California TRANSPORTATION PLAN 2040

APPENDICES

Caltrans

June 2016

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CTP2040
CALIFORNIA TRANSPORTATION PLAN

Edmund G. Brown, Jr.

Governor
State of California

Brian P. Kelly

Secretary
California State Transportation Agency

Malcolm Dougherty

Director
California Department of Transportation

Kome Ajise

Chief Deputy Director
California Department of Transportation

June 2016

APPENDIX 1
PERFORMANCE MEASURES

MEASURING TRANSPORTATION PERFORMANCE

Performance-based planning is the application of performance management within the planning process to help agencies achieve desired outcomes for the multimodal transportation system. The nation's first performance- and outcome-based surface transportation program, Moving Ahead for Progress in the 21st Century (MAP-21), was established by the Federal Highway Administration (FHWA) and the Office of Policy and Governmental Affairs and signed into law on July 6, 2012. Its goal was to foster State investment in projects that represent both regional and national goals. Performance management helps ensure efficient and effective investment of transportation funds by refocusing on national transportation goals, increasing accountability and transparency, and improving project decision-making. MAP-21 required metropolitan and statewide transportation planning agencies to incorporate performance goals, measures, and targets when identifying needs and selecting projects.

Performance measures that support the CTP 2040 goals, policies, and strategies are listed in **Table 1**. These measures were identified through two major efforts: 1) the Strategic Growth Council (SGC) and San Diego Association of Governments (SANDAG) collaborating with other California Metropolitan Planning Organizations (MPOs), and 2) the Caltrans Smart Mobility Framework (SMF). Transportation professionals used these measures to identify high-performance, cost-effective investments aligned with State and federal goals.

On December 4, 2015, President Barack Obama, U.S. Congress approved, signed into law the reauthorization of the Surface Transportation Act, Fixing America's Surface Transportation Act (FAST Act). The FAST Act maintains the performance-based planning structure and the Final Rules determination through the existing MAP-21 "Notice of Proposed Rule Making" procedures for the twelve performance driven goal areas. The law modifies and reforms several federal transportation programs that include streamlining the approval process for new transportation projects, providing new safety tools, and establishing new programs to advance critical freight projects.[1]

[1] US DOT accessed online on December 15, 2015, https://www.transportation.gov/fastact

Table 1

CTP 2040 Goals, Policies, and Possible Performance Measures (SANDAG & SMF Effort)

	The Vision Sustainability	CTP 2040 Goals and Policies
	Economy	G1: Improve Multimodal Mobility and Accessibility for All People
		Manage and Operate an Efficient Integrated System
		Invest Strategically to Maximize System Performance
		Provide Viable and Equitable Multimodal Choices Including Active Transportation
		G2: Preserve the Multimodal Transportation System
		Apply Sustainable Preventative Maintenance and Rehabilitation Strategies
		Evaluate Multimodal Life Cycle Costs in Project Decision Making
		Adapt the Transportation System to Reduce Impacts from Climate Change
		G3: Support a Vibrant Economy
		Support Transportation Choices to Enhance Economic Activity
		Enhance Freight Mobility, Reliability, and Global Competitiveness
		Seek Sustainable and Flexible Funding to Maintain and Improve the System
	Equity	G4: Improve Public Safety and Security
		Reduce Fatalities, Serious Injuries, and Collisions
		Provide for System Security, Emergency Preparedness, Response, and Recovery
		G5: Foster Livable and Healthy Communities and Promote Social Equity
		Expand Engagement in Multimodal Transportation Planning and Decision Making
		Integrate Multimodal Transportation and Land Use Development
		Integrate Health and Social Equity into Transportation Planning and Decision Making
	Environment	G6: Practice Environmental Stewardship
		Integrate Environmental Considerations in All Stages of Planning and Implementation
		Conserve and Enhance Natural, Agricultural, and Cultural Resources
		Reduce Greenhouse Gas Emissions and Other Air Pollutants
		Transform to a Clean and Energy Efficient Transportation System

PERFORMANCE MEASURES	Congestion Reduction						Infrastructure				Reliability		Safety		Economic Vitality				Env. Sust.		Location Efficiency			Reliable Mobility			Health and Safety			Env Stew.		Social Equity		Robust Economy			
	VMT per capita	% of Congested Freeway/ Hwy VMT (PeMS)	Mode share Travel to Work	Congested Arterial VMT (PeMS)*	Bike and walk miles traveled*	Non work mode share*	% of distressed lane miles hwy	% of distressed lane miles local roads	% of hwy bridge lane miles in need of rehab/replacement	% of transit assets that have surpassed FTA useful life period	Frwy/hwy travel time reliability: FHWA buffer index (PeMS)	Transit/rail travel time reliability*	Fatalities/serious injuries per capita	Fatalities/serious injuries per VMT	Transit accessibility: housing/jobs within .5 miles of stop	Travel time to jobs (mean travel time to work)	Residential and employment densities (new growth) by EJ and non EJ areas*	Housing/transportation affordability index*	Acres of ag land changed to urban use	CO2 reduction per capita	Support for sustainable growth	Transit mode share (mode share travel to work, non work mode share)	Accessibility and connectivity (transit accessibility, travel time to jobs)	Multi-modal travel mobility	Multi-modal travel reliability	Multi-modal service quality	Multi-modal safety (fatalities/injuries per capita/VMT)	Design and speed sustainability	Bike/Walk VMT	Climate and energy conservation (VMT per capita)	Emissions reduction (CO2 reduction per capita)	Equitable distribution of impacts	Equitable distribution of access and mobility	Congestion effects on productivity	Efficient use of system resources	Network performance optimization	Return on investment
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
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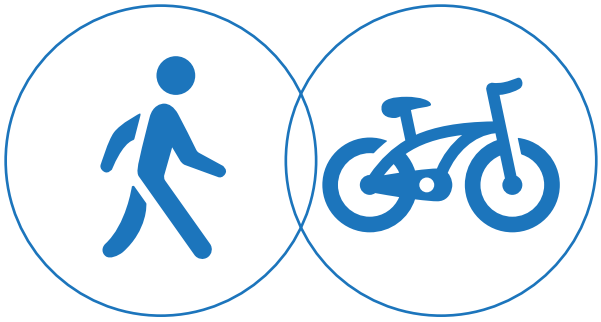
APPENDIX 2
TRANSPORTATION SYSTEM AND NON-MOTORIZED FACILITIES



NON-MOTORIZED FACILITIES

With the ever-changing demands of a growing population on the current transportation system, it is incumbent that we seek efficient, multimodal approaches in planning the future of transportation in California. This includes the importance of building safe, well-designed non-motorized facilities that support the integration of bicycle and pedestrian trail facilities into California's transportation system. According to the most recent California Household Travel Survey (CHTS), statewide, 23 percent of household trips are made via non-car transportation. This is more than double the participation of 10 years ago.[1] California is taking steps to support non-motorized facilities such as the Active Transportation Program (ATP) and the Complete Streets Implementation Action Plan 2.0. In addition, the "Three Feet for Safety Act," (AB 1371, Bradford, Chapter 331, Statutes of 2013) requires motor vehicles to leave a three-foot margin while passing a cyclist if possible.

Currently, Caltrans is preparing the California State Bicycle & Pedestrian Plan (CSBPP) in conjunction with developing a statewide bicycle map. This plan has a targeted completion of early 2017. In addition to this effort, Caltrans has prepared regional bicycle guides for some areas of California. See the links below for examples from the Redding and Fresno regions.

Non-motorized trails:

http://www.parks.ca.gov/?page_id=25680#

Bicycle links:

http://www.dot.ca.gov/hq/tpp/offices/omsp/system_planning/bicycle.html

http://www.dot.ca.gov/dist2/pdf/bikeguide.pdf

http://www.dot.ca.gov/dist6/planning/docs/BicycleGuide.pdf

1 California Household Travel Survey - http://www.dot.ca.gov/hq/paffairs/news/pressrel/2015/15pr020.htm

Table 1

CALIFORNIA TRANSPORTATION SYSTEM OVERVIEW

HIGHWAY AND ROAD CENTERLINE MILES (2012)[2]	
State Highway System (SHS)	15,104 centerline miles or 51,326 lane miles
County roads	65,335 miles
City roads	76,098 miles
Federally owned roads	15,022 miles
Other jurisdictions	3,432 miles
Total Highway and Roadway Distance	**174,991 miles**

FREIGHT AND PASSENGER RAIL ROUTE MILEAGE[3]	
Passenger: state corridors	887 miles*
Passenger: interstate AMTRAK corridors	1,663 miles*
Freight: class 1 railroads	5,418 miles*
Freight: regional and short line railroads	1,317 miles*
Freight: switching and terminal railroads	275 miles

** Route miles are estimated by adding each agency or railroad company's reported operating route miles. The class 1 railroad miles includes trackage railroad rights. (source: CFMP 2014)*

TRANSIT[4]	
Transit Vehicles Available for Maximum Service	21,866
Unlinked Transit Passenger Trips	1.4 billion^
Number of Trains in Operation (Average Weekday)	444
Transit Passenger Stations	707
Multi-Modal Transit Passenger Stations	389

AIR (2013)[2]	
Commercial service airports	28
General aviation airports	215
Special-use airports	68
Hospital heliports	160
Heliports (fire, police, commuter, private)	505

PORTS & BRIDGES[5 6]	
California seaports (Both inland and coastal)	12 (1 private, 11public)
International Ports of Entry (POE)	6
State owned bridges and other structures (ferry boats, tunnels, tubes, large-crossing & small crossing bridges)	13,133

^**Unlinked Passenger Trips** *is the number of times passengers board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination and regardless of whether they pay a fare, use a pass or transfer, ride for free, or pay in some other way. Also called boardings.*

2 Caltrans, "Executive Fact Booklet," 2015 http://dot.ca.gov/hq/tsip/data_library/EFB/2015_EFB.pdf

3 Caltrans, "2013 California State Rail Plan," 2013, http://californiaStaterailplan.dot.ca.gov/docs/Final_Copy_2013_CSRP.pdf.

4 Federal Transit Administration, "National Transit Database. In Table 19: Transit Operating Statistics: Service Supplied and Consumed," 2013, http://www.ntdprogram.gov/ntdprogram/pubs/dt/2013/excel/DataTables.htm.

5 Caltrans, "The Mile Marker: A Caltrans Performance Report," 2014, http://www.dot.ca.gov/ctjournal/MileMarker/2014-1/index.html.

6 San Diego Association of Government, "San Diego Forward: The Region Plan Draft. In Appendix U.14: Borders," 2015, http://www.sdforward.com/pdfs/DraftAppendixU14-Borders.pdf.

APPENDIX 3
STRATEGIES AND PERFORMANCE MEASURES FOR ACHIEVING SUCCESS

The policies and strategies outlined here are anticipated to achieve California's goals in Chapter 4 for a more sustainable and equitable transportation system, achieve substantial greenhouse gas (GHG) emission reductions, conserve energy, and produce economic, consumer, and health benefits, creating better communities for Californians.

The performance measures outlined for each goal are a set of metrics carefully designed to support the California Transportation Plan 2040 (CTP 2040) policy framework. These metrics should be used throughout the State by transportation professionals to monitor progress toward desired performance outcomes. A subset of these measures has been forecast to the year 2040; the data comprise the technical output of the plan shown in Chapter 3 Analysis. The forecast represents a reasonable prediction of how each of the CTP 2040 alternatives will perform in creating jobs, supporting system performance, and reducing GHG emissions.

READING THIS APPENDIX

The information in this appendix is structured and labeled in a hierarchical format from Goals in Chapter 4. Each goal is defined and explained in terms of tools that potentially can be used to achieve it, and followed by a list of succinct policies, strategies, and performance measures.

- Goals are labeled "G" and numbered for easy identification (e.g., G1).
- Policies are prefixed by the goal they support (e.g., G1), are labeled "P" for "policy," and are numbered for easy identification (e.g., G1-P1).
- Strategies are prefixed by the policy they support (e.g., P1), are labeled "S" for "strategy," and are numbered for easy identification (e.g., G1-P1-S1).
- Performance measures (PM) are listed for each goal. Transportation professionals should use these measures to identify high-performance, cost-effective investments aligned with State and federal goals (e.g., PM1).

G1: IMPROVE MULTIMODAL MOBILITY AND ACCESSIBILITY FOR ALL PEOPLE

POLICIES (P)

G1-P1 Manage and operate an efficient integrated system.

G1-P2 Invest strategically to optimize system performance.

G1-P3 Provide viable and equitable multimodal choices, including active transportation.

STRATEGIES (S)

P1-S1 Promote projects that are based on the mobility of people and freight rather than the throughput of vehicles.

P1-S2 Implement Active Transportation Demand and Management (ATDM) strategies such as dynamic pricing measures, dynamic lane use/shoulder control, dynamic routing, and dynamic ridesharing.

P1-S3 Implement programs to reduce vehicle trips while preserving personal mobility, such as employee transit incentives, telecommute programs and alternative work schedules, carsharing, parking policies, public education programs, and other strategies that enhance and complement land use and transit strategies.

P1-S4 Continue incremental improvements to the State's intercity and commuter rail system, while providing for connectivity to a future high-speed rail (HSR) network, and local transit and tribal transit networks.

P1-S5 Establish methods for evaluating levels of service for all modes in support of an integrated, multimodal transportation system.

P2-S6 Focus on cost-effective strategies, such as intelligent transportation systems (ITS) that employ proven methods and technology to improve performance.

P2-S7 Identify multimodal funding that invests in multiple strategies to yield the highest results.

P3-S8 Provide safe, convenient, and continuous pedestrian and bicycle routes that interface with and complement a multimodal transportation system.

P3-S9 Expand, repair, and upgrade existing roadways to increase access for walking, bicycling, public transit use, and freight use.

P3-S10 Incorporate safe facilities for pedestrians, bicyclists and transit into roadway capacity and expansion projects.

P3-S11 Using a "Complete Streets" approach, plan transportation projects so as to integrate the needs of those traveling via diverse modes, while also being mindful of freight needs.

P3-S12 Simplify the environmental and permitting process to more easily integrate bike, pedestrian, and transit improvements into maintenance projects.

PERFORMANCE MEASURES (PM)

PM1* vehicle miles traveled (VMT) per capita

PM2* Percent of congested freeway/highway VMT – Performance Measurement System (PeMS)

PM3* Mode-share travel to work

PM4* Congested arterial VMT (PeMS)

PM5* Bike and walk miles traveled

PM6* Non-work mode share

PM7* Freeway/highway travel time reliability: Federal Highway Administration (FHWA) buffer index (PeMS)

PM8* Transit/rail travel time reliability

PM9* Transit accessibility: housing/jobs within 0.5 miles of stop

PM10* Travel time to jobs (mean travel time to work)

PM11* Carbon dioxide (CO2) reduction per capita

PM12^ Multimodal travel mobility

PM13^ Multimodal travel reliability

PM14^ Multimodal service quality

* PMs identified in the Statewide Performance Monitoring Indicators for Transportation Planning Final Report (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

^ PMs identified in Smart Mobility 2010: A Call to Action for the New Decade (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

G2: PRESERVE THE MULTIMODAL TRANSPORTATION SYSTEM

POLICIES (P)

G2-P1 Apply sustainable (renewable and reusable resources) preventive maintenance and rehabilitation strategies.

G2-P2 Evaluate multimodal life-cycle costs in project decision-making.

G2-P3 Adapt the multimodal transportation system to reduce impacts from climate change.

STRATEGIES (S)

P1-S1 Use research, technology, innovative techniques, and new materials to extend the life of the multimodal system and to monitor defects so they can be addressed cost-effectively without risk to public safety.

P1-S2 Develop and implement a risk-based asset management plan, using cost-benefit analysis to prioritize investments.

P1-S3 Acquire sustainable funding for maintenance and preservation of the State transportation system.

P2-S4 Implement a strategic approach for assessing and prioritizing transit assets to bring the public transit system into good repair (Federal Transit Administration [FTA] FAST Act State of Good Repair and Asset Management).

P2-S5 Evaluate and enhance life-cycle cost tools to fit preservation needs.

P2-S6 Employ partnership planning with local governments to achieve equitable decision-making.

P2-S7 Implement pavement maintenance programs using best practices for all roads.

P2-S8 Preserve and maintain roads and transportation facilities in good repair.

P2-S9 Reduce the number of distressed roads and bridges.

P3-S10 Use available sea-level rise (SLR) tools to prioritize and mitigate impacts to the multimodal system.

P3-S11 Incorporate system impacts from climate change, risk, and vulnerability assessments into collaborative and proactive planning, design, construction, operations, and maintenance activities to provide affected agencies and freight partners with the ability to adapt and recover from rising sea levels.

PERFORMANCE MEASURES (PM)

PM1* Percent of distressed lane miles highway

PM2* Percent of distressed lane miles local roads

PM3* Percent of highway bridge lane miles in need of rehab/replacement

PM4* Percent of transit assets that have surpassed FTA useful life period

* PMs identified in the Statewide Performance Monitoring Indicators for Transportation Planning Final Report (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

G3: SUPPORT A VIBRANT ECONOMY

POLICIES

G3-P1 Support transportation choices to enhance economic activity.

G3-P2 Enhance freight mobility, reliability, and global competitiveness.

G3-P3 Seek sustainable and flexible funding to maintain and improve the system.

STRATEGIES

P1-S1 Develop and promote incentive programs designed to encourage efficient travel and utilization of active modes (e.g., Complete Streets).

P1-S2 Utilize technology to inform travelers of the best available travel options in terms of both time and cost.

P1-S3 Develop and promote efforts to improve reliability and efficiency through optimization of existing street and freeway capacity.

P2-S4 Develop and promote multimodal links between neighborhoods, job centers, and regional institutions centers.

P2-S5 Promote and negotiate cross-jurisdictional coordination to bring about improved efficiencies and connectivity, including at ports of entry (POE), for the movement of people, goods, services and information.

P2-S6 Research, develop, demonstrate, and deploy cost-effective technologies and operational strategies to expedite goods movement, improve safety, and reduce congestion.

P2-S7 Seek creation of national, State, and regional dedicated funding programs for freight transportation.

P3-S8 Research, develop, and propose transparent revenue sources that fully address current and future transportation system management needs.

P3-S9 Utilize reauthorization funding opportunities, such as Fixing America's Surface Transportation Act (FAST Act), while advocating for policies consistent with the economic, environmental, and equity values of California.

P3-S10 Promote flexible funding for transportation problems that have significant public benefits, regardless of facility ownership and/or jurisdiction.

PERFORMANCE MEASURES (PM)

PM1* Travel time to jobs (mean travel time to work)

PM2^ Congestion effects on productivity

PM3^ Efficient use of system resources

PM4^ Network performance optimization

PM5^ Return on investment

* PMs identified in the Statewide Performance Monitoring Indicators for Transportation Planning Final Report (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

^ PMs identified in the Smart Mobility 2010: A Call to Action for the New Decade (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

G4: IMPROVE PUBLIC SAFETY AND SECURITY

POLICIES (P)

G4-P1 Reduce fatalities, serious injuries, and collisions.

G4-P2 Provide for system security, emergency preparedness, response, and recovery.

STRATEGIES (S)

P1-S1 Identify PMs and targets that guide Caltrans divisions and transportation stakeholders to the most effective safety strategies and countermeasures.

P1-S2 Improve and update the Strategic Highway Safety Plan (SHSP) and develop performance-based measures.

P1-S3 Continue to install and test positive train control (PTC) technology on all intercity and commuter passenger rail.

P1-S4 Invest in at-grade railroad crossing safety on over 10,000 at-grade (level) railroad crossings.

P1-S5 Improve outreach and education for Operation Lifesaver to prevent collisions, injuries, and fatalities on and around railroad tracks and highway rail grade crossings.

P1-S6 Improve outreach, early involvement and engagement for tribal, rural and elderly drivers, and pedestrian safety challenge areas.

P1-S7 Improve outreach and education on bicycle and pedestrian fatalities and serious injuries by providing expertise on bicycle and pedestrian safety practices, mobility aspects, and accessibility focusing on intersections and road and rail crossings.

P2-S8 Improve outreach, education, and implementation of the Crime Prevention through Environmental Design (CPTED) approach that deters crime and provides security through environmental design in transportation systems.

P2-S9 Improve airport and airline security, including the security of airport connectivity.

P2-S10 Improve outreach and education for local Emergency Operations Plan (EOP) coordination and resiliency best management practices.

P2-S11 Improve outreach and education in the National Response Framework and the Incident Command System (ICS), which is the systematic tool for the command, control, and coordination of emergency response.

PERFORMANCE MEASURES (PMS)

PM1* Fatalities/serious injuries per capita

PM2* Fatalities/serious injuries per VMT

PM3^ Multimodal travel reliability

PM4^ Design and speed suitability

* PMs identified in the Statewide Performance Monitoring Indicators for Transportation Planning Final Report (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

^ PMs identified in Smart Mobility 2010: A Call to Action for the New Decade (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

G5: FOSTER LIVABLE AND HEALTHY COMMUNITIES AND PROMOTE SOCIAL EQUITY

POLICIES (P)

G5-P1 Expand collaboration and community engagement in multimodal transportation planning and decision-making.

G5-P2 Integrate multimodal transportation and land use development.

G5-P3 Integrate health and social equity in transportation planning and decision-making.

STRATEGIES (S)

P1-S1 Involve citizens, businesses, communities, community-based organizations, goods movement stakeholders, environmental justice (EJ) communities, Native American tribal governments, and institutions early in the transportation planning and decision-making process.

P1-S2 Design and implement public participation strategies to include those traditionally underrepresented and underserved, including low-income, the aging and the disabled, in the public planning and decision-making process.

P1-S3 Develop partnerships with schools to support increased use of public and transit options, walking, and bicycling among students and teachers (Safe Routes to School).

P1-S4 Incorporate community values and support context-sensitive solutions (CSS) for multimodal transportation facilities, creating sustainable infrastructure.

P2-S5 Encourage increased densities and mix of land uses, and other "smart growth" principles to support transit service, walking, and bicycling while accommodating goods movement.

P2-S6 Where appropriate, promote housing and land use development in coordination with multimodal transportation options; includes implementing the SMF principles at regional and local levels (including rural, suburban and urbanized settings).

P2-S7 Provide incentives for the most efficient use of land while being sensitive to regional, rural, and other community differences.

P2-S8 Promote incentives that reward employers who locate near transit or housing; and developers who build housing near employment centers.

P2-S9 Target funding toward existing communities–through strategies like HSR/transit-oriented, mixed-use development and land recycling–to increase community revitalization and the efficiency of public works investments and safeguard rural landscapes.

P3-S10 Develop models that integrate land use, transportation, health, and environmental issues.

P3-S11 Identify sustainability and equity indicators to enhance current transportation system PMs, such as access to public transit, safe transportation, recreation, healthy food, economic opportunities, and medical services.

P3-S12 Partner with stakeholders to educate the public about the health-related impacts of mobility and land use decisions, including near-roadway health, quality of life, and physical activity impacts, and the impacts of their travel choices.

PERFORMANCE MEASURES (PM)

PM1* Bike and walk miles traveled

PM2* Fatalities/serious injuries per capita

PM3* Transit accessibility: housing/jobs within 0.5 miles of stop

PM4* Residential and employment densities (new growth) by EJ and non-EJ areas

PM5* Housing/transportation affordability index

PM6* Acres of agricultural land changed to urban use

PM7* CO2 reduction per capita

PM8^ Support for sustainable growth

PM9^ Equitable distribution of impacts

PM10^ Equitable distribution of access and mobility

* PMs identified in the Statewide Performance Monitoring Indicators for Transportation Planning Final Report (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

^ PMs identified in Smart Mobility 2010: A Call to Action for the New Decade (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

G6: PRACTICE ENVIRONMENTAL STEWARDSHIP

POLICIES (P)

G6-P1 Integrate environmental considerations in all stages of planning and implementation.

G6-P2 Conserve and enhance natural, agricultural, and cultural resources.

G6-P3 Reduce GHG emissions and other air pollutants.

G6-P4 Transform to a clean and energy efficient transportation system.

STRATEGIES (S)

P1-S1 Identify and promote opportunities to retrofit or adapt facility designs to further enhance, minimize, and reduce the impact to the environment, such as the effects of climate change on facilities and natural ecosystems, including fragmentation for wildlife habitats and reduce impacts on water quality.

P1-S2 Link transportation planning decisions with resources and environmental planning to enhance and preserve the environment.

P1-S3 Incorporate mitigation and adaptation measures into transportation plans and projects early in the process.

P2-S4 Build partnerships and develop strategies for meeting State conservation goals to protect ecosystems, preserve large contiguous and viable tracts of habitat to offset adverse impacts, and determine the most valuable land for preserving and other strategies.

P2-S5 Encourage and facilitate partnerships that integrate conservation and infrastructure planning at regional scales such as, watershed planning, corridor management plans, and natural community conservation plans. Support projects such as the Essential Habitat Connectivity Project that guide future regional connectivity analysis, planning and implementation and continue to support advanced conservation planning and flexible funding to streamline these activities.

P2-S6 Pool mitigation funding for multiple projects to encourage integrated, large-scale mitigation and support new policies and legislation that promote earlier mitigation.

P2-S7 Establish a multi-agency consultation process for statewide and Regional Transportation Plan (RTP) development that minimizes impacts to natural resources and ecological systems (as required by FAST Act). This includes conducting early, frequent, and ongoing consultations with State, federal, tribal, and other resource entities responsible for natural resources, environmental protection, conservation, and historic and cultural preservation.

P2-S8 Provide guidance to enhance environmental stewardship and sustainability at the regional and local levels.

P3-S9 Support efforts to reduce GHGs, such as the California's Cap-and-Trade Program, HSR, and zero and low emission vehicles.

P3-S10 Improve links between land use planning and climate adaptation planning by using the tools such as the previous California Regional Blueprint Program and Sustainable Communities Strategies (SCSs) to better integrate adaptation strategies into regional plans, general plans, and Local Coastal Programs (LCPs).

P4-S11 Ensure transportation systems, including multimodal options, are more efficient through smart land use, operational improvements, and ITS.

P4-S12 Support and encourage funding for zero-emission vehicle (ZEV) charging and infrastructure.

P4-S13 Support efforts to coordinate placement of alternative fuel/charging stations for effective freight movement.

PERFORMANCE MEASURES (PM)

PM1* Acres of agricultural land changed to urban use

PM2* CO2 reduction per capita

* PMs identified in the Statewide Performance Monitoring Indicators for Transportation Planning Final Report (for more information, visit the Reference section of the CTP 2040 website: www.californiatransportationplan2040.org).

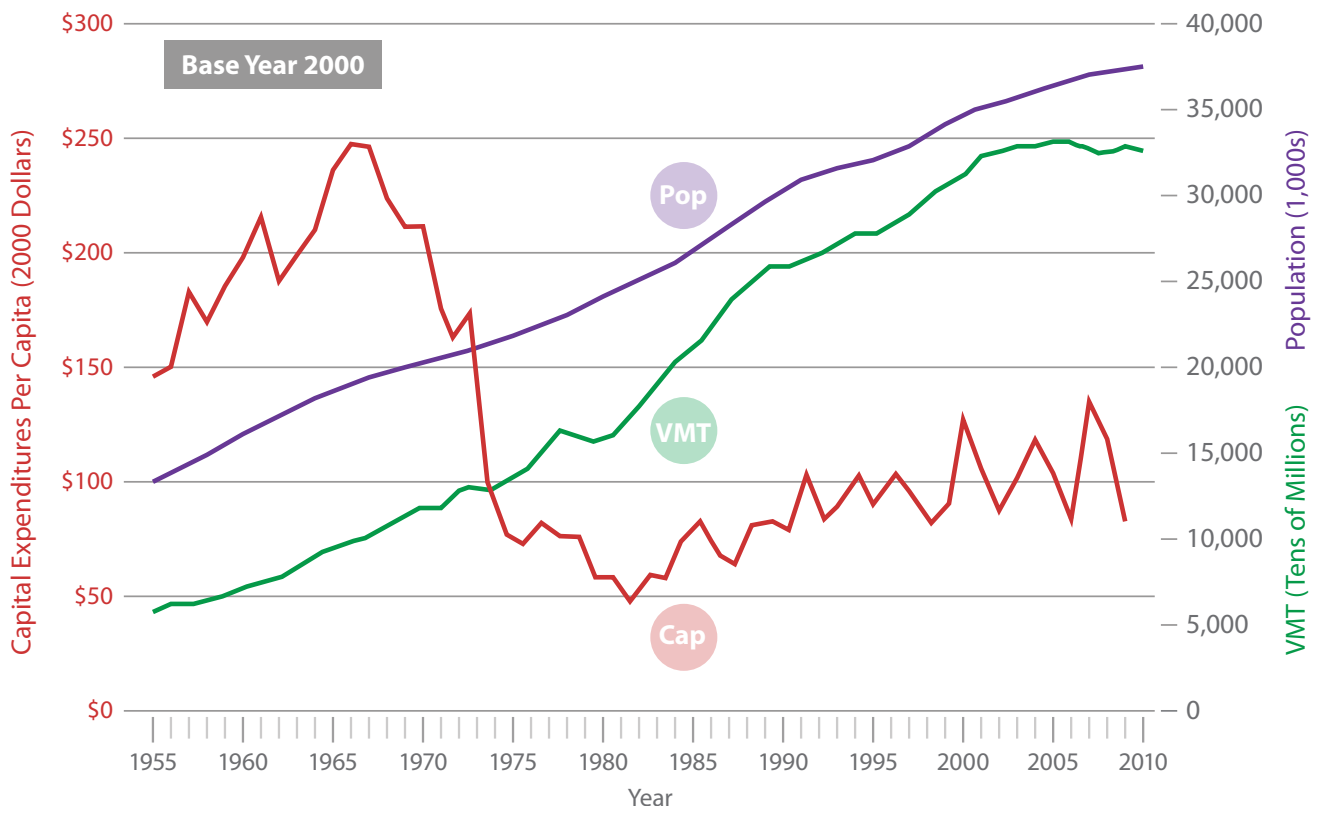
APPENDIX 4
TRENDS AND OPPORTUNITIES

TRANSPORTATION FUNDING

The expected rise in transportation needs and decline in transportation funds present a fundamental problem for California. For nearly 30 years, transportation spending has been underfunded. Caltrans is working closely with the regional transportation agencies and the United States Department of Transportation (US DOT) to maximize every dollar of investment in a multimodal system. Nevertheless, a recent assessment prepared for the California Transportation Commission (CTC)[1] highlights deep gaps in funding available for basic transportation system maintenance and operation, not to mention addressing population growth and need to accommodate and encourage transportation preference shifts. At the same time, the transportation system must support the mobility needs of California's growing population and underserved groups–such as those with disabilities, veterans, and the elderly–and to address climate change. The aging physical system needs modernization, upkeep, and maintenance to meet expected demand increases. This is impossible without adequate funding.

The traditional approach to funding transportation projects in California is based on user fees, including fuel taxes, sales taxes, vehicle weight fees, transit fares, and tolls. However, these revenues are becoming increasingly unreliable. Excise taxes on gasoline and diesel fuels are primary revenue sources for federal and State governments. The State has struggled to raise funds to maintain and improve the transportation infrastructure because these sources have not been indexed for inflation or adjusted for technological advancements and trends. Fuel taxes are collected on a per-gallon basis, which means that lower revenues will be generated as we encourage people to drive fewer miles and as vehicles become more fuel efficient (see **Figure 1**).

FIGURE 1
HISTORICAL POPULATION, TRAVEL, AND PER CAPITA HIGHWAY CAPITAL EXPENDITURES 1955-2010*



* Includes expenditures for local assistance and State highway capital outlay.
Source: Office of State Planning-Economic Analysis Branch, 08/2013

1 Leiter, B., et al., "2011 Statewide Transportation System Needs Assessment," 2011, http://www.catc.ca.gov/reports/2011Reports/2011_Needs_Assessment_updated.pdf.

The reliance on transportation funding from motor vehicle fuels, the primary source of greenhouse gas (GHG) and criteria pollutant emissions in California, is incompatible with our climate and air quality goals. Legislative efforts, such as Assembly Bill (AB) 32 and Senate Bill (SB) 375, reduce GHG emissions from transportation sources by promoting active transportation and transit, requiring cleaner fuels, mandating cleaner vehicle technology and encouraging better land use policy. As a result, household expenditure on fuel purchase is on the decline, and with transportation funding primarily based on motor vehicle fuel sales, money available for transportation maintenance and improvements is also declining. Individuals can reduce their "carbon footprint" by purchasing vehicles that are more fuel efficient or zero-emission, reduce driving by bundling trips, take public transportation more often, or choose to live in communities that offer transportation, housing, and land use options. All of these choices will lessen negative environmental impacts associated with transportation; however, with transportation funding based on user fees, these choices can negatively impact the resources available for transportation maintenance and improvements. Thus, new or modified sources of revenue must be developed.

When inflation is taken into account, the buying power of revenue from fuel and excise taxes decreases. Due to this decrease in purchasing power, the California State Legislature has utilized general obligation bonds in the past to assist with transportation financing. The largest infusion of funds came from the voter approved Proposition 1B (Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act), a $20 billion transportation bond authorized in 2006. Bonds are loans that provide temporary financial relief, but they also create additional debt to the State's General Fund. Thus, bonds can decrease the amount of available funding, for other programs or transportation projects, in the long run and are not a sustainable option.

Transportation funding has been an even greater challenge for Native American tribal communities since most of their funds come from the federal government. Native American tribes do not have a dedicated funding stream from the State, and they do not receive any direct allocation from the Highway Trust Fund (HTF) as other states. Moreover, tribal transportation projects are rarely included in Regional Transportation Plans (RTPs), even if they overlap with other local agency projects. California tribes historically receive only one to two percent of the $450 million of available federal funding, even though they represent about 20 percent of the nation's tribal population.

Transportation funding in California has increased nominally over time, but not in real economic terms. The gas tax has lost almost 37 percent of its buying power since 1993 according to the U.S. Department of Labor's statistics inflation calculator. At the federal and State levels, revenues generated from excise taxes on gasoline and diesel fuels will continue to decrease. Road pricing strategies are being explored to replace fuel taxes to better reflect the cost of driving by charging users by the actual number of miles driven.

At the local level, government entities fill this funding gap by supplementing transportation with local revenue sources such as sales tax measures. However, a two-third majority voter approval is required to pass a dedicated transportation tax measure, which represents a hurdle for counties, often depriving them of much-needed funding.[2] Yet, local funding makes up nearly half of California's transportation revenue. Revenue sources include taxes and fees such as local sales taxes, property taxes, transit fares, and development impact fees. Moreover, new locally funded projects increase the financial burden to the State, as the California Department of Transportation (Caltrans) does not receive additional funding to maintain them.

Transit receives about 20 percent of available federal transportation funding, but this trend may change as the physical space available to expand roadway and highway infrastructure reaches its limits. For example, the Bay Area Metropolitan Transportation Commission's (MTC's) recent RTP predicts the Commission will spend about 62 percent of its anticipated revenues maintaining and expanding its transit system in the coming decades. In addition, the most recent RTP from the Southern California Association of Governments (SCAG) estimates that transit will account for 47 percent of its expenditure plan–20 percent for capital projects and 27 percent for operations and maintenance. Although transit expenditures in other areas of the State may be lower than in the Bay Area or Los Angeles, other regions are also expected to increase their investment in transit.

2 Taylor, M., "A Look at Voter-Approval Requirements for Local Taxes," 2014, http://www.lao.ca.gov/reports/2014/finance/local-taxes/voter-approval-032014.pdf.

ACTIVE TRANSPORTATION AND DEMAND MANAGEMENT

Active Transportation and Demand Management (ATDM) is a concept where travel demand, traffic demand, and traffic flow are all dynamically managed to improve the efficiency and productivity of our transportation facilities. The word "dynamic" in these strategies refers to the great impact and efficiency created through constant change or activity. For example, dynamic lane use and shoulder control monitors shoulder lanes by effectively opening or closing them based on current traffic demands through overhead message signs and ramp metering to guide drivers at on-ramps. The "Active Transportation" part of ATDM refers to traffic management, which is not to be confused with active modes of travel. ATDM builds off three approaches, which include Active Traffic Management (ATM), Active Demand Management (ADM), and Active Parking Management (APM).

The first approach is ATM, which is where traffic congestion is dynamically managed based off current and predictive traffic conditions. Increasing safety and throughput are key elements that ATM approaches look to accomplish by improving our integrated highway systems through the adoption of new technologies, and dynamic strategies. Some examples of these dynamic strategies include: lane management, speed limits, and rerouting.

Promoting a sustainable multimodal transportation system requires optimizing the existing system. Currently, transportation agencies are finding Traffic Management System (TMS) approaches to be the most effective and economical way to improve system performance. Caltrans defines TMS as *"business processes and associated tools, field elements, and communication systems that help maximize the productivity of the transportation system."* The ATM approach is similar because it anticipates traffic conditions, allowing the system to act accordingly prior to any nuances that may arise, ultimately improving the performance of our state highway system (SHS).

ATM approaches also include coordination of adaptive traffic signals along a corridor, changeable message signs that display real-time road and weather information, adaptive ramp meters that control the timing of vehicle entry onto highways, and traffic incident management. ATM can also refer to lane management strategies, such as high occupancy vehicle (HOV) lanes and dynamic lane use and shoulder control. Optimizing multimodal system performance through ATM strategies will offer increased potential to serve future mobility needs than has previously been leveraged. By investing in more ATM infrastructure and by better maintaining existing devices, system management can move from reactive to active, and eventually to predictive traffic management–relieving congestion before it even occurs.

A critical aspect of traffic management provides travelers with real-time data about traffic conditions via their mobile phones, allowing them to select the optimal mode of travel or reroute on a moment's notice. Accurate, real-time information allows travelers to become partners in multimodal system management. Another new technology that supports predictive ATM is the innovative concept of vehicle-to-vehicle communication or "connected vehicle" (V2V)/ autonomous vehicles (CV/AV), currently in testing stage. CV/AV will be able to communicate with one another as well as with the TMS itself in order to warn drivers and the system to avoid potential hazards. One other idea currently undergoing exploration is automated vehicle platooning, in which frequently updated sensor-generated information allows clusters of vehicles to drive very close together at "cruising" speed without colliding. ATDM is built upon the concept of Integrated Corridor Management (ICM), which is also in development to improve traffic flow from highways to surface streets. Certain ICM strategies will also be considered within the Connected Corridors Program Pilot in order to discover opportunities that most efficiently move goods, services, and people.[3] Together, these technologies should pave the way for widespread deployment of fully automated vehicles which have the capability of making our system more dynamically performance driven.

Another method for enhancing system management is to implement the Corridor System Management Plans (CSMPs). CSMPs outline the multijurisdictional and multimodal management of congested corridors. A CSMP results in a listing and phasing plan of recommended improvements and strategies such as ramp metering; changeable message signs; transit; rail, port, and airport facilities; and system expansion projects to preserve or improve performance within the corridor.

The second approach is ADM, which dynamically manages travel demand by influencing traffic behavior in real-time. Some examples of how the ADM approach can be achieved are through either of the following dynamic strategies: fare reduction, pricing, and ridesharing. These strategies can be implemented to ultimately help drivers choose a mode choice that best suits their current situation. Ideally, this approach can help planners across the State to gather data and predict traveler information. As this method increases in popularity, the gathered data can be used to design roadways to be more accommodating of other travel modes such as walking/bicycling, transit, and the most frequented rideshare pick-up/drop-off points.

3 Caltrans, "Transportation Management Systems Business Plan Update Final," 2013, http://traffic.onramp.dot.ca.gov/downloads/traffic/files/sd/Apr_16_2013_Final_Business_Plan.pdf.

Similar to Transportation Demand Management (TDM) strategies, ADM focuses on how travelers use the system. Using new technology, ADM allows travel demand to be managed dynamically by re-routing drivers to travel at less congested intervals through the day. With incentives or disincentives of different types of travel, ADM measures often encourage travelers to reduce or eliminate single occupancy vehicle (SOV) trips, by influencing a new mode choice. ADM strategies urge travelers to consider alternatives such as dynamic ridesharing options, using on-demand transit, telecommuting, working flexible hours, and biking or walking. Dynamic pricing strategies are one of the most effective but controversial demand management methods. When faced with direct trip costs, travelers often consider modes such as transit and other transportation options. Some more examples of ADMs include tolling, pricing, parking strategies, and integrated park-and-ride lots with freeway interchange bus stops. An interesting concept to take into future planning consideration is Mobility Hubs, which are a form of transit-oriented development (TOD). These hubs provide an integration of multimodal travel choices all in one amenity filled facility which can include: transit (light-rail/bus), high-speed rail (HSR), Electric Vehicle (EV) charging stations, bikeshare, and ride share. This facility can be used as a first mile/last mile destination to determine which mode of travel is suitable for the person traveling within their region.

The third approach is APM, which is where regional parking facilities are dynamically managed to influence travel through real-time parking information, which allows the full utilization of parking facilities that are open and near a traveler's location or end destination. Parking management can encourage travel demand through mode choice, trip time, and convenient parking facility choices, which would dramatically reduce time spent to locate available space to park vehicles. Through real-time information (e.g. wireless communication) parking management can influence a driver's travel behavior by finding them a convenient open parking space prior to their arrival. This also acts as an economic benefit by having people park in areas which allow exposure to more businesses, leading to less congestion, pollution, and more effective use of our roadways.

Optimizing the existing system is critical for achieving transportation system sustainability as well as accomplishing our vision of providing a performance-driven and transparent highway system to the public. This system must also be truly multimodal through promoting viable, safe, affordable, and easily accessible multimodal options, which can serve to reduce vehicle miles traveled (VMT) and lower GHG emissions. In addition, it must accommodate those who cannot or choose not to drive, thereby establishing a more equitable transportation system for users of all income levels.

For more information on ATDM, Reference section of the CTP 2040 website: www.californiatransportationplan2040.org.

SUSTAINABILITY IN RURAL COMMUNITIES AND SMALL TOWNS

Over five million Californians, 13 percent of the State's populations live in areas considered rural.[4] Twenty-six of the State's 58 counties are considered rural–each has a population of less than 250,000 with no single urbanized area having more than 50,000. Additionally, many predominantly urban counties such as Los Angeles, San Bernardino, and San Diego also include large non-urban populations. Rural California provides excellent recreational opportunities and plays a vital role in the economy, with billions of dollars in local, national, and international food supply exports.[5]

> The vehicle fatality rate in rural areas is more than twice than that of urban areas.

Providing sustainable transportation services and active transportation options to a sparsely and widely distributed population presents special transportation challenges that must be considered when planning for a balanced, interconnected, and interregional system. Many State highways act as main streets for these rural towns and provide important bicycle and pedestrian access for residents within the community. One of the most important transportation concerns in rural areas is maintaining the existing road system. With approximately 71 percent of California's highway miles located in rural areas,[6] the proportion of highway miles to population creates a far larger responsibility without the economic means to address it. Weather issues accelerate the deterioration of roadways, particularly where flooding, landslides, and snow removal can quickly jeopardize pavement integrity. Rural roads also have additional pavement distress from heavy commercial truck and recreational traffic.

Safety is another significant concern in rural areas. Nationally, over 58 percent of motor vehicle-related fatalities occur in rural areas. The vehicle fatality rate in rural areas is more than twice that of urban areas.[7] The higher fatality rate could be attributed to many factors, including rugged terrain; shortened sightlines; unforgiving roadways; driver irresponsibility, including speeding or alcohol use; and longer response time to accidents and distance to medical treatment centers which creates the challenge for our system to have robust emergency response system.

Rural area airports provide vital access for lifeline medical emergencies, firefighting, and agricultural operations. These airports also provide links to larger urban airports for passenger and air cargo service. As commercial airports reach passenger and cargo capacity, demand will shift to regional and rural airports to provide general aviation services. Many rural airport runways need to be extended to accommodate larger aircraft. Putting emphasis on rural airports can also bring about economic benefits such as tourism. It would give the rural areas another platform to attract people into their community by having another means of transportation to travel there.

For some rural residents, transit service is the only means of transportation. Rural entities are often challenged to provide transit and paratransit services to customers that are sparsely distributed over considerable distances. Regional and intercity bus service can be difficult to provide due to low demand, fare box return requirements, and limited resources for operating and maintaining the system.

To date, much of the State's focus on reducing GHG emissions has been on light duty vehicles (LDVs) in metropolitan areas where the majority of the State's population resides. Rural areas that are not covered by the requirement to adopt a RTP/Sustainable Communities Strategy (SCS) under SB 375 are undertaking their own efforts to plan more sustainably, and the CTP 2040 supports these rural sustainability efforts. An innovative way to address rural sustainability is to look at the connections of urban and rural parts of a region and plan for the region's future as a whole, rather than considering them as separate entities. Sacramento Area Council of Governments (SACOG) is taking this approach through their successful Rural-Urban Connections Strategy (RUCS) program (see sidebar).

The CTP 2040 sets goals that encourage rural communities to continue embracing their unique values and character–whether on main streets or recreational lands–while offering travelers options to get around by bicycle, on foot, or on transit.

SACOG'S RURAL-URBAN CONNECTIONS STRATEGY (RUCS)

The RUCS project is looking at the Sacramento region's growth and sustainability objectives from the rural perspective. RUCS strives to be an economic and environmental sustainability strategy for rural areas.

HOUSING AND LAND USE

Despite the recent lows of the Great Recession from December 2007 to June 2009 and the current recovery, the cost of housing as a proportion of local wages in California continues to rank highest in the nation.[8] For more than 25 years, the State, local governments, and redevelopment agencies have helped facilitate availability of affordable housing and engage in community development. With the loss of redevelopment agencies in 2013, many local resources that promote the building of affordable housing are no longer available.

A challenge is to develop housing that is affordable, safe, and healthy. Housing in California is becoming an even more important issue as the State's demographics change.[9] It is increasingly important to consider location efficiency and compact development patterns as methods of restraining housing and transportation costs. Another challenge is promoting land use development patterns that align with where people live and work in urban, suburban, and rural areas. It is crucial that regions work together to provide housing and transportation options for all Californians.

Land use, housing, and transportation plans need to be coordinated between the cities and counties–the entities typically responsible for local land use decisions–and regional agencies and the State, which are responsible for regional and interregional transportation decisions. Planning and land use decisions have a tremendous impact on our communities. Historic land use practices have often contributed to increases in traffic congestion, commute times, and air pollution; the loss of open spaces; and a reliance on automobiles. Now, with the improvement of the housing outlook and new construction, a challenge is to provide residents with a mix of housing options. In more urbanized areas, demand for multi-unit housing near transit is expected to increase.

Past development trends included low-density growth planning, resulting in considerable land consumption and urban sprawl that required higher infrastructure investments. The SCSs and other legislation call for transportation planning, housing projections, and land use planning to be considered in concert, as opposed to separately. To help preserve open space and discourage sprawl,

4 Stanford School of Medicine, "Rural California: Demographics," http://ruralhealth.stanford.edu/health-pros/factsheets/.

5 California Department of Food and Agriculture, "California Agricultural Production Statistics," 2013, http://www.cdfa.ca.gov/statistics/.

6 Caltrans, "Caltrans Executive Fact Booklet, 16," 2014, http://dot.ca.gov/hq/tsip/data_library/EFB/2014_EFB-revised.pdf.

7 Federal Highway Administration, "Rural Fatalities, table 1," 2012, http://safety.fhwa.dot.gov/local_rural/rural_fatal.cfm.

SB 375 encourages local governments and regions to consider alternative land use patterns that promote compact urban infill. Since each SCS program is part of a RTP effort and ultimately feeds the larger CTP 2040 plan, housing and land use are keys to developing the vision of the CTP 2040.

One solution to discourage urban sprawl and coordinate land use and transportation is to support focused housing development in locations close to transit and multimodal services, with consideration for noise and air quality issues. This is often referred to as "smart growth" or TOD and it has the potential to increase the accessibility, affordability, and diversity of housing, as well as to support new jobs.

Land use development that supports the viability of rural communities, agricultural operations, and natural habitats is essential. The CTP 2040 supports sustainable development to alleviate pressure to develop open spaces and agricultural lands. Location-efficient development within established urban growth boundaries or urban limit lines will help preserve the natural beauty of California, increase agricultural productivity, and promote habitat continuity. Infill development and mixed-used development promote multimodal transportation and encourage more walking, biking, transit use, and shorter auto trips. Mixed-use development typically results in shorter vehicle trips and higher rates of non-motorized travel.

Through the goals, policies, strategies, and performance measures established by this plan, public health, environmental justice (EJ), and social equity will be integrated into transportation planning and decision-making for transportation services and housing development statewide. To ensure success, it is critical to create partnerships, build relationships, and collaborate when making housing and land use decisions at local, regional, and State levels.

8 City Rating, "California Cost of Living," http://www.cityrating.com/cost-of-living/california/#.Ui-t0NLksuc.

9 Sacramento Area Council of Governments, "Changing Demographics and Demand for Housing Types," 2011, http://sacog.org/mtpscs/files/MTP-SCS/appendices/E-6%20Housing%20Demand%20White%20Paper.pdf.

APPENDIX 5 | NATIVE AMERICAN

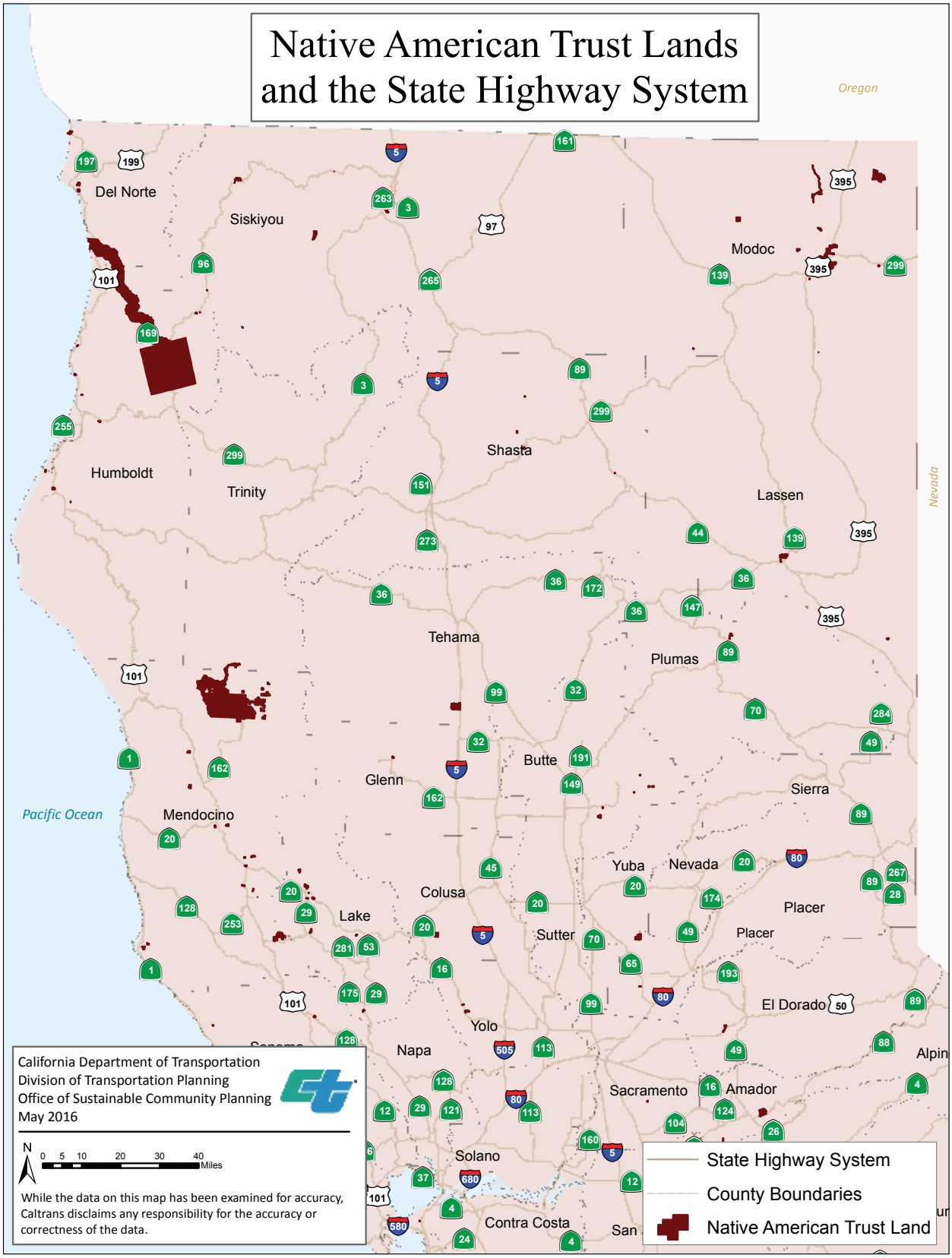
COUNTY	TRIBE
Alpine	Washoe Tribe of Nevada And California
Alpine	Woodfords Community Tribal Council (Part of Washoe Tribe)
Amador	Buena Vista Rancheria of Me-Wuk Indians of California
Amador	Ione Band of Miwok Indians of California
Amador	Jackson Rancheria of Me-Wuk Indians of California
Butte	Berry Creek Rancheria of Tyme Maidu Indians
Butte	Estom Yumeka Maidu Tribe
Butte	Mechoopda Indian Tribe of Chico Rancheria
Butte	Mooretown Rancheria of Maidu Indians
Calaveras	California Valley Miwok Tribe
Colusa	Cachil Dehe Band of Wintun Indians of The Colusa Indian Community
Colusa	Cortina Rancheria of Wintun Indians
Del Norte	Coast Indian Community of Resighini Rancheria
Del Norte	Elk Valley Rancheria
Del Norte	Tolowa Dee-ni' Nation
El Dorado	Shingle Springs Band of Miwok Indians
Fresno	Big Sandy Rancheria of Mono Indians
Fresno	Cold Springs Rancheria of Mono Indians
Fresno	Table Mountain Rancheria
Glenn	Grindstone Rancheria of Wintun-Wailaki Indians
Humboldt	Bear River Band of Rohnerville Rancheria
Humboldt	Big Lagoon Rancheria
Humboldt	Blue Lake Rancheria
Humboldt	Hoopa Valley Tribe
Humboldt	Cher-Ae Heights Indian Community of the Trinidad Rancheria
Humboldt	Wiyot Tribe
Humboldt	Yurok Tribe
Imperial	Fort Yuma Quechan Indian Nation

COUNTY	TRIBE
Imperial	Torres-Martinez Desert Cahuilla Indians
Inyo	Big Pine Paiute Tribe of Owens Valley
Inyo	Bishop Paiute Tribe
Inyo	Fort Independence Community of Paiute
Inyo	Lone Pine Paiute-Shoshone Tribe
Inyo	Timbisha Shoshone Tribe
Kern	Tejon Indian Tribe
Kings	Tachi Yokut Tribe (Santa Rosa Rancheria)
Lake	Big Valley Band of Pomo Indians of the Big Valley Rancheria
Lake	Elem Indian Colony of Pomo of the Sulphur Bank Rancheria
Lake	Habematolel Pomo of Upper Lake
Lake	Middletown Rancheria Band of Pomo Indians
Lake	Robinson Rancheria of Pomo Indians
Lake	Scotts Valley Band of Pomo Indians
Lake	Sherwood Valley Rancheria Band of Pomo Indians
Lake (and Sonoma)	Koi Nation of Northern California
Lassen	Susanville Indian Rancheria
Madera	North Fork Rancheria of Mono Indians
Madera	Picayune Rancheria of the Chuckchansi Indians
Mendocino	Cahto Tribe
Mendocino	Coyote Valley Band of Pomo Indians
Mendocino	Guidiville Band of Pomo Indians
Mendocino	Hopland Band of Pomo Indians
Mendocino	Manchester Band of Pomo Indians of the Manchester-Point Arena Rancheria
Mendocino	Pinoleville Pomo Nation
Mendocino	Potter Valley Tribe
Mendocino	Redwood Valley Rancheria of Pomo Indians
Mendocino	Round Valley Indian Tribes

COUNTY	TRIBE
Modoc	Alturas Rancheria of Pit River Indians
Modoc	Cedarville Rancheria of Northern Paiute Indians
Modoc	Fort Bidwell Indian Community of Paiute
Mono	Benton Paiute Reservation (Utu Utu Gwaitu Paiute Tribe)
Mono	Bridgeport Indian Colony
Placer	United Auburn Indian Community of the Auburn Rancheria
Plumas	Greenville Rancheria
Riverside	Agua Caliente Band of Cahuilla Indians
Riverside	Augustine Band of Cahuilla Mission Indians
Riverside	Cabazon Band of Mission Indians
Riverside	Cahuilla Band of Indians
Riverside	Morongo Band of Mission Indians
Riverside	Pechanga Band of Luiseño Indians
Riverside	Ramona Band of Cahuilla Mission Indians
Riverside	San Manuel Band of Serrano Mission Indians
Riverside	Santa Rosa Band of Cahuilla Indians
Riverside	Soboba Band of Luiseño Indians
Riverside	Torres-Martinez Desert Cahuilla Indians
Sacramento	Wilton Rancheria
San Bernardino	Chemehuevi Indian Tribe
San Bernardino	Colorado River Indian Tribes
San Bernardino	Fort Mojave Indian Tribe
San Bernardino	San Manuel Band of Serrano Mission Indians
San Bernardino	Twenty-Nine Palms Band of Mission Indians
San Diego	Barona Band of Mission Indians
San Diego	Campo Kumeyaay Nation
San Diego	Ewiiaapaayp Band of Kumeyaay Indians

COUNTY	TRIBE
San Diego	Iipay Nation of Santa Ysabel
San Diego	Inaja and Cosmit Band of Mission Indians
San Diego	Jamul Indian Village
San Diego	La Jolla Band of Luiseño Indians
San Diego	La Posta Band of Mission Indians
San Diego	Los Coyotes Band of Mission Indians
San Diego	Manzanita Band of Kumeyaay Nation
San Diego	Mesa Grande Band of Mission Indians
San Diego	Pala Band of Mission Indians
San Diego	Pauma Band of Luiseño Indians (Pauma and Yuima)
San Diego	Rincon Band of Luiseño Indians
San Diego	San Pasqual Band of Mission Indians
San Diego	Sycuan Band of Kumeyaay Nation
San Diego	Viejas Band of Kumeyaay Indians
Santa Barbara	Santa Ynez Band of Chumash Indians
Shasta	Pit River Tribe (includes XL Rancheria, Lookout Rancheria, Likely Rancheria)
Shasta	Redding Rancheria
Siskiyou	Karuk Tribe
Siskiyou	Quartz Valley Indian Reservation
Sonoma	Cloverdale Rancheria of Pomo Indians
Sonoma	Dry Creek Rancheria Band of Pomo Indians
Sonoma	Federated Indians of Graton Rancheria
Sonoma	Kashia Band of Pomo Indians of the Stewarts Point Rancheria
Sonoma	Lytton Rancheria
Tehama	Paskenta Band of Nomlaki Indians
Tulare	Tule River Tribe
Tuolumne	Chicken Ranch Rancheria of Me-Wuk
Tuolumne	Tuolumne Band of Me-Wuk
Yolo	Yocha Dehe Wintun Nation (aka Rumsey Indian Rancheria of Wintun)

FIGURE 1
NATIVE AMERICAN TRUST LANDS AND HIGHWAYS - NORTHERN CALIFORNIA

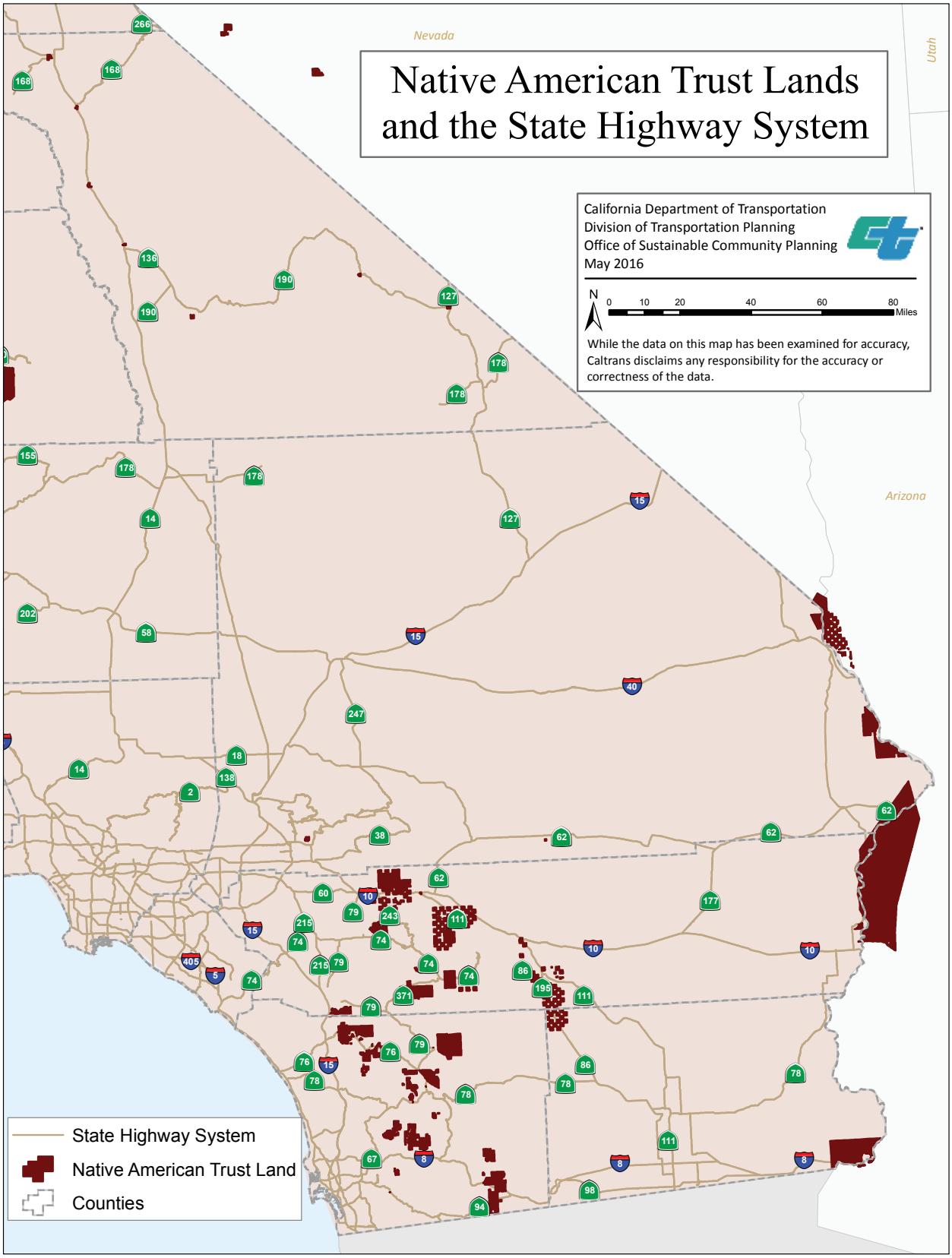


Source: Native American Trust Lands: Bureau of Indian Affairs, 2014.

FIGURE 2
NATIVE AMERICAN TRUST LANDS AND HIGHWAYS - CENTRAL CALIFORNIA

Source: Native American Trust Lands: Bureau of Indian Affairs, 2014.

FIGURE 3
NATIVE AMERICAN TRUST LANDS AND HIGHWAYS - SOUTHERN CALIFORNIA



Source: Native American Trust Lands: Bureau of Indian Affairs, 2014.

APPENDIX 6
REVENUES AND EXPENDITURES

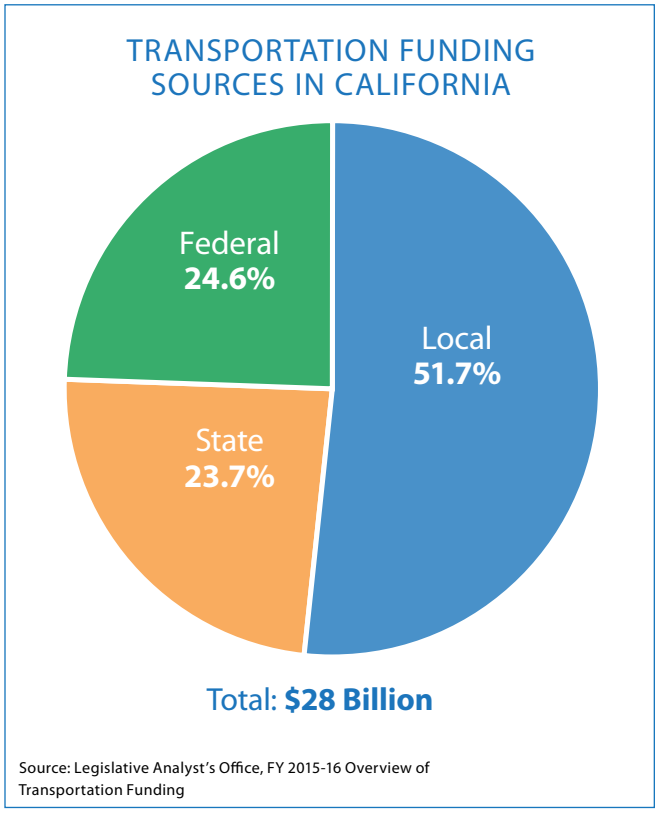
Transportation funding in California is insufficient to meet the growing needs of preserving, maintaining, and expanding the transportation system. Traditional transportation revenue sources, such as motor vehicle fuel taxes and fees, will not meet the cost of offsetting inflation, addressing increased transportation demand, complying with new sustainable policies, and supporting technological innovation. Policies that attempt to decrease vehicle miles traveled (VMT) through active modes and improved vehicle efficiency will continue to reduce fuel consumption. Therefore, a reduction in fuel consumption will correspondingly reduce fuel tax revenues that support transportation and result in a more substantial funding shortfall.

The State needs $536.2 billion worth of transportation improvements over the ten-year period from 2011-2020, according to the latest 2011 Statewide Transportation System Needs Assessment. The Needs Assessment also projects that the State will produce $242.4 billion in revenue for the same period–a shortfall of $296 billion, as noted in **Table 1**. The exploration of new funding mechanisms and strategies is necessary to close the gap. This appendix provides an overview of transportation revenue sources and expenditures, highlights upcoming financial challenges, and suggests funding strategies to help minimize the funding shortfall.

FUNDING SOURCES

California's transportation system receives funding from a variety of federal, State, and local sources. The State assumes responsibility for the federal and state highway system (SHS) and some interregional rail systems, while local entities are responsible for streets, roads, and transit systems. The primary source of federal and State revenue for the transportation system is the federal and State excise tax imposed on gasoline and diesel fuels. The State collects additional revenue from truck weight fees, State sales tax on diesel fuel, vehicle license fees (VLFs), and voter-approved bond sales. Local transportation entities obtain revenue through local sales tax measures, local property tax assessments, transit fares, developer fees, and general fund allocations. Statewide figures from the Legislative Analyst's Office indicate roughly $28 billion in transportation funding is collected annually, with local entities providing nearly half of that figure and federal and State transportation revenue mechanisms providing the other half (see **Figure 1**).[1]

Figure 1



Source: Legislative Analyst's Office, FY 2015-16 Overview of Transportation Funding

FEDERAL TRANSPORTATION REVENUES

Federal revenue is primarily generated through fuel excise taxes–18.4 cents per gallon for gasoline and 24.4 cents per gallon for diesel–and the heavy-vehicle use tax (HVUT). Consumers pay the gasoline or diesel excise tax at the time of purchase. The HVUT tax is an annual fee (maximum $550) paid by truck owners to the Internal Revenue Service (IRS). This tax is assessed on heavy vehicles operating on public highways at registered gross weights equal to or exceeding 55,000 pounds.

Additional funding is allocated based on the federal government's authorization, which sets the maximum amount that can be appropriated to programs each fiscal year (FY) over a given period. The current authorization, the Surface Transportation Act, Fixing America's Surface Transportation Act (Fast Act),[2] is a five year bill that allocates $305 billion for transportation purposes across the nation. California can expect to receive an annual average Federal Highway Administration (FHWA) apportionment of $3.88 billion until this authorization expires.[3]

1 Legislative Analyst's Office. (2015). "Overview of Transportation Funding." Retrieved from http://www.lao.ca.gov/handouts/transportation/2015/Overview-of-Transportation-Funding041615.pdf.

Table 1
TEN-YEAR TRANSPORTATION SYSTEM NEEDS ANALYSIS (2011-2020)

	A. Preservation-Rehabilitation	B. Preservation-Maintenance	C. Preservation-Subtotal	D. System Management	E. System Expansion	F. Subtotal (D+E)	**Total**
Costs:							
Highways	$70,380,000	$9,280,000	$79,660,000	$7,542,224	$78,065,899	$85,608,123	$165,268,123
Local Roads	NA	NA	$102,900,000	$2,294,798	$24,155,968	$26,450,766	$129,350,766
Public Transit	$32,675,000	$109,682,000	$142,357,000	$1,121,836	$30,816,912	$31,938,748	$174,295,748
Intercity Rail	NA	NA	$170,000	$94,045	$6,164,585	$6,258,630	$6,428,630
Freight Rail	$64,420		$64,420	$387,332	$21,924,017	$22,311,349	$22,375,769
Seaports	$4,600,000		$4,600,000	$402,550	$7,097,466	$7,500,016	$12,100,016
Airports	$10,420,000		$10,420,000	$953,892	$4,553,791	$5,507,683	$15,927,683
Land Ports	NA	NA	$935,000	-	$33,798	$33,798	$968,798
Intermodal Facilities	NA	NA	-	-	$5,942,905	$5,942,905	$5,942,905
Bike/Ped	NA	NA	-	$570,715	$2,930,592	$3,501,307	$3,501,307
Total Costs			$341,106,420	$13,367,392	$181,685,933	$195,053,325	$536,159,745
Revenues:							
Federal	NA	NA	NA	NA	NA	NA	$30,900,000
State	NA	NA	NA	NA	NA	NA	$53,100,000
Regional/Local	NA	NA	NA	NA	NA	NA	$158,400,000
Total Revenues			$147,707,000			$94,693,000	$242,400,000
Net Revenues			**$193,399,420**			**$100,360,325**	**$293,759,745**
% Funded			43.30%			48.55%	45.21%

Source: 2011 Statewide Transportation System Needs Assessment, California Transportation Commission.

Since 2000, lawmakers have been permitted to transfer money from the US Treasury's General Fund to the Highway Trust Fund (HTF) if obligations outpace revenues based on enacted legislation. The Congressional Budget Office (CBO) estimated that outlays from the highway account totaled $53 billion, while revenues amounted to only $39 billion in 2015. By CBO's estimate, the balance in the trust fund's highway account will be $3 billion at the end of federal fiscal year 2015.[4] This temporary fix could have a significant impact on California if lawmakers decide to stop this discretionary fund transfer, as it receives roughly a fourth of its transportation funding from the federal government. Thus, a sufficient and permanent financial mechanism is needed to stabilize transportation revenue.

2 US DOT, "The Fixing America's Surface Transportation Act or "FAST Act," 2016, https://www.transportation.gov/fastact.

3 Caltrans, "FAST Act FACT SHEET," 2016, http://www.dot.ca.gov/hq/transprog/map21/fact_sheets/fastact/core-apport-pgm.pdf.

4 Oakley, J, "Outlook for the Federal Highway Trust Fund," 2014, http://www.naco.org/about/leadership/nccae/Documents/Oakley-Presentation-Slides__AASHTO_2014.pdf.

Tribal Government Funding Portion

Federally recognized tribes receive formula based funding or compete with other tribes for limited financial resources, including the programs listed in **Table 2**, that are dedicated to tribal governments: Tribal Transportation Program (TTP), Federal Lands Transportation Program, Federal Lands Access Program, Federal Lands Planning Program,[5] and Public Transportation on Indian Reservations.[6]

In the last decade, Pacific Region California Tribes have received the majority of their transportation funding from two formula-based programs–the Indian Reservation Roads (IRR) program pursuant to the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), and the TTP pursuant to the FAST Act. Currently, tribes receive FAST Act funds through the TTP, a federal funding pool for tribes similar to the separate FAST Act funding pool for states. Allocation amounts under both SAFETEA-LU, Moving Ahead for Progress in the 21st Century (MAP-21), and the FAST Act have been based on a statutory formula. Under SAFETEA-LU in FY 2011, Pacific Region tribes received $21.8 million of the total, $346.7 million (6.3 percent). In 2012, MAP-21 changed the funding formula for the TTP. For FY 2014, the authorized total share for Pacific Region California tribes was $23.5 million, 6.8 percent of the total. In addition, Congress approved a one-time allocation of 60 percent of FY 2011 allocations as "transitional funding." This resulted in an additional allocation of $13.1 million for Pacific Region California tribes. The amount for the TTP is set to increase throughout the term of FAST Act, from $465 million in FY 2016 to $505 million in FY 2020 for all tribes.

Table 2
TRIBAL GOVERNMENT FINANCIAL PROGRAMS

PROGRAM	FUNDING SOURCE	DESCRIPTION
Tribal Transportation Program	Highway Account	Provides access to basic community services for tribal communities. This program replaces the Indian Reservation Roads program.
Federal Lands Transportation Program	Highway Account	Provides funding for projects that provide access to or within federal or tribal land.
Federal Lands Access Program	Highway Account	Provides funding to improve access to transportation facilities that are located on or adjacent to, or that provide access to federal or tribal land.
Federal Lands Planning Program	Highway Account	Provides funding for transportation planning activities on federal lands or tribal facilities, similar to the Statewide and Metropolitan transportation planning funding.
Tribal High Priority Projects Program	General Fund	Supplements the Tribal Transportation Program (TTP) by providing funding to tribal communities for high priority projects, or emergency-disaster projects.
Public Transportation Indian Reservations	Mass Transit Account	Provides funding for capital, operating, planning, and administrative expenses for public transit projects for rural tribal communities.

5 Federal Highway Administration, "MAP-21 Federal Lands Highway Programs," http://flh.fhwa.dot.gov/programs/map-21.htm.

6 Federal Transit Administration, "FY 2014 Section 5311(c) Public Transportation on Indian Reservations Apportionment, 2014 https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/Table_10_FY_2014__Tribal_021814_0.pdf.

STATE TRANSPORTATION REVENUES

The State generates transportation revenues by assessing fuel excise and sales taxes, general obligation bonds, and weight fees. Article XIX of the California Constitution stipulates that revenue collected from certain sources be used for specified purposes. For example, motor vehicle fuels can be used only on transportation–highway and roadway needs, public transportation, or paying off transportation debt obligations.

Gasoline Fuel Taxes

A State excise tax on gasoline is the principal source of California's transportation revenue, consisting of a fixed tax of 18 cents (base excise tax) and a variable-rate tax (price-based excise tax) as established by the Fuel Tax Swap of 2010, for each gallon of gasoline sold. The Fuel Tax Swap was first enacted in 2010 by Assembly Bill (AB) x8-6 and Senate Bill (SB) 70. Due to conflicts created by the passage of Propositions 22 and 26 by voters, the Legislature reenacted the Fuel Tax Swap through AB 105 (2011). As a result, the State sales tax on gasoline was replaced with the price-base excise tax. The California Board of Equalization (BOE) is required to adjust this rate annually to ensure the amount of tax revenue generated is equal to what would have been generated before the Fuel Tax Swap was enacted. The passage of AB 105 also authorized the redirection of weight fees from the State Highway Account (SHA) to the General Fund to pay off obligation bond debt service for specified voter-approved transportation bonds. Together, the base and price-based excise taxes have historically generated over $5 billion,[7] which is deposited into the SHA. **Table 3** illustrates the current gasoline tax per gallon.

The first portion of funding is set aside to backfill truck weight fees lost from the Fuel Tax Swap, that were reallocated to pay off transportation debt obligations and the General Fund. The remaining funds in the SHA are allocated to the State Transportation Improvement Program (STIP) for construction projects, the State Highway Operations Protection Program (SHOPP) for highway maintenance and operation, and local roadway projects.

Diesel Fuel Taxes

The State imposes a fuel excise tax and a sales and use tax on retail sales of diesel fuel that applies to general consumers. Beginning in 2011, the Fuel Tax Swap decreased the State excise tax on diesel from 18 to 10 cents and increases to 13 cents per gallon in FY 2015-16. The Fuel Tax Swap subjects the retail sale of diesel fuel to an additional sales and use tax. Therefore, sales of diesel fuel are subject to the statewide rate of 7.5 percent, any applicable district tax rates, plus the additional sales and use tax rate applicable to diesel fuel. The additional sales and use tax rate for diesel changed over several years. The additional sales and use tax rate for diesel fuel is fixed at 1.75 percent, effective July 1, 2014. **Table 4** illustrates the current diesel tax per gallon.

Table 3
FISCAL YEAR 2015-16 GASOLINE TAXES PER GALLON

NAME OF TAX	AMOUNT PER GALLON
State Excise Tax (base State excise and price-based excise taxes)	30.00¢
Average State taxes and fees for local purposes (counties/special districts tax, Bradley-Burns local tax, local public safety fund, underground storage fee, etc.)	12.35¢
Total State taxes and fees	42.35¢
Total taxes and fees paid (including Federal 18.4¢)	60.75¢

Source: American Petroleum Institute[8]

Table 4
FISCAL YEAR 2015-16 DIESEL TAXES PER GALLON

NAME OF TAX	AMOUNT PER GALLON
State Excise Tax	13.00¢
Statutory increase in sales tax rate	26.38¢
Total State Taxes and Fees	39.38¢
Total Taxes and Fees Paid (including Federal 24.4¢)	63.78¢

Source: American Petroleum Institute[9]

7 CA Board of Equalization, "Table 24: Gasoline and Jet Fuel Tax Statistics, FY 1923-24 to 2012-2013," http://www.boe.ca.gov/annual/2013-14/table_14/table24_2013-14.pdf

8 American Petroleum Institute, "State Motor Fuel Taxes – Rates Effective 7/01/2015," http://www.api.org/~/media/files/statistics/Statemotorfuel-onepagers-july-2015.pdf.

9 Ibid

The diesel fuel tax is expected to generate $400 million in 2015.[10] This funds local mass transportation efforts through the State Transit Assistance fund (STA) program for regional and county purposes. Of the 7.5 percent-per-gallon base sales and use tax for diesel fuel, 4.75 percent is split between State and local governments. Half of this revenue goes to the STA program, while the other half goes to support the State's intercity rail and other mass transportation efforts.

Transportation Bonds and Loans

Debt financing or borrowing is a method of raising large amounts of startup capital for more expensive infrastructure projects. The bond issues can be general obligation or revenue bonds (backed by project- and location-specific potential revenues). The State infrequently issues general obligation bonds to finance capital improvement projects for highways, rail, and transit. Proposition 116 of 1990 enacted the Clean Air and Transportation Improvement Act (CATIA) and authorized general bond issue of $1.99 billion. This provided funding for mostly passenger rail capital projects, with limited funds available for public mass transit guideways, paratransit vehicles, bicycle and ferry facilities, and a railroad technology museum. Proposition 192, known as Seismic Retrofit Bond Act of 1996 provided a $2 billion bond issue for seismic retrofit program, including a $650 million seismic retrofitting for toll bridges.

Proposition 1B–Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006–was the largest transportation proposition to pass to date, authorizing the State to sell $20 billion in bonds for transportation projects. Most recently, in 2008, voters passed Proposition 1A–Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century, which provided $9.95 billion to fund construction of California's high-speed rail (HSR) and connecting systems.

Another funding mechanism used by the State is Grant Anticipation Revenue Vehicles (GARVEE) bonds. GARVEE bonds are tax-exempt bonds backed by future federal aid highway funding. The State uses GARVEE bonds to finance the construction of critical transportation infrastructure projects. In accordance with California Transportation Commission (CTC) policy, GARVEE bonds have a maximum term of 12 years.

The State also uses federal credit assistance through the Transportation Infrastructure Finance and Innovation Act (TIFIA) Program. TIFIA provides federal direct or secured loans, loan guarantees and standby letters of credit to eligible surface transportation projects, including highway, transit, intercity, passenger rail, some types of freight rail, and intermodal freight transfer facilities. The program's goal is to leverage federal funds by attracting substantial private co-investment for large capital projects. The United States Department of Transportation (US DOT) awards credit assistance to eligible applicants, which include state departments of transportation, transit operators, special authorities, local governments and private entities.

Truck Weight Fees

In addition to the federal HVUT, commercial trucks pay State weight fees based on declared gross vehicle weight. For the last five years, the fee generated approximately $950 million annually. The money is used to compensate for the additional pavement distress caused by trucks on the roadway. As mentioned above, the State Legislature redirected this revenue from the SHA to the General Fund to pay the debt-service cost on transportation bonds starting in fiscal year 2010-11.

Vehicle License Fees

The VLF was established in 1935 by the Legislature in lieu of a property tax on vehicles. The formula for the VLF is based on the purchase price of the vehicle when acquired. The VLF is paid upon initial and annual vehicle registration renewal. Currently, it is calculated at 0.65 percent of the vehicle purchase price the first year, decreasing each year for the first 11 years or until the title of the vehicle is transferred.[11] The VLF brings approximately $500 million annually and the bulk of collected funds are transferred to counties and cities. The VLF also funds the Department of Motor Vehicles (DMV), the Franchise Tax Board, and the State's Controller's Office.

10 Caltrans, Division of Budgets, "2015-16 California Transportation Financing Package," http://www.dot.ca.gov/docs/CA_Transportation_Financing_Package_2015-16.pdf.

11 California Department of Motor Vehicles, "Frequently Asked Questions FAQ. In Vehicle License Fee FAQS," https://www.dmv.ca.gov/portal/dmv/detail/faq/faq_vlf/!ut/p/a1/lZD-BasMwEES_pYccxa7tKlaOIg1264QeCqmli5EVO1GxZbkIUfr1IX0PoXsYGFhm9i1IqEFaFcxVeTNZNSxebpvq9eWQIAVWBT1y5FVZvp8P57TYZfAJEqS23vkbiMsYGj1Z31nfdHaD0W-wV_MqTRj6ZdlpcwHR0rRnCd2RTjMkzxo1YSrvCGZIc5awpG1TECBkfredbuHjn4Fvj3BqEOn3aX-6xljIb8TYfoI6Xr_KihBXzNc8Sx65F9YfD_Vj8PVPsRvvDEdw48gy6sLvsRyC409_SOtTWg!!/dl5/d5/L2dBISEvZ0FBIS9nQSEh/?urile=wcm%3Apath%3A%2Fdmv_content_en%2Fdmv%2Ffaq%2Ffaq_vlf.

Cap-and-Trade

AB 32 established the goal of reducing GHG emissions to 1990 levels by 2020. To meet this goal, the ARB adopted "Cap-and-Trade," a market mechanism that places a "cap" on emissions for entities responsible for 85 percent of the State's GHG emissions. As part of the Cap-and-Trade Program, ARB conducts quarterly auctions and sells emission allowances. These auctions will likely generate billions of dollars in State revenue over the coming years. Through SB 862, GHG: Emissions Reduction, the Governor's FY 2014-15 budget appropriated $850 million in auction revenue to various State programs, including programs related to sustainable communities, clean transportation, energy efficiency, natural resources, and waste diversion. The 2014-15 budget allocated $250 million to the California High-Speed Rail Authority (CHSRA) and provided an ongoing commitment of 25 percent of future proceeds. Caltrans received $25 million to oversee the Low Carbon Transit Operations Program and another $25 million for the Transit and Intercity Rail Capital Program. The Strategic Growth Council (SGC) received $130 million to coordinate the Affordable Housing and Sustainable Communities Program and ARB received $200 million to oversee the Low-Carbon Transportation Program (see **Table 5**).[12] On June 15, 2014, the Legislature approved the 2014-15 Budget Bill and related trailer bills that support the budget. SB 862 establishes long-term funding for the Cap-and-Trade Program. Beginning FY 2015-16, SB 862 dedicates 60 percent of Cap-and-Trade revenue to all of the mentioned programs through a continuous appropriation, while the remaining 40 percent of Cap-and-Trade revenue is available for annual budget act appropriation. The 60 percent continuous appropriation includes 25 percent for HSR, 20 percent for Affordable Housing and Sustainable Communities (AHSC), 10 percent for Transit and Intercity Rail Capital Program, and 5 percent for the Low Carbon Transit Operations Program. The Legislature will allocate the remaining funds to meet specific objectives in the future. Initially, fuel costs may rise in the short run, but the creation of a carbon market would spur technological innovation and clean energy investments that lead to better efficiency and sustainability in the long run.[13]

Table 5
CAP-AND-TRADE: SUSTAINABLE COMMUNITIES AND CLEAN TRANSPORTATION PROGRAMS

AGENCY/DEPARTMENT	PROGRAM	FY 14-15 FUNDING AMOUNT (MILLIONS)	PERCENTAGE
High-Speed Rail Authority	**High-Speed Rail Project** Covers initial construction of Central Valley segment and environmental and design work on the system.	$250	25%
CalSTA/Caltrans	**Low Carbon Transit Operations Program** Funds bus and rail service projects that target disadvantage communities, reduce greenhouse gases, and improve mobility.	$25	5%
CalSTA/Caltrans	**Transit and Intercity Rail Capital Program** Funds bus and rail capital improvement projects that target disadvantaged communities, expand rail systems, reduce greenhouse gases, improve safety, and enhance connectivity to high-speed rail.	$25	10%
Strategic Growth Council	**Affordable Housing and Sustainable Communities Program** Funds "sustainable community" initiatives, such as transit-oriented development.	$130	20%
Air Resources Board	**Clean Transportation Program** Funds a range of programmatic activities, such as incentive programs for zero- and low-emissions passenger vehicles, clean buses and trucks, and sustainable freight technology.	$200	Annual Appropriation

12 CA Department of Finance, "Cap and Trade Expenditure Plan," http://www.ebudget.ca.gov/2014-15/pdf/Enacted/BudgetSummary/CapandTradeExpenditurePlan.pdf

13 California Air Resource Board, Cap-and-Trade Program. What is Cap-and-Trade?" http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.

Active Transportation Program

Governor Brown signed SB 99 on September 26, 2013, which provides about $120 million annually from the federal trust fund and the SHA to the ATP. This program provides funding for non-motorized transportation, such as pedestrian, bicycle, trail, and Safe Routes to School (SRTS) projects. Disadvantaged communities must receive no less than 25 percent of the program's funding. The ATP receives funds that were previously dedicated to SRTS, the former Transportation Enhancement Program, recreational trails funding, and the Bicycle Account. The CTC is responsible for adopting guidelines and programming ATP projects. Caltrans is responsible for recommending projects to the CTC and monitoring awarded applicants. The purpose of ATP is to encourage increased use of active modes of transportation with the following specific goals:

- Increase the proportion of trips accomplished by biking and walking
- Increase safety and mobility for non-motorized users
- Advance the active transportation efforts of regional agencies to achieve GHG emission reduction goals
- Enhance public health
- Ensure that disadvantaged communities fully share in the benefits of the program
- Provide a broad spectrum of projects to benefit many types of active transportation users

LOCAL REVENUES

Local revenue provides funding for highways, streets, roads, bike routes, pedestrian pathways, transit service, and freight services. These local funding sources derive primarily from a sales and use tax on the sale of goods, including gasoline and diesel fuel, voter-approved local sales tax initiatives, transit fares, property taxes, developer fees, and special district taxes, such as an infrastructure financing district (IFD) taxes. IFDs, which require 55 percent voter approval, generate revenue for local infrastructure improvements, including transportation projects. Governor Brown enacted SB 628 on September 29, 2014, directing IFDs to focus on specific infrastructure projects.

Transportation Development Act

The Transportation Development Act (TDA) of 1971 provides two local funding sources for transportation and transit purposes through the Local Transportation Fund (LTF) and State Transit Assistance Fund (STA). LTF is derived from a ¼ cent of the general sales tax collected statewide. The BOE collects the revenue and returns the money to each participating county on a pro rata basis. On the other hand, STA is derived from the statewide sales tax on diesel. Also, the additional 1.75 percent increase to base sales tax on diesel is dedicated to the STA. Statute requires that 50 percent of the STA funds be allocated based on population and the other 50 percent be allocated based on operator revenues from the previous year.

Self-Help Counties and Local Sales Tax Measures

The State Constitution authorizes counties to impose an additional local sales tax up to 1 percent if the measure receives supermajority two-thirds of approval votes cast. Counties with such voter-approved local sales tax initiatives are "self-help counties." Currently, 81 percent of Californians live in self-help counties.[14] Currently, there are 20 voter-approved self-help counties. These counties use transportation sales tax measures to fund highway, freight, transit, bicycle, pedestrian, and other mobility initiatives. Further, six counties have implemented a permanent 0.5 percent sales tax to fund four transit districts in their region. Statewide, self-help counties generate over $4 billion per year from local sales tax measures. Over the course of the next three decades, self-help counties are expected to spend over $95 billion on California's transportation system.

Local General Funds

Cities and counties are required by law to spend a certain amount of their general funds on streets and roads as a precondition to receiving their share of the State fuel tax revenue. Cities and counties receive 36 percent of the 18 cents per gallon base fuel excise tax revenues, while the SHA gets 64 percent.

EXPENDITURES

California has steadily increased its spending on transportation over the course of many decades. Federal and State revenues are deposited into the SHA and Public Transportation Account (PTA), and then allocated for interregional and regional transportation improvement, maintenance and operation, local assistance, and non-capital outlay. The State's primary infrastructure investment areas are: 1) highways, 2) local streets and roads, 3) mass transportation, 4) intercity rail, and 5) HSR.

14 Self-Help Counties Coalition, "California's Economy Fueled by Local Sales Tax Measures," http://www.selfhelpcounties.org/Brochure_Self-HelpCounties_011813.pdf.

HIGHWAYS

From 2001-2011, the State spent about $56 billion on highway infrastructure projects that included design, construction, and staff oversight.[15] Spending on highway projects has increased in recent years due to the infusion of one-time Proposition 1B bond funding. Additional funding includes:

- *State Transportation Improvement Program* (STIP)–Funds expansion projects that add capacity to the transportation network and consists of two components: Caltrans' Interregional Transportation Improvement Program (ITIP) and Regional Transportation Planning Agencies' (RTPAs') Regional Transportation Improvement Program (RTIP). Approximately 25 percent of overall STIP funding goes toward the ITIP, while 75 percent goes toward the RTIP. The ITIP focuses on improving interregional transportation and sustainable, integrated corridors of statewide significance while the RTIP focuses on improving transportation within regions.
- *State Highway Operation and Protection Program* (SHOPP)–Provides funding for pavement rehabilitation, operation, emergency repair, and safety improvements on State highways and bridges.

LOCAL STREETS AND ROADS

Over the past decade, roughly $19 billion has been distributed to local entities, and annual State funding for local roads has increased over the years. This includes:

- *Local Assistance Program*–Caltrans oversees the distribution of approximately $1.7 billion in federal and State funding annually to over 600 cities, counties, and regional agencies. The program provides recipients with the opportunity to improve their transportation infrastructure or provide additional transportation services.

MASS TRANSPORTATION

Capital expenditures for mass transportation have fluctuated over the past ten years. Expended State funds have varied from $200 million to $1.5 billion per year. During this period, funding sources shifted from special funds to bonds. This includes:

- *Public Transportation Account* (PTA)–Provides funding for local transit, as outlined in the TDA. Proposition 22 (2010) requires revenue generated from the State's 4.75 percent base portion of the sales tax on diesel fuel to be split equally between the State and local transit agencies. The additional 1.75 percent on top of base sales tax is dedicated to the STA for operation and capital purposes.

INTERCITY RAIL

Caltrans funds three intercity rail routes: the Pacific Surfliner, the San Joaquin, and the Capitol Corridor. State legislation transferred Caltrans management responsibilities of the Pacific Surfliner and the San Joaquin to local joint power authorities and the Capitol Corridor continues to be managed by the Capitol Corridor Joint Powers Authority. The Pacific Surfliner operates from San Luis Obispo-Los Angeles-San Diego. The San Joaquin operates from Oakland-Sacramento-Bakersfield. The Capitol Corridor operates from San Jose-Oakland-Sacramento-Auburn. All three routes are supplemented by dedicated feeder bus service. These three rail lines serve more than 5.3 million passengers annually to more than 130 destinations throughout California.

HIGH-SPEED RAIL

Compared to other transportation expenditures, spending on HSR has been minimal over the years. In the future, however, HSR construction costs alone will represent a significant portion of transportation expenditures. This includes:

- *California's Global Warming Solutions Act of 2006* (AB 32) – Established a market-based compliance mechanism known as the "Cap-and-Trade" program. Governor Brown earmarked $250 million in FY 2014-15 for the CHSRA through Cap-and-Trade auction revenues collected under AB 32, to fund the first phase in the Central Valley and to complete further environmental and design work of the statewide system. In addition, the State budget will commit 25 percent of future Cap-and-Trade revenues to complete the system.

FUNDING CHALLENGES

The SHS has steadily deteriorated over the past decades and has experienced increasing maintenance costs and congestion. The Governor's Budget Summary shows that Caltrans estimates that without new revenue, in 10 years 47 percent of pavement will either need preventative maintenance (30 percent) or already be distressed (17 percent). The SHS's pavement needs are expected to total $8 billion per year over the next decade, but only $2.3 billion per year is estimated to be available—a shortfall of $5.7 billion per year. Further, entities managing local streets and roads will experience a funding shortfall of $82 billion of their own over the next 10 years. Through a combination of deteriorating infrastructure and increasing demand and bond debt, it is uncertain if California will be able to meet its future transportation needs.

15 Taylor, M, "A Ten-Year Perspective: CA Infrastructure Spending," 2011, http://www.lao.ca.gov/reports/2011/stadm/infrastructure/infrastructure_082511.pdf.

DECREASING REVENUE

The decrease in transportation revenue can be attributed to a variety of causes, including not indexing the excise fuel tax to match inflation, or the decline in gasoline and diesel consumption due to user choice or more fuel-efficient and alternative-energy vehicles. Further, the economic recession led to a decrease in consumption, which correspondingly decreased transportation revenue. Revenue is expected to further decrease because policies, such as the Corporate Average Fuel Economy regulation that was passed in 2012, requires an increase in car and light-truck fuel economy to 54.5 miles per gallon (MPG) by 2025.[16] This policy may bring about a rebound effect; the reduction in vehicle operating costs due to increased mileage will boost disposable income, possibly inducing Californians to drive more.

BOND DEBT

Bonds serve as a quick and temporary financial mechanism to generate money and typically expedite capital projects in the short-run; however, there is a long-run financial trade-off. As bond funding remains an option, lengthy debt repayments, such as Proposition 1B, will continue to draw from future revenue that could be used to fund the transportation system. The Legislature has begun to allocate additional resources to pay down California's debt obligations. As mentioned previously, truck weight fees were redirected to pay the debt owed on bonds. The State has attempted to avoid borrowing additional money to decrease its overall debt service.

TRIBAL GOVERNMENT FUNDING AND PARTNERSHIPS

In the Tribal Listening Sessions conducted as preparation for creating this plan, tribal government representatives noted that funding is the main transportation difficulty they face. Transportation funding is vital for providing needed community services and sustaining vibrant and diverse tribal economies. Funding for tribal transportation projects is also necessary for facilities needed by tribal communities in their mostly rural settings.

Planning funds are essential in helping tribes develop their transportation systems. Transportation plans are required for several programs and are the foundation of successful transportation systems. A crucial component of planning, and therefore funding, is data. Many tribal governments lack sufficient data for planning and funding purposes due to lack of funding and rural locations. Recreational traffic is often not counted in many traffic studies. Tribes must also overcome institutional restrictions to partner with local and regional transportation agencies. As a result, many tribes experience difficulties accessing transportation funding.

Accessing transportation funding is a priority goal of California tribal governments. As Stated previously, Native American tribes are sovereign governments. In California, a majority of transportation funding is given to local governments or regional agencies. Thus, tribes must compete with cities, counties, and other local agencies for limited funds. This intense competition makes it difficult for tribal governments to access needed funding and provide essential services to their communities. New strategies are required to improve tribal transportation systems.

Innovative funding mechanisms are critical in providing better funding access. Partnerships between tribes, local governments, and regional agencies create new opportunities in transportation and provide mutually beneficial solutions to community problems. Building collaborative and cooperative relationships help ensure maximum benefits and efficiency for all. In addition, other creative solutions could empower tribal governments to develop their own transportation networks. These solutions may include partnerships with multiple tribal governments in tribal transportation funding districts, a separate funding reservation for tribes, and special transportation districts.

STRATEGIES TO REDUCE THE FUNDING GAP

Reliance on unstable revenue sources has created a challenge: how to maintain the current infrastructure and meet future demand. Federal and State initiatives to reduce gasoline and diesel fuel consumption make the creation of stable funding sources even more imperative. In order to address the revenue shortfall anticipated over the next decade, the excise tax on fuel should be indexed and additional funding mechanisms such as pay-as-you-go taxes and fees, new excise taxes, sales taxes, and other user fees must be explored.

INDEXING THE FUEL EXCISE TAX

Since 1993, the U.S. federal fuel tax has been at $0.184 cents per gallon for gasoline and $0.244 cents per gallon for diesel. Fuel taxes have not increased with inflation, maintenance, and rehabilitation costs; therefore, transportation agencies have lost purchasing power over the decades. A solution to increase purchasing power would be to index the fuel tax to the Consumer Price Index—Florida, Maryland, and New Hampshire implemented this strategy. This would allow the revenue collected from fuel excise taxes to accurately reflect current market conditions.

16 The White House: Office of Press Secretary, "Obama Administration Finalizes Historic 54.5 MPG Fuel Efficiency Standards," 2012, http://www.whitehouse.gov/the-press-office/2012/08/28/obama-administration-finalizes-historic-545-mpg-fuel-efficiency-standard.

PAY-AS-YOU-GO TAXES AND FEES

As automobile manufacturers increase production of more fuel-efficient vehicles and governments encourage sustainable communities, revenue from the excise tax on fuel will shrink. The Legislature has taken the initiative to address this issue through the passage of AB 2032 (2004), which, for a fee, permits single occupancy vehicles (SOVs) in selected areas to use designated high occupancy vehicle (HOV) lanes (carpool lanes) during peak commute periods.

In 2015, Governor Brown signed into law AB 194 authorizing regional transportation agencies or the Department to develop and operate high occupancy toll (HOT) lanes or other toll facilities upon approval of the CTC and removes the existing limitation on the number of facilities that may be approved. Prior to passage of AB 194, existing law limited the number of facilities to not more than 4, 2 in northern California and 2 in southern California, approved before January 1, 2012. The law allows applicable agencies to issue bonds, refunding bonds, or bond anticipation notes backed by revenues generated from the facilities. The southbound I-680 Express Lane was the first HOT lane project implemented in northern California, and was opened to traffic in September, 2010. The evaluation of the Express Lane within three years of opening showed that the tolls collected were not financially sufficient because revenues did not exceed operating cost. The operating cost has been subsidized by the unspent grant funds available in the project. When the Express Lane becomes financially sustainable, the Sunol Smart Carpool Lane JPA Board will assess how to reinvest these funds in the corridor.[17] I-15 in San Diego is the other project under this Express Lane Demonstration Program, but no evaluation reports submitted to the Legislature for this corridor were found to date.

The development of new revenue mechanisms will be critical to replace the outdated fuel excise tax and reduce the revenue shortfall. Decision makers may consider creating an excise tax on alternative fuels, carbon tax, road usage charge, or congestion pricing to generate more revenue. An increase to transportation related sales taxes would also increase revenue.

Vehicle Based Fees

As cars become more fuel efficient, many new car owners are paying less in fuel taxes than the average motorist. Consideration should be given to developing new fees on vehicles to stabilize transportation revenue as vehicles become more fuel efficient. This fee could be imposed in an equitable manner and revenue would not erode as more fuel efficient vehicles are introduced.

Road Charge

A mileage-based pricing strategy could be implemented. Oregon is currently exploring this under their Road Usage Charge Program. A similar effort in California has been introduced through SB 1077 (DeSaulnier, 2014). This bill requires the State to assess the potential for a user mileage-based revenue collection on California's roads and highways as an alternative to the motor fuel tax system. CTC has assembled a 15 member Road Charge Technical Advisory Committee (TAC) to develop recommendations for the design of a Road Charge Pilot Program. California State Transportation Agency (CalSTA) will implement this pilot program in the Summer of 2016. The outcomes of this program will be reported to the TAC, CTC, and Legislature in the second half of 2017. CTC will provide recommendations on this program to the Legislature in December of 2018. Caltrans is providing the technical support to the TAC, CTC, and CalSTA in carrying out their duties and responsibilities.

Congestion Pricing

Congestion pricing is a strategy that surcharges roadway users, where there is excess of demand, to reduce traffic congestion. This strategy has been used worldwide for decades and it can be applied to urban cores or single transportation facilities. "Cordon pricing" involves applying a fee or tax during peak usage as a disincentive for motorists from visiting the area, thus, helping to reduce travel and alleviating traffic congestion. "HOT lanes" allow users to access a dedicated lane such as a "carpool" lane for a fee based on the distance traveled and its demand. This allows users to access a less congested traffic lane, while alleviating the demand for a general-purpose lane that is at max throughput capacity. Moreover, it serves as another revenue mechanism.

ADDITIONAL SALES TAX

Although some Californians view the Fuel Tax Swap of 2010 as an additional tax on gasoline and diesel fuel, the program was intended to be revenue-neutral and provide the Legislature with more flexibility to allocate transportation revenue.[18] Californians could raise the sales tax across the State or within local jurisdictions for transportation purposes. Local voters could also extend or increase the sales tax measures already in place for local transportation purposes.

17 Alameda County Transportation Commission, "Southbound I-680 Express Lane Performance Evaluation- An After Study," 2013, http://www.alamedactc.org/files/managed/Document/11591/AlamedaCTC_I-680_After_Study_20130712.pdf.

18 California State Board of Equalization, "Tax Rate on Gasoline," http://www.boe.ca.gov/taxprograms/excise_gas_tax.htm.

CONCLUSION

California's transportation funding mechanisms are dated, thus, transportation will continue to face funding challenges in the future. Revenues are expected to decrease due to inflation and political initiatives that focus on reducing automobile use and shifting consumers to choose for alternative fuels. An act of indexing or a single revenue mechanism alone will not negate the funding shortfall. More likely, several revenue strategies will have to be explored and implemented to close the financial shortfall. If this gap is not addressed, the State's eroding transportation infrastructure may have an impact on the economy as the mobility needs of people and businesses will not be met.

APPENDIX 7
TECHNICAL ANALYSIS

INTRODUCTION

This report describes the technical analyses conducted to evaluate theoretical greenhouse gas (GHG) reduction strategies and economic benefits contained in the California Transportation Plan 2040 (CTP 2040) scenarios that are designed to test one possible scenario to reach the state's GHG reduction targets. Key technical analyses were conducted using the California Statewide Travel Demand Model (CSTDM), the California Air Resources Board's (ARB's) EMissions FACtor (EMFAC) and ARB's Vision for Clean Air (VISION) Models, and the Transportation Economic Development Impact Software (TREDIS).

Draft analysis results, completed in early 2015, were subsequently updated for the final forecasts contained in this report. Key changes between the draft and final CTP 2040 include the following:

- Modeled expanded pricing policies with a statewide auto operating cost increase of 36.5 percent (equivalent to 16 cents a miles) and an additional increase of 36.5 percent in urban areas (expressed in increases to auto operating costs) designed to simulate a theoretical urban county congestion fee.
- Roll back modeled transit vehicle speed increases to 50 percent above Scenario 1 (draft CTP 2040 included a doubling of transit vehicle speeds).
- San Joaquin Valley vehicle miles traveled (VMT) adjusted down by 11.6 percent in the modeling strategy, from the DRAFT model runs, to account for slower expected growth in population and jobs.
- Increased high occupancy vehicle (HOV) lane strategy, analyzed off-model, and assumed to decrease statewide VMT by 1.0 percent for this exercise.

CALIFORNIA STATEWIDE TRAVEL DEMAND MODEL

The CSTDM was recently updated using the most current information from the 2012 CHTS, the 2010 US Census, and assumptions from California Metropolitan Planning Organization (MPO) Sustainable Communities Strategies (SCSs), effective Spring 2013. The CSTDM (dubbed CSTDM Version 2.0) is documented at the California Department of Transportation (Caltrans) website at http://www.dot.ca.gov/hq/tpp/offices/omsp/statewide_modeling/cstdm.html.

The CSTDM is an integrated system of five components of typical weekday travel in California:

- Short distance personal travel
- Long distance personal travel
- Short distance truck travel
- Long distance truck travel
- Interregional Travel (from other states and Mexico)

Table 1
CSTDM MODES OF TRAVEL FOR EACH MODEL COMPONENT

Travel Modes	MODELS				
	Short Distance Personal	Long Distance Personal	Short Distance Truck	Long Distance Truck	External Travel
Auto Single Occupant	√	√			√
Auto 2 persons	√	√			√
Auto 3+ persons	√	√			√
Transit (bus and urban rail)	√				
Bicycle	√				
Walk	√				
Air		√			
Intercity Rail / HSR		√			
Trucks (3 classes x weight)			√	√	√

The CSTDM also includes all modes of transportation, including bicycling, walking, flying, taking transit, trucks, and all passenger rail, including high-speed rail (HSR) (HSR included only for future year forecasts). A summary of model components and modes of travel is shown in **Table 1**. Modes of travel are restricted to those logically associated with each model. For example, the long and short distance personal travel models do not allow for commercial truck travel. The long distance personal travel model excludes walk and bicycle trips, and HSR is excluded from short distance personal travel.

VMT and Mobility Results

A key metric for CTP 2040 was VMT, which was used in the development of transportation GHG reduction strategies, as described in Chapter 3. Statewide daily VMT has been summarized for each horizon year (2010, 2020, and 2040) and by scenario. VMT rises through 2040 as the State's population and economy increase. Substantial reductions in VMT are shown for Scenarios 2 and 3 compared to Scenario 1. VMT was used as a metric to be consistent among the strategies, as well as provide for comparison of the strategies. However, GHG reduction is the ultimate goal of the scenarios and strategies and not specifically VMT reduction. VMT is used as a surrogate in the models for reductions in GHG remissions.

VMT is the total number of miles traveled on all roadways by all vehicles. VMT per capita is the average number of miles traveled per person. VMT per capita has been calculated using two methods– first, by dividing personal travel VMT by the State population, and secondly, by including truck travel with personal travel (total travel). Personal VMT per capita is expected to decline for Scenario 1 conditions due to the impacts of the regional SCSs.

Table 2
TOTAL DAILY VMT FROM CSTDM FOR SCENARIOS 1, 2, AND 3 IN MILLIONS OF MILES (CSTDM)

	2010	2020	2040
SCENARIO 1			
Light duty vehicles	591.5	640	779.7
Heavy duty vehicles	99.7	117.2	149.3
Total	**691**	**757**	**929**
% Difference from 2010		**10%**	**34%**
SCENARIO 2 & 3			
Light duty vehicles	591.5	630.1	581.9
Heavy duty vehicles	99.7	116.6	136.7
Total	**691**	**747**	**719**
% Difference from 2010		**8%** ↑	**4%** ↑

However, truck VMT is projected to increase over time, so total VMT per capita decreases somewhat less across CTP Transportation Scenarios when truck travel is included. See **Table 3** and **Figure 1** for a summary of the VMT per capita results.

Transportation system performance

This section reviews changes in vehicle hours of travel (VHT) and vehicle hours of delay (VHD). VHT measures the total amount of time spent in personal vehicles and VHD is a measure of congested travel. Specifically, VHD measures the difference in time between traveling during congested conditions (such as during peak

Table 3
DAILY VMT PER CAPITA (CSTDM)

	Population	VMT per capita - Personal Travel	Personal Travel VMT per Capita Change	VMT per capita - Total Travel	Total Travel (includes trucks) Change from 2010
2010	37,249,200	15.9		18.6	
2020 Scenario 1	41,595,000	15.4	-3%	18.2	-2%
2020 Scenario 2 & 3	41,595,000	15.1	-5%	18.0	-3%
2040 Scenario 1	50,389,800	15.5	-3%	18.4	-1%
2040 Scenario 2 & 3	50,389,800	11.5	-27%	14.3	-23%

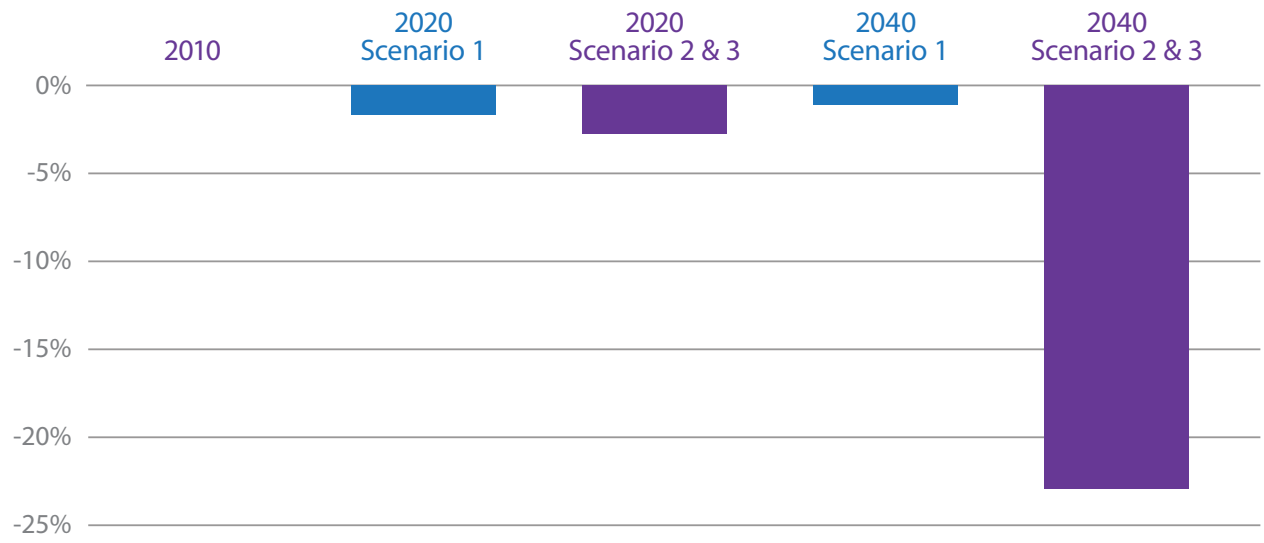
periods) minus the time spent traveling in free-flow conditions (such as during the middle of the night). Many of the transportation GHG reduction strategies were intended to reduce GHG emissions through reducing VMT. However, reducing VHT and VHD can also reduce GHG emissions. The VMT reduction strategies tended to have the added benefit of also reducing congestion; thus, VHD was also reduced significantly under Transportation Scenarios 2 and 3.

In 2010, approximately 898,000 VHD were estimated across the State, with delay more than tripling for 2040 Transportation Scenario 1. Scenario 2 transportation strategies are forecast to reduce year 2040 delay by nearly 50 percent. **Table 4** shows VHT and VHD in Scenarios 1 and for 2 and 3. (Transportation Scenarios 2 and 3 have the same levels of VHT and VHD.)

Table 4
VEHICLE HOURS OF TRAVEL AND DELAY (X 1,000) (CSTDM)

	VHT	VHD	% Congested
2010	14,865	898	6.0%
2020 Scenario 1	16,312	1,055	6.5%
2020 Scenario 2 & 3	16,037 ↓	982 ↓	6.1% ↓
2040 Scenario 1	21,587	2,942	13.6%
2040 Scenario 2 & 3	16,125 ↓	1,494 ↓	9.3% ↓

Figure 1
PERSONAL TRAVEL PER CAPITA VMT (CSTDM)



THEORETICAL TRANSPORTATION SCENARIOS

MPO/SCS Assumptions Used In Scenarios

As described in Chapter 3, the most up-to-date SCS and Regional Transportation Plan (RTP) assumptions were used for CTP 2040 analyses. However, SCS and RTP data developed after the Spring of 2013 were not included–most notably the eight San Joaquin Valley MPOs. The San Joaquin Valley MPOs have subsequently forecasted significantly lower demographic growth (population and jobs) for their 2014 SCSs, compared to prior regional plans. For the purposes of this report, an off-model VMT reduction was assumed for the San Joaquin Valley MPOs to better represent the more current lower estimates for population and employment growth. Those off-model adjustments are discussed further below in this Appendix.

As of Spring 2013, not all MPOs had completed RTPs that conformed to SB 375 requirements. Socio-economic forecasts and transportation improvement assumptions were included for the following MPOs:

- Bay Area Metropolitan Transportation Commission (MTC)
- Southern California Association of Governments (SCAG)
- Sacramento Area Council of Governments (SACOG)
- Santa Barbara County Association of Governments (SBCAG)
- San Luis Obispo Council of Governments (SLOCOG)
- Tahoe Regional Planning Agency (TRPA)

Additionally, socio-economic forecasts and transportation network assumptions that were updated, but not officially included in the final adopted RTP/SCS were also included for the following regions:

- Association of Monterey Bay Area Governments (AMBAG)
- Butte Council of Governments (BCAG)

County-level population forecast data were also updated for these counties:

- Del Norte County
- Humboldt County

Clean Fuel Assumptions Used in the Transportation Scenarios

In January 2012, the ARB approved a new emissions-control program for model years 2017 through 2025. The program combined the control of smog, soot, and global warming gases, and requirements for greater numbers of zero-emission vehicles (ZEVs) into a single package of standards called Advanced Clean Cars.

TRANSPORTATION GHG REDUCTION STRATEGIES

Transportation GHG reduction strategies were outlined in Chapter 3. **Appendix 7** presents a more thorough review of each strategy, including key GHG reduction assumptions. The contribution to GHG reductions is analyzed in terms of reduced VMT so each strategy can be compared on a one to one basis. **Table 5** summarizes the transportation GHG reduction strategies for each of the four categories–demand management, mode shift, travel cost, and operational efficiency.

Category 1: Demand Management

TELECOMMUTING STRATEGY

Telecommuting is the practice of working from home by employees who would otherwise travel to a workplace. Telecommuting usually requires the ability to communicate with coworkers electronically, by telephone, email, text message, and/or videoconference. Alternatively, telecommuters may work from a "telecommuting center," also called a "telecenter," that provides desk space, Internet access, and other basic support services but is located closer to home than the established workplace.[1] The CTP 2040 assumes a statewide implementation of the telecommuting strategy.

The impact of increased telecommuting as an alternative to commuting was analyzed by SACOG as part of their Metropolitan Transportation Plan (MTP).[2] SACOG forecasted a 0.39 percent VMT reduction as a result of more people working from home. The CTP 2040 used the same assumption on a statewide basis. See **Table 6**.

CARPOOLING STRATEGY

The CTP 2040 assumes a 5 percent increase in the rate of carpooling statewide. Using data from the CSTDM, this carpooling strategy was estimated to reduce VMT by 2.9 percent statewide.

CARSHARING STRATEGY

Carsharing allows people to rent cars for a period of time extending from as little as 30 minutes, up to a full week. Carsharing services have been available in urbanized areas for over a decade, and in that time the number of subscribers and available vehicles has grown.[3] The CTP 2040 assumes an aggressive implementation to increase the use of carsharing.

At the individual household level, carsharing could increase or decrease VMT. Carsharing may increase VMT for households that do not own automobiles, but other households with cars may choose to forego auto ownership (or own fewer vehicles) in favor of carsharing. An ARB Policy Brief examined two studies that found,

1 http://www.arb.ca.gov/cc/sb375/policies/telecommuting/telecommuting_brief.pdf

2 Sacramento Association of Governments, "2012 Metropolitan Transportation Plan, Final Environmental Impact Report," Appendix C-4, Model Reference Report, Sacramento, CA.

3 http://www.mtc.ca.gov/planning/plan_bay_area/draftplanbayarea/

Table 5
TRANSPORTATION GHG REDUCTION STRATEGIES BY CATEGORY

Demand Management	Mode Shift	Travel Cost	Operational Efficiency
Telecommute/ Work at Home	Transit Service Improvements (Urban and intercity–rail, bus and ferry)	Implement Expanded Pricing Policies	Incident/Emergency Management
Increased carpoolers	High-Speed Rail		Caltrans' (TMS) Master Plan
Increased Car Sharing	Bus Rapid Transit		ITS/TSM
	Expand Bike		Eco-driving
	Expand Pedestrian		
	Carpool Lane Occupancy Requirements		
	Increased HOV Lanes		

"[R]eductions in VMT among vehicle-owners (or previous owners) who joined carsharing outweighed increases in VMT among non-owners who had joined at the time of the study. As a result, carsharing appears to have reduced VMT overall by about a quarter to a third among those who have participated."[4]

MTC analyzed carsharing as part of their 2012 RTP.[5] MTC assumed carsharing would increase region-wide due to new policies, such as the introduction of peer-to-peer carshare exchanges (which allows an individual to rent out his/her private vehicle when not in use), and one-way carsharing (in which vehicles are picked up in one location and returned to another). MTC assumed a net five percent increase in carsharing region-wide, with higher rates of penetration assumed in urbanized areas where carsharing already exists than in suburban areas where carsharing is beginning to be introduced. For the CTP 2040, a 5 percent increase in carsharing was assumed, and this resulted in a statewide reduction in VMT of 1.1 percent. See **Table 7**.

Table 6
VMT REDUCTIONS ASSOCIATED WITH INCREASED TELECOMMUTING

% Change Work at Home	+2.1%
Daily VMT Reduced per Worker	7.0
Change in VMT	-0.39%

Source: SACOG; Assumes a 1:1 relationship between GHG reductions and VMT reductions.

Table 7
INCREASED CARSHARING ASSUMPTIONS, PLAN BAY AREA

EIR ALTERNATIVE	URBAN AREAS	SUBURBAN AREAS	ALL AREAS
No Project (2020 and 2035)	10%	0%	
Car Share Alternatives (2035)	15%	5%	
Net Change in Car Share Adoption Rates	5%	5%	5%

Source: Metropolitan Transportation Commission and Association of Bay Area Governments

4 2013, Lovejoy, Handy and Boarnet, DRAFT Policy Brief on the Impacts of Carsharing (and Other Shared-Use Systems) Based on a Review of the Empirical Literature, Prepared for California Air Resources Board, Sacramento, CA.

5 2013, Metropolitan Transportation Commission and Association of Bay Area Governments, Plan Bay Area Technical Supplementary Report: Predicted Traveler Responses, Summary of Predicted Traveler Responses, Oakland, CA.

Category 2: Mode Shift

TRANSIT SERVICE IMPROVEMENTS STRATEGY

Many different transit service-related improvements can be used to increase transit ridership. Transit services includes regularly scheduled urban, rural, and intercity transit services; this includes intercity, commuter, urban and light rail, bus services, and other transit line haul modes, such as cable cars and ferries.

For CTP 2040, an aggressive set of transit improvements was assumed. Transit service levels were assumed to double over 2040 baseline conditions, transit speeds for all services were assumed to increase by 50 percent, transit fares for all services were assumed to be free, and widespread timed transfers were also included.

The draft transit strategy has garnered a lot of attention as potentially unrealistic and unaffordable. As such, the final version of this analysis rolled back transit speed improvements from 100 percent faster to 50 percent faster. The intention to identify the maximum VMT reductions from transportation strategies has not shifted; however, doubling the speeds of all transit services in California was determined to not be practical for the purposes of this analysis.

The transit strategy was also designed to help offset road pricing by making transit a more viable option. Along with other alternative transportation strategies, dual emphases of reducing GHG emissions and increasing mobility options were paramount considerations.

Combined with the next strategy–reduced fares for HSR–the transit improvement strategy reduced statewide VMT by 6.0 percent.

HIGH-SPEED RAIL STRATEGY

The HSR system in the CTP 2040 is the same as assumed in the 2013 California State Rail Plan (CSRP) with service operating between the Los Angeles Region, San Joaquin Valley, and San Francisco Bay Area. HSR service levels and speeds are not changed from Transportation Scenario 1, but HSR fares are assumed to be reduced by 50 percent by 2040 in the modeling analysis to maximize incentives for ridership.

BUS RAPID TRANSIT STRATEGY

This strategy assumes that 20 percent of local bus services are converted to bus rapid transit (BRT). *Traffic Congestion Relief Program (TCRP) Report 118: Bus Rapid Transit Practitioner's Guide*[6] reviewed BRT improvements to local bus systems. Specific sets of improvements were not considered; rather, a combination of BRT improvements was assumed to meet the assumption of this strategy. Such improvements can include exclusive rights-of-way, limited-stop service, fare prepayment, signal priority, "branding" of the system, and other elements that enhance customer satisfaction.

The BRT strategy assumed that 20 percent of the local bus routes (or routes containing 20 percent of local bus riders) were converted from local bus to BRT. Using a series of assumptions, a modest VMT reduction of 0.07 percent was calculated as a result of the BRT strategy.

EXPANSION OF BICYCLE USE STRATEGY

The CTP 2040 assumes an aggressive implementation of the expansion of bicycle use, where the bicycle mode share is assumed to have doubled. Within the model, this objective projected a VMT decrease statewide of 0.4 percent. Some questions were raised whether the bicycle mode share could reasonably be expected to more than double over the 2040 Transportation Scenario 1 forecasts. However, absent compelling data, the doubling of the bicycle mode share was determined to be appropriate for Transportation Scenarios 2 and 3.

EXPANSION OF PEDESTRIAN ACTIVITIES STRATEGY

The CTP 2040 assumes an aggressive expansion of walking–a doubling of pedestrian mode shares. This objective assumed a VMT decrease statewide of 0.4 percent. As with the bicycle strategy, suggestions to increase the walk mode share beyond the initial assumption were made. The doubling of the walk mode share was also determined to be appropriate for Transportation Scenarios 2 and 3.

CARPOOL LANE OCCUPANCY REQUIREMENTS STRATEGY

The required minimum carpool lane occupancies were increased from 2+ persons to 3+ persons for all carpool lanes statewide. Carpool lanes with 3+ occupancy rates were not modified; thus, a uniform 3+ carpool occupancy was assessed. This strategy was evaluated using the CSTDM and yielded a modest reduction of VMT by 0.8 percent statewide.

HOV LANE SYSTEM

The HOV or carpool lane system serves to increase the person-carrying capacities of California highways in many of the State's largest regions. The HOT or express lanes provide preferential access for HOV or toll payment for facilities with excess peak period capacity.[7] The CTP 2040 Transportation Scenario 1 includes the HOV/HOT network assumed in MPO SCSs, plus all of the widened and new roads contained in the MPO RTPs/SCSs.

6 2007, Transit Cooperative Research Program, TCRP Report 118: Bus Rapid Transit Practitioner's Guide, Washington DC.

7 http://www.dot.ca.gov/hq/traffops/systemops/hov/Express_Lane/files/Caltrans%20HOV-ExpressLaneBizPlan%202009.pdf

The CTP Transportation Scenario 2 GHG reduction strategy extended the separate regional HOV systems into a seamless statewide inter-urban HOV network. The initial assumption was a series of additional new HOV lanes would be added throughout the State to connect the HOV network–particularly for interregional HOV access.

Transportation Scenario 2 did not assume any new lanes would be added to complete the HOV network–but rather that mixed flow lanes would be converted to HOV. The completed HOV network was not modeled directly using the CSTDM due to time constraints for producing the final CTP forecasts; rather, the completed HOV network was treated as an aspirational strategy, and assumed to reduce statewide VMT by 1.0 percent.

Category 3: Travel Cost

IMPLEMENT EXPANDED PRICING POLICIES

The utilization of pricing and vehicle fees to fund infrastructure improvements, manage congestion and improve roadways was modeled as a increase in auto operating cost throughout the State, plus an additional modeled increase designed to test a generalized congestion charge assessed in urban counties. Urban counties were defined as all county MPOs, except for Butte and Shasta Counties. Butte and Shasta were excluded from the generalized congestion charge because these MPOs are mostly surrounded by rural counties.

Non-MPO counties (plus Shasta and Butte) were all considered rural for this analysis. This strategy was designed to create a large mode shift in the model from single occupancy vehicle (SOV) trips to other alternative modes of transportation.

The Implement Expanded Pricing Policies strategy increased, in the model, 2040 statewide auto operating costs by 16 cents per mile. The urban congestion charge also increased auto operating costs by an additional 16 cents per mile. This totals the urban county increase in auto operating costs by 32 cents per mile. **Table 8** shows the base auto operating cost assumptions used for 2010, 2020, and 2040.

Auto operating cost calculations are based on calculations made for travel demand modeling purposes only. The travel demand models do not consider the "sunk costs" of driving, such as car payments and insurance. As such, **Table 9** below compares how CSTDM auto operating costs are calculated compared with real-life auto operating costs as calculated by the American Automobile Association (AAA).

Table 8
AUTO OPERATING COST ASSUMPTIONS

Motor Gasoline in California	-
Fuel Efficiency (mpg)	-
Gas Operating Cost ($/mile)	-
Non Gasoline Operating Cost ($/mile)	-
2010 Auto Operating Cost ($/mile)	$0.23
Motor Gasoline in California	$3.72
Fuel Efficiency (mpg)	24.1
Gas Operating Cost ($/mile)	$0.15
Non Gasoline Operating Cost ($/mile)	$0.09
2020 Auto Operating Cost ($/mile)	$0.24
Motor Gasoline in California	$4.83
Fuel Efficiency (mpg)	36.1
Gas Operating Cost ($/mile)	$0.13
Non Gasoline Operating Cost ($/mile)	$0.09
2040 Auto Operating Cost ($/mile)	$0.22

Note: All figures in constant $2010.

Table 9
FACTORS IN AUTO OPERATING COST CALCULATIONS - AAA VERSUS CSTDM

Included:	AAA	CSTDM
Fuel	√	√
Maintenance	√	√
Tires	√	
Insurance	√	
License, Registration, and Taxes	√	
Depreciation	√	
Finance	√	
Auto Operating Cost	59 cents/mile	22-24 cents/mile

Category 4: Operational Efficiency

INCIDENT AND EMERGENCY MANAGEMENT STRATEGY

Incident management programs identify, analyze, and correct minor and major traffic incidents to help mitigate traffic backups, as well as increase public safety. Incident management programs generally include three primary functions: 1) traffic surveillance–detecting and verifying traffic incidents, 2) clearance–coordinating emergency response teams to the site of the incident, and 3) traveler information–notifying motorists of the incident through changeable message signs to provide time to select a route that avoids the incident.[8] Incident and emergency management is one component of Caltrans' Transportation System Management and Operation (TSMO) program. The CTP 2040 assumes the implementation of all components of TSMO.

CALTRANS' TRANSPORTATION MANAGEMENT SYSTEM MASTER PLAN STRATEGY

Caltrans' Traffic Management System (TMS) Master Plan focuses on three core processes that help regain lost productivity in congestion. Traffic control and management systems, incident management systems, and advance traveler information systems. All three processes rely on real-time, advanced detection systems. These TMS processes and their associated detection systems represent a nucleus for the Caltrans' traffic operations strategies, form a critical part of the overall system management strategy, and are the focus of this report.[9] The TMS Master Plan is one component of Caltrans' TSMO program. The CTP 2040 assumes the implementation of all components of TSMO.

INTELLIGENT TRANSPORTATION SYSTEM ELEMENTS STRATEGY

Intelligent transportation systems (ITS) encompass a broad range of information, communications, and control technologies that improve the safety, efficiency, and performance of the surface transportation system. ITS technologies provide the traveling public with accurate, real-time information, allowing them to make more informed and efficient travel decisions.[10] The CTP 2040 assumed an aggressive deployment of ITS.

ECO-DRIVING STRATEGY

An ARB Policy Brief defined eco-driving as *"a style of driving that saves energy, improving fuel economy and reducing tailpipe emissions per mile traveled. Eco-driving tactics include accelerating slowly, cruising at more moderate speeds, avoiding sudden braking, and idling less, as well as selecting routes that allow more of this sort of driving."*[11]

The ARB referenced studies of fuel savings that found, on average, 2.3 percent fuel savings for drivers using eco-driving tactics. For the CTP, eco-driving was analyzed as an off-model aspirational objective of a 10 percent adoption rate, yielding a net fuel savings of 0.23 percent. An additional assumption of a 1:1 relationship between fuel savings and equivalent VMT reduction was made.

TRANSPORTATION SCENARIOS EQUITY ANALYSIS (CSTDM)

The CTP 2040 Transportation Scenarios 2 and 3 increase travel cost, expressed as auto operating costs (the costs of fuel and routine maintenance)—73 percent above Scenario 1 levels in urban counties and 36.5 percent in rural counties. Pricing and transit strategies were assessed to determine their impacts on different income groups across the State.

California travelers were divided into three household income groups described in 2010 constant dollars: low (0 to $25,000), medium ($25,000-$100,000), and high (greater than $100,000). Mode shares analysis for the road pricing strategy showed fairly small changes in mode shares. Drive-alone for low-income travelers was reduced from 25 percent to 23 percent for the road pricing strategy in Scenario 1 as shown in **Table 10**. Changes to non-auto modes also showed modest changes for low-income travelers.

When the travel cost strategy was analyzed in conjunction with improved transit services, the changes to mode shares were more dramatic. Low-income drive-alone shares dropped to 17 percent. The transit-mode share rides rose from 10 percent, under Scenario 1, to 11 percent for the travel cost strategy and up to 17 percent for the travel cost strategy plus transit improvements.

This analysis indicated that effecting significant modal changes required both increases to the cost of travel and improvements to transit services. Thus, the impacts of the travel cost strategy can be mitigated–in terms of transportation accessibility–by simultaneously improving transit services. Additionally, the mix of travel cost strategy and improved transit services had the added benefit of also increasing bike/walk mode shares. **Table 10** presents the mode share by percentage for income groups, while **Figure 2** shows the percent change in each mode related to the transportation strategies (travel cost and transit) relative to Transportation Scenario 1. This table helps to clearly show the relative changes for each mode.

8 http://www.dot.ca.gov/hq/tpp/offices/osp/ctp2040/ctp2040_tac/jan_9_2013/Interregional_GHG_Final_Report_2-14-14.pdf

9 http://www.dot.ca.gov/hq/traffops/sysmgtpl/reports/MasterPlan.pdf

10 http://www.itsa.org/images/ITS%20America%20Strategic%20Plan_Final.pdf

11 2012, Lovejoy, Handy and Boarnet, Draft Policy Brief on the Impacts of Eco-driving Based on a Review of the Empirical Literature, Prepared for California Air Resources Board, Sacramento, CA.

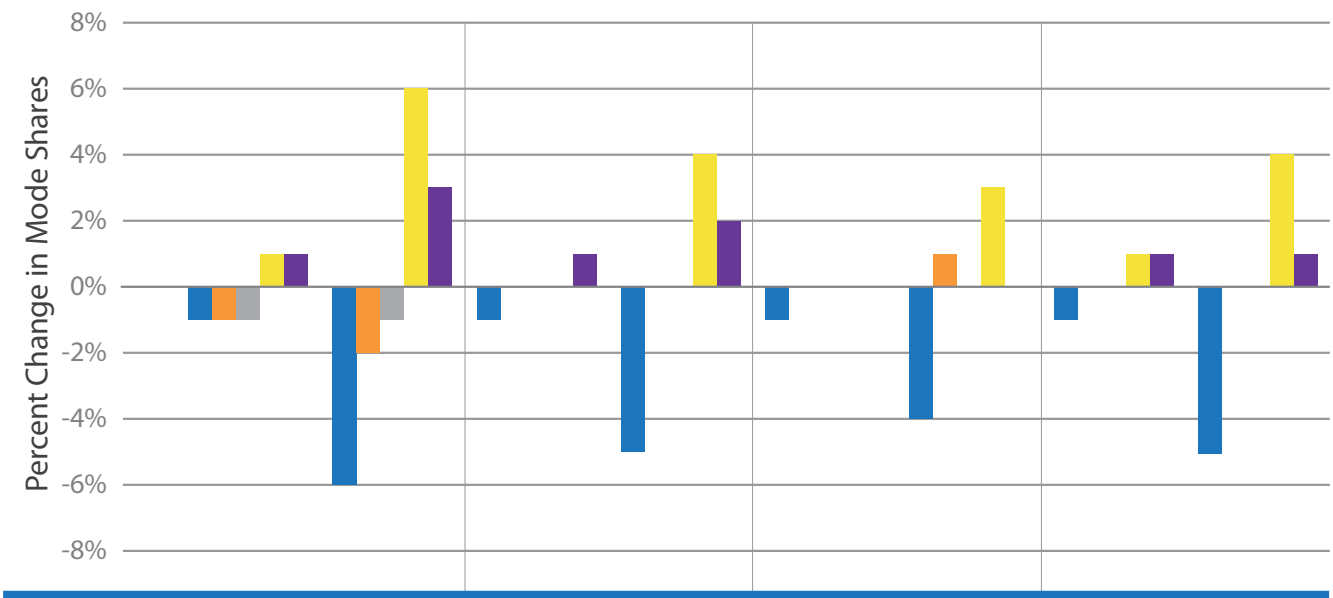
Table 10

YEAR 2040 SHORT DISTANCE PERSONAL TRAVEL MODEL MODE SHARES BY INCOME GROUPS (CSTDM)

		Drive Alone	HOV 2	HOV3+	TRANSIT	BIKE/ WALK	TOTAL
Low Income	Scenario 1	25%	27%	19%	10%	19%	100%
	Travel Cost (TC)	23%	27%	18%	11%	21%	100%
	TC + Transit	19%	26%	17%	15%	22%	100%
Med Income	Scenario 1	34%	31%	22%	5%	8%	100%
	Travel Cost	33%	31%	22%	5%	9%	100%
	TC + Transit	29%	31%	22%	8%	10%	100%
High Income	Scenario 1	46%	29%	21%	3%	1%	100%
	Travel Cost	45%	29%	21%	3%	1%	100%
	TC + Transit	42%	30%	21%	6%	1%	100%
All	Scenario 1	36%	30%	21%	5%	8%	100%
	Travel Cost	35%	30%	21%	5%	8%	100%
	TC + Transit	32%	30%	21%	9%	9%	100%

Figure 2

YEAR 2040 SHORT DISTANCE PERSONAL TRAVEL MODEL CHANGES IN MODE SHARES (COMPARED TO TRANSPORTATION SCENARIO 1) (CSTDM)



	LOW INCOME		MED INCOME		HIGH INCOME		TOTAL	
	Travel Cost (TC)	TC + Transit	Travel Cost	TC + Transit	Travel Cost	TC + Transit	Travel Cost	TC + Transit
Drive Alone	-1%	-6%	-1%	-5%	-1%	-4%	-1%	-5%
HOV 2	-1%	-2%	0%	0%	0%	1%	0%	0%
HOV 3+	-1%	-1%	0%	0%	0%	0%	0%	0%
Transit	1%	6%	0%	4%	0%	3%	1%	4%
Bike/Walk	1%	3%	1%	2%	0%	0%	1%	1%

THE TOOLS

Addressing the new technical elements identified by SB 391, required CTP 2040 performance and analysis tools to estimate current and projected future impacts of transportation-related strategies on statewide GHG emissions, system performance, and economic activity. The tools used for the analysis include:

- California Statewide Travel Demand Model (CSTDM)
- ARB's EMission FACtors model (EMFAC) and Vision for Clean Air (VISION)
- Transportation Economic Demand Impact System (TREDIS) Model

Each of these models is examined here, but for additional technical information on these model systems, please refer to following links:

Model	Link
CSTDM	http://www.dot.ca.gov/hq/tpp/offices/omsp/statewide_modeling/cstdm.html
EMFAC	http://www.arb.ca.gov/emfac/
VISION	http://www.arb.ca.gov/planning/vision/vision.htm
TREDIS	http://www.dot.ca.gov/hq/tpp/offices/osp/ctp2040/ctp2040_tac/oct_24_2013_tac_mtg/TREDIS_for_Caltrans_October_2013_notes_bp.pdf

The following is a brief description of the tools, their individual functions, and how they contribute to the overall analysis. **Figure 4** is a graphical representation of the modeling process and how information flows and interacts.

CALIFORNIA STATEWIDE TRAVEL DEMAND MODEL[12]

The CSTDM is a multimodal, tour-based, travel demand model covering the entire State. It represents both personal and commercial travel, and incorporates the statewide networks for roads, rail, bus, and air travel. The 2012 California Household Travel Survey (CHTS) and the 2010 United States Census, along with regional MPO SCS land use assumptions for population and employment were key inputs into the CSTDM Development. The CSTDM outputs a number of performance measures (VMT, VHD, trips, etc.) that are used in the subsequent emissions and economic benefit analyses.

EMISSIONS FACTOR MODEL[13]

The EMFAC model is used to assess emissions from on-road vehicles. The latest version of the model, EMFAC2014, was released in May 2015. The EMFAC2014 release is needed to support the ARB regulatory and air quality planning efforts and to meet the Federal Highway Administration (FHWA) transportation planning requirements. EMFAC2014 includes the latest data on California's car and truck fleets and travel activity. The model also reflects the emission benefits of ARB's recent rulemakings, including on-road diesel fleet rules, Pavley Clean Car Standards, and the Low-Carbon Fuel Standard.[14] CSTDM outputs are then input to EMFAC2014 to calculate future transportation-related emissions for California. The EMFAC model addresses the emissions quantification of the vehicle activity from the CSTDM, as required by SB 391.

AIR RESOURCES BOARD **VISION** MODEL[15]

The ARB VISION model (VISION 2.0) is used for air quality and climate emissions planning. VISION evaluates strategies to meet California's multiple air quality and climate change goals well into the future (to the year 2050). The model's exploration of the technology and energy transformation needed to meet goals provides a foundation for future integrated air quality and climate change program development. VISION addresses future changes in vehicle technology, vehicle efficiency, alternative fuels, and activity changes, and evaluates their impacts on emissions above and beyond on-road diesel fleet rules, Advanced Clean Car Standards, and the Low-Carbon Fuel Standard required by SB 391.

Transportation Economic Development Impact System

TREDIS was developed by Economic Development Research Group, Inc. TREDIS is an integrated economic analysis system for transportation planning and project assessment and is designed to analyze the macroeconomic impacts of long-range plans such as the CTP 2040. TREDIS assesses costs, benefits, and economic impacts across a range of economic responses and societal perspectives of passenger and freight travel across all modes. TREDIS was used to assess the economic impacts from the CSTDM relating to passenger and short distance truck travel information. TREDIS addresses the economic forecasts from the vehicle activity of the CSTDM required by SB 391 for the CTP 2040.

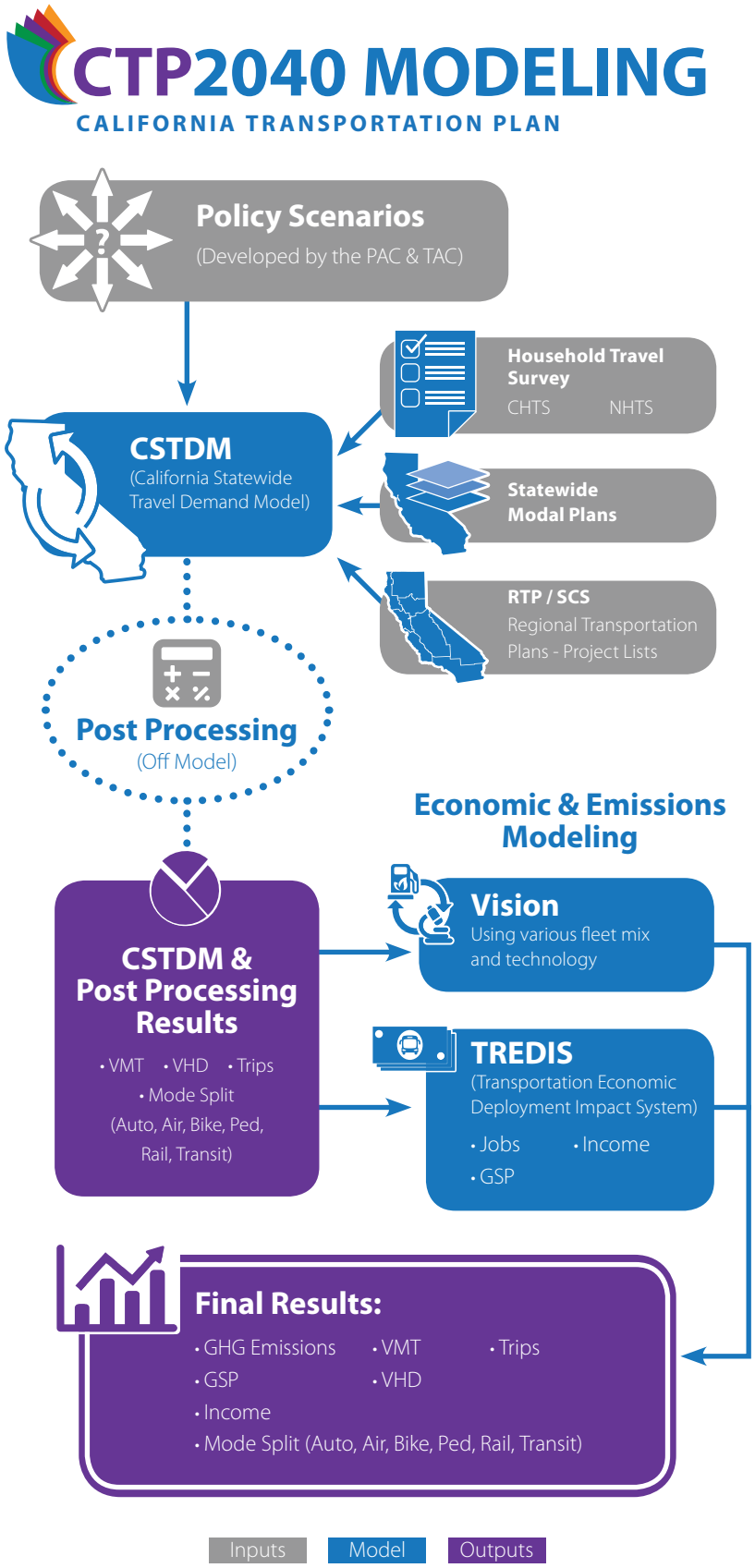
12 http://www.dot.ca.gov/hq/tpp/offices/omsp/Statewide_modeling/cstdm.html

13 http://www.arb.ca.gov/msei/msei.htm

14 http://www.arb.ca.gov/msei/emfac2011-technical-documentation-final-updated-0712-v03.pdf

15 http://www.arb.ca.gov/planning/vision/vision.htm

Figure 4
CTP 2040 MODELING PROCESS (CALTRANS)



ARB VISION MODEL

ARB prepared a technical memorandum summarizing final CTP 2040 EMFAC and VISION Model forecasts. That memorandum is included here in its entirety.

ARB MEMO

Air Quality Planning and Science Division

California Air Resources Board

July 17, 2015

To: California Department of Transportation CTP 2040 Staff

Subject: Updated ARB Vision CTP results for Alternatives 1, 2, and 3

Summary

Updated results for CTP 2040 Alternatives 1, 2, and 3 have been completed. This report is an update to the previous report dated January 28, 2015. The baseline, Alternative 1, achieved a 3% reduction in GHG emissions by 2040, but shows an increase of 10% in 2050 over the 2020 base year. Alternative 2 reduced GHG emissions, with 23% and 15% reductions in 2040 and 2050 respectively below the Alternative 1 2020 base year, but still did not achieve an 80% reduction by 2050 (the target is 32 MMT CO2e for this analysis). Finally, Alternative 3 achieved an 80% reduction in 2050 achieving the GHG goal. Detailed analysis, input assumptions, and results are given below.

Background

For reference, **Figure 1** is a pie graph of the baseline GHG emission inventory for all sectors in calendar year 2012. Total GHG emissions in 2012 were estimated to be 461 MMT CO2e of which transportation accounted for 36% (167 MMT CO2e) and industrial emissions, which include refineries and oil and gas extraction, accounted for 20% (93 MMT CO2e) of the inventory. **Figure 2** further breaks down the transportation section emissions, while **Figure 3** expands the industrial section emissions. **Figure 2** illustrates that on-road emissions from LDVs and HDVs account for 92% (154 MMT CO2e) of the transportation sector emissions with LDV contributing the greatest portion (72% or 120 MMT CO2e). From **Figure 3**, refineries and oil and gas extraction contribute ~50% of the industrial sector emissions (48 MMT CO2e). Adding the three sectors together, transportation, refineries, and oil and gas extraction, gives a wheel-to-wheel (WTW) perspective of the transportation sector total emissions occurring in California, which account for nearly half of all the GHG emission (215 MMT CO2e) in the 2012 emission inventory.

Methodology

Scenarios were run for Caltrans Alternatives 1, 2, and 3 to determine total GHG emissions and fuel demand from 2010 to 2050. The sectors highlighted in this analysis, which were most relevant for CTP, were LDV, HDV, high-speed rail (HSR), aviation (intrastate), and rail (passenger and freight). The ARB Vision 2.0 model was used for the analysis and other transportation sectors (ocean going vessels, harbor craft, cargo handling equipment, and off-road vehicles) lumped together under "other transportation" emissions. Vision 2.0 incorporates the latest data from ARB's EMFAC 2014 as well as the newest baseline policy assumptions for other sectors.

Updated LDV and HDV activity data were supplied to ARB from the Caltrans CSTDM model, which gave VMT by speed bin for three select years (2010, 2020, and 2040).[16] **Table 1** displays total VMT in billions of miles for Alternative 1 in 2010, 2020 and 2040 and the 2040 VMT for the other two Alternatives. Also shown in the table is the percent reduction in VMT between Alternatives 1 and 2 (3 is the same VMT as 2). Note that VMT was reduced by 28% in 2040 for Alternative 2 and Alternative 3. ARB extrapolated VMT annually for years between 2010 and 2040. Beyond 2040, VMT growth rates from EMFAC 2014 were applied to the 2040 data point.

Inputs for HSR came from the HSR Authority High-Speed Rail plan, which gives LDV VMT offsets and intrastate aviation trip reductions. HSR authority assumes that HSR will be entirely powered by renewable electricity so there are no GHG emissions associated with HSR and HSR only affects VMT and aircraft trips. For conventional passenger rail, inputs were matched to Vision 2.0 and the Caltrans rail plan for Alternative 1. Ridership was assumed to double for Alternative 2. It was assumed that there were no aircraft fuel efficiency improvements for Alternatives 1 and 2, but HSR aircraft trip reductions were included for both alternatives. Finally, all other assumptions, including the off-road sectors, came from the ARB Vision 2.0 baseline scenario (projections of existing policies and sector growth estimates).

16 Updated 2020 and 2040 activity data were received on June 11, 2015 by email from Cambridge Systematics, Inc., Revised 2040 activity data were received on July 10, 2015.

Table 1
TOTAL VMT FROM CSTDM FOR ALTERNATIVES 1, 2, AND 3 IN BILLIONS OF MILES PER YEAR

	2010	2020	2040
ALTERNATIVE 1			
LDV	189.7	208	265
HDV	74	73.5	88
Total	264	282	353
ALTERNATIVES 2 & 3			
LDV	-	-	181
HDV	-	-	73
Total	-	-	**254**
% Reduction			**28%**

In order to achieve the 2050 GHG target, additional assumptions were made for Alternative 3 in ARB Vision 2.0 for the following sectors. For LDVs, the assumptions are that fuel efficiency increases such that new vehicle fuel efficiency is four times higher by 2050 from today's levels and an assumption of ~20 million LDV ZEVs on the road in 2050. For HDVs, the assumptions are that fuel efficiency is more than 50% higher by 2030 for new vehicles and ZEVs (BEV, FCV) will represent 12% of total sales by 2030. For freight rail and aviation, the assumptions are that fuel efficiency increases by 2.0% per year starting in 2015. Assumptions for HSR and conventional passenger rail remained the same as in Alternative 2.

For transportation fuels, this analysis assumes 7 "BGGE" bio-fuels are available, including drop-in renewable fuel, by 2050 (~1 BGGE in Alternative 1). Also assumed is a 75% renewable electricity and hydrogen supply mix by 2050 as compared to 33% for both in Alternative 1 (for years 2020-2050).

Figure 1
2012 BASELINE GHG INVENTORY

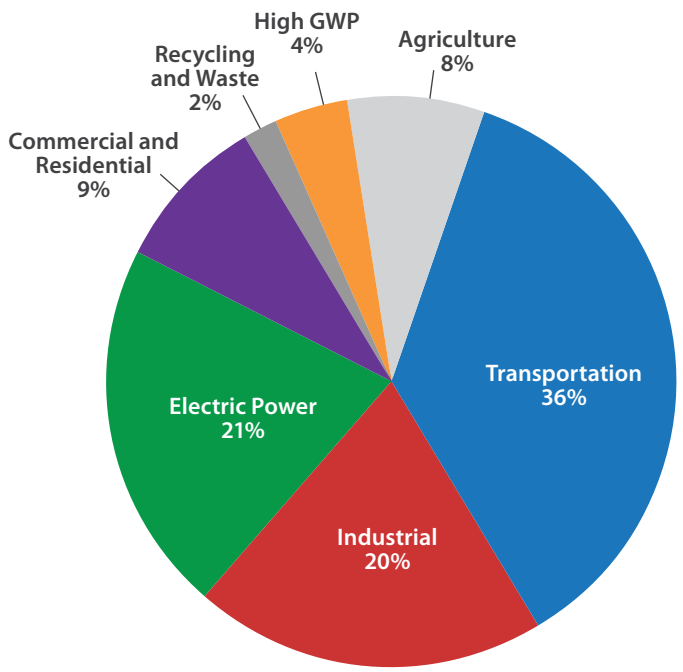
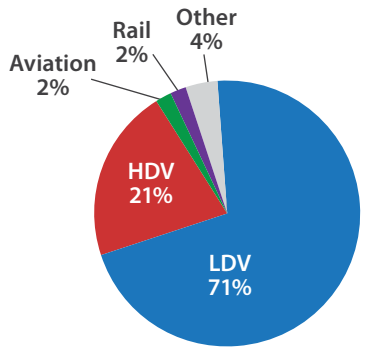
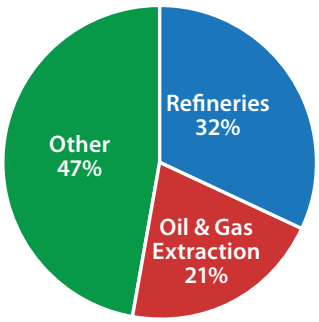


Figure 2
TRANSPORTATION SECTOR GHG INVENTORY



Total = 167 MMT CO_{2e}/yr

Figure 3
INDUSTRIAL SECTOR GHG INVENTORY



Total = 93 MMT CO_{2e}/yr

Alternatives 1 and 2 Results

Results shown in **Tables 2 and 3** are for Alternatives 1 and 2, respectively. The table displays total fuel demand (quadrillion BTUs or "quads" and "BGGE"), GHG emissions (MMT CO2e / yr), and relative percent reduction below Alternative 1 2020 for 2040 and 2050.

Note that a negative percent in the tables above equates to an increase in GHG emissions. For Alternative 1, LDV GHG emissions are reduced by 26% in 2040 and 17% in 2050, while HDV emissions increase by 26% and 38%. For all transportation sectors, there is a 3% reduction in GHG emissions by 2040 and an increase of 10% by 2050. For Alternative 2, overall transportation GHG reductions are 23% in 2040 and 15% in 2050. LDV emissions were reduced by 48% in 2040 and 40% in 2050, while HDV increased by 6% and 5%.

Table 2
ALTERNATIVE 1 RESULTS

	2010	2012	2020	2040	2050
FUEL DEMAND (QUADS)					
Gasoline (CaRFG)[1]	1.31	1.25	1.10	0.80	0.90
Diesel (ULSD)[2]	0.61	0.61	0.69	0.92	1.07
Jet Fuel	0.47	0.46	0.51	0.68	0.77
Electric Power	0.000	0.001	0.008	0.027	0.036
Hydrogen	0.000	0.000	0.001	0.008	0.010
FUEL DEMAND (BGGE)					
Gas	11.7	11.1	9.8	7.1	8.0
Diesel	5.5	5.5	6.2	8.2	9.5
Jet Fuel	4.2	4.1	4.6	6.1	6.9
Electric Power	0.00	0.01	0.07	0.25	0.33
Hydrogen	0.00	0.00	0.01	0.07	0.09
GHG EMISSIONS (MMT CO_{2e} / YR)					
LDV + Bus	114	108	94	70	79
HDV	50	49	50	63	69
Rail	2	3	3	5	6
Aviation	4	4	5	6	7
Other Transportation	4	4	6	10	14
Total	**175**	**168**	**158**	**154**	**175**
Target	**-**	**-**	**-**	**-**	**32**
GHG RELATIVE REDUCTION BELOW ALTERNATIVE 1 2020[3] (%)					
LDV + Bus	-	-	-	26%	17%
HDV	-	-	-	-26%	-38%
Rail	-	-	-	-53%	-91%
Aviation	-	-	-	-26%	-40%
Other Transportation	-	-	-	-70%	-129%
Total	**-**	**-**	**-**	**3%**	**-10%**
Target	**-**	**-**	**-**	**-**	**80%**

1 CALIFORNIA REFORMULATED GASOLINE (CARFG) INCLUDES 10% ETHANOL BLENDED BY VOLUME
2 DIESEL INCLUDES 5% BIODIESEL BY VOLUME
3 AB 32 REQUIRES THAT THE 2020 TOTAL GHG INVENTORY IS THE SAME AS THE 1990 GHG INVENTORY, WHILE THE LAW DOES NOT REQUIRE THAT EACH INDIVIDUAL SECTOR ACHIEVE ITS ABSOLUTE 1990 VALUE. BECAUSE THE CTP PROJECT DOES NOT INCLUDE ALL SECTORS, IT IS ASSUMED THAT THE TRANSPORTATION SECTOR 2020 GHG VALUE CALCULATED FOR ALTERNATIVE 1 WILL BE THE REFERENCE POINT FOR THE 2050 GHG REDUCTIONS.

Table 3
ALTERNATIVE 2 RESULTS

	2010	2012	2020	2040	2050
FUEL DEMAND (QUADS)					
Gasoline (CaRFG)[1]	1.31	1.25	1.10	0.55	0.64
Diesel (ULSD)[2]	0.61	0.61	0.69	0.80	0.87
Jet Fuel	0.47	0.46	0.51	0.68	0.77
Electric Power	0.000	0.001	0.008	0.030	0.041
Hydrogen	0.000	0.000	0.001	0.014	0.015
FUEL DEMAND (BGGE)					
Gas	11.7	11.1	9.8	4.9	5.7
Diesel	5.5	5.5	6.1	7.2	7.8
Jet Fuel	4.2	4.1	4.6	6.1	6.9
Electric Power	0.00	0.01	0.07	0.28	0.37
Hydrogen	0.00	0.00	0.01	0.12	0.13
GHG EMISSIONS (MMT CO_{2e} / YR)					
LDV + Bus	114	108	94	49	56
HDV	50	49	50	53	53
Rail	2	3	3	5	6
Aviation	4	4	5	6	7
Other Transportation	4	4	6	10	14
Total	**174**	**168**	**157**	**123**	**135**
Target	**-**	**-**	**-**	**-**	**32**
GHG RELATIVE REDUCTION BELOW ALTERNATIVE 1 2020[3] (%)					
LDV + Bus	-	-	-	48%	40%
HDV	-	-	-	-6%	-5%
Rail	-	-	-	-43%	-80%
Aviation	-	-	-	-26%	-40%
Other Transportation	-	-	-	-70%	-129%
Total	**-**	**-**	**-**	**23%**	**15%**
Target	**-**	**-**	**-**	**-**	**80%**

1 CALIFORNIA REFORMULATED GASOLINE (CARFG) INCLUDES 10% ETHANOL BLENDED BY VOLUME
2 DIESEL INCLUDES 5% BIODIESEL BY VOLUME
3 AB 32 REQUIRES THAT THE 2020 TOTAL GHG INVENTORY IS THE SAME AS THE 1990 GHG INVENTORY, WHILE THE LAW DOES NOT REQUIRE THAT EACH INDIVIDUAL SECTOR ACHIEVE ITS ABSOLUTE 1990 VALUE. BECAUSE THE CTP PROJECT DOES NOT INCLUDE ALL SECTORS, IT IS ASSUMED THAT THE TRANSPORTATION SECTOR 2020 GHG VALUE CALCULATED FOR ALTERNATIVE 1 WILL BE THE REFERENCE POINT FOR THE 2050 GHG REDUCTIONS.

Figure 4 displays the aggregate fuel demand by sector for Alternative 1 from 2010 to 2050 in BGGE. There is a reduction in total gasoline demand, but an increase in demand for the other fuels, such that the total demand in 2050 is higher than the demand in 2010.

Figures 5 and 6 illustrate total WTW GHG emissions by sector for Alternative 1 (**Figure 5**) and Alternative 2 (**Figure 6**). For Alternative 1, there are significant reductions in LDV GHG emissions as a result of existing policies, but these are somewhat offset by the increase in GHG emission for the other sectors. For this alternative, GHG emissions return to 2010 levels by 2050. For Alternative 2, there are substantial reductions in LDV GHG emissions, which lead to greater total GHG reductions. As a reference, each figure contains red "X's", which represent the 2020 and 2050 targets. The 2020 target is based on Alternative 1 (see footnotes on **Table 2 or 3**) and the 2050 target is 80% of that value. Neither scenario meets or exceeds the target of 32 MMT CO2e in 2050. Furthermore, the more aggressive Alternative 2 would still need to reduce GHG emissions by more than 60% to reach the expected goal.

Figure 4
AGGREGATE FUEL DEMAND (WITH BIOFUEL BLENDS)

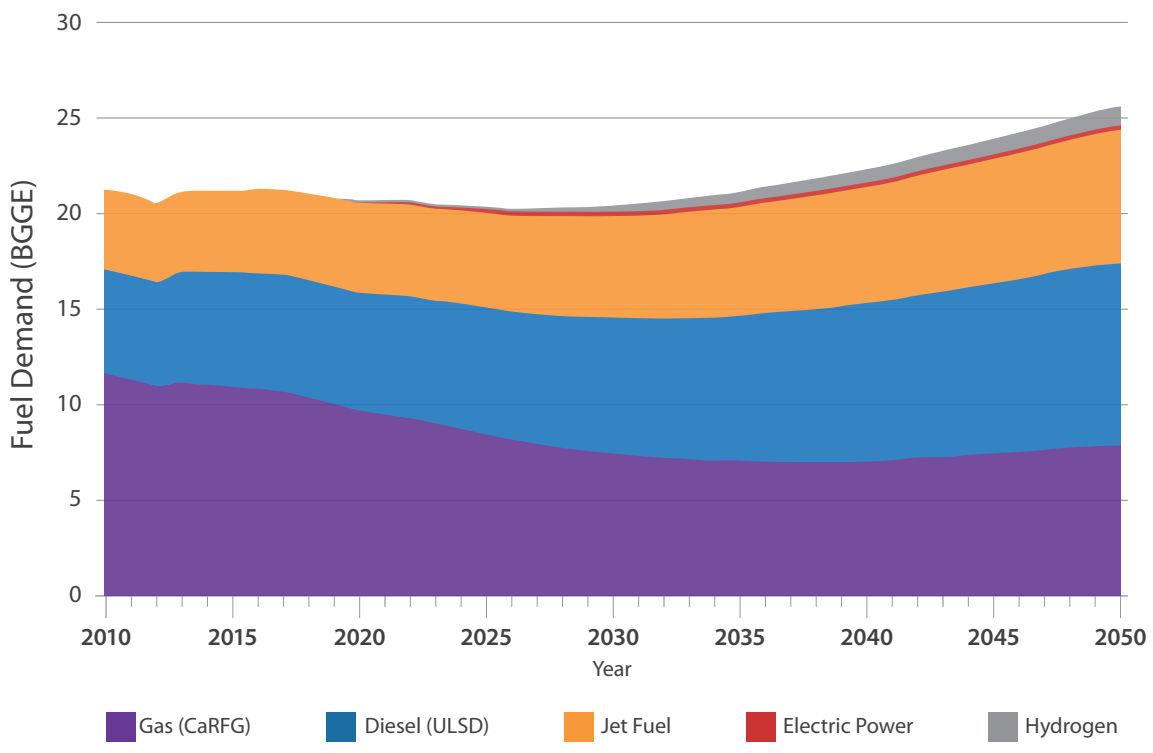


Figure 5
WTW GHG EMISSIONS BY SECTOR FOR ALTERNATIVE 1

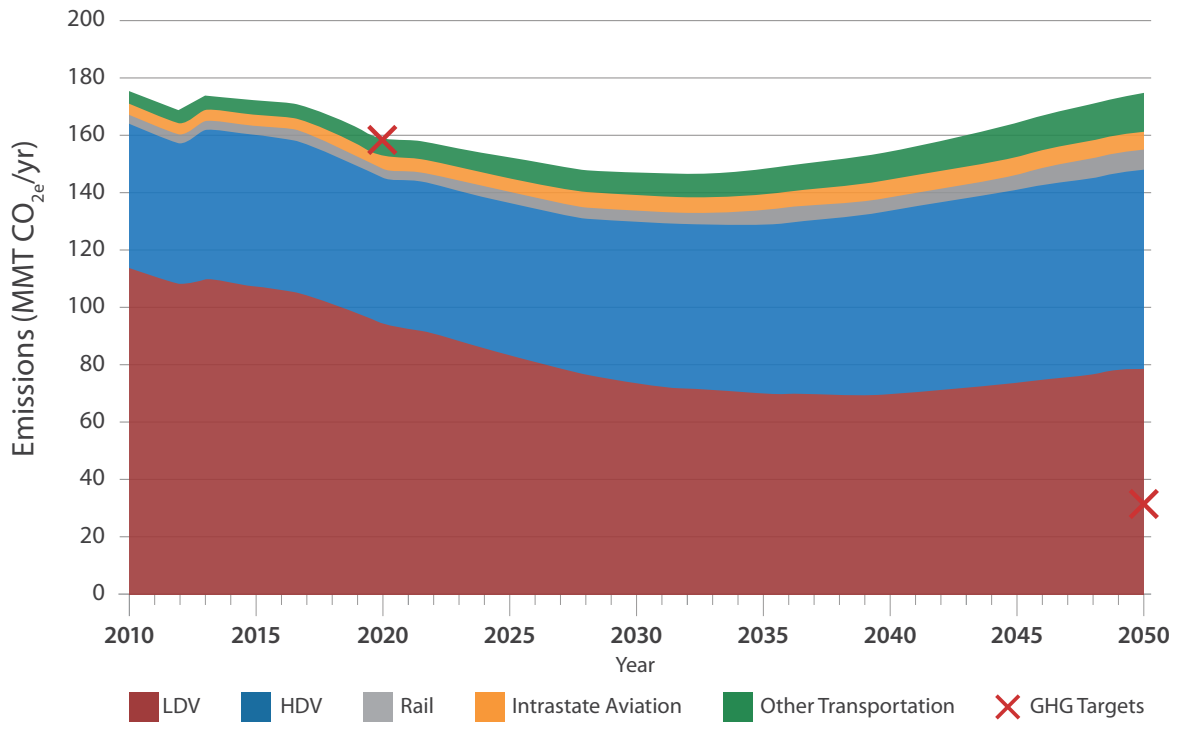
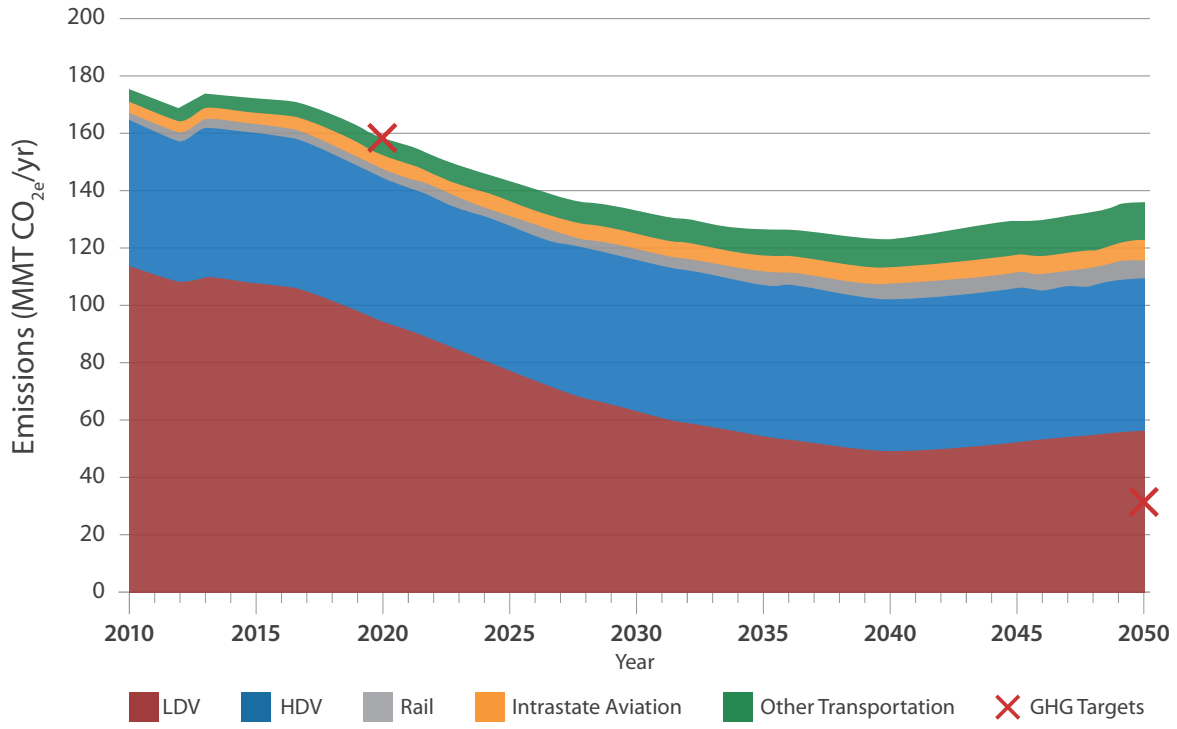


Figure 6
WTW GHG EMISSIONS BY SECTOR FOR ALTERNATIVE 2



Alternative 3 Results

Results are shown in **Table 4** for Alternative 3. The table displays total fuel demand (quadrillion BTUs or "quads" and billions gallons gasoline equivalent or "BGGE"), GHG emissions (MMT CO2e / yr), and relative percent reduction below 2020 for 2040 and 2050.

For Alternative 3, LDV GHG emissions are reduced by 72% in 2040 and 88% in 2050, while HDV emissions decrease by 46% and 76%. For all transportation sectors, there is a 60% reduction in GHG emissions by 2040 and 80% reduction by 2050.

Figure 7 displays the aggregate fuel demand by sector for Alternative 3 from 2010 to 2050. There is a large reduction in total demand due to the decrease in gasoline demand and the decrease in demand for the other sectors, such that the total demand in 2050 is 24% lower than the base value in 2010.

Figure 8 illustrates the total WTW GHG emissions by sector for Alternative 3. There are significant reductions in LDV GHG emissions as well as reductions in the other transportation sectors such that this Alternative meets the target of 32 MMT CO2e. As a reference, the figure contains red "X's", which represent the 2020 and 2050 targets (see explanation above).

Conclusions

The 2050 GHG target for CTP2040 is 80% below the 2020 data point for Alternative 1, or a target of approximately 32 MMT CO2e for the entire transportation sector, to meet its "equal share" of the GHG emissions target. Neither Alternative 1 nor 2 attained this target for the entire transportation sector. In Alternative 2, the LDV sector was the only sector to reduce emissions but barely reached 40% of its "equal share" target. In Alternative 3, the LDV mode attained more than its equal share and the other sectors reduced emissions significantly such that the 2050 target was obtained. It's important to note that the official full statewide GHG Inventory 2050 target equals 86 MMT CO2e for all sectors, with many of those sectors likely unable to reach their equal share, such that the transportation sector may have to reduce beyond their equal share.

Comment on Methodology

CSTDM has not been fully validated against official State records for gasoline, diesel, and jet fuel consumption in the 2010 base year demand.

Table 4
ALTERNATIVE 3 RESULTS

	2010	2012	2020	2040	2050
FUEL DEMAND (QUADS)					
Gasoline (CaRFG)[1]	1.31	1.25	1.10	0.33	0.17
Diesel (ULSD)[2]	0.61	0.61	0.68	0.69	0.67
Jet Fuel	0.47	0.46	0.44	0.38	0.35
Electric Power	0.000	0.001	0.011	0.067	0.097
Hydrogen	0.000	0.000	0.001	0.032	0.052
FUEL DEMAND (BGGE)					
Gas	11.7	11.1	9.8	2.9	1.5
Diesel	5.5	5.4	6.0	6.2	6.0
Jet Fuel	4.2	4.1	3.9	3.4	3.1
Electric Power	0.00	0.01	0.10	0.61	0.88
Hydrogen	0.00	0.00	0.01	0.29	0.46
GHG EMISSIONS (MMT CO_{2e} / YR)					
LDV + Bus	114	108	94	26	11
HDV	50	49	49	27	12
Rail	2	3	3	3	3
Aviation	4	4	4	2	2
Other Transportation	4	4	6	5	4
Total	**175**	**168**	**156**	**64**	**32**
Target	**-**	**-**	**-**	**-**	**32**
GHG RELATIVE REDUCTION BELOW ALTERNATIVE 1 2020[3] (%)					
LDV + Bus	-	-	-	72%	88%
HDV	-	-	-	46%	76%
Rail	-	-	-	13%	22%
Aviation	-	-	-	52%	62%
Other Transportation	-	-	-	12%	28%
Total	**-**	**-**	**-**	**60%**	**80%**
Target	**-**	**-**	**-**	**-**	**80%**

1 CALIFORNIA REFORMULATED GASOLINE (CARFG) INCLUDES 10% ETHANOL BLENDED BY VOLUME
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Figure 7
AGGREGATE FUEL DEMAND BY SECTOR FOR ALTERNATIVE 3

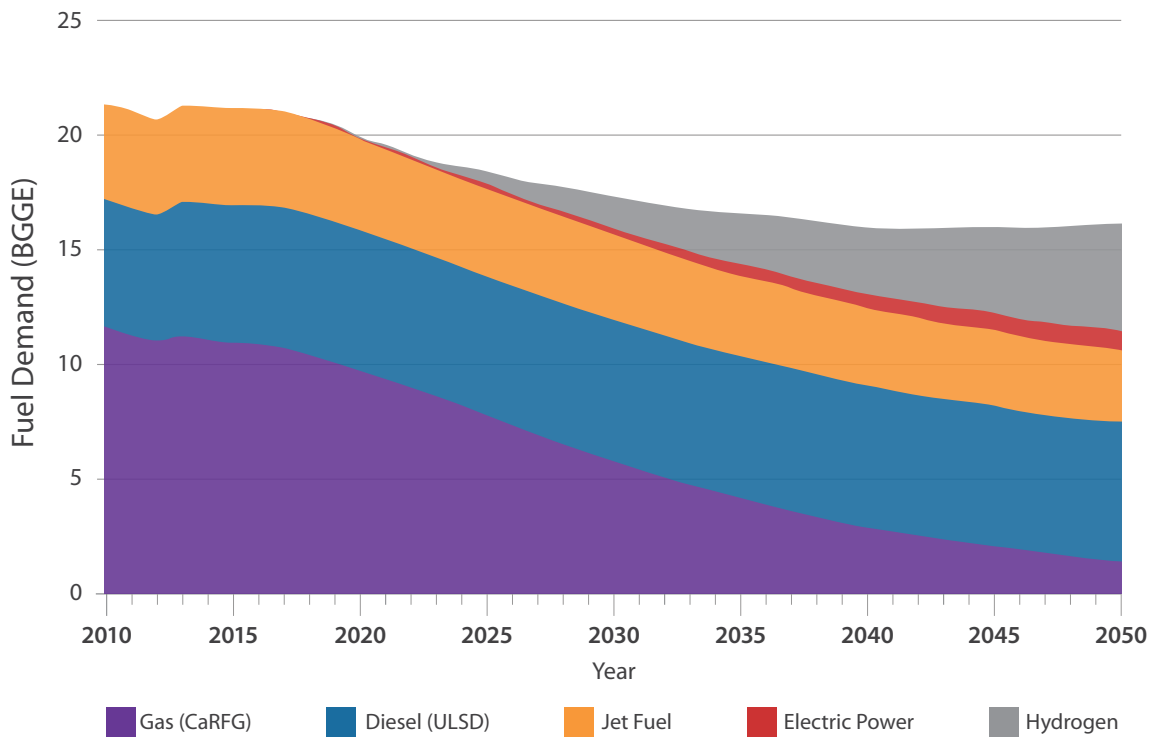
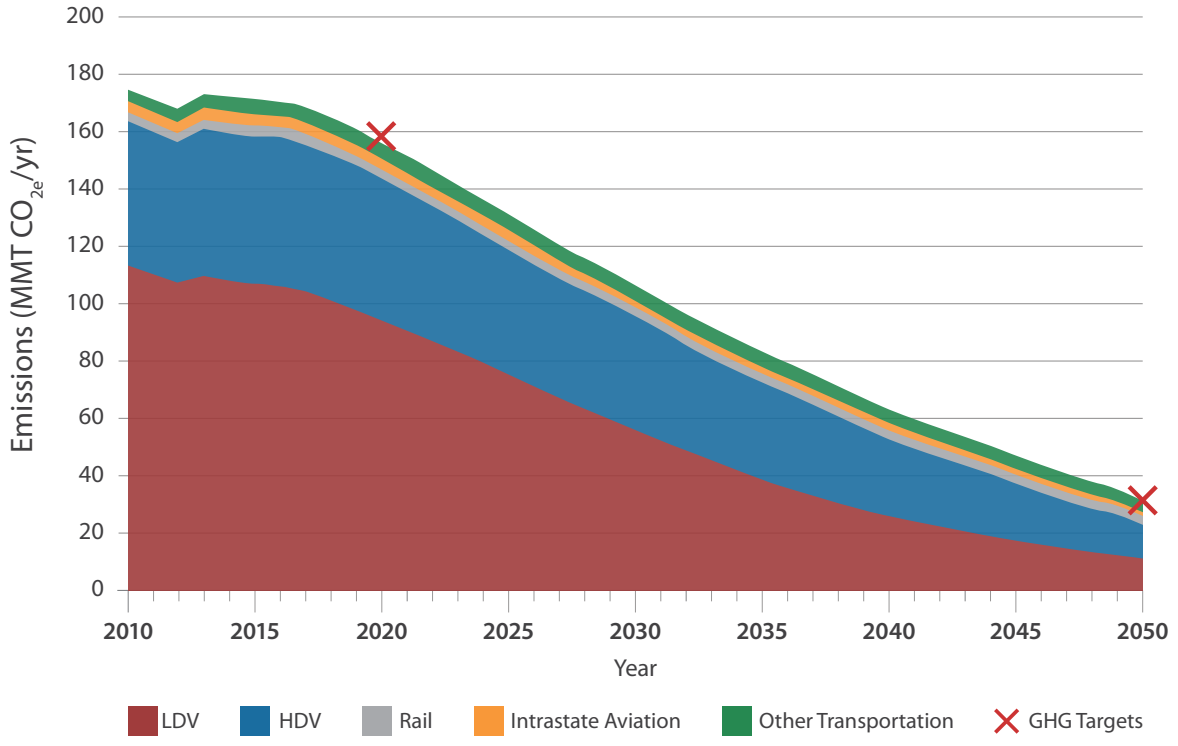


Figure 8
WTW GHG EMISSIONS BY SECTOR FOR ALTERNATIVE 3



ECONOMIC IMPACT ANALYSIS OF CTP 2040

The CTP is the first long-range planning document to consider the economic impacts of implementing the concepts and strategies presented. SB 391 requires the CTP to address how the State will achieve maximum feasible emissions reductions to attain a statewide decrease of GHG emissions as outlined in AB 32 (1990 levels by 2020 and 80 percent below 1990 levels by 2050). Under SB 391, the CTP is required to include a policy element consisting of the Department's policy and system performance objectives, a strategy element that includes concepts and strategies developed in the plan, and incorporating concepts in adopted RTPs. Additionally, the CTP must include an element that integrates economic forecasts and recommendations for achieving the concepts and strategies presented. The CTP is also required to address certain subject areas identified in SB 391 and U.S. Code 23 USC 134 and 135 of the U.S. Code, Title 23, Chapter 1, Federal-Aid Highways. SB 391 codifies consideration of "Economic Development, including productivity and efficiency" and U.S. Code specifies that the planning process provide consideration of projects and strategies that will: 1) support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency, and 2) promote consistency between transportation improvements and State and local planned growth and economic development patterns. However, SB 391 excludes the inclusion of projects in the CTP.

In previous CTP documents, economic consideration was limited to identifying the impacts associated with financial investments in transportation infrastructure projects and discussing transportation dependent industries. Input-Output (I-O) models are commonly used to assess the potential economic impacts of transportation infrastructure projects. Investments in transit and highway infrastructure projects translate into short-term increases in jobs, incomes and output (GSP). I-O models use multipliers that simulate spending patterns within and among industries resulting from initial transportation infrastructure investments. The outcomes are generally regarded as annual impacts, though research indicates these investments can have long-term impacts. Another matrix used in the past is the number of jobs in travel related industries. The North American Industry Classification System (NAICS) reports transportation related jobs in nearly all major industry categories reflecting the wide span of impact.

Economic consideration in the CTP 2040, unlike previous documents, incorporates a more comprehensive analysis. Caltrans' Economic Analysis Branch (EAB) utilized the TREDIS model to evaluate the wider economic impacts of proposed transportation investment and policy strategies identified in the CTP 2040. TREDIS is an integrated economic impact and analysis tool covering a range of applications including benefits, costs, finance and macroeconomic impacts. The emphasis of the CTP 2040 analysis focused on the impacts of travel costs, market access and economic adjustments. The travel cost impacts on households and industries are evaluated for their spending and productivity impacts. Cost savings, or dis-savings, from transportation investments or policy decisions translate into changes in household spending patterns and productivity impacts on industries. TREDIS measures how households and industries respond to changes in travel due to investment and policy changes. Additionally, TREDIS evaluates the direct changes in productivity or regional economic activity beyond the change in travel times or travel costs for users of the transportation network. These include increased production from business migration, increased labor productivity from agglomeration economies and increased international exports from improved access to international gateways.

LIMITATIONS

The economic impact analysis completed for the CTP 2040 meets the requirements set in SB 391. The results of the analysis are limited to the long-term economic impacts of traveler (time and costs) savings and market access changes, specifically, efficiency and productivity. The analysis does not include key considerations such as land use and transportation infrastructure expenditure impacts. Each of these components alone could have significant economic impacts. Limitation in the capacity of the CSTDM to address land use impacts prohibits consideration in the economic analysis. Land use is considered in the CSTDM outputs only so far as they are included in the Scenario 1 development. The impacts from expenditures related to infrastructure improvements were omitted since the CTP 2040 does not, by law, identify or consider individual projects. This document and the analysis, features transportation policy recommendations and their impacts.

Finally, limitations exist from the application of the CSTDM and the interpretation of the results. For instance, the CSTDM assigns transit, bicycle and pedestrian trips, but does not apply distance or time traveled as it does for passenger and commercial vehicles. From an economic assessment point of view, travel savings is difficult to assess. For this analysis, distance and time of travel were estimated based on the 2013 CHTS.

APPENDIX 8
MATRIX OF RECOMMENDATIONS

"California's transportation system is safe, sustainable, universally accessible, and globally competitive. It provides reliable and efficient mobility for people, goods, and services, while meeting the State's greenhouse gas (GHG) emission reduction goals and preserving the unique character of California's communities." – CTP 2040 Vision

Additional recommendations outlined in this appendix provide ways that State, regional and local government, agencies, non-governmental organizations and community based organizations can implement the California Transportation Plan 2040 (CTP 2040) vision within their respective jurisdictions, scopes and responsibilities. It should be noted that many of the recommendations put forward in this appendix are not directly under State control and, therefore, will require the voluntary cooperation of other governmental and private organizations to achieve. These entities become partners with the State in ensuring that the CTP 2040 is the overarching guide and vision for all other plans and transportation investments. The CTP 2040 will continue to evolve through an extensive public involvement process, government-to-government engagement with tribal communities, and close work with all levels of local, regional, State, and federal partners.

The recommendations reflect the work of statewide transportation leaders, and the CTP 2040 policy advisory committee (PAC) and technical advisory committee (TAC) members. This appendix is organized with the recommendations under broad-based themes or categories—many are provided within the context of the strategies from Chapter 4. Some of the recommendations can be implemented or adopted immediately, while others have longer terms. The recommendations are presented as short-range (within the next 2 years), mid-range (within the next 3 to 5 years), and long-range opportunities (from the next 5 to 20 years). A short-range recommendation is something that can be implemented rather quickly.

A short-range recommendation may result in a long-term program, policy, or other activity that lasts for years. Some categories have only short-range recommendations, while others only long-range. In addition, many recommendations are ongoing, e.g. short-range recommendations very well should continue into mid and long-range implementation.

SAFETY

IMPROVE PUBLIC SAFETY AND SECURITY

California Department of Transportation (Caltrans) supports a proactive approach to improve and promote multimodal public safety and security. Fatalities and injuries have reduced due to statewide efforts of creating awareness. However, there remains the need to reduce safety risk disparities with bicyclists and pedestrians, as these groups represent a significant percentage of all fatalities.

The CTP 2040 is consistent with the policies and strategies from the Caltrans five modal plans (i.e. Interregional Transportation Strategic Plan [ITSP], California State Rail Plan [CSRP], California Freight Mobility Plan [CFMP], Transit Plan, and the Aviation Plan), Complete Streets, and the Strategic Highway Safety Plan (SHSP) 2014-19. The SHSP 2014-19 investments in safety improvements to the multimodal system are evident in California, which experienced a 30.4 percent reduction in fatalities and a 17.5 percent reduction in severe injuries from 2005 to 2012.[1] The CTP 2040 incorporates policies and mandates from the SHSP 2014-19, 2015 California Highway Safety Plan, and Surface Transportation Act, Fixing America's Surface Transportation Act (FAST Act) (Sections 1201, 1202 and 1203) that continue to promote safety and security. The CTP 2040 also encourages future reductions in fatalities and serious injuries with programs, such as toward zero deaths (TZD) and incorporating security design improvements and approaches—for example, Crime Prevention through Environmental Design (CPTED).

Lastly, Caltrans supports investments in new technology that incorporates safety improvements to the multimodal system for traffic and modal safety efforts, such as collision prevention programs, roadway infrastructure improvements, enforcement, public education, and advances in State-of-the-art safety technology, such as connected vehicles/autonomous vehicles (CV/AVs) and interconnected multimodal systems.

1 Business. Transportation, and Housing Agency Contributing Departments, "California Strategic Highway Safety Plan," 2012, http://www.dot.ca.gov/hq/traffops/survey/SHSP/SHSP-Booklet-version2_%20PRINT.pdf.

RECOMMENDATIONS

Short-Range

- Continue investments toward planning and construction of highway safety projects.
- Invest in rail safety public awareness campaigns and social norming to change behavior related to Operation Lifesaver, railroad grade crossing safety improvements, and safe operations for both passenger and freight rail.
- Emphasize planning and funding to increase railroad crossing safety improvements and grade separations.
- Emphasize planning and funding for projects that provide a safer network of both rural and urban bike and pedestrian routes.
- Implement aggressive public education and media/awareness campaigns to increase awareness of distracted motorists, cyclists, and pedestrians.[2]
- Improve traffic safety and security programs through prioritizing opportunities for risk reductions, implementation, monitoring, testing, evaluating, and revising safety and security plans.
- Identify hazardous materials transport routes that minimize risk in populated areas.
- Assess and minimize transportation security risks for hazardous materials shipment and identify appropriate measures to address the assessed risks.
- Ensure that activities and operations enhance transportation security.[3]
- Support grants and funding opportunities for cooperative multiagency/multi-municipality data systems, data sharing and resource and data pooling.
- Continue outreach efforts to both urban and rural counties to help them improve safety, data collection, access, and analysis by continuing to fund traffic collision database and Geographic Information System (GIS) mapping.
- Continue to install and test positive train control (PTC) technology on all intercity and commuter passenger rail.
- Collect, analyze, and distribute safety data among planners and decision makers who coordinate and find areas that could benefit post benefit-cost analysis for investments that improve the safety of the arterials, corridors, ramps, etc.

Mid To Long-Range

- Fund and improve the quality, completeness, timeliness, and uniformity of safety data and the sharing among federal, State, and local agencies and stakeholders.[4]
- Fund regional emergency medical services (EMS) programs to ensure rural communities have access to the latest "State-of-the-art" rescue and extrication equipment.[5]
- Fund "corridor driving under the influence (DUI) programs" that select corridors based on data showing disproportionate numbers of DUI collisions and convening task forces to implement identified solutions.[6]
- Improve outreach, education, and implementation of CPTED, an approach that deters crime and provides security through environmental design in transportation systems.
- Establish requirements, collaborate with and support research for manufacturers of CV/AV, and Self-Guided Magnetic Bus Technology to meet specific safety requirements that have the potential to improve safety, costs, and efficiency in reducing passenger fatalities and traffic incidents as well as operational benefits.
- Support vehicle technological improvements such as automatic braking and CV/AV.
- Support at-grade freight railroad crossing improvements.

2 http://www.chp.ca.gov/programs/pdf/CIEP_HM.pdf

3 California Office of Traffic Safety, "California Highway Safety Plan," 2015, http://www.ots.ca.gov/Media_and_Research/Publications_and_Reports/hsp15/2015-HIGHWAY-SAFETY-PLAN.pdf.

4 California Department of Motor Vehicles, "Department of Motor Vehicles Strategic Plan FY 2014-2015. In Safety," 2014, https://www.dmv.ca.gov/portal/dmv/detail/pubs/strat_plan/strategic_plan/.

5 California Office of Traffic Safety, "Moving Forward: Emergency Medical Services," http://www.ots.ca.gov/OTS_and_Traffic_Safety/Moving_Forward.asp.

6 California Office of Traffic Safety, "California Highway Safety Plan," 2015, http://www.ots.ca.gov/Media_and_Research/Publications_and_Reports/hsp15/2015-HIGHWAY-SAFETY-PLAN.pdf.

SUSTAINABILITY

FOSTER LIVABLE/ HEALTHY COMMUNITIES AND SOCIAL EQUITY

In order to successfully foster livable and healthy communities, there has to be coordinated planning. The CTP 2040 encourages infill development and conservation opportunities, as a way to reduce urban sprawl and allow for better transit and rail, and to be consistent with Senate Bill (SB) 375. An integrated planning process should increase the public's ability to influence and understand the implications of planning decisions through outreach and utilization of new and emerging technologies. In transportation planning, consideration of social equity and environmental justice (EJ) modeling, and measurement of health impacts will be necessary to improve outcomes related to quality of life, livable communities and equity.[7]

Land use and transportation decisions greatly affect the health and safety of the community and the environment. CTP 2040 calls attention to the fact that public health can be impacted by transportation services. Land use planners, transportation planners, and others must collaborate to ensure that the health and safety of the community remains a priority. Shared data across sectors would benefit all entities. No single agency has authority over every decision or policy. The transportation system should provide an equitable level of multimodal transportation services to all segments of the population.[8]

RECOMMENDATIONS

Short-Range

- Collaborate with stakeholders and partners early and often in the planning process.
- Collaborate to develop transportation planning tools, policies, and incentives to improve analysis and consideration of social equity, EJ, and public health impacts.
- Ensure that transportation plans reflect strategies to connect the transport/access of people, goods, and services in efficient ways to integrate housing, work, recreation, and public institution needs while at the same time, avoiding negative impacts to agricultural production areas and sensitive land and water resources; create funding decision priorities for projects that contribute toward these goals.
- Promote mixed-use activity nodes incorporating place-making urban design principles in conjunction with transportation improvements.
- Promote inclusion of affordable housing plans, policies, and projects within applications for federal funds to take advantage of scoring criteria for these in programs such as the Federal Transit Administration's (FTA) New Starts Program.
- Promote efficient infill housing development and redevelopment opportunities to reduce urban sprawl consistent with SB 375, the Sustainable Communities Strategies (SCSs), and other regional and State policy guidance.
- Implement the Smart Mobility Framework (SMF) principles statewide to integrate the transportation system and encourage non-motorized forms of transportation and Complete Streets.[9]
- Identify potential pedestrian and bicyclist improvements on State highways and work toward development of those projects.[10]
- Promote the Affordable Housing and Sustainable Communities (AHSC) Programs.
- Support an increase of the supply of new housing units for all income levels to meet California's housing needs.
- Work with tribal governments using principles of coordination, collaboration, and engagement to improve transportation for tribal communities.
- Support general plans that are consistent with State sustainability goals such as GHG reduction and vehicle miles traveled (VMT) reduction.
- Continue research on relationships between affordable housing and mobility, and disseminate the results from the research to inform local policies.
- Encourage local policies that can help mitigate displacement effects on low-income populations.

Mid to Long-range

- Partner with industries and innovators involved in technological approaches to environmental improvement.
- Support infill development and compatible land use around rail stations.
- Follow the model of the California Health in All Policies Task Force (HiAP), through which more than twenty State departments and agencies came together to promote public health, equity, and environmental sustainability across multiple policy areas, including transportation, housing, and land use.

7 San Diego Association of Governments, "2050 Regional Transportation Plan," 2011, http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf.

8 Federal Transit Administration, "Complete Streets: Integrating the Transportation System. Deputy Directive DD- 64-R2," 2014, http://www.fta.dot.gov/12853_14875.html.

9 Caltrans, "Smart Mobility 2010: A Call to Action for the New Decade," 2010, http://www.dot.ca.gov/hq/tpp/offices/ocp/smf_files/SmMblty_v6-3.22.10_150DPI.pdf.

10 San Diego Association of Governments, "2050 Regional Transportation Plan," 2011, http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf.

- Implementing policies to provide sufficient distance between diesel-powered freight transportation projects and schools, residences, and other receptors to avoid significant health risks, e.g. through guidelines for freight siting and truck routes.
- Work with local and regional agencies to apply considerations of health, equity, and sustainability to transportation decision-making.

PRACTICE ENVIRONMENTAL STEWARDSHIP

Upholding environmental stewardship requires a multi-pronged approach. While meeting transportation goals and maintaining the transportation system, negative impacts to natural resources and working lands should be avoided to reduce costs, risks and protect and preserve the State's environment. California must develop transportation improvements that sustain and enhance the environment, and reduce GHG and criteria emission from vehicles. In all planning decisions, policy makers must consider climate change mitigation, adaptation, conserving natural resources, and limiting environmental impacts. While some recommendations may appear in other sections, there are mutual benefits. For example, recommendations in other sections, such as VMT reductions and expanded transit services and operations, have a mutual benefit of reducing GHG and criteria pollutant emissions and therefore are linked closely with environmental stewardship."

RECOMMENDATIONS

Short-Range

- Support wildlife connectivity and naturally functioning ecosystems through design plans to protect habitat and natural resources.
- Expand the use of technology and tools to provide environmental impact performance measures.
- Continue to promote policies that reduce GHG and criteria pollutant emissions such as the 2013 Zero-Emission Action Plan, which directs the State to accelerate the market for zero-emission vehicles (ZEVs) in California. This also includes a goal of 1.5 million ZEVs in California by the year 2025.[11]
- Support technological research and development of alternative fuels and transportation modes that can further improve air quality.[12]
- Promote active transportation, ridesharing, rail, and public/mass transit promoting policies for the co-benefit of reducing air pollution when they replace motor vehicle trips.
- Convene State, regional, and local stakeholders to establish coalitions that engage communities on the importance of environmental stewardship.
- Expand resiliency planning and climate change impact studies of sea-level rise (SLR) and storm events, and other climate change indicators that affect the future of communities, infrastructure, and ecosystems.
- Support electrification of passenger rail, mode shift from planes and autos to high-speed rail (HSR), and investments in renewable energy sources for transportation. Promote and expand strategies such as the Cap-and-Trade Program and HSR, and enhance environmental stewardship locally, regionally, and statewide.
- Continued coordination between Caltrans and the California Air Resources Board (ARB) on development of transportation policies as part of developing State Implementation Plans.
- Minimizing environmental impacts during construction of transportation projects where feasible by developing and disseminating a list of construction best practices.
- Providing funding and policy support for development, demonstration and deployment of needed clean technologies, including support for transportation and other infrastructure that enables and incentivizes use of zero- and near-zero-emission technologies.

Mid-Range

- Establish partnerships between State, regional and local agencies to implement recommendations from the 2014 Assembly Bill (AB) 32 Scoping Plan Update.
- Support local communities in the development of integrated transportation and land use strategies to resiliently respond to climate change through their General Plans, Regional Transportation Plans (RTPs), and Local Coastal Programs (LCPs).
- Collaborate (public and private entities) to demonstrate and deploy mobile source control technologies that will assist California in reducing air pollutants and reaching National Ambient Air Quality Standards attainment and reducing GHGs.
- Maintain and strengthen the ZEV regulation, new vehicle GHG performance standards, the Cap-and-Trade Program and the Low Carbon Fuel Standard.

11 Governor's Interagency Working Group on Zero-emission Vehicles, "2013 ZEV Action Plan A roadmap toward 1.5 million zero-emission vehicles on California roadways by 2025," 2013, http://opr.ca.gov/docs/Governor's_Office_ZEV_Action_Plan_(02-13).pdf.

12 Sacramento Area Council of Governments, "Metropolitan Transportation Plan/Sustainable Communities Strategy: 2035, 142." 2012, http://sacog.org/mtpscs/files/MTP-SCS/MTPSCS%20WEB.pdf.

SUPPORT ECONOMIC VIBRANCY

The CTP 2040 supports an efficient and affordable transportation system that enhances mobility. Transportation costs are a significant portion of an average household income. Affordable transportation is essential to a healthy and vibrant population, enhancing physical and economic interactions, and promoting a sustainable and livable environment. The CTP 2040 looks to a future transportation system that adapts to population increases, societal preferences, technological innovations, and emerging needs of businesses to provide access for employees and customers. These factors will influence where people live and what type of transportation mode they will choose, as well as the cost of transportation services.

RECOMMENDATIONS

Short-Range

- Avoid projects with high health and environmental costs.
- Prioritize funding toward transportation alternatives that enhance efficient and affordable mobility.
- Work with tribal governments to improve access to State highways from tribal lands.
- Support the modification of design standards to implement the Main Street Guidelines.
- Support projects that improve intermodal freight access and reduce congestion especially along freight corridors.
- Support regional and local government planning for investments improving the proximity of jobs-housing relationships.
- Allocate transportation project funding in a manner incentivizing improved accessibility of housing and major employment centers, restraining commuting distances, and the combined cost of housing and transportation.

Mid To Long-Range

- To the extent reasonable, adjust pricing of transportation modes to reflect the total cost for each mode, including health and environmental costs, providing subsidies to accommodate ability to pay without compromising economic competitiveness.
- Invest in interregional goods movement corridors.
- Improve the linkages between transportation, housing, and land use by tying policies to incentives with environmental benefit.
- Develop a tax and fee structure that facilitates an efficient and affordable transportation system consistent with long-term transportation, housing, land use, and resource management plans.

OBTAIN PERMANENT FUNDING

The CTP 2040 emphasizes the need for reliable, permanent sources of funding to ensure a sustainable system and service delivery. The State needs over $536 billion to sustain and improve the transportation infrastructure, but transportation revenue is estimated to only total $242 billion over the next 10 years.[13] This shortfall is primarily due to marginal transportation revenues. As mentioned, motor fuel taxes have remained constant for decades, shrinking in real terms when accounting for inflation. Moreover, the need to fund a multimodal system is more urgent than before, yet new transportation revenue sources have not been added. Policymakers must provide the transportation sector with permanent funding sources that account for inflation and population growth. One funding strategy currently being discussed in the context of the CTP 2040 goals is tolling/pricing strategies. More information about the proposal can be found here: http://calsta.ca.gov/

RECOMMENDATIONS

Short-Range

- Support efforts to implement a road pricing strategy with consideration of accounting for equity impacts, contingent upon capacity to simultaneously improve transit services.
- Support efforts to close the funding gap for Metropolitan Planning Organizations (MPOs) to implement the regions' SCSs. Encourage inter-governmental cross-sector collaboration in developing financing mechanisms, including cross-sector financing of sustainable, integrated corridors and supportive land uses.
- Support recommendations for dedicated freight funding.

Mid To Long-Range

- Implement a revenue structure that is solely dedicated to improving non-motorized travel methods.

13 Leiter, B., et al., "2011 Statewide Transportation System Needs Assessment," 2011, http://www.catc.ca.gov/reports/2011Reports/2011_Needs_Assessment_updated.pdf.

ADDRESS CLIMATE ADAPTATION AND RESILIENCY OF INFRASTRUCTURES TO ENSURE RELIABLE TRANSPORTATION

GHG reductions and climate adaptation must go hand-in-hand to effectively combat the challenges of climate change. The CTP 2040 highlights adaptation and resiliency as key factors in transportation planning. SLR, intense storm activity (causing flooding and washouts), drought, increase in forest fires, and higher temperatures are all a significant risk of climate change with uncertain effects on all modes of transportation.[14] Preparing transportation infrastructure for climate change impacts is a new priority as future projects are designed and the current system is maintained. The tools and methodologies for evaluating and adapting to such impacts are still in the early stages of development and will require ongoing monitoring.[15]

RECOMMENDATIONS

Short-Range

- Incorporate climate change resiliency in long-range transportation documents to address potential climate change-related vulnerabilities.[16]
- Require climate change resiliency in State Highway Operations Protection Program (SHOPP) and State Transportation Improvement Program (STIP) programs and projects.
- Coastal communities must utilize LCPs alongside General Plans and RTPs to reduce GHG emissions and implement climate change adaptations, giving first priority to where the impacts of SLR are most intense. Consider project alternatives that avoid significant new development in areas that cannot be adequately protected (planning, permitting, development, and building) from flooding, wildfire and erosion due to climate change.[17]
- Focus on reliable transportation routes away from SLR impacts on harbors and ports,[18] airports, access roads, rail tracks, and bridges.
- Track SLR and other climate change indicators using interactive maps and modeling that identify transportation infrastructure that could be vulnerable to environmental and climate changes.
- Develop a project-level checklist to evaluate facility risks and vulnerability due to climate change impacts. Evaluate projects for climate change vulnerabilities at the time funding is programmed, and incorporate project design features to improve resiliency of facilities and infrastructure." Example of vulnerability assessment system: Federal Highway Administration's (FHWA's) Vulnerability Assessment Scoring Tool (VAST).
- Evaluate SLR and potential adaptation responses to anticipated SLR in new construction, as well as repair and replacement projects, and factor these considerations into the selection of the preferred alternative to meet the project purpose and need.
- Education programs that teach community members about global warming, and how they can be an active part of the solution, particularly in the choices they make about transportation.
- Accelerate the use of alternative fuels, new vehicle technology, pricing strategies, public transportation expansion, more bicycling and walking to contribute to GHG reduction goals.

Mid To Long-Range

- Continue planning, funding, and implementing long-term solutions that will ensure that the State's transportation/access needs will be met through sustainable transportation choices that account for, and help mitigate, changing climate conditions.
- Develop uniform climate change assumptions for federal, State, and local agencies. It is difficult to conduct proper climate change planning activities if different agencies are using different assumptions such as the level of SLR, or intensity of storm activity.

14 Committee on Sea Level Rise in California, Oregon, and Washington, et al., "Sea Level Rise in California, Oregon, and Washington: Past, Present, and Future," 2012, http://ssi.ucsd.edu/scc/images/NRC%20SL%20rise%20W%20coast%20USA%2012.pdf.

15 San Diego Association of Governments, "2050 Regional Transportation Plan," 2011, http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf.

16 Caltrans, "State Smart Transportation Initiative Assessment and Recommendations," 2014, http://www.dot.ca.gov/CIP/docs/SSTIReport.pdf.

17 California Natural Resources Agency, "2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008," 2009, http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf.

18 Applied Development Economics, Inc., et al., "2010 California Regional Progress Report," 2010, http://www.dot.ca.gov/hq/tpp/offices/orip/Collaborative%20Planning/California_Regional_Progress_Report.html.

STREAMLINE DELIVERY

The CTP 2040 guides various State agencies and departments to work together to establish programs that will help streamline delivery of infrastructure projects that are critical for achieving GHG emission reduction goals. Applying advance mitigation planning in multiple regions will help the State take the next critical steps to plan for sustainable infrastructure on an interregional basis.

RECOMMENDATIONS

Short-Range

- Adopt a process to advance projects that reduce GHG emissions by improving the efficiency of the environmental review process.
- Develop implementation guidance for SB 226 (expanding SB 375 California Environmental Quality Act [CEQA] streamlining provisions) with the Governor's Office of Planning and Research (OPR).
- Develop advance-mitigation-planning programs that will allow simultaneous consideration of the environmental effects of several planned infrastructure projects.

Mid-Range

- Accelerate the use of alternative fuels, new vehicle technology, pricing strategies, public transportation expansion, and more bicycling and walking to achieve statewide GHG reduction goals.

MULTIMODAL SYSTEM ENHANCEMENTS

ACTIVE TRANSPORTATION SYSTEM (BICYCLING AND WALKING)

California must continue to promote active transportation. It is a key component of the CTP 2040. Programs such as the Active Transportation Program (ATP) were created to encourage increased use of these active modes of transportation by increasing proportion, mobility, and accessibility of biking and walking trips. These trips enhance public health while reducing GHG and congestion.

Often the transit system and active transportation go hand-in-hand. Thus, another proven practice is to implement more Complete Streets policies throughout cities in California. Complete Streets are those that enable safe access and mobility amongst motorists, bicyclist, pedestrians and transit service.

RECOMMENDATIONS

Short-Range

- Implement programs that encourage people to utilize active transportation modes and help educate travelers on the benefits of not using a car.[19]
- Offer strategic planning workshops on transit-oriented strategies at the local level.[20]
- Support local/regional multidisciplinary efforts to ensure safe active transportation in all jurisdictions in the State.
- Encourage local governments to develop communities with gathering places and mixed use local shops with walkable paths, bike lanes, and convenient transit stops (coordinated to access jobs, health care, and entertainment venues), that will also accommodate goods deliveries.
- Support the development and enhancement of the California Coastal Trail.

Mid To Long-Range

- Fund and expand programs that promote transportation alternatives such as carpooling, vanpooling, transit, walking, and bicycling.[21]
- Create safe and effective walking and bicycling facilities that create neighborhood connectivity and continuity.
- Leverage private sector investment to find alternatives to automobiles.
- Experiment and evaluate alternatives through pilot projects that allow for a better understanding of successful and unsuccessful strategies to help improve current transit services.
- Find ways to improve non-auto interregional and interstate travel modes.
- Optimize traffic signal timing for transit or bicycle speeds to improve the multimodal efficiency on Complete Streets.[22]
- Work with tribes to identify potential pedestrian and bicyclist improvements on State highways in Indian Country and work toward development of those projects.[23]

19 Federal Highway Administration, "Application of TDM to Policy Issues," http://ops.fhwa.dot.gov/publications/fhwahop12035/chap3.htm.

20 Matute, J.M., et al., "California Statewide Transit Strategic Plan: Recommendations for Caltrans," 2012, http://www.dot.ca.gov/hq/MassTrans/STSP/STSPrecommendations.pdf.

21 California Transportation Commission, "Active Transportation Program," http://www.catc.ca.gov/programs/ATP.htm.

22 Federal Highway and Transit Administration, "The Role of Transportation Systems Management and Operations in Supporting Livability and Sustainability: A Primer," 2012, http://ops.fhwa.dot.gov/publications/fhwahop12004/fhwahop12004.pdf.

23 San Diego Association of Governments, "2050 Regional Transportation Plan," 2011, http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf.

EXPAND TRANSIT AND RAIL SERVICES AND OPERATIONS

In order to meet increasing capacity needs and air quality requirements, California has to focus serious efforts and funding on expanding transit and intercity–commuter rail, and implementing HSR, service. It is also important to better leverage what has already been put into place by improving multimodal connections and implementing systems to integrate ticketing and customer services across modes. Comprehensive and coordinated planning should be conducted that examines the full market potential of an integrated multimodal system, and institutional structures that will support better coordinated systems.

Transit operators have options at their disposal that do not require trade-offs with automobiles. However, some measures will require that Caltrans and local governments prioritize transit and high occupancy vehicles (HOVs) over single occupancy vehicles (SOVs). These measures are important for California to move toward a sustainable transportation future. Caltrans can support local governments and regions that choose to prioritize transit by accelerating the implementation of transit-priority measures on state-administered facilities.

RECOMMENDATIONS

Short-Range

- Support technologies and capital improvements that increase convenience and competitiveness of public transit and rail, thereby making transit and rail preferred mode alternatives. This includes real-time transit information and trip planning tools, universal payment systems, as well as cost-effective infrastructure improvements optimizing reliability and connectivity between systems.
- Analyze the implications of changing market demands for transit and rail service and demographics and optimize existing resources to improve service to those markets.
- Expand funding for transit and rail service operations and capital improvements.
- Coordinate with tribes to expand transit services.
- Work with other State and regional agencies and operators to improve the perception of transit and rail in California through marketing and outreach.
- Continue to coordinate between Caltrans modal divisions.
- Share statewide successes and lessons learned in order to accelerate the implementation of cost-effective strategies to improve transit and rail.
- Streamline reporting processes for State and federal grants, and funding allocations.
- Provide statewide resources for customer service improvements like real-time passenger information systems.
- Report publicly-sponsored vanpool service data in order to attract federal operating funds.
- Support employer-assisted housing and use of Transportation Demand Management (TDM) policies with employers in transit corridors.
- "Ensure that each of the State's 12 deepwater ports have an active freight rail connection to the National Rail System."

Mid To Long-Range

- Implement rail capital improvements that will support a greatly expanded rail and transit system in California. Support seamless transfers between local-regional transit and passenger rail systems.
- Help transit operators understand real-time passenger information systems and offer grants that can help offset initial costs of publishing data.
- Caltrans Division of Rail and Mass Transportation can work with local transit stakeholders throughout the State to evaluate and learn from the bus rapid transit (BRT) project.
- Improve perception of transit services by working with other State and local agencies.
- Report vanpool service data to attract federal funds.
- Share successes and lessons learned among transit authorities in order to improve transit services.
- Improve transit payment methods to speed up vehicle boarding, which in turn can increase the efficiency of buses arriving on-time more often.
- Create circulator service which specializes in transit to link popular and frequently visited destinations within universities and downtown areas.
- Improve upon scheduled transfers between regional transit services.

IMPROVE MULTIMODAL MOBILITY AND ACCESSIBILITY FOR ALL

Californians want a sustainable transportation system that is safe, reliable, cost-effective, and benign to the environment that takes into consideration the health of the public and the character of the community. Mobility and accessibility are important factors in transporting goods as well. In order to accomplish these demands, the CTP 2040 looks to improve multimodal mobility and accessibility by creating fluidity amongst transit, bicycle/pedestrian and vehicles, optimizing the State's existing highway system, and improving intermodal access to freight facilities.

The cost of travel is a leading concern for many Californians. Moreover, transportation inequity affects Californians with lower socioeconomic status who are not able to access the same destinations as people of higher socioeconomic status, or those individuals with no physical limitations. Thus, in keeping with the guidelines of equity, it is important that people have access to efficient, affordable, integrated housing and recreational access within California's transportation system. Reliable and accessible transportation will meet the needs of the State's citizenry and the visiting public that contributes significantly to State's economy.

RECOMMENDATIONS

Short-Range

- Create modal plans and programs that improve both safety and system operations while keeping the community, environmental, and economic goals in mind.
- Implement land use strategies that make travel easier through the reduction of distances in consumer activities (e.g., shopping, recreation, etc.).[24]
- Create public spaces with bicycle/pedestrian and transit access in order to reduce automobile dependency.
- Work with tribal nations and communities to improve multimodal accessibility and mobility by integrating the tribal transportation network into the overall transportation network.
- Provide funding and emphasize Transportation Demand Strategies such as ridesharing, vanpooling, park-and-ride lots, transportation information dissemination, and employer outreach programs. Focus on HSR/transit-oriented development (TOD) projects that capitalize on incorporating high-density, mixed use areas thereby reducing individual dependency on cars and encouraging the use of transit.
- Increase funding for projects or programs that improve public access and connections to desired destinations.
- Coordinate passenger/HSR and freight rail infrastructure to gain efficiencies.
- Create supportive policies and secure funding for the promotion of shared mobility (car sharing, bike sharing, real-time ridesharing, Transportation Network Companies, scooter share, shared neighborhood electric vehicles, and on-demand shuttle and jitney services).
- Support a unified or universal transportation account that combines all forms of public transportation payments including transit fares, municipal parking and toll collection into a single user-friendly system. By offering rewards based on frequent use, toll discounts and other incentives, the system can lead to a shift from driving alone to using public transit or ridesharing.

Mid-Range

- Support infill development to slow urban sprawl and increase density. This will reduce distances between consumer activities, thus encouraging more people to take advantage of transit services, bicycling and walking.
- Increase the efficiency and reliability of transit service trips by timing signals to favor public transit.[25]
- Re-design the current roadways to integrate medians, channelized islands, and roundabouts to increase automobile throughput and multimodal accessibility.
- Ensure that an interconnected, multimodal transportation network serves all segments of the State's population as well as the significant number of tourists that visit each year.
- Add bicycle lanes, and change signal timing/countdown to increase safety at cross intersections.
- Develop rideshare programs and efficient parking management strategies to allow more people to travel using existing infrastructure, and support HSR/TOD and alternative transportation choices.
- Work with tribes to improve multimodal accessibility and mobility.

24 Handy, S., "Accessibility VS. Mobility-Enhancing Strategies for Addressing Automobile Dependence in the US," 2002, http://www.des.ucdavis.edu/faculty/handy/ECMT_report.pdf.

25 Federal Highway Administration, "The Role of Transportation Systems Management & Operations in Supporting Livability and Sustainability: A Primer," 2012, http://ops.fhwa.dot.gov/publications/fhwahop12004/fhwahop12004.pdf.

PROMOTE SUSTAINABILITY IN RURAL COMMUNITIES AND SMALL TOWNS

The CTP 2040 supports sustainable and active transportation options for all of California's residents. However, rural communities and small towns have special transportation challenges due to their sparse and widely spread populations. Communities must work towards planning an improved interregional and interconnected transportation system through preservation of the existing road system. Factors such as severe weather conditions and surface abrasion from vehicle use jeopardize pavement integrity as well as travel safety. The CTP 2040 recommends strategies and options to address the special needs and circumstances of small rural communities.

RECOMMENDATIONS

Short-Range

- Expand vanpool services as an effective way to connect rural and exurban communities with employment, food and recreational outlets.[26]
- Link areas that have labor shortages with communities that have a surplus amount in labor.[27]
- Provide accessibility to regional job markets, which can allow the transport of locally made goods to urbanized areas as well as build connectivity for tourists and customers of rural community businesses.[28]
- Create efficient, sustainable transportation solutions that embrace communities' unique context and culture.[29]
- Integrate planning for the aging population in rural community and agency projects and services.[30]
- Educate rural residential developers about integrating bicycling, walking, and public transit into rural projects and plans.
- Increase the frequency of transit services that are available to riders to a level that can support their daily activities.
- Implement a system of park-and-ride lots to encourage transit agencies to increase express bus services to rural areas for transit ridership.
- Integrate express bus stop concepts appropriate for rural areas, such as express runs, linking communities, expressway or freeway express bus stops, comprehensive bus stops, and ridesharing services.
- Encourage ride sharing and mobility management through coordination of Consolidated Transportation Services and other agencies.

Mid-Range

- Increase the State Transit Assistance fund (STA) and obtain extra funds that can be allocated towards improving transit services.
- Integrate mixed-use housing into commercial areas within small towns allowing residents to be less reliant on cars.
- Develop rural roadways to support multimodal accessibility for bicyclists, pedestrians, transit, automobiles, and agriculture and goods movement vehicles.
- Encourage private sector companies to invest within the existing rural and small town communities.
- Increase connectivity to medical care and social services, employment and educational facilities to increase health and quality of life within rural residential communities. Also, build accessibility to employment and educational facilities.
- Partner with local, regional, and tribal governments on planning rural transit improvements with rural transit agencies.

26 Matute, J. M., et al., "California Statewide Transit Strategic Plan: Recommendations for Caltrans," 2012, http://www.dot.ca.gov/hq/MassTrans/STSP/STSPrecommendations.pdf.

27 California Association for Coordinated Transportation, "Keeping Communities Connected: New Challenges for California's Rural Transportation," 2007, http://www2.calact.org/assets/pdf/publications/CalACT-Keeping-Communities-Connected.pdf.

28 United States Environmental Protection Agency, "Supporting Sustainable Rural Communities," 2011, http://www2.epa.gov/smart-growth/supporting-sustainable-rural-communities.

29 Toth, G., "What is 'Rural Livability?"2010, http://www.pbs.org/wnet/blueprintamerica/blogs/the-dig-op-ed-what-is-rural-livability/1021/.

30 California Association for Coordinated Transportation, "Keeping Communities Connected: New Challenges for California's Rural Transportation," http://www2.calact.org/assets/pdf/publications/CalACT-Keeping-Communities-Connected.pdf.

SYSTEM EFFICIENCY AND TECHNOLOGY

COORDINATE DATA AND ANALYSIS

The CTP 2040 performance measures should be used statewide to allow comparisons across regions. The California Statewide Travel Demand Model (CSTDM) (see Chapter 3) is a key tool for better understanding statewide travel and the cumulative effects of regional planning efforts on the transportation system. Creating an infrastructure for performance measurement statewide–including the collection and maintenance of data and the processing systems to make the data accessible and understandable–is costly. In particular, some rural agencies lack the recourses to apply a robust performance system.

RECOMMENDATIONS

Short-Range

- Coordinate data and analysis efforts across regions to ensure consistency and comparability of results.
- Expand partnerships with tribal governments to improve data collection for both traffic volumes and crash data.
- Secure funding to make data available statewide.
- Support funding for the purchase and maintenance of a statewide transit data collection repository–one that can capture and organize transit data funneled to Caltrans by local transit providers.

ACTIVE TRANSPORTATION AND DEMAND MANAGEMENT

The CTP 2040 shows that Active Traffic Management (ATM) is an effective and economical way to improve the current transportation system within California through dynamic: ramp meters, real-time weather/accident update message signs, and traffic incident management. With existing technologies, there is great potential to meet the State's future mobility needs. The CTP 2040 encourages investment in more Traffic System Management (TSM) technology and the maintenance of current devices.

The CTP 2040 also supports Active Demand Management (ADM) tools to develop sustainable and environmentally friendly modes of travel through dynamic: ridesharing, park and ride lots, transit, telecommuting, biking and walking. Along with ADM another approach the CTP 2040 supports is Active Parking Management (APM) in order to optimize the utilization of parking facilities through dynamic: overflow transit parking, parking reservations, way finding and priced parking.

RECOMMENDATIONS

Short-Range

- Support Integrated Corridor Management (ICM) strategies such as Corridor System Management Plans (CSMPs) where appropriate.
- Demonstrate/continued support for CV/AV efforts.
- ADM strategies must be incorporated into general planning and development review process.[31]
- Congestion management systems should incorporate ADM strategies that enhance regional mobility and accessibility to maximize transportation efficiency.
- Make ADM strategies a part of the public involvement dialogue to gain broadened community support.
- Implement and promote ADM strategies that enhance travel reliability for all modes including real-time traveler information, preferential treatment for HOV/high occupancy toll (HOT) lanes and transit vehicles.
- Implement strategies that decrease automobile traffic through reducing total vehicle travel.
- Inform companies of the benefits of offering alternative work arrangement strategies to employees, such as telecommuting, flextime, and compressed work weeks.
- Support economic incentives for new residential and nonresidential private development to implement Transportation Demand Management (TDM) measures to reduce GHG emissions.
- APM strategies must be taken into consideration in order to utilize technology that will optimize parking facilities and influence travel behavior.

Mid-Range

- Develop a performance-based framework that prioritizes ATM work activities and funding.[32]
- Create an ATM infrastructure that fosters high-performance and good maintenance which will improve real-time system management.
- Develop and implement real-time corridor-wide strategies that optimize traffic flow, pedestrian safety, and the reduction of GHGs while working in cooperation with jurisdictional stakeholders.
- Put forth strategies that shift travel to be more transit-focused and rideshare-oriented, to achieve more road safety benefits.
- Incorporate the ICM concept, once finished, to improve the flow of traffic on the state highway system (SHS).

31 Federal Highway Administration, "Application of TDM to Policy Issues," http://ops.fhwa.dot.gov/publications/fhwahop12035/chap3.htm.

32 Federal Highway Administration, "Active Traffic Management," 2015, http://ops.fhwa.dot.gov/atdm/approaches/atm.htm.

Mid To Long-Range

- Implement automated toll collection services that reduce delays through collecting tolls electronically, which can increase the flow of traffic, rather than exacerbate congestion at conventional toll booths.[33]
- Adopt adaptive traffic signal controls, which can help with the reduction in delays and GHG emissions. Using adaptive control over traffic signals in real-time can improve the efficiency of corridors and traffic conditions through optimized algorithms.

Long-Range

- Explore the technology of CV/AV and vehicle platooning.

INVEST STRATEGICALLY

The CTP 2040 sets a strategy for Caltrans and its partners to address mobility needs on interregional, sustainable, integrated corridors through investments that include system maintenance and preservation, system efficiency, operations, and multimodal capacity expansion.

The motto of "Fix It First," if applied to maintenance of the State's highways, would have a major impact on the cost of transportation in the State. The SHS has a replacement value of over $1.2 trillion.[34] Protecting this investment will require continuous maintenance and rehabilitation. According to the ten-year study period (2011 to 2020), the total cost to bring the transportation facilities into a "State of good repair" was $341.1 billion.

The SHOPP provides capital funding to address this; however, funding levels are not sufficient to meet all maintenance and rehabilitation needs. If this is not addressed, the SHS will continue to deteriorate. Roads, highways, bridges, airports, seaports, railways, border crossings, and public transit infrastructure need adequate investment and restoration to protect the future of the State's economy and quality of life.[35] Ultimately investment decision-making will need to carefully consider cost-effective and location-efficient highway expansion projects supported and approved by local and regional transportation agencies. These will help meet future mobility and accessibility needs.

RECOMMENDATIONS

Short-Range

- Carefully consider funding projects that add road capacity and increase maintenance costs.
- Use CSTDM findings (see Chapter 3) to make sound transportation investments.
- Preservation of the existing transportation system in both rural and urban areas should always be high priority when making investment decisions on maintenance and rehabilitation.[36]
- Make quick and preventive treatments to avoid more costly maintenance in the future. Utilize and install new operational strategies and technologies to optimize system capacity.[37]
- All transportation partners should actively seek to leverage available funding for maintenance and operational improvements.
- Support a competitive capital program for transit capital replacement, acquisition, and the development and construction of transit centers and bus maintenance facilities.

Long-Range

- In addition to HSR, target rail capital improvements that serve to integrate the network, that have system-wide benefits and that maximize the use of existing infrastructure capacity.
- Support a competitive capital program for transit capital replacement, acquisition, and the development and construction of transit centers and bus maintenance facilities.

33 Federal Highway Administration, "The Role of Transportation Systems Management & Operations in Supporting Livability and Sustainability: A Primer," 2012, http://ops.fhwa.dot.gov/publications/fhwahop12004/fhwahop12004.pdf

34 Caltrans, "Interregional Transportation Strategic Plan," 2015, http://www.dot.ca.gov/hq/tpp/offices/omsp/system_planning/itsp.html.

35 Leiter, B., et al., "2011 Statewide Transportation System Needs Assessment," 2011, http://www.catc.ca.gov/reports/2011Reports/2011_Needs_Assessment_updated.pdf.

36 Sacramento Area Council of Governments, "Metropolitan Transportation Plan/Sustainable Communities Strategy: 2035, 142." 2012, http://sacog.org/mtpscs/files/MTP-SCS/MTPSCS%20WEB.pdf.

37 Caltrans, Division of Maintenance Pavement Program, "2013 State of the Pavement Report: Based on the 2013 Pavement Condition Survey, 2013, http://dot.ca.gov/hq/maint/Pavement/Pavement_Program/PDF/2013_SOP_FINAL-Dec_2013-1-24-13.pdf.

EXPAND FREIGHT NETWORK CAPACITY

Freight transportation supports business and the economy. The freight industry moved over $17 trillion dollars of goods nationally in 2012.[38] Congestion and insufficient infrastructure such as port access roads and rail line overpasses are leading problems for the freight industry resulting in impacts on fifteen major freight chokepoints and bottlenecks throughout California. Total shipment by tonnage is expected to grow by 180 percent by 2040. This growth leads to concerns about the State's ability to meet freight movement demands.

RECOMMENDATIONS

Short-Range

- Enhance incorporation of freight projects into planning documents, e.g., RTPs and Overall Work Programs (OWPs).
- Work with tribal governments to improve freight accessibility to tribal lands.
- Prioritize California Freight Mobility Plan (CFMP) projects to maximize financial resources.
- Invest in capitalized rail maintenance projects in shared use intercity passenger rail corridors that preserve freight capacity and maintain on-time passenger train performance.
- Support transportation fund appropriations in the State budget to fund road infrastructure improvements along high volume California-Mexico borders, commercial ports of entry (POE), and related access roads to reduce congestion, eliminate transportation bottlenecks, expand freight network capacity, and reduce GHG emissions and pollution.

Mid-Range

- Create a dedicated, reliable, and long-term freight funding program.
- Maximize resources toward the freight network with collaborative efforts between the public and private sectors. For example, the public may be willing to help freight industries finance dedicated truck lanes to improve vehicle movement on public roadways.

Mid To Long-Range

- Preserve lightly used rail lines because the overall freight demand is anticipated to grow throughout California's main line network, thereby exacerbating existing issues and conflicts on tracks jointly used by freight and passenger trains.[39]

LONG DISTANCE MULTIMODAL TRANSPORTATION

The long distance, multimodal transportation network in the State includes the interregional road and highway system, the intercity passenger rail system, and airports. The interregional road and highway system serves to connect the State's urban regions for people and goods. Similarly, integration between the planned California HSR system and existing commuter and intercity passenger rail systems will serve long-distance travel needs within California. This system also provides connections to major California airports for travel beyond the State. Aside from the familiar use of meeting commercial passenger and air cargo needs, California's General Aviation airports are also redefining themselves to better support community job growth and economic sustainability.

RECOMMENDATIONS

Short-Range

- Encourage mobility hubs for multiple modes of transportation.
- Expand business and light manufacturing opportunities, with considerations of existing and planned surrounding uses.
- Capitalize on the competitive advantage of having a business-friendly airport zone.
- Encourage multimodal accessibility at airports, seaports, and freight rail facilities.

38 Center for Transportation Analysis, "Freight Analysis Framework Data Tabulation Tool," 2014, http://faf.ornl.gov/fafweb/Extraction1.aspx.

39 California State Transportation Agency, "California Transportation Infrastructure Priorities: Vision and Interim Recommendations," 2014, http://www.calsta.ca.gov/res/docs/pdfs/2013/CTIP%20Vision%20and%20Interim%20Recommendations.pdf.

RECOMMENDATIONS FROM MODELING ANALYSIS

REDUCE VMT PER CAPITA

Short-Range

- Create policies to incentivize employers to develop commuter benefit programs that encourage transportation alternatives.
- Encourage parking management strategies at the workplace, such as parking cash-out or priority parking for HOVs that discourage drive-alone commuting to work.
- Provide greater telecommuting options and alternative work schedules designed to reduce the number of daily commute trips.
- Create policies that incentivize developers to provide TDM programs and services that mitigate the traffic impacts of developments.
- Secure additional funding to implement significant transit improvement strategies, including increasing speeds, decreasing fares, increasing BRT, and improving transfer times to include improved access/connections to transit and rail; as well as, improving the technologies (real-time traveler information, universal transportation account) that increases the convenience and competitiveness of public transit thereby creating more a positive attitude towards public transit for choice riders.
- Create policies and secure funding for increasing and improving bicycling and pedestrian infrastructure, security, and education.
- Implement substantial public outreach to publicize the GHG benefit of eco-driving, car sharing, and telecommuting to include transit and ridesharing. Create legislation to implement an aggressive mix of VMT per capita reduction strategies, including (but not limited to) road pricing strategies, increasing car sharing, increasing the minimum carpool requirements, and increasing HOV lanes.

Mid-Range

- Utilize funds from the road pricing strategies to fund improvements for driving alternatives.
- Utilize Cap-and-Trade Program funds and other available funds to increase transit and rail infrastructure and service.
- Implement HSR service.

REDUCE GHG EMISSIONS IN THE TRANSPORTATION SECTOR

Mid-Range

- Create incentives for drivers of ZEVs to greatly increase the percentage of ZEVs in the overall fleet in order to achieve the 2050 GHG reduction target for the transportation sector.
- Subsidize and incentivize (via legislation) an aggressive shift to alternative vehicle fuels, including (but not limited to) biofuel blends and electricity in order to achieve the 2050 GHG reduction target for the transportation sector.
- Subsidize and incentivize (via legislation) an aggressive advancement of vehicle technologies in order to achieve the 2050 GHG reduction target for the transportation sector.
- Continue to implement policies and funding programs and build infrastructure that will expand rail and transit services to further mode shift from vehicles to other modes.

ADVANCE MODELING AND DATA

Short-Range/Ongoing

- Secure stable funding for statewide, regional, and local data collection, model development, documentation, and data visualization activities to support policy making activities.
- Expand use of common input assumptions between State and MPO forecasting efforts, including socio-economic data, interregional travel forecasts, goods movement/trucking, pricing policies, and other areas where data sharing will result in better and more consistent travel demand forecasts across jurisdictions.
- Coordinate data and analysis efforts across regions to ensure consistency and comparability of results.
- Expand partnerships between State agencies and Caltrans for model training, coordination of activities, and periodically updating modeling guidelines and requirements for RTP/SCS and CTP forecasting.
- Implement the California Commercial Vehicle Inventory Survey (Cal VIUS).
- Coordinate statewide model activities such as the CSTDM, California Statewide Freight Forecasting Model (CSFFM), Caltrans-Amtrak Ridership Model, ARB's EMission FACtors model (EMFAC), ARB's Vision for Clean Air (VISION) Model, and California High-Speed Rail Authority (CHSRA) Ridership Model and to enhance the capabilities of all agencies.

- Deploy a statewide integrated land use-transportation modeling system.
- Conduct a new statewide household travel/activity survey with Global Positioning System (GPS) and on-board vehicle diagnostics. Ideally, the statewide household travel survey should be conducted on an on-going and continuous basis. Decennial surveys have proven burdensome for Caltrans and MPOs, and
  key information on household changes over time are not currently collected.
- Secure funding for regular modal surveys (including transit on-board surveys, and pedestrian/bicycle activity surveys), and big data analysis using anonymous cell phone/GPS data to improve understanding of travel patterns.
- Conduct data collection and research on visitor travel to California. This information is largely absent from existing travel demand models.

SAFETY

IMPROVE PUBLIC SAFETY AND SECURITY

Recommendations	Partners	Years	CTP Goals/ Policies
Continue investments toward planning and construction of highway safety projects.	CT, RTPA/ MPO, FHWA, FTA, Locals, Transit	2	G4-P1/P2
Invest in rail safety public awareness campaigns and social norming to change behavior related to Operation Lifesaver, railroad grade crossing safety improvements, and safe operations for both passenger and freight rail.	CT, RTPA/ MPO, FHWA, FTA, FRA, Locals, Rail	2	G4-P1/P2
Emphasize planning and funding to increase railroad crossing safety improvements and grade separations.	CT, RTPA/ MPO, Locals, FTA, FRA, Rail	2	G4-P1/P2
Emphasize planning and funding for projects that provide a safer network of both rural and urban bike and pedestrian routes.	CT, RTPA/ MPO, FHWA, FTA, Locals	2	G4-P1/P2
Implement aggressive public education and media/awareness campaigns to increase awareness of distracted motorists, cyclists, and pedestrians.[40]	CT, RTPA/ MPO, FHWA, Locals	2	G4-P1/P2
Improve traffic safety and security programs through prioritizing opportunities for risk reductions, implementation, monitoring, testing, evaluating, and revising safety and security plans.	CT, RTPA/MPO, FHWA, Locals	2	G4-P1/P2
Identify hazardous materials transport routes that minimize risk in populated areas.	CT, RTPA/ MPO, FHWA, Locals	2	G4-P1/P2
Assess and minimize transportation security risks for hazardous materials shipment and identify appropriate measures to address the assessed risks.	CT, RTPA/ MPO, FHWA, Locals	2	G4-P1/P2
Ensure that activities and operations enhance transportation security.[41]	CT, RTPA/MPO, Locals	2	G4-P1/P2
Support grants and funding opportunities for cooperative multiagency/multi-municipality data systems, data sharing and resource and data pooling.	CT, RTPA/MPO, Resource Agencies	2	G4-P1/P2
Continue outreach efforts to both urban and rural counties to help them improve safety, data collection, access, and analysis by continuing to fund traffic collision database and GIS mapping systems.	CT, RTPA/MPO, CHP, DMV, FHWA, FTA, FRA, Locals	2	G4-P1/P2
Continue to install and test PTC technology on all intercity and commuter passenger rail.	CT, RTPA, Locals, FTA, FRA, Rail	2	G4-P1/P2

40 CHP, "California Highway Patrol Programs and Services," 2016, https://www.chp.ca.gov/programs-services.

41 California Office of Traffic Safety, "California Highway Safety Plan," 2015, http://www.ots.ca.gov/Media_and_Research/Publications_and_Reports/hsp15/2015-HIGHWAY-SAFETY-PLAN.pdf.

IMPROVE PUBLIC SAFETY AND SECURITY (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Collect, analyze, and distribute safety data among planners and decision makers who coordinate and find areas that could benefit post benefit-cost analysis for investments that improve the safety of the arterials, corridors, ramps, etc.	CT, RTPA/MPO, CHP, DMV, Locals	2	G4-P1/P2
Fund and improve the quality, completeness, timeliness, and uniformity of safety data and the sharing among federal, State, and local agencies and stakeholders.[42]	CT, RTPA/MPO, CHP, DMV, Federal, Locals	3 to 20	G4-P1/P2
Fund regional EMS programs to ensure rural communities have access to the latest "State-of-the-art" rescue and extrication equipment.[43]	CT, RTPA, CALOES, Locals	3 to 20	G4-P1/P2
Fund "corridor DUI programs" that select corridors based on data showing disproportionate numbers of DUI collisions and convening task forces to implement identified solutions.[44]	CT, RTPA/MPO, CHP, DMV, Locals	3 to 20	G4-P1/P2
Improve outreach, education, and implementation of CPTED, an approach that deters crime and provides security through environmental design in transportation systems.	CT, RTPA/MPO, HCD, SGC, FHWA, FTA, FRA, Locals, Transit, Rail	3 to 20	G4-P1/P2
Establish requirements, collaborate with and support research for manufacturers of CV/AV, and Self-Guided Magnetic Bus Technology to meet specific safety requirements that have the potential to improve safety, costs, and efficiency in reducing passenger fatalities and traffic incidents as well as operational benefits.	CT, RTPA/MPO, FHWA, FTA, Locals, Transit	3 to 20	G4-P1/P2
Support vehicle technological improvements such as automatic braking and CV/AV.	CT, RTPA/MPO, FHWA, FTA, Locals, Transit	3 to 20	G4-P1/P2
Support at-grade freight railroad crossing improvements.	CT, RTPA/ MPO, FTA, FRA, Locals, Rail	3 to 20	G4-P1/P2

42 California Department of Motor Vehicles, "Department of Motor Vehicles Strategic Plan FY 2014-2015. In Safety," 2014, https://www.dmv.ca.gov/portal/dmv/detail/pubs/strat_plan/strategic_plan/.

43 California Office of Traffic Safety, "Moving Forward: Emergency Medical Services," http://www.ots.ca.gov/OTS_and_Traffic_Safety/Moving_Forward.asp.

44 California Office of Traffic Safety, "California Highway Safety Plan," 2015, http://www.ots.ca.gov/Media_and_Research/Publications_and_Reports/hsp15/2015-HIGHWAY-SAFETY-PLAN.pdf.

SUSTAINABILITY

FOSTER LIVABLE/HEALTHY COMMUNITIES AND SOCIAL EQUITY

Recommendations	Partners	Years	CTP Goals/ Policies
Collaborate with stakeholders and partners early and often in the planning process.	CT, RTPA/MPO, Federal, State , Locals, Resource Agencies, Private	2	G5-P1
Collaborate to develop transportation planning tools, policies, and incentives to improve analysis and consideration of social equity, EJ, and public health impacts.	CT, RTPA/MPO, CDPH, EPA, Locals	2	G5-P3
Ensure that transportation plans reflect strategies to connect the transport/access of people, goods, and services in efficient ways to integrate housing, work, recreation, and public institution needs while at the same time, avoiding negative impacts to agricultural production areas and sensitive land and water resources; create funding decision priorities for projects that contribute toward these goals.	CT, RTPA/MPO, EPA, SGC, HCD, ARB, CNRA, DOC, Private, Locals, Transit, Rail	2	G5-P1/P3
Promote mixed-use activity nodes incorporating place-making urban design principles in conjunction with transportation improvements.	CT, RTPA/MPO, SGC, HCD, ARB, CNRA, DOC, Private, Locals, Transit, Rail	2	G5-P2
Promote inclusion of affordable housing plans, policies, and projects within applications for federal funds to take advantage of scoring criteria for these in programs such as the FTA New Starts Program.	CT, RTPA/MPO, EPA, SGC, HCD, ARB, CNRA, DOC, Private, Locals, Transit, Rail	2	G5-P2
Promote efficient infill housing development and redevelopment opportunities to reduce urban sprawl consistent with SB 375, the SCSs, and other regional and State policy guidance.	CT, RTPA/MPO, EPA, SGC, HCD, ARB, CNRA, DOC, Private, Locals, Transit, Rail	2	G5-P2
Implement the SMF principles statewide to integrate the transportation system and encourage non-motorized forms of transportation and Complete Streets.[45]	CT, RTPA/MPO, EPA, SGC, HCD, ARB, CNRA, DOC, Private, Locals, Transit, Rail	2	G5-P2
Identify potential pedestrian and bicyclist improvements on State highways and work toward development of those projects.[46]	CT, RTPA/MPO, EPA, SGC, HCD, ARB, CNRA, DOC, Private, Locals, Transit, Rail	2	G5-P2
Promote the AHSC Programs.	CT, RTPA/MPO, EPA, SGC, HCD, ARB, CNRA, DOC, Private, Locals, Transit, Rail	2	G5-P2

45 Caltrans, "Smart Mobility 2010: A Call to Action for the New Decade," 2010, http://www.dot.ca.gov/hq/tpp/offices/ocp/smf_files/SmMblty_v6-3.22.10_150DPI.pdf.

46 San Diego Association of Governments, "2050 Regional Transportation Plan," 2011, http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf.

FOSTER LIVABLE/HEALTHY COMMUNITIES AND SOCIAL EQUITY (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Support an increase of the supply of new housing units for all income levels to meet California's housing needs.	CT, RTPA/MPO, EPA, SGC, HCD, ARB, CNRA, DOC, Private, Locals, Transit, Rail	2	G5-P2
Work with tribal governments using principles of coordination, collaboration, and engagement to improve transportation for tribal communities.	CT, RTPA/MPO, FHWA, FTA, FRA, DOC, Tribal, Locals, Transit, Rail	2	G5-P1/P3
Support general plans that are consistent with State sustainability goals such as GHG reduction and VMT reduction.	CT, RTPA/MPO, FHWA, FTA, FRA, Locals, ARB, Transit, Rail	2	G5-P2
Continue research on relationships between affordable housing and mobility, and disseminate the results from the research to inform local policies.	CT, RTPA/MPO, FHWA, FTA, FRA, Locals	2	G5-P2
Encourage local policies that can help mitigate displacement effects on low-income populations.	CT, RTPA/MPO, ARB, FHWA, FTA, FRA, Locals, Private, HCD, CDPH	2	G5-P3
Partner with industries and innovators involved in technological approaches to environmental improvement.	CT, RTPA/MPO, Locals, Private	3 to 20	G5-P1
Support infill development and compatible land use around rail stations.	CT, RTPA/MPO, FRA, Rail, Local, Private	3 to 20	G5-P2
Follow the model of the HiAP, through which more than twenty State departments and agencies came together to promote public health, equity, and environmental sustainability across multiple policy areas, including transportation, housing, and land use.	CT, RTPA/MPO, Local	3 to 20	G5-P1/P3
Implementing policies to provide sufficient distance between diesel-powered freight transportation projects and schools, residences, and other receptors to avoid significant health risks, e.g. through guidelines for freight siting and truck routes.	CT, RTPA/MPO, Local, Private, EPA, ARB, CDPH	3 to 20	G5-P1/P3
Work with local and regional agencies to apply considerations of health, equity, and sustainability to transportation decision-making.	CT, RTPA/MPO, CDPH, Local, Transit, Rail	3 to 20	G5-P3

PRACTICE ENVIRONMENTAL STEWARDSHIP

Recommendations	Partners	Years	CTP Goals/ Policies
Support wildlife connectivity and naturally functioning ecosystems through design plans to protect habitat and natural resources.	CT, RTPA/MPO	2	G6-P1/P2
Expand the use of technology and tools to provide environmental impact performance measures.	CT, RTPA/MPO, FHWA, FTA, FRA, ARB, EPA	2	G6-P1
Continue to promote policies that reduce GHG and criteria pollutant emissions such as the 2013 Zero-Emission Action Plan, which directs the State to accelerate the market for ZEVs in California. This also includes a goal of 1.5 million ZEVs in California by the year 2025.[47]	CT, RTPA/MPO, ARB	2	G6-P3/P4
Support technological research and development of alternative fuels and transportation modes that can further improve air quality.[48]	CT, RTPA/MPO, ARB	2	G6-P3/P4
Promote active transportation, ridesharing, rail, and public/ mass transit promoting policies for the co-benefit of reducing air pollution when they replace motor vehicle trips.	CT, RTPA/MPO, ARB	2	G6-P3/P4
Convene State, regional, and local stakeholders to establish coalitions that engage communities on the importance of environmental stewardship.	CT, RTPA/MPO, Resource Agencies, ARB	2	G6-P1/P2
Expand resiliency planning and climate change impact studies of SLR and storm events, and other climate change indicators that affect the future of communities, infrastructure, and ecosystems.	CT, RTPA/MPO, ARB, Resource Agencies, Locals	2	G6-P1
Support electrification of passenger rail, mode shift from planes and autos to HSR, and investments in renewable energy sources for transportation. Promote and expand strategies such as the Cap-and-Trade Program and HSR, and enhance environmental stewardship locally, regionally, and statewide.	CT, RTPA/MPO, ARB, Rail, Aero, Locals	2	G6-P3/P4
Continued coordination between Caltrans and ARB on development of transportation policies as part of developing State Implementation Plans.	CT, RTPA/MPO, ARB, Locals	2	G6-P3/P4
Minimizing environmental impacts during construction of transportation projects where feasible by developing and disseminating a list of construction best practices.	CT, RTPA/MPO, Resource Agencies, Locals	2	G6-P1

47 Governor's Interagency Working Group on Zero-emission Vehicles, "2013 ZEV Action Plan A roadmap toward 1.5 million zero-emission vehicles on California roadways by 2025," 2013, http://opr.ca.gov/docs/Governor's_Office_ZEV_Action_Plan_(02-13).pdf.

48 Sacramento Area Council of Governments, "Metropolitan Transportation Plan/Sustainable Communities Strategy: 2035, 142." 2012, http://sacog.org/mtpscs/files/MTP-SCS/MTPSCS%20WEB.pdf.

PRACTICE ENVIRONMENTAL STEWARDSHIP (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Providing funding and policy support for development, demonstration and deployment of needed clean technologies, including support for transportation and other infrastructure that enables and incentivizes use of zero- and near-zero-emission technologies.	CT, RTPA/MPO, ARB, FHWA, FTA, FRA, Transit, Rail	2	G6-P3/P4
Establish partnerships between State, regional and local agencies to implement recommendations from the 2014 AB 32 Scoping Plan Update.	CT, RTPA/MPO, CPUC, Local	3 to 5	G6-P3/P4
Support local communities in the development of integrated transportation and land use strategies to resiliently respond to climate change through their General Plans, RTPs, and LCPs.	CT, RTPA/MPO, SGC, HCD, ARB, CNRA, DOC, Private, Coastal, Locals, Transit, Rail	3 to 5	G2-P3, G6-P1/P2
Collaborate (public and private entities) to demonstrate and deploy mobile source control technologies that will assist California in reducing air pollutants and reaching National Ambient Air Quality Standards attainment and reducing GHGs.	CT, RTPA/MPO, ARB, Locals, Private	3 to 5	G6-P3/P4
Maintain and strengthen the ZEV regulation, new vehicle GHG performance standards, the Cap-and-Trade Program and the Low Carbon Fuel Standard.	CT, ARB, RTPA/MPO, Private	3 to 5	G6-P3/P4

SUPPORT ECONOMIC VIBRANCY

Recommendations	Partners	Years	CTP Goals/ Policies
Avoid projects with high health and environmental costs.	CT, RTPA/MPO, Locals, Resource Agencies	2	G3-P1, G5-P3, G6-P1
Prioritize funding toward transportation alternatives that enhance efficient and affordable mobility.	CT, RTPA/MPO, Locals	2	G1-P3, G3-P3, G5-P3
Work with tribal governments to improve access to State highways from tribal lands.	CT, RTPA/MPO, Locals, Tribal	2	G3-P1, G5-P1/P3
Support the modification of design standards to implement the Main Street Guidelines.	CT, RTPA/MPO, Locals, CDPH, CPTED, SGC	2	G3-P1, G5-P2
Support projects that improve intermodal freight access and reduce congestion especially along freight corridors.	CT, RTPA/MPO, FRA, Locals, Rail	2	G3-P2

SUPPORT ECONOMIC VIBRANCY (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Support regional and local government planning for investments improving the proximity of jobs-housing relationships.	CT, RTPA/MPO, FTA, FRA, FHWA, SGC, HCD, Transit, Rail, Locals	2	G3-P1, G5-P5
Allocate transportation project funding in a manner incentivizing improved accessibility of housing and major employment centers, restraining commuting distances, and the combined cost of housing and transportation.	CT, RTPA/MPO, FTA, FHWA, FRA, Transit, Rail, SGC, HCD, Locals	2	G1-P3, G3-P1/P3, G5-P2
To the extent reasonable, adjust pricing of transportation modes to reflect the total cost for each mode, including health and environmental costs, providing subsidies to accommodate ability to pay without compromising economic competitiveness.	CT, RTPA/MPO, CDPH, Locals, Resource Agencies	3 to 20	G3-P1/P3, G5-P3, G6-P1
Invest in interregional goods movement corridors.	CT, RTPA/MPO, Rail, FHWA, FRA, Locals	3 to 20	G3-P1/P2/P3
Improve the linkages between transportation, housing, and land use by tying policies to incentives with environmental benefit.	CT, RTPA/MPO, SGC, HCD, Transit, Locals	3 to 20	G3-P1, G5-P1/P2
Develop a tax and fee structure that facilitates an efficient and affordable transportation system consistent with long-term transportation, housing, land use, and resource management plans.	CT, RTPA/MPO, SGC, HCD, Resource Agencies, Locals	3 to 20	G3-P1/P3, G5-P1/P2, G6-P1/P2

OBTAIN PERMANENT FUNDING

Recommendations	Partners	Years	CTP Goals/ Policies
Support efforts to implement a road pricing strategy with consideration of accounting for equity impacts, contingent upon capacity to simultaneously improve transit services.	CT, RTPA/MPO, Transit	2	G3-P3
Support efforts to close the funding gap for MPOs to implement the regions' SCSs. Encourage inter-governmental cross-sector collaboration in developing financing mechanisms, including cross-sector financing of sustainable, integrated corridors and supportive land uses.	CT/RTPA/MPO, SGC, Locals, FHWA, FTA, FRA, Transit, Rail	2	G3-P3, G5-P2
Support recommendations for dedicated freight funding.	CT, RTPA/MPO, Locals, FHWA	2	G3-P2
Implement a revenue structure that is solely dedicated to improving non-motorized travel methods.	CT, RTPA/MPO, Locals	3 to 20	G1-P3, G3-P3

ADDRESS CLIMATE ADAPTATION AND RESILIENCY OF INFRASTRUCTURES TO ENSURE RELIABLE TRANSPORTATION

Recommendations	Partners	Years	CTP Goals/ Policies
Incorporate climate change resiliency in long-range transportation documents to address potential climate change-related vulnerabilities.[49]	CT, RTPA/MPO, Locals	2	G2-P3
Require climate change resiliency in SHOPP and STIP programs and projects.	CT, RTPA/MPO, Locals	2	G2-P3
Coastal communities must utilize LCPs alongside General Plans and RTPs to reduce GHG emissions and implement climate change adaptations, giving first priority to where the impacts of SLR are most intense. Consider project alternatives that avoid significant new development in areas that cannot be adequately protected (planning, permitting, development, and building) from flooding, wildfire and erosion due to climate change.[50]	CT, RTPA/MPO, Locals, Coastal	2	G2-P3
Focus on reliable transportation routes away from SLR impacts on harbors and ports[51], airports, access roads, rail tracks, and bridges.	CT, RTPA/MPO, Locals, Coastal	2	G2-P3
Track SLR and other climate change indicators using interactive maps and modeling that identify transportation infrastructure that could be vulnerable to environmental and climate changes.	CT, RTPA/MPO, Locals, Coastal	2	G2-P3
Develop a project-level checklist to evaluate facility risks and vulnerability due to climate change impacts. Evaluate projects for climate change vulnerabilities at the time funding is programmed, and incorporate project design features to improve resiliency of facilities and infrastructure." Example of vulnerability assessment system: FHWA's VAST.	CT, RTPA/MPO, Locals	2	G2-P3
Evaluate SLR and potential adaptation responses to anticipated SLR in new construction, as well as repair and replacement projects, and factor these considerations into the selection of the preferred alternative to meet the project purpose and need.	CT, RTPA/MPO, Locals, Coastal	2	G2-P3
Education programs that teach community members about global warming, and how they can be an active part of the solution, particularly in the choices they make about transportation.	CT, RTPA/MPO, Locals	2	G2-P3, G5-P1, G6-P1/P3/P4
Accelerate the use of alternative fuels, new vehicle technology, pricing strategies, public transportation expansion, more bicycling and walking to contribute to GHG reduction goals.	CT, RTPA/MPO, Locals, FHWA, FTA, FRA, Transit, Rail, Private	2	G6-P3/P4

49 Caltrans, "State Smart Transportation Initiative Assessment and Recommendations," 2014, http://www.dot.ca.gov/CIP/docs/SSTIReport.pdf.

50 California Natural Resources Agency, "2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008," 2009, http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf.

51 Applied Development Economics, Inc., et al., "2010 California Regional Progress Report," 2010, http://www.dot.ca.gov/hq/tpp/offices/orip/Collaborative%20Planning/California_Regional_Progress_Report.html.

ADDRESS CLIMATE ADAPTATION AND RESILIENCY OF INFRASTRUCTURES TO ENSURE RELIABLE TRANSPORTATION (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Continue planning, funding, and implementing long-term solutions that will ensure that the State's transportation/ access needs will be met through sustainable transportation choices that account for, and help mitigate, changing climate conditions.	CT, RTPA/MPO, Locals, FHWA, FTA, FRA, Transit, Rail	3 to 20	G2-P3
Develop uniform climate change assumptions for federal, State, and local agencies. It is difficult to conduct proper climate change planning activities if different agencies are using different assumptions such as the level of SLR, or intensity of storm activity.	CT, RTPA/MPO, Locals, Coastal	3 to 20	G2-P3, G5-P1

STREAMLINE DELIVERY

Recommendations	Partners	Years	CTP Goals/ Policies
Adopt a process to advance projects that reduce GHG emissions by improving the efficiency of the environmental review process.	CT, RTPA/MPO, OPR	2	G6-P3
Develop implementation guidance for SB 226 (expanding SB 375 CEQA streamlining provisions) with the Governor's OPR.	CT, RTPA/MPO, OPR	2	G6-P3
Develop advance-mitigation-planning programs that will allow simultaneous consideration of the environmental effects of several planned infrastructure projects.	CT, RTPA/MPO, Resource Agencies, Locals	2	G6-P1/P2/P3
Accelerate the use of alternative fuels, new vehicle technology, pricing strategies, public transportation expansion, and more bicycling and walking to achieve statewide GHG reduction goals.	CT, RTPA/MPO, Rail, Transit, Locals	3 to 5	G6-P3/P4

MULTIMODAL SYSTEM ENHANCEMENTS

ACTIVE TRANSPORTATION SYSTEM (BICYCLING AND WALKING)

Recommendations	Partners	Years	CTP Goals/ Policies
Implement programs that encourage people to utilize active transportation modes and help educate travelers on the benefits of not using a car.[52]	CT, RTPA/MPO, Transit, Local	2	G1-P3, G5-P2/P3
Offer strategic planning workshops on transit-oriented strategies at the local level.[53]	CT, RTPA/MPO, FTA, Locals, Transit	2	G1-P3, G5-P2/P4
Support local/regional multidisciplinary efforts to ensure safe active transportation in all jurisdictions in the State.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Rail, Locals	2	G1-P3, G5-P1/P2/P5
Encourage local governments to develop communities with gathering places and mixed use local shops with walkable paths, bike lanes, and convenient transit stops (coordinated to access jobs, health care, and entertainment venues), that will also accommodate goods deliveries.	CT, RTPA/MPO, Transit, Locals, Private	2	G1-P3, G5-P1/P2/P5
Support the development and enhancement of the California Coastal Trail.	CT, RTPA/MPO, Locals, Coastal, Resource Agencies	2	G1-P3, G5-P1/P2/P5
Fund and expand programs that promote transportation alternatives such as carpooling, vanpooling, transit, walking, and bicycling.[54]	CT, RTPA/MPO, OPR, FHWA, FTA, FRA, Transit, Rail, Locals	3 to 20	G1-P3, G5-P1/P2/P5
Create safe and effective walking and bicycling facilities that create neighborhood connectivity and continuity.	CT, RTPA/MPO, Locals	3 to 20	G1-P3, G4-P1/P2, G5-P2/P3
Leverage private sector investment to find alternatives to automobiles.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Rail, Locals, Private	3 to 20	G3-P3, G5-P1, G6-P4
Experiment and evaluate alternatives through pilot projects that allow for a better understanding of successful and unsuccessful strategies to help improve current transit services.	CT, RTPA/MPO, FHWA, Transit, FTA, Locals	3 to 20	G1-P1/P2/P3, G2-P2
Find ways to improve non-auto interregional and interstate travel modes.	CT, RTPA/MPO, FHWA, locals	3 to 20	G1-P1/P2/P3, G2-P2
Optimize traffic signal timing for transit or bicycle speeds to improve the multimodal efficiency on Complete Streets.[55]	CT, RTPA/MPO, Locals, Transit	3 to 20	G1-P1
Work with tribes to identify potential pedestrian and bicyclist improvements on State highways in Indian Country and work toward development of those projects.[56]	CT, RTPA/MPO, Tribal, Locals	3 to 20	G1-P3, G5-P1/P3

52 Federal Highway Administration, "Application of TDM to Policy Issues," http://ops.fhwa.dot.gov/publications/fhwahop12035/chap3.htm.

53 Matute, J.M., et al., "California Statewide Transit Strategic Plan: Recommendations for Caltrans," 2012, http://www.dot.ca.gov/hq/MassTrans/STSP/STSPrecommendations.pdf.

54 California Transportation Commission, "Active Transportation Program," http://www.catc.ca.gov/programs/ATP.htm.

55 Federal Highway and Transit Administration, "The Role of Transportation Systems Management and Operations in Supporting Livability and Sustainability: A Primer," 2012, http://ops.fhwa.dot.gov/publications/fhwahop12004/fhwahop12004.pdf.

56 San Diego Association of Governments, "2050 Regional Transportation Plan," 2011, http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf.

EXPAND TRANSIT AND RAIL SERVICES AND OPERATIONS

Recommendations	Partners	Years	CTP Goals/ Policies
Support technologies and capital improvements that increase convenience and competitiveness of public transit and rail, thereby making transit and rail preferred mode alternatives. This includes real-time transit information and trip planning tools, universal payment systems, as well as cost-effective infrastructure improvements optimizing reliability and connectivity between systems.	CT, RTPA/MPO, Transit, Rail, Locals	2	G1-P1/P2, G2-P2
Analyze the implications of changing market demands for transit and rail service and demographics and optimize existing resources to improve service to those markets.	CT, RTPA/MPO, Transit, Rail, Locals	2	G1-P1/P2
Expand funding for transit and rail service operations and capital improvements.	CT, RTPA/MPO, Transit, Rail, Locals	2	G1-P2, G2-P2, G3-P3
Coordinate with tribes to expand transit services.	CT, RTPA/MPO, Tribal, Transit, Rail, Locals	2	G1-P2/P3, G5-P1
Work with other State and regional agencies and operators to improve the perception of transit and rail in California through marketing and outreach.	CT, RTPA/MPO, Transit, Rail, Locals	2	G3-P1, G5-P1
Continue to coordinate between Caltrans modal divisions.	CT, RTPA/MPO, Transit, Rail, FHWA, FTA, FRA, HCD, Resource Agencies, Tribal, Locals	2	G5-P1
Share statewide successes and lessons learned in order to accelerate the implementation of cost-effective strategies to improve transit and rail.	CT, RTPA/MPO, Transit, Rail, FHWA, FTA, FRA, Locals	2	G1-P2, G5-P1
Streamline reporting processes for State and federal grants, and funding allocations.	CT, RTPA/MPO, FHWA, FTA, FRA, Locals, Transit, Rail	2	G3-P3, G5-P1
Provide statewide resources for customer service improvements like real-time passenger information systems.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Rail, Locals	2	G1-P1, G3-P3
Report publicly-sponsored vanpool service data in order to attract federal operating funds.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Rail, Locals	2	G3-P3, G5-P1

EXPAND TRANSIT AND RAIL SERVICES AND OPERATIONS (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Support employer-assisted housing and use of TDM policies with employers in transit corridors.	CT, RTPA/MPO, Transit	2	G1-P3, G5-P1/P2
"Ensure that each of the State's 12 deep water ports have an active freight rail connection to the National Rail System."	CT, RTPA/MPO, FHWA, FRA, Rail, Locals, Private	2	G3-P2
Implement rail capital improvements that will support a greatly expanded rail and transit system in California. Support seamless transfers between local-regional transit and passenger rail systems.	CT, RTPA/MPO, FHWA, FTA, FRA, Rail, Locals, Private, Rail, Transit	3 to 20	G1-P1/P2/P3
Help transit operators understand real-time passenger information systems and offer grants that can help offset initial costs of publishing data.	CT, RTPA/MPO, Transit, Locals	3 to 20	G1-P2, G3-P3
Caltrans Division of Rail and Mass Transportation can work with local transit stakeholders throughout the State to evaluate and learn from the BRT project.	CT, RTPA/MPO, Rail, Transit, Locals	3 to 20	G5-P1
Improve perception of transit services by working with other State and local agencies.	CT, RTPA/MPO, Rail, Transit, Locals	3 to 20	G5-P1
Report vanpool service data to attract federal funds.	CT, RTPA/MPO, FHWA, FTA, Transit, Locals	3 to 20	G5-P1, G3-P3
Share successes and lessons learned among transit authorities in order to improve transit services.	CT, RTPA/MPO, Transit	3 to 20	G1-P3, G5-P1
Improve transit payment methods to speed up vehicle boarding, which in turn can increase the efficiency of buses arriving on-time more often.	CT, RTPA/MPO, Transit	3 to 20	G1-P1
Create circulator service which specializes in transit to link popular and frequently visited destinations within universities and downtown areas.	CT, RTPA/MPO, Transit, Locals	3 to 20	G3-P1, G5-P2
Improve upon scheduled transfers between regional transit services.	CT, RTPA/MPO, Transit	3 to 20	G1-P1, G5-P1

IMPROVE MULTIMODAL MOBILITY AND ACCESSIBILITY FOR ALL

Recommendations	Partners	Years	CTP Goals/ Policies
Create modal plans and programs that improve both safety and system operations while keeping the community, environmental, and economic goals in mind.	CT, RTPA/MPO, Resource Agencies, Locals, Transit, Rail, FHWA, FTA, FRA, Private	2	G1, G2, G3, G4, G5, G6
Implement land use strategies that make travel easier through the reduction of distances in consumer activities (e.g., shopping, recreation, etc.).[57]	CT, RTPA/MPO, Locals, Private	2	G1-P3, G3-P1, G5-P3
Create public spaces with bicycle/pedestrian and transit access in order to reduce automobile dependency.	CT, RTPA/MPO, Transit, Locals	2	G1-P3, G5-P2
Work with tribal nations and communities to improve multimodal accessibility and mobility by integrating the tribal transportation network into the overall transportation network.	CT, RTPA/MPO, Tribal, Transit, Rail, Locals	2	G1-P3, G5-P1/P3
Provide funding and emphasize Transportation Demand Strategies such as ridesharing, vanpooling, park-and-ride lots, transportation information dissemination, and employer outreach programs. Focus on HSR/TOD projects that capitalize on incorporating high-density, mixed use areas thereby reducing individual dependency on cars and encouraging the use of transit.	CT, RTPA/MPO, FHWA, FTA, FRA, Rail, Transit, Locals, Private	2	G1-P1/P2/P3, G3-P3, G5-P2
Increase funding for projects or programs that improve public access and connections to desired destinations.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Rail, Locals	2	G1-P2/P3, G3-P3, G5-P2
Coordinate passenger/HSR and freight rail infrastructure to gain efficiencies.	CT, RTPA/MPO, Rail, FRA, Locals	2	G1-P3, G5-P1
Create supportive policies and secure funding for the promotion of shared mobility (car sharing, bike sharing, real-time ridesharing, Transportation Network Companies, scooter share, shared neighborhood electric vehicles, and on-demand shuttle and jitney services).	CT, RTPA/MPO, Transit, Locals Private	2	G1-P2/P3, G3-P3, G5-P1
Support a unified or universal transportation account that combines all forms of public transportation payments including transit fares, municipal parking and toll collection into a single user-friendly system. By offering rewards based on frequent use, toll discounts and other incentives, the system can lead to a shift from driving alone to using public transit or ridesharing.	CT, RTPA/MPO, FHWA, FTA, FRA, Rail, Transit, Locals	2	G1-P1, G3-P1/P3
Support infill development to slow urban sprawl and increase density. This will reduce distances between consumer activities, thus encouraging more people to take advantage of transit services, bicycling and walking.	CT, RTPA/MPO, Transit, Locals	3 to 5	G5-P1/P2

57 Handy, S., "Accessibility VS. Mobility-Enhancing Strategies for Addressing Automobile Dependence in the US," 2002, http://www.des.ucdavis.edu/faculty/handy/ECMT_report.pdf.

IMPROVE MULTIMODAL MOBILITY AND ACCESSIBILITY FOR ALL (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Increase the efficiency and reliability of transit service trips by timing signals to favor public transit.[58]	CT, RTPA/MPO, Transit, Locals	3 to 5	G1-P1
Re-design the current roadways to integrate medians, channelized islands, and roundabouts to increase automobile throughput and multimodal accessibility.	CT, RTPA/MPO, Locals	3 to 5	G1-P2
Ensure that an interconnected, multimodal transportation network serves all segments of the State's population as well as the significant number of tourists that visit each year.	CT, RTPA/MPO, Locals, Transit, Rail	3 to 5	G1-P3, G5-P3
Add bicycle lanes, and change signal timing/countdown to increase safety at cross intersections.	CT, RTPA/MPO, Locals	3 to 5	G1-P3, G4-P1
Develop rideshare programs and efficient parking management strategies to allow more people to travel using existing infrastructure, and support HSR/TOD and alternative transportation choices.	CT, RTPA/MPO, Transit, Rail, Locals	3 to 5	G1-P1/P2/P3
Work with tribes to improve multimodal accessibility and mobility.	CT, RTPA/MPO, Tribal, Locals, Rail, Transit	3 to 5	G1-P3, G5-P1/P3

PROMOTE SUSTAINABILITY IN RURAL COMMUNITIES AND SMALL TOWNS

Recommendations	Partners	Years	CTP Goals/ Policies
Expand vanpool services as an effective way to connect rural and exurban communities with employment, food and recreational outlets.[59]	CT, RTPA/MPO, Locals, Transit	2	G1-P3, G3-P1, G5-P1/P3
Link areas that have labor shortages with communities that have a surplus amount in labor.[60]	CT, RTPA/MPO, Locals, Transit, Rail, Private	2	G1-P3, G3-P1, G5-P1
Provide accessibility to regional job markets, which can allow the transport of locally made goods to urbanized areas as well as build connectivity for tourists and customers of rural community businesses.[61]	CT, RTPA/MPO, Locals, Private, Transit, Rail	2	G1-P3, G3-P1/P2, G5-P1
Create efficient, sustainable transportation solutions that embrace communities' unique context and culture.[62]	CT, RTPA/MPO, Locals, Transit, Rail	2	G5-P2

58 Federal Highway Administration, "The Role of Transportation Systems Management and Operations in Supporting Livability and Sustainability: A Primer," 2012, http://ops.fhwa.dot.gov/publications/fhwahop12004/fhwahop12004.pdf.

59 Matute, J. M., et al., "California Statewide Transit Strategic Plan: Recommendations for Caltrans," 2012, http://www.dot.ca.gov/hq/MassTrans/STSP/STSPrecommendations.pdf.

60 California Association for Coordinated Transportation, "Keeping Communities Connected: New Challenges for California's Rural Transportation," 2007, http://www2.calact.org/assets/pdf/publications/CalACT-Keeping-Communities-Connected.pdf.

61 United States Environmental Protection Agency, "Supporting Sustainable Rural Communities," 2011, http://www2.epa.gov/smart-growth/supporting-sustainable-rural-communities.

62 Toth, G., "What is 'Rural Livability'?" 2010, http://www.pbs.org/wnet/blueprintamerica/blogs/the-dig-op-ed-what-is-rural-livability/1021/.

PROMOTE SUSTAINABILITY IN RURAL COMMUNITIES AND SMALL TOWNS (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Integrate planning for the aging population in rural community and agency projects and services.[63]	CT, RTPA/MPO, Locals, Transit, Rail	2	G5-P3
Educate rural residential developers about integrating bicycling, walking, and public transit into rural projects and plans.	CT, RTPA/MPO, Locals, Transit, Rail	2	G1-P3, G5-P1/P2/P3
Increase the frequency of transit services that are available to riders to a level that can support their daily activities.	CT, RTPA/MPO, Locals, Transit, Rail	2	G1-P3, G5-P3
Implement a system of park-and-ride lots to encourage transit agencies to increase express bus services to rural areas for transit ridership.	CT, RTPA/MPO, Locals, Transit, Rail	2	G1-P3, G5-P2
Integrate express bus stop concepts appropriate for rural areas, such as express runs, linking communities, expressway or freeway express bus stops, comprehensive bus stops, and ridesharing services.	CT, RTPA/MPO, Locals, Transit, Rail	2	G1-P3, G5-P3
Encourage ride sharing and mobility management through coordination of Consolidated Transportation Services and other agencies.	CT, RTPA/MPO, Locals, Transit, Rail, Private	2	G5-P1
Increase the STA and obtain extra funds that can be allocated towards improving transit services.	CT, RTPA/MPO, Transit, FTA	3 to 5	G1-P2/P3, G3-P3, G5-P3
Integrate mixed-use housing into commercial areas within small towns allowing residents to be less reliant on cars.	CT, RTPA/MPO, HCD, Private, Locals	3 to 5	G5-P1/P2/P3
Develop rural roadways to support multimodal accessibility for bicyclists, pedestrians, transit, automobiles, and agriculture and goods movement vehicles.[64]	CT, RTPA/MPO, Transit, Locals	3 to 5	G1-P2/P3, G3-P3, G5-P2/P3
Encourage private sector companies to invest within the existing rural and small town communities.	CT, RTPA/MPO, Private, Locals	3 to 5	G1-P2, G3-P3, G5-P1
Increase connectivity to medical care and social services, employment and educational facilities to increase health and quality of life within rural residential communities. Also, build accessibility to employment and educational facilities.	CT, RTPA/MPO, Private, Locals	3 to 5	G1-P3, G5-P3
Partner with local, regional, and tribal governments on planning rural transit improvements with rural transit agencies.	CT, RTPA/MPO, Tribal, Locals, Transit	3 to 5	G5-P1/P2/P3

63 California Association for Coordinated Transportation, "Keeping Communities Connected: New Challenges for California's Rural Transportation," http://www2.calact.org/assets/pdf/publications/CalACT-Keeping-Communities-Connected.pdf.

64 United States Environmental Protection Agency, "Supporting Sustainable Rural Communities," 2011, http://www2.epa.gov/smart-growth/supporting-sustainable-rural-communities.

SYSTEM EFFICIENCY AND TECHNOLOGY

COORDINATE DATA AND ANALYSIS

Recommendations	Partners	Years	CTP Goals/ Policies
Coordinate data and analysis efforts across regions to ensure consistency and comparability of results.	CT, RTPA/MPO	2	G1-P1, G5-P1
Expand partnerships with tribal governments to improve data collection for both traffic volumes and crash data.	CT, RTPA/MPO, Tribal, Locals	2	G1-P1, G5-P1, G4-P1, G6-P1
Secure funding to make data available statewide.	CT, RTPA/MPO	2	G1-P1, G3-P3, G5-P1
Support funding for the purchase and maintenance of a statewide transit data collection repository–one that can capture and organize transit data funneled to Caltrans by local transit providers.	CT, RTPA/MPO, Transit, Locals, FTA	2	G1-P1, G3-P3, G5-P1

ACTIVE TRANSPORTATION AND DEMAND MANAGEMENT

Recommendations	Partners	Years	CTP Goals/ Policies
Support ICM strategies such as CSMPs where appropriate.	CT, RTPA/MPO, Transit, Rail, Locals	2	G1-P1
Demonstrate/continued support for CV/AV efforts.	CT, RTPA/MPO, FTA, FHWA, FRA, Transit, Locals	2	G1-P1/P2
ADM strategies must be incorporated into general planning and development review process.	CT, RTPA/MPO, Locals, FTA, FHWA, Transit	2	G1-P1/P2/P3, G5-P2
Congestion management systems should incorporate ADM strategies that enhance regional mobility and accessibility to maximize transportation efficiency.	CT, RTPA/MPO, FHWA, FTA, Transit, Locals	2	G1-P1/P2/P3
Make ADM strategies a part of the public involvement dialogue to gain broadened community support.	CT, RTPA/MPO, Locals	2	G1-P1, G5-P1
Implement and promote ADM strategies that enhance travel reliability for all modes including real-time traveler information, preferential treatment for High Occupancy Vehicle / High-Occupancy Toll (HOV/HOT) lanes and transit vehicles.	CT, RTPA/MPO, FHWA, FTA, Transit, Locals	2	G1-P1/P2/P3, G5-P1
Implement strategies that decrease automobile traffic through reducing total vehicle travel.	CT, RTPA/MPO, Locals	2	G1-P1/P2/P3
Inform companies of the benefits of offering alternative work arrangement strategies to employees, such as telecommuting, flextime, and compressed work weeks.	CT, RTPA/MPO, Private	2	G5-P1, G6-P3/P4

ACTIVE TRANSPORTATION AND DEMAND MANAGEMENT (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Support economic incentives for new residential and nonresidential private development to implement TDM measures to reduce GHG emissions.	CT, RTPA/MPO, Private, Locals	2	G1-P2, G5-P1/P2, G6-P3/P4
APM strategies must be taken into consideration in order to utilize technology that will optimize parking facilities and influence travel behavior.	CT, RTPA/MPO, Private, Locals	2	G1-P1/P2/P3
Develop a performance-based framework that prioritizes ATM work activities and funding.[65]	CT, RTPA/MPO, FHWA, FTA, Transit, Locals	3 to 5	G1-P1/P2/P3
Create an ATM infrastructure that fosters high-performance and good maintenance which will improve real-time system management.	CT, RTPA/MPO, FHWA, FTA, Transit, Locals	3 to 5	G1-P1/P2/P3
Develop and implement real-time corridor-wide strategies that optimize traffic flow, pedestrian safety, and the reduction of GHGs while working in cooperation with jurisdictional stakeholders.	CT, RTPA/MPO, FHWA, FTA, Transit, Rail, Locals, Private	3 to 5	G1-P1/P2/P3, G5-P1
Put forth strategies that shift travel to be more transit-focused and rideshare-oriented, to achieve more road safety benefits.	CT, RTPA/MPO, Transit, Local	3 to 5	G1-P3, G4-P1, G5-P1/P2/P3
Incorporate the ICM concept, once finished, to improve the flow of traffic on the SHS.	CT, RTPA/MPO, Locals	3 to 5	G1-P1/P2, G3-P1
Implement automated toll collection services that reduce delays through collecting tolls electronically, which can increase the flow of traffic, rather than exacerbate congestion at conventional toll booths.	CT, RTPA/MPO, Locals	3 to 20	G1-P1, G3-P3
Adopt adaptive traffic signal controls which can help with the reduction in delays and GHG emissions. Using adaptive control over traffic signals in real-time can improve the efficiency of corridors and traffic conditions through optimized algorithms.	CT, RTPA/MPO, Locals	3 to 20	G1-P1, G6-P3/P4
Explore the technology of CV/AV and vehicle platooning.	CT, RTPA/MPO, Locals, Private, Transit	5 to 20	G1-P2

65 Federal Highway Administration, "Active Traffic Management," 2015, http://ops.fhwa.dot.gov/atdm/approaches/atm.htm.

INVEST STRATEGICALLY

Recommendations	Partners	Years	CTP Goals/ Policies
Carefully consider funding projects that add road capacity and increase maintenance costs.	CT, RTPA/MPO, FHWA, FTA, FRA, Rail, Transit, Locals	2	G2-P1/P2
Use CSTDM findings (see Chapter 3) to make sound transportation investments.	CT, RTPA/MPO, Locals	2	G2-P1/P2
Preservation of the existing transportation system in both rural and urban areas should always be high priority when making investment decisions on maintenance and rehabilitation.[66]	CT, RTPA/MPO, Locals	2	G2-P1/P2
Make quick and preventive treatments to avoid more costly maintenance in the future. Utilize and install new operational strategies and technologies to optimize system capacity.[67]	CT, RTPA/MPO, Locals, Private	2	G2-P1/P2
All transportation partners should actively seek to leverage available funding for maintenance and operational improvements.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Rail, Locals	2	G2-P1/P2
Support a competitive capital program for transit capital replacement, acquisition, and the development and construction of transit centers and bus maintenance facilities.	CT, RTPA/MPO, Transit, FTA, FHWA, Locals	2	G2-P1/P2, G3-P3
In addition to HSR, target rail capital improvements that serve to integrate the network, that have system-wide benefits and that maximize the use of existing infrastructure capacity.	CT, RTPA/MPO, FRA, Rail, Locals	5 to 20	G1-P2
Support a competitive capital program for transit capital replacement, acquisition, and the development and construction of transit centers and bus maintenance facilities.	CT, RTPA/MPO, Transit, FTA, FHWA, Locals	5 to 20	G2-P1/P2, G3-P3

EXPAND FREIGHT NETWORK CAPACITY

Recommendations	Partners	Years	CTP Goals/ Policies
Enhance incorporation of freight projects into planning documents, e.g., RTPs and OWPs.	CT, RTPA/MPO, FRA, Rail, Locals	2	G3-P1/P2
Work with tribal governments to improve freight accessibility to tribal lands.	CT, RTPA/MPO, Tribal, Locals	2	G3-P1/P2
Prioritize CFMP projects to maximize financial resources.	CT, RTPA/MPO, Rail, Locals	2	G3-P1/P2

66 Sacramento Area Council of Governments, "Metropolitan Transportation Plan/Sustainable Communities Strategy: 2035, 142." 2012, http://sacog.org/mtpscs/files/MTP-SCS/MTPSCS%20WEB.pdf.

67 Caltrans, Division of Maintenance Pavement Program, "2013 State of the Pavement Report: Based on the 2013 Pavement Condition Survey, 2013, http://dot.ca.gov/hq/maint/Pavement/Pavement_Program/PDF/2013_SOP_FINAL-Dec_2013-1-24-13.pdf.

EXPAND FREIGHT NETWORK CAPACITY (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Invest in capitalized rail maintenance projects in shared use intercity passenger rail corridors that preserve freight capacity and maintain on-time passenger train performance.	CT, RTPA/MPO, FRA, Rail, Locals	2	G3-P1/P2
Support transportation fund appropriations in the State budget to fund road infrastructure improvements along high volume California-Mexico borders, commercial ports of entry, and related access roads to reduce congestion, eliminate transportation bottlenecks, expand freight network capacity, and reduce GHG emissions and pollution.	CT, RTPA/MPO, Locals, FHWA, FRA, Rail, Private	2	G3-P1/P2/P3
Create a dedicated, reliable, and long-term freight funding program.	CT, RTPA/MPO, FRA, Rail, Locals	3 to 5	G3-P1/P2/P3
Maximize resources toward the freight network with collaborative efforts between the public and private sectors. For example, the public may be willing to help freight industries finance dedicated truck lanes to improve vehicle movement on public roadways.	CT, RTPA/MPO, Locals, Rail, FRA, Private	3 to 5	G3-P1/P2/P3, G5-P1
Preserve lightly used rail lines because the overall freight demand is anticipated to grow throughout California's main line network, thereby exacerbating existing issues and conflicts on tracks jointly used by freight and passenger trains.[68]	CT, RTPA/MPO, Rail, FRA, Locals	3 to 20	G2-P1, G3-P2

LONG DISTANCE MULTIMODAL TRANSPORTATION

Recommendations	Partners	Years	CTP Goals/ Policies
Encourage mobility hubs for multiple modes of transportation.	CT, RTPA/MPO, FHWA, FTA, FRA, Rail, Transit, Locals, Private	2	G1-P1/P3
Expand business and light manufacturing opportunities, with considerations of existing and planned surrounding uses.	CT, RTPA/MPO, Private, Locals, SGC, Resource agencies	2	G3-P1, G5-P2
Capitalize on the competitive advantage of having a business-friendly airport zone.	CT, RTPA/MPO, Aero, Private, Locals	2	G3-P1
Encourage multimodal accessibility at airports, seaports, and freight rail facilities.	CT, RTPA/MPO, Aero, Private, Locals, Transit, Rail	2	G3-P1/P2

68 California State Transportation Agency, "California Transportation Infrastructure Priorities: Vision and Interim Recommendations," 2014, http://www.calsta.ca.gov/res/docs/pdfs/2013/CTIP%20Vision%20and%20Interim%20Recommendations.pdf.

RECOMMENDATIONS FROM MODELING ANALYSIS

REDUCE VMT PER CAPITA

Recommendations	Partners	Years	CTP Goals/ Policies
Create policies to incentivize employers to develop commuter benefit programs that encourage transportation alternatives.	CT, RTPA/MPO, Private, FHWA, FTA, FRA, Transit, Rail, Locals	2	G5-P1
Encourage parking management strategies at the workplace, such as parking cash-out or priority parking for HOVs that discourage drive-alone commuting to work.	CT, RTPA/MPO, Private, FHWA, Locals	2	G1-P1, G6-P3/P4
Provide greater telecommuting options, and alternative work schedules designed to reduce the number of daily commute trips.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Rail, Private, Locals	2	G1-P1, G6-P3/P4
Create policies that incentivize developers to provide TDM programs and services that mitigate the traffic impacts of developments.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Rail, Private, Locals	2	G1-P1, G5-P2, G6-P1/P3/P4
Secure additional funding to implement significant transit improvement strategies, including increasing speeds, decreasing fares, increasing BRT, and improving transfer times to include improved access/connections to transit and rail; as well as, improving the technologies (real-time traveler information, universal transportation account) that increases the convenience and competitiveness of public transit thereby creating more a positive attitude towards public transit for choice riders.	CT, RTPA/MPO, FHWA, FTA, FRA, Rail, Transit, Locals	2	G1-P1/P2/P3, G3-P3
Create policies and secure funding for increasing and improving bicycling and pedestrian infrastructure, security, and education.	CT, RTPA/MPO, FHWA, FTA, FRA, Transit, Locals	2	G1-P3, G3-P3, G4-P1, G5-P1/P2
Implement substantial public outreach to publicize the GHG benefit of eco-driving, car sharing, and telecommuting to include transit and ridesharing. Create legislation to implement an aggressive mix of VMT per capita reduction strategies, including (but not limited to) road pricing strategies, increasing car sharing, increasing the minimum carpool requirements, and increasing HOV lanes.	CT, RTPA/MPO, Transit, Rail, Locals, Private	2	G6-P3/P4
Utilize funds from the road pricing strategies to fund improvements for driving alternatives.	CT, RTPA/MPO, Transit, Rail, Locals, Private	3 to 5	G1-P2/P3
Utilize Cap-and-Trade Program funds and other available funds to increase transit and rail infrastructure and service.	CT, RTPA/MPO, Transit, Rail, Locals	3 to 5	G1-P2/P3
Implement HSR service.	CT, RTPA/MPO, Rail, FRA, Locals	3 to 5	G1-P3, G3-P1

REDUCE GHG EMISSIONS IN THE TRANSPORTATION SECTOR

Recommendations	Partners	Years	CTP Goals/ Policies
Create incentives for drivers of ZEVs to greatly increase the percentage of ZEVs in the overall fleet in order to achieve the 2050 GHG reduction target for the transportation sector.	CT, RTPA/MPO, Private, FHWA, Locals	3 to 5	G6-P3/P4
Subsidize and incentivize (via legislation) an aggressive shift to alternative vehicle fuels, including (but not limited to) biofuel blends and electricity in order to achieve the 2050 GHG reduction target for the transportation sector.	CT, RTPA/MPO, Private, FHWA, FTA, FRA, Rail, Transit, Locals	3 to 5	G6-P3/P4
Subsidize and incentivize (via legislation) an aggressive advancement of vehicle technologies in order to achieve the 2050 GHG reduction target for the transportation sector.	CT, RTPA/MPO, Private, FHWA, FTA, FRA, Rail, Transit, Locals	3 to 5	G6-P3/P4
Continue to implement policies and funding programs and build infrastructure that will expand rail and transit services to further mode shift from vehicles to other modes.	CT, RTPA/MPO, Private, FHWA, FTA, FRA, Transit, Rail, Locals	3 to 5	G6-P3/P4

ADVANCE MODELING AND DATA

Recommendations	Partners	Years	CTP Goals/ Policies
Secure stable funding for statewide, regional, and local data collection, model development, documentation, and data visualization activities to support policy making activities.	CT, RTPA/MPO, CEC, ARB, HCD, CDPH, Resource Agencies, Transit, Rail, Locals	2 or on-going	G3-P3, G5-P1
Expand use of common input assumptions between State and MPO forecasting efforts, including socio-economic data, interregional travel forecasts, goods movement/trucking, pricing policies, and other areas where data sharing will result in better and more consistent travel demand forecasts across jurisdictions.	CT, RTPA/MPO, Rail, Transit, FHWA, FTA, FRA, Locals, Private	2 or on-going	G1-P1, G5-P1
Coordinate data and analysis efforts across regions to ensure consistency and comparability of results.	CT, RTPA/MPO, CEC, ARB, HCD, CDPH, Resource Agencies, Transit, Rail, Locals	2 or on-going	G1-P1, G5-P1
Expand partnerships between State agencies and Caltrans for model training, coordination of activities, and periodically updating modeling guidelines and requirements for RTP/SCS and CTP forecasting.	CT, RTPA/MPO, CEC, ARB, HCD, CDPH, Resource Agencies, Transit, Rail, Locals	2 or on-going	G1-P1, G5-P1

ADVANCE MODELING AND DATA (continued)

Recommendations	Partners	Years	CTP Goals/ Policies
Implement the California Commercial Vehicle Inventory Survey (Cal VIUS).	CT, RTPA/MPO, Locals, Private, DMV	2 or on-going	G1-P1, G5-P1
Coordinate statewide model activities such as the CSTDM, CSFFM, Caltrans-Amtrak Ridership Model, ARB's EMFAC model, ARB's VISION Model, and CHSRA Ridership Model and to enhance the capabilities of all agencies.	CT, RTPA/MPO, CEC, ARB, HCD, CDPH, Resource Agencies, Transit, Rail, Locals	2 or on-going	G1-P1, G5-P1
Deploy a statewide integrated land use-transportation modeling system.	CT, RTPA/MPO, Locals	2 or on-going	G1-P1, G5-P1
Conduct a new statewide household travel/activity survey with GPS and on-board vehicle diagnostics. Ideally, the statewide household travel survey should be conducted on an on-going and continuous basis. Decennial surveys have proven burdensome for Caltrans and MPOs, and key information on household changes over time are not currently collected.	CT, RTPA/MPO, CEC, ARB, HCD, CDPH, Resource Agencies, Transit, Rail, Locals	2 or on-going	G1-P1, G5-P1
Secure funding for regular modal surveys (including transit on-board surveys, and pedestrian/bicycle activity surveys), and big data analysis using anonymous cell phone/GPS data to improve understanding of travel patterns.	CT, RTPA/MPO, CEC, ARB, HCD, CDPH, Resource Agencies, Transit, Rail, Locals	2 or on-going	G1-P1, G3-P3, G5-P1
Conduct data collection and research on visitor travel to California. This information is largely absent from existing travel demand models.	CT, RTPA/MPO, CEC, ARB, HCD, CDPH, Resource Agencies, Transit, Rail, Locals	2 or on-going	G1-P1, G5-P1

ACKNOWLEDGMENTS

This document would not have been possible without the contributions of many people, past and present, from department staff and managers, consultants, and partner agencies, to California tribal governments, key stakeholders, advocacy organizations, and the public at large. In particular, the following are acknowledged for their significant contributions and dedication to completion of this effort:

EXECUTIVE TEAM

Brian Annis, Undersecretary, California State Transportation Agency

Kate White, Deputy Secretary, Environmental Policy & Housing Coordination, California State Transportation Agency

Coco Briseno, Deputy Director, Planning and Modal Programs, Caltrans

Katie Benouar, Division Chief, Transportation Planning, Caltrans

CALTRANS PROJECT TEAM—Office of State Planning

Chris Ratekin, Office Chief

Gabriel Corley, Project Manager

David Priebe, CTP Public Engagement & Outreach

Christian Bushong, Senior Transportation Planner

Barry Padilla, Chief Economist, Economic Analysis Branch

Mark Barry, Associate Transportation Planner

Patrick Record, Transportation Planner

Josephine Hsai, Transportation Planner

Michael Sidhu, Transportation Planner

Neri Rose Agacer-Solis, Economic Research Specialist, Economic Analysis Branch

Ryan Ong, Staff Economist, Economic Analysis Branch

W. Don Farrimond, Policy Analyst & Legislative Coordinator

CONSULTANT TEAM

Ron West, Principal, Cambridge Systematics

Adam Sutkus, Interim Executive Director, Center for Collaborative Policy, California State University, Sacramento

Stephanie Horii, Assistant Facilitator, Center for Collaborative Policy, California State University, Sacramento

Kevin Swaim, Graphic Designer, Academic Technology & Creative Services, California State University Sacramento

With special thanks to prior Office of State Planning staff who made significant contributions for which we are supremely grateful:

Pam Korte, Office Chief, Office of State Planning (Retired)

Austin Hicks, Air Quality Specialist, California Air Resources Board

Laurie Waters, Senior Transportation Planner, California Transportation Commission

Stuart Mori, Senior Transportation Planner, California High Speed Rail Authority

Terri Bridges, Associate Transportation Planner, Office of State Planning (retired)

Steve Alexander, Associate Transportation Planner, Office of State Planning (retired)

Marco Gonzalez, Assistant Planner, City of Sacramento

All photography provided by Caltrans unless otherwise noted.

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Caltrans, Division of Transportation Planning, MS-32
P.O. Box 942874
Sacramento, CA 94272-0001