOOL

SAFETEA-LU established the Safe Routes to School (SRTS) program to "enable and encourage primary and secondary school children to walk and bicycle to school" and to support infrastructure-related and behavioral projects that are "geared toward providing a safe, appealing environment for walking and bicycling that will improve the quality of our children's lives and support national health objectives by reducing traffic, fuel consumption, and air pollution in the vicinity of schools." Safe Route to school programs can play a critical role in eliminating some of the vehicle trips that occur during peak periods to drop-off or pick up students by ensuring safe routes to bike or walk to school

COMPLETE STREETS

The Complete Streets Act of 2008 (AB 1358) requires cities and counties to incorporate the concept of Complete Streets in their general plan updates to ensure that transportation plans meet the needs of all users of our roadway system. SCAG supports and encourages implementation of Complete Street policies in the 2012 RTP. SCAG will work with the local jurisdictions as they implement Complete Streets strategies within their jurisdictions by providing information and resources to support local planning activities. SCAG also supports the following policies and actions related to active transportation:

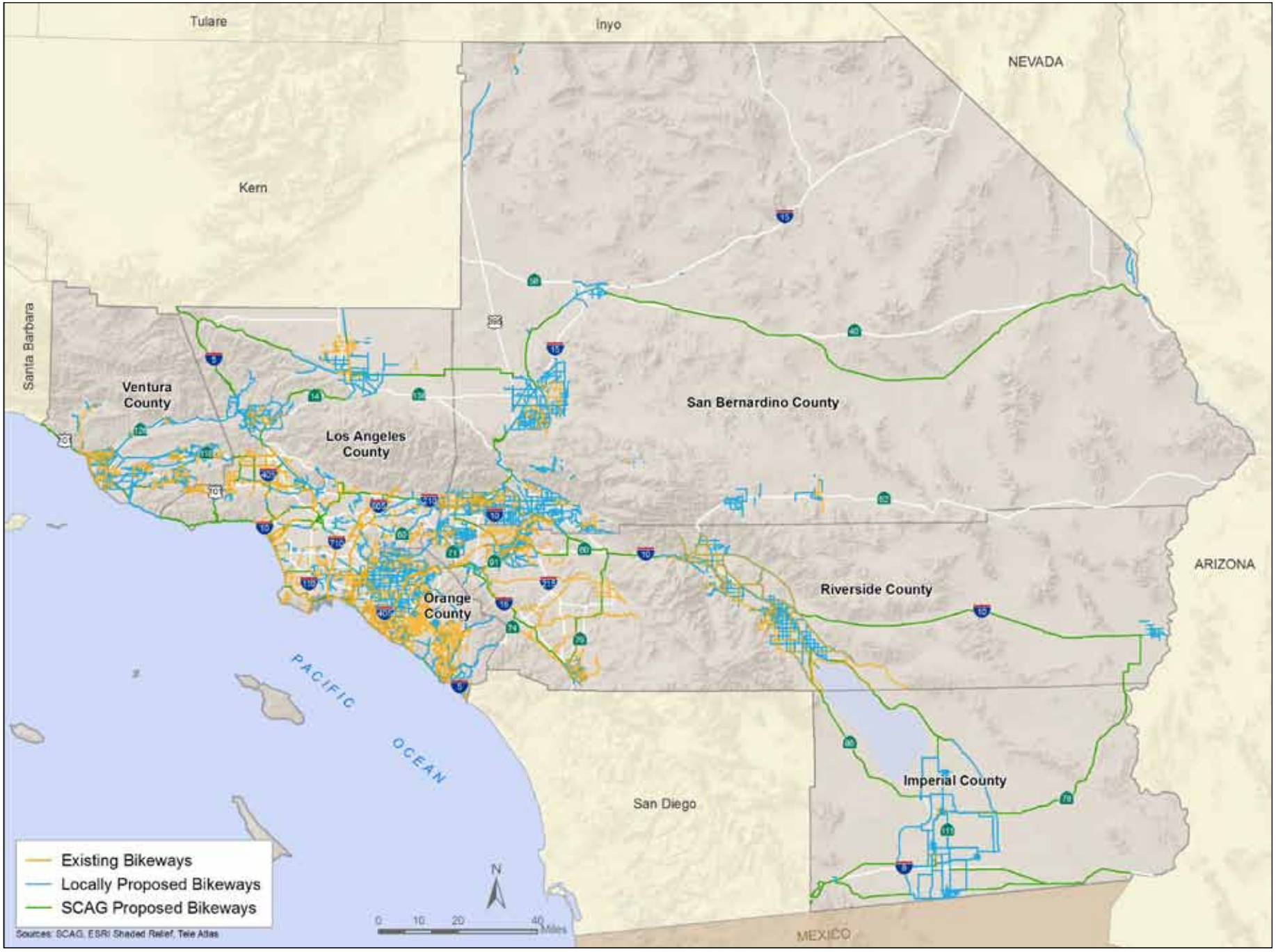
- Encourage and support local jurisdictions to develop 'Active Transportation Plans' for their jurisdictions if they do not already have one,
- Encourage and support local jurisdictions to develop comprehensive educational programs for all road users,
- Encourage local jurisdictions to direct enforcement agencies to focus on bicycling and walking safety to reduce multi-modal conflicts,
- Support local advocacy groups and bicycle related businesses to provide bicycle-safety curricula to the general public,
- Encourage children, including those with disabilities, to walk and bicycle to school,
- Encourage local jurisdictions to adopt and implement the proposed SCAG Regional Bikeway Network,
- Support local jurisdictions to connect all of the cities within the SCAG region via bicycle facilities,
- Encourage local jurisdictions to complete the California Coastal Trail,
- Encourage the use of Intelligent Traffic Signals and other technologies that detect slower pedestrians in signalized crosswalks and extend signal time as appropriate,
- Support the facilitation, planning, development and implementation of projects and activities that will improve safety, reduce traffic, and air pollution in the vicinity of primary and middle schools, and
- Encourage local jurisdictions to prioritize and implement projects/policies to comply with ADA requirements.

Express/HOT Lane Network

Despite our concerted effort to reduce traffic congestion through years of infrastructure investment, the region's system demands continue to exceed available capacity. Consistent with our regional emphasis on the mobility pyramid (**FIGURE 2.1**), recent planning efforts have focused on enhanced system management including integration of pricing to better utilize existing capacity and to offer users greater travel time reliability and choices. Express/HOT 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/HOT sooner and to support complementary transit investments.

Based on recent analysis of critical corridors performed for the CSMPs, inter-county trips comprise more than 50 percent—suggesting the value of a regional network of Express Lanes that would seamlessly connect multiple counties. As such, the 2012 RTP includes a regional Express/HOT Lane network that would build upon the success of the 91 Express

EXHIBIT 2.5 Regional Bicycle Network



Lanes in Orange County and two demonstration projects in Los Angeles County planned for operation in late 2012.

Image courtesy of the Orange County Transportation Authority

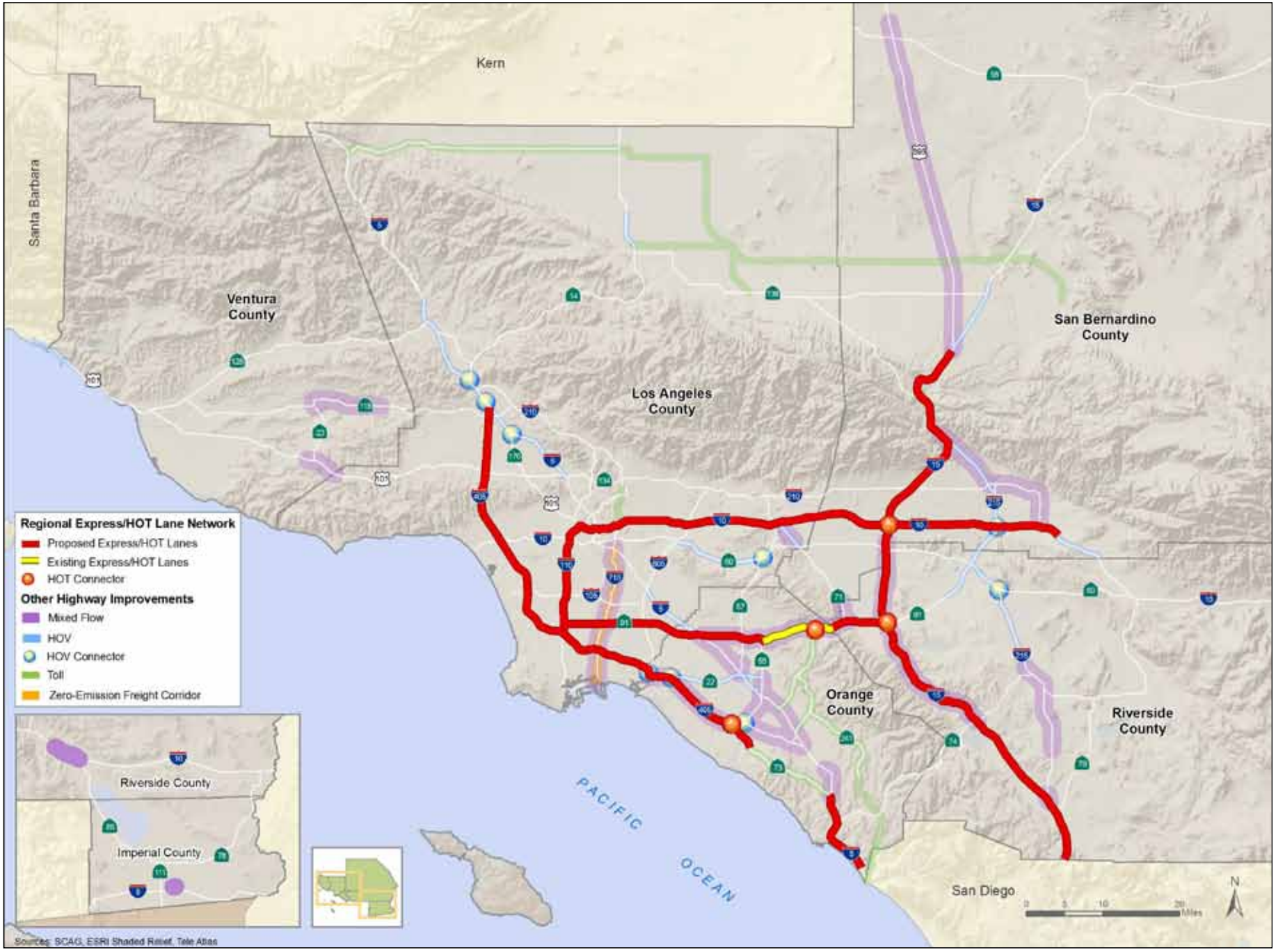
Additional efforts underway include the extension of the 91 Express Lanes to I-15 in Riverside County along with planned Express Lanes on the I-15. Also, traffic and revenue studies are proceeding for I-10 and I-15 in San Bernardino County.

TABLE 2.6 and **EXHIBIT 2.6** display the segments in the proposed Express Lane network.

TABLE 2.6 Express/HOT Lane Network

County	Route	From	To
Los Angeles	I-405	I-5 (North SF Valley)	LA/OC County Line
Los Angeles	I-110	Adams Blvd (s/o I-10)	I-405
Los Angeles	I and SR-110/	Adams Blvd	US-101
Los Angeles	US-101	SR-110	I-10
Los Angeles	I-10	US-101	I-710
Los Angeles	I-10	I-710	I-605
LA, Orange	SR-91	I-110	SR-55
LA, SB	I-10	I-605	I-15
Orange	I-405	LA/OC Line	SR-55
Orange	I-5	SR-73	OC/SD County Line
Orange	SR-73	I-405	MacArthur
Riverside	SR-91	OC/RV County Line	I-15
Riverside	I-15	Riv/SB County Line	SR-74
Riverside	I-15	SR-74	Riv/SD County Line
San Bernardino	I-10	I-15	SR-210
San Bernardino	I-10	SR-210	Ford St
San Bernardino	I-15	SR-395	Sierra Ave
San Bernardino	I-15	Sierra Ave	6th St
San Bernardino	I-15	6th St	Riv/SB County Line

EXHIBIT 2.6 Express/HOT Lane Network



Meeting Our Airport Demand

Although at a rate much slower than those seen in previous decades, air travel in the SCAG region continues to grow, and is expected to pick up the pace when the region economically recovers. This RTP's regional air passenger demand forecast of 145.9 million annual air passengers (MAP) in 2035 is a very conservative forecast compared to forecasts adopted by past SCAG RTPs, such as the 165.3 MAP 2035 forecast adopted by the 2008 RTP. However, like previous forecasts, this new long-range forecast is also based on interim forecasts that show the urban capacity-constrained airports of Los Angeles International (LAX), Bob Hope, Long Beach and John Wayne airports all reaching their defined legally allowable or physical capacity constraints well before 2035. The remaining air travel demand is served by the other, suburban airports with ample capacity to serve future demand, including Ontario International, San Bernardino International, March Inland Port, Palmdale Regional, Southern California Logistics, and Palm Springs airports. A small amount of future air passenger demand would also be served by the two commuter airports in the region, Oxnard and Imperial airports.

TABLE 2.7 displays Low Growth, Baseline/Medium Growth and High Growth air passenger forecast scenarios that were considered for inclusion in this RTP. At 164 MAP in 2035, the High Growth Scenario is only slightly less than the 165.3 MAP forecast adopted for the 2008 RTP in 2035, and its average annual growth rate is consistent with recent industry forecasts developed by the FAA, Boeing and Airbus. This Plan's aviation demand forecast is the Baseline/Medium Growth Forecast that is more conservative than the High Growth Scenario, and is consistent with recent passenger trends. At 145.9 MAP, it is virtually identical to the Constrained/No Project Scenario that was modeled for the 2008 RTP. **FIGURE 2.4** shows the airport allocations for this RTP's regional air passenger demand forecast.

At 5.61 million tons of cargo in 2035, this RTP's region air cargo demand forecast is also much more conservative than what was adopted by the 2008 RTP for 2035 (8.28 million tons). **FIGURE 2.5** shows the airport allocations for this RTP's regional air cargo demand forecast. A more complete discussion of the methodology use to develop these forecasts can be found in the Aviation technical appendix.

TABLE 2.7 2035 Airport Forecasts (Million Annual Air Passengers)

Airport	Low	Baseline	High
Bob Hope	9.4	9.4	9.4
John Wayne	10.8	10.8	10.8
LAX	78.9	78.9	78.9
Long Beach	4.2	4.2	4.2
March Inland Port	0.4	0.6	2.5
Ontario	19.2	30.7	31.6
Palmdale	1.6	2.6	6.1
Palm Springs	2.6	4.1	9.6
San Bernardino	1.8	2.8	6.7
SoCal Logistics	0.4	0.7	1.6
Imperial	0.6	0.9	2.1
Oxnard	0.1	0.2	0.5
Total	**130.0**	**145.9**	**164.0**

FIGURE 2.4 2035 Air Passenger Demand Airport Allocations

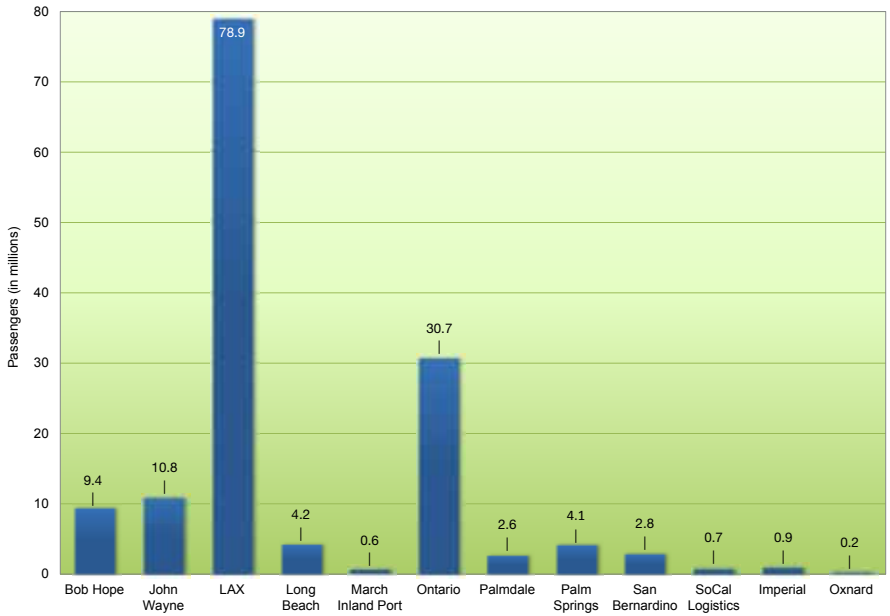
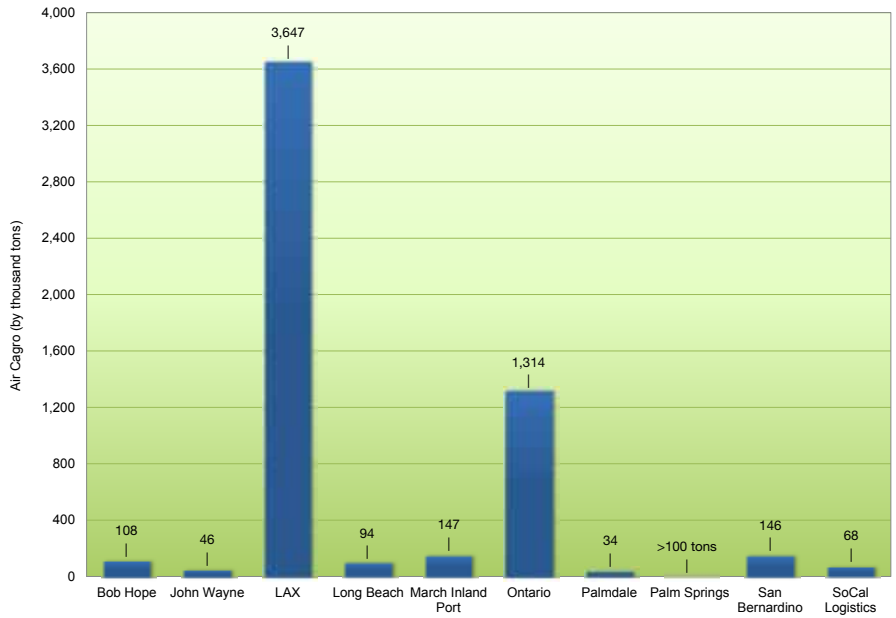


FIGURE 2.5 2035 Air Cargo Demand Airport Allocations



The past few years have seen deep cutbacks in flights by the airlines, particularly at mid-sized airports. There have also been several significant mergers in the U.S. airline industry. These mergers will likely lead to the elimination of duplicate service that may decrease airline competition, increase fares and reduce the number of flights in many markets. However, the merged carriers may find it advantageous to offer service at multiple airports in a given market, rather than add frequency at LAX. The other recent dynamic in the aviation industry has been the transition of the low-cost carriers, as they have gained market share, from primarily serving secondary airports in large metropolitan regions to competing directly with the legacy network carriers at the primary airport. A recent example is the decision by both Virgin America and Southwest to introduce or expand service at LAX, rather than primarily serve the region through the secondary airports. One consequence of this strategy has been a significant decline in passenger traffic at both Bob Hope Airport and Ontario International Airport.

These and other recent trends call into question the ability to shift air traffic from the existing constrained airports in the urban core to the outlying/suburban airports that have the capacity to accommodate the forecast growth, which is necessary to meet this RTP's 145.9 MAP forecast in 2035. In order to attract the number of passengers to the suburban airports envisaged in the 2035 regional air passenger demand forecast, some incentives are likely to be needed to encourage airlines to offer service at these airports. Potential incentives fall into three broad categories:

1. Improvements to the airport ground access system that would make the alternate airports more accessible to travelers from those parts of the region that currently find the core urban airports more convenient,
2. Measures that would reduce the cost to the airlines of offering service at the alternate airports, either through direct subsidy or by reducing airport fees and charges relative to the more congested airports, and
3. Marketing programs to encourage air travelers to consider using the air services at the alternate airports.

General Aviation

SCAG also updated regional general aviation demand forecasts for the 44 general aviation airports in the region, as well as for the 10 commercial airports in the region that support general aviation activity. Regional general aviation demand forecasts were last developed by SCAG in 2003. The new forecasts employed a sophisticated "cohort" methodology that considers the amount of flying done by pilots as they pass through different age groups, and the extent to which older pilots are replaced by new pilots. The forecast shows a decline in regional general aviation operations by about 32 percent from 2010 to 2035. The main reason for the anticipated decline is the fact that the aging pilot population is not expected to be adequately replenished by new student pilot starts. The regional general aviation demand forecast and methodology can be found in the Aviation technical appendix.

Airport Ground Access Strategy

Improvements to airport ground access (and egress) fall under SCAG's domain of responsibility. SCAG works closely with the airport authorities and county transportation commissions to identify and pursue implementation of specific projects. To be effective in attracting passengers to air service at the alternate airports, ground access improvements will need to significantly reduce the travel time and/or cost of accessing the alternate airports. This is likely to be a particular concern with airports such as Palmdale, which is almost 70 miles from downtown Los Angeles and around 50 miles from communities in the San Fernando Valley.

While the cost of significantly reducing freeway travel times beyond those improvements that will be implemented for other reasons would be prohibitive, particularly for the relatively small number of travelers likely to use the alternate airports, there may be opportunities to take advantage of improved transit and rail services that are being planned. These include the extension of the Metro Gold Line to Ontario and improvements to Metrolink service on the Antelope Valley and San Bernardino lines. While the

volume of airport passengers alone would not justify the cost of these projects, if they are being done anyway to address other travel needs, SCAG can work with the relevant agencies to make sure that the connections to the alternate airports are well planned and marketed. In the case of Ontario Airport, airport passenger volumes may be high enough to support express bus service from remote terminals at such locations as the Anaheim Regional Transportation Intermodal Center, Los Angeles Union Station, and the Van Nuys FlyAway terminal in the San Fernando Valley. These facilities all currently exist or will by 2035, so it would only be necessary to operate the bus service. These services may need to be subsidized until ridership reaches a level where the fare revenue can support the operation, and SCAG could work with the airport authorities and regional transportation agencies to identify funding to subsidize the operation. Potential sources of funding could include charging fees for private vehicles picking up and dropping off passengers at the congested airports. This would not adversely impact existing airport revenues and would have a number of advantages:

- It would encourage resident passengers to use airport parking instead of being dropped off and picked up, which would increase airport revenues,
- By discouraging pick-up and drop off trips it would reduce vehicle trips generated by the airport on surrounding streets, and
- It would encourage more passengers to use public transportation or express buses from remote terminals, which would reduce vehicle miles of travel (VMT) on the region's arterial and freeway system.

It is unlikely that the volumes of air passengers at the other three alternate airports would be high enough to support dedicated express bus service, but it might be possible to serve San Bernardino International Airport as an extension of express bus service to Ontario Airport from Union Station or Van Nuys.

A more thorough discussion and listing of recommended ground access projects for each airport, both roadway and public transit projects, can be found in the Airport Ground Access Element in the Aviation technical appendix.

AIRPORT FINANCIAL STRATEGY

SCAG currently does not have a source of funding to provide subsidies for air service or to reduce airport fees and charges to the airlines. However, it can work with the various airport authorities in the region to establish a regional funding mechanism to support the development of airport facilities and infrastructure at the alternate airports using revenues generated at the congested airports as part of efforts to limit traffic growth at those airports. This is currently prohibited by the U.S. Department of Transportation regulations on airport revenue diversion, except in cases where both airports are operated by the same airport authority. SCAG may need to work with the Congressional representatives from the region to obtain legislation that allows joint programs by congested and uncongested airports, even if they are operated by different agencies. This should not be a controversial issue as long as it is sufficiently targeted and narrowly scoped. Congested airports have an interest in shifting traffic to less congested airports. For airports like LAX, which has a significant component of international traffic that generates more revenue than domestic flights, it may be more efficient to limit domestic flights that could be accommodated at other airports in the region, thereby freeing up capacity for more lucrative international flights.

AIRPORT MARKETING STRATEGY

SCAG does not currently have a source of funding to support marketing efforts to encourage air travelers in the region to consider using air service at the alternate airports. However, there is potential for the various airport authorities and the region's business community to develop an effective region-wide marketing effort to promote alternatives to the use of congested airports. This program could be funded through a variety of sources, such as airport parking and rental car transactions. SCAG would need to work with the various stakeholders to identify the benefits of an effective marketing program to all the region's airports and develop a consensus on how to fund and implement such a program.

AIRPORT POLICIES AND ACTION STEPS

This section outlines the additional policies and action steps associated with the aviation program contained in this RTP/SCS.

Regional Aviation Demand, Airport Infrastructure and Airport Ground Access

The following outlines key policies:

- The capability of uncongested secondary airports in the region to accommodate future aviation demand, where such growth is desired, should be preserved during periods of declining or stagnant air traffic
- Uncongested secondary airports in the region, where additional activity is desired, should be supported through appropriate incentives, marketing, and projects that enhance their capacity and regional accessibility
- The factors that most influence the growth in demand for air travel and the composition of the market should be identified
- A regional consensus should be developed on how best to support the development of new air services at uncongested secondary airports, where such growth is desired
- State-of-the-art aviation demand forecast methodologies should be employed to accurately forecast future aviation demand in the region's complex multi-airport system, and regional aviation demand forecasts should be regularly updated to address changing conditions
- Existing and planned regional highway and high-occupancy transit improvements should be leveraged to the extent possible to increase the regional accessibility of uncongested secondary airports, where traffic is desired, while minimizing improvement needs

The following outlines additional action steps to improve aviation and airport ground access in the region:

- Work with the region's airport operators to conduct a region-wide air passenger survey on an ongoing basis, designed to enhance and inform regional aviation demand forecasting and airport marketing efforts
- Develop an in-house aviation demand forecasting model that can support the development of future forecasts and allocation of forecast demand to airports in a complex multi-airport regional system. The model should be fully integrated with SCAG's regional transportation model, and should have airport ground access modeling capabilities

- Work with the region's airport operators and business community to define a region-wide marketing effort to promote alternatives to increased use of congested urban airports, consistent with the policy directions of airport operators
- Identify and define incentives that airports can effectively use to encourage airlines to provide new air service
- Establish a Regional Airport Ground Access Task Force to define potential projects and programs to improve airport accessibility to secondary airports, and reduce vehicular traffic generated by the large urban airports. The Task Force would help plan and promote rail and express bus service improvements and extensions to airports in the region, as well as an integrated regional system of remote air terminals ("FlyAways")

Airport Economics, Finance and Funding

The following policies are related to Airport Economics, Finance and Funding:

- New funding mechanisms should be identified for implementing regional infrastructure and airport ground access improvements
- Efforts by airport operators to develop strategic financial plans and explore non-aeronautical revenue-generating use of underutilized airport property should be supported
- Strategies that enhance the economic contribution of aviation to the regional economy should be identified and implemented

The following are recommended action steps:

- Sponsor and support new legislation that allows for more flexible use of airport revenues for off-airport ground access projects when requested by airport operators
- The Airport Ground Access Task Force should explore and develop potential new funding sources to support specific projects they have identified for improving regional airport accessibility
- Coordinate with the region's County Transportation Commissions and other transportation agencies to include joint funding of airport ground access projects identified in SCAG's Regional Transportation Plan in those agencies' plans
- Conduct regional aviation economic impact studies that identify the economic benefits to the region of different types and levels of regional aviation activity, and the likely economic impacts of implementing alternative policy options for serving future regional aviation demand

Airport Land Use Compatibility and Environmental Impacts

The following policies are related to Land-Use Compatibility and Environmental Impacts:

- Increased coordination between airport planning and land use planning on both regional and local levels should be promoted
- Regional support and coordination should be extended to the region's Airport Land Use Commissions
- Information on aviation environmental "best practices" should be shared and disseminated on a regional level
- Mechanisms for promoting cleaner and quieter aircraft at the region's airports should be identified and supported

The following are related action steps.

- Continue to pursue airport "smart growth" projects, using the Airport Smart Growth Framework developed for the Chino Airport Smart Growth Demonstration Project and applying it to different airport settings
- Incorporate airport "smart growth" land use principles in land use forecasts used by future regional transportation plans
- Periodically conduct information sharing forums for the region's Airport Land Use Commissions in cooperation with the Caltrans Division Aeronautics on "best practices" for airport land use compatibility planning
- Serve as a clearinghouse for information on aviation environmental "best practices" by airports for mitigating air, noise and water pollution and reducing greenhouse gas emissions
- Sponsor and support new legislation for creating substantial incentives for airlines to upgrade their aircraft fleets to cleaner, quieter aircraft and NextGen-compatible aircraft

Airspace Planning and New Technologies

The following are policies related to Airspace Planning and New Technologies:

- Modifications to the regional airspace system that reduce potential airspace conflicts, increase passenger safety, reduce costs to airlines, and reduce noise and air quality impacts should be identified and promoted
- Opportunities should be pursued for increasingly the region's airspace capacity, reducing potential future airspace conflicts and increasing airline efficiencies through new navigation and air traffic control technologies
- Existing and potential future airspace constraints should be incorporated into regional aviation planning

The following are related action steps:

- Continue to coordinate and provide input to the FAA's Optimization of Airspace and Procedures in the Metroplex (OAPM) Program for Southern California, and similar airspace modernization activities, including updated operational forecasts
- SCAG Aviation Technical Advisory Committee (ATAC) should continue and enhance its coordination with the Southern California Airspace Users Working Group (SCAUWG) on airspace issues of regional importance
- Continue to advocate that the region should serve as an early "test bed" for the phased implementation of new airspace technologies, including new satellite-based NextGen technologies developed by the FAA, that have the potential to reduce airspace conflicts and reduce noise and air quality impacts on local communities
- Explore how new navigation and air traffic control technologies can contribute to the region's airspace capacity, and should incorporate potential airspace constraints in aviation demand forecasts developed for future regional transportation plans

Goods Movement System

System Vision

Goods movement and freight transportation are essential to support the SCAG regional economy and quality of life. In 2010, over 1.15 billion tons of cargo valued at almost $2 trillion moved across the region's system.[1] Whether carrying imported goods from the San Pedro Bay Ports to regional distribution centers, supplying materials for local manufacturers, or delivering consumer goods to SCAG residents, the movement of freight provides the goods and services needed to sustain regional industries and consumer needs on a daily basis.

Working with its public and private sector partners, SCAG has established a vision for the goods movement system that is reflected in the 2012 RTP.

A world-class coordinated Southern California goods movement system that accommodates growth in the throughput of freight to the region and nation in ways that support the region's economic vitality, attainment of clean air standards, and the quality of life for our communities.

[1] FHWA Freight Analysis Framework: http://faf.ornl.gov/fafweb/Extraction0.aspx

Key Function and Markets

The goods movement system has developed in the SCAG region to serve a wide range of user markets. Each of these markets has unique performance needs that dictate the components of the system that they will use. A brief summary of these markets follows.

INTERNATIONAL TRADE

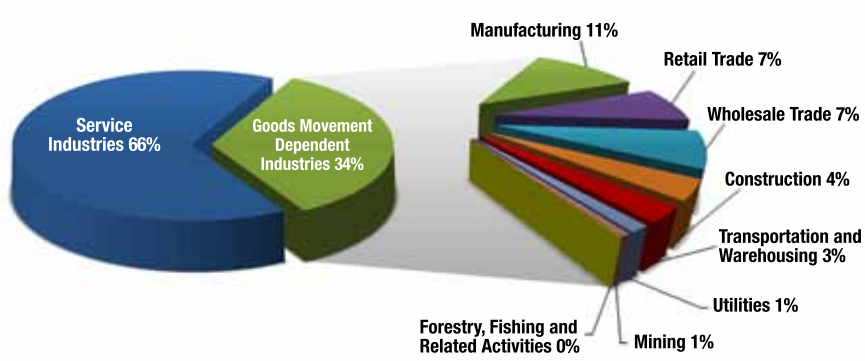
The SCAG region is the largest international trade gateway in the U.S. In 2010, the Los Angeles Customs District (which includes the Ports of Los Angeles, Long Beach and Hueneme and Los Angeles International Airport) handled $336 billion of maritime cargo and $78 billion of air cargo. In the same year, $10.4 billion of trade passed through the three international Ports of Entry (POEs) between the U.S. and Mexico in Imperial County. Trade moving through these international gateways is supported by an extensive transportation system including a highly-developed network of roadways and railroads, air cargo facilities, intermodal facilities, and an abundance of regional distribution and warehousing clusters.

LOCAL GOODS MOVEMENT – DEPENDENT INDUSTRY SUPPORT

An overwhelming majority of the goods movement activity in the SCAG region is generated by local businesses moving goods to local customers and supporting national domestic trade systems. These businesses are sometimes referred to as "goods movement-dependent industries." In 2010, these industries including manufacturing, wholesale and retail trade, construction and warehousing, employed over 2.9 million people throughout the region, and contributed $253 billion to the regional Gross Domestic Product (GDP) (**FIGURE 2.6**).[2] These industries are anticipated to grow substantially with manufacturing forecast to increase its GDP contribution 130 percent by 2035 and wholesale trade growing 144 percent.

Over 85 percent of truck trips in the SCAG region are related to goods movement-dependent industries.[3] Domestic manufacturers, wholesalers, and retailers also use the rail system and the air cargo system, though to a much more limited extent than international shippers.

FIGURE 2.6 GDP Contribution of Goods Movement Dependent Industries (2010)



LOGISTICS ACTIVITIES – INCLUDING WAREHOUSE AND DISTRIBUTION FACILITIES

The SCAG region hosts one of the largest clusters of logistics activity in North America. Logistics activities, and the jobs they provide, depend on a network of warehousing and distribution facilities, highway and rail connections, and intermodal rail yards. In addition to carrying needed inventories, many warehouses and distribution centers in the SCAG region provide transloading services, or the deconsolidation and reloading of freight from marine containers to domestic containers. Because domestic containers are larger than marine containers, importers and shippers are able to realize significant cost savings in transportation costs through economies of scale by transloading. The abundance of warehousing and distribution facilities, along with the highly-developed highway and rail network, serves as a competitive advantage for the SCAG region by attracting transloading activities that supply numerous local and regional jobs and revenue. Trucking access is particularly critical to warehousing and logistics businesses, and the transloading industry. However, distribution centers serving national demand also need access to rail intermodal terminals and air cargo facilities.

[2] SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy, REMI
[3] SCAG HDT Model

Components of the Regional Goods Movement System

EXHIBIT 2.7 depicts the region's multi-modal goods movement system. This system is comprised of the following major elements:

- **Seaports (Ports of Los Angeles, Long Beach and Hueneme):** Serving as the largest container port complex in the U.S., the Ports of Los Angeles and Long Beach handled 76 million tons, or $269 billion of imports, and 48 million tons, or $67 billion of exports in 2009.[4] Port Hueneme, in Ventura County, specializes in the import and export of automobiles, fresh fruit and produce and serves as the primary support facility for the offshore oil industry.
- **Land Ports:** The international border crossings in Imperial County are busy commercial land ports responsible for over $7 billion in imports and $5 billion in exports in 2007 driven by the maquiladora trade and movement of agricultural products.
- **Air Cargo Facilities:** The SCAG region is home to numerous air cargo facilities including Los Angeles International Airport (LAX) and Ontario International Airport (ONT) that together handled over 96 percent of the region's air cargo in 2010.
- **Interstate, Highways and Local Roads:** The region has about 53,400 road miles, 1,630 miles of which are interstate and freeway type.[5] Sections of I-710, I-605, SR-60, and SR-91 carry the highest volumes of truck traffic in the region, averaging over 25,000 trucks per day in 2008. Other major components of the regional highway network also serve significant numbers of trucks including I-5, I-10, I-15, and I-210, some with sections that carry over 20,000 trucks per day. These roads carry a mix of local, domestic trade, and international cargoes. The arterial roadway system also plays a critical role providing "last mile" connections to regional ports, manufacturing facilities, intermodal terminals and warehouses and distribution centers.
- **Class I Railroads:** Critical to the growth of the region's economy, the Burlington Northern Santa Fe Railway (BNSF) and Union Pacific (UP) carry international and domestic cargo to and from distant parts of the country. The BNSF mainline operates on the Transcontinental Line (and San Bernardino Subdivision) while the UP operates on Coast Line, Santa Clarita Line, Alhambra Line, LA Subdivision, and El Paso Line. Both railroads operate on the Alameda Corridor that connects directly to the San Pedro Bay Ports. The San Pedro Bay Ports also provide several on-dock rail terminals along with the six major intermodal terminals operated by the BNSF and UP.
- **Warehouse and Distribution Centers:** In 2008, the region had about 837[6] million square feet of warehousing space and another 185 million square feet in developable land.[7] An estimated 15 percent of the occupied warehouse space served port-related uses while the remaining 85 percent supported domestic shippers.[8] Many of these warehouses are clustered along key goods movement corridors (**EXHIBIT 2.7**). Port-related warehousing is concentrated in the Gateway Cities subregion while national and regional distribution facilities tend to be located in the Inland Empire.

4 America's Freight Transportation Gateways: Connecting Our Nation to Places and Markets Abroad. Research and Innovative Technology Administration, Bureau of Transportation Statistics, U.S. Department of Transportation, 2009

5 http://www.dot.ca.gov/hq/tsip/hpms/hpmslibrary/hpmspdf/2009PRD.pdf (last accessed on December 10, 2010

6 SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy

7 Potentially developable warehouse space is estimated based on land zoned and suitable for warehouse development

8 Some domestic warehouse space may include use by domestic shippers mixing internationally-sourced and domestically-sourced goods

EXHIBIT 2.7 Regional Goods Movement System

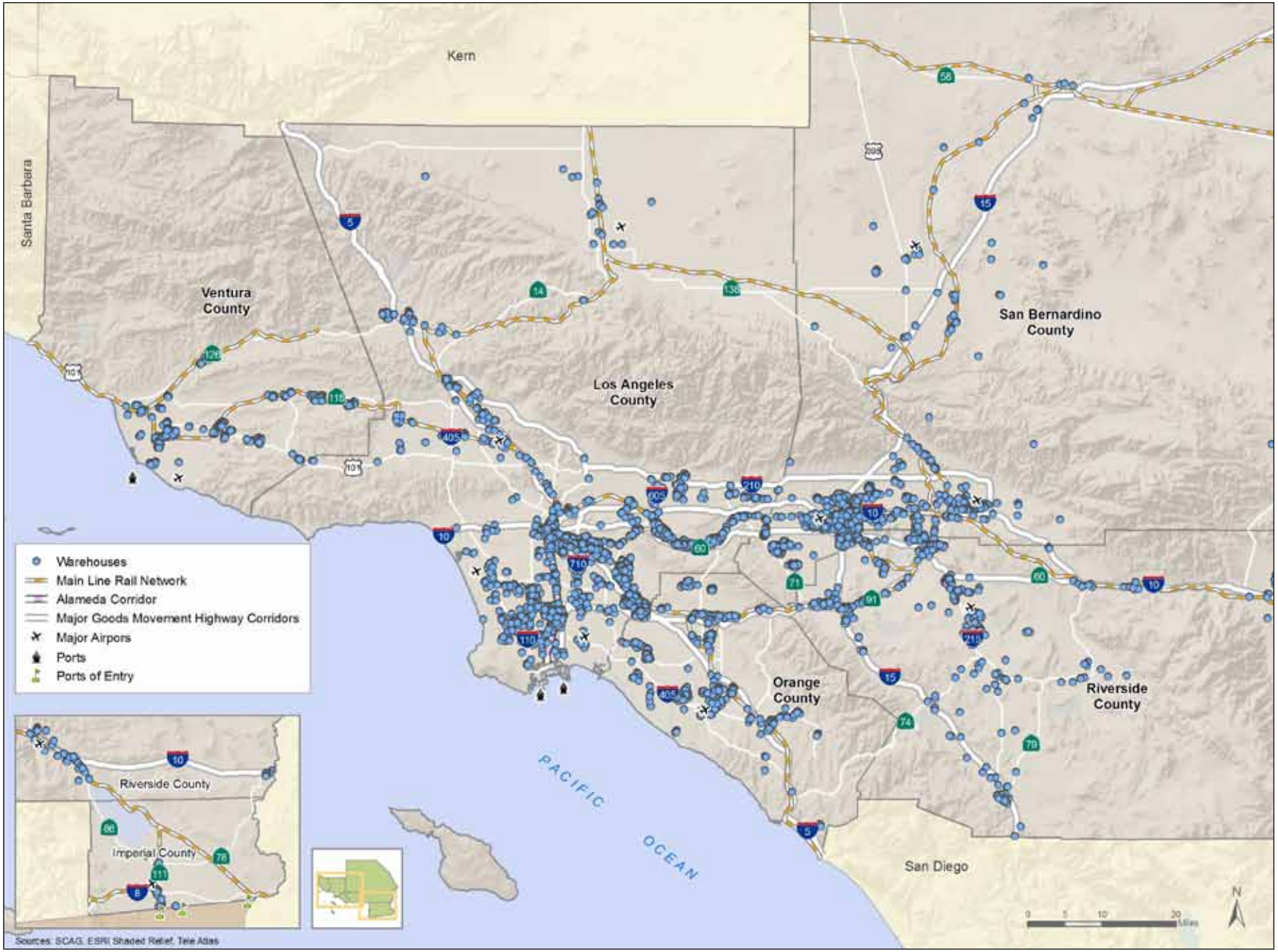


Image courtesy of the Port of Long Beach

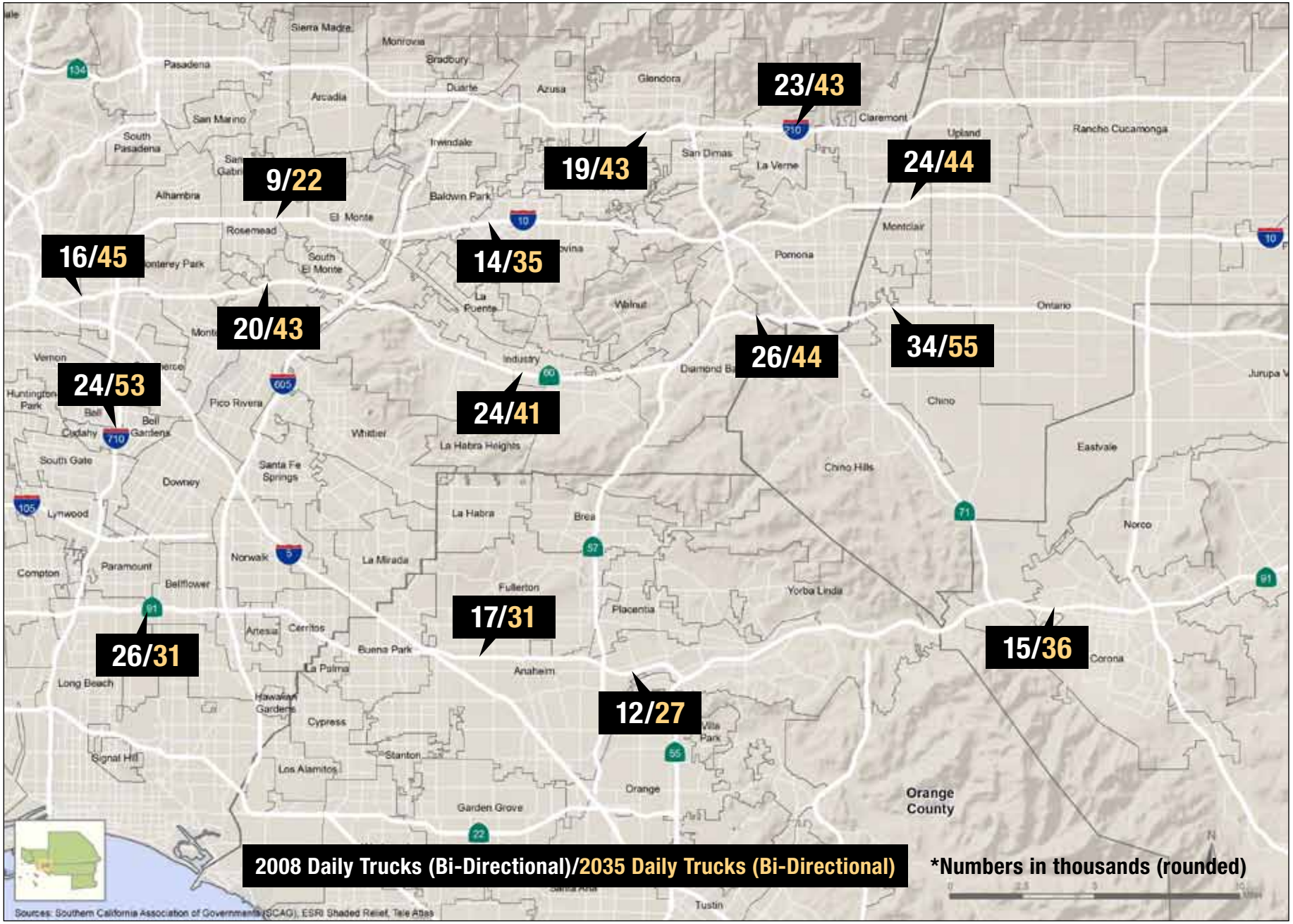
Goods Movement Trends and Drivers

There are a number of key trends that are anticipated to have major impacts on the goods movement system. These trends include:

- **Population and General Economic Growth:** Despite a current economic downturn brought on by challenging global conditions, population and employment in the SCAG region are expected to grow by approximately 24 percent and 22 percent by 2035, respectively. This growth will create increased consumer demand for products and the goods movement services that provide them. The increased demand will drive stronger growth in freight traffic on shared highway and rail facilities. Truck traffic on many key east-west corridors is anticipated to grow by 70–100 percent. Without an increase in capacity, truck and auto delay will increase substantially, truck-involved accidents will be more frequent, and the levels of harmful emissions will rise. Moreover, growing demand for commuter rail services on rail lines owned by the freight railroads will create needs for expanded capacity on these facilities.
- **Recovery and Expansion of International Trade:** Within the RTP time horizon, international trade is anticipated to recover with renewed demand for both import and export capabilities. Despite increasing competition with other North American ports and the expansion of the Panama Canal, the San Pedro Bay Ports anticipate cargo volumes to grow to 43 million containers by 2035[9]—more than tripling from current levels. This will create the need to expand marine terminal facilities, improve highway connections (particularly those connecting directly to the San Pedro Bay Ports, like I-710 and SR-47), and address on-dock and off-dock intermodal terminal capacities. If port-related rail traffic and commuter demand are to be satisfied, additional mainline capacity improvements will be required. Mitigating the impacts of increased train traffic on communities will continue be a considerable challenge.
- **Continued Expansion of Warehouse and Logistics Activity:** Southern California is an ideal place for expanded distribution and logistics activity and will continue to be a significant source of well-paying jobs in the region through 2035. Demand for port-related warehouse space is projected to grow at a faster pace than demand for domestic warehousing. As space near the San Pedro Bay Ports reaches capacity, port warehousing will push out to the Inland Empire. Expansion in national and regional distribution facilities is also likely to occur in the Inland Empire resulting in substantial congestion problems due to the increased truck volumes on regional highways. By 2035, the region may experience a shortfall of more than 228 million square feet in warehouse space relative to demand.
- **Air Quality Issues:** Much of the SCAG region does not meet federal ozone and fine particulate ($PM_{2.5}$) air quality standards. Goods movement is a major source of emissions that contribute to these regional air pollution problems (NO_X and $PM_{2.5}$). While emissions from goods movement are being reduced through efforts such as the San Pedro Bay Ports Clean Air Action Plan, these reductions are unlikely to be sufficient to meet regional air quality goals.

[9] San Pedro Bay Ports Container Forecast

EXHIBIT 2.8 Rising Truck Volumes in the Region



Goods Movement Strategy

To realize the benefits of efficient and sustainable goods movement, it is critical to identify strategies and projects that address expected growth trends. Recent regional efforts have focused on strategies to develop a coherent, refined, and fully integrated regional goods movement system. Following the completion of the 2008 RTP, SCAG initiated the Comprehensive Regional Goods Movement Plan and Implementation Strategy. This effort, involving diverse regional stakeholders, is intended to identify a multimodal regional freight plan that integrates existing strategies and projects with newly developed regional initiatives advanced through the study. Some of these strategies are highlighted below.[10]

REGIONAL CLEAN FREIGHT CORRIDOR SYSTEM

In past RTPs, SCAG has envisioned a system of truck-only lanes extending from the San Pedro Bay Ports to downtown Los Angeles along the I-710, connecting to an east-west segment, and finally reaching the I-15 in San Bernardino County. Such a system would address the growing truck traffic on core highways through the region and serve key goods movement industries in a manner that mitigates negative impacts on communities and the environment. Truck-only freight corridors are effective as they add capacity in congested corridors, improve truck operations and safety by separating trucks and autos, and provide a platform for the introduction and adoption of zero-emission technologies. Significant progress towards a regional freight corridor system has continued as evidenced by recent work on an environmental impact report (expected to be completed in 2012) for the I-710 segment. As part of the 2012 RTP, SCAG includes a refined concept for the east-west corridor component of the system and connections to an initial segment of I-15.

While numerous potential east-west freight corridor options were examined, the 2012 RTP identifies a corridor concept to be explored further that could fall within a five-mile span of the route illustrated in **EXHIBIT 2.9**.

EXHIBIT 2.9 Potential East West Freight Corridor

Non-freeway alignments may provide an opportunity to move the facility away from neighborhoods and closer to industrial uses that it would serve. Approximately 50 percent of the region's warehousing space, and 25 percent of its manufacturing employment lies along the identified route. After adoption of the 2012 RTP, it is anticipated that significant additional study of alignments will be conducted, including an alternatives analysis completed as part of a full environmental review.

The East-West Freight Corridor would carry between 58,000 and 70,000 trucks per day—trucks that would be removed from adjacent general purpose lanes and local arterial roads. As highlighted in **TABLE 2.8**, the corridor would benefit a broad range of goods movement markets: between 25–40 percent of the trucks would be port-related, almost 40 percent would serve local goods movement dependent industries, and the remainder would support domestic trade. Truck delay would be reduced by up to 11 percent while

[10] For more detailed information on the SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy, please see the Goods Movement Technical Appendix.

speeds for autos on SR-60 would be improved by 11–12 percent. Truck traffic on the SR-60 general purpose lanes would be reduced by 42–82 percent, depending on location, by as much as 33 percent on I-10, and by as much as 20 percent on adjacent arterials. Separating trucks and autos would also reduce truck involved accidents on east-west freeways that currently have some of the highest accident levels in the region (20–30 accidents a year on certain segments).[11]

For the 2012 RTP, the regional freight corridor system also includes an initial segment of I-15 that would connect to the East-West Freight Corridor, reaching just north of I-10. Additional study will be undertaken to complete specification of the I-15 component of this project.

TABLE 2.8 Benefits of an East-West Corridor Strategy

Benefits of an East-West Corridor Strategy	
Mobility	▪ Truck delay reduction of approximately 11% ▪ All traffic delay reduction of approximately 4.3% ▪ Reduces truck volumes on general purpose lanes—42–82% reduction on SR-60
Safety	▪ Reduced truck/automobile accidents (up to 20–30 per year on some segments)
Environment	▪ 50% clean truck utilization removes: 2.4 tons NO_X, 0.08 tons $PM_{2.5}$, and 2,001 tons CO_2 daily (2.7–6% of region's total)
Community	▪ Preferred alignment has least impact on communities ▪ Removes traffic from other freeways ▪ Zero-emissions technology (ZET)—reduces localized health impacts
Economic	▪ Supports mobility for goods movement industries—comprise 34% of SCAG regional economy and jobs

[11] SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy

BOTTLENECK RELIEF STRATEGY

In recent analysis of critical issues affecting the trucking industry conducted by the American Transportation Research Institute (ATRI), traffic congestion ranked near the top in 2011 after being less of a concern in 2009–2010 as a result of the economic downturn.[12] Besides causing delays to other highway users, heavy truck congestion results in wasted labor hours and fuel. In 2010, it was estimated that the cost of truck congestion in 439 major urban areas was approximately $23 billion.[13] Truck congestion in urban areas within the SCAG region resulted in approximately $2.6 billion in costs.[14] Given that driver wages and fuel costs represent over 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," and generally have significantly degraded localized air quality caused by increased idling from passenger vehicles and trucks.

A coordinated strategy to address the top-priority truck bottlenecks is a cost-effective way to improve the efficiency of goods movement in the SCAG region. Bottleneck projects may also be easier to implement since they are often less intrusive than other types of projects, contribute to the region's environmental goals (by reducing emissions "hot spots"), and result in substantial, tangible benefits to commuters and goods movement industries alike.

SCAG recently studied key regional truck bottlenecks and associated projects. Through this analysis, project concepts that may address the highest priority truck bottlenecks and have the most significant impact on delay were identified and continue to be evaluated. The 2012 RTP allocates an estimated $5 billion to address goods movement bottleneck relief strategies. Examples of bottleneck relief strategies include ramp metering, extension of merging lanes, ramp and interchange improvements, capacity improvements, and auxiliary lane additions. Annually, 3.6 million hours of heavy truck delay during the most congested time periods on area roadways could be eliminated if the highest priority truck bottlenecks in the region are addressed.

[12] http://www.atri-online.org/2011_top_industry_issues.pdf
[13] Texas Transportation Institute 2011 Urban Mobility Report
[14] Texas Transportation Institute 2011 Urban Mobility Report. Urban areas as defined in the report include Los Angeles-Long Beach-Santa Ana, Riverside-San Bernardino, Lancaster-Palmdale, Bakersfield, Indio-Cathedral City-Palm Springs, and Oxnard-Ventura.

RAIL STRATEGY

The health of the Southern California economy depends on an efficient railroad system that has the capacity to accommodate projected growth in international and domestic freight rail. The railroad system in the SCAG region provides a critical connection between the largest port complex in the country and producers and consumers throughout the U.S. Over half of the international cargo arriving at the San Pedro Bay Ports utilizes rail (including on, near- and off-dock). Railroads also serve a myriad of domestic industries, predominantly for long-haul freight leaving the region. The extensive rail network in the SCAG region is a critical link in the regional supply chain offering shippers the ability to move large volumes of goods over long distances at lower costs versus other transportation options.

The SCAG region is served by two Class I freight railroads: Burlington Northern Santa Fe Railway (BNSF) and Union Pacific Railroad (UP). BNSF operates a single main line extending from connections to the Alameda Corridor near downtown Los Angeles to Barstow with a terminus in Chicago. UP operates two main lines between downtown Los Angeles and the City of Colton. Both railroads share trackage rights on rail segments between West Riverside and Barstow through existing agreements. The Alameda Corridor, a 20-mile, multi-track freight rail expressway, connects the San Pedro Bay Ports with railyards and BNSF and UP rail lines in downtown Los Angeles.

The railroad network connects the SCAG region with many locations in the U.S. Major rail hubs in Illinois (Chicago in particular) and Texas constitute over 50 percent of total tonnage moving to and from the SCAG region. In order to deliver the benefits of rail transport to the region and the nation, the Southern California freight rail system needs to address future capacity needs on both the Class I mainlines and at intermodal terminals where capacity is likely to be strained in light of future demand. The investments needed to meet these capacity needs will be made largely by the private railroads.

At the same time that the rail system is expanding to meet future demand, rail emissions need to be reduced further in order to contribute to the region's goal of meeting ambient air quality standards for the South Coast Air Basin. In addition, issues of grade crossing delay and safety in communities will need to be addressed. Lastly, growth in passenger rail services is an important component of regional mobility strategies and this will require expanded capacity. To the extent that passenger rail shares space on the freight rail system, the ability of the public sector to achieve regional goals within this capacity constrained environment will be challenged. SCAG's recent analysis of train volumes for selected rail segments is shown in **TABLE 2.9**.[15]

TABLE 2.9 Regional Train Volumes (Freight and Passenger)

Rail Line	Segment	2010	2035
BNSF San Bern Sub	Hobart to Fullerton	85	159
	Atwood to W. Riverside	59	133
	W. Riverside to Riverside	90	190
UP Alhambra Sub	LA to El Monte	22	48
	Industry to Pomona	28	54
	Kaiser to W. Colton	29	60
UP LA Sub	LA to Pomona	25	54
	Mira Loma to W. Riverside	30	58
BNSF Cajon Sub	Keenbrook to Silverwood	70	142
UP Yuma Sub	Colton to Indio	44	91

As part of the Comprehensive Regional Goods Movement Plan and Implementation Strategy, SCAG worked closely with regional stakeholders to develop a set of rail strategies aimed at increasing freight and passenger mobility, promoting job creation and retention, improving safety, and mitigating environmental impacts.

Several different components comprise this rail package:

Mainline rail improvements and capacity expansion: This includes rail-to-rail grade separations, 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.

[15] These forecasts are based upon simulation analysis conducted for planning purposes only as part of the SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy. BNSF and UP do not forecast train volumes through 2035.

Rail yard improvements: This includes upgrades to existing railyards as well as construction of new yards. These projects would provide vital improvements to the region's ability to handle the projected growth in cargo volumes.

Rail operation safety improvements: This includes technology such as Positive Train Control (PTC) that can greatly reduce the risk of rail collisions.

Grade separations of streets from rail lines: These projects reduce vehicular delay, improve emergency vehicle access, reduce the risk of accidents, and lower emissions levels.

Key rail projects in the 2012 RTP include:

- Rail-to-rail grade separation at Colton Crossing
- Additional mainline tracks for the BNSF San Bernardino and Cajon Subdivisions and the UPRR Alhambra and Mojave Subdivisions
- Southern California International Gateway (SCIG)
- Modernization of the Intermodal Container Transfer Facility (ICTF)
- Highway-rail grade separations
- Port-area rail improvements, including on-dock rail enhancements

The benefits of the rail strategies to the region are considerable, and include mobility, safety, and environmental gains. As shown in **TABLE 2.10**, these strategies could eliminate almost 6,000 hours of vehicle delay per day at grade crossings, decrease emissions (NO_X, CO_2, and $PM_{2.5}$) by almost 23,000 lbs. per day, and reduce overall train delay to 2005 levels.

TABLE 2.10 Benefits of the SCAG Regional Rail Strategy

Mobility	▪ Reduces train delay to 2005 levels ▪ Provides mainline capacity to handle projected demand in 2035 (includes 43.2 million TEU port throughput) ▪ Eliminates 5,782 vehicle hours of delay per day at grade crossings in 2035
Safety	▪ Eliminates 69 at-grade railroad crossings
Environment	▪ Reduces 22,789 lbs of emissions per day (CO_2, NO_X and $PM_{2.5}$ combined) from idling vehicles at grade crossings ▪ Facilitates on-dock rail ▪ Reduces truck trips to downtown rail yards and associated emissions

GOODS MOVEMENT ENVIRONMENTAL STRATEGY

In Southern California, goods movement and air quality are inextricably linked. 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. Goods movement is a major source of emissions that contributes to these regional air pollution problems as well as localized air pollution "hot spots" that can have adverse health impacts.

Goods movement is also a major source of greenhouse gas (GHG) emissions that contribute to global climate change. Although reduction in GHG emissions from goods movement is not required under California Senate Bill 375 (which focuses solely on light-duty vehicle emissions), the State has established GHG reduction goals under California Assembly Bill 32. Clean goods movement activities can contribute to these goals. As such, the region's goods movement strategy is complementary to sustainable communities planning.

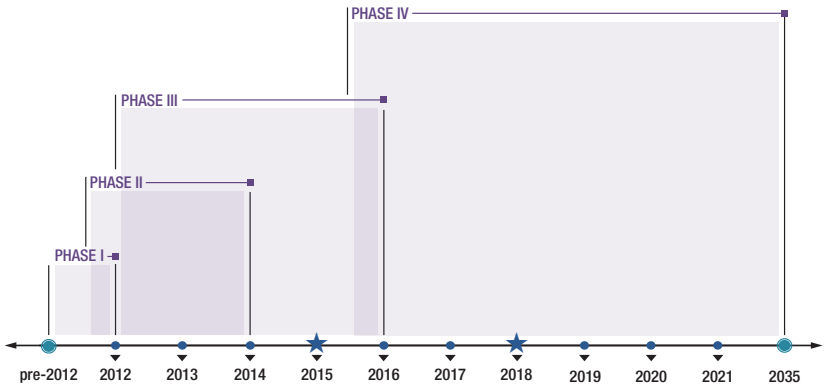
The two air pollutants of greatest concern in Southern California are nitrogen oxides (NO_X) and fine particulate matter ($PM_{2.5}$). The South Coast Air Basin is classified as an extreme nonattainment area per the federal ambient ozone standard, with a required attainment date of 2023. By approximately 2031, a second more stringent federal ozone standard must be attained. The federal Clean Air Act requires the region to demonstrate timely attainment of these standards or federal sanctions may result such as interruption or curtailment of funding for transportation projects. To attain the federal ozone standards, the region will need broad deployment of zero and near-zero emission transportation technologies in the 2023 to 2035 timeframe. The 2012 RTP includes a path forward to achieve this objective. Integration of advanced technologies into the region's goods movement strategies can contribute to other regional objectives such as energy security, economic development opportunities, and potentially broader public support for infrastructure initiatives.

The 2012 RTP 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, upgrading switcher locomotive engines could reduce 1 to 3 percent of regional rail emissions. Additionally, heavy-duty hybrid trucks are already in use, but market penetration can be increased. In the longer term, the strategy focuses on a more fundamental shift in technology—taking critical steps toward phased implementation of a zero-emission or near zero-emission freight system. Two of many promising technologies that merit further investigation are electric trucks and electrified rail systems. Additionally, SCAG's planning efforts are cognizant of the need to incorporate evolving technologies into new infrastructure. These include technologies to fuel vehicles, as well as to charge batteries and provide power.

Both near-term and long-term approaches require substantial investment. A path forward to development and deployment of a zero and near-zero emission freight system follows and is summarized in **FIGURE 2.7**. This path is discussed in greater detail in the Technical Appendix.

Phase I: Project Scoping—current research and technology testing of some vehicle prototypes constitutes Phase 1.

FIGURE 2.7 Timeline to Implement a Zero & Near Zero Emission Freight System



Major Milestones
- *2012 – Identify potential funding to support truck, wayside power and rail evaluation and prototype demonstration efforts; incorporate into financially constrained RTP as appropriate*
- *2012 - Implement plan of advocacy to secure action by federal or other governments*
- *2012-2014- Continue to evaluate truck technology implementation and funding mechanisms*
- *2012-2013 – Continue to evaluate practicability of applying existing electrified rail technologies, and evaluate funding and implementation mechanisms*
- *2015-2016 – Incorporate decisions on wayside power and technology direction, including strategy, funding and timeframe into 2016 RTP update and SIP revisions; if existing rail technologies are practicable, identify technologies, infrastructure and implementation mechanisms in RTP update and SIP*
- *2016- Begin deployment of appropriate zero emission trucks and continue operational demonstration*
- *2018-2020 – If existing rail applications were not practicable, resolve need for new rail technologies and incorporate planning into the 2020 RTP*

Phase II: Evaluation, Development, and Prototype Demonstrations—convene working groups and increase understanding of logistics. Evaluate, develop and test prototype trucks and rail locomotives, as well as wayside power options. 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—Truck fleet evaluation testing and advanced technology locomotive demonstrations.

Phase IV: Full Scale Demonstrations and Commercial Deployment—includes implementation of regulatory and market mechanisms needed to launch commercialization.

It is important that the region work collaboratively to pursue advanced technologies and secure funding for their development and deployment. Although several regional forums currently exist, SCAG anticipates building on these efforts by establishing a logistics working group with key stakeholders. Participants may include government agencies, logistics industry representatives, and original equipment manufacturers (OEMs).

Modeling of environmental strategies has determined that significant emissions benefits could be achieved from implementation of different zero and near-zero emission environmental strategies. As summarized in **TABLE 2.11**, the zero-emission East-West Freight Corridor would eliminate 4.7 tons of NO_X, 0.16 tons of $PM_{2.5}$, and 4,000 tons of CO_2 emissions daily, and would set the stage for broader regional deployment of zero-emission technologies and additional emission reductions. Full electrification of the rail system, though still a concept at this point, would remove comparable amounts of NO_X, $PM_{2.5}$, and CO_2. Regionally, a 20 percent market penetration of plug-in hybrid trucks would achieve a reduction of 8.3 tons of NO_X, 0.16 tons of $PM_{2.5}$, and 3,200 tons of CO_2 daily.

TABLE 2.11 Environmental Benefits

Strategy	Impact		
	NO_X	$PM_{2.5}$	CO_2
East-West Freight Corridor with 100% Zero-Emission Vehicles (ZEVs)	4.7	0.16	4,000
Full Railroad Main Line Electrification*	10.4	0.19	2,400
20% Penetration of Plug-in Hybrid Trucks	8.3	0.16	3,200

* Further evaluation is required to determine feasible options for implementation of rail electrification or other zero-emission rail systems.

2012 RTP Environmental Mitigation

SAFETEA-LU, the reauthorization of TEA-21, was enacted into law by President Bush on August 10, 2005. Pursuant to Section 6001 of this legislation, statewide or metropolitan long-range plans must include a discussion 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." As such, the RTP includes a discussion of mitigation measures in order to comply with this requirement. As a public agency in California, SCAG first and foremost fulfills mitigation requirements by complying with CEQA.

In addition, as part of the planning process, states and 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 a long-range transportation plan." They also must consider, if available, "conservation plans and maps" and "inventories of natural or historic resources."

California law requires SCAG to prepare and certify a Program Environmental Impact Report (PEIR) prior to adopting the RTP. The PEIR evaluates the environmental impacts of the RTP and proposes specific measures to mitigate impacts to the maximum extent feasible. Although the 2012 RTP, in and of itself, is a plan to mitigate the transportation-related effects of population growth, such as traffic congestion and poor air quality, because the transportation improvements can result in additional growth, the PEIR goes further by recommending additional environmental mitigation at the program level for those resource areas that would be affected by the Plan (and associated growth) such as land use, biological resources and open space, water and greenhouse gases.

The section below summarizes the mitigation program. A list of all the mitigation measures included in the 2012 RTP PEIR will be included in the Environmental Mitigation Report of the Final 2012 RTP. The general purpose of the mitigation measures included in the PEIR is to identify how to protect the environment, improve air quality, and promote energy efficiency in concert with the proposed transportation improvements and related planning. This provides a framework through which implementing agencies and subregions can address the environmental impacts of RTP projects, while implementing RTP goals and policies.

Mitigation Strategies

The PEIR provides three different categories of mitigation measures for consideration and implementation, as indicated below:

- Regional Mitigation Measures: Within this category are mitigation measures that can be implemented by SCAG at the regional level. These measures are generally aimed at gathering additional information that can assist in measuring impacts and determining appropriate mitigation and promoting policies and programs that would reduce impacts.
- Local Mitigation Measures: The second type of mitigation measures are those that would be implemented at the local level by individual cities and counties. These measures can strengthen planning documents to ensure the provision of appropriate mitigation measures in the planning process.
- Project-Specific Mitigation Measures: This category includes project-specific mitigation measures that are required by the appropriate agency under whose jurisdiction the project falls (i.e., city or county). As a programmatic document, many of the measures in the PEIR refer to performance standards because site-specific conditions cannot reasonably evaluated at the programmatic level.

Conservation Planning Policy

SAFETEA-LU requires that the RTP contain a discussion of 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 environmental functions affected by the plan [Sec. 6001(i)(2)(B)(i)]. As such, this is being addressed in the RTP and is separate and distinct from the mitigation measures addressed in the PEIR. SCAG could demonstrate progress and satisfy SAFETEA-LU requirements through the large-scale acquisition and management of critical habitat to mitigate impacts related to future transportation projects.

Suggested steps to develop a conservation policy of this type could include the following:

- Engage in a strategic planning process to determine the critical components and implementation steps for identifying and addressing open space resources
- Identify and map regional priority conservation areas based on the most recent land use data for future consideration and potential inclusion in future plans.
- Engage with various partners, including CTCs, to determine priority conservation areas and develop an implementable plan.
- Develop regional mitigation policies or approaches for the 2016 RTP.

This strategy supports natural land restoration, conservation, protection and acquisition offering Greenhouse Gas (GHG) emissions reduction benefits. Post-RTP strategic planning efforts would include addressing various pertaining to this proposed approach such as identifying appropriate agencies to partner with and determining specific mapping parameters (for example, geographic scale).

In addition, this type of strategic planning approach could also be applied to address impacts to other resource areas.

Summary of the Environmental Mitigation Program

As required by SAFETEA-LU, the RTP includes an environmental mitigation program that links transportation planning to the environment. Building on its strong commitment to the environment as demonstrated in the 2008 PEIR, SCAG's mitigation program creates an implementation strategy to show varying levels of authority (state, regional, and local). 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 the proposed approaches to mitigate impacts to these areas.

BIOLOGICAL RESOURCES AND OPEN SPACE

The RTP Programmatic Environmental Impact Report (PEIR) includes two regional scale maps that identify sensitive environmental resources, such as protected lands and sensitive habitats.

According to the Federal Highway Administration, there are more than 3.9 million centerline miles of public roads that span the United States. Each day, an estimated one million animals are killed on roads, making road kill the greatest human cause of wildlife mortality in the country. As in previous RTPs, the 2012 RTP 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. 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.

The biological resources mitigation program includes the following types of measures:

- Planning transportation routes to avoid/minimize removal of native vegetation,displacement of wildlife, and impacts to regionally and locally significant habitat types such as oak woodlands, vernal pools, estuaries, lagoons, and other riparian areas
- Including provisions for habitat enhancement such as mitigation banking, improving/retaining habitat linkages, preserving wildlife corridors and wildlife crossings to minimize the impact of transportation projects on wildlife species and habitat fragmentation
- Conducting appropriate surveys to ensure no sensitive species' habitator special-status natural communities is unnecessarily destroyed
- Avoiding and minimizing impacts to wildlife activities (such as breeding, nesting, and other behaviors) during construction of the project by avoiding construction during critical life stages or sensitive seasons
- Avoiding and minimizing impacts to habitat during project construction through actions such as fencing off sensitive habitat, minimizing vehicular accessibility, and salvaging native vegetation and topsoil
- Minimizing further impacts to wildlife and their habitats after project construction by replanting disturbed areas; providing vegetation buffers at heavily trafficked transportation facilities; and restoring local, native vegetation

LOCATIONS FOR MITIGATION

As part of the 2008 Regional Comprehensive Plan, SCAG mapped locations of the protected and unprotected areas in relation to wildlife linkages, linkage design areas, park and recreation areas (from SCAG's 2008 land use inventory), agricultural lands, and developed lands. Together, these form the region's open space infrastructure. Maps were created showing the distribution of protected and unprotected lands within the SCAG region and its vicinity. It also shows the location of county-level conservation efforts such as Habitat Conservation Plans (HCPs) and Natural Communities Conservation Plans (NCCPs). Although portions of these areas fall within the "protected" category, large portions of habitat within these areas remain "unprotected" and therefore should still be considered for mitigation activities. These maps will be updated as a function of post-RTP planning efforts.

Specifically, those areas that are "unprotected" could be possible locations for mitigation. SCAG does not have the authority to purchase or manage lands. Conservation of these areas will be achieved through already-established programs. SCAG will continue to work with its regional partners to help facilitate conservation.

Types of Mitigation Activities

The mitigation program of the 2012 RTP generally includes strategies to reduce impacts where transportation and sensitive lands intersect and also encourages smart land use strategies that maximize the existing system and eliminate the need for new facilities that might impact open space and habitat. Potential mitigation programs include better planning of transportation projects to avoid or lessen impacts to open space, recreation land, and agricultural lands through information and data sharing, increasing density in developed areas and minimizing development in previously undeveloped areas that may contain important open space.

The mitigation program also emphasizes the importance of integrating consideration of wildlife and habitat into the design of transportation facilities in those areas where impacts cannot be avoided. SCAG encourages project sponsors to review Ventura County's Wildlife Crossing Guidelines and FHWA's Critter Crossings. Both documents provide examples of context-sensitive solutions (CSS) which is a way of involving all stakeholders to develop transportation facilities that fit their physical setting and preserve scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will exist. CSS principles include the employment of early, continuous, and meaningful involvement of the public and all stakeholders throughout the project development process. Additional information on CSS is available on FHWA's website at: http://www.fhwa.dot.gov/context/index.cfm

In summary, the biological resources and open space mitigation programs include the following types of measures:

- Identifying open space areas that can be preserved and developing mitigation measures such as mitigation banking, transfer of development rights (for agricultural lands), and payment of in lieu fees
- Updating General Plan information from cities to provide the most recent land use data to the region
- Coordinating with cities and counties to implement growth strategies that maximize the existing transportation network
- Evaluating project alternatives and alternative route alignments where projects intersect with sensitive habitats
- Integrating the planning of transportation facilities with context-sensitive design elements such as wildlife crossings

GREENHOUSE GASES

California is the fifteenth largest emitter of GHGs on the planet. The transportation sector, primarily, cars and trucks that move goods and people, is the largest contributor with 36.5 percent of the State's total GHG emissions in 2008. On road emissions (from passenger vehicles and heavy duty trucks) constitute 93 percent of the transportation sector total. In order to disclose potential environmental effects of the RTP, SCAG has prepared an estimated inventory of the region's existing GHG emissions, identified mitigation measures, and compared alternatives in the PEIR.

The GHG mitigation program includes, but is not limited to, the following types of measures:

- Land use changes included in the SCS that reduce number and length of trips
- Encouragement of green construction techniques such as using the minimum amounts of GHG emitting construction equipment;
- Public outreach campaigns publicizing the importance of reducing GHG emissions
- Promotion of pedestrian and bicycle as modes of transportation

AIR QUALITY

The 2012 RTP 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. SCAG's vision includes the introduction of a high-speed, high-performance regional transport system that may potentially reduce airport and freeway congestion and provide an alternative to the single-occupancy automobile. In order to disclose potential environmental effects of the RTP, SCAG has prepared an estimated inventory of the region's emissions, identified mitigation measures, and compared alternatives in the PEIR. The mitigation measures seek to achieve the maximum feasible and cost-effective reductions in emissions.

The air quality mitigation program includes, but is not limited to, the following types of measures:

- ARB measures that set new on-road and off-road engine standards and accelerate turnover of higher emitting engines from the in-use fleet;
- Project specific measure to reduce impacts from construction activities such as the use of water and dust suppressants and restrictions on trucks hauling dirt, sand and soil; and
- Incorporating planting of shade trees into construction projects where feasible

In addition, the RTP includes Transportation Control Measures (TCMs), which are those mitigation measures that reduce congestion and improve air quality in the region.

TRANSPORTATION AND SAFETY

The 2035 transportation model takes into account the population, households, and employment projected for 2035, and therefore the largest demand on the transportation system expected during the lifetime of the 2012 RTP. 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 2012 RTP on transportation resources. The regional growths, and thus, cumulative impacts, are captured in the VMT, VHT, and heavy-duty truck VHT data.

Implementation of the 2012 RTP/SCS includes implementation of a series of projects which are described in the RTP. The 2035 transportation system performance is compared to the performance of the existing (2011) system for the purpose of determining the significance of impacts. 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 2012 PEIR. The mitigation program for the 2012 RTP aims for extensive coordination, collaboration and flexibility among all of the agencies and organizations involved in planning, mitigation, response and recovery.

The transportation and safety mitigation program includes the following types of measures:

- Increasing rideshare and work-at-home opportunities to reduce demand on the transportation system
- Investments in active transportation and maximizing the benefits of the land use-transportation connection
- Transportation Demand Management (TDM) measures
- Goods movement capacity enhancements
- Key transportation investments targeted to reduce heavy-duty truck delay
- Establishing transportation infrastructure practices that promote and enhance security
- Helping to enhance the region's ability to deter and respond to terrorist incidents, and human-caused or natural disasters by strengthening relationships and coordination with transportation agencies
- Working to enhance emergency preparedness awareness among public agencies and with the public at large

POPULATION AND HOUSING

Transportation projects including new and expanded infrastructure are necessary to improve travel time and can enhance quality of life for those traveling throughout the region. However, these projects also have the potential to induce population growth in certain areas of the region. Although SCAG does not anticipate that the RTP would affect the total growth in population in the region, the RTP has the ability to affect the distribution of that growth.

In addition to induced population growth, transportation projects in the RTP also have the potential to divide established communities, primarily through acquisition of rights-of-way.

The population and housing mitigation program includes the following types of measures:

- Develop advisory land use policies and strategies that utilize the existing transportation network and enhance mobility while reducing land consumption
- Require project implementation agencies to provide relocation assistance, as required by law, for residences and businesses displaced
- Require project implementation agencies to design new transportation facilities that consider existing communities

LAND USE

The 2012 RTP contains transportation projects to help more efficiently distribute population, housing, and employment growth. These transportation projects are generally consistent with the county- and regional-level general plan data available to SCAG; however, general plans are not updated consistently. In addition, the RTP's horizon year of 2035 is beyond the timeline of even the most recent general plans.

The land use mitigation program includes the following types of measures:

- Encourage cities and counties to update their general plans and provide the most recent plans to SCAG
- Work with member cities to ensure that transportation projects are consistent with the RTP and general plans
- Work with cities and counties to ensure general plans reflect RTP policies

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 RTP 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.

In summary, the aesthetics mitigation program includes the following types of measures:

- Require project implementation agencies to implement design guidelines to protect views of scenic corridors Require project implementation agencies to use construction screens and barriers that complement the existing landscape
- Require project implementation agencies to complete design studies for projects in designated or eligible scenic highways
- In visually sensitive areas, require local land use agencies to apply development standards and guidelines that maintain compatibility

PUBLIC SERVICES AND UTILITIES

Impacts to public services from the 2012 RTP 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.

The 2012 RTP's influence on growth could contribute to impacts on public schools, requiring additional teachers and educational facilities. Additional population growth could result in a greater demand for solid waste disposal facilities. Furthermore, collecting solid waste and transporting it to an available disposal facility would impact roads and railways.

In summary, the public services mitigation program includes the following types of measures:

- Require the project implementation agencies to identify police protection, fire service, emergency medical service, waste collection and public school needs and coordinate with local officials to ensure that the existing public services would be able to handle the increase in demand for their services
- Require the project implementation agencies to identify the locations of existing utility lines and avoid all known utility lines during construction
- Encourage green building measures to reduce waste generation and reduce the amount of waste sent to landfills
- Encourage the use of fire-resistant materials and vegetation when constructing projects in areas with high fire threat

As the region continues to add more people, households and jobs, the demand for energy will continue to grow. Every day, the SCAG region consumes more than 23 million gallons of oil and the SCAG region's vehicle fuel consumption has increased 20 percent over the last ten years. In the face of this growth in energy demand and concerns about future oil supplies, there is the mounting realization that we are living in an energy-constrained world. As such, the 2012 RTP includes strategies to reduce Vehicle Miles Traveled (VMT), and as a result, per capita energy consumption from the transportation sector. The PEIR also includes mitigation measures relating to energy designed to reduce consumption and increase the use and availability of renewable sources of energy in the region. Since these measures not only reduce energy consumption but also reduce GHG emissions they are addressed above under GHG.

GEOLOGY, SOILS, AND SEISMICITY

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-induced 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.

The geological mitigation program includes the following types of measures:

- Employing appropriate grading, construction practices, siting, and design standards, such as adherence to the California Building Code and State of California design standards
- Obtaining site-specific geotechnical data from qualified geotechnical experts
- Complying with all relevant local, state, and federal construction and design requirements for structures located on or across Alquist-Priolo Fault Zones and other local faults

CULTURAL RESOURCES

Impacts to 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. Adverse changes include the destruction of culturally and historically (recent or geologic time) significant and unique historical, archaeological, paleontological, and geological features.

The cultural resources mitigation program includes the following types of measures:

- Obtaining consultations from qualified cultural and paleontological resource experts to identify the need for surveys and preservation of important historical, archaeological, and paleontological resources
- Implementing design and siting measures that avoid disturbance of cultural and paleontological resource areas, such as creating visual buffers/landscaping or capping/filling the site to preserve the contextual setting of the resource
- Monitoring construction activity in areas with moderate to high potential to support paleontological resources and overseeing salvage operations of paleontological resources
- Consulting local tribes and the Native American Heritage Commission for project impacts to sacred lands and burial sites

WATER RESOURCES

Impacts to water resources from the 2012 RTP 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 from the projected growth induced by the RTP include increased impervious surfaces; increased development in alluvial fan floodplains; and increased water demand and associated impacts, such as drawdown of groundwater aquifers. Increased output of greenhouse gases from the region's transportation system impacts the security and reliability of the imported water supply.

The water resources mitigation program includes the following types of measures:

- Utilizing advanced water capture and filtration techniques, showing a preference for naturalized systems and designs, to control stormwater at the source

- Avoiding any new construction of impervious surfaces in non-urbanized areas, such as wetlands, habitat areas, parks, and near river systems
- Avoiding any new construction that provides access to flood-prone areas,such as in alluvial fans and slide zones
- Protection and preservation of existing natural flood control systems, such as wetlands and riparian buffers, and expansion of such systems in areas where they do not currently exist
- Constructing projects according to Best Management Practices for water quality protection and water conservation, including low-impact development and green building standards
- Coordinating project development and construction efforts across jurisdictional, agency, and departmental boundaries, to increase project benefits

HAZARDOUS MATERIALS

Implementation of the 2012 RTP 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. Potential mitigation programs include active coordination with regulatory agencies and first responders in order to ensure proper handling and transport of hazardous materials and their containers.

Mitigation measures also involve ensuring that the project implementation agency complies with all applicable laws, regulations, and health and safety standards set forth by federal, state, and local authorities that regulate the proper handling of such materials and their containers and that the routine transport, use, and disposal of hazardous materials does not create a significant hazard to the public or the environment.

The hazardous materials mitigation programs include the following types of measures:

- Coordinating with regulatory agencies and first responders in order to continue to govern goods movement and hazardous materials transportation throughout the region
- Considering existing and known planned school locations when determining the alignment of new transportation projects and modifications to existing transportation facilities
- Encouraging project sponsors to consider published lists of contaminated properties, which are continually updated, in order to identify cases where new development would involve the disturbance of contaminated properties
- Developing appropriate mitigation measures to assure that worker and public exposure is minimized to an acceptable level and to prevent any further environmental contamination as a result of construction
- Ensuring that project implementation agencies comply with all applicable laws, regulations, and health and safety standards set forth by federal, state, and local authorities that regulate the proper handling of such materials and their containers and that the routine transport, use, and disposal of hazardous materials does not create a significant hazard to the public or the environment

NOISE

Some of the principal noise generators within the SCAG region are associated with transportation (i.e., airports, freeways, arterial roadways, seaports, and railroads). Additional noise generators include stationary sources, such as industrial manufacturing plants and construction sites. Noise impacts resulting from the 2012 RTP 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. As such, the noise mitigation program includes mitigation measures designed to minimize the impact of noise on sensitive receptors as a result of the implementation of the 2012 RTP. These mitigation measures include ensuring that project implementing agencies comply with all local sound control and noise level rules, regulations, and ordinances; utilizing the best available noise control techniques (including mufflers, intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) in order to minimize construction noise impacts; and utilizing land use planning measures, such as zoning, restrictions on developments, buffers, etc., to minimize exposure to sensitive receptors.

The noise mitigation programs include the following types of measures:

- Encouraging project implementing agencies to comply with all local sound control and noise level rules, regulations, and ordinances
- Developing the best available noise control techniques in order to minimize construction noise impacts
- Conducting a project-specific noise evaluation as part of the appropriate environmental review of each project
- Encouraging project implementation agencies to maximize the distance between noise-sensitive land uses and new roadway lanes, roadways, rail, transit centers, park-and-ride lots, and other new noise-generating facilities