PUBLIC PARTICIPATION AND CONSULTATION

COMMUNITY INPUT

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

2016 2040 RTP SCS

SUB APPENDIX PART 2D OF 5

Letters from Agencies/Organizations

T–123

ADOPTED | APRIL 2016

2016 2040 RTPSCS

SUB APPENDIX PART 2D OF 5

COMMUNITY INPUT | PUBLIC PARTICIPATION AND CONSULTATION

LETTERS FROM AGENCIES/ORGANIZATIONS T–123

ADOPTED | APRIL 2016

SUB APPENDIX PART 2D OF 5
Letters from Agencies/Organizations T–123

San Joaquin Hills
Transportation
Corridor Agency

Chairman:
Ross Chun
Aliso Viejo

Transportation Corridor Agencies™

Foothill/Eastern
Transportation
Corridor Agency

Chairman:
Craig Young
Yorba Linda

January 27, 2016

Mr. Hasan Ikhrata
Executive Director
Southern California Association of Governments
818 West Seventh Street, 12th Floor
Los Angeles, CA 90017-3435

RE: Comments on the Draft 2016 Regional Transportation Plan and Program Environmental Impact Report

Dear Mr. Ikhrata:

The Foothill/Eastern Transportation Corridor Agency and the San Joaquin Hills Transportation Agency ("TCA") appreciates the opportunity to review and provide comments on the Draft 2016-2040 Regional Transportation Plan ("RTP")/Sustainable Communities Strategy ("SCS") and associated Draft Programmatic Environmental Impact Report ("PEIR"). TCA commends the SCAG staff and consultants for the tremendous amount of work and effort in putting these documents together. TCA also recognizes and supports the timely adoption of the RTP/SCS to enable the Southern California region to proceed with the planning and implementation of regionally significant transportation projects. Further, TCA recognizes that the SCS is particularly important for the region to meet its state mandated greenhouse gas emissions reduction targets for 2020 and 2035.

TCA supports the comments submitted by the Orange County Council of Governments (OCCOG) on behalf of Orange County jurisdictions, the Orange County Transportation Authority, and other Orange County jurisdictions.

In addition, TCA submits the following two comments to clarify the RTP/SCS Project List Appendix.

DRAFT 2016-2040 RTP/SCS: Project List Appendix

Pp 57, Table 1: FTIP Projects, Project 111207

We wish to clarify that project 111207 is a distinct and separate project from any other TCA project included within the FTIP. The SR 241/91 connector project has always had its own project description, schedule, budget and unique ID number. This project was first introduced in the 2008 RTP as 2T01135. The project ID was updated to ORA084403 when the project was added to the 2008 FTIP in August 2010. The project ID was updated to ORA111207 when the project was included in the 2011 FTIP. The project has since been carried over into all subsequent FTIPs as project 111207. Copies of these FTIP listings are attached to this letter as documentation of the project's separate identity.

125 Pacifica, Suite 100, Irvine, CA 92618-3304 • (949) 754-3400 Fax (949) 754-3467
TheTollRoads.com
Members: Aliso Viejo • Anaheim • Costa Mesa • County of Orange • Dana Point • Irvine • Laguna Hills • Laguna Niguel • Laguna Woods • Lake Forest Mission Viejo • Newport Beach • Orange • Rancho Santa Margarita • Santa Ana • San Clemente • San Juan Capistrano • Tustin • Yorba Linda

Therefore, we request that the reference to "parent project ORA050" be struck from the project description, as the SR 241/91 connector is not part of ORA050. This clarification will have no effect on the project content, schedule or budget.

Page 174, Table 2, Financially-Constrained RTP Projects

Consistent with our comment above on the FTIP listing for 111207, we request that the reference to "parent project ORA050" be struck from the project description. The SR 241/91 connector project is not part of ORA050. This will have no effect on the project content, schedule or budget. As noted in the previous comment for 111207 in Table 1, the SR 241/91 connector project has always had its own unique project description, schedule, budget, and project ID and has never been part of ORA050.

Pp. 173 and 174, Table 2: Financially-Constrained RTP Projects

TCA's four main toll road project descriptions are correctly listed in this table for project numbers, 10254, ORA050, ORA051 and ORA052. However, Table 2 also lists specific components of the toll road projects as "projects" with unique RTP ID numbers. For example, in addition to 10254 (Route 73/ San Joaquin Hills Transportation Corridor), the Glenwood Drive/Pacific Park Drive on/off ramps are listed as a separate TCA project (RTP ID 2M0726). There is no reference to the ramps being a subset of 10254, and the project actually precedes the San Joaquin Hills Transportation Corridor listing. Similarly, a series of SR 241 interchanges and improvements are called out on page 174, with no reference that they are subsets of a larger toll road project that is also included in Table 2.

Further, the opening dates for these pieces of the four main toll road projects should be 2020, consistent with the main project listings.

TCA requests that SCAG work with our agency to remove any duplication or inconsistencies among the TCA project listings in Table 2, and that all completion dates be updated as needed to reflect the correct completion dates identified in the FTIP project descriptions.

TCA thanks you in anticipation of your written responses to these comments. We look forward to the amendments in the final 2016-2040 RTP/SCS and PEIR to incorporate the recommended changes. Should you have any questions or require any clarification regarding these comments, please feel free to contact Ms. Valarie McFall, Chief Environmental Planning Officer, at 949.754.3475 or via email at vmcfall@thetollroads.com.

Sincerely,

Michael A. Kraman
Chief Executive Officer

Attachments

Cc: Rongsheng Luo, SCAG
Daniel Tran, SCAG
Valarie McFall, TCA

SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS

Project Sheet

2008 Federal TIP (FY2008/2009 -2013/2014)

Federal Approved (as of 8/18/2010 10:09:11 AM)

Project ID	ORA084403	County	Orange	Amendment	44
Agency	TCA				
System	S	Route	241	Last Update	8/18/2010 10:09:11 AM
PM Begin	15.9	Conform Cat.	NON-EXEMPT	Updated by	Gutierrez
PM End	15.9	Air Basin	SCAB		
Phase	Environmental Document/Pre-design Phase (PA&ED)				
Program Code:	CAXT7	NEW INTERCHANGE W/ TCM: RS		CTIPS ID	20930003047
Second				Model No.	
Third				Env. Doc. Type	CE
Scheduled	Starting	Ending	Completion Date	Env. Doc. Date	
PAED			1/1/2015		
PS&E(ENG)			Conformity Category	Year Added	0
ROW			NON-EXEMPT		
CON			Current Project Status		
Actual Dates:	Starting	Ending	Federal Approved (as of 8/18/2010 10:09:11 AM)		
PAED					
PS&E(ENG)				Project Total Cost	444,000
ROW					
CON					
Change Reasons:	NEW PRJ		UZAs:	PPNOs	
Sub Regions:				Sub Areas	
Fed Demo IDs					

Project Description:

HOV/HOT Connector: NB SR-241 to EB SR-91, WB SR-91 to SB SR-241

FUNDING

Fund Type	Fiscal Year	ENG	ROW	CON	Fund Total
PRIVATE FUNDS	2010/2011	1,000			1,000
	2011/2012	2,000			2,000
Subtotal		3,000			3,000
Total		3,000			3,000

(1)

SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS

Project Sheet - ORA084403

2009 RTIP (FY 2008/2009 - FY 2013/2014)
Federal Approved
Cost in Thousands

Project ID	ORA084403	County: Orange	Version: 2	Amendment	44
Agency	TCA				
System	S	Route	241	CTC Update	8/18/2010 10:09 AM
Begin PM	15.9	Conform Cat.	NON-EXEMPT	by	Gutierrez
End PM	15.9	Air Basin	SCAB	SCAG Update	
Phase	Environmental Document/Pre-design Phase (PA&ED)			by	
Program Code:	CAXT7	NEW INTERCHANGE W/ TCM: RS		RTP ID	2T01135
Scheduled Dates	Starting	Ending	Completion Date:	CTIPS ID	20930003119
PAED			1/1/2015	Model No.	
PS&E(ENG)			Conformity Category:	Env. Doc. Type	CE
ROW			NON-EXEMPT	Env. Doc. Date	
CON			Current Project Status:	Year Added	0
			Federal Approved (as of 8/18/2010 10:09:11 AM)		
Change Reason:	NEW PRJ				
Project Description:				Project Total Cost:	444,000

HOV/HOT Connector: NB SR-241 to EB SR-91, WB SR-91 to SB SR-241

Fund Type	Fiscal Year	ENG	ROW	CON	Fund Total
	2010/2011	1,000			1,000
	2011/2012	2,000			2,000
PRIVATE FUNDS		3,000			3,000
Total		3,000			3,000

2

SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS

Project Sheet - ORA111207

2011 FTIP (FY 2010/2011 - FY 2015/2016)
Federal Approved
Cost in Thousands

Project ID	ORA111207	County: Orange		Version: 3		Amendment	12
Agency	TCA						
System	S	Route	91			CTC Update	9/27/2011 9:57 AM
Begin PM	15.9	Conform Cat.	TCM			by	Ben
End PM	15.9	Air Basin	SCAB			SCAG Update	
Phase	Environmental Document/Pre-design Phase (PA&ED)					by	
Program Code:	CAXT7	NEW INTERCHANGE W/ TCM: RS				RTP ID	2T01135
Scheduled Dates	Starting	Ending		Completion Date:		CTIPS ID	20930003171
PAED				12/1/2017		Model No.	
PS&E(ENG)				Conformity Category:		Env. Doc. Type	CE
ROW				TCM		Env. Doc. Date	
CON				Current Project Status:		Year Added	0
				Federal Approved (as of 11/2/2011 11:39:15 AM)			
Change Reason:	NEW PRJ						
Project Description:						Project Total Cost	3,000

HOV/HOT CONNECTOR: NB SR-241 TO EB SR-91, WB SR-91 TO SB SR-241 (1 LANE EACH DIR)

Fund Type	Fiscal Year	ENG	ROW	CON	Fund Total
	2011/2012	2,000			2,000
	2012/2013	500			500
	2013/2014	500			500
PRIVATE FUNDS		3,000			3,000
Total		3,000			3,000

Comments

general ENG only = TCM-Type project

(3)

SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS

Project Sheet - ORA111207

2013 FTIP (FY 2012/2013 - FY 2017/2018)
Federal Approved
Cost in Thousands

Project ID	ORA111207	County: Orange	Version: 5	Amendment	0
Agency	TCA				
System	S	Route	241	CTC Update	3/8/2012 8:36 AM
Begin PM	36	Conform Cat.	TCM	by	Ben
End PM	39.5	Air Basin	SCAB	SCAG Update	9/19/2012 4:25 PM
Phase	Environmental Document/Pre-design Phase (PA&ED)			by	Gutierrez
Program Code:	CAXT7	NEW INTERCHANGE W/ TCM: RS		RTP ID	2T01135
Scheduled Dates	Starting	Ending	Completion Date:	CTIPS ID	20930003171
PAED			12/1/2018	Model No.	
PS&E(ENG)			Conformity Category:	Env. Doc. Type	CE
ROW			TCM	Env. Doc. Date	
CON			Current Project Status:	Year Added	0
			Federal Approved (as of 9/19/2012 4:25:49 PM)		
Change Reason:	NEW PRJ				
Project Description:				Project Total Cost:	189,200

HOV/HOT CONNECTOR: NB SR-241 TO EB SR-91, WB SR-91 TO SB SR-241 (1 LANE EACH DIR) AS REQ, BY 2020 PER SCAG/TCA MOU 4/05/01. Parent project ORA050

Fund Type	Fiscal Year	ENG	ROW	CON	Fund Total
	2011/2012	2,000			2,000
	2012/2013	500			500
	2013/2014	500			500
PRIVATE FUNDS		3,000			3,000
Total		3,000			3,000

Comments

general ENG only = TCM-Type project

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

February 1, 2016

Draft 2016 RTP/SCS and PEIR Comments
Attn: Courtney Aguirre
Southern California Association of Governments
818 W. 7th Street, 12th Floor
Los Angeles, CA 90017

Subject: EPA Comments on the 2016-2040 Draft Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and the Draft Program Environmental Impact Report

Dear Ms. Aguirre:

The U.S. Environmental Protection Agency (EPA) appreciates the opportunity to provide feedback on the 2016-2040 Draft Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and the Draft Program Environmental Impact Report (PEIR). EPA supports the Southern California Association of Government (SCAG) goal of incorporating environmental and community considerations in the regional transportation planning process. Early integration of comments from regulatory and resource agencies results in greater opportunities to avoid sensitive resources and receptors and minimize impacts associated with future transportation projects.

We note that Title 23 USC 134 states that a long-range transportation plan "shall include a discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan" and that the discussion of mitigation "shall be developed in consultation with Federal, State, and tribal wildlife, land management, and regulatory agencies." EPA is available to coordinate with SCAG as the development of the RTP and SCS continues in order to provide feedback on mitigation activities and assist in meeting consultation requirements. EPA provides the following comments following our limited review of plan elements related to Environmental Justice, Air Quality, and Climate Change.

Comments on the Draft RTP/ SCS

Zero Emissions Goods Movement

The 2016 RTP/SCS contains a strong focus on the long-term goal of a zero emission goods movement system where technically feasible and economically viable, while also integrating near-zero emissions technologies that serve as bridging options to continue to reduce emissions. EPA strongly supports these efforts to move towards zero emission goods movement, and is available to assist SCAG in meeting this goal. Well-planned and executed zero-emission freight corridors will contribute to improved air quality and reduce public health impacts for the already heavily burdened, low income and minority communities along these corridors and throughout the Southern California Air Basin.

The Draft RTP/SCS uses the term clean trucks. For example, page 99 states "The East-West Freight Corridor would carry between 58,000 and 78,000 clean trucks per day that would be removed from adjacent general-purpose lanes and local arterial roads." There are also several references to the San Pedro Bay Ports Clean Truck Program. However, there is no definition provided for "clean trucks".

> ***Recommendation:***
> EPA suggests defining the term "clean truck" in relation to current vehicle emissions standards. One possible criteria for defining "clean truck" could consist of meeting the EPA exhaust emission standards for model year 2010 and newer heavy-duty on-highway engines, or the CARB optional low NOx emission standards for on-road heavy-duty engines.[1]

Environmental Justice Appendix

The Environmental Justice Appendix to the Draft RTP/SCS provides a thorough Environmental Justice Analysis which includes five different geographies (Environmental Justice Areas, SB 535 Disadvantaged Communities, Communities of Concern, Urban Areas, and Rural Areas) and eighteen different performance areas. The analysis of impacts along freeways and highly traveled corridors is an especially important performance criteria because vulnerable populations (such as older adults, children, and those with pre-existing cardiovascular and respiratory conditions), and people with "low socioeconomic status" are particularly susceptible to $PM_{2.5}$-related health impacts.[2] EPA supports the recommendation in the Environmental Justice Toolbox (RTP/SCS Environmental Justice Appendix, page 194) to conduct corridor-level near roadway environmental justice analyses for proposed projects in areas where air quality impacts may be concentrated among Environmental Justice communities. Please consider the following recommendations in order to facilitate effective analysis and mitigation of the impacts that communities with Environmental Justice concerns may experience from the proposed plan and future projects.

> ***Recommendations:***
> Please consider making the underlying Environmental Justice Toolbox data and analyses accessible for project proponents to use as a starting point for corridor and project level analyses. In addition, please consider which of the other 17 performance areas would be useful for a corridor or project level analysis, include those as recommendations in the Environmental Justice Toolbox, and make the data easily accessible.
>
> Please consider highlighting the use of the recently published EPA-guidance document titled "Best Practices for Mitigating Near Roadway Pollution at Schools (November 2015)" which could serve as a useful resource for mitigating Environmental Justice Impacts.
>
> EPA strongly supports the following advanced technology deployment measures included in this section and recommends SCAG discuss strategies to incentivize their

[1] http://www3.epa.gov/otaq/standards/heavy-duty/hdci-exhaust.htm
http://www.arb.ca.gov/msprog/onroad/optionnox/optionnox.htm
[2] See Chapter 8 of EPA's Integrated Science Assessment for Particulate Matter (December 2009; http://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=494950).

implementation: 1) zero emission heavy-duty trucks; 2) Tier 4 marine engine repowers and replacements; and 3) Tier 4 and zero emission railyard equipment.

In the Climate Vulnerability Chapter, include a discussion about how global warming affects ozone formation. Please also include a discussion about the possible health threats from dust storms related to extended drought conditions, which could be a concern for vulnerable populations at risk for Valley Fever.

Please update Exhibit 39 to describe areas at risk from inland flooding, in addition to the information describing coastal areas at risk for sea level rise in 2100. This information is available from national flood maps, and would more holistically communicate potential flood risks to Environmental Justice communities.

Please provide a reference for the statement in Table 94 that states, "Increased greening may increase gentrification/ housing cost pressures."

Comments on the Program Environmental Impact Report

EPA appreciates that the Air Quality chapter of the PEIR contains a very thoughtful and detailed discussion of the health impacts associated with transportation projects. The air quality chapter used a public health lens in the analyses because air quality is closely related to public health. The PEIR cites specific studies which link freeways to health impacts, for example, page 3.3-28 cites studies which have shown long-term particle pollution exposure increases hospitalization of children with asthma living near busy roads with heavy truck traffic, reduces lung function in children and teenagers, damages small airways of the lungs, increases risk of death from cardiovascular disease, and increases risk of lower birth weight and infant mortality.

EPA also appreciates the inclusion of asthma data in the PEIR, along with the statement on page 3.3-27 that "asthma rates are a good indicator of population sensitivity to environmental stressors because asthma is both caused by and exacerbated by pollutants."

The PEIR also considers the potential benefits and impacts on sensitive receptors and low-income and minority populations located in the vicinity of transportation facilities (e.g., the potential to increase or decrease diesel particulate emissions). Further, section 3.3.2 acknowledges that "Low-income and minority populations are more at risk because they are more likely to live near major sources of pollution such as power plants or large freeways."

Air Quality Mitigation Measures

One of the SCAG Air Quality Mitigation Measures is programs to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks (MM-Air-2(a)(1)XVI). Given the significant contribution of vehicle emissions to the poor air quality conditions throughout Southern California, vehicle owners in the region should be strongly encouraged to retire legacy light and heavy-duty vehicles and replace them with technologies that comply with current emissions standards.

Recommendation:

EPA suggests that mitigation measure MM-Air-2(a)(1)XVI be revised to read as follows: "Programs to encourage the voluntary removal from use and the marketplace of pre-2010 model year on-highway vehicles."

SCAG Air Quality Mitigation Measure MM-Air-2(a)(2) states that during the 2016-2040 Planning Horizon, SCAG shall pursue activities to reduce the impacts associated with health risk for sensitive receptors within 500 feet of freeways and high-traffic volume roadways, and lists four specific activities to achieve this goal. Given the current air quality conditions in the Southern California region, EPA suggests that SCAG elaborate on the activities identified, and provide descriptions of additional specific actions that are under the control of SCAG to assist in meeting this goal. Further, SCAG could describe in the PEIR any programs to incentivize implementing strategies at the project level.

Recommendation:
Please further describe SCAG measures to result in reduced impacts to sensitive receptors within 500 feet of freeways and high-traffic volume roadways. Describe specific activities or incentive mechanisms that SCAG can implement to assist in achieving this goal. For example, elaborate on the zero-emission technology objectives for the region and describe SCAGs role in advancing technology that would result in lowered emissions impacting sensitive receptors.

Project-Level Mitigation Measure MM-Air-2(b) details specific actions to reduce construction emissions. Given the current air quality conditions in the Southern California region, project proponents should be required to reduce construction-related emissions as much as possible. Additionally, one of the specific construction emissions mitigation measures is "Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators." EPA recommends modifying this language, as suggested below, to provide a more definitive statement about preference for grid electricity and renewables versus combustion-based electricity generation.

Recommendation:
EPA recommends the implementation of construction emissions mitigation measures in all plan-related projects. In addition, EPA recommends rewording the specific mitigation measure on electric power to state "Project sponsors should ensure to the extent possible that construction activities utilize grid-based electricity and/or onsite renewable electricity generation rather than diesel and/or gasoline powered generators."

Project-Level Mitigation Measure MM-Air-4(b) details specific activities to reduce cancer risk from projects that have the potential to expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially. EPA suggests that this mitigation measure be revised to expand upon SCAG's goals to protect human health.

Recommendations:
State SCAG's commitment to deploying low emission technologies for transportation project construction and operation as a means for improving air quality and protecting public health throughout Southern California. EPA recommends that SCAG identify that plan-related projects should seek to implement the following emission mitigation measures in pursuit of this objective.

EPA recommends including the following in order to provide specific guidance for plan-related projects.

- *On-Highway Vehicles* - Heavy-duty on-highway vehicles (i.e., >14,000 lbs gross vehicle weight rating-GVWR) servicing project sites should meet, or exceed the EPA exhaust emissions standards for model year 2010 and newer heavy-duty on-highway engines. Where feasible, these vehicles should meet, or exceed the CARB optional low NOx emission standards for on-road heavy-duty engines (e.g., drayage trucks, long haul trucks, refuse haulers, shuttle buses, etc.). Additionally, light-duty vehicles (i.e., <14,000 lbs GVWR) servicing project sites should meet, or exceed the CARB Low Emission Vehicle (LEV) Standards for model year 2015 and newer cars and trucks.[3]

- *Nonroad Vehicles & Equipment* - Nonroad vehicles & equipment servicing project sites should meet, or exceed the EPA Tier 4 exhaust emissions standards for heavy-duty nonroad compression-ignition engines (e.g., nonroad trucks, construction equipment, cargo handlers, etc.).[4]
- *Locomotives* - Locomotives servicing project sites should meet, or exceed the EPA Tier 4 exhaust emissions standards for line-haul and switch locomotive engines.[5]
- *Marine Vessels* – Marine vessels servicing project sites should meet, or exceed the latest EPA exhaust emissions standards for marine engines (i.e., Tier 4 for Category 1 & 2 vessels, and Tier 3 for Category 3 vessels).[6]
- *Low Emission Equipment Exemptions* – The equipment specifications outlined above should be met unless: 1) a piece of specialized equipment is not available for purchase or lease within the United States; or 2) the relevant project contractor has been awarded funds to retrofit existing equipment, or purchase/lease new equipment, but the funds are not yet available.
- *Advanced Technology Demonstration & Deployment* – Project proponents should be encouraged to demonstrate and deploy technologies that exceed the latest emission performance standards for the equipment categories that are relevant for a given project (e.g., plug-in hybrid-electric vehicles-PHEVs, battery-electric vehicles-BEVs, fuel cell electric vehicles-FCEVs, advanced technology locomotives and marine vessels, etc.).

Climate Change

Please consider the following suggestions related to the Climate Change analysis in the PEIR.

Recommendations:

- Consider use of the Council on Environmental Quality revised draft guidance that describes an approach for considering the effects of greenhouse gas emissions and climate change in National Environmental Policy Act reviews. Although the PEIR is not subject to NEPA, this draft guidance (or the finalized guidance if it is completed prior to finalizing the PEIR) is a useful reference document that SCAG could consider when revising and finalizing Section 3.8.

- In the Final PEIR, discuss if drought conditions could cause land subsidence and if this should be a consideration for infrastructure projects. The Central Valley and Sacramento River basin have recently experienced land subsidence due to

[3] http://www3.epa.gov/otaq/standards/heavy-duty/hdci-exhaust.htm ; http://www.arb.ca.gov/msprog/onroad/optionnox/optionnox.htm; http://www.arb.ca.gov/msprog/levprog/levprog.htm

[4] http://www3.epa.gov/otaq/standards/nonroad/nonroadci.htm

[5] http://www3.epa.gov/otaq/standards/nonroad/locomotives.htm

[6] http://www3.epa.gov/otaq/standards/nonroad/marineci.htm

the California drought, and we encourage SCAG to check in with organizations that are researching and monitoring groundwater supply and land subsidence such as California Department of Water Resources and National Aeronautics and Space Administration[7] (NASA).

- The PEIR lists SCAG Sustainability Award recipients, but does not highlight environmental outcomes. In the Final PEIR, It would be useful to list environmental outcomes, especially for organizations that may be interested in replicating these projects.

- Table 3.8.4-2 discusses "water related energy" reduction goals, but doesn't specify what "water related energy" is. Please describe if "water related energy" includes agricultural pumps, which often use old diesel motors, and may be a localized source of emissions exposure for minority workers.

- The PEIR contains a number of Greenhouse Gas Emissions and Climate Change mitigation measures in response to the anticipated significant cumulative impact. Mitigation measures are categorized into two categories: SCAG mitigation and project-level mitigation measures. EPA strongly supports the implementation of the SCAG mitigation measures (MM-GHG-3(a)(1-12)) as the mitigation measures will play a constructive role in reducing GHG and criteria pollutant emissions throughout the Southern California region. For the Project-Level Mitigation Measures (MM-GHG-3(b)), EPA recommends that these mitigation measures be clarified and strengthened using the below language in order to offer more specific GHG emissions mitigation guidance for plan-related projects.

- For the Best Available Control Technology (BACT) measures listed on 3.8-44, EPA suggests using the following updated language:
  - Use energy and fuel-efficient vehicles and equipment;
    - Vehicles greater than 14,000 pounds gross vehicle weight rating (GVWR) should meet, or exceed the EPA/NHTSA fuel efficiency standards for model year 2017 and newer heavy-duty on-highway vehicles. (e.g., drayage trucks, long haul trucks, refuse haulers, shuttle buses, etc.). Vehicles less than 14,000 pounds GVWR should meet, or exceed the CARB Low Emission Vehicle (LEV) Standards for model year 2015 and newer cars and trucks.
    - Project proponents should be encouraged to demonstrate and deploy technologies that exceed the latest emission performance standards for the equipment categories that are relevant for a given project (e.g., plug-in hybrid-electric vehicles-PHEVs, battery-electric vehicles-BEVs, fuel cell electric vehicles-FCEVs, advanced technology locomotives and marine vessels, etc.).
  - Use alternative fuels (i.e., non-petroleum based);
  - Use zero and/or near-zero emission technologies as defined by CARB;
  - Use lighting systems that are energy efficient, such as LED technology;
  - Using the minimum feasible amount of GHG-emitting construction materials that is feasible;

[7] NASA Data Reveal Major Groundwater Loss in California http://www.jpl.nasa.gov/news/news.php?release=2009-194

- Use cement blended with the maximum feasible amount of fly ash or other materials that reduce GHG emissions from cement production;
- Incorporate design measures to reduce GHG emissions from solid waste management by encouraging solid waste reduction, recycling and reuse;
- Incorporate passive solar and other design measures to reduce energy consumption and increase production and use of renewable energy;
- Incorporate design measures like WaterSense fixtures and water capture and recycling to reduce water consumption;
- Use lighter-colored pavement where feasible;
- Recycle construction debris to maximum extent feasible;
- Protect and plant appropriate shade trees in or near construction projects where feasible; and
- Solicit bids that include concepts listed above.

EPA values the opportunity to provide feedback for consideration during the regional transportation planning process. We hope that this feedback will lead to improved environmental and public health outcomes. When the Final RTP/SCS and PEIR are available, please send a copy of each to the address above. If you have any questions about our comments, feel free to contact me at lowe.debbie@epa.gov or by phone at 415-947-4155.

Sincerely,

Debbie Lowe Liang
Environmental Review Section (ENF-4-2)

CC (via email): Brenda Powell-Jones, Caltrans Headquarters
Allison Morrow, Caltrans District 7
Aaron P. Burton, Caltrans District 8
Sylvia Vega, Caltrans District 12
Philip Fine, South Coast Air Quality Management District

RESOURCE MANAGEMENT AGENCY

county of ventura

Planning Division
Kimberly L. Prillhart
Director

February 1, 2016

Southern California Association of Governments
Land Use and Environmental Planning Division
Attn: Ms. Lijin Sun, Senior Regional Planner
818 West Seventh Street, 12th Floor
Los Angeles, CA 90017-3435

Email: 2016PEIR@scag.ca.gov

Subject: Comments on the NOA of a DPEIR for the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (2016 RTP/SCS)

Dear Ms. Sun:

Thank you for the opportunity to review and comment on the subject document. Attached are the comments that we have received resulting from intra-county review of the subject document. Additional comments may have been sent directly to you by other County agencies.

Your proposed responses to these comments should be sent directly to the commenter, with a copy to Laura Hocking, Ventura County Planning Division, L#1740, 800 S. Victoria Avenue, Ventura, CA 93009.

If you have any questions regarding any of the comments, please contact the appropriate respondent. Overall questions may be directed to Laura Hocking at (805) 654-2443.

Sincerely,

Tricia Maier

Tricia Maier, Manager
Planning Programs Section

Attachments

County RMA Reference Number 15-024

Memorandum

County of Ventura • Resource Management Agency • Planning Division
800 S. Victoria Avenue, Ventura, CA 93009-1740 • (805) 654-2478 • ventura.org/rma/planning

DATE: **January 28, 2016**

TO: **Laura Hocking, RMA/Planning Technician**

FROM: **Kari Finley, Senior Planner**

SUBJECT: **Environmental Document Review, RMA Ref. #15-024**
2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (2016 RTP/SCS)

We would like to thank the Southern California Association of Governments (SCAG) for the opportunity to review the Draft 2016 RTP/SCS and Program EIR. This memo provides comments on the Draft 2016 RTP/SCS from the Ventura County Planning Division for consideration by SCAG.

In September 2015, the Ventura County Board of Supervisors adopted a comprehensive update to the Saticoy Area Plan. The Saticoy community is defined as a "severely economically disadvantaged community". The Saticoy Area Plan has a 20-year time horizon that extends from 2015 to 2035. Within the Saticoy Area Plan, project objectives are called "guiding principles" that must be used when evaluating future Area Plan amendments. The four guiding principles developed for the Saticoy Area Plan update 1) sustainable development that supports a healthy community, 2) economic revitalization, 3) improved housing opportunities and, 4) improved infrastructure systems. The Area Plan update was primarily funded through a combination of Compass Blueprint Program Grant and the Strategic Growth Council Sustainable Communities Planning Grant Program. Significant planning efforts were focused on reducing vehicle miles travelled.

One of the unavoidable, significant impacts that was identified in the Saticoy Area Plan Program EIR, includes traffic impacts on State Route 118 (SR118) in the Saticoy Community. One potential mitigation measure that was identified includes the widening/re-striping of SR118 in the Saticoy community (e.g., generally between Vineyard Avenue to Darling Road). Although the Board of Supervisors adopted a statement of overriding considerations for this impact, the following implementation program (highlight added) was included in the Area Plan to help mitigate the impact in the future:

No.	Program Description	Responsibility	Priority	Timeframe
MOBILITY ELEMENT				
MOB-P2	***Reclassify Portion of SR 118***: To mitigate significant project and cumulative traffic impacts on SR 118 between Vineyard Avenue and Darling Road, the County should review and process a General Plan Amendment that would reclassify that segment of SR 118 from 4 to 6 lanes on the Regional Road Network. The road reclassification should be incorporated into the next General Plan Update, tentatively scheduled for completion in 2020. Finally, the County shall work with VCTC and Caltrans to reprioritize the re-striping of SR 118 from Vineyard Avenue to Darling Road on the Ventura County Congestion Management Plan and the Caltrans list of projects. Although the re-striping project is currently listed in the Congestion Management Plan, the prioritization and timing for construction should be modified to occur within the 20-year horizon of the Saticoy Area Plan.	**PWA/ Transportation;** RMA/Planning; VCTC; Caltrans; City of Ventura	A	0-5 years

As indicated in the adopted Saticoy Area Plan program, it is critical for implementation of the recently adopted Saticoy Area Plan and future development in the Saticoy community that the re-striping project be included as a prioritized project in the 2016 RTP/SCS (FTIP Projects). The Saticoy Area Plan guiding principles are consistent with the RTP/SCS overarching strategy that calls for “more compact communities in existing urban areas”. The Saticoy Area Plan includes a land use plan with more compact development and improved mobility in an existing urban area. Peak-hour traffic impacts are already significant in this area and will impede future revitalization of this disadvantaged community if improvements to SR118 are not constructed.

As such, we respectfully request that the re-striping and any other critical intersection improvements in the Saticoy area be included in the RTP/SCS or FTIP Projects list as necessary, to make this a priority project. If you have any questions concerning these comments, you may contact Kari Finley at kari.finley@ventura.org or 805/654-3327.

PUBLIC WORKS AGENCY
TRANSPORTATION DEPARTMENT
Traffic, Advance Planning & Permits Division
MEMORANDUM

DATE: January 14, 2016

TO: RMA – Planning Division
Attention: Laura Hocking

FROM: Transportation Department *Bar*

SUBJECT: **REVIEW OF DOCUMENT 15-024** Notice of Availability of Draft Program Environmental Impact Report (NOA/DPEIR)
Project: **2016-2040 Regional Transportation Plan/ Sustainable Communities Strategy (2016 RTP/SCS)**
Lead Agency: **Southern California Association of Governments (SCAG)**
First-tier CEQA document that serves as long-range regional transportation plan for six southern California counties in SCAG through horizon year 2040.

Pursuant to your request, the Public Works Agency Transportation Department (PWATD) has reviewed the DPEIR prepared by Sapphos Environmental dated November 24, 2015, for the 2016 RTP/SCS published by SCAG and updated every four (4) years.

SCAG is one (1) of eighteen (18) Metropolitan Planning Organizations (MPOs) in the State of California designated for the six-county 38,000-square-mile region of Southern California that includes the counties of Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura, sixteen (16) federally recognized tribal nations, fifteen (15) sub-regional entities, 191 cities, and 19 million Californians (49% of total state population). The PEIR for the 2016 RTP/SCS is intended to serve as an informational document to inform decision-makers and the public of the potential environmental consequences of approving the proposed Plan. The PEIR is a first-tier California Environmental Quality Act (CEQA) document with mitigation measures designed to help avoid or minimize significant cumulative impacts on a regional-scale leaving project-specific details to subsequent EIRs.

We have the following comments:

1. There may be a math error in Table 3.17.4-6 on Page 3.17-49. "Active Transportation" is the summation of "Walk" and "Bike." "Active Transportation" plus "Transit" does not equal the "Total."

2. The PWATD has jurisdiction over transportation-related facilities on County-maintained roadways in the unincorporated areas of Ventura County. We offer the following comments with regard to our projects that are or are not listed in Appendix B.

   a. The intersection improvement project at Pleasant Valley Road and Fifth Street in Table 1 on Page 95 (VEN 130104) has a Total Project Cost (TPC) of $2.96 million (not $1.76 million).

b. It is our understanding that bicycle lane and pedestrian improvement projects that are not specifically listed in the tables would be grouped in the Call for Projects listings in Table 2 on Page 136 (RTP IDs 101007 and 101008). If this is not true, then the following two (2) CMAQ and locally funded pedestrian/safe-routes-to-school improvement projects in Camarillo Heights and El Rio should be added to the appropriate table.

   i. Camarillo Heights Elementary School Pedestrian Improvements – TPC of $452,000.
   ii. Rio Real Elementary School Pedestrian Improvements – TPC of $365,000.

c. The following two (2) HSIP and locally funded road/bicycle improvement projects in Casitas Springs should be added to the appropriate table.

   i. Santa Ana Road Pavement Widening and Bike Lanes (MP 0.05 to MP 1.7) – TPC of $980,000.
   ii. Santa Ana Road Pavement Widening and Bike Lanes (MP 3.81 to MP 5.81) – TPC of $1.3 million.

d. The following two (2) unfunded road improvement projects in the Oxnard Plain and Oxnard Beach Areas should be added to the appropriate table.

   i. Hueneme Road Widening Project – Rice Road to Las Posas Road – TPC of $22.34 million.
   ii. Harbor Boulevard Widening Project – Oxnard City Limits to Ventura City Limits – TPC of $58.7 million.

e. The following two (2) projects are listed in two tables in Appendix B (Table 1, Page 95; Table 2, Page 319):

   i. Hueneme Road (VEN 011202) for $6.953 million
   ii. Pleasant Valley Road at Fifth Street (RTP ID 5A0709 / VEN 130104) for $1.76 million.

Our review is limited to the impacts this project may have on the County of Ventura Regional Road Network.

T:\Planning\Land Development\Non_County\15-024 (SCAG).doc

Ventura Hillsides Conservancy

P.O. Box 1284 Ventura, California 93002
www.venturahillsides.org 805-643-8044

January 31, 2016

To whom this concerns,

Thank you for the opportunity to comment on the Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan (RTP) and Sustainable Community Strategy (SCS) and the Program Environmental Impact Report (PEIR). Following the release of the 2012 RTP/SCS, Friends of Harbors, Beaches and Parks (FHBP) coordinated a cross-county regional conservation coalition focused on the inclusion of natural lands mitigation and policies within that SCAG plan. Our organization, the Ventura Hillsides Conservancy, is now a part of this growing coalition in 2016.

The Ventura Hillsides Conservancy works in Ventura County and has since 2004. Our mission is to preserve the open space resources that contribute to the unique character and natural environment of the City of Ventura and surrounding region for the benefit of present and future generations. We have had important successes since our inception including the creation of the lower Ventura River Parkway and the ongoing purchase of important Ventura hillside lands that provide numerous public benefits, including wildlife habitat and migration corridors.

The 2012 RTP/SCS was an important stepping stone for the 2016 Plan. In previous Plans, natural lands and farmlands were handled under the banner of "land use." In this new Plan, they are their <u>own</u> category. This is a great milestone in conservation planning for the region and SCAG. Additionally, the creation of a Natural and Farmlands Appendix provides important opportunities for SCAG that shouldn't be overlooked. We believe the opportunity before you isn't to "plan for" the future of open space in the region—as that's what you've been doing since the 2012 Plan. Instead, we believe SCAG can now start "implementing" a regional conservation program. **We strongly urge SCAG to take a more serious leadership role by actively seeking funding to implement conservation efforts** by partnering with agencies, transportation commissions and non-profits to see that the Plan created in 2012 comes to fruition through the 2016 Plan. The One Bay Area Grant Program in Northern California is a program that we believe can be replicated in Southern California. We and other coalition members would gladly assist with this implementation effort.

We've reviewed the RTP/SCS and PEIR and offer the following comments and suggestions for inclusion in the Plan with the intent to clarify/strengthen the language, as well as link the goals of the RTP and SCAG's mission with the Natural and Farmland policies.

Congratulations
We are pleased to see an Appendix devoted directly to natural and farmlands protection in the 2016 Plan. We are glad that the Plan contains specific strategies addressing natural land and farmlands issues. This is certainly a step in the right direction. The culmination of the work from the last RTP/SCS is clearly visible in this Draft Plan. SCAG has demonstrated that Metropolitan Planning Organizations can play a vital, thoughtful and science-based role in mitigating impacts to our natural environment from transportation, infrastructure and other development projects. By incorporating natural and farmlands protection strategies into your policy document, we believe the many benefits of this broad-based conservation approach will be realized sooner than expected. Thank you for your leadership.

SCAG's Support of Regional Wildlife Corridors
The current federal transportation bill, FAST Act, supports understanding transportation impacts on natural resources. The previous bill, MAP-21, supported restoring and maintaining environmental functions (i.e., wildlife corridors) affected by the infrastructure projects in the RTP. SCAG has even supported efforts in Los Angeles County to create a wildlife corridor over the 101 Freeway. Many efforts are underway across the region to connect landscapes to one another. This is very important to the region and its biodiversity. Wildlife corridors allow species to migrate and forage and expand genetic diversity. These corridors also allow ecosystems to maintain ecological functions, act as sources for repopulation after natural disasters such as fire, flood or landslide, and improve the resiliency in the face of climate change impacts. The Plan would be stronger if it supported the enhancement of and/or protection of documented and regionally significant wildlife corridors, especially those that are impacted by infrastructure projects.

Formal Versus Informal Conservation Plans—All Are Important

SCAG focused many sections of the document on formal conservation plans, in the form of Natural Community Conservation Plans and Habitat Conservation Plans (NCCP/HCP), as the conservation method most identified by the agency. It is important to note that NCCP/HCP programs are only one conservation mechanism and they have limitations. For example, they are voluntary, property owner driven and generally only apply to larger land ownerships. Efforts underway by local, regional, state and federal agencies outside of these formal plans should not be discounted and must be included. Furthermore, many conservation organizations help facilitate, coordinate and find funding for land conservation transactions. We believe the conservation approach promoted by SCAG should include all of the ways land is protected, including those less regulated methods of conservation outside of NCCP/HCP programs.

Identify a Conservation Mechanism for the Natural and Farmlands Preservation

Our organization supports the idea that as new growth occurs it should focus on the existing infill areas. This is consistent with the finding in the SCAG surveys where respondents preferred to see existing urban areas built upon before greenfields are targeted for development, especially those at the Wildland-Urban Interface. When developments are built in infill areas, it likely relieves pressure from the fringe. However, the Plan fails to outline exactly how (or with what mechanism) these fringe lands (or any lands) will actually be protected. Just because the pressure is relieved doesn't mean the land then automatically becomes protected. Numerous organizations, ours included, focus their work on preservation of important habitat lands. A lot of time, energy, political will, strategy and other efforts combine to create a successful conservation transaction that leads to permanently conserved lands. SCAG must identify the mechanism, process or plan on how the greenfield lands will be protected.

Population Growth Impacts to Existing and Future Parklands

The Plan outlines that the region anticipates an additional 3.8 million people by 2040 providing increased pressure on our existing parkland. Studies document that many communities in the Southern California region already do not have enough parkland as outlined by the Quimby Act (three acres per 1,000 residents). Throughout the document, the Plan promotes providing more access to these existing parks as infill projects are built, but nowhere does it state how additional parks will be created. The mechanism is missing. More importantly, these city parks are fundamentally different than habitat-focused parks. Usually city and regional parks include high intensity recreation oriented activities, like soccer and baseball fields, and are turfed. The types of land acquired as mitigation or through local conservation efforts typically are focused on preservation of natural habitat and less intensive uses (birding, hiking, etc.). In fact, many of these mitigation lands have limited or managed public access. Providing "more" access to either high or low intensity parks and/or habitat lands may have significant consequences for the land manager. The document needs to address the impacts to local parks with increased access from expanding populations. The document also needs to address how additional lands will be protected, i.e., what mechanism will be used?

Amendments to the Open Space Maps in the PEIR

Maps contained within the PEIR, RTP, SCS and Appendix should be internally consistent and they are not. For example, each map that shows "open space" or "protected lands" should be using the same base dataset but they do not. The 2012 Plan resulted in the creation of SCAG's very own geographic information systems (GIS) dataset: the Natural Resource Inventory. It is more accurate than what is in the document now and it has been vetted by numerous organizations. That's why it is surprising to see that so few of SCAG's own GIS layers were actually used in the documents' maps. We urge SCAG to honor its own work and that of its partner organizations by using this dataset as the basis for natural and farmland mapping. Let's move forward with the same baseline information.

Conclusion

Thank you for reviewing our comments and we look forward to working with SCAG on the implementation of this Plan, especially as it relates to the Natural and Farmlands Appendix. Should you need to contact me, I can be reached at 805-643-8044. In addition, we request to be included on any notifications (electronic or otherwise) about this policy's creation and implementation, please send information to dpoultney@venturahillsides.org.

Sincerely,

Derek Poultney

Derek Poultney
Executive Director

Western Riverside Council of Governments

County of Riverside • City of Banning • City of Calimesa • City of Canyon Lake • City of Corona • City of Eastvale • City of Hemet • City of Jurupa Valley City of Lake Elsinore • City of Menifee • City of Moreno Valley • City of Murrieta • City of Norco • City of Perris • City of Riverside • City of San Jacinto City of Temecula • City of Wildomar • Eastern Municipal Water District • Western Municipal Water District • Morongo Band of Mission Indians Riverside County Superintendent of Schools

February 1, 2016

Draft 2016 RTP/SCS Comments
Attn: Courtney Aguirre
Southern California Association of Governments
818 W. 7th Street, 12th Floor
Los Angeles, CA 90017

Subject: **Comments on the Draft 2016-2040 Regional Transportation Plan and Sustainable Communities Strategy**

Dear Ms. Aguirre:

On behalf of the Western Riverside Council of Governments (WRCOG), I would like to commend SCAG staff on producing a Draft 2016-2040 Regional Transportation Plan/ Sustainable Communities Strategy (2016 RTP/SCS) that is both comprehensive and well-suited to support the SCAG region's healthy development in the coming years. WRCOG and many of our partners are acutely aware of the significant need for long-range planning, are impressed by the quality of the Draft 2016 RTP/SCS and Appendices, the Public Health appendix in particular. With SCAG's leadership, the Draft 2016 RTP/SCS has been positioned to meet the needs of the WRCOG subregion and SCAG's objectives of balancing future mobility and housing needs with economic, environmental and public health goals.

WRCOG has two requests of SCAG pertaining to the Draft 2016 RTP/SCS which are intended to help maximize the impact of the final document and the resources that went into preparing the document. First, WRCOG asks that SCAG compile a distinct listing of all commitments explicitly made of SCAG and/or others in the document that could affect WRCOG and/or our member agencies. Several examples of these occurrences are listed below:

> (Page 70)
> The 2012 RTP/SCS discussed strategies to combat gentrification and displacement, a continuing challenge that we discussed in Chapter 3. <u>Jurisdictions in the SCAG region should continue to be sensitive to the possibility of gentrification and work to employ strategies to mitigate its potential negative community impacts</u>.
>
> (Page 88)
> To accommodate the growth in walking, biking and other forms of active transportation regionally, the 2016 Active Transportation Plan also considers new strategies and approaches beyond those proposed in 2012. Among them:
>
> - <u>Better align active transportation investments with land use and transportation strategies to reduce costs and maximize mobility benefits</u>;
> - Expand regional understanding of the role that short trips play in achieving RTP/SCS goals and performance objectives and provide a strategic framework to support local planning and project development geared toward serving these trips; and
> - Expand understanding and consideration of public health in the development of local plans and projects.

(Page 111)
Consistent with the provisions of Section 15091 of the State CEQA Guidelines and review of county and city general plans and Caltrans designated scenic vistas, aesthetics performance standards-based mitigation measures may include, but are not limited to:

- Design landscaping along highway corridors to add significant natural elements and visual interest to soften the hard-edged, linear transportation corridors.
- Remove blight or nuisances that compromise visual character or visual quality of project areas including graffiti abatement, trash removal, landscape management, maintenance of signage and billboards in good condition, and replacing compromised native vegetation and landscape.

WRCOG asks that commitments such as these be called out in a separate document and that SCAG denote an action plan to fulfill such commitments.

Second, in recognition of the extensive research and data collection efforts of SCAG to prepare the document, WRCOG requests that all data be made publicly accessible. Further, WRCOG requests that SCAG widely promote the availability of the data, particularly among jurisdictions within the region, to ensure the information's use and ongoing benefit to the region.

WRCOG greatly values SCAG's efforts in preparing the 2016-2040 RTP/SCS. With the addition of the components recommended above, WRCOG is confident in the ability of the document to deliver high-impact results for the region. Should you have any questions on WRCOG's comments, do not hesitate to contact me at (951) 955-8303 or bishop@wrcog.cog.ca.us. WRCOG is grateful for our ongoing, collaborative relationship with SCAG and looks forward to continuing our partnership in the future.

Sincerely,

Rick Bishop
Executive Director

XPRESSWEST
6720 VIA AUSTI PKWY., STE. 200
LAS VEGAS, NEVADA 89119

TELE: 702.739.2020
FAX: 702.739.2005

February 1, 2016

Southern California Association of Governments
Attn: Philip Law
818 West 7th Street, 12th Floor
Los Angeles, CA 90017

RE: Comments to the 2016 Regional Transportation Plan (RTP) Draft

Dear Mr. Law:

XpressWest appreciates the opportunity to provide comments to the 2016 RTP Draft. Enclosed is a comment matrix indicating the document, page number, section and requested revision.

Should you have any questions regarding the XpressWest project or the comments provided, please feel free to contact me at (702) 739-2020.

Best Regards.

Andrew Mack
Chief Operating Officer
XpressWest

Encl. As stated

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS ("SCAG")
2016 REGIONAL TRANSPORTATION PLAN - DRAFT
COMMENTS SUBMITTED BY XPRESSWEST
FEBRUARY 1, 2016

DOCUMENT	PAGE #	SECTION	PROPOSED REVISION
RTP/SCS	86	Passenger Rail	Although XpressWest is included as a Strategic Plan project, request adding a discussion of the XpressWest project in the passenger rail section of the RTP since it is a federally licensed interstate passenger railroad that will be interoperable with the California High Speed Rail system and interface with Metrolink at Palmdale.
RTP/SCS	172	XpressWest	Request modifying the language as follows: In addition to the California High-Speed Train system, our region has other important high-speed rail projects in development. XpressWest is a high-speed rail service that will connect Victorville and Las Vegas along the I-15 corridor and connect via the High Desert Corridor to Palmdale and California High-Speed Train Phase One. It will use “steel wheel on steel rail” electric multiple unit train technology, ~~with electrical propulsion to~~at speeds of up to 150 miles per hour (mph). That would result in a trip between Victorville and Las Vegas lasting only 80 minutes. XpressWest has secured federal environmental Records of Decision and authorization to construct and operate. I~~reviews and i~~n ~~September~~ November, 2015, ~~China Railway International and XpressWest entered into a $100 million agreement to implement the project. XpressWest continues to seek additional funding and required regulatory approvals.~~ XpressWest was awarded the franchise to construct and operate high speed rail service between Southern California and Las Vegas by the Nevada High Speed Rail Authority.
Passenger Rail Appendix	7	High Speed Rail	Request adding a discussion of XpressWest in the High Speed Rail section.

DOCUMENT	PAGE #	SECTION	PROPOSED REVISION
Passenger Rail Appendix	19	Los Angeles to Las Vegas	Request modifying the language as follows: Passenger service was last provided between Los Angeles and Las Vegas by Amtrak on its Desert Wind interstate service that ceased operations in 1997. Currently, XpressWest is a high-speed rail service under development connecting Victorville and Las Vegas along the current I-15 corridor. It will use steel wheel on steel rail electric multiple unit train technology ~~with electrical propulsion~~ operating at speeds of up to 150 mph to make the trip between Victorville and Las Vegas in 80 minutes. The tracks will largely be within the I-15~~'s~~ ROW. It will run daily, with peak departures up to every 20 minutes. ~~XpressWest estimates 5 million passengers during its first year of operation with one-way fares of $50.00 and round-trip fares of $89.00.~~ XpressWest has been completely permitted since ~~2011~~2012. XpressWest had applied for a ~~$5.5 billion~~ loan through FRA's Railroad Rehabilitation & Improvement Financing program, however the loan was indefinitely suspended in July 2013 due to the failure of the application to meet the federal "Buy America" policy. ~~It is estimated to cost $6.9 billion, with $1.4 billion coming from private investors.~~ ~~In September 2015, China Railway International and XpressWest entered into a Joint Venture agreement to implement the project providing rail connectivity from Los Angeles to Las Vegas.~~ In November, 2015, XpressWest was awarded the franchise to construct and operate high speed rail service between Southern California and Las Vegas by the Nevada High Speed Rail Authority.
Passenger Rail Appendix	20	Southwest High Speed Speed Rail Network	Suggest inserting the map from the FRA Southwest Multi-State Planning Study that identifies the Core Express Service corridors.

DOCUMENT	PAGE #	SECTION	PROPOSED REVISION
Passenger Rail Appendix	27	XpressWest	Request modifying the language as follows: The XpressWest would connect Las Vegas to Victorville using steel wheel on steel rail technology with a top speed of 150 mph. There are no intermediate stops between Victorville and Las Vegas and the running time is estimated to be approximately 80 minutes. The project has completed the environmental process with the Records of Decision from the Federal Railroad Administration, Bureau of Land Management, Federal Highway Administration, and Certificate of Public Convenience and Necessity issued by the Surface Transportation Board. ~~and the FRA issued a record of decision (ROD) on July 8, 2011.~~ XpressWest ~~Enterprises~~ had applied to the FRA's Railroad Rehabilitation Improvement Financing (RRIF) program for a loan to start and complete construction of the project however the loan application was ~~denied~~ suspended in 2013 due to the application not meeting Buy America requirements. ~~In addition to the RRIF loan, private debt and equity are expected be included in the project financing. In September 2015, China Railway International and XpressWest entered in to a $100 million agreement to begin construction on the project.~~ Phase Two of this project would connect Victorville to Palmdale along the High-Desert Corridor, thereby providing a connection with the CA HSR system and the Metrolink Antelope Valley Line. Phase Two was not included in XpressWest's environmental process, nor was it part of their FRA loan application. In November, 2015, XpressWest was awarded the franchise to construct and operate high speed rail service between Southern California and Las Vegas by the Nevada High Speed Rail Authority.

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January 29, 2016

Courtney Aguirre and Lijun Sun
Southern California Association of Governments
818 W. 7th Street, 12th Floor
Los Angeles, CA 90017
2016PEIR@scag.ca.gov

Re: 2016 Draft Regional Transportation Plan/Sustainable Communities Strategy and Draft Program Environmental Impact Report

Dear Ms. Aguirre and Ms. Sun:

This firm represents the cities of Glendale, La Cañada Flintridge, Pasadena, Sierra Madre, and South Pasadena ("5-Cities Alliance") in connection with the 2016 Draft Regional Transportation Plan/Sustainable Communities Strategy ("RTP/SCS" or "Plan") and Draft Program Environmental Impact Report ("PEIR"). Our client's primary concern relates to the SR-710 North Project—and specifically the proposed Freeway Tunnel Alternative—and the far-ranging environmental impacts this Alternative would have on their residents and environmental resources. More generally, though, transportation projects like the SR-710 North Freeway Tunnel Alternative ("Freeway Tunnel Alternative" or "SR-710 North Project") do not provide a sustainable solution to the SCAG region's transportation needs. Consistent with state climate policies, the region should be striving toward transportation solutions that will make car ownership an option rather than a necessity. Projects such as the Freeway Tunnel Alternative that facilitate travel by automobile not only threaten the livability of our communities and the air we breathe, but also undermine the state's ability to meet its critical goals to reduce greenhouse gas ("GHG") emissions over the long term.

Thus, this letter addresses four key points. First, the Freeway Tunnel Alternative is flawed and unnecessary. Second, the Freeway Tunnel Alternative would be inconsistent with the RTP/SCS's goal that its transportation projects be sustainable and environmentally protective. Third, there are viable alternatives to the Freeway Tunnel Alternative that would improve mobility and expand transportation options in the San

Gabriel Valley while also limiting dependence on personal vehicles. Fourth, the Draft PEIR's evaluation of environmental impacts that would result from the RTP/SCS's transportation projects, including the SR-710 North Project, does not comply with the California Environmental Quality Act ("CEQA"), Public Resources Code section 21000 *et seq*.

Because the SR-710 North Project is flawed and unnecessary and because the RTP/SCS PEIR fails to adequately disclose or mitigate the environmental impacts from this Project, the 5-Cities Alliance respectfully requests that SCAG eliminate the Project from the 2016 RTP/SCS (including the transportation model and project list).

This letter, along with the enclosed report by Nelson Nygaard on transportation (Exhibit 1) and the enclosed report by Dr. Phyllis Fox on air quality and health risk (Exhibit 2) constitutes the 5-Cities Alliance's comments on the Draft PEIR. We respectfully request that the Final EIR respond separately to each of the points raised in the technical consultants' reports as well as to the points raised in this letter.

In addition, we enclose this firm's comment letter to Caltrans in connection with the Draft Environmental Impact Report/Environmental Impact Statement ("DEIR/S") for the SR-710 North Project. *See* Letter to Garrett Damrath, Chief Environmental Planner, July 9, 2015, attached as Exhibit 3. Many of the issues raised in that letter are relevant to the RTP/SCS's PEIR as SCAG is tasked with evaluating the environmental impacts from each of the RTP's transportation projects, including the SR-710 North Project.

I. The Proposed Freeway Tunnel Alternative Is Flawed and Unnecessary.

According to the SR-710 North DEIR/S, the SR-710 Project's primary objective is to address the lack of continuous north-south transportation facilities in the San Gabriel Valley.[1] DEIR/S at 3. The DEIR/S suggests that it is this lack of facilities that results in congestion on freeways and "cut-through" traffic affecting local streets. *Id.* Yet, Nelson Nygaard studied the regional transportation network and determined that the region actually lacks east-west transportation facilities, not north-south. Moreover, very little—about 14 percent—of current peak period traffic is cut-through traffic. *See* Nelson

[1] SR 710 North Study Draft EIR/EIS Volume 1 available at: http://www.dot.ca.gov/dist07/resources/envdocs/docs/710study/draft_eir-eis/SR%20710%20No.%20Study%20Draft%20EIR_EIS%20Vol%20I%20Rpt.pdf; accessed January 15, 2016.

Nygaard Report at 1. By providing a new freeway link, the Freeway Tunnel Alternative would reduce this cut-through traffic from about 14 percent to between 7 percent and 11 percent. Through these reductions, approximately 7 percent to 13 percent of all motorists throughout the SR-710 study area would receive a nominal travel-time savings of 2.5 minutes.[2] This means that about 90 percent of motorists in the study area would receive no significant travel time savings; indeed, the study shows that the travel time of some motorists would worsen as a result of this Alternative. *Id.*

Nor would the Freeway Tunnel Alternative actually improve regional traffic. Instead, it would shift congestion around. Traffic would significantly worsen on various connecting freeways as a result of the Tunnel, in part because the Freeway Tunnel Alternative induces extra driving. For example:

- Connecting the I-710 to I-210 would shift a significant amount of traffic off the I-605 and onto the I-710 and I-210. Total traffic would increase by about 1,350 vehicles in the peak hour on the I-710 south of I-10, and about 2,600 vehicles per hour north of I-10. Traffic on the I-210 would increase by about 380 vehicles per hour through La Cañada Flintridge, and by about 400 vehicles per hour through Pasadena. *See* Nelson Nygaard Report at 7.

- The significant increase in congestion on the I-210 means that many drivers would avoid using SR-2, and instead stay on the I-5, exacerbating existing traffic congestion on the I-5. *Id.*

- The Freeway Tunnel Alternative would result in significant induced north-south travel demand, adding traffic to both the I-5 and I-210 freeways. Where those freeways join, in the bottleneck south of the SR-14 split, there would likely be a significant increase in traffic congestion, with an additional 650 vehicle in the peak hour. *Id.*

The RTP/SCS PEIR refers to the need to add highway capacity by closing gaps in the region's highway and arterial system and asserts that the SR-710 North is a "gap

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[2] 2.5 minutes is the threshold used to count vehicle hours travelled during peak periods. Some savings may be greater, but the 710 North Project DEIR/S does not contain this granular information. *See* DEIR/S Transportation Technical Report at 4.3.

closure" project. *See* PEIR at 2-20; 3.17-39; and RTP/SCS, Transportation Project List Appendix, pdf p. 37. Yet, according to Nelson Nygaard, of the top 100 "Road Bottlenecks" in the region, only one occurs along the I-710 corridor (at Washington Blvd). *See* Nelson Nygaard Report at 5. In addition, the RTP/SCS's Appendix ranks this bottleneck at the bottom (98th out of 100). *Id.* Perhaps most importantly, the SR-710 North Project DEIR/S shows that the Freeway Tunnel Alternative would actually exacerbate the congestion bottleneck at I-710 and Washington by inducing between 1,330 and 2,180 additional vehicles per peak hour on I-710 through that interchange. *Id.*

The Freeway Tunnel Alternative would also bypass many of the destinations people want to go. The San Gabriel Valley is a community of diverse people with widely varying commute patterns. According to the "New Initiative for Mobility and Community," prepared by Nelson Nygaard for Connected Cities and Communities[3], 85 percent of commuters exiting the SR-710 Freeway at Valley Boulevard are intent on reaching local destinations. Employees need to make short commutes to Pasadena and longer commutes to Burbank (Metro has found that 70 percent of study-area vehicle trips start and end within the San Gabriel Valley). *Id.* Students attending Cal State LA and East LA College need ways to make short commutes to school. The Freeway Tunnel Alternative would not serve these types of transportation needs.

In addition, it is important to understand that even if a freeway tunnel were the appropriate solution to meet the region's transportation needs—which it is not—the Freeway Tunnel Alternative proposed here is flawed and entirely unprecedented. The recommended 60-foot diameter tunnel would be the widest subsurface tunnel attempted anywhere in the world—a risky proposition given other agencies' experiences with smaller tunnels. In December 2013, the tunnel boring machine ("TBM") used to construct Washington State's Alaskan Way Viaduct replacement project—the largest such tunnel to date (57-foot diameter)—became stuck after tunneling only one thousand feet of the tunnel's 1.7-mile length. *See* Exhibit 3. Workers had to construct an access pit 120 feet deep and 80 feet wide to lift the TBM out in order to repair it. Had it not failed so early, accessing the machine for repairs would have been even more difficult, or impossible, because the tunnel's route takes it beneath downtown Seattle. Tunnel boring began again in December 2015. However, construction was terminated almost immediately when Washington Governor Inslee issued a stop-work order following the

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[3] *See* New Initiative for Mobility and Community, available at: http://www.beyondthe710.org/the_bt710_proposal; accessed January 13, 2016.

report of a sinkhole opening up above the TBM.[4] That project serves as a cautionary tale for the proposed Freeway Tunnel Alternative, especially given that the SR-710 route alignment is located in a densely developed area. Remarkably, however, the SR-710 North Project DEIR/S nowhere acknowledges these risks.

In sum, the Freeway Tunnel Alternative does very little, if anything, to relieve local or regional traffic congestion; rather, it is expected to exacerbate existing conditions. At the same time, the Project poses enormous threats to the environment. Indeed, the Tunnel Alternative reflects strategies from the 1960s, when the state pursued road-building projects without regard to global climate change and other environmental threats. The 5-Cities Alliance has recommended that Caltrans and Metro go back to the drawing board to design a project that is capable of meeting the region's transportation needs in a manner that is sustainable and environmentally responsible. In particular, as discussed more fully below, the 5-Cities Alliance has urged those transportation agencies, and urges SCAG, to evaluate the "Beyond the 710"—a multimodal option that combines mass transit, "great streets," and bikeways—as an alternative to the Freeway Tunnel. In any event, SCAG should eliminate the SR-710 North Project from the RTP/SCS.

II. The Freeway Tunnel Alternative Would Not Implement the 2016 RTP/SCS's Goals.

The RTP/SCS and the PEIR go to great lengths to promote SCAG's vision for a sustainable, less auto-centric approach to transportation in the Southern California region. To this end, the PEIR includes several goals and policies for the RTP/SCS, explaining that "[t]he guiding policies for the 2016 RTP/SCS are intended to help focus future investments on the best performing projects and strategies to preserve, maintain and optimize the performance of the existing transportation system." PEIR at 2-6. One goal, for example, calls for the Plan to "maximize mobility and accessibility for all people and goods in the region." *Id.* Another goal calls for the Plan to "preserve and ensure a sustainable regional transportation system." *Id.* Yet another goal states that the RTP/SCS should "protect the environment and health of our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking)." *Id.*

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[4] *See* "Inslee orders tunnel dig halted as soil sinks above Bertha," The Seattle Times, January 14, 2016 available at: http://www.seattletimes.com/seattle-news/transportation/inslee-orders-bertha-tunneling-stopped-after-sinkhole-forms/; accessed January 27, 2016.

The Freeway Tunnel Alternative achieves none of these goals because it does not provide a sustainable solution to the region's transportation needs. To begin with, it confers no support for transit or active transportation. The region should be striving toward a transportation solution that will make car ownership an option rather than a necessity, yet the Freeway Tunnel Alterative would increase freeway capacity at the expense of transit. Moreover, every trip starts by walking, and the people of San Gabriel Valley deserve to be able to walk safety and comfortably. Because the Freeway Tunnel Alternative would facilitate travel by automobile, it provides no benefits for pedestrians or bicycle riders. In addition, by promoting increased vehicular speeds, it would threaten the walkability and overall livability of surrounding communities.

The Freeway Tunnel Alternative would further impede the RTP/SCS's goals for sustainability because it would increase highway capacity, vehicle miles traveled ("VMT") and induce travel. According to Nelson Nygaard, the reduction of VMT per capita is the most important metric for sustainability because it identifies a shift from dependence on personal vehicles and a reduction of stress on the region's congested arterial and highway networks. *See* Nelson Nygaard Report at 2. Conversely, any increase in highway capacity, such as that which would occur with the Freeway Tunnel Alternative, will increase VMT because it would induce travel.

The phenomenon that highway capacity increases lead to additional travel is corroborated by the Surface Transportation Policy Project ("STPP"). The STPP cites a growing body of research showing that, in the long run, wider highways actually create additional traffic, above and beyond what can be attributed to population increases and economic growth. *See* STPP, Build It and They'll Come, attached as Exhibit 4. The SR-710 North Project DEIR/S provides a real-world example of this effect, as it acknowledges that the Freeway Tunnel Alternative would result in a sizable increase in vehicular travel. Indeed, total VMT under all freeway tunnel alternatives would increase by as many as 460,000 miles per day. *See* Nelson Nygaard Report at 3.

Because the Freeway Tunnel Alternative would increase capacity and induce travel, it would also take the Southern California region in a direction that undercuts the state's preeminent climate goals. These goals include Governor Brown's Executive Order of April 29, 2015, which directed the state to cut its GHG emissions 40 percent below 1990 levels by 2030. Governor Brown's order reiterates Governor Schwarzenegger's 2005 Executive Order, which calls for reducing statewide GHG emissions 80 percent below 1990 levels by 2050. The state will not be able to meet these goals without significant reductions in motor vehicle travel. Tellingly, Caltrans itself specifically recognized this fact when it noted that achieving the state's climate change goals requires a "fundamental, holistic transformation of the transportation systems." *See* California's 2040 Transportation Plan, March 2015 at 4, attached as Exhibit 5 (stating that one of the main strategies to reduce future GHG emissions from the movement of people and freight is reducing VMT and increasing a shift to more sustainable transportation). Similarly, the RTP/SCS itself specifically calls for reductions in VMT in order to reduce GHGs. *See* RTP/SCS at 6.

The Freeway Tunnel Alternative's effect on individuals' health would be equally harmful. Cancer risks could reach up to 149 chances per million at the maximum exposed residential receptors, which far exceeds the South Coast Air Quality Management District's recommended CEQA threshold of 10 per million. *See* 710 North Project DEIR/S, Health Risk Assessment Appendix Table 3-4.[5] The Freeway Tunnel Alternative would also result in air quality impacts throughout wide portions of Los Angeles County. According to the United States Environmental Protection Agency, it appears that the Freeway Tunnel would cause total concentrations of PM2.5 to exceed the National Ambient Air Quality Standards. *See* Letter from J. Blumenfeld to C. Bowe, August 27, 2015, attached as Exhibit 6. The Tunnel would also focus all of the vehicle emissions along the entire tunnel to the tunnel portal and ventilation stack areas, thereby harming individuals living, working or attending school in these locations. In a region that already experiences some of the worst air quality in the nation, a project that would substantially increase harmful levels of air pollution must be avoided. Avoiding these harmful impacts is consistent with SCAG's goals of protecting the environment and health of the region's residents. *See* PEIR at 2-6.

In short, the Freeway Tunnel Alternative directly undercuts several of the central goals of the RTP/SCS. As discussed below, there are better solutions to meeting the region's transportation needs, especially given the Freeway Tunnel Alternative's hefty $5.6 billion price tag.[6]

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[5] SR 710 DEIR/S Health Risk Assessment Volume I available at: http://www.dot.ca.gov/dist07/resources/envdocs/docs/710study/draft_eir-eis/Health%20Risk%20Assessment/SR%20710%20Health%20Risk%20Assessment%20Vol%20I.pdf; accessed January 6, 2016.

[6] The cost to construct the Freeway Tunnel Alternative is all but certain to exceed this amount in light of the construction difficulties plaguing the Seattle tunnel project.

III. There Are Viable Ways to Maximize the Productivity of the Region's Transportation System While Minimizing Environmental Harm.

The Freeway Tunnel Alternative would add to the existing transportation network, before maximizing the system on a local level. As SCAG acknowledges, the arterial and highway network provides the "backbone" that supports transportation in the region. However, this does not mean that all opportunities to expand the backbone network should be pursued, especially to accommodate personal vehicles, as the SR-710 North Project would do. Instead, it is important to identify alternative tools and strategies that can be employed to maximize current network utility, without expanding capacity and inducing more vehicular traffic.

Importantly, there are viable alternatives to the SR-710 North Project, beyond those studied in the SR-710 North Project DEIR/S, that do not include a tunnel or any additional highway/toll lanes. As mentioned previously, the 5-Cities Alliance, in conjunction with other organizations, has developed a "Beyond the 710" alternative that presents 21st-century options for improving mobility and accessibility in the San Gabriel Valley. Rather than construct a highway extension, this innovative, multimodal approach to transportation would focus on the following components:

- Transit – Bringing rapid service, including missing north-south linkages, to provide an alternative mode for regional trips
- Active Transportation – Reducing conflicts between people and vehicles to create safer environments for residents to walk and bike within their community
- Manage Demand – Using travel demand management strategies to encourage individuals to leave their vehicles at home
- Congestion – Spending efficiently to employ transportation system management strategies to address congestion for trips that simply must be made in a vehicle.

SCAG's RTP/SCS describes a "preferred scenario" that calls for best practices for increasing transportation choices and reducing dependence on personal automobiles throughout the region. *See* RTP/SCS at 65. The SR-710 North Project study area provides an opportunity to showcase the Beyond 710 Alternative, as it uses transit and "great streets" to sustainably grow communities and improve quality of life. *Id.* We urge

SCAG to evaluate the Beyond 710 Alternative or a similar multi-modal alternative in the revised PEIR.

IV. The RTP/SCS PEIR Violates CEQA.

The EIR is "the heart of CEQA." *Laurel Heights Improvement Ass'n v. Regents of University of California* (1988) 47 Cal.3d 376, 392 ("*Laurel Heights*") (citations omitted). It is "an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return. The EIR is also intended 'to demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the ecological implications of its action.' Because the EIR must be certified or rejected by public officials, it is a document of accountability." *Id.* (citations omitted).

CEQA requires the EIR not only to identify a project's significant effects, but also to identify ways to avoid or minimize them. Pub. Res. Code § 21002.1. An EIR generally may not defer evaluation of mitigation to a later date. CEQA Guidelines § 15126.4(a)(1)(B). Rather, an EIR must assess each mitigation proposal that is not "facially infeasible," even if such measures would not completely eliminate an impact or render it less than significant. *Los Angeles Unified School Dist. v. City of Los Angeles* (1997) 58 Cal.App.4th 1019, 1029-31. Furthermore, for every mitigation measure evaluated, the agency must demonstrate that the mitigation measure either: (1) will be effective in reducing a significant environmental impact; or (2) is ineffective or infeasible due to specific legal or "economic, environmental, social and technological factors." *Friends of Oroville v. City of Oroville* (2013) 219 Cal.App.4th 832, 841-44; Pub. Res. Code §§ 21002, 21061.1; CEQA Guidelines §§ 15021(b), 15364.

After carefully reviewing the PEIR for the RTP/SCS, we have concluded that it fails to comply with the requirements of CEQA. For example, the PEIR fails to adequately describe the RTP/SCS because it incorrectly characterizes the SR-710 North Project as a freeway tunnel and toll road. Notwithstanding this fact, we can find no indication that the PEIR actually analyzes the Freeway Tunnel Alternative's effects on air quality, health risk and greenhouse gas emissions. A thorough analysis is particularly critical since these impacts would likely be quite severe. Finally, the PEIR fails to properly analyze or mitigate those environmental impacts it does address. Such fundamental errors undermine the integrity of the PEIR.

A. The PEIR's Justifications For Failing to Provide a More Detailed Analysis of the RTP/SCS's Environmental Impacts Are Unavailing.

Among the PEIR's most notable deficiencies is the lack of a detailed accounting of the Plan's environmental impacts. The PEIR attempts to defend its vague analysis by asserting that the document "serves as a first-tier document for later CEQA review of individual projects included in the program. These project-specific CEQA reviews will focus on project-specific impacts and mitigation measures, and need not repeat the broad analyses contained in the PEIR." PEIR at ES-1. This justification is unavailing.

Under CEQA, the "programmatic" nature of this PEIR is no excuse for its lack of detailed analysis. The PEIR grossly misconstrues both the meaning and requirements of a "program" EIR by suggesting that the long-range planning horizon plays an important role in determining the appropriate level of detail to include in the PEIR. PEIR at ES-1. This approach is flawed, at the outset, because CEQA mandates that a program EIR provide an in-depth analysis of a large-scale project, looking at effects "as specifically and comprehensively as possible." Guidelines § 15168(a), (c)(5). Indeed, because it is designed to look at the "big picture," a program EIR must (1) provide "more exhaustive consideration" of effects and alternatives than can be accommodated by an EIR for an individual action, and (2) consider "cumulative impacts that might be slighted by a case-by-case analysis." Guidelines § 15168(b)(1)-(2).

Furthermore, whether a lead agency prepares a "program" EIR or a "project-specific" EIR under CEQA, the requirements for an adequate EIR remain the same. Guidelines § 15160. "Designating an EIR as a program EIR also does not by itself decrease the level of analysis otherwise required in the EIR." *Friends of Mammoth v. Town of Mammoth Lakes Redevelopment Agency* (2000), 82 Cal.App.4th 511. Even a program-level EIR must contain "extensive detailed evaluations" of a plan's effects on the existing environment. *See Envt'l Planning and Info. Council v. County of E Dorado* (1982), 131 Cal.App.3d 350, 358. *See also Kings County Farm Bureau v. City of Hanford* (1990), 221 Cal.App.3d 692,723-24 (where the record before an agency contains information relevant to environmental impacts, it is both reasonable and practical to include that information in an EIR).

The PEIR's reliance on future, project-level environmental review is also misplaced. Again, CEQA's policy favoring early identification of environmental impacts does not allow agencies to defer analysis of a plan's impacts to some future EIR for specific projects contemplated by that plan. *See Bozung v. Local Agency Formation Comm.* (1975), 13 Cal.3d 263, 282-84; *Christward Ministry v. Superior Court* (1986), 184 Cal.App.3d 180, 194 (1986); *City of Redlands v. County of San Bernardino* (2002), 96 Cal.App.4th 398, 409 (2002). As Guidelines section 15152(b) explicitly warns, "[t]iering does not excuse the lead agency from adequately analyzing reasonably foreseeable significant environmental effects of the project and does not justify deferring such analysis to a later tier EIR or negative declaration."

Moreover, there is no guarantee that such future, detailed environmental review will happen. Several CEQA provisions provide that neither SCAG nor other local agencies will have to conduct further environmental review for specific future projects that are consistent with the RTP or SCS. *See, e.g.*, Pub. Res. Code § 21155.1 ("transit priority projects" that are consistent with an SCS and meet certain other criteria are exempt from CEQA review entirely); Guidelines § 15183 (streamlined environmental review for projects consistent with general or community plans for which EIRs have already been prepared). Thus, the time to analyze the potential environmental impacts caused by projects contemplated by the proposed RTP/SCS is now. In order to do so, SCAG and the public must have a full understanding of the various components contemplated by and included within the 2016 RTP/SCS.

B. The PEIR's Description of the Project Violates CEQA.

An accurate description of a proposed project is "the heart of the EIR process" and necessary for an intelligent evaluation of the project's environmental effects. *Sacramento Old City Ass'n. v. City Council* (1991) 229 Cal.App.3d 1011, 1023; *see also Rio Vista Farm Bureau v. County of Solano* (1992) 5 Cal.App.4th 351, 369-370 (project description is the "sine qua non" of an informative and legally sufficient EIR). An inaccurate or incomplete project description renders the analysis of significant environmental impacts inherently unreliable.

The PEIR's "Project Description" fails to fulfill CEQA's requirements because it errs in its description of the SR-710 North Project. First, the PEIR describes the SR-710 North Project as "Toll Lanes (Plan 2040)." *See, e.g.,* Figures 2.4.2-1: Major Highway Projects and 2.4.2-5: Major Toll Projects. The only SR-710 North Project alternative that calls for a toll road is the Freeway Tunnel Alternative. Yet Caltrans and Metro, the lead agencies for the SR-710 North Project, have not yet identified a preferred alternative. The SR-710 North Project DEIR/S purports to analyze the Project's alternatives on equal footing, without giving priority to any single one. *See* SR-710 North Project DEIR/S at

2-1.[7] Since Caltrans and Metro have not yet selected a preferred alternative, SCAG's assumption that Caltrans and Metro will select the Freeway Tunnel Alternative as the preferred alternative is improper. *See* emails between C. Aguirre and M. Lin, attached as Exhibit 7 (SCAG staff confirming that SR-710 North Project is currently modeled as four toll lanes in each direction).

In the event that SCAG does not eliminate the SR-710 North Project from the RTP/SCS altogether, as the 5-Cities Alliance recommends, it must revise the RTP/SCS (and the PEIR's Project Description) to give equal weight to each SR-710 North Project alternative. As the City of South Pasadena explained in its letter on the Notice of Preparation for the RTP/SCS DEIR, "[i]nclusion of the SR-710 tunnel places a heavy and unlawful finger on the scale by which alternatives for the SR-710 corridor are to be evaluated in the [SR-710 North DEIR/S]." Letter from S. Gonzalez to Lijin Sun, April 7, 2015, attached as Exhibit 8.

As further indication that SCAG is improperly facilitating the Freeway Tunnel Alternative, the RTP/SCS—like its 2012 predecessor—goes so far as to rely on tolls received from the SR-710 North Project to partially fund its "financially constrained Plan." *See* PEIR Figure 2.4.2-5. Specifically, the RTP/SCS PEIR identifies \$23.5 billion from highway tolls as part of its "innovative funding strategies." *Id.* at 2-26. The SR-710 North Project DEIR/S confirms this fact when it states that "[t]he forecast revenues in the [2012] RTP/SCS financial plan include toll revenues from the SR-710 freeway tunnel." SR-710 North Project PEIR/S at 1-51.

Finally, as discussed previously, the RTP/SCS PEIR's Project Description incorrectly identifies the SR-710 Project as a "gap closure" project. As South Pasadena explains, however, "[t]he term 'gap closure' is designed to create a sense of inevitability

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[7] The 710 North Project DEIR/S analyzes five alternatives: (1) No Build Alternatives; (2) Transportation System Management/ Transportation Demand Management; (3) Bus Rapid Transit; (4) Light Rail Transit; and (5) Freeway Tunnel Alternative. *Id.* at 2-1 and 2-2. Moreover, Caltrans and Metro are evaluating two design variations on the Freeway Tunnel Alternative: the dual-bore and single-bore. *See* 710 North Project DEIR/S at 2-60 available at: http://www.dot.ca.gov/dist07/resources/envdocs/docs/710study/draft_eir-eis/SR%20710%20No.%20Study%20Draft%20EIR_EIS%20Vol%20I%20Rpt.pdf; accessed December 21, 2015.

for this project over competing ones." *See* Exhibit 8. For this reason, and because it erroneously implies that a tunnel along the SR-710 alignment provides a necessary transportation function, the PEIR should not suggest that the SR-710 North Project is needed to close a gap.

In the event that SCAG does not eliminate the SR-710 North Project from the RTP/SCS, it is imperative that a revised PEIR accurately describe the SR-710 North Project and the Freeway Tunnel Alternative. By incorrectly suggesting that the Freeway Tunnel Project will generate revenue and provide connectivity, the PEIR misleads the public and decision-makers as to the necessity of this environmentally damaging project. Such inaccuracies in project description fundamentally undermine the PEIR's analysis, in violation of CEQA. *Laurel Heights*, 47 Cal.3d at 392.

C. The PEIR's Analysis of and Mitigation for the Project's Air Quality Impacts Are Inadequate.

Air quality in the Southern California region ranks among the worst in the nation. PEIR at 3.3-1; 3.3-22; 3.3-26; 27; 28. The region is nonattainment for PM2.5, PM10 and ozone federal and state standards. *Id.* At 3.3-41. Given the region's severe air pollution and the fact that motor vehicles are a significant source of air pollutant emissions, it is critical that the PEIR accurately analyze and mitigate the Plan's impacts. Unfortunately, the PEIR does not accomplish these tasks.

1. The PEIR Fails to Adequately Evaluate the Plan's Potential to Violate Air Quality Standards and to Contribute Substantially to an Existing or Projected Violation.

The PEIR's analysis of the Plan's potential to violate air quality standards is riddled with flaws. As an initial matter, the PEIR fails to provide the information necessary to determine how emissions from the Plan were determined. The PEIR asserts that emissions were quantified using SCAG's transportation model (*see* Table 3.3.4-1), but the PEIR does not explain what this modeling entailed, the assumptions used in the calculations, or how the Plan's emissions and forecasted emission changes were calculated. The PEIR includes an air quality appendix, Appendix C "Air Quality and Greenhouse Gas Emissions and Climate Change Technical Report," where supporting calculations such as modeling input and output files would ordinarily be found. However, the Appendix is just a verbatim repetition of the text found in the main body of the PEIR. It is not possible to determine, for example, how the various transportation projects would affect traffic and thus emissions. Nor does the PEIR provide any information regarding regulatory assumptions. As discussed below, it is not possible to verify the accuracy of the air quality impact analysis without a comprehensive description of the air quality regulatory structure.

Details regarding the air quality analysis are critical here because the PEIR concludes simultaneously that Impact Air-2 is significant and unavoidable *and* that it is less than significant.[8] This contradictory conclusion makes no sense and is unlawful; an EIR must come to a definitive determination as to the significance of a project's environmental impacts. *See* CEQA Guidelines § 15064. Here, the absence of information as to the PEIR's methodology and assumptions only compounds the problem. Had the PEIR included supporting documentation, the public and decision-makers might have been able to determine which of the document's significance determinations was accurate.

Moreover, because the PEIR provides no explanation as to how the air quality analysis was performed, there is no indication that the PEIR even included the emissions from the SR-710 North Project. This is particularly concerning because the SR-710 North Project has the potential to exacerbate already hazardous levels of air pollution in the SCAG region. The failure to clearly identify the transportation projects that were included in the air quality analysis is a fatal flaw in the PEIR.

2. The PEIR Substantially Understates the Plan's Air Quality Impacts.

The PEIR concludes that the Plan's potential to violate air quality standards is a less than significant impact because for every criteria pollutant in the SCAG region, air pollutant emissions would either experience no change or be reduced between 2012 (existing conditions) and 2040 (Plan horizon). *See* PEIR at 3.3-40 and Table 3.3.4-1. Yet, the projected decrease in emissions compared to the existing baseline is *not* due to the Plan, but rather to regulatory changes that reduce emissions from vehicles. The PEIR's use of the existing baseline to evaluate the Plan's air quality impacts improperly credits the *Plan* for these regulatory reductions, when in fact they will result from unrelated state and federal regulatory changes governing vehicle emissions. The PEIR's approach thus masks the true impacts of the Plan, in violation of CEQA.

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[8] On page 3.3-40, the DEIR asserts that Impact Air-2 is less than significant while page 3.3-54 asserts that Impact Air-2 is significant and unavoidable.

The California Supreme Court has determined that the use of a future baseline is appropriate in some cases. *In Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* 57 Cal.4th 439 (2013), the Supreme Court recognized that, under certain circumstances, a departure from existing conditions (i.e., NOP date) may be appropriate. Specifically, use of a future baseline is appropriate when "justified by substantial evidence that an analysis based on existing conditions would tend to be misleading or without informational value to EIR users." *Id.* at 445.

Here, the PEIR's use of an existing conditions baseline for determining the significance of air quality impacts is misleading. According to the Fox Report, many critical factors, apart from the Plan, will affect emissions from transportation projects over the life of the RTP/SCS (2012 to 2040). Fox Report at 4. These factors include, most importantly, regulations that govern the amount of pollution allowed from on-road vehicles. Determining the significance of air quality impacts based on existing conditions (2012) proves to be uninformative and misleading, as it leaves the false impression that the Plan will significantly reduce emissions, i.e., improve air quality. In fact, the Plan will likely *increase* emissions in many areas, and at various times, over the planning horizon of 2012 to 2040. *Id.* Accordingly, to present an accurate picture of the Plan's impact on air quality, the PEIR should have compared the Plan at buildout in 2040 to a scenario without the Plan in 2040.

In its comments on the SR-710 North Project DEIR/S's analysis of health risks, the South Coast Air Quality Management District ("SCAQMD") criticized Caltrans for this same faulty approach. SCAQMD stated:

> The Draft EIR/EIS incorrectly uses a static 2012 year in comparison to project impacts. This approach is inappropriate because existing regulations (e.g., ARB's Truck and Bus Rule) will lower this health risk, even in the absence of this project. By using a static 2012 baseline, the Draft EIR/EIS is taking credit for other projects (e.g., ARB regulations) as a component of the build alternatives for the SR-710. *See* letter from I. MacMillan to G. Damrath, August 5, 2015, attached as Exhibit 9.

The RTP/SCS PEIR preparers attempt to remedy this problem by conducting a second analysis – one that compares PM2.5 and CO emissions in 2040 with and without the Plan. PEIR at 3.3-41. Curiously, however, the PEIR declines to use this "with and without" plan analysis to evaluate the significance of other Plan impacts affecting air quality. *Id.* In particular, the PEIR fails to perform a similar 2040 "with and without" analysis for NOx and ROG, which are ozone precursors. Such an analysis is critical since the SCAG region is nonattainment for ozone, and NOX and ROG are emitted in large amounts by on-road vehicles. *See* Fox Report at 4 (on-road vehicles emit 35 percent of the ROG and 61 percent of the NOx in the SCAQMD region).

According to Dr. Fox, if the PEIR had conducted an analysis for ROG and NOx that was similar to the analysis of CO and PM, it would show that the Plan will increase NOx and ROG emissions throughout most of the SCAG region. Fox Report at 5. Because most areas in the SCAG region already exceed the 8-hour national ambient air quality standard for ozone, the Plan would thus (1) contribute to existing exceedances in some areas, and (2) likely cause new exceedances in others. The PEIR's use of a baseline that masked the Plan's potential to cause these exceedances violates CEQA. CEQA Guidelines Appendix III(b); *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority*, 57 Cal.4th at 445.

3. The PEIR Fails to Analyze the Plan's Cumulative Air Quality Impacts.

The PEIR errs in its approach to analyzing the Plan's cumulative air quality impacts. The PEIR concludes that cumulative impacts pertaining to PM2.5 and ozone would be less than significant because Plan emissions, when compared to existing conditions, would result in either no change or a decrease in projected long-term emissions. This is wrong. For the reasons discussed previously, the projected emission decreases are due not to the Plan, but to changes in state and federal regulations. Because the Plan consists of thousands of individual transportation projects that will be built out between 2015 and 2040, its emissions may well increase at a given location and point in time between 2015 and 2040, depending upon the phasing of the projects. In fact, PEIR Figures 3.3.4-1 and 3.3.4-2 clearly show that the Plan would cause CO and PM2.5 emissions to increase in many areas.

Moreover, in determining the significance of a project's incremental contribution, the question is not the relative amount of the project's contribution to the existing cumulative problem (i.e., does the project contribute the same, less, or more than other projects), but rather whether the addition of the project's impact is significant in light of the serious existing problem (i.e., is the project's contribution to the existing problem cumulatively considerable). Thus, the greater the existing environmental problem is, the lower the threshold of significance is for considering a project's contribution to the cumulative impact. *Communities for a Better Environment v. California Resource Agency* (2002) 103 Cal.App.4th at 120 (disapproved on another ground in *Berkeley Hillside Preservation v. City of Berkeley* (2015) 60 Cal.4th 1086, 1109, fn. 3). Inasmuch as the RTP/SCS would cause air pollutant emissions to increase in a region that already suffers from extreme air pollution, the Plan's incremental contribution is clearly cumulatively considerable.

4. The PEIR Fails to Adequately Analyze or Mitigate the Plan's Construction-related Impacts.

The PEIR concludes that "[t]he construction and operation of individual transportation projects and anticipated development as result of the proposed transportation and land use strategies in the 2016 RTP/SCS are expected to have the potential to violate air quality standards or contribute substantially to an air quality violation, thus requiring the consideration of mitigation measures." PEIR at 3.3-40.

The PEIR errs, however, because it does not provide any substantive analysis to support this conclusion. To begin with, it does not describe the existing regulatory framework for off-road construction equipment, or identify any criteria for evaluating the Plan's construction emissions. It then fails to provide any estimate of the Plan's actual construction-related emissions. These omissions violate CEQA. An agency's rote acknowledgement that impacts are "significant" does not cure its EIR's failure to analyze the issue. As the court stated in *Galante Vineyards v. Monterey Peninsula Water Management Dist.*, "this acknowledgment is inadequate. 'An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences . . . .'" (1997) 60 Cal.App.4th 1109, 1123 (quoting *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 831); *see also Mira Monte Homeowners Assn. v. County of Ventura* (1985) 165 Cal.App.3d 357, 365 (an EIR is meant to protect "the right of the public to be informed in such a way that it can intelligently weigh the environmental consequences of a[] contemplated action.").

The PEIR includes measures to reduce construction-related emissions (at 3.3-51), but contrary to CEQA, the document provides no analysis of the effectiveness of these measures to reduce emissions. Furthermore, as Dr. Fox explains, to assure that the Plan is eligible for federal funding in accordance with 40 CFR Part 93, Subpart B, and its construction emissions must be reduced to zero. Fox Report at 7. Here, the PEIR failed to estimate construction emissions, before and after mitigation to, demonstrate that they would meet this requirement.

Finally, as the Fox Report explains, the PEIR identifies only five (ineffective) mitigation measures for reducing the Plan's significant construction-related impacts before simply concluding that the impacts would be significant and unavoidable. PEIR at 3.3-54. In fact, there are numerous additional mitigation measures that SCAG could adopt to reduce these impacts. *See* Fox Report pps. 8 through 18. The revised PEIR should evaluate the feasibility of each of the measures. If the document determines that any measure is infeasible, it must support this determination with substantial evidence. *Friends of Oroville,* 219 Cal.App.4th at 841-44.

5. The PEIR Fails to Adequately Evaluate the Plan's Potential to Expose Sensitive Receptors to Substantial Pollutant Concentrations and Harm Public Health.

Studies show that diesel exhaust and other cancer-causing chemicals emitted from cars and trucks are responsible for as much as 90 percent of the overall cancer risk from airborne toxics in California. PEIR at 3.3-17 and 3.3-20. With nearly half of U.S. adults living with a chronic disease, we commend SCAG for its decision to place great emphasis on public health in the 2016 RTP/SCS. *Id.* at 2-31; 3.3-45. SCAG takes an important first step by preparing a health risk assessment ("HRA") that assesses the potential carcinogenic risk to persons potentially exposed to harmful diesel exhaust emissions near major transportation corridors within the SCAG region. *Id.* at 3.3-32; 3.3-43. Unfortunately, as the Fox Report explains, the HRA is incomplete, poorly supported, and poorly presented.

(a) The PEIR's HRA Relies on an Incorrect Baseline for Determining the Significance of the Plan's Health Risks.

The PEIR substantially understates the Plan's health risks because the HRA relies on the same flawed baseline approach described above for air quality impacts, inappropriately comparing Project impacts in 2040 with 2012 baseline conditions. This baseline approach is misleading because it gives the false impression that the Plan, when fully implemented, would significantly decrease cancer risk. It does so by allowing the Plan to take credit for state and federal regulations that, independently, lower diesel particulate matter ("DPM") emissions. The HRA should have evaluated health risks in 2040 with and without the Plan, so that the public and decision-makers can evaluate how the Plan itself—not the emission reductions from regulatory measures—will affect public health.

(b) The PEIR Substantially Understates the Plan's Health Impacts Because It Studies Only a Fraction of the Plan's Highway Projects.

The RTP/SCS would affect about 70,904 highway lane miles. *See* PEIR Appendix D at 4. The PEIR's HRA, however, evaluates cancer risks along only 16 "representative" segments, each about one mile long—or only 0.025 percent of the entire SCAG transportation network. *See* Fox Report at 20. This small sample size is not adequate to evaluate the Plan's regional health impacts.

Compounding the problem, the PEIR never explains how the 16 transportation corridors were selected, other than a vague statement suggesting factors such as the corridors' proximity to sensitive receptors and population, traffic, and VMT. *Id.* at 3.3-33. The PEIR should disclose the number of additional freeway segments not included among the 16 analyzed that would pose a significant increased health risk. For starters, there should be an analysis for all freeway segments that have the potential to increase traffic. As discussed below, such an analysis is particularly important for the SR-710 North Project, which poses significant health risks yet is entirely ignored by the PEIR.

(c) The PEIR Does Not Analyze the Health Risk Near the SR-710 North Project.

The PEIR analyzes health risk to I-710, but this analysis focuses solely on the I-710 South Project. The I-710 South is a separate project from the SR-710 North and is located near Compton, a community considerably south of the SR-710 North Project. *See* PEIR Table 3.3.4-3 on page 3.3-45; and Appendix D at 48 and pdf page 84 (indicating that the I-710 South Project is near Compton). Because the SR-710 North Project is included in the 2016 RTP/SCS, SCAG's failure to analyze its health risk impacts is improper under CEQA.

It is especially important that SCAG include the SR-710 North Project in its analysis of health risks because the DEIR/S prepared for the Freeway Tunnel Alternative was sorely lacking. While the DEIR/S's HRA determined that the Freeway Tunnel Alternative would present a significant health risk to local residents when compared to a No Build scenario, the main body of the SR-710 North Project DEIR/S concluded that this impact was less than significant. Consequently, the DEIR/S contains no mitigation despite the Project's significant health risk. *See* Exhibit 3 at 24; *see also* Exhibit 9 (SCAQMD stating that the DEIR/S relied on an improper baseline in its analysis of the Project's health risk impacts); and Exhibit 6 (USEPA stating that the DEIR/S is misleading regarding its conclusions that the build alternatives would cause a net decrease in cancer risks impacts.)

(d) The Health Risk Analysis Underestimates the Number of Potentially Affected People.

The HRA prepared for the RTP/SCS evaluates cancer risks only to sensitive receptors within 500 feet of a major freeway, asserting that "only a small portion of the total number of existing sensitive receptors in the six counties are affected by the transportation projects . . . ." PEIR at 3.3-42. At the same time, however, the HRA demonstrates that significant cancer risk could occur at over 1,300 meters (4,264 feet) from a freeway. PEIR Appendix D at 48.

According to the Fox Report, this much larger significant risk area is consistent with other studies in the Project area demonstrating that cancer risk from DPM extends many miles beyond a freeway. Fox Report at 22. For example, Los Angeles County Public Health has determined that the exposure to unhealthy traffic emissions may occur up to 1,640 feet. *See* Air Quality Recommendations For Local Jurisdictions, Los Angeles County Public Health, January 22, 2013, attached as Exhibit 10. Consequently significant cancer risk, greater than 10 in one million exposed, likely extends far beyond 500 feet from a freeway, into densely populated areas where many more people are located. The PEIR must analyze these potentially significant impacts of the Plan.

(e) The Health Risk Analysis Focuses Solely on Emissions from Trucks, Ignoring Hazardous Compounds Emitted from Cars.

The PEIR errs further because it evaluates the cancer risk of only a single pollutant, DPM. DPM originates from on-road mobile sources that burn diesel fuel, i.e., primarily trucks. Yet, trucks make up a very small fraction of the total on-road vehicle fleet and vehicle miles traveled in the study area. By evaluating the health risks from only a tiny slice of on-road vehicles—trucks—the PEIR grossly understates the extent of the Plan's impacts.

Because passenger cars generally do not emit diesel exhaust, they were not included in the PEIR's analysis. However, these vehicles do emit many other hazardous air pollutants, including benzene, formaldehyde, and acrolein, which are potent carcinogens, as well as many hazardous air pollutants (HAPs), which can be acutely and chronically toxic. *See* PEIR Appendix D at 30. Accordingly, even though the cancer potency of DPM is higher than the HAPs present in car exhaust, the cancer risk from the Plan's non-diesel sources could be higher than that from the diesel sources because there are many times more cars than diesel-fueled vehicles in the study area.

The PEIR asserts that an analysis was done to determine the contribution of cars to total cancer risk and that, when cars are included, DPM is still responsible for 96.1 to 96.3 percent of the cancer risk. PEIR Appendix D at 31. Yet, the document provides no support for this conclusion, other than a reference to the prior RTP/SCS and a letter from James Dill and Russell Erbes. The revised PEIR must provide sufficient documentation for this result, so that the public and decision-makers can independently determine whether the cancer risk from cars is truly nominal.

(f) The PEIR Masks the Actual Health Effects of the Plan Because It Does Not Disclose Where the Impacts Would Occur.

The PEIR identifies the number of potentially impacted sensitive receptors but does not identify their location. Normally, environmental studies describe the geographical distribution of cancer risk through isopleth maps showing the boundary of the 10 in one million cancer significance threshold. Here, because the PEIR fails to include any isopleth maps, people living and working near the RTP highway projects have no way of determining whether their health would be impacted.

In addition, the true impact of a project depends on the number of excess cancer cases, not the cancer risk expressed per million exposed. Accordingly, using U.S. Census data, the HRA must determine the affected population and calculate the increase in the number of cancer cases due to the transportation projects in the Plan. To complete this "cancer burden analysis," this data must then be overlaid on maps, so that the public and decision-makers can determine the actual severity and extent of the Plan's health impacts.

Because the PEIR includes neither of these graphical displays – isopleth maps and cancer burden analysis – the document fails to disclose the true impacts of the Project.

(g) The PEIR's Mitigation Measures Are Vague, Optional, and Otherwise Unenforceable.

The primary goal of an EIR is to identify a project's significant environmental impacts and find ways to avoid or minimize them through the adoption of mitigation measures or project alternatives. Pub. Res. Code §§ 21002.1(a), 21061. The lead agency must adopt all feasible mitigation that can substantially lessen the project's significant impacts, and it must ensure that these measures are enforceable. Pub. Res. Code § 21002; CEQA Guidelines § 15002(a)(3), 15126.4(a)(2); *City of Marina v. Bd. of Trustees of the Cal. State Univ*. (2006) 39 Cal.4th 341, 359, 368-69. The requirement for enforceability ensures "that feasible mitigation measures included in project. Measures will actually be implemented as a condition of development, and not merely adopted and then neglected or disregarded." *Federation of Hillside and Canyon Assns. v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1261 (italics omitted); CEQA Guidelines § 15126.4(a)(2).

The PEIR concludes that the RTP/SCS's potential to expose sensitive receptors to substantial pollutant concentrations would constitute a significant and unavoidable impact. PEIR at 3.3-54. The PEIR identifies mitigation measures that would allegedly reduce these impacts, yet every one of the measures is vague, undefined and unenforceable. MM-Air-2(a)(1), for example, merely lists transportation control measures such as "programs for improved use of public transit" and "programs to limit or restrict vehicle use in downtown areas . . . ." PEIR at 3.3-50. Tellingly, these measures do not actually require that SCAG, or any other agency, take any action.

For each of the specified mitigation measures, the PEIR should have described the specific action that SCAG could take to lessen the impact. For example, SCAG has the authority to identify new transit routes and services beyond those already included in the RTP/SCS. It could identify opportunities for more frequent transit service, longer service hours, and improvements in system performance. Regarding the measure to limit or restrict vehicle use in downtown areas, SCAG could implement a test program modeled after the numerous European cities that are implementing car-free zones. Madrid has already banned most traffic from certain city streets.[9] When Paris briefly banned cars with even-numbered plates, pollution dropped as much as 30 percent in some areas—and now the city plans to make the plan permanent. These are the exact types of programs that a regional transportation agency such as SCAG should be studying and implementing, yet the PEIR's mitigation commits the agency to no action at all.

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[9] *See* 7 Cities That Are Starting To Go Car-Free available at http://www.fastcoexist.com/3040634/7-cities-that-are-starting-to-go-car-free. Accessed January 12, 2016.

Other mitigation measures are similarly vague and unenforceable. MM-Air-2(a)(4) calls for action from lead agencies "if they determine that a project has the potential to expose sensitive receptors to substantial pollutant concentrations." PEIR at 3.3-52. The PEIR suggests that these agencies "can and should consider" measures to reduce cancer risk "as applicable and feasible." *Id.* at 3.3-52,53. But simply directing other agencies to take action "if feasible" does not provide the necessary assurance that mitigation measures will actually be implemented.

Finally, many of the mitigation measures that the PEIR identifies are simply unrealistic, as they require new state or federal rulemaking. These include:

- Set technology forcing new engine standards
- Reduce emissions from in-use fleet
- Reduce petroleum dependence
- Proposed new transportation-related SIP measures

Thus, while the PEIR appears to include a long list of mitigation measures, a careful review demonstrates that few, if any, of these measures will actually reduce the Plan's significant air quality and public health impacts. As a result, we can find no evidence that SCAG is seriously committed to protecting the public from the serious health impacts of its Plan.

D. The PEIR Fails to Properly Analyze the Plan's Contribution to Climate Change.

The PEIR's analysis of GHG emissions attributable to the Plan is deficient. CEQA is clear that lead agencies must thoroughly evaluate a project's impacts on climate change. *See* Pub. Res. Code § 21083.05. Consistent with this mandate, the CEQA Guidelines require lead agencies to determine the significance of a proposed project's GHG emissions. CEQA Guidelines § 15064.4. If an agency's analysis indicates that a proposed project will have a significant project-specific or cumulative impact on climate change, the agency must identify and adopt feasible mitigation measures to address this impact. CEQA Guidelines § 15126.4(c).

Reducing GHG emissions is one of the most urgent challenges of our time. In recognition of this urgency, in 2005, Governor Schwarzenegger's signed Executive Order S-3-05, which established a long-term goal of reducing California's emissions to 80 percent below 1990 levels by 2050. The order also directed several state agencies (collectively known as the "Climate Action Team") to carry its goal forward. The following year, the Legislature enacted the Global Warming Solutions Act of 2006 ("AB 32"), codified at Health and Safety Code § 38500, *et seq*. By these authorities, California has committed to reducing emissions to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. In 2015, Governor Brown took further action to meet this challenge by issuing Executive Order B-30-15, which sets an interim target of 40 percent below 1990 levels by the year 2030.

The PEIR recognizes that the SCAG region could face "devastating environmental impacts" unless GHG emissions are curbed significantly. *See* PEIR at 3.8-29. Given CEQA's requirement to properly analyze the environmental impacts of GHG emissions—and the importance of regional transportation planning in meeting state goals to reduce GHGs—it is disappointing that the PEIR's analysis of the Plan's climate change impacts falls short. As a long-range transportation plan authorizing an investment of $556 billion in regional transportation improvements over a 20-year period, the Plan is the ideal means by which SCAG can make sure that the region helps California meet its GHG reduction goals, which are critical to ensuring the public's long-term health and welfare. Achieving meaningful GHG reductions is especially critical in Southern California, where transportation emissions account for a much higher percentage of total emissions than the national average. PEIR at 3.8-29 (transportation emissions account for 40 percent of total emissions in SCAG region, but only 27 percent of total emissions nationally).

Unfortunately, the Plan fails in this respect. Although SCAG projects decreases in GHG emissions over the life of the Plan, the Plan's reductions fall far short of what is required. SCAG touts the Plan's moderate reductions in GHGs over time, but these decreases are inconsistent with the steep downward trajectory established by Executive Orders S-3-05 and B-30-15. This shortcoming arises in part because the Plan does not go far enough to prioritize transit over highways, and the Plan's inclusion of the SR-710 North Project is a particularly troubling example. The PEIR's failure to disclose the Plan's inconsistency with state climate policy violates CEQA.

1. The PEIR Fails to Analyze the Plan's Inconsistency with State Climate Policy.

The Supreme Court has recently weighed in on appropriate thresholds for GHG emissions. In *Center for Biological Diversity v. California Department of Fish and Wildlife* ("*Center for Biological Diversity*"), the Court affirmed reliance on compliance with AB 32's reduction goals as a valid threshold of significance when used as a "comparative tool for evaluating efficiency and conservation efforts." *Center for*

Biological Diversity v. California Dep't of Fish & Wildlife (2015) 62 Cal.4th 204, 260-63.

In addition to properly analyzing consistency with the reduction goals set under AB 32, the PEIR must analyze the Project's consistency with state climate policy as set forth in Executive Orders S-3-05 and B-30-15. Yet, while the PEIR acknowledges Executive Orders S-3-05 and B-30-15, it does not analyze the Project's consistency with either directive in any meaningful way. Instead, it provides a "discussion . . . for illustrative purposes" and, without any further analysis or justification, asserts that the Plan "is consistent, if not more aggressive, with the accelerated pace established in the recent Executive Order B-30-15." PEIR at 3.8-40. This bare, unsupported assertion is not the careful evaluation of potential impacts against a threshold of significance that CEQA requires. *See Lotus v. Department of Transportation* (2014) 223 Cal.App.4th 645, 654.

The PEIR tries to dodge its obligation to conduct a meaningful analysis by arguing that "the Executive Orders are not plans, policies or regulations adopted for the purpose of reducing GHG emissions." *Id.* But the Supreme Court has clearly signaled that agencies taking a goal-consistency approach to CEQA significance should consider the extent to which a project meets longer-term emissions reduction targets. *Center for Biological Diversity*, 62 Cal.4th 204 at 260, fn. 6 (citing Executive Orders S-3-05 and B-30-15). And the Court of Appeal has recognized that Executive Order S-3-05, designed to meet the environmental objective of climate stabilization, is highly relevant under CEQA. *Sierra Club v. County of San Diego* (2014) 231 Cal.App.4th 1152, 1157 (quoting the California Attorney General).

Other agencies have adopted the Executive Orders as thresholds of significance for long-term projects, including Regional Transportation Plans. For example, in 2015 the San Diego Association of Governments ("SANDAG") used them as a threshold of significance in the EIR for its most recent RTP/SCS. Specifically, Impact GHG-4 of that EIR asked whether the project would "[b]e inconsistent with the State's ability to achieve the Executive Order B-30-15 and S-3-05 goals of reducing California's GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050." *See* SANDAG's 2015 RTP/SCS EIR at 4.8-33, Section 4.8 attached as Exhibit 11; *see also Cleveland National Forest Foundation v. SANDAG* (November 24, 2014) 180 Cal.Rptr.3d 548 (Review Granted, 343 P.3d 903).

The SANDAG RTP/SCS EIR evaluated the project's impacts by calculating a 40 percent and 80 percent reduction from the region's 1990 emissions and using those figures as a target reference point for the RTP. It then compared the region's expected GHG emissions in the years 2035 and 2050 to the emissions necessary to meet the Executive Orders' trajectories. It included charts showing that the Plan will not come close to meeting the Executive Orders' goals. It concluded: "Because the total emissions in the San Diego region of 25.5 MMT CO2e in 2035 would exceed the regional 2035 GHG reduction reference point of 14.5 MMT CO2e (which is based on Executive Order-B-30-15 and Executive Order S-3-05), the proposed Plan's 2035 GHG emissions would be inconsistent with state's ability to achieve the Executive Orders' GHG reduction goals. Therefore, this impact (GHG-4) in the year 2035 is significant." Exhibit 11 at 4.8-35. It reached a similar conclusion for the year 2050 goal. This straightforward analysis is easily adaptable to the projected emissions under SCAG's proposed Plan.

The PEIR's failure to compare the RTP/SCS's emissions against the long-term GHG emission reduction policies set forth in Executive Orders S-3-05 and B-30-15 is unlawful, and SANDAG's recent example demonstrates that there is no excuse for the omission. SCAG has access to the state's GHG reduction goals, which reflect the emissions decreases that climate scientists have concluded are needed to provide a 50-50 chance of limiting global average temperature rise to 2°C above pre-industrial levels. The PEIR should reveal the nature and extent of the Plan's sharp inconsistency with these clear goals. Because the PEIR nowhere discloses how far off course the Plan will set the region from state climate targets, it fails to satisfy CEQA's most basic informational purpose. *See* Pub. Res. Code § 21061 ("The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect that a proposed project is likely to have on the environment").

E. The SR-710 North Project Impedes the Plan's Goals for GHG Emission Reductions and Increasing Sustainable Transportation.

The SR-710 North Project would impede the Plan's goals because it will increase highway capacity and induce travel rather than ensure a sustainable regional transportation system. As we explained in our comment letter on the SR-710 North Project DEIR/S (*see* Exhibit 3), the evidence suggests that the Freeway Tunnel Alternative would significantly increase GHG emissions. Specifically, total VMT would increase in the Project area as a result of the Freeway Tunnel Alternative by as many 460,000 miles per day. *See* Exhibit 3 (citing the Project DEIR/S Transportation Technical Report). Per capita VMT would also increase as a result of the Freeway Tunnel Alternative. *Id.* These impacts directly contradict and undermine SCAG's efforts to reduce GHG emissions in its RTP, as the increase in VMT from operation of the Freeway Tunnel Alternative would lead to substantial increases in GHG emissions.

The link between increased VMT and increased GHG emissions is well-established. Multiple studies and a report by the California Air Resources Board ("CARB") demonstrate that increases in VMT overwhelm planned improvements in vehicle efficiency, thus making reductions in GHG emissions impossible without concomitant reductions in VMT. *See* Growing Cooler: Evidence on Urban Development and Climate Change at 3, excerpts attached as Exhibit 12; "Increases in Greenhouse-gas Emissions From Highway-widening Projects," Sightline Institute, October 2007, attached as Exhibit 13. In fact, under almost any set of plausible assumptions, increasing highway capacity in a congested urban area, as the Freeway Tunnel Alternative would do, will substantially increase GHG emissions over the long term. *See* Exhibit 4.

CARB provides strong evidence on the relationship between increases in highway capacity, induced travel, and increased GHG emissions. In its recent report entitled "Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions," CARB confirmed that increased capacity induces additional VMT." *See* Exhibit 14 at 3. As CARB explains, "[a]ny induced travel that occurs reduces the effectiveness of capacity expansion as a strategy for alleviating traffic congestion and offsets any reductions in GHG emissions that result from reduced congestion." *Id.* at 2. Accordingly, the Freeway Tunnel Alternative, which will increase VMT and therefore increase GHG emissions, is incompatible with the Plan's goals for emissions reductions.

Moreover, as discussed above, the Freeway Tunnel Alternative, which will increase freeway capacity at the expense of transit, rail, and active transportation options, contravenes the following RTP/SCS PEIR's statement:

> The Plan would not conflict with the recommendation to increase investment in expanded transit and rail services, active transportation, and other VMT reduction strategies in the Scoping Plan Update. From 2016 to 2040, the Plan includes increased investment in transit and rail services, active transportation, and other VMT reduction strategies.

PEIR at 3.8-39. By increasing highway capacity to the exclusion of transit, rail, and active transportation alternatives, the Freeway Tunnel Alternative precludes modes of transportation capable of reducing GHG emissions.

Similarly, the RTP/SCS PEIR lists "climate change mitigation strategies" to reduce GHGs in the SCAG region," which include, among other things, "Reducing automobile dependence" and "Increasing transit options." PEIR at 3.8-30. Yet the

Freeway Tunnel Alternative undermines and controverts these key strategies for emission reduction by *increasing* automobile dependence and building more freeway capacity. The RTP/SCS PEIR ignores this conflict, in violation of CEQA.

Without fully informing the public of the severity of the Plan's climate change impacts, or analyzing the extent to which individual Projects—such as the Freeway Tunnel Alternative —would impede the Plan's GHG reduction efforts, the PEIR fails as an informational document.

F. There Is No Evidence that the SR-710 North Project Was Included in the GHG Inventory for the Plan.

Given the Freeway Tunnel Alternative's inconsistency with the Plan's GHG emission reduction goals and sustainable transportation goals, it is alarming that the PEIR's technical report on GHGs (Appendix C) makes no mention of the SR-710 North Project. In fact, there is no evidence that the PEIR included the emissions from the SR-710 North in the Plan's GHG inventory at all.

In explaining its methodology, the PEIR states simply, "GHG emissions and transportation data were projected to 2040 using SCAG's Regional Travel Demand Model, and ARB's EMFAC2014 emissions model." Appendix C at 71. The document does not bother to describe the model, its assumptions, or whether and how it took emissions from individual projects, such as the SR-710 North Project, into account. Without this critical information, the public cannot evaluate the adequacy of the PEIR's GHG analysis, and the PEIR fails as an informational document.

V. Conclusion

In summary, the 5-Cities Alliance respectfully requests that SCAG eliminate the SR-710 North Project from the 2016 RTP/SCS. First, the Freeway Tunnel Alternative is flawed and unnecessary, failing to provide a real solution to the region's transportation needs. Second, the Freeway Tunnel would be inconsistent with the RTP/SCS's goal that transportation projects be sustainable and environmentally protective. Third, there are viable alternatives to the Freeway Tunnel that improve mobility and expand transportation options while limiting dependence on personal vehicles. Finally, the PEIR's evaluation of environmental impacts from the RTP/SCS's transportation projects generally, and from the SR-710 North Project specifically, fails to comply with CEQA.

In the event that SCAG does not eliminate the SR-710 North Project from the RTP/SCS, it will need to prepare and recirculate a revised PEIR correcting the problems identified in this letter.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

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ccs: La Cañada Flintridge City Council
Glendale City Council
Pasadena City Council
Sierra Madre City Council
South Pasadena City Council

List of Exhibits:

Exhibit 1	Nelson Nygaard Report (Transportation).
Exhibit 2	Dr. Phyllis Fox Report (Air Quality and Health Risk).
Exhibit 3	Letter to G. Damrath, Chief Environmental Planner, July 9, 2015.
Exhibit 4	Surface Transportation Policy Project, *Build It and They'll Come*.
Exhibit 5	California Department of Transportation, *California's 2040 Transportation Plan*, March 2015.
Exhibit 6	Letter from J. Blumenfeld to C. Bowe, August 27, 2015.
Exhibit 7	Emails between C. Aguirre and M. Lin.
Exhibit 8	City of South Pasadena's NOP Letter to L. Sun (SCAG), April 7, 2015.
Exhibit 9	Letter from I. MacMillan to G. Damrath, August 5, 2015.
Exhibit 10	Los Angeles County Public Health, *Air Quality Recommendations For Local Jurisdictions*, January 22, 2013.
Exhibit 11	San Diego Association of Governments (SANDAG), *Regional Plan EIR: Section 4.8, Greenhouse Gas Emissions*, October 2, 2015.
Exhibit 12	R. Ewing, et al., Urban Land Institute, *Growing Cooler: The Evidence on Urban Development and Climate Change*, excerpts.
Exhibit 13	Sightline Institute, *Increases in Greenhouse-gas Emissions From Highway-widening Projects*, October 2007.
Exhibit 14	S. Handy and M. Boarnet, California Air Resources Board, *Policy Brief in the Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions*, September 30, 2014.

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NELSON
NYGAARD

MEMORANDUM

To: Five Cities Alliance

From: Paul Moore, Jeffrey Tumlin, Rogelio Pardo

Date: January 12, 2016

Subject: DRAFT Nelson\Nygaard Review of 2016 RTP/SCS

PURPOSE OF REVIEW

This memorandum provides a summary of our review of SCAG's Draft 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), and its accompanying Draft Program Environmental Impact Report (PEIR), as the documents relate to the proposed I-710 extension (FTIP ID 18790). Because the PEIR provides a holistic environmental analysis of the impact the RTP/SCS is expected to have region-wide, the PEIR does not identify the impacts directly attributed to the I-710 extension. As a result, this review focuses on the I-710 project's conflicts with the overarching goals adopted by the RTP/SCS.

CONFLICTING RTP/SCS GOALS

Of the nine regional goals identified by the 2016 RTP/SCS, the four following goals can be seen as conflicting with the impacts of the I-710 extension:

- Maximize mobility and accessibility for all people and goods in the region
- Preserve and ensure a sustainable regional transportation system
- Maximize the productivity of our transportation system
- Protect the environment and health of our residents by improving air quality and encouraging active transportation

Conflicts are explained in the following sections.

Maximize mobility and accessibility for all people and goods in the region

The RTP/SCS is intended to develop a scenario that maximizes mobility and accessibility to transportation options to as many individuals as possible. However, the I-710 extension brings only minimal benefits to residents of the San Gabriel Valley area.

As shown in Figure 1, only 13.7% of peak hour congestion on arterials within the I-710 study area is projected to be caused by "cut-through," traffic travelling between adjacent cities. The project EIR estimates a reduction of cut-through traffic to a rate between 7.3% and 10.6% in the peak period.

In addition, 7-13% of motorists in the study area will see a travel time benefit of 2.5 minutes or better. For 87-93% of motorists, no significant travel time savings will result from the I-710 expansion.

Considering the cost of the proposed tunnel to connect the I-710 gap is approximately $5.5 billion, it is likely that funds would be more efficiently spent improving mobility via alternative modes and methods, as outlined in the Beyond the I-710 Proposal.

Alternatives that restrict trucks from the tunnel will produce little or no benefits for goods movements.

None of the I-710 tunnel options provide significant benefits for pedestrians, bicycle riders, or transit riders.

To the extent that the tunnel options provide some travel time benefits for a small number of motorists, the travel time savings in the tunnel are available only to those who can afford to pay the yet-undefined tolls.

Figure 1 2035 Cut-Through Traffic and Improved Travel Time[1]

		Freeway Tunnel Alt. (2035)	
	No Build (2035)	Low	High
PM Peak Period Percent Cut-Through Traffic Using Arterials in Study Area	13.7%	7.3%	10.6%
Percent AM and PM Peak Period trips more than 2.5 minutes faster than No Build	-	7.0%	13.0%

Preserve and ensure a sustainable regional transportation system

Prioritizing Funds for Preservation and Sustainability

Preservation of the existing transportation system, particularly the highway network, is identified as a key priority in the RTP/SCS. The cost of the I-710 project is equal to about 8% of the funds made available for state highway maintenance in the RFP/SCS expenditure plan. As noted above, these funds could be better utilized to provide sustainable alternatives within the study area, or to maintain existing infrastructure.

Ensuring Sustainability

When discussing sustainability of the transportation system, reducing VMT per capita is a significant metric, as it identifies a shift from dependence on personal vehicles, and a reduction of stress on our congested arterial and highway networks. With this in mind, it is critical to note that the findings of the I-710 Transportation Technical Report show an increase of localized VMT in

[1] Transportation Technical Report, SR 710 North Study, Table 4-9, pg 4-18.

the build-out scenario, when compared to a no-build scenario, as seen in Figure 2. Building the I-710 extension is predicted to increase VMT by as much as 460,000 miles per day.

The I-710 extension results in increased demand of the localized highway network, as evident in the VMT projections below. As a result, an increase in VMT of 2% as a result of project build-out highlights a step backwards in promoting sustainable alternatives to driving. A no-build scenario, however, is consistent with the goals of SCAG's RTP/SCS, reducing VMT by 11%.

Figure 2 Study Area VMT: No Build and Freeway Tunnel Alternatives

	No Build (2035)	Freeway Tunnel Alt. (2035)	
		Low	High
Daily Study Area VMT per Day	25,120,000	25,300,000	25,580,000
Study Area Population	1,330,000	1,330,000	1,330,000
Study Area per capita VMT per Day	18.89	19.02	19.23
Estimated Increase in Total Daily VMT Compared to No-Build[2]	-	180,000	460,000
Increase in per capita Daily VMT Compared to No-Build	-	+1%	+2%

Maximize the productivity of our transportation system

Extending the I-710 adds to the existing transportation network, before maximizing the system on a local level. As noted by SCAG, the arterial and highway network provide the backbone that supports transportation in the region. However, this does not mean that all opportunities to expand the backbone network should be pursued, especially to accommodate vehicular traffic, as the I-710 expansion would do.

Instead, it is important to identify alternative tools and strategies that can be employed to maximize current network utility, without expanding capacity and inducing more vehicular traffic. The New Initiative for Mobility and Community, developed by Nelson\Nygaard[3], provides a comprehensive look at an alternative approach to improving mobility and accessibility in the San Gabriel Valley. The approach utilizes funds to strengthen the following networks instead of constructing a highway extension:

- Transit – Bringing rapid service, including missing north-south linkages, to provide an alternative mode for regional trips
- Active Transportation – Reducing conflicts between people and vehicles to create safer environments for residents to walk and bike within their community

[2] The EIR's analysis does not state how VMT is calculated, and no details about modeling have been provided, despite repeated requests. So we have estimated VMT difference as follows:

975 = hourly lane capacity

11,700 = lane capacity over 12-hour period (for argument's sake)

180,000 / 11,700 = 15.4

460,000 / 11,700 = 39.3

[3] Nelson\Nygaard. New Initiative for Mobility and Community, Retrieved from: http://www.beyondthe710.org/the_bt710_proposal

- Managing Demand – Using travel demand management strategies to encourage individuals to leave their vehicles at home
- Congestion – Spending efficiently to employ transportation system management strategies to address congestion for trips that simply must be made in a vehicle.

SCAG's preferred scenario states that, "best practices for increasing transportation choices; reducing our dependence on personal automobiles,[4]" are incorporated throughout the region. The I-710 study area provides an opportunity to highlight the benefits of choosing alternatives to capacity expansion to improve mobility.

Protect the environment and health of our residents by improving air quality and encouraging active transportation

The RTP/SCS showcases a continued emphasis on greenhouse gas emissions reduction statewide, necessary to continue the region's progress in meeting emission goals set by SB 375, and Governor Brown's Executive Order B-30-15, establishing a reduction target of 40% below 1990 levels by 2030.[5]

While the 710 project EIR/S shows a slight decrease in greenhouse gas emissions in the study area[6] as a result of some I-710 tunnel alternatives, the EIR findings do not reconcile the previously identified increases in VMT within the study area. As a result, the increased VMT and resulting greenhouse gas emissions, provide direct conflicts with SCAG and state goals for emission reductions.

In addition, utilizing funds for the I-710 extension limits the ability of funds to be used in alternative ways as identified by Nelson\Nygaard to improve conditions for active transportation, and as a result, the overall health of residents.

PRIORITIZING PUBLIC OPINION

SCAG takes pride in its public outreach efforts during the RTP/SCS process, in order to develop a "bottoms up planning effort," that incorporates the needs and concerns of residents throughout the region. Key findings from the 2016 RTP/SCS survey results, identifying participant priorities, are as follows[7]:

- Expansion of transportation choices
- Protection and preservation of existing transportation infrastructure via a "fix it first," policy (identified as priority by most respondents)
- Achievement of maximum productivity through system management and demand management (identified as priority by most respondents)
- Less focus on new road/lane construction to expand capacity
- Preference for creating more public transportation options, constructing bikeways, and improving traffic flow (in order)

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[4] SCAG, 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy, Pg. 65

[5] SCAG, 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy, Pg. 60

[6] Transportation Technical Report, SR 710 North Study, Table 4-9 and Table 4-10, pg 4-100

[7] SCAG, 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy, Pg. 64

Based on the public feedback received by SCAG, the public prefers managing and maximizing the utility of the current transportation system, over the expansion of road/highway infrastructure. The strategies proposed by Nelson\Nygaard as alternatives to the I-710 expansion better meet the public's priorities.

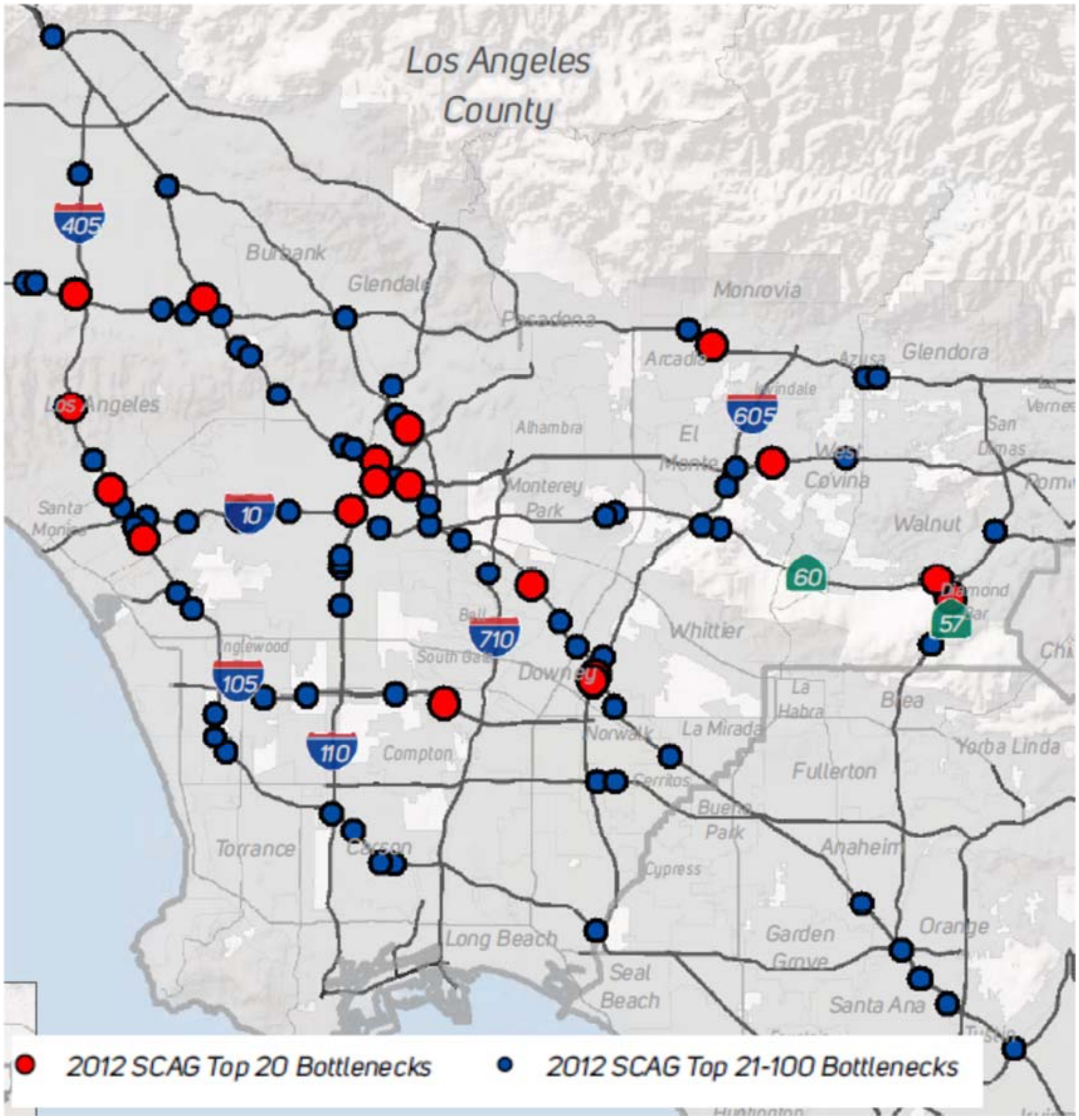
REFUTING THE NEED FOR AN I-710 "GAP CLOSURE"

Current Bottleneck locations

Of the top 100 "Road Bottlenecks" in the region, only one occurs along the I-710 corridor (at Washington Blvd), and is ranked 98th, as seen in the Congestion Management Appendices of the 2016-2040 RTP/SCS.[8] The results of the RTPs analysis suggest that the I-710 extension project should not be prioritized over identified bottleneck problems in the SCAG region. More importantly, the tunnel project EIR shows that it will in fact *exacerbate* the congestion bottleneck at I-710 and Washington by inducing between 1,330 and 2,180 additional vehicles per peak hour on I-710 through that interchange (see Figures 3-5 below).

[8] SCAG, 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy – Appendix: Congestion Management, Pg. 10

Figure 3 **Major Road Bottlenecks in the SCAG Region**[9]



Redistribution of Traffic

One of the major goals of the I-710 extension is improving congestion on the regional highway network. However, analysis of projected (2035) traffic patterns produced by the project EIR, show that overall performance of the highway network does not improve. Instead, traffic is observed to shift from some sections (ex. I-605 and SR-2), to others (I-5, I-10, I-210, and I-710), resulting in increased congestions in areas already at capacity, such as along the I-5. All proposed tunnel options result in roughly the same amount of traffic on all highways, with only the I-605 and SR-2 seeing benefits.

[9] SCAG, 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy – Appendix: Congestion Management, Exhibit 1, Page 11

Figure 4Figure 5 highlight the change in AM and PM peak period congestion, comparing expected congestion for the No-Build and Dual-Bore tunnel alternative. Figure 6 shows how the RTP/SCS incorporates the tunnel project congestion findings. Key findings of this analysis are as follows:

- Connecting the I-710 to I-210 succeeds in shifting a significant amount of traffic off the I-605 and onto the I- 710 and I-210, as well as inducing new north-south driving. Total traffic increases by about 1,350 vehicles in the peak hour on the I- 710 south of I-10, and about 2,600 vehicles per hour north of I-10. Traffic on the I-210 increases by about 380 vehicles per hour through La Canada Flintridge, and by about 400 vehicles per hour through Pasadena.
- The significant increase in congestion on I-210 means that many drivers would avoid using SR-2, and instead stay on the I-5, exacerbating existing traffic congestion on the I-5.
- The tunnel alternative results in significant induced north-south travel demand, adding traffic to both the I- 5 and I-210 freeways. Where those freeways join, in the bottleneck south of the SR-14 split, there would likely be a significant increase in traffic congestion, with an additional 650 vehicle in the peak hour. While the project would result in significant increases in congestion in this segment, the EIR/S does not acknowledge these impacts.

The lack of improvement to the highway network shown by the model, suggest that theI-710 expansion project does not have the capability to provide the desired relief. As such, SCAG should identify alternatives to provide strategic expansion of mobility options in the area.

Figure 6, taken from the Highways and Arterials Appendix of the RTP/SCS, shows that building the I-710 project as part of the RTP preferred scenario simply shifts congestion from one place to another. More importantly, compared to the 2040 baseline, the RTP scenario, with inclusion of the I-710 project, significantly worsens congestion and delay on portions of the I-710 and I-210 freeways.

Figure 4 2035 Change in AM Peak Period Congestion (Build vs. No Build Alternatives)

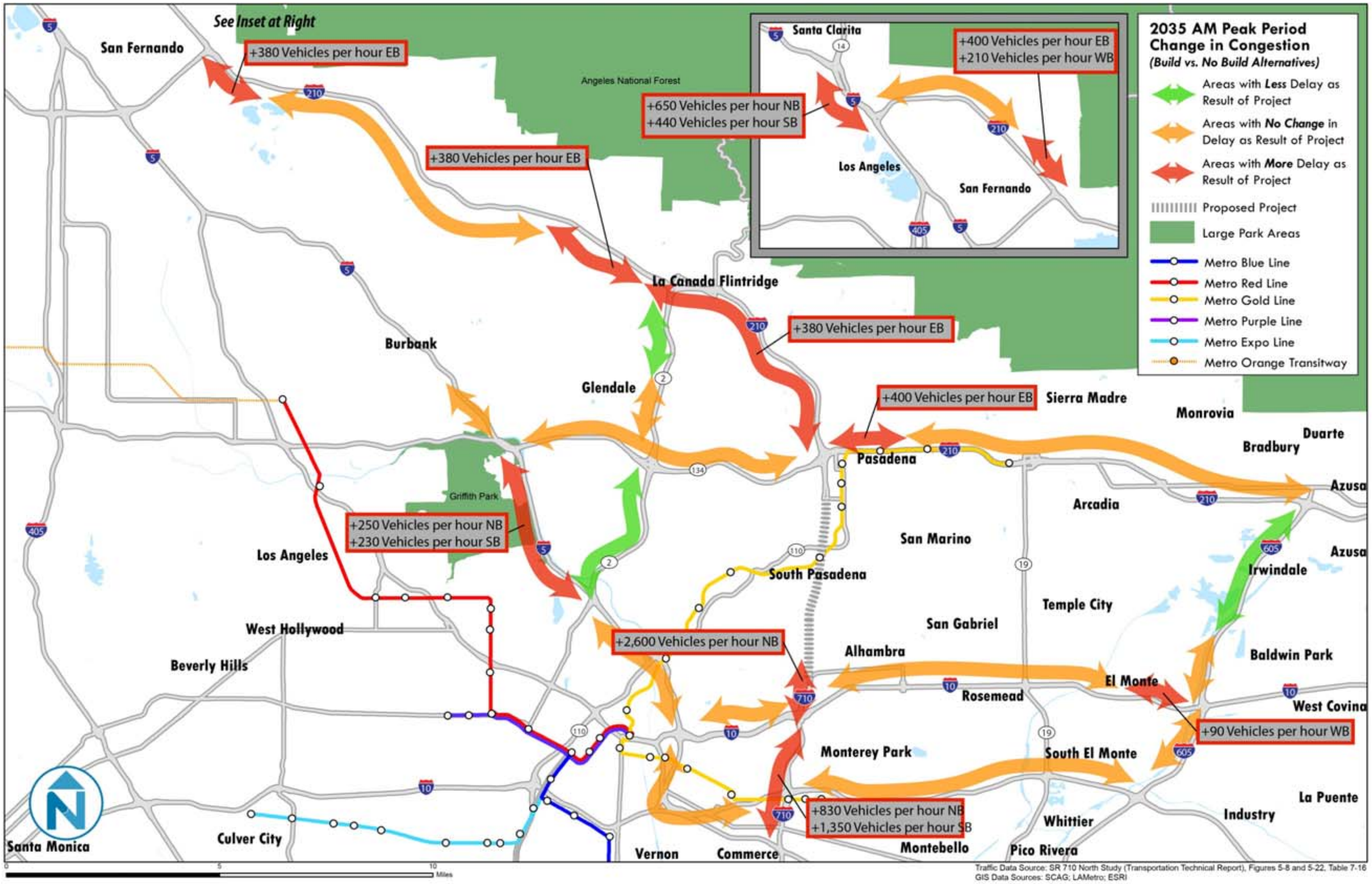


Figure 5 2035 Change in PM Peak Period Congestion (Build vs. No Build Alternatives)

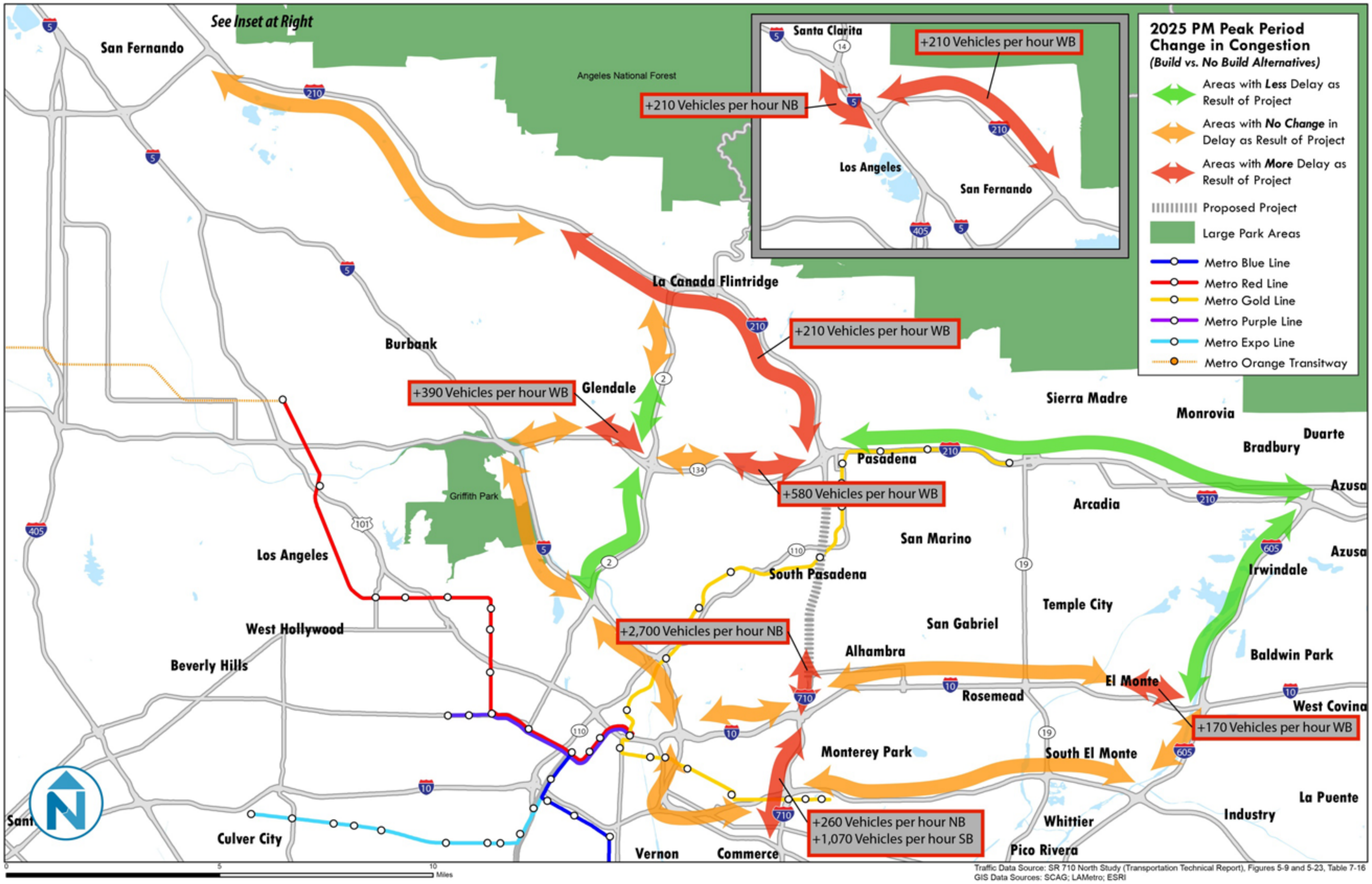


Figure 6 **Baseline 2040 to Preferred Scenario 2040: Freeway Speed Changes – PM Peak** [10]

Investment Effectiveness

The RTP/SCS process developed a series of four evaluation categories to evaluate the cost-effectiveness of the Plan's outcome. The categories were as follows[11]:

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[10] SCAG, 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy – Appendix: Highways and Arterials, Exhibit 12, Page 47

- Savings resulting from reduced travel delayed
- Air quality improvements
- Safety improvements
- Reductions in vehicle operating costs

If applying these categories to the I-710 extension project individually, it is likely that the benefits of time savings and air quality improvements would be minimal (if existent), due to the lack of time savings, and the likely increase in pollutant emissions as previously discussed. Additionally, the lack of funds to develop competitive alternatives to driving, and improving conditions for active transportation in the I-710 study area, would also result in limited positive impacts on safety improvements and reductions in vehicle operation costs.

[11] SCAG, 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy, Pg. 158

NELSON NYGAARD

NEW INITIATIVE FOR MOBILITY AND COMMUNITY

www.nelsonnygaard.com

SUMMARY

The San Gabriel Valley is an area of diverse cities and neighborhoods that trace the history of Southern California. New homes mingle with historic downtowns and educational institutions to create a lively sub-region. All of that activity, however, creates demand for ever-increasing mobility and access. The economic might of our region means we will continue to have opportunities to invest in transportation. Doing so in ways that serve our economy and environment, while supporting our health and quality of life, will require sound decisions. This initiative is a starting point that changes the conversation to focus on the transportation needs of the area and the opportunities that may be explored by the local community as they develop their vision for community mobility.

Transit – Building out the area's rapid transit network (particularly some missing north-south options) will make car ownership an option rather than a necessity – potentially improving life quality and household finance.

Active Transportation – Every trip starts by walking, and the people of this community deserve to be able to walk safely and comfortably. What better use of dollars is there than those spent to reduce injuries and deaths while taking cars off our congested roads?

Managing Demand – Sometimes it costs less to convince people not to drive than it does to accommodate driving with more road construction. Five-Hundred Million well spent dollars can take more cars off the roads than could be carried on a comparably priced new facility.

Congestion – While spending to create more choice, we can't lose sight of the fact that sometimes you just need to drive. Dollars spent smartly can help make those drives less miserable without encouraging the development sprawl that can result from less focused projects.

DIVERSE COMMUNITY, DIVERSE SOLUTIONS

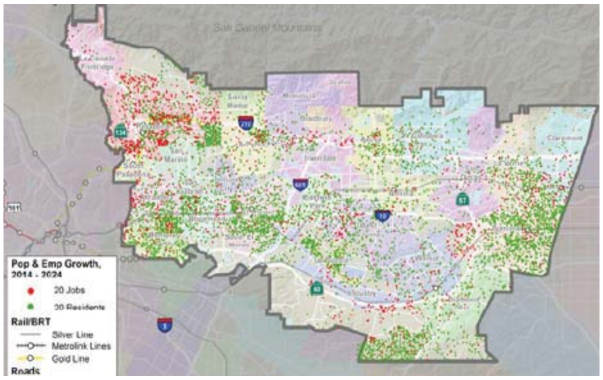
For many years, the idea of a 710 freeway connection has been misleadingly touted as a solution to the transportation woes of the San Gabriel Valley. The publication of the 710 Environmental Impact Report has made clear, however, that this 50-year old project is no solution. It does not help a community craving transit access. It does not address east-west mobility problems. It prohibits trucks, bikes, pedestrians and charges tolls for cars. Perhaps most importantly, it will consume all of the available financial resources for this area. Problems with the tunnel proposal include:

- The tunnel does not "pay for itself" through tolls as some have asserted.
- According to the EIR, the tunnel does not address congestion issues in Alhambra.
- The tunnel bypasses the very destinations people want to go to.

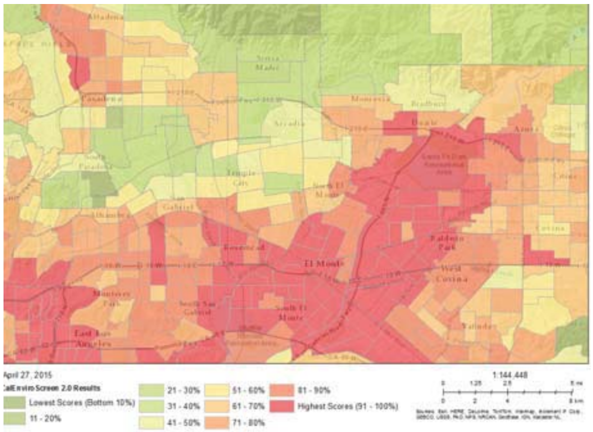
The San Gabriel Valley is a community of diverse people, with widely varying commute patterns. Employees need to make short commutes to Pasadena and long commutes to Burbank (Metro has found that 70 percent of study area vehicle trips start and end within the San Gabriel Valley). Students attending Cal State LA and East LA College need ways to make short commutes to school. Communities need to be able to walk safely to transit and want to be able to invest in ways that can improve air quality.

The set of ideas outlined in the pages that follow are intended as a starting point for the development of a real, community-based transportation vision. This is a compilation of many good ideas that have emerged from community and agency processes over the years. This diverse set of solutions should be refined based on community input and community needs in order to accommodate community aspirations. A community-based solution represents the best investment of our transportation dollars to connect and create community in the San Gabriel Valley.

It strains credibility that, despite holding scores of public open houses filled with community comment, no changes of substance have been made to any of the alternatives under evaluation. The 710 tunnel is not a community solution.



The addition of a 710 freeway linkage could bring the same level of environmental risk to local residents as that faced by residents in corridors such as I-605.



Analysis by Metro indicates the greatest population growth in the San Gabriel Valley will be in Pasadena - a community that has passed a resolution against 710 tunnel.

THE NORTH STUB

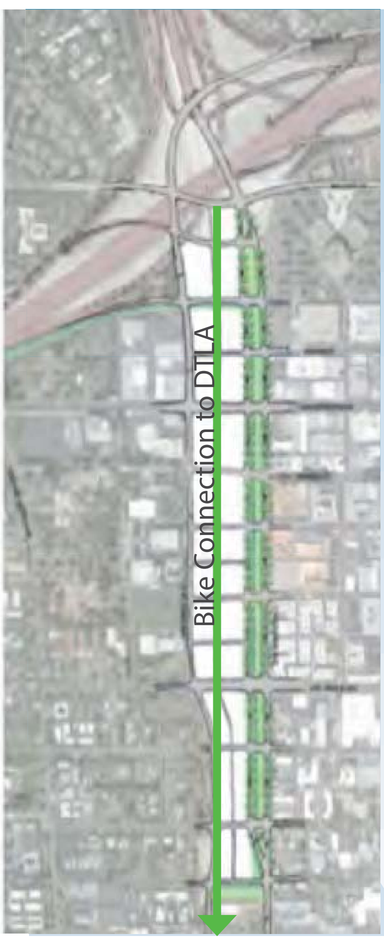
For fifty years this community has been held hostage to the wrong-headed idea of a freeway extension – an idea which has precluded all sensible solutions. Allowing these "complete street" connections to happen would improve access and reconnect neighborhoods as the land relinquished by Caltrans is put back into productive use. The plan could even facilitate a trail connection from Pasadena, along the Arroyo to the LA river.
As an example of the kind of solution that can be developed from the grass roots community, this vision of Pasadena's future stands in stark contrast to the 710 tunnel envisioned by planners (not influenced by community input).

This vision of reconnected streets supporting redevelopment would bridge the gap between downtown and West Pasadena.

QUICK COMPARISON

OPTION A:
FILL THE DITCH

OPTION B:
RETAIN CURRENT GRADES



Option A		Option B
+	East-West Connections	
+	Reducing Traffic Impacts	
+	Developable Land	
+	Grade Issues for Buildings	
+	Grade Issues for Access	
	Maintaining Bridges	X
+	Front/Back/Servicing	
+	Civic Open Space Plan	
?	Costs	?
←	MORE VALUE	

THE SOUTH STUB

The 710 freeway stub north of the 10 is over-scaled, and dumps all its traffic onto Valley Blvd, creating a congestion bottleneck. Converting the freeway into a boulevard allows us to solve its traffic problems by providing direct access to Cal State LA, and a 2-lane complete street connection to Alhambra Ave/Mission Rd, allowing traffic to be distributed into the arterial grid while protecting residential neighborhoods. A complete street connection through the emerging "Biotech Triangle" can reduce traffic at Fremont/Mission and cut-though along Concord Ave.

These changes also allow the restoration of Arroyo Rosa de Castilla, the year-round creek that runs alongside and under the 710, and the creation of over 30 acres of new parklands, three regular soccer fields, and a 2.5 mile bike path connecting Alhambra, El Sereno, and South Pasadena.

The boulevard also allows the creation of a new front door for Cal State LA, including 6.7 acres of flat, developable campus land.

Changing the disconnected south 710 Freeway stub into a connected boulevard would free up space for Cal State LA campus expansion, more efficiently disperse area traffic, provide space for premium transit including the opportunity to expand Dash service to El Sereno and Cal State LA. Perhaps more importantly it would connect communities, provide needed greenspace.

LEGEND

- New Rapid Bus
- Restored Aroyo Rosa de Castilla
- Golden Eagle Boulevard Complete Street
- Bike Path

THE NORTH STUB

Offers the potential to create 35 “new acres” of developable land to link the vibrant West Pasadena neighborhoods with Old Pasadena. This could create as much as 2.5 million square feet of new housing, retail, and office space.

Nearly 1,300 Residential units

Retail equivalent of expanding Old Pasadena by one-third

New Parks and Open Space

JOB CREATION

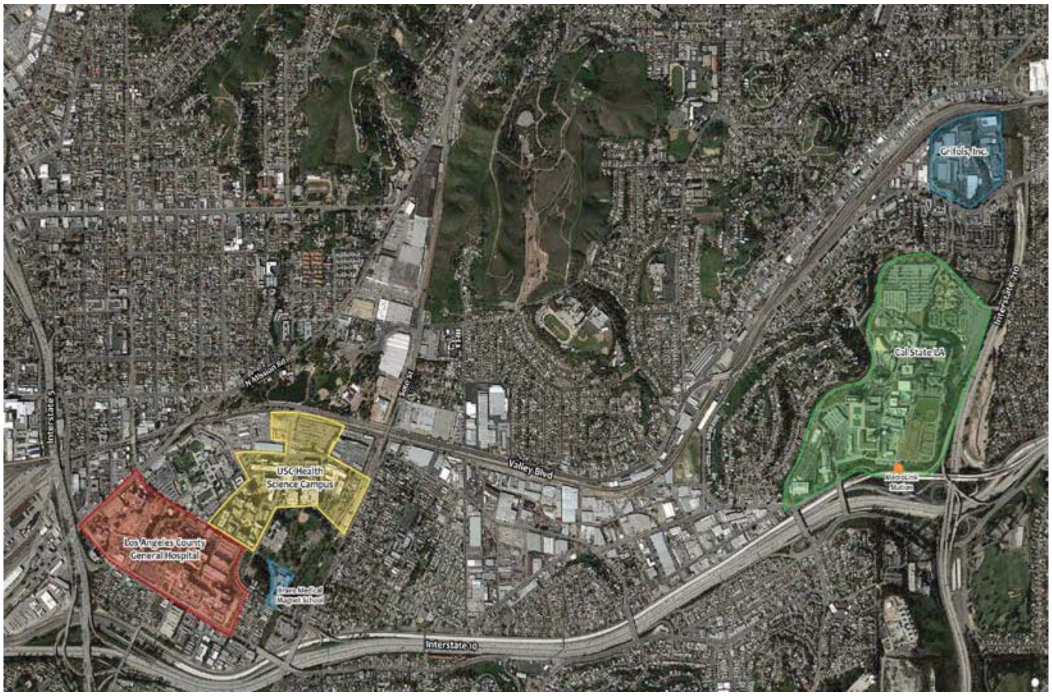
Building this development program will create more than 8,000 construction job years and more than $275 million in wages. Property and sales taxes are estimated to be more than $12 million per year.

Commercial space in the north stub could potentially house more than 4,000 on-going office and retail jobs.

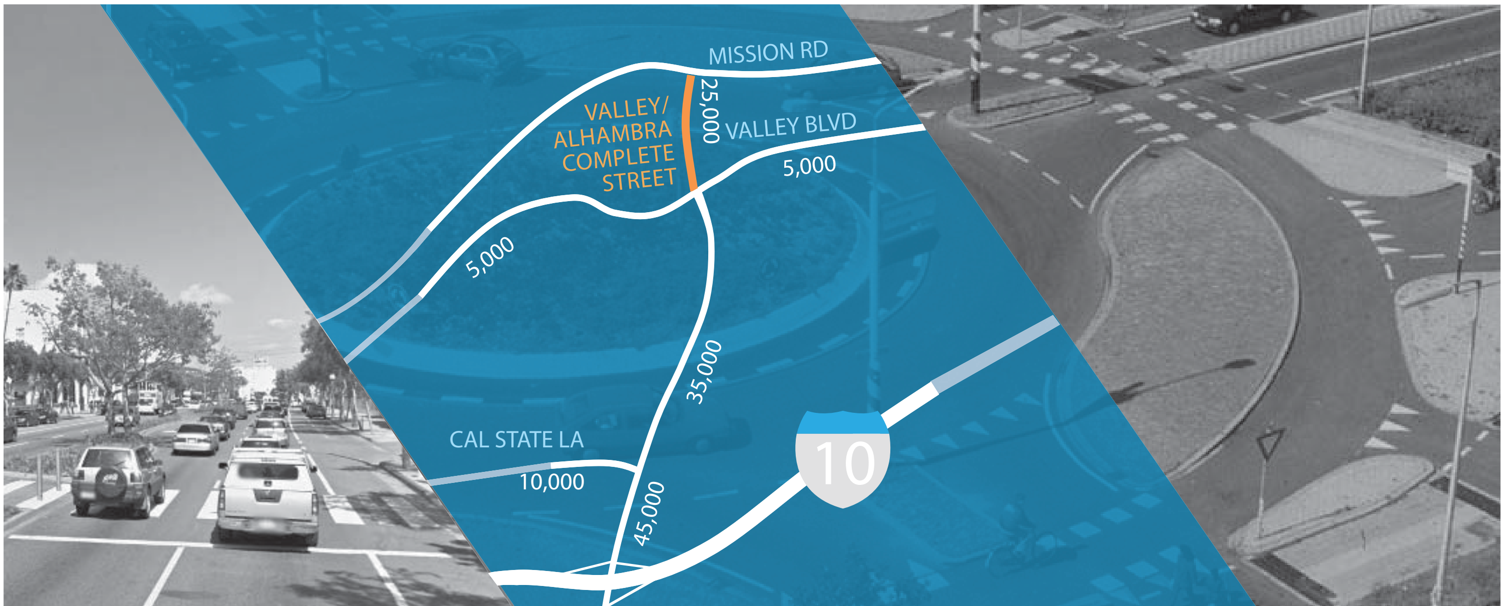
THE SOUTH STUB

Enhanced quality of life and home values from proximity to parks, open space, and transit.

Construction jobs from the development of a gateway for Cal State LA and buildout of the bus rapid transit system.



Support for the emerging Valley Boulevard Biosciences Corridor, connecting LAC/USC Medical Center, Keck School of Medicine, Bravo Medical Magnet High School, Grifols, Inc. and other private sector biotech firms.



SCALE OF GOLDEN EAGLE BLVD 45,000 VEHICLES PER DAY

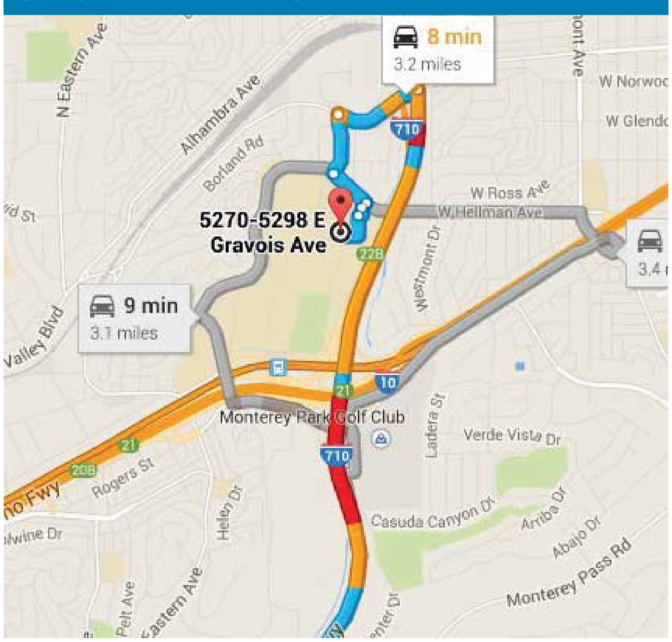
SCALE OF GOLDEN EAGLE BLVD/ MISSION RD

CONGESTION RELIEF

DISAPPEARING TRAFFIC

By replacing the freeway stub with a connected local street, "Golden Eagle Boulevard" would allow drivers to reach their destinations sooner – reducing traffic on the northern connector so much that a two-lane complete street (potentially ending in a traffic calming roundabout) could handle the reduced traffic. Measure R tax money was set aside for improvements to this corridor, but has gone unused so that the idea of a tunnel wouldn't be harmed. The citizens have already paid the taxes – it's time to get the benefit.

CAL STATE LA TRAFFIC



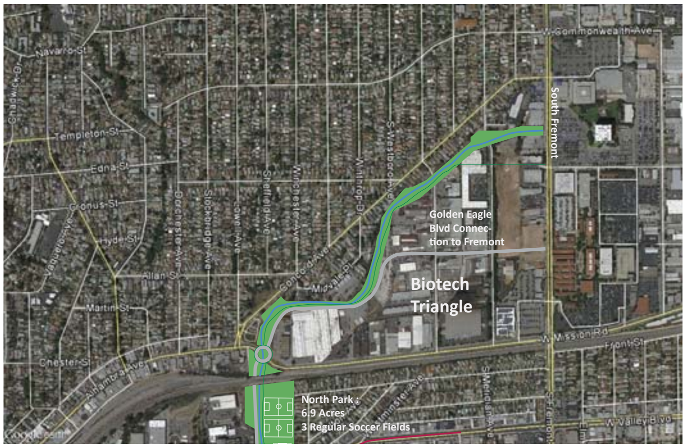
Currently, a query to Google would send a driver on a round about trip to Cal State LA, adding miles to the roads and congestion to local streets.

Changing the Freeway stub to a connected street and adding a complete street link to Mission Road is the real solution to area congestion.

RESTORATION

Restoration of the Arroyo Rosa de Castilla will provide local residents with increased open space, beautiful vistas, opportunities for active mobility, areas for community gatherings and overall improved quality of life.

BIOTECH TRIANGLE



Rebuilding the stub as a complete street would allow the restoration of the Arroyo Rosa de Castilla – a natural waterway that was piped and channelized to make room for the freeway stub.

The new street connection will provide a link between the University and the emerging "Biotech Triangle." Connecting these minds to the investment outcomes of their thinking allows this cycle of creativity to happen in the San Gabriel Valley. The new network along "Golden Eagle Boulevard" can reduce traffic at Fremont/ Mission and cut-through traffic along Concord Ave. The resulting complete street intersection on Mission will have such an manageable level of traffic entering that it could likely be handled by a single lane roundabout.

ON-GOING COMMUNITY DEVELOPMENT BENEFITS

Creation of a diverse mobility plan provides long-term economic benefits that cannot be duplicated with the tunnel solution.

- Thousands of permanent transit jobs for operators, maintenance workers, and administrators

Opportunities for transit oriented development at each transit station

- Phase 1 of the Gold Line to Pasadena has already generated $1.4B in private investment, with a potential of many times this amount as the light rail system develops regionally.
- Phase 2A and B is estimated to generate over twice the investment of Phase 1.
- The Gold Line Eastside Extension, proposed BRT, and increased Metrolink service create significant additional opportunities for sustainable community development.

ADDITIONAL BENEFITS

PUBLIC HEALTH

- Reduces air pollution and greenhouse gases
- Increases physical activity through walking and biking
- Reduces traffic-related injuries and fatalities
- Provides access to medical facilities
- Reduces the stress of commuting

QUALITY OF LIFE

- Open space and recreation promote healthy lifestyles
- Access to transit makes regional destinations more accessible
- Parks and complete streets reduce the noise, stress, and vibration associated with living near a freeway.

ECONOMIC OPPORTUNITIES

- The average transit pass holder in Los Angeles saves about $11,000 per year on commuting costs
- Transit access and nearby parks create a premium for housing values
- Transit supports sustainable community development and more opportunities for housing

WALKING

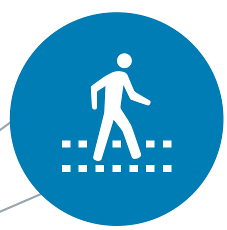
SUPPORTED BY ENHANCED PRIORITY CROSSINGS

This budget could improve safety for pedestrians throughout the San Gabriel Valley. Crossings of major arterials, accessibility improvements to intersections and dignified transit stops could all be achieved.

$25 M

PEDESTRIAN FATALITIES IN CALIFORNIA

700 estimated pedestrians are killed in California every year, the most of any state.

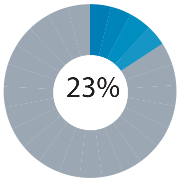


200 of those fatalities are in Los Angeles County alone.

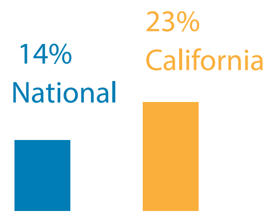
COLLISIONS IN LA

5,000 collisions involving pedestrians, in an average year in LA. County

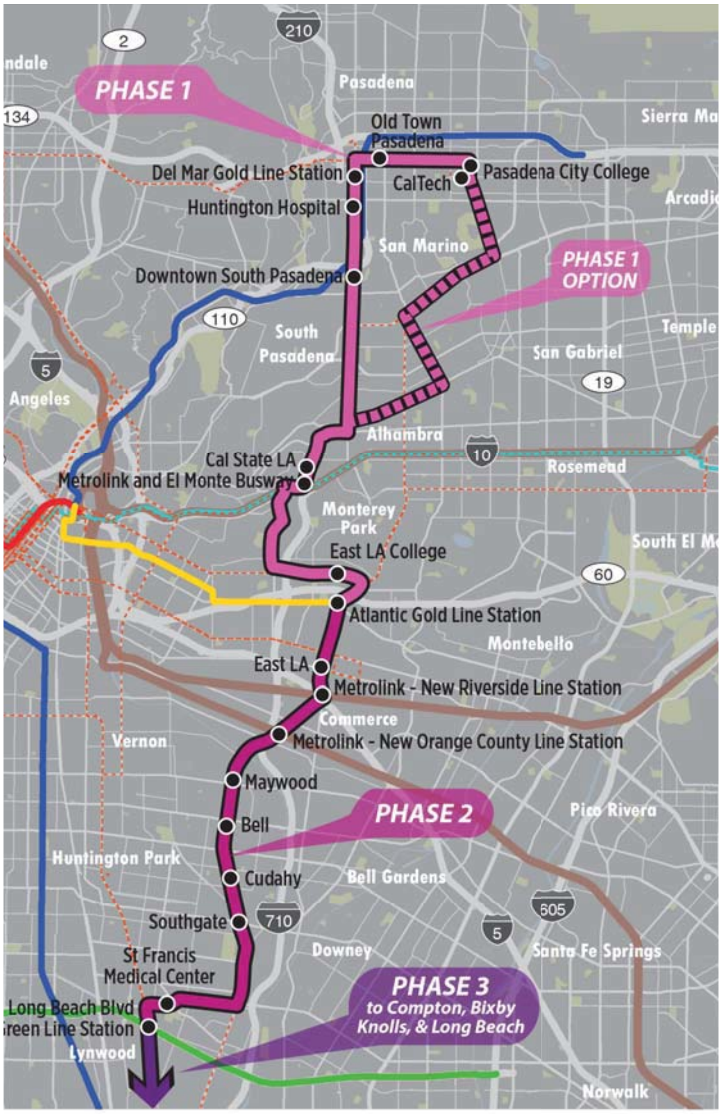
CAR CRASHES AND PEDESTRIANS IN CALIFORNIA



In 2014, 23% of those killed in car crashes in California were pedestrians – well above the national average of 14%.



NORTH-SOUTH CONNECTIONS

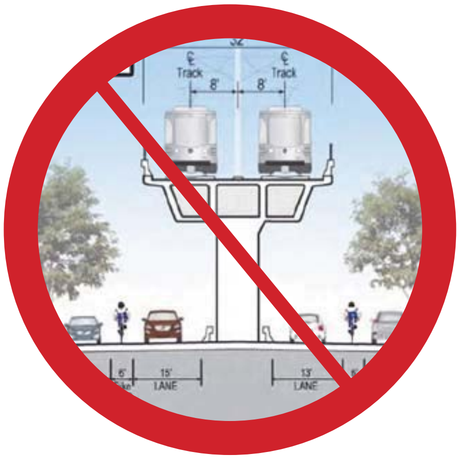


LEGEND

● Activity Centers

This option would be different from the transit alternative shown in the EIR. Rather than a disruptive aerial structure, this would be a fast, surface, community-serving alternative.

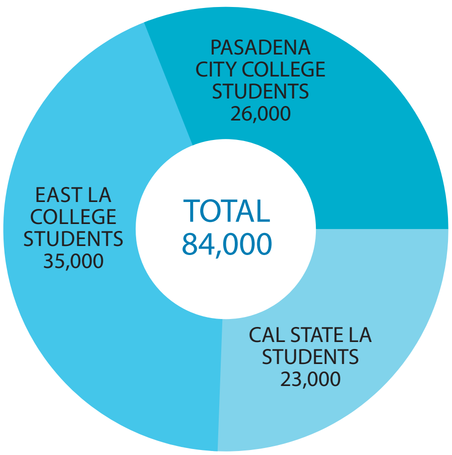
This area's great east-west transit connectivity could be supplemented by a north-south corridor that would connect both legs of the Gold Line, MetroLink's San Bernardino, Riverside and Orange County Lines, the El Monte Busway, the Green Line and the Blue Line. In addition to all those transit linkages, activity centers along the line such as Huntington Hospital, Cal State LA, East LA College, St. Francis Medical Center and the communities of Bell, Maywood and Southgate and Long Beach would all become better connected. As ridership continues to grow, the community may explore the possibility of a light rail option that could further enhance the existing transit network.



The community supports an enhanced, surface transit solution that connects to employment centers, recreational opportunities and educational institutions, not a disruptive aerial structure as proposed in the EIR.

DEMAND MANAGEMENT

CAN TDM SOLVE THE PROBLEM?



20%
VEHICLE TRIP
REDUCTION ESTIMATE

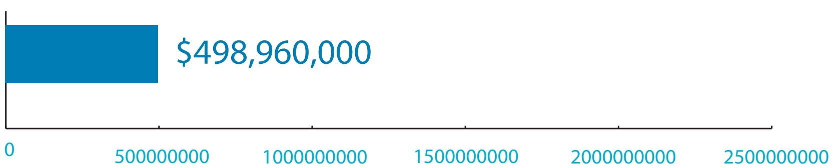
33,600 TRIPS
SAVED PER DAY

302,400 TRIPS
SAVED PER YEAR

YES

COST
$500 M

30 YEAR COST AT MARGINAL COST RATE

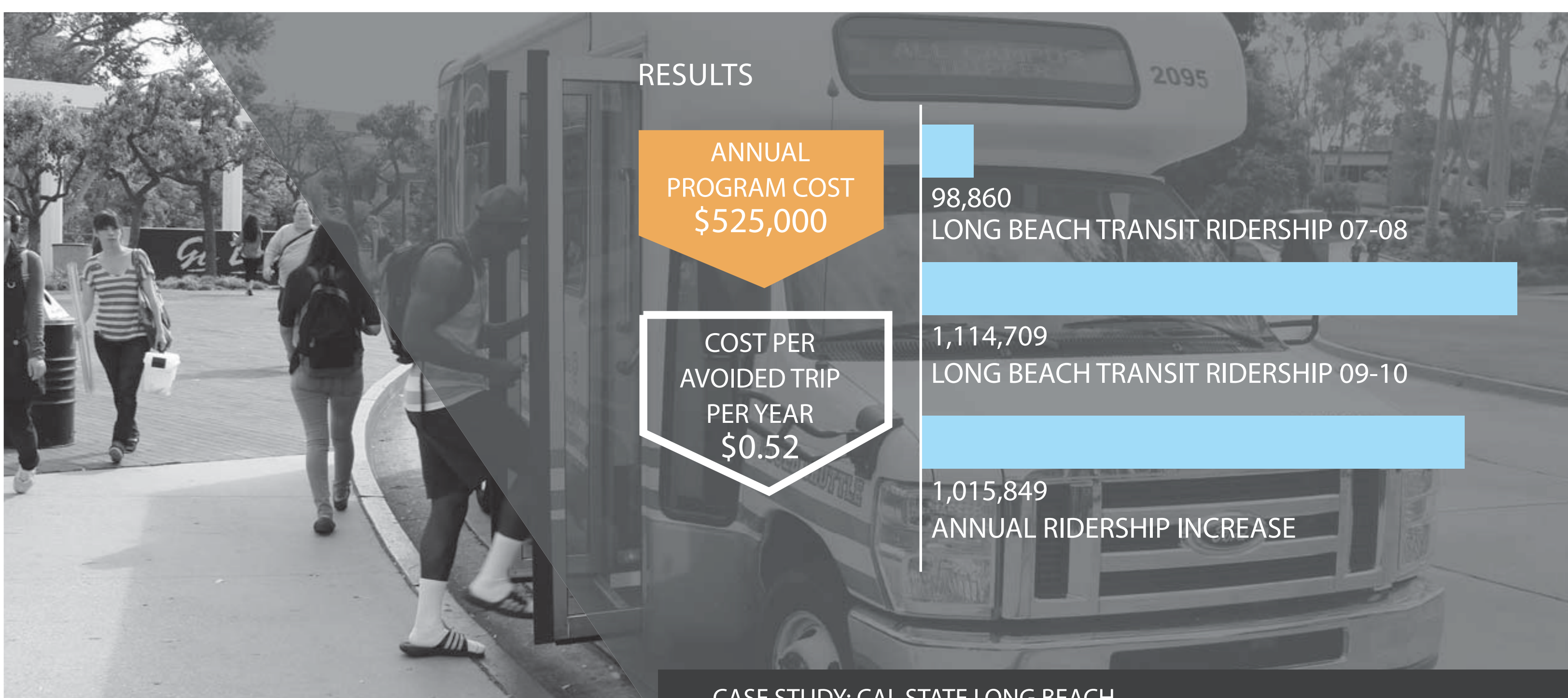


$73.00

COST PER YEAR PER
RIDER - MARGINAL

CASE STUDY:

Cal State Long Beach has offered unlimited free rides on Long Beach Transit to all faculty, staff and students since 2008, achieving great results.



WHAT CAN HAPPEN NOW?

Remove the South Stub and build "Golden Eagle Boulevard," including a connection to Mission Road, as a "complete street." (bus lanes and separated bike path included)	$200 M
Expanded DASH service to CalState LA	$15 M
Rebuild street connections to stitch together the North Stub	$95 M
Add 30 safe, pedestrian arterial crossings, 10 miles of new sidewalks and build the planned network of bike lanes and paths within one mile of either side of the 710 alignment	$25 M
Deliver real Rapid Surface Transit (Improved Route 762) north-south service to include greater frequency, longer hours, weekend service and some dedicated bus lanes	$170 M
Rosemead Boulevard is the main north-south street in the San Gabriel Valley, connecting the City of Rosemead to Temple City, East San Gabriel and East Pasadena. It is also served by Metro Lines 266 and 489, and a segment in Temple City features the region's first protected bike lanes.	$200 M

FUTURE PHASES: Moving forward the sale of surplus Caltrans properties could generate up to an additional $250 million to fund effective approaches such as student transit passes in the corridor:

Transit passes for 10 years for students of Pasadena City Collage, Cal State LA and East LA Collage	$170 M

WHAT COULD HAPPEN WITH MORE FUNDING

With an initiative such as Measure R2, the following projects can address the regional transportation issues throughout the area.

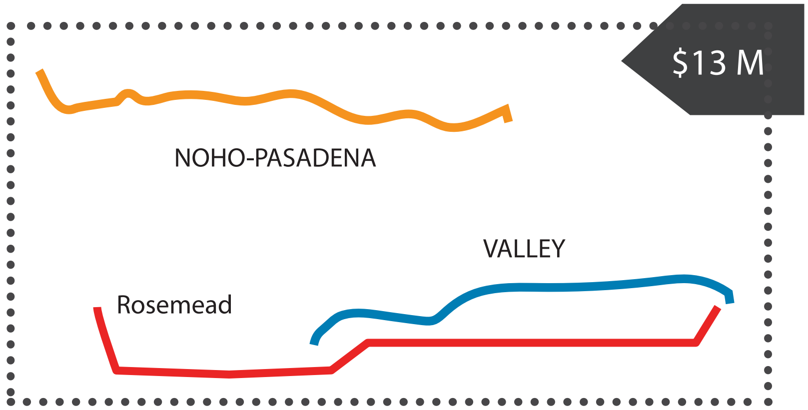
Premium Transit to connect the network. Pasadena-Hollywood BRT and Valley Boulevard BRT. Glendale-Burbank link.	$13 M
Extension of the Foothill and Eastside Gold Line.	$2.3 B
Metrolink upgrades to Burbank Airport and San Bernardino. Providing 30 minute all day service.	$400 M
Gold Level Active Transportation. Safe and comfortable bike and pedestrian networks throughout the Valley.	$275 M

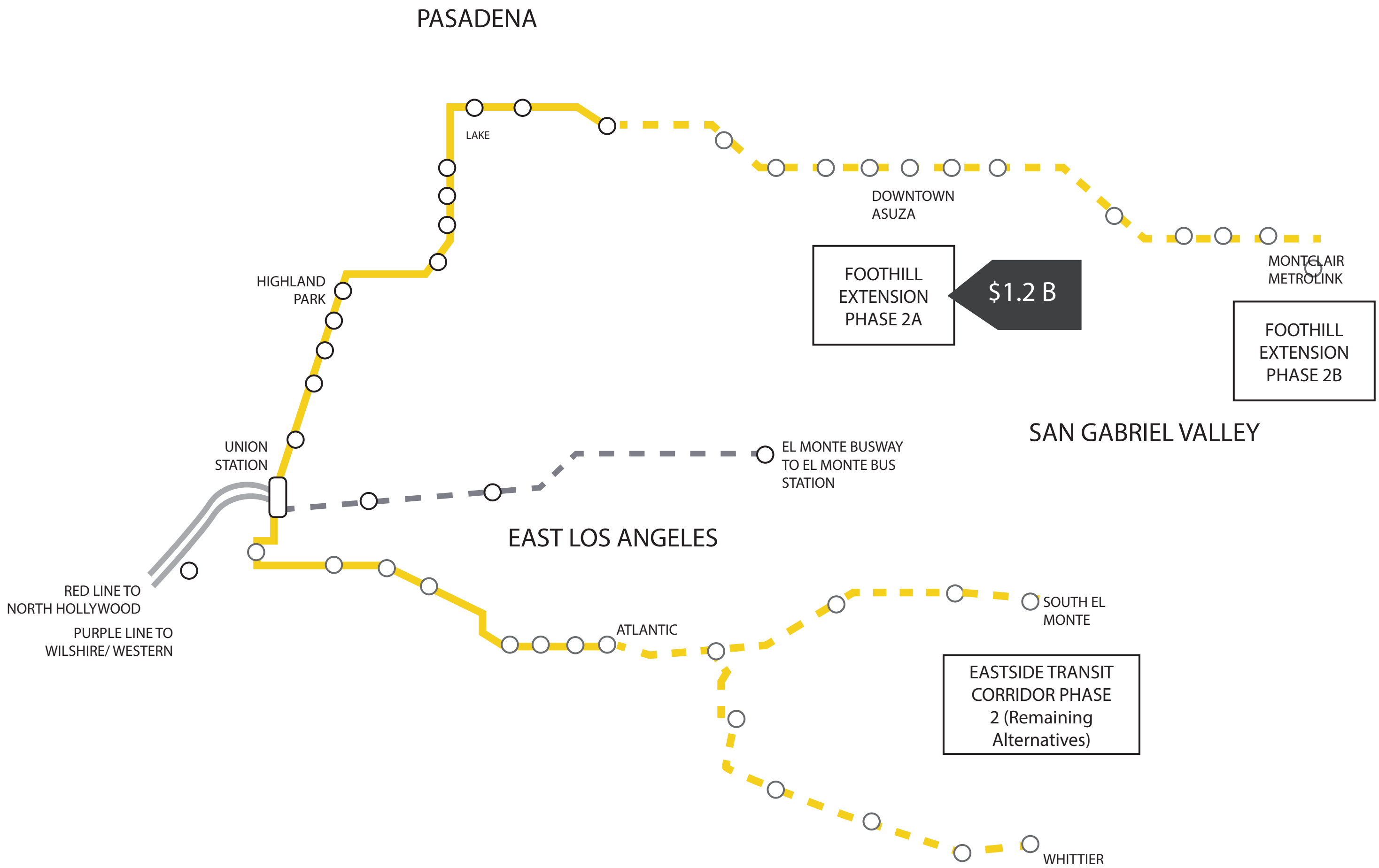
PREMIUM TRANSIT CONNECTIVITY

- North Hollywood to Pasadena BRT (including Burbank and Glendale)
- Valley Boulevard BRT (Downtown LA to El Monte Transit Center)
- Rosemead BRT (Boyle Heights to El Monte Station)

Rapid Bus Transit along the sub-region's key corridors can connect communities that are a bit farther from the rail network. These corridors involve more than just buses. Improvements to transit stops/stations can assure that all riders have a safe and dignified experience. Improvement of sidewalk connectivity and quality can assure people can get to the system and safely cross streets at stations. Once the sidewalks are improved, consolidating stations can make the ride much faster and more reliable.

As illustrated in this 1990 Metro Rail Plan, there has always been a "V" shaped missing link in rail planning that bypasses Glendale and Burbank. The time has come to bridge the missing link and connect communities.





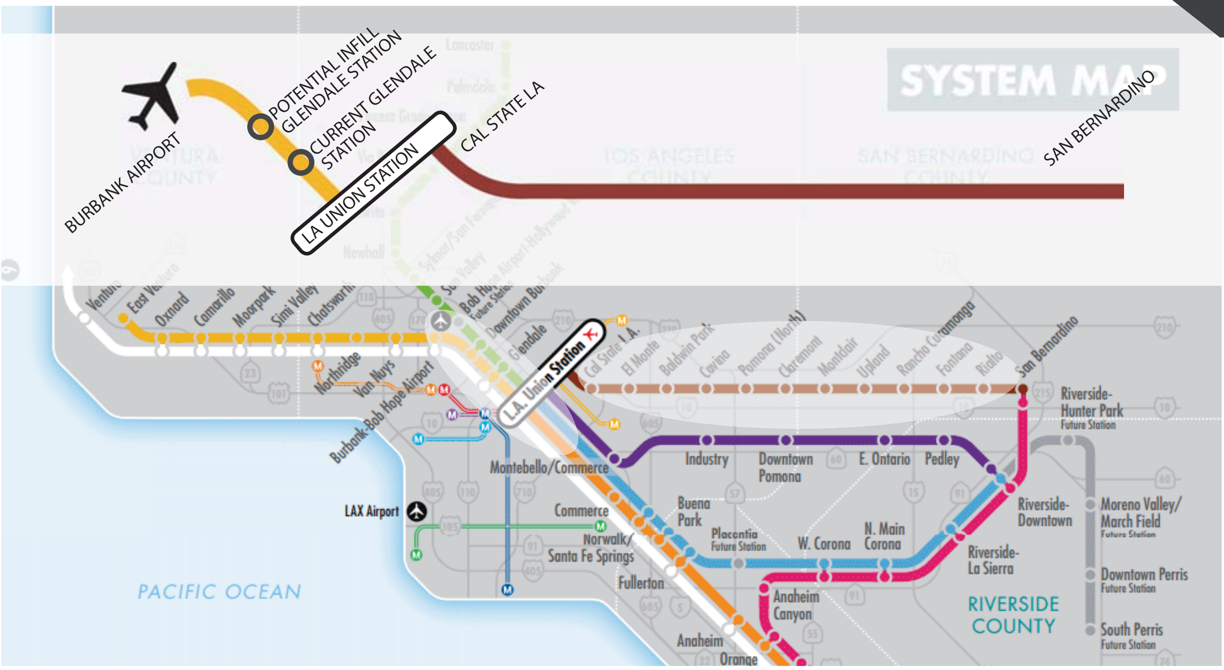
GOLD LINE COMPLETION

Premium Transit Access for the east end of the San Gabriel Valley will connect many more residents to jobs throughout Los Angeles County.

The long-planned completion of the Gold Line will connect the eastern San Gabriel Valley into the rest of the region's rapidly expanding transit network.

All day, frequent service to Burbank Airport, San Bernardino and points between will represent a significant improvement to quality of life.

$400 M

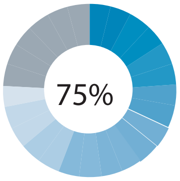


METROLINK
UPGRADES

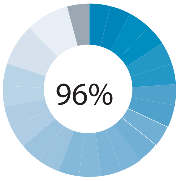
Upgrades to service on the Ventura County Line could provide 30 minute all day (and evening) service to the Burbank Airport. It might also make sense to supplement the current Glendale station (which is closer to Atwater Village) with an infill station closer to downtown Glendale. Improvements to the San Bernardino Line could provide hourly reverse commute and mid-day service. Both would represent a tremendous improvement to the usability of these valuable existing systems.

GOLD LEVEL ACTIVE TRANSPORTATION

This budget would be enough to create a premier, nationally-competitive bike network connecting the entire San Gabriel Valley. This system would focus on "low-stress" facilities that are comfortable to a wide range of potential users.

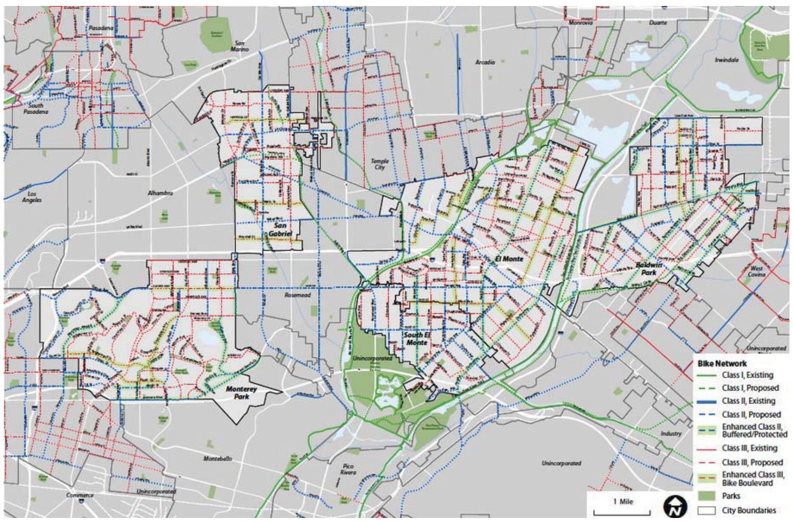


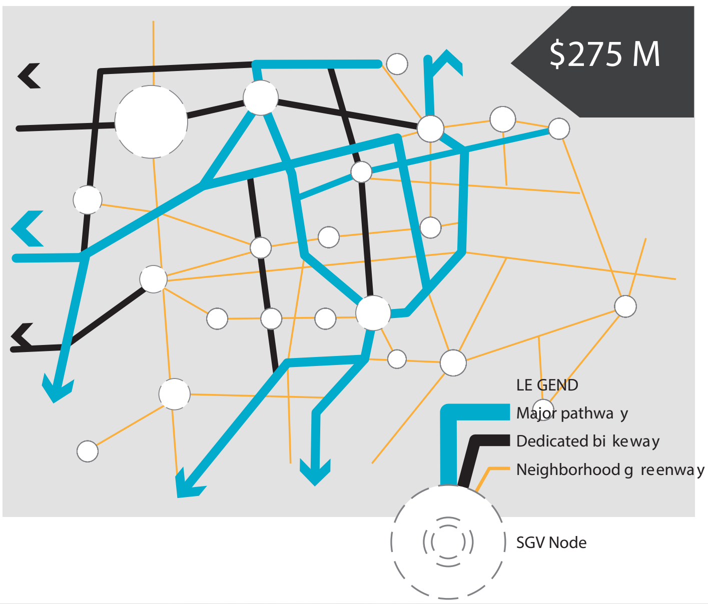
In its first year, a protected bike lane increases bicycle traffic on a street by an average of 75%



Most people riding in protected bike lanes feel safer on the street because of the lanes

SGV ACTIVE TRANSPORTATION FRAMEWORK





NETWORK PRINCIPLES

NEIGHBORHOOD GREENWAYS EVERY 1/2 MILE

SEPARATED BACKBONE - EVERY 1 MILE

Since the initial release of the Beyond the 710: New Initiative for Mobility and Community during the May 28, 2015, press conferences at Gateway Plaza, the Connected Cities and Communities has met with numerous stakeholders to refine the projects and strategies identified in the Initiative to build consensus, provide opportunities for stakeholder engagement and collaboration.

Future revisions and refinements will be provided to reflect ongoing public input of impacted communities and interested stakeholders.

The Beyond the 710: New Initiative for Mobility and Community and associated economic analysis was produced in conjunction with the internationally recognized transportation firm Nelson\Nygaard Consulting Associates, and The Maxima Group LLC, Real Estate and Business Solutions.

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Dear Ms. Impett:

As you requested, I have reviewed the air quality section (Sec. 3.3) of the Draft Programmatic Environmental Impact Report (DPEIR) for the Southern California Association of Governments' (SCAG) 2016–2040 Regional Transportation Plan/Sustainable Communities Strategy (2016 RTP/SCS).[1] My comments are summarized below.

AIR QUALITY IMPACT ANALYSIS IS FLAWED

The DPEIR evaluated the impact of emissions of nitrogen oxides (NOx), reactive organic gases (ROG), carbon monoxide (CO), sulfur oxides (SOx), particulate matter less than 10 microns (PM10), and particulate matter less than 2.5 microns (PM2.5) from the transportation projects in Appendix B (the Project) on ambient air quality. The DPEIR concluded, based on this analysis, that Project emissions had the "potential" to violate air quality standards or contribute substantially to an existing or projected air quality violation and concluded this impact was significant and unavoidable,[2] even though its emission analysis showed a decrease in emissions.[3]

The Air Quality Emission Analysis Is Unsupported

A project with the potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation results in a significant air quality impact. This determination is normally made by estimating the increase in emissions from the project and

[1] Southern California Association of Governments (SCAG), Draft Program Environmental Impact Report, 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy, December 2015; http://scagrtpscs.net/Pages/DRAFT2016PEIR.aspx.

[2] DPEIR, Figure ES.4-1 and pp. 3.3-40/41 (Impact Air-2).

[3] DPEIR, Table 3.3.4-1.

using an air dispersion model, such as AERMOD, to determine if the emissions will cause or contribute to violations of air quality standards.

This impact is considered under Impact Air-2 in the DPEIR. The results of this analysis are summarized in Table 3.3.4-1 (criteria pollutant emissions by county) and in Figures 3.3.4-1 (PM2.5 emission changes) and 3.3.4-2 (CO emission changes). The source of Table 3.3.4-1 is cited as "SCAG Transportation Modeling, 2015." However, this modeling is not included in the DPEIR nor otherwise cited with specificity. The DPEIR fails to explain what this modeling entailed, the assumptions used in the calculations, and how the emissions in Table 3.3.4-1 and the emission changes in Figures 3.3.4-1 and -2 were calculated. One cannot determine from inspection of this information, for example, how the various transportation projects would affect traffic and thus emissions nor what future regulations are assumed.

Further, the analysis for PM2.5 and CO in Figures 3.3.4-1 and 3.3.4-2 are described in one manner in the text and another on the figures, creating significant confusion. The text at page 3.3-41 indicates the information plotted on these figures is standard deviations (SDs), but fails to note standard deviations from what. A standard deviation is a measure of how spread out replicate measurements of a single value are, *i.e.,* the amount of variation in measurements used to compute an average. However, the figures themselves indicate the plotted values are "emission changes," not standard deviations. A standard deviation in the context of this discussion makes no sense. Because the DPEIR contains no support whatsoever for these figures, *i.e.,* the assumptions and calculations used to generate them are not disclosed, this contradictory information cannot be resolved. In these comments, I have assumed the figure notation, "emission changes," are what is actually plotted, as standard deviations make no sense in the content of the baseline discussion, which involves comparing a future condition with a baseline, in which emission changes are calculated by subtracting baseline average emissions from the future average emissions.

Emissions from transportation projects are normally calculated using computer models such as the SCAG Transportation Demand Model and Scenario Planning Model, the U.S. EPA MOVES2014 model, and the CARB EMFAC2014 model. The emission increases in grams per second from these analyses are then used as input to an air dispersion model, such as AERMOD, to determine if the emission changes will cause or contribute to a violation of an air quality standard.

These models require many inputs, which ultimately determine air quality impacts. The input and output files from these models are normally included in an appendix to an EIR, the input assumptions are discussed and justified, and the electronic files are cited, indicated as available from the lead agency, and provided on a compact disc upon request. The DPEIR includes an air quality appendix, Appendix C, "Air Quality and Greenhouse Gas Emissions and Climate Change Technical Report", where supporting calculations would ordinarily be found. However, in this case, the appendix is just a nearly verbatim repetition of the text found in the main body of the DPEIR,[4] with no further disclosure of how the emissions and emission changes were calculated. Thus, Impact Air-2 is unsupported.

This is important because the DPEIR concludes simultaneously that Impact Air-2 is significant and unavoidable (and proposes mitigation) and less than significant.[5] This makes no sense; an EIR must clearly and consistently come to a determination as to the extent of a project's environmental impacts. Had the DPEIR included supporting documentation, I would have been able to determine which of the document's significance determinations was accurate.

Assuming that the project's impacts are significant, in order to comply with the Clean Air Act's conformity requirements, all emission increases of nonattainment pollutants must be fully mitigated. To satisfy CEQA, all feasible mitigation must be proposed and the resulting emissions and related air quality impacts, after mitigation, must be disclosed. An accurate estimate of emission changes is required to assure full mitigation.

The Air Quality Analysis Uses A Misleading Baseline

The Project consists of over 5,000 individual transportation projects valued at 556 billion dollars that would be implemented between 2015 and 2040.[6] The significance of air quality impacts of this Project is evaluated in the DPEIR by comparing annual air emissions by county from traffic in 2040 to annual air emissions from traffic under "existing conditions" in 2012.[7] This analysis erroneously suggests the Project would result in a reduction or no change in annual emissions of all criteria pollutants in all counties,[8] thus misleading the public and decision makers.

The decrease in annual county-wide emissions compared to the existing baseline shown in Table 3.3.4-1 is not due to the Project, but rather to regulatory changes that reduce emissions from vehicles.[9] The use of the existing baseline to evaluate Project significance transfers credit

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[4] DPEIR, Appx. C, pp. 73-75.

[5] DPEIR, p. 3.3-40 and 3.3-50/52.

[6] DPEIR, Executive Summary and Appx. B, Impact Air-2.

[7] DPEIR, Table 3.3.2-6.

[8] DPEIR, p. 3.3-40 and Table 3.3.4-1.

[9] See, *e.g.*, DPEIR, p. 3.3-41.

for these regulatory reductions to the Project, when they are due to unrelated state and federal regulatory changes to vehicle emissions. This hides the true impacts of the Project.

Many things besides the Project will take place over this period (2012 to 2040) that will affect emissions from transportation projects. These include regulations that govern the amount of pollution allowed from on-road vehicle;[10] the fraction of the on-road vehicle population that complies with these regulations; and the impact of the Project on vehicle miles traveled ("build it and they will come"). Thus, determining the significance of air quality impacts based on existing conditions (2012) is uninformative and misleading, leaving the false impression that the Project will significantly reduce emissions, *i.e.,* improve air quality, when the Project will likely increase emissions in many areas and at various times over the planning horizon of 2012 to 2040, compared to conditions at buildout in 2040.

The DPEIR also includes a geographic, segment-by-segment comparison of 2040 conditions with and without the Project for CO and PM2.5, but declines to use this analysis to evaluate significance.[11] This comparison appears to demonstrate that the Project would increase emissions of PM2.5 and CO in many areas (those colored yellow, pink and brown in Figures 3.3.4-1/2), including most of Los Angeles County, an area with some of the worst air quality in the United States. Many of these areas are currently in nonattainment with the state PM2.5 air quality standard.[12] Thus, the Project would result in significant PM2.5 impacts by contributing to existing violations of the state PM2.5 air quality standard.

The DPEIR failed to perform a similar 2040 with and without Project analysis for NOx and ROG, which are ozone precursors. The Project area is nonattainment for ozone.[13] Further, NOx and ROG are also emitted in large amounts by on-road vehicles. In fact, on-road vehicles are the major source of both NOx and ROG in the Project area. In the South Coast Air Quality Management District (SCAQMD), for example, on-road vehicles emit 35% of the ROG and 61% of the NOx.[14] If a similar analysis to that shown in Figures 3.3.4-1/2 was performed for ROG

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[10] See, *e.g.*, DPEIR, p. 3.3-14 (Heavy-duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements) and 3.3-18 (Emission Reduction Plan for Ports and Goods Movement).

[11] DPEIR, p. 3.3-41 and Figures 3.3.4-1/2.

[12] DPEIR, p. 3.3-28 and Figure 3.3.2-1.

[13] DPEIR, Figure 3.3.2-2 and Table 3.3.2-4.

[14] See, *e.g.,* SCAQMD, Air Quality Management Plan, Appendix III. Base and Future Year Emission Inventory, December 2012, Table III-2-IA available at: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-

and NOx, it would show that the Project would increase NOx and ROG emissions throughout most of the Project area. As most areas in the SCAG region currently exceed the 8-hour national ambient air quality standard for ozone,[15] the Project would contribute to existing exceedances and likely in some areas, cause new exceedances of the federal and state ozone air quality standards. Thus, the Project would also result in significant NOx and ROG impacts that were not disclosed in the DPEIR. Therefore, the Project does not satisfy conformity requirements in 40 CFR Part 93, Subpart B and is not eligible for federal funding.

The DEIR Omits An Analysis of Interim Years

The DPEIR understates impacts because it does not evaluate air quality conditions during interim years. The significance of air quality impacts is evaluated in the DPEIR by comparing total annual air emissions from traffic in 2040 to total annual air emissions from traffic under "existing conditions" in 2015, assuming full buildout of the Project by 2040. However, as noted above, the Project consists of over 5,000 individual projects that would come on line at different times between 2016 and 2040.[16] These projects include those that would reduce daily vehicle miles traveled and thus emissions, *e.g.*, public transit projects, and those that would increase vehicle miles traveled, *e.g.*, freeway expansion projects, such as the 710 North project. If capacity expansion projects are operational before the public transit and other projects that remove people from their cars, vehicle miles traveled and hence emissions would increase due to Project staging. This could occur, for example, if some of the public transit projects are unfunded and/or delayed due to right-of-way issues or cost escalation. Thus, the Project has the potential to create local air quality hot spots due to Project staging, between 2014 and 2040, that were not acknowledged and evaluated in the DPEIR.

Data Presentation Is Confusing

The public and decision makers must be able to understand an EIR in order to comment on it and make effective use of it. The presentation of the air quality analyses fails this fundamental test.

First, as explained elsewhere, the text discussing Figures 3.3.4-1 and 3.3.4-2 and notes on the figures disagree. The first asserts that standard deviations are plotted. The second asserts differences are plotted. Neither explains how the graphed values were calculated.

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air-quality-management-plan/final-carb-epa-sip-dec2012/2012-aqmp-carb-epa-sip-submittal-appendix-iii.pdf.

[15] NOx and ROG form ozone in the atmosphere and thus are ozone precursors.

[16] DPEIR, Executive Summary and Appx. B.

Second, an air dispersion model, such as AERMOD, is normally used to convert emissions into ambient concentrations so they can be compared with ambient air quality standards. This is particularly critical for the Project area, as large portions of it already violate state and federal ambient air quality standards.[17] The results of this modeling are normally displayed on maps that show the points of maximum impact and isopleths which allow impacted parties and decision makers to determine where the impacts would occur. An isopleth is a line of equal or constant concentration (or cancer risk) on a map. An isopleth map plots isopleths (or contour lines) for increments of ambient concentration from the modeling, in micrograms per cubic meter. This allows interested parties to determine the geographic location and extent of significant impacts. No isopleth maps are included in the DPEIR.

Air Quality Impacts Are Cumulatively Considerable

The DPEIR includes a section entitled "cumulative impacts" (Impact Air-3), concluding the impacts are not significant as to nonattainment pollutants PM2.5 and ozone because Project emissions, when compared to existing conditions, would result in either no change or a decrease in projected long-term emissions.[18] This is wrong.

First, as discussed above, the reported emission decreases are due to changes in regulations, rather than reductions due to the Project. Because the Project consists of thousands of individual transportation projects that will be built out between 2015 and 2040, Project emissions may either increase or decrease at a given place and point in time between 2015 and 2040, depending upon the phasing of the projects. The impact of the Project can only be determined by comparing emissions in 2040 with and without the Project. As Figures 3.3.4-1 and 3.3.4-2 clearly demonstrate, CO and PM2.5 emissions will increase in many areas.

Second, Impact Air-2 concludes that emissions from the Project have the "potential" to violate air quality standards and classified the impact as significant and unavoidable. In the event that this is an accurate assessment, the cumulative impacts are also significant. In determining the significance of a project's incremental contribution, the question is not the relative amount of the project's contribution to the existing cumulative problem (i.e., does the project contribute the same, less, or more than other projects), but rather whether the addition of the project's impact is significant in light of the serious existing problem (i.e., is the project's contribution to the existing problem cumulatively considerable). Thus, the greater the existing environmental problem is, the lower the threshold of significance should be for considering a

[17] DPEIR, Figures 3.3.2-1, 3.3.2-2.

[18] DPEIR, pp. 3.3-41/42.

project's contribution to the cumulative impact.[19] Since the RTP would cause air pollutant emissions to increase in a region that already suffers from extreme air pollution, the Project's incremental contribution is clearly cumulatively considerable.

Third, the DPEIR does not even analyze the Project's cumulative air quality impacts. The DPEIR does not identify other current and proposed projects that may cumulatively contribute to the Project's impact. Thus, even if one were to assume Project impacts were not significant, the DPEIR does not contain a proper cumulative impact analysis.

DPEIR Omits An Analysis of Construction Emissions

Construction equipment emits significant amounts of particulate matter and the ozone precursors, NOx and ROG, for which most of the study area currently violates ambient air quality standards. These pollutants can cause severe cardiovascular and respiratory illnesses, asthma attacks, acute bronchitis, and even premature death.

The DPEIR concludes that "[t]he construction and operation of individual transportation projects and anticipated development as result of the proposed transportation and land use strategies in the 2016 RTP/SCS are expected to have the potential to violate air quality standards or contribute substantially to an air quality violation, thus requiring the consideration of mitigation measures."[20] The DPEIR proposes construction mitigation[21] and concludes the impact (Air-2) would remain significant and unavoidable.[22]

However, the DPEIR fails to describe the existing regulatory framework for off-road construction equipment,[23] fails to estimate unmitigated and mitigated construction emissions, and fails to compare emissions to CEQA significance thresholds. In addition, contrary to CEQA, the document provides no detail about the effectiveness of the construction-related mitigation measures. Further, to assure the Project complies with the requirements in 40 CFR Part 93, Subpart B, construction emissions must be reduced to zero for the Project to be eligible for

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[19] CEQA Guidelines, Sections 15064(h)(1),15130, 15355(b); http://ceres.ca.gov/topic/env_law/ceqa/guidelines/art9.html).

[20] DPEIR, p. 3.3-40.

[21] DPEIR, pp. 3.3-51/52.

[22] DPEIR, p. 3.3-54.

[23] See CARB, In-Use Off-Road Diesel Vehicle Regulation, Overview, Revised February 2014, Available at: http://www.arb.ca.gov/msprog/ordiesel/faq/overview_fact_sheet_dec_2010-final.pdf.

federal funding. Therefore, the DPEIR must estimate construction emissions before and after mitigation and demonstrate that such emissions would be reduced to zero.

Air Quality Mitigation Is Not Enforceable

Mitigation measures proposed in an EIR must be "fully enforceable" through permit conditions, agreements, or other legally binding instruments.[24] The DPEIR proposes several mitigation measures but many of the measures are vague, optional, directory, or otherwise unenforceable. A few examples follow (*emphasis* added):

MM-Air-2(a)(1):

- Unidentified programs (items I, VII, VIII, IX, X, SI, SII, XIV, XV, XVI).
- Program that *encourages* the *voluntary* removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks (XVI).
- Programs to *encourage* the installation of personal electric vehicle charging stations, and other alternative fuel sources (XVII).

MM-Air-2(a)(2):

- *Discretionary* participation in various work groups.

MM-Air-2(b):

- *As appropriate* require portable engines and portable engine-driven equipment units…obtains CARB…Arrange *appropriate* consultations…

MM-Air-4(b):

- A list of CARB's strategy to reduce emissions without any specific implementation programs that represent a firm, enforceable commitment to mitigate Project impacts
- *Proposed* new transportation-related SIP measures, without any specific implementation programs or firm commitment to implement these measures to mitigate Project impacts, regardless of SIP outcome.

All Feasible Construction Mitigation Is Not Required

The DPEIR concludes construction emissions are "significant and unavoidable" yet does not require all feasible mitigation. An EIR may conclude that an impact is significant and unavoidable only if all available and feasible mitigation measures have been proposed, but are inadequate to reduce the impact to a less than significant level.[25] If supported by substantial evidence, the lead agency may make findings of overriding considerations and approve the

[24] Pub.Res.Code § 21081.6(b); CEQA Guidelines § 15126.4(a)(2).

[25] See Cal. Code Regs. Titl. 14 ("CEQA Guidelines"), § 15126.2.

project in spite of the significant and unavoidable impact(s). However, the lead agency cannot simply conclude that an impact is significant and unavoidable without any analysis whatsoever, pick a random subset of mitigation measures, and move on, as here.

Construction Diesel-Exhaust Mitigation

Off-road and on-road equipment, such as dozers and trucks, will be required to support Project construction. This equipment is a major source of NOx, ROG, and CO emissions. Construction exhaust emissions for many individual projects within the Plan, such as the 710 North project, are typically significant. The DPEIR identifies only five mitigation measures directed at these emissions – properly tune/maintain engines, limit idling time to 5 minutes, use existing power sources or clean fuel generators, traffic plan, and use electric power or clean fuel generators.[26]

Additional feasible construction exhaust mitigation measures are included in CEQA guidelines of various air quality management districts, have been required in recent CEQA documents,[27,28,29,30,31] or are recommended by the U.S. EPA.[32] Some additional feasible construction exhaust mitigation measures from these sources are as follows:

- Implement EPA's National Clean Diesel Program;[33,34,35]

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[26] DPEIR, p. 3.3-52.

[27] SWCA Environmental Consultants, Draft Initial Study and Mitigated Negative Declaration for the California American Water Slant Test Well Project, Prepared for City of Marina, May 20 (IS/MND).

[28] MBUAPCD 2008, Table 8-2 to 8-4, and 8-7.

[29] Chevron Refinery Modernization Project EIR, March 2014, Chapter 4.8, Greenhouse Gases; Available at: http://chevronmodernization.com/wp-content/uploads/2014/03/4.8_Greenhouse-Gases.pdf and Chapter 5, Mitigation Measure Monitoring and Reporting Program; Available at: https://s3.amazonaws.com/chevron/Final+EIR/5_MMRP.pdf.

[30] San Luis Obispo County Air Pollution Control District, CEQA Air Quality Handbook, April 2012, http://www.slocleanair.org/images/cms/upload/files/CEQA_Handbook_2012_v1.pdf.

[31] Bay Delta Conservation Plan RDEIR/SDEIS, 2015; http://baydeltaconservationplan.com/RDEIRS/Ap_A_Rev_DEIR-S/App_22E_Gen_Conform_Determin.pdf.

[32] Verified Technologies List; http://baydeltaconservationplan.com/RDEIRS/Ap_A_Rev_DEIR-S/App_22E_Gen_Conform_Determin.pdf.

[33] Northeast Diesel Collaborative, Best Practices for Clean Diesel Construction. Successful Implementation of Equipment Specifications to Minimize Diesel Pollution;

- Diesel- or gasoline-powered equipment shall be replaced by lowest emitting feasible for each piece of equipment from among these options: electric equipment whenever feasible, gasoline-powered equipment if electric infeasible;

- On-site electricity shall be used in all construction areas that are demonstrated to be served by electricity;

- If cranes are required for construction, they shall be rated at 200 hp or greater equipped with Tier 4 or equivalent engines;

- Use alternative diesel fuels, such as Clean Fuels Technology (water emulsified diesel fuel) or O2 diesel ethanol-diesel fuel (O2 Diesel) in existing engines;[36]

- Convert part of the construction truck fleet to natural gas;[37]

- Include "clean construction equipment fleet", defined as a fleet mix cleaner than the state average, in all construction contracts;

- Fuel all off-road and portable diesel powered equipment with ARB-certified motor vehicle diesel fuel (non-taxed version suitable for use off-road);

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http://www2.epa.gov/sites/production/files/2015-09/documents/best-practices-for-clean-diesel-construction-aug-2012.pdf..

[34] U.S. EPA, Cleaner Diesels: Low Cost Ways to Reduce Emissions from Construction Equipment, March 2007; http://www2.epa.gov/sites/production/files/2015-09/documents/cleaner-diesels-low-cost-ways-to-reduce-emissions-from-construction-equipment.pdf.

[35] NEDC Model Contract Specification, April 2008; http://www2.epa.gov/sites/production/files/2015-09/documents/nedc-model-contract-sepcification.pdf.

[36] SCAQMD, Mitigation Measure Resources, Construction Emissions Mitigation Measures, https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=scaqmd%20ceqa%20construction%20mitigation.

[37] This is a mitigation measure used by PG&E to offset NOx emissions from its Otay Mesa Generating Project. See: GreenBiz, Natural Gas Trucks to Offset Power Plant Emissions, September 12, 2000; Available at: http://www.greenbiz.com/news/2000/09/12/natural-gas-trucks-offset-power-plant-emissions.

- Use electric fleet or alternative fueled vehicles where feasible including methanol, propane, and compressed natural gas;

- Use diesel construction equipment meeting ARB's Tier 4 certified engines or cleaner off-road heavy-duty diesel engines and comply with State off-road regulation;

- Use on-road, heavy-duty trucks that meet the ARB's 2007 or cleaner certification standard for on-road diesel engines, and comply with the State on-road regulation;

- Use idle reduction technology, defined as a device that is installed on the vehicle that automatically reduces main engine idling and/or is designed to provide services, e.g., heat, air conditioning, and/or electricity to the vehicle or equipment that would otherwise require the operation of the main drive engine while the vehicle or equipment is temporarily parked or is stationary;[38]

- Minimize idling time either by shutting off equipment when not in use or limit idling time to 3 minutes (5 minutes proposed in the DPEIR is required by 13 CCR 2449[d][3], 2485, so it is not "mitigation"). Signs shall be posted in the designated queuing areas and/or job sites to remind drivers and operators of the 3 minute idling limit. The construction contractor shall maintain a written idling policy and distribute it to all employees and subcontractors. The on-site construction manager shall enforce this limit.

- Prohibit diesel idling within 1,000 feet of sensitive receptors;

- Staging and queuing areas shall not be located within 1,000 feet of sensitive receptors;

- The number of construction equipment operating simultaneously shall be minimized through efficient management practices to ensure that the smallest practical number is operating at any one time;

- The engine size of construction equipment shall be the minimum practical size;

- Catalytic converters shall be installed on gasoline-powered equipment;

- Signs shall be posted in designated queuing areas and job sites to remind drivers and operators of the idling limit;

[38] http://www3.epa.gov/smartway/forpartners/technology.htm#tabs-3.

- Construction worker trips shall be minimized by providing options for carpooling and by providing for lunch onsite;

- Use new or rebuilt equipment;

- Maintain all construction equipment in proper working order, according to manufacturer's specifications. The equipment must be check by an ASE-certified mechanic and determined to be running in proper condition before it is operated;

- Use low rolling resistance tires on long haul class 8 tractor-trailers;[39]

- Suspend all construction activities that generate air pollutant emissions during air alerts;

- Install a CARB-verified, Level 3 emission control device,[40] e.g., diesel particulate filters, on all diesel engines.[41]

To assure the construction mitigation program is carried out, the construction mitigation program should also require that exhaust emissions from off-road diesel-powered equipment do not exceed 20% opacity for more than 3 minutes in any hour. Any equipment found to exceed 20% opacity must be repaired immediately. A visual inspection of all in-operation equipment must be made at least weekly by the contractor and witnessed monthly or more frequently by the District or County, and a periodic summary of the visual survey results must be submitted by the contractor throughout the duration of the project to the County. The summary should include the quantity and type of vehicles inspected and dates.

Construction Fugitive Dust Mitigation

The DPEIR recommends 14 mitigation measures to reduce fugitive dust (PM10, PM2.5) emissions from Project construction.[42] Several agencies have conducted comprehensive studies

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[39] http://www3.epa.gov/smartway/forpartners/technology.htm#tabs-3.

[40] CARB, Off-Road Diesel Vehicle Regulation and Verified Diesel Emissions Control Strategies (VDECS), June 23, 2014, Available at: http://www.arb.ca.gov/msprog/ordiesel/vdecs.htm#currentdevices.

[41] CARB, Heavy-Duty Diesel Emission Control Strategy Installation and Maintenance, April 4, 2014, Available at: http://www.arb.ca.gov/msprog/decsinstall/decsinstall.htm.

[42] DPEIR, pp. 3.3-51/52.

of fugitive dust control measures to bring their region into compliance with national ambient air quality standards on PM10. For example, SCAQMD has sponsored research, passed regulations (e.g., Rule 403[43]), and published guidelines that identify best management practices for controlling fugitive dusts at construction sites. The Rule 403 Implementation Handbook[44] contains a comprehensive list of such measures. The SCAQMD also maintains a list of mitigation measures, including for fugitive dust sources.[45]

Clark County, Nevada, has also sponsored research, passed regulations (Rule 94), and published best management practices for controlling fugitive dust from construction activities.[46] Clark County's *Construction Activities Notebook* contains a comprehensive list of best management practices. Similarly, Arizona has developed guidance to control fugitive PM10 emissions.[47]

Several of the measures included in these agency guidelines are feasible and much more effective, especially for PM2.5, than the mitigation measures included in the DPEIR. The DPEIR mitigation measures are too generalized to implement and do not require any monitoring to verify. For example, grading would be suspended when wind gusts exceed 25 miles per hour, unless the soil is wet enough to prevent dust plumes. The DPEIR does not require the collection of on-site wind speed data or soil moisture data to confirm these conditions are met. Further, an on-site monitor is not required to assure the measures are implemented. Therefore, the additional feasible measures I list below should be considered for adoption here under CEQA Guidelines §§15126.4 and 15091. Further, additional feasible measures have recently been required in the

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[43] South Coast Air Quality Management District ("SCAQMD"), Revised Final Staff Report for Proposed Amended Rule 403—Fugitive Dust and Proposed Rule 1186—PM10 Emissions from Paved and Unpaved Roads, and Livestock Operations, February 14, 1997.

[44] South Coast Air Quality Management District ("SCAQMD"), January 1999.

[45] SCAQMD, Mitigation Measure Resources, Available at: http://webcache.googleusercontent.com/search?q=cache:CNeTjv1E5d8J:www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/particulate-matter-(pm)-2.5-significance-thresholds-and-calculation-methodology/pm2-5-working-group-meeting-2-construction-mitigation-measures.doc%3Fsfvrsn%3D2+&cd=1&hl=en&ct=clnk&gl=us.

[46] P.M. Fransioli, PM10 Emissions Control Research Sponsored by Clark County, Nevada, Proceedings of the Air &Waste Management Association's 94th Annual Conference & Exhibition, Orlando, FL, June 24-28, 2001.

[47] Arizona Department of Environmental Quality ("ADEQ"), Air Quality Exceptional and Natural Events Policy PM10 Best Available Control Measures, June 5, 2001.

Chevron Modernization EIR.[48] Examples of such feasible mitigation measures not included in the DPEIR are also listed below:

- For backfilling during earthmoving operations, water backfill material or apply dust palliative to maintain material moisture or to form crust when not actively handling; cover or enclose backfill material when not actively handling; mix backfill soil with water prior to moving; dedicate water truck or large hose to backfilling equipment and apply water as needed; water to form crust on soil immediately following backfilling; and empty loader bucket slowly; minimize drop height from loader bucket. (CCHD)[49] This is more effective than the DPEIR's measure, which only requires "stabilize the surface of dirt piles if not removed immediately."[50]
- During clearing and grubbing, prewet surface soils where equipment will be operated; for areas without continuing construction, maintain live perennial vegetation and desert pavement; stabilize surface soil with dust palliative unless immediate construction is to continue; and use water or dust palliative to form crust on soil immediately following clearing/grubbing. (CCHD). This is more effective than the DPEIR's measure: "revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities."[51]
- While clearing forms, use single stage pours where allowed; use water spray to clear forms; use sweeping and water spray to clear forms; use industrial shop vacuum to clear forms; and avoid use of high pressure air to blow soil and debris from the form. (CCHD)
- During cut and fill activities, prewater with sprinklers or wobblers to allow time for penetration; prewater with water trucks or water pulls to allow time for penetration; dig a test hole to depth of cut to determine if soils are moist at depth and continue to prewater if not moist to depth of cut; use water truck/pull to water soils to depth of

[48] Chapter 5, Mitigation Measure Monitoring and Reporting Program; Available at: https://s3.amazonaws.com/chevron/Final+EIR/5_MMRP.pdf.

[49] The following acronyms are used in this listing of mitigation measures: ADEQ = Arizona Department of Environmental Quality; BCAQMD = Butte County Air Quality Management District; CCHD = Clark County (Nevada) Health Department; MBUAPCD = Monterey Bay Unified Air Pollution Control District; SBCAPCD = Santa Barbara County Air Pollution Control District; SJVUAPCD = San Joaquin Valley Unified Air Pollution Control District; SLOCAPCD = San Luis Obispo County Air Pollution Control District.

[50] DPEIR, p. 3.3-52.

[51] DPEIR, p. 3.3-52.

cut prior to subsequent cuts; and apply water or dust palliative to form crust on soil following fill and compaction. (CCHD)

- For large tracts of disturbed land, prevent access by fencing, ditches, vegetation, berms, or other barrier; install perimeter wind barriers 3 to 5 feet high with low porosity; plant perimeter vegetation early; and for long-term stabilization, stabilize disturbed soil with dust palliative or vegetation or pave or apply surface rock. (CCHD, Chevron) In addition, the Chevron measure requires that the wind breaks be installed on the windward side(s) of actively disturbed area and that wind breaks have 50% porosity.
- In staging areas, limit size of area; apply water to surface soils where support equipment and vehicles are operated; and limit ingress and egress points. (CCHD).
- For stockpiles, maintain at optimum moisture content; remove material from downwind side; avoid steep sides or faces; and stabilize material following stockpile-related activity (CCHD).
- To prevent trackout, pave construction roadways as early as possible; install gravel pads; install wheel shakers or wheel washers, and limit site access. (CCHD). This is more effective than the DPEIR's measure, which only requires: "limit vehicular paths on unpaved surfaces and stabilize any temporary roads."[52]
- When materials are transported off-site, in addition to covering all material and maintaining at least 6 inches of freeboard space from the top of the container shall be maintained, assure all material is effectively wetted to limit visible dust emissions (BAAQMD, SJVUAPCD, Rule 403 Handbook, ADEQ). This is much more effective than the DPEIR's measure which only requires: "Cover trucks when hauling dirt."[53]
- Where feasible, use bedliners in bottom-dumping haul vehicles. (Rule 403 Handbook)
- Grade each phase separately, timed to coincide with construction phase or grade entire project. (Rule 403 Handbook)
- All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. (BAAQMD) *(The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust*

[52] DPEIR, p. 3.3-52 ("Limit vehicular paths on unpaved surfaces and stabilize any temporary roads.").

[53] DPEIR, p. 3.3-51 ("Cover trucks when hauling dirt.").

emissions.) (Use of blower devices is expressly forbidden.). (SJVUAPCD) This is more effective that the DPEIR's sweeping measure, which only requires: "Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway."[54]

- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant. (SJVUAPCD, ADEQ). This is more effective than the DPEIR's dirt pile measure which only requires: "Stabilize the surface of dirt piles if not removed immediately."[55]
- During initial grading, earth moving, or site preparation, projects 5 acres or greater may be required to construct a paved (or dust palliative treated) apron, at least 100 ft in length, onto the project site from the adjacent site if applicable. (BCAQMD)
- Post a publicly visible sign with the telephone number and person to contact regarding dust complaints. This person shall respond and take corrective action within 24 hrs (48 hrs in the DEIR, MM 4.10-1a, p. 4.10-23). (BCAQMD, MBUAPCD, CCHD, Chevron)
- Prior to final occupancy, the applicant shall demonstrate that all ground surfaces are covered or treated sufficiently to minimize fugitive dust emissions. (BCAQMD)
- The contractor or builder shall designate a person or persons to monitor the dust control program and to order increased watering and other controls, as necessary, to prevent transport of dust offsite. (SBCAPCD, SLOCAPCD). This is more effective than the DPEIR's measure,[56] which only requires sufficient monitoring to confine dust plumes to the project work areas, without designating a person to monitor the dust control program to assure this measure is achieved.
- Prior to land use clearance, the applicant shall include, as a note on a separate informational sheet to be recorded with map, these dust control requirements. All requirements This misleads as to the true impacts of the Project. This is difficult to determine from the PDEIRThis misleads as to the true impacts of the Project. This is difficult to determine from the PDEIRshall be shown on grading and building plans. (SBCAPCD, SLOCAPCD)

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[54] DPEIR, p. 3.3-52 ("Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.").

[55] DPEIR, p. 3.3-52 ("Stabilize the surface of dirt piles if not removed immediately.").

[56] DPEIR, p. 3.3-51 ("Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas.").

- All roadways, driveways, sidewalks, etc. to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used. (SLOCAPCD)
- Barriers with 50% or less porosity located adjacent to roadways to reduce windblown material leaving a site. (Rule 403 Handbook)
- Limit fugitive dust sources to 20% opacity. (ADEQ)
- All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12%. Moisture content can be verified by lab samples or moisture probe. (Chevron)
- Plant native species to replace any plants or trees slated for removal. Vegetation shall only be removed after the new vegetation has reached maturity and has mass similar to the removed vegetation (11/24/14 SLOAPCD)[57]
- All excavation, grading, and/or demolition activities shall be superseded when average wind speeds exceed 20 mi/hr. (Chevron). This is more effective than the DPEIR's limit of 25 mph.[58]
- Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established. (Chevron) This is more effective than the DPEIR's measure, which does not require revegetation "as soon as possible" nor watering.[59]
- The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surface at any one time. (Chevron)
- Site accesses to a distance of 100 feet from the paved road shall be treated with a 6- to 12-inch compacted layer of wood chips, mulch, or gravel. (Chevron)
- Apply non-toxic chemical soil stabilizers according to manufacturer' specifications, to all inactive construction areas (previously graded area inactive for 10 days or

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[57] Letter from A. A. Genet, SLOAPCD, to San Luis Obispo Department of Planning and Building, Re: Recirculated Draft Environmental Impact Report (RDEIR) for the Phillips 66 Rail Spur Project, November 24, 2014.

[58] DPEIR, p. 3.3-51 ("Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes").

[59] DPEIR, p. 3.3-52 ("Revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities.").

more). (SCAQMD). This is more effective than the DPEIR's measure, which only requires that the surface of dirt piles be stabilized, without disclosing how.[60]

- Enclose, cover, water twice daily, or apply non-toxic soil binders, according to manufacturer's specifications, to exposed stockpiles (i.e., gravel, sand, dirt) with 5% or greater soil content. (SCAQMD)
- Monitor for particulate emissions according to District-specified procedures. (SCAQMD)
- Construction activities that will generate dust should be limited to periods when good air quality is forecast. (11/24/14 SLOAPCD)
- Designate a Visible Emission Evaluation certified person or persons to monitor fugitive dust emissions and enhance the implementation of the fugitive dust mitigation measures as necessary to minimize nuisance violations from dust complaints and to assure opacity does not exceed 20% for greater than 3 minutes in any 60 minute period. (11/24/14 SLOAPCD)

All of these measures are feasible and various combinations of them are routinely required elsewhere to reduce fugitive PM10 and PM2.5 emissions. See the fugitive dust control program for the Big Dig[61], for the El Toro Reuse Draft EIR[62], and for the Padres Ballpark Final EIR[63]. The implementation of all of these measures likely would not reduce fugitive PM10 and PM2.5 emissions below significance thresholds. Thus, all of these measures, which are feasible construction mitigation, must be required in the PEIR.

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[60] DPEIR, p. 3.3-52 ("Stabilize the surface of dirt piles if not removed immediately").

[61] A. Kasprak and P.A. Stakutis, A Comprehensive Air Quality Control Program for a Large Roadway Tunnel Project, Proceedings of the Air & Waste Management Association's 93rd Annual Conference & Exhibition, June 18-22, 2000.

[62] County of Orange, Draft Environmental Impact Report No. 573 for the Civilian Reuse of MCAS El Toro and the Airport System Master Plan for John Wayne Airport and Proposed Orange County International Airport, Draft Supplemental Analysis, Volume 1, April 2001, pp. 2-121 to 2-123.

[63] City of San Diego, Final Subsequent Environmental Impact Report to the Final Master Environmental Impact Report for the Centre City Redevelopment Project and Addressing the Centre City Community Plan and Related Documents for the Proposed Ballpark and Ancillary Development Projects, and Associated Plan Amendments, V. IV. Responses to Comments, September 13, 1999, pp. IV-254 to IV-256.

HEALTH RISK ASSESSMENT IS FLAWED

The DPEIR includes a health risk assessment (HRA) to assess the cancer risks from emissions of diesel particulate matter (DPM) on major freeways and transportation corridors in impact Air-4.[64] This analysis is incomplete, poorly supported, and poorly presented.

Construction Emissions Were Omitted From the HRA

The DPEIR is silent on health impacts from construction of the Project. Construction of major transportation projects requires the use of diesel-fueled, off-road equipment such as backhoes, bulldozers, paving equipment, and cranes. This equipment emits large amounts of DPM, much more per mile traveled than on-road vehicles, such as those analyzed in the HRA, *e.g.*, "big rigs".[65]

Construction is well known to result in significant health impacts in surrounding communities. In a study of construction health impacts in California, the South Coast air basin (encompassing most of the Project study area) ranked first in California with the greatest construction health impacts, including more than 700 premature deaths, more than 650 hospitalizations for respiratory and cardiovascular illness, more than 1,700 cases of acute bronchitis, nearly 21,000 incidents of asthma attack and other lower respiratory symptoms, and over 300,000 days of lost work and school absences. This loss of life and productivity cost South Coast residents an estimated $5.9 billion.[66]

The Project encompasses over 5,000 individual projects that will be built out over a 25 year period, including many very large, long-term construction projects, such as the 710-North project. These projects will result in individual and cumulatively significant health impacts in the surrounding communities. These significant health impacts should be quantified, impact isopleths presented on maps, and the significant impacts mitigated. The PDEIR should be recirculated with this new information.

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[64] DPEIR, p. 3.3-42, Impact Air-4 and Appendix D.

[65] Don Anair, Union of Concerned Scientists, Digging Up Trouble. The Health Risks of Construction in California, 2006, Figure 1. Available at: http://www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_vehicles/digging-up-trouble.pdf.

[66] *Id.*, pp. 1, 12, and Table 1.

The Health Risk Assessment Uses A Misleading Baseline

The HRA (included in DEIR Appendix D) followed the same baseline approach described above for air quality impacts, comparing Project impacts in 2040 with 2012 baseline conditions. This baseline approach*, i.e.*, comparing 2040 conditions with 2012 conditions, is misleading for health impacts for the same reasons described above for air quality as it gives the false impression that the Project, when fully implemented, will significantly decrease cancer risk by taking credit for state and federal regulations that lower DPM. In addition, it is difficult to even determine the DPEIR's baseline because summary Table 3.3.4-3 is not adequately annotated. First, the column labeled "2016 RTP/SCS" is ambiguous. A review of tables in Appendix D indicates it is the proposed Project in 2040.[67] Second, the existing condition cancer risk for segments 14, 15, and 16 are substantially higher than the values reported in the HRA appendix and should be changed to 125 (810), 82 (165), and 664 (832) per one million, respectively.[68]

The HRA Table ES-1 also reports the no Project alternative (Simulation 2) compared to the proposed Project (Simulation 3). This comparison, which is more relevant and consistent with CEQA because it compares future no project conditions to future with project conditions, shows a significant increase in cancer risk in Segment 13 (SB I-15 VIC), from 48 to 64 cancer risk per million exposed or a 33% increase in cancer risk.

All Freeway Segments Were Not Evaluated

The SCAG regional transportation system that the Project would affect includes about 70,904 lane miles.[69] The HRA evaluated cancer risks along only 16 "representative" segments, each about one mile long, or only 0.025% of the system. This small sample size is not adequate to evaluate regional health impacts. How many additional freeway segments, not included among the 16 analyzed, would also result in increased health risk? The reviewer is left to guess. If one out of 16 or 6.25% of the entire Project freeway network of 70,904 lane miles[70] experienced a similar increase as Segment 13, 4,432 additional miles of freeway would experience significant increases in cancer risk due to the Project. This is significant and must be disclosed and mitigated.

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[67] See Appx. D, Table 3-1, column: "Simulation 3 (Proposed Project)".

[68] DPEIR, Appx. D, Table 3-1.

[69] DPEIR, Appx. D, p. 4.

[70] DPEIR, Appx. D, p. 4.

Further, the analysis used to select these 16 segments is not in the record, but rather, the selection methodology is only very generally described.[71] There should be an analysis for all freeway segments with the potential to increase traffic.

All Emission Sources and Health Endpoints Were Not Evaluated

The DPEIR only evaluated the cancer risk of a single pollutant, diesel particulate matter (DPM). DPM originates only from on-road mobile sources that burn diesel fuel, or primarily trucks. Trucks make up a very small fraction of the total on-road vehicle fleet and vehicle miles traveled. Thus, the HRA has only evaluated the health risks of one pollutant from a tiny slice of on-road vehicles, trucks, that would be affected by the Project.

Passenger cars do not emit diesel exhaust and thus were not included in the DPEIR's analysis.[72] However, they do emit many other hazardous air pollutants, including benzene, formaldehyde, and acrolein,[73] which are potent carcinogens, as well as many HAPs that are acutely and chronically toxic. While the cancer potency factor of DPM is higher than any of the HAPs present in car exhaust, because there are many more cars than diesel-fueled vehicles in the study area, the cancer, acute and chronic risks could be even higher for non-diesel-fueled sources than diesel sources.

The DPEIR's Appendix D (p. 31) asserts that an analysis was done to determine the contribution of cars to total cancer risk and that, when cars are included, DPM is still responsible for 96.1% to 96.3% of the cancer risk. The DPEIR does not provide any support for this assumption other than a reference to the prior RTP and a letter from James Dill and Russell Erbes, Feb. 3, 2015. The revised PEIR should provide sufficient documentation for this assumption so that the public and decision makers are able to verify its accuracy.

In addition, the DPEIR did not evaluate all health endpoints. Acute and chronic health impacts and cancer risks of pollutants other than DPM are likely to be significant. While the DPEIR argues that "cancer risk is used as a corollary for general respiratory health,"[74] air

[71] DPEIR, Appx. D, p. 4.

[72] DPEIR, Appx. D, Appx. B, DPM Emissions for each Transportation Segment and Evaluation Simulation.

[73] ENVIRON International Corporation, Expanding and Updating the Master List of Compounds Emitted by Mobile Sources – Phase III, Report EPA420-R-06-005, February 2005; Available at: http://www3.epa.gov/otaq/regs/toxics/420r06005.pdf.

[74] DPEIR, p. 3.3-43.

pollution is known to result in other non-respiratory health endpoints, including cardiovascular disease, stroke, and premature death.

All Potentially Affected Sensitive Receptors Were Not Evaluated

The HRA limits its analysis to only 500 feet from 16 freeway segments, asserting that "only a small portion of the total number of existing sensitive receptors in the six counties are affected by the transportation projects…"[75]. Only 1% to 5% of the sensitive receptors – locations where people reside as well as schools, medical facilities, senior centers, nursing homes, etc. – are within 500 feet of the 16 freeway segments.[76] Significant cancer risk, greater than 10 in one million exposed, extends far beyond 500 feet from the freeway, into densely populated areas where many more people are located.[77]

Elsewhere, the HRA demonstrates that significant cancer risk occur at over 1300 meters (4,264 feet) from the freeway. This much larger significant risk area is consistent with other studies in the Project area that demonstrate that cancer risk from DPM extends many miles beyond a freeway. The 100 per million risk isopleth for freeway segments near the Ports of Los Angeles and Long Beach encompassed 10.85 square miles.[78] The DPEIR should be modified to include a map that identifies, at a minimum: (1) the point of maximum impact; (2) the maximally exposed individual at a residence (MEIR); and (3) the 10 in one million cancer risk significance isopleth, as required by OEHHA risk assessment guidance.

Data Presentation Is Misleading

The DPEIR admits that cancer health risks remain significant after the Project is implemented.[79] Further, it shows that the Project causes significant increases in cancer risk in two of the 16 evaluated segments: (1) Segment 10, RIV I-15 (Riverside/Temecula) and (2) Segment 13, SB I-15 VIC (San Bernardino/Victorville), compared to the 2040 No Project

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[75] DPEIR, p. 3.3-42.

[76] DPEIR, p. 3.3-42 and Table 3.3.4-2.

[77] See, for example, Lindsey Nicole Sears, Diesel Trucks: Health Risk and Environmental Equity, Master of Arts in Geography Thesis, California State University, Northridge, December 2012 and County of Los Angeles Public Health Air Quality Recommendations for Local Jurisdictions; http://preservecalavera.org/wp-content/uploads/2015/01/AQinFreeways.pdf.

[78] Sears 2012, Section 4, Table 4.1 and Figure 4.1.

[79] DPEIR, p. 3.3-44.

alternative.[80] However, it fails to explain what this means so that decision-makers and the public understand the actual and specific health risks of the Project.

The presentation of the DPM cancer analysis downplays its geographic extent and the affected population. As discussed above, the results of the HRA are presented only as excess cancer cases per one million people exposed, only within 500 feet of 16 1-mile-long freeway segments.[81] This hides the true impact of Project. The significance of the impact cannot be determined without knowing the geographic area that is impacted, i.e., where the impact occurs, and the number of excess cancer cases that would result from the Project as a whole, not a tiny subset of the Project.

A typical resident, for example, would not be able to tell whether they would be impacted by the Plan by reviewing the DPEIR. The geographical distribution of cancer risk is normally conveyed using isopleth maps which show the boundary of the 10 in one million cancer significance threshold. The DPEIR does not include any isopleth maps and thus fails to disclose the true impact of the Project.

In addition, the true impact of the Project depends on the number of excess cancer cases, not the cancer risk expressed per million exposed. The affected population must be compiled from U.S. Census data and used to calculate the increase in the number of cancer cases due to the Project. This type of analysis is known as a "cancer burden analysis".

Neither of these graphical displays – isopleth maps and cancer burden analysis -- were presented to summarize the health risk assessment in terms understandable to potential users of the DPEIR. Thus, the true impacts of the Project are not adequately disclosed.

Health Risk Mitigation Is Inadequate

The DPEIR concludes the Project would expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially (Impact Air-4), and that direct, indirect and cumulative impacts would remain significant and unavoidable after mitigation.[82] The DPEIR identifies mitigation (MM-Air-2(a)(1) and MM-Air-2(a)(2)) for these impacts, but as discussed above, the measures are vague, optional, directory, or otherwise unenforceable.

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[80] DPEIR, Appx. D, Tables 3-1, 3-2, 3-3, 3-4, 3-5, 3-6.

[81] DPEIR, Table 3.3.4-3 and Appx. D, Tables 3-1 to 3-7.

[82] DPEIR, p. 3.3-54.

In addition, the DPEIR lists certain "project-level mitigation measures" that it claims are within the jurisdiction and authority of air quality management districts to enforce. However, most of these measures cannot be implemented by lead agencies and require state or federal rulemaking, including:

- Set technology forcing new engine standards
- Reduce emissions from in-use fleet
- Reduce petroleum dependence
- Proposed new transportation-related SIP measures

For the reasons discussed above, the DPEIR is factually inadequate and should not serve as the basis for approving the RTP/SCS.

Sincerely,

Phyllis Fox, Ph.D., PE

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July 9, 2015

Garrett Damrath, Chief Environmental Planner
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Department of Transportation, District 7
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Los Angeles, CA 90012

Re: Draft Environmental Impact Report/Environmental Impact Statement SR 710 North Study

Dear Mr. Damrath:

This firm represents the cities of Glendale, La Cañada Flintridge, Pasadena, South Pasadena and Sierra Madre ("5-Cities Alliance") in connection with the State Route ("SR") 710 North Project ("Project").[1] On behalf of 5-Cities Alliance, we respectfully submit these comments to help ensure that agency decision-makers fully comply with the California Environmental Quality Act ("CEQA"), Public Resources Code section 21000 *et seq.*, and the National Environmental Policy Act ("NEPA"), 42 U.S.C. section 4321 *et seq*. Our client is deeply concerned about the far-ranging environmental impacts the Project may have on their cities.

After carefully reviewing the SR 710 Draft Environmental Impact Report/Statement ("DEIR/S") for the Project, we have concluded that it fundamentally fails to comply with the requirements of CEQA and NEPA in numerous respects. As described below, the DEIR/S violates these laws because it: (1) fails to identify

[1] For purposes of this letter, the "Project" refers collectively to the build alternatives unless we indicate otherwise. The build alternatives include: Transportation System Management/Transportation Demand Management ("TSM/TDM"); Bus Rapid Transit ("BRT"); Light Rail Transit ("LRT"); and single bore and dual bore variations of the Freeway Tunnel alternative (collectively, "Freeway Tunnel").

thresholds of significance for the vast majority of the environmental impact analyses; (2) fails to provide significance determinations for numerous environmental impact categories; (3) fails to properly describe the Project's environmental setting; (4) defers analysis of critical environmental impacts and fails to adequately analyze those impacts it does address; (5) fails to support its conclusions with substantial evidence; (6) fails to propose adequate mitigation measures for the Project's numerous significant environmental impacts; and (7) fails to undertake a sufficient study of alternatives to the Project.

Of critical importance, the DEIR/S fails in its role as an informational document. In order to fully understand the analyses and conclusions in the DEIR/S, the public must wade through over 25,000 pages. While one would expect that the main body of the EIR/S would contain an accurate summary of the information contained in the technical appendices, this is not the case. In certain instances, the DEIR/S's conclusions are contradicted by analyzes in the technical appendices. For example, the DEIR/S concludes the Project would result in a benefit to public health while the technical appendix shows that that certain of the Project alternatives would harm public health by increasing the risk of cancer in certain locations. Such fundamental errors undermine the integrity of the EIR/S.

The EIR is "the heart of CEQA." *Laurel Heights Improvement Ass'n v. Regents of University of California* (1988) 47 Cal.3d 376, 392 ("*Laurel Heights*") (citations omitted). It is "an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return. The EIR is also intended 'to demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the ecological implications of its action.' Because the EIR must be certified or rejected by public officials, it is a document of accountability." *Id.* (citations omitted). Likewise, NEPA requires that federal agencies "consider every significant aspect of the environmental impact of a proposed action . . . [and] inform the public that [they have] indeed considered environmental concerns in [their] decision-making process[es]." *Earth Island Institute v. U.S. Forest Service* (9th Cir. 2003) 351 F.3d 1291, 1300 (citations omitted).

CEQA requires the EIR not only to identify a project's significant effects, but also to identify ways to avoid or minimize them. Pub. Res. Code § 21002.1. An EIR generally may not defer evaluation of mitigation to a later date. CEQA Guidelines[2] § 15126.4(a)(1)(B). Rather, an EIR must assess each mitigation proposal that is not "facially infeasible," even if such measures would not completely eliminate an impact or render it less than significant. *Los Angeles Unified School Dist. v. City of Los Angeles* (1997) 58 Cal.App.4th 1019, 1029-31. Furthermore, for every mitigation measure evaluated, the agency must demonstrate that the mitigation measure either: (1) will be effective in reducing a significant environmental impact; or (2) is ineffective or infeasible due to specific legal or "economic, environmental, social and technological factors." *Friends of Oroville v. City of Oroville* (2013) 219 Cal.App.4th 1352, 1359-61; Pub. Res. Code §§ 21002, 21061.1; CEQA Guidelines §§ 15021(b), 15364.

NEPA's requirements are similar. NEPA requires an EIS to contain a detailed discussion of all unavoidable environmental impacts. 42 U.S.C. § 4332(C)(ii). In its discussion of the proposed actions and alternatives, the EIS must "[i]nclude appropriate mitigation measures" and discuss the "[m]eans to mitigate adverse environmental impacts." 40 CFR §§ 1502.14(f), 1502.16(h). The statute "require[s] that an EIS discuss mitigation measures, with 'sufficient detail to ensure that environmental consequences have been fairly evaluated.' An essential component of a reasonably complete mitigation discussion is an assessment of whether the proposed mitigation measures can be effective." *South Fork Band Council of W. Shoshone of Nevada v. U.S. Dep't of Interior* (9th Cir. 2009) 588 F.3d 718, 727 (quoting *Robertson v. Methow Valley Citizens Council* (1989) 490 U.S. 332, 352).

Where, as here, the environmental review document fails to fully and accurately inform decision-makers and the public of the environmental consequences of proposed actions, or identify ways to mitigate or avoid those impacts, it does not satisfy the basic goals of either CEQA or NEPA. *See* Pub. Res. Code § 21061 ("The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect that a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project."); 40 C.F.R. § 1500.1(b) ("NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken."). As a

[2] 14 California Code of Regulations § 15000 *et seq*.

result of the SR 710 DEIR/S's numerous and serious inadequacies, there can be no meaningful public review of the Project.

This letter, along with the report by Nelson Nygaard on transportation (Exhibit 1), the report by Landrum & Brown on air quality and greenhouse gas ("GHG") (Exhibit 2), the report by Landrum & Brown on noise (Exhibit 3), and the report by Wilson Geosciences Inc. on geology and groundwater resources (Exhibit 4), constitutes 5-Cities Alliance's comments on the DEIR/S. We respectfully request that the Final EIR/S respond separately to each of the points raised in the technical consultants' reports as well as to the points raised in this letter. In addition, each of the 5-Cities Alliance member cities will be submitting letters under separate cover. The Alliance joins in the CEQA and NEPA comments of all of its member cities.

THE PROPOSED FREEWAY TUNNEL ALTERNATIVE IS FLAWED AND UNNECESSARY.

This letter focuses primarily on the DEIR/S's failure to comply with CEQA and NEPA. Nevertheless, it is important to emphasize at the outset that the Project's primary alternative,[3] the Freeway Tunnel, is itself flawed and unnecessary. The DEIR/S has posited an ill-defined Project objective and, consequently, the Freeway Tunnel alternative does not address the region's transportation needs. According to the DEIR/S, the Project's primary objective is to resolve the lack of continuous north-south transportation facilities in the San Gabriel Valley. DEIR/S at 3. The DEIR/S suggests that it is this lack of facilities that results in congestion on freeways and "cut-through" traffic that affects local streets. *Id*. Yet, as the Nelson Nygaard Report explains, the region actually lacks east-west transportation facilities, not north-south. Moreover, very little – about 14 percent – of current peak period traffic is cut-through traffic. By providing a new freeway link, the Freeway Tunnel alternative would reduce this cut-through traffic from about 14 percent to between 7 percent and 11 percent. By reducing

[3] The DEIR/S purports to analyze Project alternatives on equal footing, without giving priority to any single one. However, the document subtly reveals an implicit bias in favor of the Freeway Tunnel alternative based, for example, on its selection of Caltrans (not Metro) as lead agency, and SCAG's inclusion of the Freeway Tunnel in the 2012 Regional Transportation Plan/Sustainable Communities Strategy. *See* Section I.B, below.

this cut-through traffic, approximately 7 percent to 13 percent of all motorists throughout the study area would receive a nominal travel time savings of 2.5 minutes.[4] This means that about 90 percent of motorists in the study would receive no significant travel time savings, or their travel time would worsen, as a result of this alternative.

Nor would the Freeway Tunnel actually improve regional traffic. Instead, it would shift congestion around. Traffic would significantly worsen on various connecting freeways as a result of the tunnel, in part because the Freeway Tunnel induces extra driving. The Freeway Tunnel would also increase traffic congestion in parts of Alhambra, Rosemead, San Marino, Pasadena and South Pasadena.

The Freeway Tunnel would also bypass many of the destinations people want to go. According to the New Initiative for Mobility and Community, the San Gabriel Valley is a community of diverse people with widely varying commute patterns. *See* "New Initiative for Mobility and Community," prepared by Nelson Nygaard for Connected Cities and Communities, attached as Exhibit 5. Eighty-five percent of commuters exiting the 710 Freeway at Valley Boulevard are intent on reaching local destinations. Employees need to make short commutes to Pasadena and longer commutes to Burbank (Metro has found that 70 percent of study-area vehicle trips start and end within the San Gabriel Valley). Students attending Cal State LA and East LA College need ways to make short commutes to school. The Freeway Tunnel Alternative simply would not serve these types of transportation needs.

In addition, the Freeway Tunnel does not provide a *sustainable* solution to the region's transportation needs, and confers no support for active transportation. Every trip starts by walking, and the people of San Gabriel Valley deserve to be able to walk safety and comfortably. The region should be striving toward a transportation solution that will make car ownership an option rather than a necessity. Projects such as the Freeway Tunnel that facilitate the automobile and promote increased vehicular speeds threaten the walkability of a community. Clearly, there must be a better solution to meeting the region's transportation needs, especially given the Freeway Tunnel's hefty

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[4] 2.5 minutes is the threshold used to count vehicle hours travelled during peak periods; some savings may be greater but the DEIR/S does not contain this granular information. *See* DEIR/S Transportation Technical Report at 4.3.

$5.5 billion price tag—and the fact that it will not "pay for itself" through tolls as some have asserted.

Furthermore, the Freeway Tunnel's increase in vehicular capacity will cause a substantial increase in vehicle miles travelled ("VMT"), with resulting increases in greenhouse gas ("GHG") emissions and other air pollution. As explained further below, ample studies demonstrate that increased highway capacity increases VMT and GHG emissions in the long-run.[5] Consequently, providing increased roadway capacity is unlikely to relieve congestion. The DEIR/S provides a real-world example of this effect, as it acknowledges that the Freeway Tunnel would result in a sizable increase in vehicular travel. Total VMT under all freeway tunnel alternatives would increase by as many as 460,000 miles per day. This increase in VMT demonstrates that adding highway capacity is a temporary solution, at best, to the complex problem of traffic congestion.

Because the Freeway Tunnel alternative would increase capacity and induce travel, it would take the region in a direction that prevents achieving the State's preeminent climate goals. Governor Brown's Executive Order issued on April 29, 2015 directs the state to cut its GHG emissions 40 percent below 1990 levels by 2030; this directive reiterates Governor Schwarzenegger's 2005 Executive Order, which calls for reducing statewide GHG emissions 80 percent below 1990 levels by 2050. The State will not be able to meet these goals without a reduction in motor vehicle travel. Tellingly, Caltrans itself specifically recognized this fact when it noted that achieving the State's climate change goals requires a "fundamental, holistic transformation of the transportation systems." *See* California's 2040 Transportation Plan, March 2015 at 4, attached as Exhibit 6 (stating that one of the main strategies to reduce future GHG emissions for the movement of people and freight is reducing vehicle miles traveled and increasing a shift to more sustainable transportation).

In addition, it is important to understand that even if a freeway tunnel were the appropriate solution to meet the region's transportation needs—which it is not—the Freeway Tunnel design being considered here is entirely unprecedented. The proposed

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[5] *See* S. Handy and M. Boarnet, California Air Resources Board (CARB), *Policy Brief in the Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions*, September, 30, 2014, at 4, 5, attached as Exhibit 7.

60-foot diameter tunnel would be the widest subsurface tunnel attempted anywhere in the world. In December 2013, the tunnel boring machine ("TBM") used to construct Washington State's Alaskan Way Viaduct replacement project—the largest such tunnel to date (57-foot diameter)—became stuck after tunneling only one thousand feet of the tunnel's 1.7-mile length. Workers had to construct an access pit 120 feet deep and 80 feet wide to lift the TBM out in order to repair it. Had it not failed so early, accessing the machine for repairs would have been even more difficult—or impossible—because the tunnel's route takes it beneath downtown Seattle. The Seattle project is now at least two years behind schedule and it is unclear whether it can or will be successfully completed. That project serves as a cautionary tale for the proposed Freeway Tunnel alternative, yet the DEIR/S fails to address the impacts that could result if a TBM were stuck along the SR 710 route alignment, which is located in a densely developed area.

In sum, selection of the Freeway Tunnel alternative would result in the loss of a critical opportunity to fundamentally, holistically transform the region's transportation system. Indeed, this alternative reflects strategies from the 1960's, when the state pursued road-building projects without regard to global climate change and other environmental threats. The agencies should deny the proposed Project and go back to the drawing board, to design a project that is capable of meeting the region's transportation needs in a manner that is sustainable and environmentally responsible. In particular, as discussed more fully below, the 5-Cities Alliance urges the agencies to consider its "Beyond the 710" alternative, a multimodal option that combines mass transit, "great streets," and bikeways.

THE DEIR/S FAILS TO COMPLY WITH CEQA AND NEPA.

I. The DEIR/S's Description of the Project Violates NEPA and CEQA.

An accurate description of a proposed project is "the heart of the EIR process" and necessary for an intelligent evaluation of the project's environmental effects. *Sacramento Old City Ass'n. v. City Council* (1991) 229 Cal.App.3d 1011, 1023; *see also Rio Vista Farm Bureau v. County of Solano* (1992) 5 Cal.App. 4th 351, 369-370 (project description is the "sine qua non" of an informative and legally sufficient EIR); *see also Westlands Water Dist. v. U.S. Dep't of Interior* (9th Cir. 2004) 376 F.3d 853, 866-868 (the purpose and need statement of an EIS must "reasonably define[ ] the objectives of the project"). Consequently, courts have found that, even if an EIR is adequate in all other respects, the use of a "truncated project concept" violates CEQA and mandates the conclusion that the lead agency did not proceed in a manner required by law. *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 730. Furthermore, "[a]n accurate project description is necessary for an intelligent evaluation of the potential environmental effects of a proposed activity." *Id.* (citation omitted).

Thus, an inaccurate or incomplete project description renders the analysis of significant environmental impacts inherently unreliable. While extensive detail is not necessary, the law mandates that EIRs should describe proposed projects with sufficient detail and accuracy to permit informed decision-making. *See* CEQA Guidelines §15124 (requirements of an EIR). NEPA similarly requires an accurate and consistent project description in order to fulfill its purpose of facilitating informed decision-making. 43 U.S.C. § 4332(2)(C).

The DEIR/S's description of the Project fails to fulfill these requirements. It lacks adequate detail regarding project construction, obscures the alternative preferred by Caltrans and Metro, fails to identify the standards by which the agencies will select an alternative, and lacks critical information about Project funding. As a result, the DEIR/S does not come close to meeting the basic thresholds for legal adequacy.

A. The DEIR/S Fails to Identify Performance Criteria or Objective Standards by Which Caltrans and Metro Will Evaluate the Alternatives.

The DEIR/S provides no objectives or standards by which the lead agency may evaluate the various alternatives' comparative performance. This omission undermines the public process, leaving interested parties without guidance as to how project selection will transpire. The document's lack of transparency violates CEQA's and NEPA's fundamental goals of ensuring that, especially for projects involving potentially significant environmental impacts, decisions are made with a maximum of transparency and public input. *See, e.g., Save Tara v. City of W. Hollywood* (2008) 45 Cal.4th 116, 136 ("CEQA's goal. . .[is] transparency in environmental decision-making."); *Sierra Club v. Gates* (S.D. Ind. 2007) 499 F.Supp.2d 1101, 1132 (lack of transparency in decision-making process was "troubling in light of the goal of NEPA to ensure public input into the process").

The DEIR/S's omission is surprising, given that some objectives and performance measures were identified in Metro's Alternatives Analysis Report. That report included eight performance objectives related to transportation system performance, environmental impacts, planning considerations, and cost efficiency. Alternatives Analysis Report (2012) ES-3 to -4. For each of these eight objectives, the document identified one or more performance measures. *Id*. at 2-4. It also described the screening criterion selection process Metro used to select the alternatives it would consider in the DEIR/S. *Id*. at ES-4. Yet, such criteria are entirely lacking in the DEIR/S, where their presence is even more crucial. The public is thus left in the dark as to whether Caltrans and Metro will be relying on these same objectives and performance measures to select from among the proposed project alternatives, or whether the agencies will be using a different set of objectives and performance measures.

Of course, Caltrans commonly relies on performance measures and criteria. For example, Caltrans' Strategic Management Plan 2015-2020 sets very specific targets for transportation mode shift and VMT reduction. Similarly, Caltrans' Smart Mobility Caltrans Report (2010) describes specific performance measures to advance "smart mobility." Smart Mobility Caltrans Report (2010) at 8, 50, attached as Exhibit 8. Neither document is even mentioned in the DEIR/S, however. Readers need to know if the agencies will be using these, or other performance measures, to assess the alternatives.

Equally troubling, the DEIR/S fails to clarify the respective roles of Caltrans and Metro in making the ultimate selection among project alternatives. The DEIR/S states that "Caltrans, in consultation with Metro, will identify a Preferred Alternative and make the final determination of the project's effect on the environment." DEIR/S at 2-107. But the document does not address how the two agencies will share responsibility for the choice among alternatives, or how they will each bring their distinct expertise to bear in that decision. This is especially confusing, as the lead agency for the Project will differ depending on the alternative eventually chosen. *See* DEIR/S at preface. As the City of South Pasadena's comment letter explains, changing the lead agency depending on the selected alternative is unlawful and improperly skews the analysis in favor of the Freeway Tunnel alternative. Letter from Rossman & Moore for City of South Pasadena, pp.__.

B. The DEIR/S Does Not Acknowledge That the Freeway Tunnel Is the Preferred Alternative.

The CEQ's regulations for implementing NEPA require the alternatives section of an EIS to "identify the agency's preferred alternative if one or more exists, in the draft statement, and identify such alternative in the final statement . . . ." 40 C.F.R. § 1502.14(e). Therefore, if the agency has a preferred alternative at the draft EIS stage, that alternative must be labeled or identified as such in the draft EIS. *See also* Council on Environmental Quality, Memorandum to Agencies: Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026, 18028 (March 23, 1981).

Although the DEIR/S purports to evaluate the alternatives without giving priority to any single one, there are strong indications that the Freeway Tunnel is Caltrans' and Metro's preferred alternative, and that the agencies have already made their decision to select it for project approval. For example, the DEIR/S states, when discussing the Project generally: "Because *the proposed project would add a new freeway tunnel* to the project area and/or would widen existing local roads, it would potentially worsen air quality." DEIR/S at 3.13-16 (emphasis added).

Tellingly, unlike the other alternatives, the freeway tunnel is included in SCAG's 2015 Federal Transportation Improvement Program ("FTIP") and its 2012 Regional Transportation Plan/Sustainable Communities Strategy ("RTP/SCS"). DEIR/S at 1-51; 3.13-14. Accordingly, the DEIR/S states that "[t]he forecast revenues in the RTP/SCS financial plan include toll revenues from the SR 710 freeway tunnel." *Id.* at 1-51. This is revealing. By acknowledging that SCAG's transportation plan includes, and actually relies on the toll revenues from the freeway tunnel, the DEIR/S suggests that the freeway tunnel is a foregone conclusion in the eyes of Metro and SCAG.

Together, these statements indicate that despite the DEIR/S's ostensible lack of a preferred alternative, Caltrans and Metro have already determined to approve and construct the Freeway Tunnel alternative. The DEIR/S must acknowledge that the Freeway Tunnel alternative is in fact the preferred alternative. By failing to do so, the document misleads readers and obscures the institutional momentum behind the Freeway Tunnel alternative.

C. The DEIR/S Lacks an Adequate Description of Potential Funding Sources for Each Alternative.

The DEIR/S's discussion of funding for each of the alternatives is altogether opaque, and the public therefore has no way to determine the Project's true costs. The DEIR/S should contain a separate, detailed description (accompanied by a summary in table format) of both: (1) the estimated costs of each project component, and (2) the estimated funding sources for each alternative.

Given the size and cost of the proposed Project, the public has a keen interest in ready access to cost and funding data for the various alternatives. Indeed, the environmental impacts of project alternatives cannot be fully considered without an understanding of this crucial information. As it stands, the DEIR/S addresses cost information only superficially, in one short paragraph at the end of the description of each project alternative. This approach is entirely unhelpful.

As for potential funding sources, the DEIR/S fails to discuss this topic in any focused manner. Instead, it sprinkles references to possible funding sources throughout the document, but with insufficient detail. The most specific discussion of funding for the alternatives appears, of all places, in two rows of the Table 3.1.3, which addresses the Project's consistency with state, regional, and local plans. DEIR/S at 3.1-36; 3.1-47 (Policy 4.2.3 and Policy 1.21). But these explanations merely state that "state and local funding sources are anticipated to be used" for all build alternatives, and that the TSM/TDM, LRT, and Freeway Tunnel alternatives would need to be added to the FTIP[6] to be eligible for federal funding. *Id.* Again, this information is too nebulous to be useful.

The DEIR/S's other statements about Project funding are vague or inconsistent. For example, the DEIR/S states that "[t]he Project is proposed to be funded entirely or in part by Measure R, a half-cent sales tax dedicated to transportation projects in Los Angeles County." DEIR/S at 1-1. Elsewhere, however, it explains that only $780 million in funding has been committed by Measure R to the SR 710 improvements.[7] *Id*. at 1-6; 1-51. This is a small fraction of the cost of the Project, which is estimated to be $5.5 billion for the Freeway Tunnel alternative. There is little mention of the other sources of local or regional funding, or how those funding sources may differ depending on the alternative selected.

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[6] Confusingly, the document elsewhere states that the Freeway Tunnel Alternative is already included in SCAG's 2015 FTIP. DEIR/S at 3.13-14.

[7] Although the DEIR/S states that Measure R includes a "commitment" of $780 million to the 710 Project, DEIR/S at 1-52, Metro has previously taken the position that Measure R does *not* constitute a binding commitment to spend in a particular manner. Exhibit 9 at 37 (Opening Brief of Respondent Los Angeles County Metropolitan Transportation Authority, *City of South Pasadena v. Los Angeles County Metropolitan Transp. Authority* (Cal. Ct. App., Mar. 22, 2011, B221118) 2011 WL 989553).

Nor does the DEIR/S analyze the revenues expected from the toll version of the Freeway Tunnel alternative despite earlier indications that this analysis would be conducted at this stage. Specifically, Metro's 2012 Alternatives Analysis Report stated that "Metro . . . concludes that freeway tunnel alternatives could be funded by future toll revenues. However, no analysis of toll revenues has been conducted in this Alternatives Analysis so this conclusion will be verified in the PA/ED ["Project Approval & Environmental Documentation"] phase." Alternatives Analysis Report Appx. X, Cost of Alternatives Technical Memorandum at 5. Nevertheless, the DEIR/S includes only a single, offhand mention of toll revenues, noting that toll revenues from the freeway tunnel are included in SCAG's 2012 RTP/SCS financial forecast. DEIR/S at 1-51.

The DEIR/S's discussion of federal funding is similarly incomplete. It explains that the Project is classified as a "Type I" project because federal aid is proposed for construction for the Freeway Tunnel, BRT, and TSM/TDM alternatives. *Id.* at 3.14-7. But the document nowhere explains what a "Type I project" is. Nor does it explain in the project description why federal aid is proposed for all build alternatives except the LRT, and whether the (un)availability of federal funding will influence selection of the project alternative. Simply stating that federal funding is "proposed" provides little useful information. The reader is left guessing as to: (1) the likelihood that such funding will actually be secured, (2) the expected grant amount, and (3) what portion of the Project's overall cost would be covered by that funding.[8]

The absence of meaningful discussion of project funding is surprising, since the issue is not new. In 2003, the Federal Highway Administration ("FHWA") informed Caltrans that the FHWA was rescinding its 1998 Record of Decision (the NEPA approval document) for a prior version of the SR 710 project and requiring Caltrans to conduct a supplemental EIS. The FHWA based this decision, in part, on "[c]ontinued uncertainty regarding the financing of this project and the failure to develop a comprehensive financial plan for its implementation." Exhibit 10 at 7 (G. Hamby Letter to J. Morales, December 17, 2003).

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[8] As noted above, simply referring to appendices or technical documents is not sufficient. The DEIR/S's information on costs and funding sources must be presented to the reader in a straightforward, comprehensible format. *See California Oak Found. v. City of Santa Clarita* (2005) 133 Cal. App. 4th 1219, 1239 (relevant information may not be "buried in an appendix").

The DEIR/S's omission of any useful information as to Project cost and funding is glaring. These monetary issues are vital, as they dictate not only whether the Project's purported benefit justifies the cost, but also whether the Project will ever be completed. Other tunnel-boring projects with lesser risks have encountered serious difficulties, resulting in huge cost-overruns and long delays. The Alaskan Way Viaduct tunnel, whose pre-project cost estimate was about half that of the dual-bore Freeway Tunnel alternative, again is illustrative. As noted previously, work has been stalled on the Seattle project since 2013, when the tunnel boring machine broke down in situ.[9] Additional costs are unknown,[10] although the Washington State Department of Transportation hopes to hold the contractor liable for such costs. [11]

The Alaskan Way Viaduct replacement project is not the only example of an underground infrastructure project involving the use of tunnel boring machines that is afflicted by high costs and delays. Contractors operating a tunnel boring machine for a similar project in Miami demanded an extra $150 million three months before the start of excavation based on the results of new geotechnical analysis.[12] Indeed, studies have shown that for large-scale transportation infrastructure projects like the SR 710 North Project, the likelihood of cost overruns correlates with the length of the project's

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[9] Galloway, P., *et al.*, *Alaskan Way Viaduct Replacement Program Expert Review Panel Updated Report*, April 3, 2015 at 4, attached as Exhibit 11.

[10] The Washington State Department of Transportation currently estimates that additional costs could exceed $300 million. Alaskan Way Viaduct Replacement Expert Review Panel Update Report at 28.

[11] *See* KOMO NEWS, *Transportation officials: New cracks on Alaskan Way Viaduct* (April 7, 2015), available at: http://www.komonews.com/news/local/Transportation-officials-New-cracks-on-Alaskan-Way-Viaduct-298930741.html.

[12] *See* CBS MIAMI, *Company Building Port of Miami Tunnel Seeks More Money* (July 8, 2011), available at http://miami.cbslocal.com/2011/07/08/company-building-port-of-miami-tunnel-seeks-more-money/; *see also* THE COLUMBUS DISPATCH, *Project to bore tunnel under Columbus faces $29.5 million cost overrun* (Dec. 6, 2014), available at: http://www.dispatch.com/content/stories/local/2014/12/06/daunting-drilling.html (Cleveland project involving tunnel boring machine delayed two years with $29.5 million cost overrun).

implementation phase; here, the dual-bore Freeway Tunnel alternative is expected to take five years to construct, three years longer than the initial time estimate for the Seattle project. In addition, tunnel projects are especially likely to fall prey to higher levels of cost escalation. *See generally* Bent Flyvbjerg, et al. "What Causes Cost Overrun in Transportation Infrastructure Projects?" *Transport Reviews* (2004), attached as Exhibit 12; Bent Flyvbjerg, "What You Should Know About Megaprojects and Why: An Overview" *Project Management Journal* (2014), attached as Exhibit 13.

D. The DEIR/S's Description of the Project Fails to Include Adequate Detail Regarding Construction of the Tunnel Alternatives.

The description of a Project's construction details should be commensurate with its size and scope. Given the immense cost, size, and scope of the alternatives proposed in the DEIR/S, the Project description should have supplied more detail regarding their construction. Below are just three examples of the ways in which the Project description's discussion of construction details falls short.

First, the DEIR/S states that for the LRT and Freeway Tunnel alternatives, the tunnel would be fabricated from a precast concrete segmental lining system. DEIR/S at 2-52; 2-80. There is no explanation of how the precast concrete tunnel rings will be transported to, or fabricated at, the Project site. The precast concrete tunnel rings required to build very large diameter tunnels such as the dual bore are enormous: nearly 60 feet in diameter. Given the 4.2 miles of tunnel, the Freeway Tunnel alternative would require 1056 tunnel rings if they are 20 feet long, or 2,112 rings if they are 10 feet long. Concrete structures that are 60 feet in diameter would cover about five traffic lanes on a freeway and must be hauled to the tunnel entrance portal from the fabrication site. Given their size, they likely would be designed in several pieces to be assembled on site. The DEIR/S provides no description of this process, despite the obvious impacts. For example, the possibility of unaccounted-for truck trips implicates the transportation, air quality, noise, and GHG analyses.

Second, the DEIR/S states that the Project would be built in phases. However, the DEIR/S addresses construction phasing only in the most general terms; it even lacks factual detail about when the phases would occur. *See* DEIR/S at 2-24 (TSM/TDM); 2-38 to -39 (BRT); 2-57 to -60 (LRT); 2-85 to -86 (Freeway Tunnel). Construction is estimated to take up to five to six years, depending on the alternative selected. Details of the timing of construction are critical to understanding Project impacts, yet the DEIR/S lacks any description of this critical Project component.

Third, the DEIR/S contains no description of how repairs will be made to the tunnel boring machines in the event that they malfunction during Project construction. The DEIR/S must address this issue. As noted previously, the TBM for the Alaskan Way Viaduct Replacement Project tunnel malfunctioned during the early stages of tunnel construction and became stuck, requiring workers to lift it out to perform repairs. This intensive work, which involved the use of heavy equipment to excavate an access pit 120 feet deep and 80 feet wide, has delayed that project by at least two years. Given Seattle's experience, and the fact that the Freeway Tunnel alternative proposes to use up to *four* TBMs (thereby quadrupling the risk of mechanical failure), the DEIR/S should have addressed how repairs would be made in the event of a TBM malfunction. Unfortunately, this flaw in the Project description resulted in an incomplete analysis of the tunnel alternatives' impacts in a number of areas. For example, because the DEIR/S does not describe a TBM repair plan or strategy, it does not analyze the potential impacts from repair-related excavation and extended tunnel construction. Such impacts may include ground settlement and additional noise, vibration, and air quality impacts. In a worst-case scenario, homes and businesses above or adjacent to the Project site would need to be relocated in order to allow workers access to a TBM from the surface.

In sum, the DEIR/S's description of the Project suffers from serious flaws and omissions. Consequently, the DEIR/S does not meet CEQA and NEPA's basic requirements.

II. The DEIR/S's Analysis of and Mitigation for the Project's Environmental Impacts Are Inadequate.

The evaluation of a proposed project's environmental impacts is the core purpose of an EIR. *See* CEQA Guidelines § 15126.2(a) ("[a]n EIR shall identify and focus on the significant environmental effects of the proposed project"). Likewise, NEPA requires that federal agencies "consider every significant aspect of the environmental impact of a proposed action . . . [and] inform the public that [they have] indeed considered environmental concerns in its decision-making process." *Earth Island Institute,* 351 F.3d at 1300 (citations omitted). Each statute also requires that the EIR/S identify measures that would effectively mitigate a proposed project's significant effects on the environment. Pub. Res. Code § 21002.1(a); *Robertson,* 490 U.S. at 352-352. As explained below, the DEIR/S fails to analyze the Project's numerous environmental impacts, including those affecting air quality, climate change, traffic and transportation, noise, geology, hydrology and water quality. It also fails to identify effective mitigation measures for the Project's significant effects.

A. The DEIR/S's Analysis of and Mitigation for Air Quality Impacts Are Inadequate.

The Project is located within the South Coast Air Basin, which has the worst air quality – with the highest observed ozone concentrations – in the United States. *See* Letter to Michael Miles, Caltrans from USEPA, September 28, 2012 regarding the I-710 Project from Ocean Boulevard to State Route 60, at pdf page 6, attached as Exhibit 14. The South Coast Air Basin also has the greatest number of unhealthy air quality days.[13] Direct and indirect air pollutant emissions from transportation-related activities is a major contributor to this poor air quality. *See* Exhibit 14 (J. Blumenfeld Letter to M. Miles, September 28, 2012).

Given the severe air pollution in the Project study area, and the Project's potential to contribute to that pollution (particularly if the Freeway Tunnel is selected), one would expect the DEIR/S to provide a comprehensive analysis of the Project's impacts and to thoroughly mitigate for these impacts. Yet, the DEIR/S fails to achieve CEQA's and NEPA's most basic purpose: informing governmental decision-makers and the public about the potential significant environmental effects of a proposed activity. CEQA Guidelines § 15002 (a) (1); 40 C.F.R. § 1500.1(b). Because the attached air quality report by Landrum & Brown discusses the inadequacies of the DEIR/S's air quality analysis in detail, this letter will highlight just a few of these deficiencies. *See also* Letter of the City of La Cañada Flintridge (presenting detailed discussion of DEIR/S's defective air quality analysis).

1. The DEIR/S's Analysis of Construction-Related Air Quality Impacts Is Flawed, and the Proposed Mitigation Insufficient.

Determining whether a project may result in a significant adverse environmental effect is one of the key aspects of CEQA and NEPA. CEQA Guidelines § 15064(a) (determination of significant effects "plays a critical role in the CEQA process"); 40 C.F.R. § 1502.16 (Discussion of environmental consequences "shall include discussions of...[d]irect effects and their significance [and] [i]ndirect effects and their significance."). CEQA specifically anticipates that agencies will use thresholds of

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[13] *See* "State of the Air," American Lung Association, available at: http://www.stateoftheair.org/2014/key-findings/ozone-pollution.html, accessed on May 26, 2015.

significance as an analytical tool for judging the significance of a Project's impacts. *Id*. § 15064.7. Because the requirement to provide mitigation is triggered by the identification of a significant impact, an EIR's failure to identify a project's significant impacts also results in a failure to mitigate these impacts. Here, the DEIR/S fails to identify construction-related thresholds of significance; as a result, it never comes to a conclusion regarding the significance of the Project's construction-related impacts, or identifies adequate mitigation for those impacts.

The DEIR/S quantifies the increase in construction-related criteria air pollutant emissions (Table 3.13.4 at page 3.13-11) and states that "short-term degradation of air quality may occur due to the release of particulate emissions generated by excavation, grading, hauling, and other construction equipment." *Id*. at 4-6. The DEIR/S then fails to take the next critical step in the analysis: to disclose whether the Project's increase in emissions constitutes a significant impact. According to the Landrum & Brown Air Quality Report, the Project's construction emission levels before mitigation are well above the regional significance thresholds recommended by the South Coast Air Quality Management District ("SCAQMD"). *See* SCAQMD Air Quality Significance Thresholds, attached as Exhibit 15. The LRT and Freeway Tunnel alternatives would exceed relevant thresholds for reactive organic gasses ("ROGs"), and carbon monoxide ("CO") emissions. *See* Landrum & Brown Air Quality Report. All of the build alternatives greatly exceed the SCAQMD thresholds for particulates and NO_x emissions. Indeed, For the LRT and Freeway Tunnel alternatives, particulate emissions are between 3.8 and 9.7 times greater than the SCAQMD thresholds. NO_x emissions are 22.4 times greater than the SCAQMD thresholds for the LRT alternative and 43.9 and 49.3 times greater for the two Freeway Tunnel alternatives. *Id*. The DEIR/S does not disclose these exceedances of regional air quality standards.

Notwithstanding the Project's clearly significant construction-related emissions, the DEIR/S errs further by failing to evaluate whether these emissions also violate federal and state ambient air quality standards. The SCAQMD recommends using an approach called a "localized construction impact assessment" to determine whether construction emissions will create any exceedances of these ambient air quality standards, or worsen any existing exceedances. *See* SCAQMD's Localized Significance Threshold ("LST") Methodology, attached as Exhibit 16. LSTs, which are developed based on the ambient concentrations of pollutants for each source receptor area, represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard. Projects larger than five acres typically are not exempt from this analysis but must perform their own dispersion modeling to determine pollutant concentrations at nearby receptors. We can find no indication that the DEIR/S conducted the necessary dispersion modeling to evaluate whether construction emissions from the Freeway Tunnel alternative would violate federal or state air quality standards even though the proposed freeway tunnel(s) would be much larger than five acres in size. The DEIR/S also should have analyzed the construction-related emissions from the other Project alternatives under this threshold. This omission alone constitutes a fatal flaw in the DEIR/S.

Although the DEIR/S fails to come to a determination regarding the significance of the Project's construction-related emissions, it nonetheless identifies some air quality mitigation measures. DEIR/S at 3.13-40 – 42. Yet, here too, the DEIR/S fails because it does not provide any information as to the expected effectiveness of these measures. *See Friends of Oroville,* 219 Cal.App.4th 1352, 1359-61. Consequently, it does not provide any evidentiary support for the DEIR/S's conclusion that the Project's construction-related air emissions would be less than significant.

Nor, as the Landrum & Brown Air Quality Report makes clear, does the DEIR/S propose the most effective measures to control construction-related emissions, particularly for the Freeway Tunnel alternative. For example, the DEIR/S identifies a very stringent measure (complying with Metro's Green Construction Policy) for the TSM/TDM, LRT, and BRT alternatives, but it does not require this same protective measure for the Freeway Tunnel alternative. *Id*. at 3.13-42. Metro's Green Construction Policy requires, among other things, all construction equipment greater than 50 horsepower to meet Tier 4 standards and be equipped with diesel particulate filters after January 1, 2015.[14] Yet the sole mitigation measure for reducing emissions from construction of the Freeway Tunnel alternative requires only compliance with Tier 3 standards. *Id*. at 3.13-41. The DEIR/S provides no explanation as to why the Freeway Tunnel alternatives would not be mitigated using the most stringent measures, especially since they would have greater emissions than the other alternatives. DEIR/S at 3.13-11. Indeed, according to Landrum & Brown, this less restrictive measure means that the NO_x emissions under the tunnel alternative would be reduced only by about 33 percent, as compared to a 90 percent reduction if the tunnel alternative were required to meet Tier 4 standards. Notably, the less restrictive measure would not reduce particulate emissions at

[14] Tier 4 standards are the most stringent.

all. The failure to require the most effective mitigation measures for these significant effects violates CEQA. Pub. Res. Code §§ 21002, 21081.

2. The DEIR/S's Analysis of Operation-Related Air Quality Impacts Is Flawed, and the Proposed Mitigation Insufficient.

(a) The DEIR/S Underestimates the Project's Increase in Operation-Related Regional Emissions.

As discussed below, the DEIR/S underestimates predicted traffic volumes because it fails to take into account all of the Freeway Tunnel alternative's induced travel demand beyond the first 10 years of operation. It also greatly understates increased delay where the Freeway Tunnel would create new bottlenecks or make existing bottlenecks worse. Inasmuch as the Project's air quality emissions are dependent on the transportation assumptions, any underestimation of vehicular trips and/or vehicle delay necessarily results in an underestimation of vehicular emissions. Moreover, as the Landrum & Brown Air Quality Report explains, the DEIR/S also underestimates vehicular emissions because it overestimates the increase in vehicle speeds that would occur as a result of the Freeway Tunnel.

Because Metro's inaccurate modeling leads to flawed conclusions regarding the severity of these impacts, the EIR violates both CEQA and NEPA. *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 829 (EIR must provide accurate information regarding "how adverse the adverse impact will be"); *see* 40 C.F.R. § 1502.24 ("Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements"); *Natural Resources Defense Council v. U.S. Forest Service* (9th Cir. 2005) 421 F.3d 797, 812-813 (EIS's erroneous calculations based on improper assumptions subverted NEPA's purpose and presented a "misleading…evaluation of alternatives").

(b) The DEIR/S Fails to Adequately Analyze or Mitigate Impacts Relating to Particulate Hotspots.

It is critical that the DEIR/S conduct an adequate analysis of particulate impacts given the well documented serious health risks associated with $PM_{2.5}$ exposure. In its final rule designating attainment and non-attainment of $PM_{2.5}$ standards, the U.S. EPA noted the "significant relationship between $PM_{2.5}$ levels and premature mortality, aggravation of respiratory and cardiovascular disease . . . , lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and cardiac arrhythmia," particularly among "older adults, people with heart and lung disease, and children." *See generally* Air Quality Designations and Classifications for the Fine Particles ($PM_{2.5}$) National Ambient Air Quality Standards, 70 Fed. Reg. 944, 945 (Jan. 5, 2005) [Vol. 2, Ex. 28-e]; s*ee also* Assessment and Mitigation of Air Pollutant Health Effects from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review, Rajiv Bhatia and Thomas Rivard, May 6, 2008, attached as Exhibit 17. The study by Bhatia and Rivard, in particular, elaborates on the health effects of particulate matter exposure and the epidemiology of roadway proximity health effects, providing guidance for assessing these effects.

The purpose of a particulate hotspot analysis, such as the one the DEIR/S purports to undertake, is to determine whether a project would: (a) conflict with or obstruct implementation of an applicable air quality plan, or (b) violate the ambient air quality standard or contribute substantially to an existing or projected air quality violation. DEIR/S at 3.13-19. In order to determine if a project would result in exceedances of air quality standards, the DEIR/S must describe existing air pollutant concentrations, identify the increase in emission concentrations from the Project, and then model the Project-related concentrations together with ambient concentrations.

Unfortunately, the DEIR/S's particulate hotspot analysis is flawed. Critical analytical details are missing altogether, while others are clearly erroneous. First, the DEIR/S does not describe the existing environmental setting. For example, the DEIR/S does not appear to take into account existing sources of particulate emissions in the Project area. Data from areas immediately adjacent to the proposed alignment are necessary to predict local impacts.

Second, the DEIR/S does not identify any of the technical data and/or assumptions that were used to conduct the quantitative particulate hotspot dispersion modeling. The document does not provide any specific input parameters such as specific roadways included in the model and their traffic volumes, speeds and emission rates.

Third, the DEIR/S appears to rely on faulty methodology for evaluating the Project's particulate concentrations. While the document never actually discloses its particulate hot spot methodology, the technical report for the DEIR/S's health risk assessment ("HRA"), provides a reasonable amount of documentation of the input parameters used for the mobile source air toxics ("MSAT") dispersion modeling. It is likely that the DEIR/S preparers used the same methodology and assumptions for the particulate hotspot analysis as they did for the HRA. According to Landrum & Brown, the methodology and data used for the MSAT dispersion modeling show that the consultants used average daily traffic volumes and speeds in the modeling. Yet, as discussed more fully below, the use of average data does not properly account for diurnal variations in traffic characteristics, e.g., increased emissions during peak commute hours. Consequently, this averaging underestimates the Project's particulate emissions and concentrations.

Fourth, the DEIR/S fails to provide any thresholds of significance for determining whether the Project's particulate concentrations would be significant. How high would the Project's particulate concentrations have to be in order to exceed the state or federal ambient air quality standards? The DEIR/S never identifies this critical numerical threshold. In fact, the DEIR/S never explains the results of its "analysis" at all. While the document identifies PM_{10} and $PM_{2.5}$ concentrations for each Project alternative in 2025 (*see* Tables 3.13.7, 8 and 9 at page 3.13-25), these values have no context other than indicating that concentrations would be less than the "no-build" alternatives. *Id*. CEQA is clear that the no-project alternative is not the baseline for determining whether the proposed project's environmental impacts may be significant. CEQA Guidelines § 15126.6. The DEIR/S should have identified a threshold of significance and then evaluated the Project's increase in particulate concentrations against a baseline of existing conditions.

Fifth, the DEIR/S asserts that it modeled particulate concentrations at thirteen freeway locations that are considered "areas that are potentially of air quality concern" (at 3.13-20), but the document never explains the effect the Project's increase in particulate pollution would have at these locations. This information is of critical importance. Members of the public who reside in homes or attend schools near these freeway locations must be informed as to whether they could be exposed to excessive particulate concentrations. In order to disclose the effects of the Freeway Tunnel alternative, the specific receptor locations must be presented graphically to show the particulate concentrations in each modeled location, along with some indication as to whether these concentrations result in particulate hotspots.

Sixth, the DEIR/S does not mention, let alone analyze, the Freeway Tunnel alternative's potential to exceed California's ambient air quality standards. The flawed analysis discussed above, relates only to the Project's potential to exceed the federal air quality standards. The South Coast Air Basin, which is the setting for the Project, is designated "nonattainment" of the State PM_{10} and $PM_{2.5}$ standards. DEIR/S at 3.13-7.

California's standards for particulate matter are more protective of public health – and therefore more stringent – than respective federal standards. *See* California Air Resources Board ("CARB"), "California Ambient Air Quality Standards" available at: http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm.[15] Accordingly, it is critical that the DEIR/S analyze the Project's potential to violate the state standards.

For all of these reasons, the DEIR/S's analysis of particulate hotspots violates CEQA and NEPA by failing to accurately assess health impacts, thereby precluding Project approval.

3. The DEIR/S Fails to Adequately Analyze or Mitigate the Project's Health Risks.

(a) The DEIR/S Substantially Underestimates the Project's Health Risk Because the HRA Relied on Inappropriate Methodology.

As the Landrum & Brown Air Quality Report explains, the DEIR/S substantially underestimates the Project's cancer and chronic-non-cancer risks because the health risk assessment ("HRA") relied on flawed methodology. First, as with the DEIR/S's particulate hot spot analysis, the HRA's dispersion modelling utilized average variables, such as average daily trips and daily average speed, to characterize the Project's pollutant concentrations. In other words, the modeling assumed that each roadway link generated the exact same amount of pollutants each hour of the day. Thus, according to the DEIR/S, total daily emissions = average daily traffic volume X emission

[15] Ambient air quality standards ("AAQS") define the maximum amount of pollution that can be present in outdoor air without harm to the public's health. The Federal Clean Air Act requires the U.S. EPA to set ambient air quality standards for the nation. It also permits states to adopt additional or more protective air quality standards if needed. The California Legislature authorized CARB to set ambient air pollution standards for the state. Health & Safety Code section 39606. Accordingly, CARB has set standards for certain pollutants, such as particulate matter and ozone, which are more protective of public health than the respective federal standards. CARB has also set standards for some pollutants that are not addressed by federal standards

rate based on average speed. This approach is inaccurate, of course; in reality, emissions from a roadway source vary throughout the day as traffic volumes and speeds change.

A vehicle's travelling speed affects the amount of emissions it generates. However, emission rates are not linearly correlated with speed. For most pollutants, emissions per mile are greatest at low and high speeds and lower at medium speeds. Because emission rates and speed are not linearly correlated, multiplying the average traffic volume with an emission rate based on average speed does not result in the average emissions. This averaging improperly minimizes a project's emissions.

An accurate prediction of emissions thus requires modeling across time of year, day of week, and hour of the day. Here the DEIR/S's use of extremely simplified modeling inputs – a single hourly average based on the daily average – filtered out differences such as traffic volumes, speed and weather conditions. Consequently, the DEIR/S underestimates the Project's increase in mobile source air toxics ("MSAT") emissions and therefore understates the Project's potential to result in cancer and chronic-non-cancer risks.

The U.S. EPA's PM_{10} Hotspot Guidance identifies an appropriate methodology to model health risks (and particulate concentrations). EPA suggests that a health risk model use four different emission factors for each highway link, one each for the AM and PM peak periods, one for the midday period, and one for the overnight period. We can find no plausible explanation why the DEIR/S did not rely on the EPA approach. As the Landrum & Brown Air Quality Report explains, the traffic model used for the DEIR/S provides AM and PM peak period traffic volumes speeds as well as average daily volumes and speeds. Emission factors could easily have been developed based on these data. The agencies' decision to rely on a methodology that understates impacts violates CEQA. *Berkeley Keep Jets Over the Bay Com. v. Bd. of Port Cmrs.* (2001) 91 Cal.App.4th 1344 ("*Berkeley Keep Jets*").

Equally concerning, the DEIR/S fails to take into account revisions to the Air Toxics Hot Spots Program Risk Assessment Guidelines adopted by the Office of Environmental Health Hazard Assessment ("OEHHA") earlier this year. *See* Air Toxics Hot Spots Program, Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, OEHHA, February 2015, attached as Exhibit 18. The revised guidelines recognize the Children's Environmental Health Protection Act of 1999 (Health and Safety Code Section 39606), which requires explicit consideration of infants and children in assessing risks from air toxics. *Id*. The HRA prepared for the SR 710 Project should consider this guidance in order to ensure that risks from the Project are properly identified and mitigated.

(b) The DEIR/S Fails to Disclose the Project's Potential to Cause a Significant Increase in Cancer Risk, and Fails to Identify Any Mitigation.

The DEIR/S asserts that the Project would result in substantial regional benefits that will reduce health risks from exposure to mobile source air toxics ("MSATs") in the majority of the study area. DEIR/S at 4-8. The DEIR/S attributes this benefit to the Project: "The No Build Alternative and all the Build Alternatives would *cause* a net decrease of cancer risks compared to the 2012 existing condition everywhere in the study area." *Id*. (emphasis added). But the DEIR's claim is unsupported by evidence. In fact, evidence in the record overwhelmingly demonstrates that the Project—particularly the Freeway Tunnel alternative—would result in a significant increase in cancer risk.

The DEIR/S's technical appendix discloses that all of the freeway tunnel alternatives could cause a localized cancer increase due to the added vehicle emissions from the new freeway corridor and the roadways directly connected to it. Health Risk Assessment Appendix at page 3-8. The appendix identifies the particular tunnel alternative variants that would have the worst case localized impacts (dual-bore without toll tunnel variation) and the specific locations with the largest cancer impact (a narrow strip around the north and south tunnel portals and the adjacent interchanges). *Id*., Chapter 3. Many of these locations would result in cancer increases that greatly exceed the SCAQMD's 10-in-1-million cancer risk significance threshold established in its Air Toxics Hotspot Rule (Rule 1401). *Id*. The appendix acknowledges that the increased cancer risk at certain locations would be a staggering 149 in 1 million. *Id*. at ES-4 and Table 3-4.

Given the Freeway Tunnel alternative's potential to greatly increase the risk of cancer in numerous locations, the DEIR/S's assertion that it would improve health is deeply misleading. MSATs are expected to decline substantially in the future – not as a result of building a new freeway-based tunnel, but due to stringent environmental regulations. EPA's 2007 rule, in particular, requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. DEIR/S at 3.13-31. Accordingly, the DEIR/S errs in giving the Project credit for these improvements. *See Neighbors for Smart Rail v. Exposition Metro Line Const. Auth.* (2013) 57 Cal.4th 439, 445, 457. In fact, without the Freeway Tunnel and the substantial VMT that will accompany it, the region's residents would likely be far healthier.

Furthermore, the lead agencies' decision to present the cancer risk information in the DEIR/S's technical appendix is wholly improper under CEQA. Essential information of this sort must be included the text of the EIR, not buried in some appendix.

Finally, the DEIR/S's failure to disclose the increased cancer risk associated with the Freeway Tunnel alternative as a significant impact is yet another fatal flaw. As a result of this error, the document fails entirely to identify mitigation measures capable of eliminating or offsetting these impacts, as required by CEQA and NEPA. CEQA Guidelines §§ 15121(a); 15123(b)(1); s*ee* 40 C.F.R. 1502.16(h) (EIS must discuss "[m]eans to mitigate adverse environmental impacts").

Because the DEIR/S misleads the public and decision-makers about the Freeway Tunnel's potential to increase cancer in the region, and identifies no mitigation for this impact, the document cannot support approval of the Freeway Tunnel alternative.

B. The DEIR/S Fails to Adequately Evaluate or Mitigate Impacts Related to Climate Change.

1. Analyzing Climate Change Impacts Is Required Under CEQA and NEPA.

The law is clear that lead agencies must thoroughly evaluate a project's impacts on climate change under CEQA. *See Communities for a Better Env't v. City of Richmond* (2010) 184 Cal. App. 4th 70, 89-91. In 2007, the state Legislature passed Senate Bill 97, which required the Governor's Office of Planning and Research to prepare guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions *as required by* [CEQA], including, but not limited to, effects associated with *transportation* or energy consumption." SB 97 (2007), codified as Pub. Res. Code § 21083.05 (emphasis added). Consistent with this mandate, the state Natural Resources Agency adopted revisions to the CEQA Guidelines that require lead agencies to determine the significance of a proposed project's greenhouse gas ("GHG") emissions. CEQA Guidelines § 15064.4.

Climate change is the classic example of a cumulative effects problem; emissions from numerous sources combine to create the most pressing environmental and societal problem of our time. *See Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.* (9th Cir. 2008) 538 F.3d 1172, 1217 ("the impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct."); *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 720 ("Perhaps the best example [of a cumulative impact] is air pollution, where thousands of relatively small sources of pollution cause serious a serious environmental health problem."). If an agency's analysis indicates that a proposed project will have a significant project-specific or cumulative impact on climate change, the agency must identify and adopt feasible mitigation measures to address this impact. CEQA Guidelines § 15126.4(c).

NEPA also requires an analysis of the Project's GHG emissions. *Ctr. for Biological Diversity*, 538 F.3d at 1217 (NEPA requires agencies to assess impacts of project on GHG emissions); *Earth Island Institute,* 351 F.3d at 1300 (NEPA requires that federal agencies "consider *every* significant aspect of the environmental impact of a proposed action . . . .") (emphasis added) (citations omitted). The President's Council on Environmental Quality has issued draft guidance on analyzing this issue under NEPA. *See* December 18, 2014, Revised Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions, attached as Exhibit 19. This document recognizes that during the NEPA process, agencies should consider both "the potential effects of a proposed action on climate change as indicated by its GHG emissions" and "the implications of climate change for the environmental effects of a proposed action." *Id.* at FR 77824. Specifically, the proposed regulations require that agencies analyze a project's GHG emissions and consider reasonable mitigation measures and alternatives to lower the level of the potential GHG emissions. *See generally, id*. Agencies are not excused from analyzing impacts from GHG emissions just because these regulations are not yet in effect; instead, as the draft document states, the new regulations are "on par with the consideration of any other environmental effects and this guidance is designed to be implemented without requiring agencies to develop new NEPA implementing procedures." *Id*. at FR 77824. The draft document also urges agencies to make a determination as to whether emissions from a project are consistent with relevant emissions targets and reduction goals, and specifically references California's AB 32 as an example. *Id.* at FR 77826.

2. The DEIR/S's Perfunctory Climate Change Analysis Fails to Inform the Public and Decision-makers About the Freeway Tunnel Alternative's Greenhouse Gas Emissions.

The DEIR/S is seriously flawed because it trivializes the Project's contribution to climate change, particularly that of the Freeway Tunnel alternative. The DEIR/S labels impacts due to climate change as "speculative" and then fails to conduct an adequate analysis of these potential impacts. However, the Freeway Tunnel alternative's GHG emissions from construction activities, increased VMT, and energy use are far from speculative. As detailed below, the DEIR/S's failure to properly assess the Freeway Tunnel's significant impacts on global climate change, and to identify enforceable mitigation for them, is fatal.

The United States Supreme Court has noted that "[t]he harms associated with climate change are serious and well recognized." *Massachusetts v. EPA* (2007) 549 U.S. 497, 499. Reducing greenhouse gas emissions in order to limit these harms is one of the most urgent challenges of our time. In recognition of this urgency, in 2005, Governor Schwarzenegger's signed Executive Order S-3-05. The order established a long-term goal of reducing California's emissions to 80 percent below 1990 levels by 2050. The order also directed several state agencies (collectively known as the "Climate Action Team") to carry its goals forward. The following year, the Legislature enacted the Global Warming Solutions Act of 2006 ("AB 32"), codified at Health and Safety Code § 38500, *et seq*. By these authorities, California has committed to reducing emissions to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. Most recently, Governor Brown took further action to meet this challenge by issuing a new executive order, B-30-15. It sets an interim target of 40 percent below 1990 levels by the year 2030. This order, like EO S-3-05, is binding on state agencies such as Caltrans.

The California Climate Action Team's 2009 Report to Governor Schwarzenegger details the science behind, and the environmental impacts of, global warming.[16] This report makes clear that the release of greenhouse gases into the

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[16] *See* California Environmental Protection Agency, Climate Action Team Biennial Report to Governor Schwarzenegger and the Legislature, December 2010, available at http://www.climatechange.ca.gov/climate_action_team/reports/#2010. The entire Report is incorporated herein by reference.

atmosphere leads to global warming, which in turn leads to myriad environmental impacts. As the report explains, "[c]limate change poses serious risks to California's natural resources. California-specific impacts are expected to include changes in temperature, precipitation patterns, and water availability, as well as rising sea levels and altered coastal conditions."

Despite all of this—the scientific consensus, the potentially catastrophic impacts on the State, and California's well-founded commitment to reducing emissions—the DEIR/S's climate change analysis is perfunctory. It fails to determine a threshold of significance, it calculates only a portion of the GHG emissions for which the Project alternatives will be responsible, and then it ignores its obligation to determine whether the impact is significant. It thus fails to satisfy the most basic purpose of an EIR/EIS: to disclose to decision-makers and the public a project's significant environmental impacts. *See* Pub. Res. Code § 21061 ("The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect that a proposed project is likely to have on the environment"); 40 C.F.R. § 1500.1(b) ("NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken.").

Having avoided its obligation to make a significance determination, as CEQA and NEPA require, the DEIR/S then fails to identify credible mitigation measures to reduce or avoid the Project's contributions to global warming. This approach, which ignores science and law, stands in stark contrast to the conscientious treatment of global warming impacts undertaken by other lead agencies throughout the state. The agencies must make substantial modifications to the DEIR/S's climate change analysis to achieve compliance with CEQA and NEPA.

3. The DEIR/S's Refusal to Make a Significance Determination Regarding the Project's Contribution to Climate Change Is Unlawful.

The DEIR/S contains no thresholds of significance for the Project's potential impacts on climate change. Instead, the DEIR/S states that "in the absence of further regulatory scientific information related to GHG emissions and CEQA significance, it is too speculative" to make a significance determination. DEIR/S at 4-102. This approach is unlawful, as the statute expressly requires a lead agency to determine if a project's impacts are significant. Pub. Res. Code § 21002.1(a) ("The purpose of an environmental impact report is to identify the significant effects on the environment of a project. . . ."). Accordingly, the CEQA Guidelines require agencies to "make a good-faith effort . . . to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." CEQA Guidelines § 15064.4. The Guidelines also include a section entitled "Determining the Significance of Impacts from Greenhouse Gas Emissions." *Id*. There is nothing in CEQA that relieves a lead agency from its obligation to determine significant effects simply because the impact is related to a rapidly-evolving area of science and policy. *See Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1106-12 (CEQA does not allow impact analysis to be labeled too "speculative" based on lack of threshold). *See also* CEQA Guidelines § 15065 (entitled "*Mandatory* Findings of Significance") (emphasis added). Thus, there is no justification for the DEIR/S's failure to contain a significance finding for GHG emissions.

CEQA Guidelines section 15064.4(a)(1) & (2) provides two methods for making a significance determination related to GHG emissions. An agency may either:

> (1) use "a model or methodology to quantify greenhouse gas emissions resulting from a project . . . [that] it considers most appropriate provided it supports its decision with substantial evidence," or
>
> (2) "[r]ely on a qualitative analysis or performance based standard []."

The DEIR/S follows neither approach here, opting to make no significance determination at all. The Guidelines do not sanction such approach.

Determining whether a project may have a significant effect plays a critical role in the CEQA and NEPA processes, and this determination must be "based to the extent possible on scientific and factual data." CEQA Guideline § 15064(a) and (b). Accordingly, a significance threshold for greenhouse gases must reflect the grave threats posed by the cumulative impact of adding new sources of GHG emissions into an environment when deep reductions from existing emission levels are necessary to avert the worst consequences of global warming. *See Center for Biological Diversity*, 508 F.3d at 550 ("we cannot afford to ignore even modest contributions to global warming.").

Although the CEQA Guidelines do not prescribe a particular methodology for making the significance determination, other agencies and groups have established methodologies, and their analysis may be useful for Caltrans. The California Air Pollution Control Officers Association ("CAPCOA")[17] has issued a "CEQA & Climate Change" white paper to assist lead agencies in analyzing greenhouse gas impacts under CEQA. *See* Exhibit 20. Noting that "the absence of an adopted threshold does not relieve the agency from the obligation to determine significance" of a project's impacts on climate change, CAPCOA explored various approaches to determining significance and then evaluated the effectiveness of each approach. *See* Exhibit 20. According to CAPCOA's analysis, the only two thresholds that are highly effective at reducing emissions and highly consistent with AB 32 and Executive Order S-3-05 are a threshold of zero or a quantitative threshold of 900-tons CO_2 Equivalent ("CO_2 eq.")[18]. *Id.* A zero threshold is preferable in light of ongoing scientific advances showing that global warming is more significant than originally anticipated. For example, even the ambitious emissions reduction targets set by Executive Order S-3-05 in 2005, which were consistent with contemporaneous science indicating that this level of reductions by developed countries would be sufficient to stabilize the climate, are now believed to be insufficient. Given the recent extreme losses in arctic sea ice, scientists at the National Snow and Ice Data Center have concluded that the observed changes in the arctic indicate that this feedback loop is now starting to take hold.[19]

Based on these and other recent climate change observations, leading scientists now agree that "humanity must aim for an even lower level of GHGs."[20] Thus, the scientific and factual data now support a threshold of significance of zero in order to

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[17] CAPCOA is an association of air pollution control officers representing all local air quality agencies and air districts in California.

[18] Carbon dioxide equivalents (CO2 eq.) provide a universal standard of measurement against which the impacts of releasing different greenhouse gases can be evaluated. As the base unit, carbon dioxide's numeric value is 1.0 while other more potent greenhouse gases have a higher numeric value.

[19] *See* Oct. 3, 2006 press release by National Snow and Ice Data Center, available at: http://nsidc.org/news/newsroom/2006_seaiceminimum/20061003_pressrelease.html. This document is incorporated herein by reference.

[20] James Hansen et al., *Target Atmospheric CO_2: Where Should Humanity Aim?* 2 Open ATMOSPHERIC SCI. J. 217, 226 (2008).

ensure that new projects do not have a cumulatively significant impact on global warming. Consistent with this data, many EIRs have adopted a zero threshold of significance as the most scientifically supportable threshold. *See, e.g*., San Francisco Metropolitan Transportation Commission, Transportation 2035 Plan DEIR, at 2.5-15, SCH # 2008022101 (project would have a significant impact if it resulted in an increase in CO_2 eq. emissions from on-road mobile sources compared to existing conditions); San Francisco Metropolitan Transportation Commission & Association of Bay Area Governments, Plan Bay Area 2040 DEIR, at 2.5-41, SCH # 2012062029 (project would have a potentially significant impact if it would result in a net increase in direct and indirect GHG emissions in 2040 when compared to existing conditions). These examples, and others, demonstrate that, contrary to this DEIR/S's assertion, it is feasible to establish thresholds of significance.

The Bay Area Air Quality Management District's ("BAAQMD") 2010 guidelines also established thresholds for GHG emissions. *See* 2010 BAAQMD Air Quality Guidelines, excerpts attached as Exhibit 21. These thresholds established 1,100 metric tons of CO_2 eq. as the standard for most new development, and *no net increase* in emissions for transportation and other regional plans. *Id*. at pp. 2-1 to 2-4.

Although the DEIR/S fails to make a significance determination, it offers minimal, unsupported data purporting to demonstrate that the Project, including even the Freeway Tunnel alternative, would actually reduce GHG emissions. DEIR/S at 4-98 to 4-100. The DEIR/S preparers may have intended that these data show the Project would not result in significant impacts to climate change, yet the paltry analysis is insufficient for a true significance determination and, in any event, is faulty itself, as described below. Pub. Res. Code § 15064(f) (significance determination must "be based on substantial evidence in the record").

4. The DEIR/S's Claim That the Project Will Reduce Greenhouse Gas Emissions Is Flawed.

The DEIR/S concludes that all of the Project's build alternatives—including construction of 4.2 new miles of an eight-lane freeway—will actually *reduce* vehicle emissions, and therefore GHG emissions. DEIR/S at 4-98 to -99. This conclusion is contradicted by current transportation research and is also unsupported by substantial evidence in the record. As the DEIR/S acknowledges, total VMT will increase in the Project area as a result of all of the tunnel alternatives by as many 460,000 miles per day. *See* DEIR/S Transportation Technical Report Table 4-8 at pg., 4-15. Per capita VMT also increases with all freeway tunnel alternatives. *Id.* These impacts directly contradict, or undermine, State and regional efforts to reduce GHG emissions, as the increase in VMT from operation of the Freeway Tunnel will lead to substantial increases in emissions.

The link between increased VMT and increased GHG emissions is well-established. Studies show how the nation's increase in VMT is projected to overwhelm planned improvements in vehicle efficiency, thus making reductions in GHG emissions impossible without concomitant reductions in VMT. *See* Growing Cooler: Evidence on Urban Development and Climate Change at 3, excerpts attached as Exhibit 22. Recognizing the nation's unsustainable growth in driving, the American Association of State Highway and Transportation Officials, representing state departments of transportation, has urged that the growth of VMT be cut in half. *Id*. Under these circumstances, the DEIR/S's contention that the Freeway Tunnel will result in reduced GHG emissions is simply untenable.

The DEIR/S attempts to circumvent the well-established link between increased VMT and increased GHG emissions by concluding that purported reductions in congestion resulting from the Project will reduce the amount of fuel that vehicles waste in stop-and-go traffic, leading to reduced emissions of climate-warming gases from cars and trucks. DEIR/S at 4-98. Yet, as the attached Sightline Institute article explains, this claim – which is frequently used by proponents of road-building – is mistaken. *See* "Increases in Greenhouse-gas Emissions From Highway-widening Projects," Sightline Institute, October 2007, attached as Exhibit 23. In fact, under almost any set of plausible assumptions, increasing highway capacity in a congested urban area will substantially *increase* long-term GHG emissions. *Id.* Over the short term—perhaps 5 to 10 years after new lanes are opened to traffic—the DEIR/S's conclusion may find some support. But the document's prediction of congestion reduction fails over the long term. *See* Nelson Nygaard Report. Considering the full increase in emissions from highway construction and additional VMT, experts at Sightline conclude that adding one mile of new highway lane will increase CO_2 eq. emissions by more than 100,000 tons over 50 years. *Id*.

This research is corroborated by the Surface Transportation Policy Project ("STPP"). The STPP cites a growing body of research showing that, in the long run, wider highways actually create additional traffic, above and beyond what can be attributed to population increases and economic growth. *See* Surface Transportation Policy Project, Build It and They'll Come, attached as Exhibit 24. According to the STPP, 100 percent of additional VMT in Los Angeles County, and 72.6 percent of additional VMT in San Diego County, is attributable to "induced traffic." *Id*. This means that increases in highway capacity actually induces additional traffic—it does not simply "accommodate" existing or predicted traffic.

CARB has also now weighed in on the relationship between increases in highway capacity, induced travel and increased GHG emissions. In its recent report entitled "Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions," CARB further confirms that increased capacity induces additional VMT." *See* Exhibit 7 at 3. CARB attributes this phenomenon to the basic economic principles of supply and demand: adding capacity decreases travel time, in effect lowering the "price" of driving; when prices go down, the quantity of driving goes up (Noland and Lem, 2002). *Id*. As CARB explains, "[a]ny induced travel that occurs reduces the effectiveness of capacity expansion as a strategy for alleviating traffic congestion and offsets any reductions in GHG emissions that would result from reduced congestion." *Id*. at 2.

Accordingly, while agencies generally have discretion to choose appropriate methodological approaches under CEQA and NEPA, the DEIR/S appears to ignore mounting evidence that building highway capacity induces traffic, thereby increasing emissions. As the Nelson Nygaard Report on transportation explains, the DEIR/S's traffic demand model does not disclose the assumptions it uses to calculate induced demand and likely understates true induced demand. Furthermore, the demand model inaccurately forecasts traffic volumes on a segment-by-segment basis, meaning that it cannot be trusted to accurately estimate induced travel. *See* Nelson Nygaard Report. Moreover, the DEIR/S analyzes traffic demand only through 2035—that is, during the short-term window when congestion may actually be reduced. It does not analyze impacts during the period following 2035 when the purported efficiency gains, if any, can be expected to dissipate as a result of induced demand. *Id.*

A third-party audit of Caltrans recently conducted by the State Smart Transportation Initiative specifically faulted Caltrans' approach to induced demand, finding that "the department has not come to grips with the reality of induced traffic." *See* State Smart Transportation Initiative Assessment and Recommendations California Department of Transportation, January 2014 at iv, attached as Exhibit 25. The auditors concluded that Caltrans has almost completely ignored important recommendations (including for reducing VMT) contained in its own *Smart Mobility 2010* report. *Id.* at v. The audit went on to say that "despite a rich literature on induced demand, [Caltrans employees] frequently dismissed the phenomenon." *Id.* at 62. Given Caltrans' history of ignoring or downplaying induced traffic, it is especially important that the DEIR/S support its prediction of induced demand with substantial evidence. It has failed to do so.

Finally, the DEIR/S's calculation of the Project's future emissions assumes that future regulatory controls will be imposed and will be effective in reducing tailpipe emissions. Landrum & Brown Air Quality Report (EMFAC2011 modeling included assumption that low carbon fuel standards would be implemented). The document thus compares future conditions to existing conditions without providing an independent measure of the Project's impacts. In this manner, the DEIR/S effectively assigns the *Project* credit for technological and regulatory advances that will occur regardless of its implementation. Because the DEIR/S thus fails to disclose the full climate impacts of the Project's increase in VMT, it violates CEQA and NEPA. Indeed, this Project serves as a cautionary example of how statewide improvements in emissions reductions due to regulatory measures—such as California's low carbon fuel standard—can be erased by increases in VMT.[21]

5. The DEIR/S Fails to Account for Non-Vehicular Sources of Greenhouse Gas Emissions From the Project.

The GHG emissions calculations presented in the Air Quality Assessment Report and the DEIR/S include only those emitted from vehicles driving within the study area, and fail to recognize that the Project will contribute to GHG emissions through other sources. For example, electricity generated for use by the Project will also create GHG emissions. *See* Landrum & Brown Air Quality Report. The Freeway Tunnel alternative would consume electricity for tunnel lighting and the tunnel ventilation system. This could result in considerable GHG emissions that should have been included in the Project's GHG emissions' inventory. The LRT would consume the most electricity of the build alternatives, as it relies on electrically-powered railcars. Failure to include the GHG emissions associated with electricity generation for the LRT alternative in the DEIR/S's reported GHG emissions is a particularly egregious omission.

[21] Experts have pointed out that increases in the amount of driving cause CO_2 emissions to rise despite technological advances, because the growth in driving overwhelms planned improvements in vehicle efficiency and fuel carbon content. Growing Cooler: Evidence on Urban Development and Climate Change at 13-14.

The Landrum & Brown Air Quality Report estimates that the electricity consumption required for propulsion of the railcars for the LRT alternative would generate between 65 and 170 metric tons of CO_2 eq. per day, equivalent to approximately 23,400 and 61,700 metric tons of CO_2 eq. per year. These figures do not include electricity consumed by other components of the LRT alternative, such as lighting and ventilation. The DEIR/S anticipates that the LRT alternative would reduce vehicular emissions by 20.0 metric tons per day in the 2025 opening year and by 2.2 metric tons per day in 2035. DEIR/S at 4-100. For the LRT alternative, this means that increased GHG emissions due to electrical generation would outweigh the anticipated reductions in GHG emissions from vehicular travel. It is irrelevant that some of the emissions from new electrical generation might come from outside the Project area; because GHG emissions are a cumulative global effect, the location of the sources of emissions is not important.

To evaluate the Project's actual effect on climate change, the DEIR/S must inventory the carbon emissions generated through non-vehicular means. This should include electricity generation for the Project, and also the manufacturing and lifecycle of the Project's building materials. Without an inventory of these additional emissions, the DEIR/S's analysis is incomplete, making the formulation of appropriate mitigation impossible.

6. The DEIR/S Must Calculate Greenhouse Gas Emissions From the Project Through 2050.

The DEIR/S calculates fuel consumption and related carbon emissions only to the year 2035. *See* DEIR/S at 4-100. This time horizon fails to provide the public with a meaningful assessment of the Project's long-term impacts. Indeed, the dual-bore freeway tunnel alternative is not scheduled to be completed until after 2020, and that is assuming that it stays on schedule. *Id.* (calculating emissions for the Freeway Tunnel alternative only from operational year 2025 onward). As a result, the document considers at most only 15 years' worth of emissions—a small fraction of the expected lifetime of the Project.[22] The DEIR/S should have analyzed GHG emissions through the year 2050.

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[22] Although the DEIR/S's description of the Project is inexplicably silent on its expected lifetime, Metro's Cost Benefit Analysis for the Project states that the tunnels (footnote continued on next page)

Without examining impacts through the year 2050, the DEIR/S cannot provide meaningful assessment of the Project's long-term impacts, particularly those of the Freeway Tunnel. And there is reason to believe that these long-term impacts will be more significant than in the short term. As described previously, CARB's report states that increases in highway capacity induce travel, which, in turn reduces the effectiveness of capacity expansion as a strategy for alleviating traffic congestion. Exhibit 7 (Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions). This induced growth offsets any reductions in GHG emissions that would result from improved traffic flow. *Id.* Therefore, over the long term, increases in highway capacity will result in increased GHG emissions. This phenomenon is not captured by the DEIR/S's analysis, which looks, at most, only 15 years beyond the completion date of the dual-bore freeway tunnel alternative.

Tellingly, the DEIR/S does provide some evidence that emissions will increase after the 2035 end-date. The document states that in 2025, the GHG emissions from the Freeway Tunnel alternative (dual-bore freeway tunnel with tolls) would decline by 35.7 metric tons per day compared to existing conditions. DEIR/S at 4-100. In 2035, however, the Project's GHG emissions would creep upwards, resulting in a decline of only 24.2 metric tons per day compared to existing conditions. *Id.* (In fact, this decline in purported reductions is estimated to occur for all of the freeway alternatives.) In other words, the Freeway Tunnel alternative does not appear to result in *sustained* GHG emission reductions; the opposite appears to be true. But because the DEIR/S does not analyze 2050 conditions, the public has no way of knowing the extent of the Freeway Tunnel's long term increase in GHG emissions.

Analysis of the Project's impacts in 2050 is essential to determining if the Project achieves the long-term emissions reductions needed for climate stabilization and required by EO S-3-05, B-30-15, and AB 32. The statewide reduction goals set forth in EO S-3-05 and AB 32 call for reducing emissions levels to 80 percent below 1990 levels by the year 2050. Accordingly, 2050 is the appropriate planning horizon for analyzing the Project's emissions.

(footnote continued from previous page)
are expected to have a lifetime of 100 years. Analysis of Costs and Benefits for the State Route 710 North Study Alternatives at 2-8.

7. The DEIR/S Fails to Analyze the Project's Consistency with Applicable State Plans and Policies for Greenhouse Gas Emissions Reductions.

The DEIR/S fails to analyze the Project's consistency with the state's plans and policies for reducing GHG emissions. In fact, the document barely mentions these critical plans. It merely lists eight state bills and executive orders aimed at reducing GHG emissions in bullet-point format under the heading "Regulatory Setting – State" (DEIR/S at 4-95); it provides no discussion or analysis of whether the Project is consistent with these mandates, or whether it will help the State meet the reduction targets that they prescribe. The DEIR/S cannot ignore the question of whether its emissions trajectory is consistent with the trajectory embodied in EO S-3-05, the AB 32 Scoping Plan, and the First Update to the Scoping Plan. These are based on the scientific consensus that "the 2050 [reduction] target represents the level of greenhouse gas emissions that advanced economies must reach if the climate is to be stabilized in the latter half of the 21st century." Climate Change Scoping Plan: A Framework for Change (2008), p. 117, attached as Exhibit 26.[23]

California climate policy, as reflected in EO S-3-05, requires reducing GHG emissions to 80 percent below 1990 levels by 2050 so as to avoid catastrophic climate impacts. This Executive Order embodies the reductions that climate scientists have concluded are needed to provide a 50-50 chance of limiting global average temperature rise to 2°C above pre-industrial levels. The AB 32 Scoping Plan incorporates this goal, establishing a "trajectory" for reaching it over time. Exhibit 26 at 15 (Climate Change Scoping Plan: A Framework for Change (2008)).

In May 2014, CARB approved an Update to the Scoping Plan that examines California's progress toward meeting the "near-term" 2020 GHG emission reduction goals defined in the initial Scoping Plan. First Update to the Climate Change Scoping Plan: Building on the Framework, 2014, attached as Exhibit 27.[24] It also

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[23] *See also* full scoping plan at http://www.arb.ca.gov/cc/scopingplan/document/ adopted_scoping_plan.pdf (referencing the 2050 reduction goals throughout the document).

[24] The full update is available at http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm.

evaluates how to align the State's "longer-term" GHG reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use. Additionally, on April 29, 2015, Governor Brown signed Executive Order B-30-15, which sets an interim target in order to help state agencies achieve California's reductions goals. This interim target calls for reductions in GHG emissions to 40 percent below 1990 levels by the year 2030. EO B-30-15. This newest executive order confirms that GHG emissions reductions are a top state priority and that interim targets are crucial for achieving the 2050 reductions goal.

Meeting the statewide 2050 trajectory requires continuing and steady annual reductions in both total and per capita emissions. Climate Change Scoping Plan, p. ES-1. Because state policy aims to reduce GHG emissions over time, it is imperative that environmental review documents inform the public and decision-makers whether a project will advance or impede the state's reduction goals, and how. As the California Supreme Court has held, an agency "abuses its discretion if it exercises it in a manner that causes an EIR's analysis to be misleading or without informational value." *Neighbors for Smart Rail,* 57 Cal.4th at 445, 457.

Accordingly, the DEIR/S should have included a climate change analysis discussing whether the Project: (1) is consistent with these policies, (2) will help advance these policies, or (3) will impede the achievement of these policies. In addition, it should have used the EO S-3-05 trajectory as a threshold of significance in evaluating the Project's environmental impacts. *See Friends of Oroville,* 219 Cal.App.4th at 841 (AB 32's reduction targets were a proper threshold of significance in determining whether the Project's GHG emissions constituted a significant impact).

As lead agency, Caltrans must consider statewide climate policy. As the DEIR/S acknowledges, Caltrans' parent agency, the California State Transportation Agency, is a member of the Governor's Climate Action Team, which is charged with coordinating and carrying forward the state's climate goals established in EO S-3-05 and AB 32. Although the DEIR/S mentions this fact, the document provides no analysis of the Project's consistency with these goals.

8. The DEIR/S Fails to Include Enforceable, Feasible Measures to Mitigate or Offset the Project's Greenhouse Gas Impacts Even Though Such Measures Exist.

Had the DEIR/S established a threshold of significance, as required under CEQA and NEPA, and properly accounted for emissions generated by the Project, particularly the Freeway Tunnel, including emissions from induced traffic, it would have found that Project-generated emissions and cumulative emissions exceed all of the potential thresholds of significance discussed above. The Freeway Tunnel's contribution to climate change must therefore be considered significant.

The DEIR/S makes only a halfhearted attempt to identify feasible mitigation measures for the Project's climate change impacts. For construction-related GHG emissions, which it estimates could exceed 48,000 metric tons of CO_2 eq. for the Freeway Tunnel, the DEIR/S appears to suggest that it may rely on measures intended to mitigate the Project's air quality impacts. But the document is confusing on this point. A reader might infer this reliance from one line of a table in the Executive Summary, listing air quality mitigation measures AQ-1 through AQ-5 as the mitigation for construction-related climate impacts. DEIR/S at ES-40. Yet, the DEIR/S does not identify these measures anywhere in the two-paragraph discussion that constitutes the document's entire analysis of construction-related GHG emissions. *Id*. at 4-101. This confusing, contradictory approach is impermissible under CEQA. The DEIR/S must identify specific, enforceable mitigation measures and describe how, and to what extent, they are expected to avoid or minimize the Project's construction-related GHG impacts. Pub. Res. Code § 21081.6(b); CEQA Guidelines § 15126.4(a)(2).

Even more troublesome, the DEIR/S does not propose *any* mitigation for the Project's operational impacts to climate change. *See* DEIR/S at ES-40 ("No measures are proposed."). Instead, it suggests that the Project will incorporate three apparently voluntary reduction measures to reduce these impacts: (1) using landscaping; (2) recommending energy-efficient lighting; and (3) restricting idling time during lane-closure for construction. *Id*. at 4-103-104.

The proposed voluntary "reduction measures" are unlawful because they are hortatory rather than binding commitments. Under CEQA, mitigation measures must be "fully enforceable" through permit conditions, agreements, or other legally binding instruments. Pub. Res. Code § 21081.6(b); CEQA Guidelines § 15126.4(a)(2). Similarly, CEQA and NEPA require that any proposed mitigation must provide assurance that such implementation will in fact occur. *Anderson First Coalition v. City of Anderson* (2005)130 Cal.App.4th 1173, 1186-87; *Fed'n of Hillside & Canyon Ass'ns v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1261; *South Fork Band Council of W. Shoshone of Nevada,* 588 F.3d at 727 (NEPA requires discussion of whether mitigation will actually be effective). Moreover, a conclusion that a measure will be effective in mitigating an impact must be supported by substantial evidence—evidence that is lacking here. *Gray v. County of Madera* (2008) 167 Cal.App.4th 1099, 1115-18; *see also San Franciscans for Reasonable Growth v. City & County of San Francisco* (1984)151 Cal.App.3d 61,79 (measures must not be so vague that it is impossible to gauge their effectiveness). The DEIR/S's proposed mitigation does not come close to meeting these standards.

The DEIR/S's paltry selection of mitigation measures is puzzling, as there is an impressive array of obvious measures that could actually reduce the Project's GHG emissions. Numerous mitigation measures are detailed in Appendix B and C to the 2008 CAPCOA report, attached as Exhibit 20, and the SR 710 North DEIR/S must consider all feasible, applicable measures therein. Most importantly, it must consider the following sampling:

- Requiring that off-road diesel-powered vehicles used for construction be new low-emission vehicles or use retrofit emission control devices such as diesel oxidation catalysts and diesel particulate filters verified by CARB.

- Requiring the Project to generate all or a portion of its own power through alternative means, such as photovoltaic arrays.

- Requiring use of a catalyzed diesel particulate filter on both new and existing diesel engines (because black carbon is a component of diesel particulate matter, strategies that reduce particulate matter will also reduce black carbon).

- Minimizing and recycling construction-related waste.

- Using salvaged and recycled-content materials for hard surfaces and non-plant landscaping materials.

- Maximizing water conservation measures in landscaping, using drought-tolerant plants in lieu of turf, planting shade trees.

- Landscaping to preserve natural vegetation and maintain watershed integrity.

- Utilizing the combination of construction materials with the lowest carbon footprint.

- Requiring the use of "cool pavement" that reflects more solar energy. Such measures, which can markedly reduce heat islands, have been used effectively in California and elsewhere. In fact, new building standards in California, called "CalGreen", will require use of such pavement in certain instances. *See* http://www.arb.ca.gov/research/seminars/gilbert/gilbert.pdf for a complete description of cool pavement issues, technology and use.

All of these measures would result in direct reductions in GHG emissions that would otherwise be attributable to the Project. In addition, through a combination of other on-site and off-site measures, the agencies could require all aspects of the Project to be "carbon neutral." An important aspect of such mitigation would be the adoption of an off-set requirement for any reductions that could not be achieved directly. CEQA and NEPA specifically envision such offsets for the mitigation of GHG emissions. CEQA Guidelines § 15126.4(c)(3) ("Measures to mitigate the significant effects of greenhouse gas emissions may include . . . [o]ff-site measures, including offsets that are not otherwise required"); December 18, 2014, Revised Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions, attached as Exhibit 19 at FR 77828. Emissions could be offset either through financial contributions to sustainable energy projects or through the purchase of carbon credits. Such programs are increasingly common and thus raise no issue of infeasibility.

In sum, development of the Project, specifically the Freeway Tunnel, will make it more difficult for the State to meet its commitments to reduce GHG emissions. To comply with applicable law, the DEIR/S was required to, but did not, include: (1) a complete and adequate inventory of the Project's greenhouse gas emissions, including those from induced traffic; (2) a significance determination regarding the Project's cumulative climate impacts; (3) an analysis of the Project's consistency with state climate policy; and (4) a thorough and quantitative analysis of mitigation measures to reduce impacts. The agencies cannot lawfully approve the Project in the absence of this analysis.

C. The DEIR/S's Analysis of and Mitigation for the Project's Impacts on Transportation Are Inadequate.

1. The DEIR/S's Traffic Analysis Does Not Adequately Analyze the Freeway Tunnel Alternative's Traffic Impacts.

The DEIR/S fails to disclose the traffic impacts that would actually occur as a result of the Freeway Tunnel alternative. The DEIR/S demonstrates that rather than resolve regional traffic congestion, the Freeway Tunnel alternative would cause bottlenecks to shift between locations. Yet, as the Nelson Nygaard Report explains, the EIR/S's travel demand model is incapable of properly analyzing how these bottlenecks function.

Numerous segments along the I-10, SR 134, I-210, I-5 and I-710 would operate at Level of Service (LOS) F in 2035 under the Freeway Tunnel alternative. *See* Nelson Nygaard Report, Figure 7. This means that the modeled demand is far greater than the traffic volume that can actually travel across these freeway segments. When demand exceeds capacity, the *Highway Capacity Manual* requires that the excess volume "spill over into adjacent upstream segments" and be accumulated unless demand drops enough that the bottleneck can clear. This phenomenon is referred to as "spillback." Unfortunately, the EIR/S model does not account for this spillback. Instead, it mistakenly assumes that all modeled vehicles will get through the bottleneck. If the DEIR/S's traffic demand forecast had been accurate, it would have shown that traffic begins spilling back at 7 a.m. and the queue gets longer and longer during the day, eventually reaching 3 hours in length. It would take much longer than 3 hours for such a queue to clear because vehicles would continue to arrive after 7 p.m.

The DEIR/S's failure to recognize the potential for this extensive traffic congestion is a serious flaw. As a case in point, in the a.m. peak period under the No Build alternative, the northbound section of I-710 at I-10 is modeled as the 280th most congested freeway segment in the greater Los Angeles region. In the Dual-Bore Tunnel alternative, this segment moves up the list 256 places to become the 24th most congested freeway segment in the region. Nevertheless, the DEIR/S assumes the increase in travel time on this segment is only one minute relative to the No Build alternative. Clearly, a sizeable traffic bottleneck produces more than one minute of delay.[25]

This flaw in the DEIR/S's travel demand model calls into question the accuracy of the entire traffic impact analysis. For example, it is highly unlikely that the DEIR/S accurately estimates the Project's induced travel. The flawed traffic analysis also implicates the DEIR/S's analysis of environmental impacts. The DEIR/S's estimates for criteria pollutants, air toxics, and greenhouse gas emissions, for example, are predicated on an accurate accounting of the volume and nature of traffic operations. The DEIR/S's failure to accurately document how the Freeway Tunnel alternative will affect regional traffic undermines the accuracy of these other analyses.

2. The DEIR/S Relies on an Artificially Constrained Study Area and Therefore Fails to Identify All of the Project's Transportation Impacts.

The DEIR/S chooses certain freeway segments near SR 710 to establish the study area over which to conduct a detailed transportation analysis. Yet, the study area does not include all of the potentially impacted highways and interchanges. Cars and trucks do not stop at arbitrary locations identified on a map; numerous vehicles that will be affected by the Project will travel to and from destinations outside the study area. The California Supreme Court emphasized that an EIR may not ignore a project's regional impacts, including those occurring outside of its borders; on the contrary, a regional perspective is required." *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 575. Rather, an EIR must analyze environmental impacts over the entire area where one might reasonably expect these impacts to occur. *See Kings County Farm Bureau,* 221 Cal.App.3d at 721-23. This principle stems from the requirement that an EIR analyze all significant or potentially significant environmental impacts. Pub. Res.

[25] In reality, a queue of more than 3 hours may never happen because travelers would likely adjust their travel to avoid the extreme bottleneck. Yet, even if travelers adjust their behavior to avoid the bottleneck, the congestion would just be transferred elsewhere. Accordingly, the DEIR/S erred in omitting reference to the extensive traffic congestion resulting from the Freeway Tunnel alternatives. Analyzing the potential for a 3-hour queue would have more accurately portrayed the Freeway Tunnel alternatives' impact than the DEIR/S's rosy assessment does.

Code §§ 21061, 21068. Similarly, NEPA requires that an EIS fully discuss the foreseeable cumulative impacts of the action on surrounding areas. *Earth Island Institute,* 351 F.3d 1291 (9th Cir. 2003) (EIS for timber sale was inadequate where it failed to consider impacts on owl species in neighboring national forest); *see also* 40 C.F.R. § 1508.25(c) (requiring agencies to consider direct, indirect, and cumulative impacts).

Here, as the Nelson Nygaard Report explains, the Freeway Tunnel alternative will significantly worsen congestion at several locations, yet the DEIR/S fails to evaluate these areas. For example, project-related traffic volumes under the Freeway Tunnel alternative will be heavy on I-210 from SR 710 to I-5, but the DEIR/S does not analyze transportation impacts any further north than La Cañada Flintridge. The DEIR/S also omits an analysis of the Freeway Tunnel's impact on I-5 north of I-210 and the I-210/I-5 interchange. It also fails to examine the effects on SR-710 south of SR 60, which means that it ignores effects on the SR 710/I-10 interchange. Based on the volume of traffic at all of these locations, the Freeway Tunnel's impacts are likely to be significant.

Certain locations just beyond the DEIR/S study area's boundaries have the highest concentrations of truck accidents per mile annually in Los Angeles County and the Inland Empire. *See* "California Commute -- 4 stretches of freeways tally most big rig crashes per mile annually," Los Angeles Times, June 2, 2015, attached as Exhibit 28. In its latest analysis of California Highway Patrol data, SCAG identified the following freeways sections as having the highest concentrations of truck crashes per mile annually: SR 710 at the SR 60 interchange with 7.2 accidents and the I-5 between the 710 and the 10 with 6.6 crashes. *Id*. The Freeway Tunnel alternative has the potential to worsen traffic congestion in these locations. However, because the DEIR/S does not include these locations in its study area, it does not analyze the potential for the Freeway Tunnel alternative's increase in congestion to contribute to big rig accidents.

In short, the DEIR/S should have analyzed a study area that includes all of the freeways and interchanges that will experience increased traffic congestion as a result of the Freeway Tunnel alternative. The absence of this analysis is a serious omission, precluding any agency action on the Project.

3. The DEIR/S Fails to Mitigate Numerous Significant Transportation Impacts Due to Operation of the Project.

While the DEIR/S identifies intersections and freeway segments that would be significantly impacted by the Project, the document admits that the measures that would mitigate the impacts at these locations are not recommended for implementation. For example, the Freeway Tunnel alternative would result in an additional 2,500 vehicles per hour (the level of service ("LOS") would decline from C to F) in the AM peak hour and 2,700 vehicles per hour (LOS would decline from B to E) in the PM peak hour on I-710 northbound between the I-10 off-ramp and the eastbound I-10 on-ramp. DEIR/S at 3.5-52 (under the dual-bore operational variation: no tolls). The DEIR/S identifies a mitigation measure (adding a lane between the I-10 off-ramp and the eastbound I-10 on-ramp), but this roadway improvement is not recommended for implementation. *Id*.

In fact, each freeway tunnel alternative would result in significant transportation impacts that remain unmitigated. For example, under the "single bore operational variation: with tolls and no trucks alternative", the 4 intersections and 11 freeway segments that would be significantly impacted as a result of the Project receive no mitigation. DEIR/S at 3.5-42; 3.5-48 to -49. CEQA does not permit this approach. When an EIR makes a finding of significant environmental harm from a project, as it does here, CEQA requires the lead public agency to adopt all feasible mitigation measures to lessen that harm, or to adopt a feasible alternative that will do less environmental damage. Pub. Res. Code, §§ 21002, 21081. Here, the DEIR/S fails to provide substantial evidence that all feasible mitigation has even been identified. Certainly, the agencies could have made some attempt to alleviate the traffic congestion at intersections and along freeways through measures that do not require widening freeways or adding intersection and arterial capacity. For example, the agencies could have evaluated meeting travel needs by funding increases in local and regional transit service. The agencies' failure to identify such measures, or other effective mitigation, violates CEQA.

Finally, notwithstanding the agencies' refusal to mitigate the significant impacts at these and dozens of other locations, the DEIR/S does not identify these impacts as significant and unavoidable. *See* DEIR/S at 4-85 (indicating that Project would have less than significant impact on transportation). This omission also violates CEQA and NEPA. *See* CEQA Guidelines § 15126.2(b); 42 U.S.C. § 4332(C)(ii) (requiring the EIS to discuss "any adverse environmental effects which cannot be avoided should the proposal be implemented").

4. The DEIR/S Fails to Analyze or Mitigate the Project's Construction-Related Transportation Impacts.

According to the DEIR/S, construction of the Freeway Tunnel alternative would occur over a five-year period. DEIR/S at 14. Construction of the LRT alternative would occur over a six-year period. *Id*. at 10. One would expect that, given the massive scale and prolonged duration of such construction, the DEIR/S would have comprehensively analyzed its extensive impacts on local and regional traffic. Project construction will generate traffic and alter traffic patterns from lane closures, delivery of materials, hauling of excavated material, and construction employees' commuting to/from the job site.

Despite these obvious effects, the DEIR/S includes only vague, cursory statements about construction-related transportation impacts. For example, it devotes one sentence to potential impacts in Alhambra, El Sereno, Monterey Park and Pasadena:

> The single-bore design variation of the Freeway Tunnel Alternative could result in delays at 5 locations and detours in 7 locations in Alhambra, El Sereno, and Monterey Park in the vicinity of the south tunnel portal, as well as delays at 8 locations and detours in 11 locations in Pasadena in the vicinity of the north tunnel portal. DEIR/S at 3.24-4.

The document never identifies the specific locations where these delays or detours would occur, or provides any estimate of their duration. In another instance, the DEIR/S states that "prior to the estimated time of construction, coordination would take place to ensure that the proposed closures and/or detours would be coordinated with other transportation improvement projects in the area that may be impacted and that potential traffic impacts during the construction of this [tunnel] alternative are adequately addressed." *Id*. at 3.24-5. These types of vague, generic statements fail to assure the public that the traffic impacts during construction will in fact be "adequately addressed."

The document's failure to supply this information is not a superficial deficiency. Recently, Metro undertook a major expansion project for the I-405. As the attached article explains, construction of that project wreaked havoc on travelers for several years:

> The four-turned–five-year, $1.1 billion project became a long-running nightmare of sudden ramp closures, poorly advertised by Metro and made all the worse by baffling detours that led drivers into the unfamiliar Bel Air Hills and Sherman Oaks hills, dead ends and unlit canyons. As Metro's closures and delays reached their height in 2013, L.A. Weekly encountered stranded motorists merely by following Metro's official detours — which in many cases were roads to nowhere. There is one crystal-clear improvement: With barricades gone and ramp closures less frequent, commuters are at least getting relief from problems Metro itself created — particularly its widely mocked detours, which proved indecipherable on its website and could not be explained by road crews.

See L.A. WEEKLY, *$1.1 Billion and Five Years Later, the 405 Congestion Relief Project Is a Fail* (March 4, 2015), attached as Exhibit 29.

Instead of analyzing the Project's five to six-year long construction-related transportation effects for the Freeway Tunnel and LRT alternatives, the DEIR/S looks to a future "Traffic Management Plan" ("TMP") to minimize the effects of construction activities. *Id*. But this deferral of mitigation violates CEQA. *See* CEQA Guidelines § 15126.4(a)(1)(B) ("Formulation of mitigation measures should not be deferred until some future time."); *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 93. Indeed, the DEIR/S's approach to these transportation impacts is a "mere expression[] of hope" that the agencies will be able to devise a way around the problems created by construction of this massive Project. *Lincoln Place Tenants Ass'n v. City of Los Angeles* (2005) 130 Cal.App.4th 1112. CEQA requires more.

Importantly, a court may consider lead agencies' prior actions when it adjudicates the adequacy of mitigation measures. As the Supreme Court explained, "[b]ecause an EIR cannot be meaningfully considered in a vacuum devoid of reality, a project proponent's prior environmental record is properly a subject of close consideration in determining the sufficiency of the proponent's promises in an EIR." *Laurel Heights,* 47 Cal.3d at 420. As one of the agencies routinely responsible for large-scale transportation projects, Metro has not demonstrated that it is able to protect travelers from the adverse effects of their construction projects. The agency's inability to manage traffic during the I-405 Project construction period raises significant red flags for the effectiveness of the TMP.

In short, the DEIR/S's failure to provide a complete analysis of the Project's five to six-year long construction-related impacts for the Freeway Tunnel and LRT alternatives, or an actual mitigation plan, violates CEQA and NEPA.

D. The DEIR/S's Analysis of and Mitigation for the Project's Noise Impacts Are Inadequate.

The Project will generate two distinct categories of noise impacts: construction-related noise and permanent operational noise. Depending on the alternative selected, the latter category will include: traffic noise from the cars, trucks, motorcycles, and buses that will travel along the route, and/or noise from operation of the light rail trains. The World Health Organization recognizes noise, and in particular traffic noise, as a serious public health problem. *See, e.g.,* excerpts from Traffic Noise Reduction in Europe, attached as Exhibit 30. Given the magnitude of the Project's potential noise impacts, coupled with the effect that elevated noise levels has on public health, the DEIR/S should have rigorously examined this issue. Unfortunately, the document's analysis of noise impacts is riddled with errors and critical omissions. The Landrum & Brown Report Noise Report provides detailed comments on the shortcomings in the DEIR/S's noise analysis; a few of the most troubling errors are briefly described here.

1. The DEIR/S Fails to Clarify the Significance Thresholds It Uses for Analyzing Noise Impacts.

The CEQA Guidelines, Appendix G, state that a project will have a significant noise impact if it would result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. CEQA requires that a determination of an impact's significance employ "careful judgment . . . based to the extent possible on scientific and factual data." CEQA Guidelines § 15064(b).

The first step in any discussion of an environmental impact is to select a threshold of significance. Here, the DEIR/S contains no thresholds of significance for the Project's noise impacts. Instead, the document simply reprints the questions contained in Appendix G of the CEQA Guidelines. DEIR/S at 4-69 to -70. But these questions do not alone constitute a threshold of significance. For instance, Appendix G, question XII(c) asks whether the project would result in a "substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project." *Id.* In order to apply this standard, the DEIR/S must define "substantial permanent increase" and provide a numerical threshold upon which it bases its finding of no significance.

The DEIR/S preparers failed to take this crucial first step. This flaw in turn leads to a host of other failures: without a threshold, the DEIR/S cannot do its job. For example, the DEIR/S concludes that the Project would mitigate all significant noise impacts to less-than-significant levels (DEIR/S at 4-69 to 4-70), yet the document provides no standard by which to judge the impact's significance. Because the DEIR/S provides no standard or threshold on which to base its conclusion as to the Project's impacts, its conclusions regarding the significance of the Project's noise impacts are meaningless.

Moreover, the DEIR/S should have adopted thresholds that acknowledge that where existing ambient noise is already elevated, tolerance is very low for *any* increase in noise. Existing ambient noise at various receptors in the Project area is already in excess of 65 dBA, the typical outdoor residential noise level deemed acceptable by local municipalities. Here, the proper question is not the relative amount of noise resulting from the Project, but "whether any additional amount of [] noise should be considered significant . . ." in light of existing conditions. *Los Angeles Unified School District*, 58 Cal.App.4th at 1025-26 (emphasis added). Therefore, the DEIR/S erred in failing to evaluate whether residents who already experience elevated noise levels will be adversely affected by the Project.

2. The DEIR/S Does Not Adequately Analyze the Project's Construction-Related Noise Impacts.

Although construction of the Project would take five to six years for the Freeway Tunnel and LRT alternatives, respectively, and construction equipment would operate immediately adjacent to residences, businesses, open space, and parks, the DEIR/S never discusses the specific noise impacts of this massive construction. As anyone notices while walking next to a construction site, construction equipment can be extraordinarily noisy. The DEIR/S acknowledges, generally, that construction will involve a variety of noise-producing activities. Noise levels from construction trucks and equipment can be as high at 87 dBA at 50 feet. DEIR/S at 3.14-7 to 3.14-8. Noise generated from excavation activities, in particular, can reach 88 dBA at 50 feet. *Id.* And the DEIR/S notes that noise associated with pile-driving activities is estimated to approach 93 dBA at 50 feet. *Id.* To put this in perspective, a noise level of approximately 88 dBA is as loud as the sound that a food blender makes at a distance of one meter. *Id*. at 3.14-2.

Given the potential for the ear-splitting noise levels associated with Project construction, the proximity of sensitive receptors, and the protracted construction schedule, the DEIR/S should have made at least some attempt to evaluate the Project's construction-related noise impacts. Instead, the DEIR/S merely presents generic information about typical noise levels for construction equipment and for construction activities, and speaks in hypothetical terms. For example, in discussing noise generated during excavation, grading, and facility construction, the document refers to "typical" construction equipment noise levels (DEIR/S at 3.14-8, 4-70); it provides no discussion or analysis of how or why these "typical" levels will be generated by the Project alternatives.

The DEIR/S is similarly vague and dismissive with respect to haul truck trips associated with construction. Although the dual-bore freeway tunnel design would require 360,000 truck trips, at a rate of 15 trucks per hour to export material from the excavation site, the document states that noise impacts associated with hauling for tunnel excavation activities is expected to be less than significant and no mitigation is required. *Id.* at 4-70. The only evidence it provides for this statement is the unsupported conclusion that the "total number of delivery trucks per day is also a very small percentage of the daily volumes on the haul route roadways." *Id.* As the attached Landrum & Brown Noise Report explains, this amounts to an average of 720 daily heavy truck passes per day, which, at 35 miles per hour, would generate the same level of noise as a typical arterial roadway with a daily traffic volume of 36,000 vehicles, and would increase the noise level along the roadway by 3 dB. Landrum & Brown Noise Report. The DEIR/S's analysis should present the traffic volumes and speeds on the roadways that will be carrying haul trucks and demonstrate, based on substantial evidence, that the additional truck trips will not have a significant impact on sensitive receptors along the haul routes.

The DEIR/S generic description of typical noise levels fails to inform decision-makers, let alone the affected public, of the noise events from *this particular Project*. Although the DEIR/S admits that a temporary noise increase would occur, the public is given no specific information as to the type, severity or even the duration of the construction-related noise impacts. Nor does the DEIR/S provide any assurance that sensitive receptors would be sufficiently protected during the Project's protracted construction process, i.e., five to six years depending on the alternative selected. Omission of a detailed and specific construction noise analysis is particularly troubling given that the Federal Highway Administration requires that construction noise *must* be considered during the development of any transportation facility, and identifies the specific FHWA model that agencies should use to predict noise levels for highway construction projects.[26]

The DEIR/S's failure to include a useful and legally-sufficient analysis of construction-related noise impacts is a serious shortcoming. An adequate analysis would have described existing ambient noise levels at receptor locations, established appropriate significance thresholds for both interior and exterior noise levels to assess if the increase would be substantial, predicted noise levels during each phase of construction at each sensitive receiver location, compared noise levels during construction to the existing ambient noise levels, and reached a conclusion as to whether noise levels would substantially increase. This type of evaluation is necessarily complex, requiring a thorough description of the type, duration, amplitude, topological conditions, relationship of sensitive receptors to construction areas, construction techniques, construction phasing, and construction durations for each project alternative.

A conclusion regarding the significance of an environmental impact that is not based on an analysis of the relevant facts fails to fulfill CEQA's informational goal. *See Stanislaus Natural Heritage Project v. County of Stanislaus* (1996) 48 Cal.App.4th 182; *Citizens of Goleta Valley,* 52 Cal.3d at 568. Similarly, NEPA places upon an agency the "obligation to consider every significant aspect of the environmental impact of a proposed action." *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council* (1983) 462 U.S. 87, 97 (internal quotation omitted). The DEIR/S fails to fulfill these paramount statutory purposes both because it neglects to present all relevant facts relating to the Project's construction noise impacts and because its cursory conclusions are based upon no analysis. Without a detailed quantitative analysis of construction-related noise, it is not possible to determine the severity of these impacts or whether the proposed mitigation measures would effectively reduce such effects.

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[26] *See* FHWA, Highway Traffic Noise Handbook (emphasis added) available at: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/.

3. The DEIR/S Does Not Adequately Analyze the Project's Construction-Related Vibration Impacts.

The deficiencies in the DEIR/S's noise analysis extend beyond its failure to analyze construction-related noise impacts. The DEIR/S also inadequately analyzes construction-related vibration impacts resulting from construction of the tunnel alternatives. Construction-related vibration not only can contribute to high levels of annoyance, but also can cause substantial property damage. Even at levels below those that damage structures, the effects of ground-borne vibration include perceptible movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Federal Transit Administration Noise and Vibration Manual (2008)[27] at 7-1. The Project's tunnel alternatives require the use of up to four tunnel boring machines, which will operate underground continuously to excavate the tunnels by crushing rock into sediment. This will occur directly below residences and businesses in the Project area. Additionally, the DEIR/S proposes to use supply and muck trains to remove excavated material from the tunnel portals. These and other construction activities will result in ground-borne vibration affecting sensitive receptors within the Project area.

The DEIR/S is legally deficient because it does not include a comprehensive assessment of construction-related vibration impacts, and downplays their significance. The Federal Transit Administration ("FTA") has established criteria thresholds for annoyance from ground-borne vibration. The criteria are 72 VdB for frequent events (more than 70 events daily); 75 VdB for occasional events (between 30 and 70 events daily); and 80 VdB for infrequent events (fewer than 30 events daily). FTA Noise and Vibration Manual (2008) at 8-3. The DEIR/S's technical report on vibration impacts concludes that the tunnel boring machines used for the LRT and Freeway Tunnel alternatives may generate levels as high as 77 VdB at homes directly above the tunnel. Ground-borne Noise and Vibration Impacts Report at 6-1. It also states that these vibration levels would last two or three days, and possibly longer. *Id.* The tunnel boring machines will operate continuously, generating relatively constant levels of vibration while they are in operation. This activity means that residences and other sensitive receptors near the tunnel construction activities will experience nearly

[27] The manual is available at http://www.fta.dot.gov/12347_2233.html.

continuous ground-shaking day and night for up to three days, at levels above those permitted by the FTA criteria.

Therefore, the DEIR/S's own analysis indicates that ground-borne vibration levels would exceed the FTA's thresholds for annoyance. Instead of acknowledging the significance of this impact, however, the DEIR/S dismisses it as unimportant because it will not produce structural damage to residences and the impact will not be permanent. DEIR/S at 3.14-9 to -10. This approach is unlawful. The DEIR/S has no basis for concluding that the vibration impacts from the tunnel boring machines would be less than significant. *See* DEIR/S at 4-75. Any conclusion that an impact is less than significant must be supported with substantial evidence. Substantial evidence consists of "facts, a reasonable presumption predicated on fact, or expert opinion supported by fact," not "argument, speculation, unsubstantiated opinion or narrative." Pub. Res. Code § 21080(e)(1)-(2). Similarly, under NEPA, agencies may not rest on "bald conclusions," but must take a "hard look" at the environmental impacts of a project. *Maryland-Nat'l Capital Park & Planning Comm'n v. U.S. Postal Serv*. (D.C. Cir 1973) 487 F.2d 1029, 1040. Because the DEIR/S's conclusion of insignificance is premised on unsupported assumptions and bald conclusions, it falls far short of complying with this legal standard.

Moreover, the DEIR/S does not even analyze the potentially significant effects of blasting. The document acknowledges that blasting may occur if high strength bedrock is discovered in the cut-and-cover tunnel sections or in the excavation of cross passages. DEIR/S at 3.14-9; 3.24-13. However, rather than analyze the significance of any such blasting, it elects instead to defer analysis of controlled blasting methods until a future date. *Id.* This is not an acceptable approach. As the attached Landrum & Brown Noise Report explains, impacts from blasting can vary widely, and there are control measures available to minimize impacts. For example, several small blasts can perform the same work as one large blast but result in lower maximum vibration levels. Landrum & Brown Noise Report. The DEIR/S cannot simply raise the possibility of underground blasting in a densely-populated urban environment and decline to address its impacts and potential mitigation measures altogether. Instead, the document should indicate where blasting may be used, and how likely it is to occur. It should also develop mitigation measures, based on a quantitative performance standard, to ensure that any blasting would not result in significant vibration impacts.

4. The DEIR/S Does Not Adequately Analyze the Project's Operational Impacts.

The DEIR/S systematically understates or outright ignores the Project's operational noise impacts. First, as the Landrum & Brown Noise Report explains, while the DEIR/S focuses myopically on traffic noise level changes along numbered highways, it completely overlooks potential increases along arterial roadways in the Project area. *See* DEIR/S at 4-76 to -82 (Tables 4.3 through 4.7). But traffic volumes and noise levels along arterial roadways will be affected by the Project and significant impacts will likely occur along these roadways as well. The DEIR/S's analysis must be extended to arterial roadways to assess potential impacts along these roadways.

Second, the DEIR/S ignores multiple receptor locations that will experience significant noise impacts due to prevailing wind conditions. Studies have shown that noise can be affected by atmospheric conditions, including wind, which can cause noise to travel farther from its source. *See* Nick Ovenden, et al. *How the weather affects the scale of urban noise pollution* (2011), attached as Exhibit 31. The prevailing winds in the San Gabriel and La Crescenta/Cañada valleys are from the west, so the operational noise from increased traffic caused by the Project would carry in the direction of the foothills of the San Gabriel mountains. Thus, receptors in the following cities, some of which are outside the area studied in the DEIR/S, could be affected by operational noise from the Project: La Crescenta, La Cañada Flintridge, Altadena, Pasadena, Sierra Madre, Arcadia, Monrovia, Azuza and Glendale. The DEIR/S overlooks these potentially significant noise impacts.

Third, the DEIR/S completely ignores impacts to receptors for which Caltrans asserts mitigation is infeasible or unreasonable. The result is not only illogical, it is completely contrary to CEQA and NEPA's mandate to disclose significant environmental impacts, especially those that are significant and unavoidable. As explained in the Landrum & Brown Noise Report, the DEIR/S and the Noise Study Report reveal a large number of receptors where noise levels under the freeway tunnel alternatives would exceed federal criteria, but for which noise abatement measures were deemed unreasonable or infeasible. DEIR/S at 3.14-12. Many of these receptors, representing hundreds of dwelling units, would be subject to Project-related CNEL[28]

[28] CNEL stands for "Community Noise Equivalent Level" and is a weighted average sound level over a 24-hour period.

noise increases of 3 dB or greater over existing conditions and an exterior noise level greater than 65 dB under the Freeway Tunnel alternative. Landrum & Brown Noise Report. Although the DEIR/S fails to establish a threshold of significance for noise impacts, these increases exceed the typical CEQA significance threshold for highway noise impacts—and the document proposes no feasible mitigation to reduce these significant impacts to less than significant levels. The DEIR/S fails to acknowledge this significant and apparently unavoidable impact, a critical error.

Fourth, the DEIR/S improperly excludes analysis of operational noise impacts on interior noise levels. This is a key omission, since, for those receptors where exterior noise exposure will exceed 65 dB CNEL, interior noise levels could exceed 45 CNEL with closed windows, and could exceed 57 dB CNEL with the windows open. By comparison, the State of California's Title 24 building regulations establish 45 dB CNEL as the interior noise standard for new residential dwellings. Landrum & Brown Noise Report. What's more, the DEIR/S fails to consider second floor noise exposure, where noise barrier mitigation is often ineffective. The DEIR/S preparers should also have modeled these second floor noise exposures to those receptors located behind barriers that will be constructed to comply with FHWA criteria.

These serious errors in the DEIR/S's analysis of operational noise impacts render the document legally infirm.

5. The DEIR/S Fails to Evaluate Single Noise Events and Nighttime Noise.

Another significant oversight is the DEIR/S's failure to evaluate single noise events or nighttime noise. In fact, the noise analysis discusses the Project's potential impacts only in terms of Leq and CNEL, both of which are averaging metrics. Motor vehicle noise is characterized by a high number of individual events, which often create a higher sustained noise level in proximity to areas sensitive to noise exposure. The light rail trips associated with the LRT alternative will give rise to single noise events. And construction activities, including pile driving and possibly blasting, will also contribute to single noise events. The DEIR/S should have evaluated the effect that single noise events from traffic, light rail car trips, and construction activities will have on the communities in the Project area. Yet, rather than analyze how these single noise events will impact receptors, the DEIR/S focuses only on average noise.

Analyzing average noise impacts only has been rejected by California courts because impacted residents do not hear noise averages, but single events. *See Berkeley Keep Jets*, 91 Cal.App.4th at 1382. The DEIR/S must also analyze single event noise impacts. Single event noise levels have been shown to be likely to result in sleep disruption and speech interference, and heightened levels of stress and annoyance. Noting that "sound exposure level [SEL] has been found to be the most appropriate and useful descriptor for most types of single event sounds," the court in *Berkeley Keep Jets* held that the Port of Oakland's noise analysis was deficient for failing to consider these impacts. *Id.* Accordingly, the DEIR/S should have analyzed the impacts of single noise events on sleep, speech, stress and annoyance levels, and analyze adequate measures to mitigate those impacts.

Nor does the DEIR/S differentiate between daytime and nighttime noise. Noise can be far more intrusive during the evening and nighttime hours, when ambient noise levels are at their lowest and when people are sleeping. Since the surrounding area is quieter at these times, the masking effect of other noise does not screen the freeway noise. The DEIR/S should have taken into account this higher sensitivity to noise and evaluated how the increase in noise from the Project, including construction activities, would affect receptors during these sensitive time periods.

6. The Proposed Mitigation for Noise Impacts Is Inadequate.

The DEIR/S's proposed mitigation for construction-related noise impacts is legally inadequate. The DEIR/S concludes that implementation of Measures N-1 and N-2 would reduce construction noise impacts under the build alternatives to a less than significant level. DEIR/S at 4-70. These measures simply require compliance with the Caltrans Standard Specifications, the County Code, and city municipal codes, as applicable. *Id*. at 4-70, 3.14-16 to -17. This sweeping conclusion obscures the fact that the Freeway Tunnel alternative, for which construction-related impacts are arguably the greatest, is not subject to Measure N-2. *Id*. at 3.14-16 to -17 (Measure N-2 states that it "applies [only] to the Transportation System Management/Transportation Demand Management [TSM/TDM], Bus Rapid Transit [BRT] and Light Rail Transit [LRT] Alternatives"). Caltrans is thus free to conduct freeway tunnel construction activities unrestrained by the limits on such noise contained in local jurisdictions' municipal codes.

At any rate, merely requiring compliance with agency regulations does not conclusively indicate that a proposed project would not have a significant and adverse impact. In *Kings County Farm Bureau*, for example, the court found that the fact that the

EPA and the local air pollution control district had issued the necessary air emission permits for the construction of a coal-fired cogeneration plant did not nullify the CEQA requirement that the lead agency analyze the significant air quality impacts of the entire project. 221 Cal.App.3d at 692.

Furthermore, the DEIR/S does not consider whether compliance with local noise ordinances is actually feasible. An EIR must describe *feasible measures* that could minimize the project's significant adverse impacts. CEQA Guidelines § 15126.4(a)(1). The DEIR/S fails in this respect because it does not analyze the feasibility of compliance with local noise ordinances. In fact, if nighttime construction occurs near residential areas, compliance may not be feasible. For example, Pasadena Municipal Code 9.36.070 (A) reads: "No person shall operate any pile driver, power shovel, pneumatic hammer, derrick power hoist, forklift, cement mixer or any other similar construction equipment within a residential district or within a radius of 500 feet therefrom at any time other than as listed below. . ." Section 9.36.070 (B) reads: "No person shall perform any construction or repair work on buildings, structures or projects within a residential district or within a radius of 500 feet therefrom in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance at any time other than as listed below. . ." The allowable times are 7 am to 7 pm Monday through Friday and 8 am to 5 pm on Saturday. The only way to comply with the first provision is to forego nighttime and Sunday construction with the equipment listed. The DEIR/S must demonstrate that the anticipated construction activities can actually be completed without violating the applicable noise ordinances in order to conclude these measures will reduce construction noise impacts to a level of insignificance.

The proposed mitigation for construction-related vibration impacts is equally deficient. These impacts are addressed in Measure N-5, a sprawling, multi-part mitigation measure that proves to be largely empty when scrutinized. For example, Measure N-5 would require LRT construction activities to comply with applicable Federal Transit Administration ("FTA") criteria and guidelines and any local regulations related to ground-borne noise and vibration. It also would require the Freeway Tunnel alternative to comply with the Federal Highway Administration ("FHWA") and Caltrans guidelines and any applicable local regulations. DEIR/S at 3.14-17 to -18. However, the document provides no discussion of what these guidelines require, whether compliance with them is feasible, and whether and how such compliance would actually mitigate significant vibration impacts. Indeed, the requirement that construction activities comply with "any applicable local regulations related to ground-borne noise and vibration" is a nonstarter as the document does not identify, let alone discuss, any such regulations.

Measure N-5 also requires the Project Engineer to develop specific property line vibration limits during final design for inclusion in the construction vibration specifications. DEIR/S at 3.14-18. The DEIR/S cannot defer the preparation of these vibration limits until after Project approval. Mitigation for the Project's noise impacts must be identified in this DEIR/S. *See* CEQA Guidelines § 15126.4(a)(1)(B). Similarly, the measure calls for a variety of future "control and minimization" measures that are "anticipated to be applied during construction." DEIR/S at 3.14-18. These include monitoring, a public notice and complaint resolution program, and the vague promise that the Project Engineer will "incorporate comprehensive construction vibration specifications in all construction bid documents." *Id.* These vague gestures do not come anywhere near meeting CEQA's exacting standards for mitigation. Agencies may defer mitigation only in very limited circumstances. *See* CEQA Guidelines § 15126.4(a)(1)(B). In those cases, the agency must commit itself to the mitigation, which must contain specific quantifiable performance criteria to ensure that it is effective. *Endangered Habitats League, Inc. v. Cnty. of Orange* (2005) 131 Cal. App. 4th 777, 793 (measure requiring acoustic analysis and reports to be submitted prior to permit approval inappropriately deferred mitigation). Here, because the DEIR/S failed to include such performance measures, it cannot justify the decision to defer the bulk of mitigation for vibration impacts until after Project approval.

In the absence of other feasible mitigation, and to ensure that no significant impacts to residents will occur, the DEIR/S should provide for compensation for residents who will be adversely affected by tunnel boring machines passing beneath their homes.

E. The DEIR/S's Analysis of and Mitigation for Geology/Soils Impacts Are Inadequate.

CEQA provides that a "significant effect on the environment" exists where, among other things, "[t]he environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly." Pub. Res. Code § 21083(b)(3). The CEQA Guidelines further explain: "The EIR shall . . . analyze any significant environmental effects the project might cause by bringing development and people into the area affected." CEQA Guidelines § 15126.2(a). Accordingly, the DEIR/S must thoroughly study whether the seismic risks involved in constructing tunnel(s) through a region of Los Angeles County that contains numerous earthquake fault zones would create significant risks to users and residents of the Project area.

Courts do not hesitate to scrutinize the adequacy of an agency's discussion of a project's potential seismic risks to the occupants of the project, and have held the agency's analysis to the same standards applicable to any other environmental impact analyzed under CEQA. *California Oak Foundation v. Regents of University of California* (2010) 188 Cal.App.4th 227, 263-264 (applying Guidelines, § 15126.2 to analysis of geologic hazards to project); *People v. County of Kern* (1974) 39 Cal.App.3d 830, 836, 842 (EIR improperly failed to respond to comments that development was directly over active fault and adjacent to other active faults); *see also Bozung v. Local Agency Formation Corn.* (1975) 13 Cal.3d 263, 279-280, fn. 21 (observing that the CEQA Guidelines have long provided a project " 'may have a significant effect on the environment'" if it " '[c]ould expose people or structures to major geologic hazards'").

To further highlight the importance of a project's seismic impacts, the Legislature has provided that several types of projects that would otherwise be exempt from CEQA must undergo CEQA review if they are located near geologic features that present seismic risks.[29] Finally, as the DEIR/S acknowledges, the CEQA Appendix G checklist asks whether proposed projects would expose people or structures to the risks including fault rupture, seismic ground-shaking, and seismic related ground failure. CEQA Guidelines Appx. G, § VI. Given the Legislature's obvious concern that geologic and seismic impacts be analyzed thoroughly during the CEQA process to protect public health and safety, the DEIR/S's failure to do so here is troubling. As discussed below and in the attached report by Wilson Geosciences, Inc., the DEIR/S's analysis of geological and seismic impacts, including fault offset, ground-shaking, and ground settlement, is inadequate. Further, the DEIR/S has not shown that the mitigation it proposes for these impacts will actually reduce them to less than significant levels.

[29] *See* Pub. Res. Code §§ 21155.1(a)(6)(D); 21159.21(h)(4); 21159.22(b)(3); 21159.23(a)(2)(A); 21159.24(a)(3).

1. The DEIR/S Fails to Properly Analyze the Project's Seismic Impacts.

The Southern California region is particularly seismically active because of the influence of several earthquake fault systems resulting from the Pacific and North American plates. The Project area contains at least one active fault—the Raymond fault—defined by the State of California as a well-defined fault line that has exhibited surface displacement within the last 11,000 years. DEIR/S at 3.10-4. Additionally, two potentially active faults—the Eagle Rock and San Rafael faults—are present within the Project study area. *Id.* The DEIR/S acknowledges that an earthquake on the Raymond may result in ground rupture. *Id.* Nonetheless, both the Freeway Tunnel alternative and the LRT alternative designs (collectively, "tunnel alternatives") cross the Raymond and Eagle Rock faults, and the Freeway Tunnel alternative also crosses the San Rafael fault. *Id.* The regional faults may also cause strong ground-shaking to occur in the Project area. *Id.* Ground settlement is also a potential hazard of tunnel construction, due to the area's geological makeup. *Id*. at 3.10-10 to -12. It is against this backdrop of seismic activity that the DEIR/S must evaluate the impacts of the Project. Unfortunately, critical flaws in this analysis lead the DEIR/S to substantially understate these potential impacts.

2. The DEIR/S Fails to Support Its Analysis of Fault Offset Potential With Substantial Evidence.

A fault rupture offset is the ground movement along an earthquake fault, measured from one side of the fault to the other. The DEIR/S recognizes that "there is the potential for substantial adverse effects due to fault rupture" in the Project area. DEIR/S page 4-59. This is unsurprising, as all of the tunnel designs cross multiple mapped faults. *Id.* Despite the obvious need for careful analysis of these impacts in order to protect the public safety and welfare, the DEIR/S mistakenly relies on an outdated methodology to determine fault rupture offset, thereby underestimating the tunnel alternatives' threat to public safety.

Using outdated methodology, the DEIR/S's analysis of the tunnel alternatives' potential fault offset mischaracterizes the active fault rupture offset for the Raymond, Eagle Rock, and San Rafael faults at the point where the tunnels will cross. This error results in an inaccurate and understated estimation of the tunnel alternatives' risk to public safety. There are two principal methodologies for estimating the magnitude of fault ruptures. Of the two, the EIR/S preparers elected to use the older methodology, published over twenty years ago. *See* Preliminary Geotechnical Report, Appx. E at 11;

Wilson Geosciences Report. In doing so, they rejected a newer methodology that takes into account data obtained from more recent earthquakes.

The implications of this error are more than theoretical. The newer methodology predicts a fault offset more than *four times* the size of the offset prediction yielded by the older methodology for the Raymond fault.[30] In fact, the new methodology's fault offset prediction for the Raymond fault is nearly the same as the fault offset observed in the 1971 San Fernando earthquake at a very similar fault. Wilson Geosciences Report. By "selecting" and then designing for the lower offset prediction, the DEIR/S greatly underestimates the risk of damage to the tunnel(s) in the case of an earthquake. *Id*.

The DEIR/S's approach, which eschews current information in favor of outdated material, violates basic principles of CEQA. *Berkeley Keep Jets*, 91 Cal.App.4th at 1367 (EIR's use of scientifically outdated information caused it to fall short of a "reasoned and good faith effort to inform decision-makers and the public"). Moreover, an agency's reliance on inadequate data or assumptions amounts to a fundamental failure to take the "hard look" required by NEPA. *See*, *e.g.*, *Natural Resources Defense Council,* 421 F.3d at 812 (EIS's analysis of economic impacts based on inaccurate models and flawed assumptions "subverted NEPA's purpose").

3. The DEIR/S Does Not Adequately Evaluate Impacts on the Tunnel Design From Ground-Shaking.

As with its approach to fault rupture, the DEIR/S falls short in addressing and evaluating the potential impact of near-source ground-shaking on the tunnel from an earthquake on the Raymond, Eagle Rock, and/or San Rafael faults. Seismic ground-shaking occurs during an earthquake, with the intensity of the shaking at a location depending on the location's distance from the earthquake epicenter. Ground-shaking, like fault rupture, can cause significant damage to structures within 50 feet of fault traces. Wilson Geosciences Report. Effects can include ground and grout cracking, and local permanent ground deformation.

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[30] *See* Wilson Geosciences Report, explaining that Caltrans elected to use the "average" 0.5 meter Wells and Coppersmith (1994) predicted offset value instead of the "maximum" 2.2 meter Wesnousky (2008) value for the Raymond fault.

The DEIR/S does not evaluate the potential impact of the near-source ground-shaking hazard on the tunnel. Because this specific hazard is simply not addressed, there is no evidence that the recommended design measures, which are intended to accommodate vertical and lateral offset movements, would be sufficient to address near-source ground-shaking hazards. Wilson Geosciences Report (citing the DEIR/S's Preliminary Geotechnical Report, Appx. at 8). Furthermore, as described below, the DEIR/S fails to identify seismic design criteria for freeway tunnels that would account for the potential hazards associated with near-source ground-shaking. This omission undermines the effectiveness of any tunnel design measures it proposes.

4. The DEIR/S's Conclusion That Ground Settlement Will Not Occur Is Not Supported By Substantial Evidence.

The DEIR/S states that the Project's proposed excavation and tunneling could cause ground settlement and differential settlement immediately above and adjacent to the bored tunnel portion, and the portal and station excavations of the tunnel alternatives. DEIR/S at 3.10-10 to -12. Unless properly controlled, these activities could result in groundwater inflows and flowing ground conditions at the head of the tunnel excavation, which would lead to ground surface settlement. *Id.* Such groundwater inflow into excavation areas may require dewatering, which in turn could cause more ground settlement. Wilson Geosciences Report. Ground settlement can, of course, cause significant damage to existing surface structures.[31]

Many of the areas above and adjacent to the tunnel location are occupied with residences, roads, and businesses, which stand to be damaged in the event of ground settlement. Remarkably, however, the DEIR/S does not fully describe the impact of ground settlement on these existing structures and infrastructure. Instead, the DEIR/S defers proper alluvial deposit and groundwater characterization studies until after Project

[31] Seattle residents experienced this problem firsthand, in conjunction with the Alaskan Way Viaduct replacement project. Efforts to excavate a broken tunnel boring machine coincided with ground settlement that caused considerable damage to surface structures, including commercial office buildings. *See* NEW YORK TIMES, *In Seattle, a Sinking Feeling About a Troubled Tunnel* (Dec. 10, 2014), available at: http://www.nytimes.com/2014/12/10/us/in-seattle-a-sinking-feeling-about-a-troubled-tunnel.html?&_r=0.

approval. Yet, these studies are necessary at the outset, to determine whether the proposed excavation and tunneling techniques require adjustment or augmentation through mitigation. In particular, the studies would evaluate the specific groundwater conditions within the alluvial deposit portions of the tunnel alignments, including the densities, porosities, and transmissivities of the materials. Only with such evidence can the DEIR/S analyze the impacts of dewatering in these areas, and identify necessary design changes and mitigation.

In lieu of this required analysis, the DEIR/S speculates that use of certain construction techniques may limit ground settlement: "tunneling equipment and procedures as well as portal and station support methods are capable of controlling ground movements to limit surface settlements and in turn minimize damage to existing structures." DEIR/S at 3.10-11. However, according to Wilson Geosciences, the techniques identified in the document are *not* likely to be effective in reducing or avoiding most of the surface settlement. Wilson Geosciences Report. Although the DEIR/S provides a cursory discussion of ground improvement measures, such as chemical or cement grouting, its analysis is entirely perfunctory.

In order to evaluate properly the potential hazards associated with the soil settlement and the consequent impact on existing improvements, the DEIR/S must estimate: (1) the anticipated total and differential settlements, and (2) the tolerance limits of the existing improvements to such settlements. Wilson Geosciences Report. The document does neither. Accordingly, the DEIR/S lacks an adequate assessment of the potential adverse impacts on existing improvements from ground settlement associated with the Project, in violation of CEQA and NEPA.

5. The DEIR/S Fails to Identify and Justify Thresholds of Significance for Impacts to Geology and Soils.

The DEIR/S does not clearly identify the standards of significance it used to evaluate geological and seismic impacts, in violation of CEQA. In order to perform its function of identifying significant impacts, an EIR must first provide a reasonable discussion of the significance criteria the lead agency will be using to evaluate those impacts. This discussion must not only identify the specific standards of significance, but also provide a justification for why their use is appropriate. Here, the DEIR/S's mere recitation of generic questions from the CEQA Guidelines Appendix G does not serve this function. Guidelines § 15064(b) (CEQA recognizes that the significance of an activity may vary with the setting); *see Bowman v. City of Berkeley* (2004) 122

Cal.App.4th 572, 589 ("The Guidelines confirm that the significance of an activity may vary with the setting. For example, an activity which may not be significant in an urban area may be significant in a rural area.") (internal quotation marks omitted). Given the unique size, scope, and technical complexity of the tunnel alternatives, it is not sufficient simply to incorporate the suggested standards from the CEQA Guidelines wholesale and without any explanation.

For example, the DEIR/S implies that state and local design standards, building codes, and regulations will ensure that no significant impacts result from Project implementation. DEIR/S at 4-59 (reliance on "compliance with applicable Caltrans, FHWA, Metro, and/or local jurisdiction seismic design standards for construction and operation"); *id.* (reliance on "compliance with applicable building and seismic design standards"). But the document does not actually identify these standards or codes, nor does it describe the specific requirements that they would impose. Further, the DEIR/S never explains how these design standards and codes will actually mitigate seismic impacts to a less than significant level. Notably, the Appendix G Checklist for geology and soils, section VI, does not even mention standards established by regional or local jurisdictions, in contrast to its treatment of noise impacts. *See* Appendix G Checklist § XII(a). Since tunnel construction of this scale is unprecedented in California, it is speculative to assert that state and local design standards will ensure that there will be no significant impacts. The problem is further amplified by the DEIR/S's failure to identify specific design standards for tunnel construction, as described below and in the Wilson Geosciences Report.

In short, the DEIR/S must develop meaningful significance criteria to guide its analysis of these impacts.

6. The DEIR/S Improperly Relies on Seismic Design Criteria Developed for Bridges to Mitigate Impacts to Tunnels.

Compounding its analytic errors, the DEIR/S relies on seismic design criteria for bridges rather than for tunnels. As the DEIR/S explains, Project "[s]tructures are designed using the Caltrans Seismic Design Criteria ("SDC"). The Caltrans SDC provides the minimum seismic requirements *for highway bridges* designed in California." DEIR/S at 3.10-1 (emphasis added); *see also* DEIR/S Preliminary Geotechnical Report, Appx. E at 15 ("No Caltrans seismic design criteria for tunnels are currently available."); Appx. F at 8 (same). As the Wilson Geosciences Report explains, the SDC does not even mention tunnels. The SDC refers readers to the "20-10 Fault Rupture Memo to

Designers," authored by Caltrans and updated in 2013, but that document does not address tunnels either. On the contrary, all of its fault rupture references are to "structures." We assume these "structures" are bridges inasmuch as the State Bridge Engineer prepared the memo.

This error is profound. The DEIR/S makes no attempt to justify or explain why the SDC developed for highway bridges would be effective for *tunnels*. It simply states that "to support the environmental documentation, it was agreed that the Caltrans seismic design criteria for an Ordinary Nonstandard facility will be used as the basis for seismic design of the Freeway Tunnel." DEIR/S Preliminary Geotechnical Report, Appx. F at 8. This is a far cry from the substantial evidence required under CEQA to support environmental determinations. *See* Pub. Res. Code §§ 21080(e)(1) ("substantial evidence includes fact, a reasonable assumption predicated upon fact, or expert opinion supported by fact"), 21082.2(c). As the Wilson Geosciences Report confirms, there is no sound scientific basis for Caltrans' reliance on design criteria for bridges in analyzing and developing mitigation for impacts to massive, deeply seated tunnels like those proposed by the Project.

The agencies must not proceed with the Project until the DEIR/S identifies seismic design criteria for constructing tunnels. Wilson Geosciences Report. The DEIR/S should fully describe these standards and explain specifically why their use is appropriate for the proposed Freeway Tunnel alternatives (both the single- and dual-bore variations). This explanation should include examples of technical methods for determining the magnitude of acceptable fault offsets for the specific tunnel design. It should also specify how the design standards, such as use of cross-passages and other safety measures, would best prevent risks to tunnel users.

The agencies may counter that developing such standards would be time-consuming, impractical, or infeasible. But that is irrelevant. The unprecedented size and scope of the Project's Freeway Tunnel alternatives, coupled with their location in a seismically active area, demand that Caltrans develop and use design standards specifically intended for tunnels. *See Laurel Heights,* 47 Cal.3d at 399 ("We find no authority that exempts an agency form complying with the law, environmental or otherwise, merely because the agency's task may be difficult.").

7. The DEIR/S's Proposed Mitigation Measures Are Vague and Unsupported By Substantial Evidence That They Will Be Effective.

The mitigation proposed in the DEIR/S for the Project's impacts to geology and soils are inadequate and legally deficient. Most notably, the measures defer development of crucial plans and studies until after Project approval. For example, the DEIR/S contemplates, but does not include, the following plans and studies: a "comprehensive geologic and geotechnical investigation," "design-level geotechnical/baseline reports," and a "quality assurance/quality control (QA/QC) plan." DEIR/S at 3.10-22. This information must be part of the DEIR/S and be provided to the public before Project approval, not put off to an unknown future date. *See San Joaquin Raptor Rescue Ctr. v. County of Merced* (2007) 149 Cal. App. 4th 645, 670. Deferral is impermissible where an EIR calls for mitigation measures to be created based on future studies and/or describes mitigation in general terms and the agency does not commit itself to specific performance standards. *California Clean Energy Comm'n v. City of Woodland* (2014) 225 Cal.App.4th 173, 195 (agency could not rely on future report on urban decay with no standards for determining whether mitigation would be required).

The following measures do not commit Caltrans to specific performance standards and cannot therefore constitute legally adequate mitigation:

- Mitigation Measure **GEO-1** states that during preliminary and final design, a comprehensive geologic and geotechnical investigation will be conducted and design level geotechnical/baseline reports will be prepared. This measure defers investigation and preparation of key reports until an unspecified later date, and it is not clear at which stage of project construction and design these reports will issue. Furthermore, the design recommendations that it will purportedly contain for seismic hazards and for geology related constraints should be identified up front.

- Mitigation Measure **GEO-2** states that the Resident Engineer will maintain a quality assurance/quality control (QA/QC) plan during construction and submit "weekly reports" to Caltrans or Metro during Project construction.

- Mitigation Measure **GEO-3** states that the Project Engineer will "make sure" various measures are included in the comprehensive geologic and geotechnical investigation and the design-level geotechnical/baseline report and the project design and specifications. For example, "[a] fault crossing design will be evaluated to be able to accommodate the expected fault offset, maintaining the structural integrity of the tunnel lining and preventing the intrusion of surrounding groundwater into the tunnel. The design will meet the performance criteria of the operating agency." However, the measure does not specify what these performance criteria are, and provides no evidence to conclude that they will be adequate to deal with the fault offset.

- Mitigation Measure **GEO-4** states that "If ground movements exceed acceptable levels set during design, additional measures will be required. . ." However, the document does not state what the "acceptable levels" of ground movements will be. Moreover, the additional measures that will be required are not described in adequate detail. The measure also fails to describe the contents of the "contingency plan of action" that will be required in the event that ground movements occur above levels that could cause structural damage.

DEIR/S at 3.10-21 to -24. These measures are not adequate to support the DEIR/S's conclusion that geological and seismic impacts will be mitigated to a less than significant level. This deferral of mitigation is especially problematic since Caltrans has not developed, and the DEIR/S does not rely on, seismic design criteria for tunnels.

8. Caltrans Improperly Substituted a Less Robust Tunnel Design for the Original Design in Order to Save Costs, Without Explaining If or How the Later Design Will Minimize or Avoid Impacts.

As originally proposed, the Project's freeway tunnel design called for an oversized tunnel, or large vault backfilled with crushable materials in the sections of the tunnel crossed by active faults. DEIR/S Preliminary Geotechnical Report at 11-9 to -10. This design was intended to protect tunnel users by reducing tunnel damage at fault crossings in the case of fault offset. Ultimately, however, Caltrans settled on a different design that calls for vault sections with steel segmental lining. Caltrans made the change due to "constructability issues as well as risk, cost, and schedule implications." *Id*. at 11-10. In other words, the subsequent design can be built more cheaply and quickly. Moreover, the design change was made in reliance on "future design studies," without any specific analysis of how either design would perform in response to an earthquake.

DEIR/S Tunnel Evaluation Report at 2-4 ("Site-specific geotechnical investigations have yet to be completed at each of the various fault zones; future design studies will require site-specific data to be obtained in order to refine the design concepts discussed herein.")

In fact, as the Wilson Geosciences Report describes in detail, the change in design could potentially *increase* the damage to the tunnel due to an earthquake. But the DEIR/S ignores this critical problem, as it fails to address how the proposed tunnel design option will best protect tunnel users. The DEIR/S should have analyzed the design's expected performance under various fault offset and near-source ground motion scenarios. It also should have explained the cost, risk, and construction time trade-offs used to justify the final design selected by Caltrans. Without this information, the DEIR/S cannot assure the public that the chosen design will prevent serious impacts to tunnel users, and that cost and time considerations were properly balanced with public safety.

In sum, the DEIR/S's analysis of impacts relating to seismic risks does not meet CEQA and NEPA's minimum standards. As a result, the DEIR/S provides no evidence that any of the tunnel alternatives would be constructed in a manner that will ensure public safety.

F. The DEIR/S's Analysis of and Mitigation for the Project's Hydrological and Groundwater Impacts Are Inadequate.

One of the policy goals of CEQA and NEPA is to identify impacts and feasible mitigation at the earliest feasible stage before project momentum decreases an agency's flexibility. *See Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 307; *Oro Fino Gold Mining Corp. v. County of El Dorado* (1990) 225 Cal.App.3d 872, 884-85; *see also City of Tenakee Springs v. Clough* (9th Cir. 1990) 915 F.2d 1308, 1313 ("NEPA requires consideration of the potential impact of an action *before* the action takes place"). To that end, information regarding the project's impacts must be "painstakingly ferreted out." *Environmental Planning and Information Council of Western El Dorado County v. County of El Dorado* (1982) 131 Cal.App.3d 350, 357 (finding an EIR for a general plan amendment inadequate where the document did not make clear the effect on the physical environment).

As discussed below and in the report prepared by Wilson Geosciences Inc., the DEIR/S's analysis of the Project's hydrologic and groundwater impacts from the Project's LRT and Freeway Tunnel alternatives is inadequate because it fails to: (a) adequately describe the Project setting; (b) identify thresholds of significance; (c) describe the engineering design features of the tunnel alternatives; (d) support its conclusions with the necessary facts and analysis; and (e) identify mitigation capable of minimizing the tunnel alternatives' significant environmental impacts.

1. The DEIR/S's Failure to Accurately Describe the Project's Existing Hydrological and Groundwater Setting Results in a Serious Underestimation of the Project's Hydrological Effects.

Knowledge of the regional setting is critical, as it forms the baseline for evaluating a project's environmental effects. In considering impacts to hydrology and groundwater, the DEIR/S must provide a through description of the site's existing hydrological characteristics and then comprehensively describe how the Project, particularly the LRT and Freeway Tunnel alternatives, would affect these conditions. Here, the DEIR/S fails to provide the most basic hydrologic information about the groundwater basins and floodplains that the Project would potentially affect.

(a) Raymond Basin and Main San Gabriel Basins.

As the Wilson Geosciences Report explains, the DEIR/S mentions the Main San Gabriel and Raymond groundwater basins, but it does not describe the geologic, hydrological and groundwater characteristics of these basins. The DEIR/S provides no information on groundwater depth contours, groundwater flow direction, basin thickness descriptions or contours, groundwater volumes, groundwater interactions between the Raymond and Main San Gabriel basins, rates of groundwater recharge and withdrawal, locations of pumping wells, or groundwater quality. Nor does the document provide sufficient hydrogeologic and geotechnical information to allow for an evaluation of groundwater flow constraints associated with constructing a tunnel in a seismically active zone.

EIRs for projects that have the potential to threaten groundwater – such as the proposed tunnel alternatives – must describe the site's hydrologic conditions (i.e., baseline conditions) before they can adequately analyze impacts and propose mitigation measures. Here, the DEIR/S tackles the task in reverse order. First, it provides a cursory acknowledgment of the Project's groundwater impacts. Then, it proposes that, as *mitigation* for the tunnel alternatives, the lead agency would comprehensively investigate the characteristics of groundwater resources in the areas where tunneling and excavation would occur; this investigation would establish the baseline for examining the Project tunnel alternatives' impacts. DEIR/S at 3.9-21 (WQ-3); *see also* the DEIR/S's Tunnel Evaluation Report at 20, 21.

The DEIR/S's approach violates CEQA and NEPA. The agency's detailed investigation as to setting cannot be deferred until after project approval. *See Sundstrom,* 202 Cal.App.3d at 307; *see also Robertson,* 490 U.S. at 352 (EIS must discuss mitigation "in sufficient detail to ensure that environmental consequences have been fairly evaluated"). Without sufficient groundwater and geologic characterization, the DEIR/S is unable to estimate whether construction of the tunnel, or an earthquake affecting the tunnel, would substantially deplete groundwater supplies or affect groundwater quality. The potential development of a tunnel traversing several alluvial groundwater basins warrants a comprehensive understanding of the groundwater resources within these basins. These data are readily available and/or attainable, and we can find no plausible explanation why this fundamental information was not included in the DEIR/S.

(b) Laguna Regulating Basin and Dorchester Channel.

The DEIR/S also does not provide a sufficient description of the two floodplains that are located within the study area: Laguna Regulating Basin and Dorchester. DEIR/S at 3.8-2. Certain alternatives, including, for example, the dual-bore tunnel alternative, would require longitudinal encroachments[32] within one or both of these floodplains. *Id*. at 3.8-5. The DEIR/S provides no description of either basin's hydrologic system. It includes no information on flood elevations, peak flows to drainage areas, or the flood frequencies associated with peak flows. Without this information, there is no context for potential flooding impacts that could occur as a result of construction within the floodplains.

Floodplains are critical, interrelated components of the hydrologic system that receive and discharge water. Changes to one part of the system will affect others. Dorchester Channel, in particular, is a major drainage within the study area. *Id*. at 3.9-8. The failure of the DEIR/S to accurately portray the site's underlying environmental conditions contravenes CEQA and NEPA, undercutting the legitimacy of the environmental impact analysis. Especially because the Federal Highway Administration

[32] An encroachment is defined as "an action within the limits of the base floodplain." DEIR/S at 3.8-1

requires that the practicality of alternatives be evaluated if a project results in a longitudinal encroachment into a floodplain (*Id*. at 3.8-1), it is critical that the DEIR/S accurately describe these existing floodplains and the potential for the Project to encroach into them.

2. The DEIR/S Lacks Thresholds of Significance for Determining the Project's Hydrological and Groundwater Impacts.

As discussed above, one of the first steps in any analysis of an environmental impact is to select a threshold of significance. As with other impact sections, the DEIR/S contains no thresholds of significance for the Project's hydrological and groundwater impacts. This flaw leads to a cascade of other failures; without a threshold, the DEIR/S cannot do its job.

For example, the DEIR/S states that the Project would not substantially deplete groundwater supplies, would result in no groundwater quality impacts, and would cause no impacts relating to the placement of structures in floodplains. *Id*. at 4-65 and 4-66. But because the DEIR/S does not identify numeric levels for any of these impacts, there is no way for the public to confirm that these impacts would in fact be less than significant. Indeed, based on the limited information in the DEIR/S and analysis prepared by Wilson Geosciences, there is sound evidence that the Project would have potentially significant impacts on groundwater supplies and groundwater quality, and would adversely impact the floodplains in the study area.

3. The DEIR/S Does Not Disclose Groundwater Impacts That Could Result From Penetrating the Raymond Fault.

(a) Impacts to Groundwater Supplies.

The DEIR/S fails to adequate analyze the Project's impacts on groundwater supplies. First, as discussed above, the DEIR/S omits critical information regarding the Project's hydrologic setting. As the Wilson Geosciences Report explains, the Raymond Fault separates the adjudicated Raymond and the Main San Gabriel Groundwater Basins. The fault serves as a natural subsurface dam, holding back water in the Raymond Basin on the north from water in the Main San Gabriel Basin on the south. DEIR/S at 3.10-3. Water levels are 160 feet lower in the Main San Gabriel Basin than immediately across the Raymond Fault in the Raymond Basin. Perforating this groundwater barrier, either through tunnel construction or as a result of an earthquake, could create significant pathways for groundwater from the Raymond Basin to flow into the Main San Gabriel Basin. Any perforation of this subsurface dam could have devastating impacts, including on the City of Pasadena's water supply.

Unfortunately, the DEIR/S does not recognize the relationship between the two groundwater basins and the subsurface dam, and thus dismisses the potential threat to groundwater resources that could result from perforating this barrier. A major part of the problem is that the DEIR/S relies on tunnel design features to assert that the tunnel would not cause a drawdown of local groundwater tables. DEIR/S at 4-66. However, the DEIR/S provides only a superficial discussion of these Project features, never actually explaining how they would prevent groundwater inflows. Equally concerning, the Project would be constructed in a seismically active area, but the DEIR/S fails to determine whether the Project's tunnel alternatives have been adequately engineered to ensure that a moderate or large earthquake would not impair the Main San Gabriel Groundwater Basins.

The DEIR/S casually asserts that "special care would have to be exercised" when tunneling through a fault zone. DEIR/S at 3.10-21. Yet, the DEIR/S never describes the "careful" techniques that would be employed to protect groundwater during this process; it merely states that Caltrans would use a pressurized-face tunnel boring machine ("TBM") as well as grout and concrete lining with rubberized gaskets. *Id*. at 3.10-21; 3-24.7; 4-65. Tellingly, the DEIR/S never explains *how* the TBM, grout and lining would actually protect groundwater. Thus, contrary to CEQA and NEPA's requirements, the DEIR/S provides no evidence to support either its finding that groundwater would be sufficiently controlled, or its conclusion that the impact would be less than significant (*see id*. at 3.9-16, 3.10-12, 3.10-19, 3.247, 4-66).

In fact, as the Wilson Geosciences Report demonstrates, there is a high potential for the proposed SR 710 tunnel to leak excessive amounts of groundwater. Wilson Geosciences conducted a literature search of tunneling projects and, specifically, the effectiveness of grout to control groundwater. These studies clearly demonstrate that tunnels leak. *See* Wilson Geosciences Report, citing Jacobs Engineering. Grouting can help, but it does not eliminate leaks through or around a tunnel lining. In a study of the South Cobb tunnel project constructed in Atlanta, Georgia, Jacobs Engineering determined that the tunnel would likely leak by 252 gallons per minute ("gpm"). Unfortunately, even after the most advanced grouting techniques were installed, flow rates were projected to be reduced by only 40 percent, i.e., 152 gpm would continue to leak. Accordingly, roughly 80 million gallons annually, or roughly 245-acre feet per year, continued to leak from the South Cobb tunnel despite advanced grouting techniques.

Although the SR 710 DEIR/S does not identify the expected flow rates upon completion of the tunnels, Wilson Geosciences assumed for purposes of their analysis that the Project could result in the same relative amount of leakage as that from the South Cobb tunnel. Based on Geosciences' analysis, the Freeway Tunnel alternative could result in a 5.23 percent reduction in Pasadena Subarea storage each year.[33] The DEIR/S never discloses this potential dewatering of the Pasadena's water basin, in violation of CEQA and NEPA.

Confusingly, while DEIR/S assures readers that the Project's tunnel alternatives will be designed to avoid groundwater flows, the document's technical appendix acknowledges that groundwater inflows *in fact are expected to occur* during construction unless systematic ground improvement measures are implemented to treat the ground prior to excavation. *See* Tunnel Evaluation Report at 20. Despite this alarming fact, the appendix states that the estimates of the maximum potential groundwater flush flows and sustained flows are not available and will not be developed until future design phases. *Id*. at 20. As a result, it impossible at this time for the agency to develop specific criteria, plans, and procedures for effective groundwater control measures. *Id*. at 21. The appendix never thus explains how the ground improvement measures would actually control groundwater inflows.

The DEIR/S's practice of deferring these critical analyses until after Project approval violates CEQA and NEPA. Because the DEIR/S declines to analyze the Projects' hydrological and geotechnical conditions, the document repeatedly concludes

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[33] Wilson Geosciences' conclusion may actually underestimate the dewatering impact, as it is modeled on a study from seismically inactive environment in Georgia, not for an earthquake-prone region of California. The Project's tunnel alternatives would be constructed across multiple active faults. Indeed, there is a 93 percent chance of a magnitude 7 or larger earthquake occurring during the next 30 years in southern California. *See* "Magnitude – 6.7 quake certain to hit California within 30 years, USGS says," March 10, 2015, attached as Exhibit 32. The DEIR/S fails to analyze the potentially disastrous consequences from a moderate or large earthquake on any of the area faults.

that impacts will be determined as they happen and mitigation will be worked out then. This strategy is unlawful. An EIR is "an environmental alarm bell" whose purpose it is to alert the public and its responsible officials to environmental changes *before* they have reached ecological points of no return. *Laurel Heights,* 47 Cal.3d at 392; *see also City of Tenakee Springs,* 915 F.2d at 1313 ("NEPA requires consideration of the potential impact of an action *before* the action takes place"). The DEIR/S's approach strips the document of its key purpose: to provide forewarning.[34]

In sum, the DEIR/S lacks any evidentiary support for its conclusion that the Project, particularly the tunnel alternatives, would not adversely impact groundwater water supplies in the Raymond or San Gabriel groundwater basins under a steady state scenario, much less in the event of a moderate or large earthquake.

(b) Impacts to Groundwater Quality.

The DEIR/S's conclusion that impacts to groundwater quality would be less than significant also does not stand up to scrutiny. The DEIR/S does not analyze the potential for groundwater pathways to transport contaminants in the Raymond Basin (Pasadena Subarea) groundwater into the Main San Gabriel Basin – either along the Raymond fault, along the tunnel contact with alluvium or bedrock, or through the tunnel.

As the Wilson Geosciences Report explains, cracked and fractured areas that could facilitate seepage along the outside of the tunnel could allow contaminated groundwater to flow from the Raymond Basin into the Main San Gabriel Basin. Potential contamination of Raymond Basin groundwater could come from sources such as the Jet Propulsion Laboratory's facilities or from incidents such as chemical or fuels spills along the freeway. Studies have documented actual and projected movements of contaminants from JPL (perchlorates) and groundwater flow pathways from north and northwest to south and southeast, all toward the proposed bored tunnel location beginning at the SR-210/SR-134 interchange. Any current or future groundwater contamination along this

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[34] Moreover, the fact that groundwater inflows are expected to occur appears only the DEIR/S's technical appendix keeps the public in the dark as to the true magnitude of the Project's environmental effects. *See California Oak Found.,* 133 Cal.App.4th at 1239 (information buried in an appendix is not a substitute for good faith reasoned analysis in the EIR).

pathway could end up at the proposed bored tunnel north of the penetration of the Raymond fault.

As with its discussion of groundwater supplies, the DEIR/S relies primarily on grouting to conclude that the Project's tunnel alternatives would not impact groundwater quality. *Id*. at 3.9-17. However, the DEIR/S does not analyze static effects, such as vibration or chemical degradation, on the proposed grout. Nor does it consider the effect that a moderate or larger earthquake would have in disrupting the post-construction "impermeable" groundwater barrier. Rigorous analyses are needed to evaluate the potential impacts on groundwater quality resulting from ground movements.

Without any evaluation of the geologic units and fracture patterns in bedrock, or of the potential deterioration of the "grout seal", the DEIR/S fails to support its conclusion that impacts related to groundwater contamination will be less than significant.

4. The DEIR/S Does Not Adequately Analyze Impacts to the Laguna Regulating Basin or the Dorchester Channel.

(a) Laguna Regulating Basin.

The Freeway Tunnel alternative (dual-bore) would require widening SR 710 along its east side, which is along the western boundary of the Laguna Regulating Basin.[35] *Id*. at 3.8-5. Widening the freeway to provide access to the south portal of the dual-bore tunnel would involve a longitudinal encroachment within the floodplain of the Laguna Basin. *Id*. at 3.8-6. The longitudinal encroachment, which would be up to 20 feet wide and 700 feet long along the Basin's western boundary, results from the excavation necessary for the construction a bridge structure. *Id*. at 3.8-7.

The DEIR/S asserts that this excavation and other construction activities would not affect the storage volume or the Laguna Basin. *Id*. The document further

[35] The Freeway Tunnel alternative single-bore design variation would also require widening SR 710 with associated impacts to the Laguna Regulating Basin. *Id*. at 3.8-5, -6.

asserts that while construction of the bridge structure would result in slight modifications to the floodplain boundary, the base floodplain elevation would not change. *Id*. at 3.8-6; 7. However, because the document provides no information on the basin's existing storage volume or floodplain elevation, it lacks any evidentiary support for its conclusion that the Freeway Tunnel would not affect the floodplain's elevation.

The DEIR/S also does not describe the extent of the excavation or provide any details about the engineering of the bridge structure, e.g., the number and size of the bridge pilings. Nor does it identify the existing floodplain elevations or the elevation of the floodplain upon completion of the Project. Without this basic information, it is not possible to determine the Freeway Tunnel alternative's hydrologic impacts on the Basin.

(b) Dorchester Channel.

The dual-bore Freeway Tunnel design variation requires widening SR 710 along its west side, which is along Dorchester Channel's eastern boundary. DEIR/S at 3.8-5, 6. It would also place fill into the Channel, which would result in narrowing the floodplain boundary. *Id*. at 3.8-8. The placement of fill and/or structures in a floodplain would reduce the capacity of the basin and increase water surface elevation (*id.*), yet the DEIR/S concludes that these modifications would result in no increased flood risk to adjacent communities. *Id*. The DEIR/S lacks the evidentiary support for this conclusion. What information that is provided in the DEIR/S strongly indicates that the Freeway Tunnel would in fact adversely impact the capacity of the flood basin, with associated impacts to adjacent areas.

The DEIR/S states that the dual-bore Freeway Tunnel would increase water surface elevation by two feet, with the maximum increase occurring about 235 feet upstream of the Hellman Avenue crossing. *Id*. However, the DEIR/S never explains the implications associated with this increase in the Basin's water surface elevation; it merely states that there would be no increased flood risk because water would still be contained within the concrete box. Unfortunately, the DEIR/S omits the following critical information: the capacity of the existing concrete box and the design engineering and capacity of the new box. Furthermore, it provides no analysis of how hydrological flows would change as a result of the Project, or the effect that these changes would have on adjacent and downstream areas.

Notwithstanding the DEIR/S's lack of analysis, the document concludes that the Project – specifically, the dual-bore Freeway Tunnel variation – would minimize the longitudinal encroachment within this floodplain. *Id*. at 3.8-8. The DEIR/S further asserts that other design variations considered for this Alternative were rejected because they would have required geometric modifications to the horizontal or vertical alignment, or realignment of the freeway mainline. *Id*. Yet, the DEIR/S includes none of this information, even in summary form. The document never even bothers to identify the alternative design variations that the lead agencies purportedly considered.

In conclusion, the DEIR/S's failure to analyze or mitigate the Project's hydrological and groundwater impacts is a clear violation of CEQA and NEPA. Consequently, Metro and Caltrans may not rely on this EIR/S to approve the proposed Project.

G. The DEIR/S Fails to Evaluate the Project's Cumulative Impacts.

Both CEQA and NEPA require an analysis of a project's cumulative impacts. CEQA defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." CEQA Guidelines § 15355(a). "[I]ndividual effects may be changes resulting from a single project or a number of separate projects." *Id*. "Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." CEQA Guidelines § 15355(b). The cumulative impacts concept recognizes that "[t]he full environmental impact of a proposed . . . action cannot be gauged in a vacuum." *Whitman v. Bd. of Supervisors* (1979) 88 Cal. App. 3d 397, 408. Likewise, NEPA requires analysis of connected and similar actions that will lead to cumulative impacts. 40 C.F.R. § 1508.25(a), (c); *see also Florida Wildlife Fed'n v. U.S. Army Corps of Eng'rs* (D. Fla. 2005) 401 F.Supp.2d 1298. NEPA regulations define a "cumulative impact" as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions . . . ." 40 C.F.R. § 1508.7.

Here, the DEIR/S's analysis of cumulative impacts fails to comply with CEQA's and NEPA's clear requirements. To begin with, while the DEIR/S's cumulative impact chapter identifies 40 projects (see Table 3.25-1), it essentially disregards the potential for these projects, together with the SR 710 North Project, to result in cumulatively significant environmental impacts. For example, the DEIR/S mentions the Devil's Gate Reservoir Project but fails to analyze the effects of this project together with the SR 710 North Project.

The Devils Gate project, located in the City of Pasadena (very near the northern terminus of the Tunnel Alternatives), involves a comprehensive sediment removal plan that will restore and maintain flood control capacity at the Devil's Gate reservoir. *See* Devil's Gate Reservoir Sediment Removal and Management Project, Final EIR at ES-1, attached as Exhibit 33. This project will include removal of approximately 2.9 million cubic yards of existing excess sediment from the reservoir as well as additional sediment that accumulates during construction. DEIR/S at 3.25-10. According to the DEIR/S, sediment removal activities at Devil's Gate are expected to occur over approximately 5 years, beginning in summer 2015. *Id*. This effort will require an average of 50 truck trips per hour, with an estimated maximum of 425 truck round-trips per day during excavation. Devils Gate FEIR at 85. Trucks depositing sediment from Devil's Gate will travel along many of the freeways that will be impacted by construction and operation of the SR 710 North Project, including the I-210, I-5, SR 134 and SR 2. *Id*. at 238, 240.

Even though construction of the two projects appears to be concurrent and will impact many if not all of the same freeways, the DEIR/S concludes that the SR 710 North Project, together with Devil's Gate, would not contribute to cumulative transportation impacts.[36] DEIR/S 3.25-28. Tellingly, the DEIR/S includes no evidence to support this remarkable assertion. Moreover, the two projects would also result in other cumulatively significant impacts, including air quality, climate change and noise impacts. The DEIR/S should have provided a thorough analysis of these impacts.

The DEIR/S also fails to examine the cumulative impacts of the SR 710 North Project together with I-710 expansion project in Los Angeles County between Ocean Boulevard and SR 60 ("I-710 South Project"). This omission is surprising inasmuch as the DEIR/S admits that the SR 710 North Project will have potential cumulative impacts on traffic/transportation, hydrology/floodplain and air quality. DEIR/S at 3.25-3. The I-710 South Project includes widening I-710 up to 10 general-purpose lanes (five lanes in each direction); modernizing and reconfiguring the I-405, the SR 91, and a portion of the I-5 interchanges with the I-710; modernizing and reconfiguring most local arterial interchanges along the I-710; and providing a separated four-lane freight corridor to be used by conventional or zero-emission trucks. *Id*. A

[36] The DEIR/S admits that the SR 710 North Project may be constructed concurrently with the Devils Gate Project. DEIR/S at 3.25-28.

RDEIR/SDEIS is being prepared to analyze a revised set of build alternatives for the I-710 South Project and will be released for public review and comment in 2015. The anticipated start of construction is 2020. *Id.*

As the letter submitted by Rossman & Moore on behalf of the City of South Pasadena explains, there is an intimate connection between the I-710 South Project and the proposed Project. Indeed, the projects occur along segments of the same freeway, likely require design coordination, and will apparently be constructed concurrently. Agencies may not improperly "segment" projects in order to avoid preparing an EIS or EIR; instead, they must consider related actions in a single document. *Thomas v. Peterson*, 753 F.2d 754, 758 (9th Cir. 1985); *Laurel Heights*, 47 Cal.3d. at 376-395 (1988). "Not to require this would permit dividing a project into multiple 'actions,' each of which individually has an insignificant environmental impact, but which collectively have a substantial impact." *Thomas*, 753 F.2d at 758. The Council on Environmental Quality's NEPA regulations thus require agencies to consider "connected," "cumulative," and "similar" actions within a single EA or EIS. 40 C.F.R. § 1508.25; *Thomas*, 753 F.2d at 758-59. Similarly, CEQA regulations require that an EIR describe the entirety of a project, including reasonably foreseeable future actions that are part of a project, and must analyze those reasonably foreseeable actions. 14 Cal. Code Regs § 15378(a). The SR 710 North DEIR/S must analyze the impacts from these two projects together "when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement." 40 C.F.R. § 1508.25(a)(3).

The DEIR/S's cumulative impacts chapter is further flawed in that it does not mention whole categories of potential cumulative impacts. For example, the DEIR/S never studies the potential for the Project, together with other projects listed in Table 3.25-1, to substantially deplete water supplies. In fact, the cumulative impact analysis never mentions the term "groundwater supplies" at all. It also completely ignores health risk impacts that would result from the release of mobile and other sources of toxic air contaminants.

In other instances, the DEIR/S provides cumulative impacts analyses that are simply nonsensical; as a result, its conclusions that these impacts are less than significant lack any evidentiary basis. For example, regarding impacts to hydrology and floodplains, the DEIR/S explains that the Freeway Tunnel alternative would encroach into the Laguna Regulating and Dorchester flood basins. DEIR/S at 3.25-34. It further acknowledges that other cumulative projects such as the I-710 South Project and the

Olive Pit Mining and Reclamation Project have the potential to result in "*substantial effects* relating to hydrology and floodplains." *Id*. (emphasis added). The DEIR/S then concludes, illogically, that because there are no feasible design variations for *the Project*, the proposed Project would not have a cumulative impact on hydrology and floodplains. It makes no attempt to actually analyze the effect of the other projects together with the Project, as CEQA and NEPA require.

In regards to water quality and storm water impacts, the DEIR/S states, "Of the 39 projects listed in Table 3.25-1, *none* have the potential to contribute to an impact on water quality because they all implement BMPs [best management practices] and other avoidance, minimization, and/or mitigation measures." *Id*. at 3.25-36. This statement defies common sense and is incorrect. If every project that were ever developed fully mitigated water quality impacts with BMPs, the quality of water in Los Angeles County would be pristine. Yet, as the DEIR/S explains, groundwater in the area is impaired with, among other things, VOCs, nitrates, ammonia, copper, lead oil, trash, coliform bacteria and cyanide and that this pollution is from sources such as residential and industrial development. Clearly BMPs and other mitigation measures may incrementally reduce some groundwater pollution, but they are not sufficient to avoid groundwater contamination altogether as the DEIR/S asserts.

As regards energy consumption, the DEIR/S explains that California is the most populous state in the United States, and its total energy demand is second only to Texas. DEIR/S at 3.25-46. It goes on to state:

> Much of the energy consumed in the SCAG region is for residential, commercial, and transportation purposes. Driven by high demand from California's many motorists, major airports, and military bases, the transportation sector is the State's largest energy consumer. More motor vehicles are registered in California than in any other state, and worker commute times are among the longest in the country. Transportation-related activities account for approximately half of all the petroleum products consumed in California. *Id*.

Despite the fact that energy consumption is a major problem in California, the DEIR/S illogically states that "the 39 reasonably foreseeable actions have no or limited potential to result in effects related to energy and, therefore, limited potential to contribute to cumulative effects related to energy with particular relevance to energy." *Id*. at 3.25-47.

The DEIR/S then finally admits that only one project – the El Monte Walmart – might have limited potential to result in energy-related effects, but then implies, absent any evidence, that it would be designed to reduce energy consumption. *Id*.

The DEIR/S's approach to cumulative transportation impacts is particularly uninformative. First, the DEIR/S explains that for the purpose of this cumulative impacts analysis, the Project study area includes a total of 156 intersections. DEIR/S at 3.25-26. Yet, this is the precise study area used to examine *Project-specific* impacts. *Id*. at 3.5-5. Using the same study area for purposes of Project-specific and cumulative impacts might be sufficient if the cumulative projects – and their respective transportation impacts – did not extend outside the study area boundary. But, as discussed above, the study area here is not even large enough to capture all of the Project-specific transportation impacts. It is clearly too small to capture the Project's cumulative transportation impacts.

Perplexingly, many of the transportation projects identified on the DEIR's cumulative project list (Table 3.25-1) are actually located *outside* of this study area.[37] These projects include the following:

- Project #1: SR 710 south project (partially located outside the study area)
- Project #2: The I-5 Corridor Project (Project #2) (entirely outside the study area)
- Project #3: I-5 Improvement Project between SR-118 & SR-170 (entirely outside the study area)
- Project #4: I-5 North Improvement Projects between SR-134 & SR-170 (entirely outside the study area)
- Project# 5: I-5/Western Interchange Improvements (entirely outside the study area)
- Project # 7: San Bernardino Freeway (I-10) add one HOV lane from I-605 to SR-57/71 &I-210 (entirely outside the study area)

[37] Compare Figure ES-1 (SR 710 North Study Area) and Figure 3.25-1 (SR 710 North Study Cumulative Project).

- Project # 9: the I-110 (Harbor Freeway)/Transitway HOT Lanes Project (entirely outside the study area)
- Project # 20: Wilshire Boulevard Bus Rapid Transit – Phases I & II (entirely outside the study area)
- Project # 30: Olive Pit Mining and Reclamation Operations and Long Term Reuse Project (entirely outside the study area).

Certain of these projects are massive; there can be no doubt that their transportation impacts, together with the Project's, would be cumulatively considerable. The DEIR/S's failure to evaluate the cumulative effect that these projects, taken together, would have on the region's transportation network is a fatal flaw.

In fact, the DEIR/S fails to analyze the transportation impacts of *any* of the cumulative projects. The DEIR/S identifies 19 projects it purports to include in the cumulative transportation analysis because "they have the potential to contribute to substantial changes in traffic conditions."[38] DEIR/S at 3.5-27. Despite having identified these 19 projects, the DEIR/S never conducts the required impact analysis. While it asserts that the effects of these 19 projects were already analyzed in Project-specific analysis (*Id*. at 3.25-28), the DEIR/S lacks any evidentiary support for this assertion. We searched both the Transportation Technical Report and the Transportation Technical Report Appendix for these projects (Devil's Gate Reservoir Sediment Removal and Management Project and the Olive Pit Mining and Reclamation Operations and Long Term Reuse Project) and neither document even mentions them. Thus, there is simply no evidence to support the DEIR/S's claim that the agencies ever conducted any analysis of the Project's cumulative transportation impacts.

The DEIR/S also fails to analyze the Project's cumulative air quality impacts. Here, the DEIR/S states that most of the 39 projects listed in Table 3.25-1 have

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[38] The DEIR/S fails to study the effects of the other 21 projects. This is a serious omission since the DEIR/S clearly acknowledges that all of the projects identified in Table 3.25-3 have "some potential to result in traffic impact and potential to contribute to cumulative traffic impacts." *Id*. at 3.25-27. The failure to analyze these impacts is a fatal flaw, warranting recirculation.

the potential to result in air quality impacts and that 11 of these have the potential to result in *substantial* air quality impacts. *Id*. at 3.25-43. Of these 11, the DEIR/S states that 7 projects would contribute to a *permanent* air quality impacts in the study area. *Id*. at 3.25-44 (emphasis added). Yet, the document does not proceed to the next required step in the cumulative impacts analysis: (1) to quantify the increases in emissions from these nearby projects, and (2) to analyze how the increases from these projects would affect air quality *together with* the Project. The DEIR/S's failure to provide any analysis for the 7 projects that the DEIR/S concedes would contribute to a permanent air quality impact, is particularly glaring.

Rather than provide the required analysis, the DEIR/S offers various illogical arguments and conclusory statements that the Project will not contribute to any cumulative air quality impact. For example, while the DEIR/S acknowledges that some of the other projects could be constructed concurrently with the proposed Project, it asserts that the *Project's* construction-related air quality impacts will be reduced because it must comply with the SCAQMD Rule 403 and Caltrans Specifications. *Id*. at 3.25-44. The DEIR/S misses the point. Even if the Project's individual impact were small, the agency is required to analyze that impact together with air quality impacts of other projects, to determine the extent of the *cumulative* impact. *Kings County Farm Bureau,* 221 Cal.App.3d at 720-21. CEQA Guidelines § 15355(b) ("Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.") [39]

Finally, as noted above, the DEIR/S fails to provide an adequate analysis of the Project's cumulative impacts on climate change. Climate change, of course, is the classic example of a cumulative effects problem: emissions from numerous sources combine to create the most pressing environmental and societal problem of our time. *Kings County Farm Bureau,* 221 Cal.App.3d at 720 ("Perhaps the best example [of a cumulative impact] is air pollution, where thousands of relatively small sources of pollution cause serious a serious environmental health problem."). As one appellate court held, "the greater the existing environmental problems are, the lower the threshold for treating a project's contribution to cumulative impacts as significant." *Communities for*

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[39] In any event, as the Landrum & Brown Air Quality Report explains, the DEIR/S does not provide the necessary assurance that the Project's air quality impacts would be reduced to less-than-significant levels.

Better Env't v. Cal. Res. Agency (2002) 103 Cal.App.4th 98, 120. Here, despite overwhelming evidence of this environmental threat, the DEIR/S neglects even to measure the significance of the cumulative climate impact.

III. The DEIR/S's Analysis of Alternatives Is Inadequate.

The DEIR/S's analysis of alternatives falls short. Properly developing, evaluating, and comparing project alternatives is key to the environmental review process. Under CEQA, the alternatives analysis "must contain sufficient detail to help ensure the integrity of the process of decision-making by precluding stubborn problems or serious criticism from being swept under the rug." *Kings County Farm Bureau,* 221 Cal.App.3d at 733 (citing cases). An EIR that does not produce adequate information regarding alternatives cannot achieve the EIR's dual purposes of enabling the reviewing agency to make an informed decision and making the decision-maker's reasoning accessible to the public. *Id.* Similarly, the CEQ regulations describe the alternatives analysis as "the heart of the environmental impact statement." 40 C.F.R. § 1502.14. The DEIR/S suffers from an inadequate analysis of the Project alternatives as discussed below.

A. The DEIR/S Does Not Provide an Adequate Comparative Analysis of the Impacts of Each Alternative.

The DEIR/S does not contain adequate analysis comparing the alternatives' respective environmental impacts. Under CEQA, readers must be able to "evaluate [alternatives'] comparative merits." *Kings County Farm Bureau,* 221 Cal.App.3d at 733 (absence of comparative data in EIR precluded meaningful consideration of alternatives). Likewise, the CEQ's regulations provide that an EIS "should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision-maker and the public." 14 C.F.R. § 1502.14. A thorough comparison of the Project alternatives' impacts is therefore crucial to a successful environmental document. Unfortunately, the DEIR/S fails to provide this information. Instead of supplying an actual qualitative or quantitative comparison of the impacts of each alternative, the document merely summarizes, in abbreviated, tabular form, the information provided elsewhere in the various DEIR/S chapters. *See* DEIR/S at 2-87, Table 2.15.

The DEIR/S's truncated approach is no substitute for the in-depth discussion comparing each alternative's impacts that the law and common sense require.

The matrix should provide more detailed descriptions of the alternatives' impacts, and a means for readers to quickly and easily weigh them. (For example, in the matrix, each cell in a row could contain a numeric ranking on a scale of 1 to 5 of the extent of that impact.) Moreover, the document's current approach prevents the public from understanding the effect on the environment of each alternative *as a whole* in comparison to each other alternative. The DEIR/S should provide detailed narrative analysis and a comprehensive discussion comparing the alternatives' impacts in addition to the existing matrix. Organizing this discussion by impact category would be the preferred approach.

An actual comparative analysis of alternatives takes on special significance here, where the agencies claim they have not identified a preferred alternative. Since at this stage of the environmental review process any one of the document's alternatives may be selected, the comparative analysis of the alternatives' impacts should be particularly thorough.

This deficiency is compounded by the fact that the Freeway Tunnel alternative itself contains distinct variants, including single- and dual-bore tunnel designs. The DEIR/S must describe the comparative impacts of each of these variants in greater detail throughout the document. For example, for noise and vibration impacts and impacts to geology and soils, Table 2.15 does not distinguish between the Freeway Tunnel alternative variants. DEIR/S at 2-96 to -97, 2-100 to -101. It simply lumps the impacts from these design options together, without distinguishing which impacts derive from the single- or dual-bore variations. This shortcoming must be corrected throughout the document. At the very least, where impacts will be identical for each of these variants, the DEIR/S should state as much.

B. The DEIR/S Fails to Identify an Environmentally Superior Alternative.

The DEIR/S does not specify an environmentally superior alternative, as required by CEQA. CEQA Guidelines section 15126.6(e)(2) provides that a lead agency must identify an environmentally superior alternative among the alternatives considered. *See also Kings County Farm Bureau,* 221 Cal.App.3d at 737; *Watsonville Pilots Ass'n v. City of Watsonville* (2010) 183 Cal.App.4th 1059, 1089 (". . .the purpose of an alternatives analysis is to allow the decision-maker to determine whether there is an environmentally superior alternative that will meet most of the project's objectives."). The DEIR/S simply ignores this crucial requirement without explanation or justification. The DEIR/S's failure to meet this requirement renders the document legally defective.

This shortcoming is highly problematic. Identifying an environmentally superior alternative is a necessary prerequisite for the lead agency to make the findings required by CEQA. In order to approve a project that would have a significant environmental impact, an agency must make findings identifying: (1) the "[s]pecific ... considerations" that "make infeasible" the environmentally superior alternatives, and (2) the "specific . . . benefits of the project [which] outweigh" the environmental harm. Pub. Res. Code, §§ 21002.1(b), 21081; Guidelines § 15092(b). This requirement is rendered inoperable if a lead agency is permitted to consider alternatives without identifying which of them is environmentally superior.

The DEIR/S's failure to identify an environmentally superior alternative is therefore contrary to the very purpose of the EIR process. The omission undermines the public's ability to determine which alternative is environmentally superior—and therefore preferable—thus thwarting its capacity to comment on the Project and its environmental review in a meaningful way. This task is made especially difficult by the DEIR/S's failure to provide clear standards by which Caltrans and Metro will choose between project alternatives, an infirmity described in detail in section I.A. of this letter.

C. The DEIR/S Failed to Consider a Reasonable Range of Alternatives.

The DEIR/S is defective because it fails to consider a reasonable range of alternatives, including a community-based multi-modal alternative. CEQA requires that every EIR analyze a reasonable range of potentially feasible alternatives to a proposed project. *See* Pub. Res. Code § 21100(b)(4); CEQA Guidelines § 15126.6(a); *Center for Biological Diversity v. County of San Bernardino* (2010) 185 Cal.App.4th 866 (EIR for outdoor composting facility legally deficient for failure to consider alternative that would significantly reduce air quality impacts). NEPA requires EISs to do the same. *See* 40 C.F.R. § 1502.14; *National Parks & Conservation Ass'n v. Bureau of Land Management* (9th Cir. 2010) 606 F.3d 1058, 1072 (BLM's EIS for land swap overturned for failure to analyze a "reasonable range of alternatives."). To be reasonable, the range of alternatives analyzed in an EIR must provide enough variation from the proposed project "to allow informed decisionmaking" regarding options that would reduce environmental impacts. *Laurel Heights,* 47 Cal.3d at 404-05.

The DEIR/S fails to meet CEQA and NEPA's requirements for a reasonable range of alternatives. Members of the 5-Cities Alliance have long encouraged the lead agencies to consider alternatives that could achieve Project objectives without the negative environmental impacts described above. Although the agencies hosted over

90 community meetings and 200 stakeholder "briefings," DEIR/S at ES-26, they have ignored input from the 5-Cities Alliance member cities. For example, none of the alternatives examined in the DEIR/S includes eliminating either the north or south freeway stubs, despite wide public support for this approach. Community meetings are meaningless if, as here, agencies do not act on public input to shape project objectives and alternatives.

Given the public support for this option, the lead agencies for the Project should have considered a more innovative, multimodal alternative that combines mass transit, bikeways, and new parks. As noted previously, the 5-Cities Alliance, in conjunction with other organizations, has worked to develop a "Beyond the 710" alternative that presents 21st-century options for connecting people to their destinations. Exhibit 34 (Media Release for "Beyond the 710"), Exhibit 5 (Nelson Nygaard, "New Initiative for Mobility and Community"). This alternative uses transit and "great streets" to sustainably grow communities and improve quality of life in the project area. *Id.* The lead agencies must consider this, or a similar multi-modal alternative, to comply with CEQA and NEPA.

CONCLUSION

The 5-Cities Alliance respectfully requests that Metro and Caltrans deny the SR 710 North Project for the following reasons. First, the Project itself is flawed and unnecessary, failing to provide a real solution to the region's needs. Second, the SR 710 North DEIR/S is inadequate under CEQA and NEPA, as the document fails to provide an accurate, comprehensive analysis of Project impacts, mitigation and alternatives. Third, as the DEIR/S makes clear, the Project, particularly the Freeway Tunnel alternative, would result in numerous significant and unmitigated environmental impacts. The lead agencies should go back to the drawing board and prepare a different alternative, such as "Beyond the 710," that is both environmentally responsible and sensitive to community needs. In the event that the agencies continue to pursue the present Project, they will need to prepare and recirculate a revised DEIR/S correcting the problems identified in this letter.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

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ccs: La Cañada Flintridge City Council
Glendale City Council
Pasadena City Council
Sierra Madre City Council
South Pasadena City Council

List of Exhibits:	
Exhibit 1	Nelson Nygaard Report (Transportation)
Exhibit 2	Landrum & Brown Report (Air Quality and Greenhouse Gas)
Exhibit 3	Landrum & Brown Report (Noise)
Exhibit 4	Wilson Geosciences Inc Report

Exhibit 5	Nelson Nygaard, "New Initiative for Mobility and Community"
Exhibit 6	California Department of Transportation, *California's 2040 Transportation Plan*, March 2015
Exhibit 7	S. Handy and M. Boarnet, California Air Resources Board (CARB), *Policy Brief in the Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions*, September, 30, 2014
Exhibit 8	California Department of Transportation, *Smart Mobility Report*, 2010
Exhibit 9	Los Angeles County Metropolitan Transportation Authority's Respondent's Brief, *City of South Pasadena v. Los Angeles County Metropolitan Transp. Authority*, Court of Appeal, Second Appellate District Case No. B221118
Exhibit 10	G. Hamby Letter to J. Morales, December 17, 2003
Exhibit 11	Galloway, P., *et al.*, *Alaskan Way Viaduct Replacement Program Expert Review Panel Updated Report*, April 3, 2015
Exhibit 12	B. Flyvbjerg, *et al.*, *What Causes Cost Overrun in Transport Infrastructure Projects?*, Transport Reviews, 2004
Exhibit 13	B. Flyvbjerg, *What You Should Know About Megaprojects and Why: An Overview*, Project Management Journal, 2014
Exhibit 14	J. Blumenfeld Letter to M. Miles, September 28, 2012
Exhibit 15	South Coast Air Quality Management District (SCAQMD), *Air Quality Significance Thresholds* (March 2015)

Exhibit 16	T. Chico and J Koizumi, South Coast Air Quality Management District (SCAQMD), *Final Localized Significance Threshold Methology*, July 2008
Exhibit 17	R. Bhatia and T. Rivard, *Assessment and Mitigation of Air Pollutant Health Effects from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review*, May 6, 2008
Exhibit 18	Office of Environmental Health Hazard Assessment (OEHHA), *Air Toxics Hot Spots Program, Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments* (February 2015)
Exhibit 19	U.S President's Council on Environmental Quality, *Revised Draft Guidance on the Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews*, December 18 2014
Exhibit 20	G. Tholen, *et al.*, California Air Pollution Control Officers Association (CAPCOA), *CEQA & Climate Change*, January 2008
Exhibit 21	Bay Area Air Quality Management District (BAAQMD), *Air Quality Guidelines* excerpts, May 2010
Exhibit 22	R. Ewing, et al., Urban Land Institute, *Growing Cooler: Evidence on Urban Development and Climate Change*, excerpts
Exhibit 23	Sightline Institute, *Increases in Greenhouse-gas Emissions From Highway-widening Projects*, October 2007
Exhibit 24	Surface Transportation Policy Project, *Build It and They'll Come*
Exhibit 25	California Department of Transportation, *State Smart Transportation Initiative Assessment and Recommendations*, January 2014

Exhibit 26	California Air Resources Board (CARB), *Climate Change Scoping Plan: A Framework for Change*, December 2008
Exhibit 27	California Air Resources Board (CARB), *First Update to the Climate Change Scoping Plan: Building on the Framework*, May 2014
Exhibit 28	D. Weikel, Los Angeles Times, *California Commute: 4 stretches of freeways tally most big rig crashes per mile annually* , June 2, 2015
Exhibit 29	A. Gropman, *$1.1 Billion and Five Years Later, the 405 Congestion Relief Project Is a Fail*, L.A. Weekly, March 4, 2015
Exhibit 30	CE Delft, *Traffic Noise Reduction in Europe: Health effects, social costs and technical and policy options to reduce road and rail traffic noise*, excerpts, August 2007
Exhibit 31	N. Ovenden, et al., *How the weather affects the scale of urban noise pollution,* 2011
Exhibit 32	89.3 KPCC, *Magnitude – 6.7 quake certain to hit California within 30 years, USGS says*, March 10, 2015
Exhibit 33	Los Angeles County Flood Control District, *Devil's Gate Reservoir Sediment Removal and Management Project Final Environmental Impact Report*, October 2014
Exhibit 34	C. King, *Beyond the 710: Moving Forward*, Media Release, May 28, 2015

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ISSUES

traffic congestion
public transit
pedestrian safety
streets & highways
funding
smart growth
social equity
public health
bicycling
legislation
tourism
the environment

TRAFFIC CONGESTION

Build It And They'll Come

A growing body of research has shown that widening highways is only a temporary solution at best to the complex problem of traffic congestion. Indeed, research has pointed to a phenomenon known as "induced traffic" that suggests new and wider highways actually create additional traffic, above and beyond what can be attributed to rapid population increases and economic growth. In larger metropolitan areas, drivers will often abandon carpools and public transit when additional roadway space is made available through highway widenings or new road construction, thus creating additional trips and more traffic. In the longer term, the promise of more convenient transportation access allows commuters to live further from work, increasing development pressures and thus fueling even more traffic demand. (It should be noted that any form of transportation can produce this effect; whether it was "streetcar suburbs" at the turn of the 20th century or new commuter trains attracting Silicon Valley workers to live in the Central Valley with the promise of a more convenient commute.)

REGIONAL IMPACTS FROM "INDUCED TRAFFIC"

Metropolitan area (UZA)	Forecast annual growth rate in VMT (on freeways & arterials), assuming current growth trends	Forecast annual growth rate in VMT (on freeways & arterials), with no growth in roadway capacity	Percent of total VMT growth attributable to "induced traffic"

Bakersfield	9.0%	6.8%	24.6%
Fresno	5.8%	5.1%	12.4%
Los Angeles	-0.01%	-0.8%	100.0%
Sacramento	3.3%	1.5%	54.6%
San Diego	1.3%	0.4%	72.6%
San Francisco-Oakland	0.6%	-0.4%	100.0%
San Jose	1.3%	0.3%	73.6%
AVERAGE	3.0%	1.6%	45.2%
Note: VMT = vehicle miles traveled or overall mileage driven; Los Angeles and San Francisco have negative growth in VMT when no lane miles are constructed, thus 100% of growth is attributed to the induced travel effect. **Source**: Robert Noland, 2000.			

The Federal Highway Administration has recently concluded that this phenomenon of "induced traffic" does in fact occur quite frequently in metropolitan areas throughout the United States. Another detailed study has also concluded that traffic in the Bay Area and Los Angeles would actually decrease if no new highway expansion took place. It also determined that two-thirds of the growth in traffic in San Jose and San Diego in the coming decades will be attributable to induced demand.

A recent study conducted by the U.C. Berkeley Institute for Transportation Studies concluded that 90 percent of all new highway capacity added to California's metropolitan areas is filled within four years, and 60 percent-70 percent of all new county-level highway capacity is filled within two years. This, authors Mark Hansen and Yuanlin Huang explain, means an additional highway lane-mile constructed in the San Francisco Bay Area, Los Angeles or San Diego regions would increase traffic by 10,000-12,000 vehicle-miles traveled per day; in Sacramento and Stockton would equate to 7,000-8,000 additional VMT; and in smaller but nonetheless rapidly growing areas like Modesto, Merced, Monterey and Bakersfield would translate into an additional 3,000-6,000 VMT per day. The authors conclude:

"Our results suggest that the urban state highway lane miles added since 1970 have, on the whole, yielded little in the way of level of service improvements. Consistent with previous work, we find that increasing highway supply results in higher vehicle miles traveled (VMT). An induced traffic impact of such magnitude must be considered when assessing road capacity enhancements, whether in a broad policy context or on a project specific basis."

Several other reports in recent years have pointed to similar conclusions. In 1998, the Legislative Analyst's Office revealed the results of its own research on the issue and cautioned policymakers about the promise of relying solely on new highway construction in order to reduce traffic congestion throughout California:

"New road capacity will typically lead to new traffic, especially in urban areas, because people and businesses benefit from the mobility that the transportation system provides and seek to use it to their benefit. Ultimately, road use will increase, leading to congestion of new road capacity. For this reason, expansion of the existing transportation will rarely alleviate congestion permanently; however, by restraining demand this tendency can be offset and existing congested roads, as well as new roads, can be made to operate efficiently."

The growing belief that induced traffic largely offsets any short-term congestion relief gains also led authorities in the United Kingdom to cancel more than 70 planned highway construction and road expansion projects in the 1990s alone. Similar experiences have been reported by transportation officials in Germany, Holland and Japan. Many of these countries have retooled their transportation programs to incorporate a more balanced approach to managing traffic congestion as well as a new emphasis on growth management techniques, more compact development patterns, and other land use strategies as a way of beginning to combat what officials and experts see as the underlying cause of increasing traffic volumes.

California Transportation Plan 2040

Integrating California's Transportation Future

DRAFT-March 2015

Caltrans

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WELCOME FROM DIRECTOR

Note: The letter from the Director and an Executive Summary will be included in the final version of this document.

CALTRANS MISSION

Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

CALTRANS VISION

A performance-driven, transparent, and accountable organization that values its people, resources and partners, and meets new challenges through leadership, innovation, and teamwork.

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INTRODUCTION

The California Transportation Plan 2040 (CTP 2040) is a statewide, long-range transportation plan developed to meet the State's future travel needs while reducing greenhouse gas (GHG) emissions. The CTP 2040 calls for a sustainable transportation system that improves mobility for all, strengthens our communities, and enhances our quality of life. To accomplish this, the CTP 2040 presents a set of goals, policies, strategies and performance measures. The goals are:

- Improve Multimodal Mobility and Accessibility for All People;
- Preserve the Multimodal Transportation System;
- Support a Vibrant Economy;
- Improve Public Safety and Security;
- Foster Livable and Healthy Communities and Promote Social Equity; and
- Practice Environmental Stewardship.

The goals were developed in conjunction with a policy advisory committee. The CTP 2040 was formulated through an extensive public involvement process, government to government engagement with tribal communities, and close work with local, regional, state, and federal partners. This consisted of a series of seven public workshops, seven focus groups, multiple advisory committees, as well as direct tribal interaction, listening sessions, and consultation as requested. The result is a transportation policy framework designed to serve all of California's diverse populations and economic interests.

The CTP 2040 is organized into eight chapters, summarized as follows:

Chapter 1: Purpose and Context
Purpose of the CTP 2040, and the planning framework in which the CTP 2040 was created.

Chapter 2: The Transportation System
A detailed description of the current transportation system.

Chapter 3: Trends and Challenges
A review of the major factors influencing today's statewide transportation system.

Chapter 4: Native American Transportation
Transportation issues and rights of the State's Native American population.

Chapter 5: Revenues and Expenditures
Funding challenges and the potential strategies to support California's transportation system through 2040.

Chapter 6: The Plan
Six core goals of the CTP 2040, and the policies, strategies, and performance measures that support them.

Chapter 7: Analysis and Outcomes
Three statewide GHG emission reduction alternatives to meet our legislative requirements.

Chapter 8: Recommendations
The recommendations and next steps to implement the CTP 2040.

CHAPTER 1
PURPOSE AND CONTEXT

CTP 2040 Vision:
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 emission reduction goals and preserving the unique character of California's communities.

California's transportation system is multimodal, and includes many different interconnected modes such as freight, aviation, and rail. This integrated, interconnected, and resilient multimodal system supports a thriving economy, human and environmental health, and social equity.

CTP 2040 Goals:

Achieving this vision relies on attaining the six goals of the CTP 2040, which are discussed fully in Chapter 6:

1. Improve Multimodal Mobility and Accessibility for All People;
2. Preserve the Multimodal Transportation System;
3. Support a Vibrant Economy;
4. Improve Public Safety and Security;
5. Foster Livable and Healthy Communities and Promote Social Equity; and
6. Practice Environmental Stewardship.

In the context of the CTP 2040 vision and goals, this chapter describes the basis for why and how the Plan was prepared, as well as California's multimodal transportation system.

This chapter includes the following sections:

- Purpose of the Plan;
- Planning Framework;
- Measuring Transportation Performance; and
- Public and Partner Engagement.

PURPOSE OF THE PLAN

In the context of the CTP 2040 vision, this document describes California's transportation system and explores major trends that will likely influence travel behavior and transportation decisions over the next 25 years. It outlines goals, policies, strategies, performance measures, and recommendations to achieve that vision. The CTP 2040 is a policy framework designed to guide transportation-related decisions for the betterment of all who live, work, and conduct business in California. Its aim is to help ensure that policy decisions and investments made at all levels of government and within the private sector will work congruently to enhance the State's economy, improve social equity, support local communities, and protect the environment. In developing the CTP 2040, State transportation planners and other stakeholders considered factors such as defining legislation, the latest in applied technology, performance measures, and requirements needed to meet Californian's mobility. Further, the CTP 2040 is based on the needs expressed by the full breadth of California's diverse demographic – from rural geographical areas to the State's most populous urban centers.

The CTP 2040 is the latest iteration of a statewide transportation plan that began in April 2006 with the release of the CTP 2025. It reflects the evolution of stakeholder expectations to move California's transportation system from a focus on infrastructure, capital improvements, and delivery, to a more sustainable focus that supports equitable economic prosperity in concert with GHG emission reductions. The CTP 2025 was approved in 2006 and updated in 2007 as the CTP 2030, to comply with federal planning requirements that govern the development of statewide transportation plans. These planning requirements are titled SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users).

While this document retains relevant strategies from the previous CTP 2025 and CTP 2030 update, it also reflects the changing transportation environment. Seminal climate change legislation enacted at the State level over the last decade requires establishment of new priorities affecting all aspects of transportation in California. The key legislation is summarized below:

- **Assembly Bill (AB) 857 (Wiggins, 2002)** Established three planning priorities: promote equitable infill development within existing communities, protect the State's most valuable environmental and agricultural resources, and encourage efficient development patterns. Requires the State to adopt consistent planning and capital spending priorities.
- **Executive Order (EO) S-3-05 (2005)** Requires continued reduction of transportation-related GHG emissions to a new, more stringent standard of 80 percent below 1990 levels by 2050.
- **AB 32 (Nunez, 2006)** California's landmark *Global Warming Solution Act of 2006*. Requires reducing the State's GHG emissions to 1990 levels by 2020.
- **Senate Bill (SB) 375 (Steinberg, 2008)** Requires Metropolitan Planning Organizations (MPOs) to include sustainable communities strategies (SCS) in their regional transportation plans (RTPs) for the purposes of reducing greenhouse gas (GHG) emissions, aligning planning for transportation and housing, and creating incentives for the implementation of strategies. Each SCS must strive to meet a 2020 and 2035 GHG emissions reduction target provided by the California Air Resources Board (ARB). If the combined measures in an SCS do not meet regional targets, an MPO must prepare an alternative planning strategy (APS), which is not part of the RTP.
- **SB 391 (Liu, 2009)** Requires Caltrans to update the CTP every five years. Requires the CTP to show how the State will achieve statewide GHG emissions reduction to meet the goals of AB 32 and EO S-3-05. Directs Caltrans to consider

"the use of fuels; new vehicle technology; tailpipe emissions reductions; and expansion of public transit, commuter rail, intercity rail, bicycling and walking." Requires the CTP to identify the statewide integrated multimodal transportation system needed to achieve these results. In response, Caltrans developed the California Interregional Blueprint (CIB), which laid the foundation for the CTP 2040.

- **EO B-16-2012** Reaffirms EO S-3-05, calling for continued reduction of transportation-related GHG emissions to 80 percent below 1990 levels by 2050.

- **SB 743 (Steinberg, 2013)** Requires the Office of Planning & Research (OPR) to revise California Environmental Quality Act (CEQA) guidelines and establishes criteria for determining transportation impacts of projects within transit priority areas. The criteria emphasize reduction of GHG emissions, development of multimodal transportation networks, and diversity of land uses. Upon certification of the guidelines, the delay of automobile traffic (as described by level of service [LOS] or similar measures of traffic congestion) may not be considered a significant impact except in locations identified in the guidelines.

At its core, the CTP 2040 exemplifies the federal planning process (cooperative, continuing, and comprehensive)[1] and the State planning priorities established by AB 857 (economy, equity, and environment) as it strives to move California toward a more sustainable transportation system. Sustainability is described as meeting the needs of the present without compromising the ability of future generations to meet their needs.[1] As it applies to transportation, sustainability means that environmental, social, health, and economic transportation decisions will support the needs of current and future generations. Considering these key elements in concert will result in a sustainable legacy for California's future.

Sustainable practices will help achieve the ambitious 2050 goal for GHG reductions as well as California's air quality goals, but they require a fundamental, holistic transformation of the transportation systems. This calls for significant innovation and adjustments in how we develop and expand communities, how people travel, how freight is moved, and which fuels are used. The CTP 2040 relies on four main strategies to reduce future GHG emissions for the movement of people and freight:

- Reduce vehicle miles traveled and increase a shift to more sustainable transportation modes (mode shift);
- Efficiently manage, operate and maintain the transportation system (including construction practices);
- Eliminate all emissive vehicles from California roads, and replace them with zero- to near-zero-emissions vehicles (road, rail, transit and air) throughout the State; and
- Improve technology for all modes.

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 is to foster State investment in projects that represent both regional and national goals. Performance management helps ensure efficient and effective investment of federal transportation funds by refocusing on national transportation goals, increasing accountability and transparency, and improving project decision making. MAP-21 requires 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 with the Strategic Growth Council and the San Diego Association of Governments, and the Caltrans Smart Mobility Framework. Chapter 6 discusses these measures in detail. Transportation professionals should use these measures to identify high-performance, cost-effective investments aligned with State and federal goals.

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TABLE 1. PERFORMANCE MEASURES THAT SUPPORT THE CTP 2040 GOALS, POLICIES, AND STRATEGIES

California TRANSPORTATION PLAN

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

The Vision Sustainablity	CTP 2040 Goals and Policies
Economy	**G1: Improve Multimodal Mobility and Accessbility 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: Perserve 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 Measurements

		Performance Measurement
1	Congestion Reduction	VMT per capita
2		% of Congested Freeway/ Hwy VMT (PeMS)
3		Mode share Travel to Work
4		Congested Arterial VMT (PeMS)*
5		Bike and walk miles traveled*
6		Non work mode share*
7	Infrastructure	% of distressed lane miles hwy
8		% of distressed lane miles local roads
9		% of hwy bridge lane miles in need of rehab/replacement
10		% of transit assets that have surpassed FTA useful life period
11	Reliability	Frwy/hwy travel time reliability: FHWA buffer index (PeMS)
12		Transit/rail travel time reliability*
13	Safety	Fatalities/serious injuries per capita
14		Fatalities/serious injuries per VMT
15	Economic Vitality	Transit accessibility: housing/jobs within .5 miles of stop
16		Travel time to jobs (mean travel time to work)
17		Residential and employment densities (new growth) by EJ and non EJ areas*
18		Housing/transportation affordability index*
19	Env. Sust.	Acres of ag land changed to urban use
20		CO2 reduction per capita
1	Location Efficiency	Support for sustainable growth
2		Transit mode share (mode share travel to work,non work mode share)
3		Accessibility and connectivity (transit accessibility,travel time to jobs)
4	Reliable Mobility	Multi-modal travel mobility
5		Multi-modal travel reliability
6		Multi-modal service quality
7	Health and Safety	Multi-modal safety (fatalities/injuries per capita/vmt)
8		Design and speed sustainability
9		bike/walk vmt)
10	Env Stew.	Climate and energy conservation (vmt per capita)
11		Emissions reduction (co2 reduction per capita)
12	Social Equity	Equitable distribution of impacts
13		Equitable distribution of access and mobility
14	Robust Economy	Congestion effects on productivity
15		Efficient use of system resources
16		Network performance optimization
17		Return on investment

LEGEND

(shaded)	Possible Policy Performance Measures
blue	Performance Measures in the Smart Mobility Framework
red	Statewide Performance Monitoring Indicators for Transportation Planning (SGC/SANDAG)
grey	SMF PM's not needed, covered by SGC/SANDAG (Data in parenthesis is the SGC/SANDAG PM)
*	Proposed for Future Consideration (SGC/SANDAG)
^	Measures that will be forecasted/modeled

PLANNING FRAMEWORK

Transportation planning in California is a complex endeavor, reflecting the size and diversity of the State and the multimodal nature of our transportation system. Caltrans is one of many agencies responsible for the State's transportation system. Caltrans guides the statewide vision, and serves regional and interregional needs as the owner-operator of the state highway system. The success of the CTP 2040 ultimately depends on a close collaboration between Caltrans and its partners, California's regional transportation organizations and agencies. The balanced approach described in this plan is based on a comprehensive set of planning documents and other information listed below. Following this list is a brief description of each bulleted item:

- Caltrans' planning initiatives;
- California Interregional Blueprint;
- five Caltrans modal plans;
- regional transportation plans and sustainable communities strategies;
- California High-Speed Rail Business Plan;
- tribal transportation and safety plans;
- California Transportation Commission Statewide Transportation Needs Assessment;
- California Transportation Infrastructure Priorities: Vision and Interim Recommendations;
- Climate Change Scoping Plan;
- Sustainable Freight Transport Initiative; and
- California's Climate Future: The Governor's Environmental Goals and Policies Report (draft).

Caltrans Planning Initiatives

In addition to integrating modal plans, the recommendations rely heavily on policy and modeling frameworks of various successful planning initiatives, including:

- California Regional Blueprint Planning Program;
- Smart Mobility Framework;
- Complete Streets Implementation Action Plan 2.0;
- California Essential Habitat Connectivity Study;
- Regional Advance Mitigation Planning and Statewide Advance Mitigation Initiative;
- Caltrans Climate Action Program;
- Strategic Highway Safety Plan; and
- Main Street, California: A Guide for Improving Community and Transportation Vitality.

For more on the Caltrans planning initiatives, please visit: http://www.dot.ca.gov/hq/tpp/californiatransportationplan2040/programs.shtml

California Interregional Blueprint (CIB)

SB 391 requires the CTP to address how the State will achieve maximum feasible reductions of GHG emissions by identifying the statewide transportation system needed to achieve these results. The CIB was the first step toward this goal. The CIB integrates Caltrans' five modal plans and multiple planning initiatives that complement RTPs and future land use. Through the CIB process, Caltrans developed a set of statewide modeling tools that were used in the development of the CTP 2040 to model various strategies that will achieve the maximum GHG reductions mandated in SB 391.

Caltrans' Five Long-Range Modal Plans

The CTP 2040 incorporates the research and findings of Caltrans' five modal plans listed and described the Table 2.

TABLE 2. CURRENT LONG-RANGE TRANSPORTATION PLANS

PLAN	NEXT UPDATE	PLAN FEATURES
HIGHWAY PLAN 2013 Interregional Transportation 2013 Interregional Transportation Strategic Plan	2015	The first complete update to the 1998 Interregional Transportation Strategic Plan (ITSP) will address significant statute and policy issues that have occurred since then. The goals and objectives from the 1998 ITSP will be completely re-assessed, along with the Focus Routes. The ITSP will be consistent with the CTP 2040 and the Mission, Vision, and Goals of the Department. The 2015 ITSP Update will occur simultaneously with the Interregional Transportation Improvement Program update.
FREIGHT PLAN 2014 California Freight Mobility Plan	2014	This plan will update the project list, develop a new vision and goals, and include sections on air cargo, agriculture, and tribal governments.
RAIL PLAN 2013 California State Rail Plan	2017	This plan will comply with state and federal law and provide a long-term plan for freight and passenger rail, including integrated rail network requirements.
AVIATION PLAN 2011 California Aviation System Plan Policy Element	2016	This plan will include updated programs and directives to better support aviation sustainability in California.
TRANSIT PLAN Statewide Transit Strategic Plan	N/A	This plan will help the state and partners gain a better understanding of present and future roles and responsibilities to support public transportation.

For more information on the Caltrans modal plans, please visit:

http://www.dot.ca.gov/hq/tpp/californiatransportationplan2040/modal.shtml

Regional Transportation Plans and Sustainable Communities Strategies

MPOs and Regional Transportation Planning Agencies (RTPAs) are the entities that receive State and/or federal transportation planning funds to accomplish regional transportation planning activities. Both types of agencies perform essentially the same planning functions in their respective jurisdictions. One of these functions is the development of a policy framework that shapes a respective region's long-range planning goals and is generally presented in the format of an RTP. Unlike the CTP which is not project based, these RTPs include a financially constrained project list. RTPAs and MPOs address transportation from a regional perspective, while the CTP addresses the connectivity and/or travel between regions.

Unlike their regional counterparts, MPOs are required to develop SCS as an integral part of their RTPs. The SCS present land use, housing, and transportation strategies that are expected to support the region in meeting its GHG emission reduction targets as established by the California Air Resources Board ARB). After the SCS is adopted by the MPO, the ARB reviews it and accepts or rejects the MPO's determination that it will meet regional GHG emissions reduction targets. If the combined measures in the SCS do not meet the regional targets, the MPO must prepare an alternative planning strategy (APS), which is not part of the RTP. Table 3 shows the GHG emissions reduction target and the ARB's determination for each MPO in California.

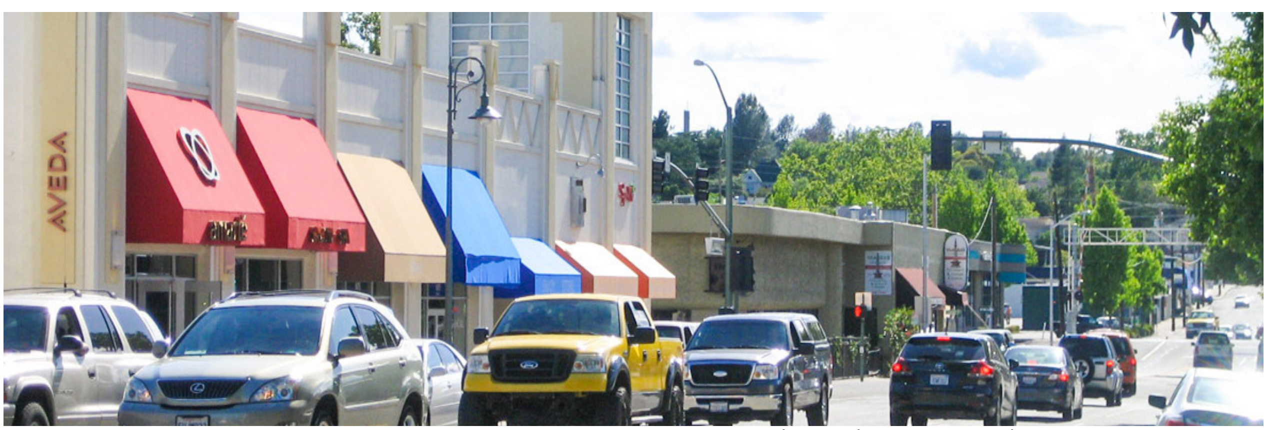


Photo: Shasta Regional Transportation Agency

TABLE 3. STATUS OF SUSTAINABLE COMMUNITIES STRATEGIES IN CALIFORNIA REGIONAL TRANSPORTATION PLANS AS OF NOVEMBER 2014

MPO	STATUS OF SUSTAINABLE COMMUNITIES STRATEGY (SCS)	ARB GHG TARGET, 2020	MPO SCS GHG, 2020	ARB TARGET, 2035	MPO SCS GHG, 2035
Butte County Association of Governments	Project kickoff July 2014; anticipated completion (adoption) December 2016.	+1%	-2%	+1%	-2%
Council of Fresno County Governments	Adopted June 2014; under review by ARB.	-5%	-	-10%	-
Kern Council of Governments	Adopted June 2014; under review by ARB.	-5%	-	-10%	-
Kings County Association of Governments	Adopted July 2014; under review by ARB.	-5%	-	-10%	-
Madera County Transportation Commission	Anticipated adoption in 2014.	-5%	SCS not adopted	-10%	SCS not adopted
Merced County Association of Governments	Adopted September 2014; under review by ARB.	-5%	-	-10%	-
Metropolitan Transportation Commission	Adopted December 2013.	-7%	-10.4%	-15%	-16.2%
Association of Monterey Bay Area Governments	Adopted June 2014; under review by ARB.	0%	-	-5%	-
Sacramento Area Council of Governments	Adopted April 2012.	-7%	-10%	-16%	-16%
San Diego Association of Governments	Adopted last RTP/SCS in October 2011; started next RTP/SCS, expected completion in 2015.	-7%	-14%	-13%	-13%
San Joaquin Council of Governments	Adopted June 2014; under review by ARB.	-5%	-	-10%	-
San Luis Obispo Council of Governments	Anticipated adoption in 2015.	-8%	SCS not adopted	-8	SCS not adopted
Santa Barbara County Association of Governments	Adopted August 2013.	0%	-10%	0%	-15.4%
Shasta Regional Transportation Agency	50% complete; anticipated completion/adoption 2015.	0%	SCS not adopted	0%	SCS not adopted
Southern California Association of Governments	Adopted June 2013.	-8%	-9%	-13%	-16%
Stanislaus Council of Governments	Adopted June 2014; under review by ARB.	-5%	-	-10%	-
Tahoe Regional Planning Agency/Tahoe Metropolitan Planning Organization	Adopted 2012.	-7%	-12%	-5%	-7%
Tulare County Association of Governments	Adopted June 2014; under review by ARB.	-5%	-	-10%	-

DID YOU KNOW?

Each Sustainable Communities Strategy (SCS) completed to date demonstrates a comprehensive shift away from business-as-usual. The plans reduce per capita vehicle-miles-traveled (VMT) while offering a host of additional benefits that will improve quality of life for Californians. By 2035, for example, residents in the San Diego area will make nearly one-third of their trips in a mode other than, or in addition to, driving. In Southern California, two-thirds of new housing will be multifamily dwellings. Jobs in high-frequency-transit areas near Sacramento will more than double, making it easier for commuters to get to work. By 2040, the San Francisco Bay Area will experience a 20 percent increase in the region's share of car-free trips. These are just a few examples of the ways that improved regional planning, in coordination with local governments, will reduce per capita VMT and support vibrant, livable communities.

– ARB Scoping Plan, Appendix C, 2013

High-Speed Rail Business Plan

The California High-Speed Rail Authority (CHSRA) is responsible for planning, designing, building, and operating the first high-speed rail system in the nation. The California high-speed rail will connect the major regions of the state, and is expected to contribute to economic development and a cleaner environment, create jobs, and preserve agricultural and protected lands. By 2029, the planned system will transport passengers from San Francisco to the Los Angeles basin in under three hours at speeds that can exceed 200 miles per hour. Eventually, the system will extend to Sacramento and San Diego, covering 800 miles with up to 24 stations. In addition, the CHSRA is working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the State's 21st century transportation needs.[2]

Tribal Transportation and Safety Plans

Native American tribal governments engage in transportation safety planning for their communities. As sovereign nations, Native American tribal governments have the authority to make and approve transportation plans to further their unique community goals. These plans support the planning, construction, maintenance, and operations of roadways and guide the development of transit services on their tribal lands and for the residents of the community. In addition, tribal transportation plans are essential for successful proposals for competitive State and some federal transportation grant programs. The tribal transportation safety plans seek to improve safety on tribal roads for all road users. In Fiscal Year 2012-13, nine California tribes received MAP-21 Tribal Transportation Program Safety Funds to write tribal transportation safety plans for their respective communities.

California Transportation Commission Statewide Transportation Needs Assessment

The California Transportation Commission (CTC) allocates funds for the construction of highway, passenger rail, and transit improvements throughout California. The CTC also advises and assists the Secretary of the California State Transportation Agency (CalSTA) and the Legislature to formulate and evaluate state policies and plans for California's transportation programs. To assist with these responsibilities, in 2011 the CTC developed a needs assessment that coordinates a list of transportation projects and programs and identifies related funding requirements that will allow local, State, and regional transportation agencies in California to present a consistent message when communicating statewide needs for preserving, expanding, maintaining, and operating the State's transportation system. The report is designed to address the needs of the statewide transportation system over a ten-year timetable (2011 to 2020).

For more information on the statewide transportation needs assessment, please visit: http://www.catc.ca.gov/reports/.

California Transportation Infrastructure Priorities: Vision and Interim Recommendations

The CalSTA consists of departments, boards, and offices, each with a unique role to ensure the safety and mobility of California's traveling public. Caltrans is one such department. In an effort to identify the transportation system needed to achieve long-range goals and determine how it can best be implemented, CalSTA developed the California Transportation Infrastructure Priorities (CTIP) workgroup in April 2013. This workgroup examined the current status and challenges of the State's transportation system and developed the CTIP Vision and Interim Recommendations, which represents both a vision for California's transportation future and a set of immediate action items centered on the concepts of preservation, innovation, integration, reform, and funding. The vision represents a general consensus of the CTIP workgroup and a focus on transportation system objectives of mobility, safety, and sustainability.

For more information on the CTIP, please visit: http://www.calsta.ca.gov/res/docs/pdfs/2013/CTIP%20Vision%20and%20Interim%20Recommendations.pdf

Assembly Bill 32 (Climate Change) Scoping Plan

The Global Warming Solutions Act of 2006 (AB 32) required the ARB to prepare a scoping plan to achieve reductions in GHG emissions in California. Approved in December 2008, the AB 32 Scoping Plan provides the outline for actions to reduce California's GHG emissions. In May 2014, the first update to the Scoping Plan was approved. The update builds upon the initial plan with new strategies and recommendations, including climate change priorities to reach current and post-2020 goals. It also identifies opportunities to leverage existing and new funds to further drive GHG emission reductions and evaluate how to align longer term reduction strategies with State policy priorities.

For more information on the Climate Change Scoping Plan, please visit: http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

Sustainable Freight Transport Initiative

On January 23, 2014, ARB adopted Resolution 14-2, which directed staff to engage all interested stakeholders to provide input on the development of a Sustainable Freight Transport Initiative (SFTI) by the end of 2014. The purpose of the SFTI is to identify and prioritize actions that move California toward a sustainable freight transport system characterized by zero or near-zero emissions.

The SFTI will also recognize other freight system priorities, such as maintaining the competitiveness of California's ports and logistics industry; creating jobs in California and training local workers; maintaining the reliability, velocity, and capacity of the California freight transport system; integrating with the national and international freight transportation system; transitioning to cleaner, renewable transportation energy sources; and increasing the system's support for healthy, livable communities.

The SFTI will include recommendations for near-term actions that arise from stakeholder input and technology assessments for truck, rail, ship, commercial harbor craft, air cargo, and cargo handling equipment. ARB staff is also working closely with Caltrans and the California Freight Advisory Committee to ensure the State's freight efforts are coordinated.

For more information on the SFTI, please visit: http://www.arb.ca.gov/gmp/sfti/sfti.htm

California's Climate Future: The Governor's Environmental Goals and Policies Report

The discussion draft of "California's Climate Future – The "Governor's Environmental Goals and Policy Report" (EGPR) for 2013 provides an overview of the State's environmental goals, key steps to achieving them, and a framework of metrics and indicators to help inform decision making at all levels. The EGPR applies to all State departments and agencies, thus allowing for coordination and adoption of common strategies to achieve environmental goals.

For more information on the EGPR, please visit: http://opr.ca.gov/s_egpr.php

PUBLIC AND PARTNER ENGAGEMENT

Caltrans' Public Participation Plan (PPP) is in compliance with federal laws and supports its mission to involve the public in transportation-related decisions and statewide planning and programming activities.

Planning activities are coordinated with many transportation partners and key stakeholders, and public input is solicited throughout the planning and decision-making process. For the CTP 2040, a series of seven public workshops, seven focus groups, and multiple advisory committees were conducted, as well as direct tribal interaction, listening sessions, and consultation as requested. Public outreach materials included a summary brochure, a document describing the project scope and timeline, and project status fact sheets in English and Spanish. A user-friendly website was developed that has functioned as a major conduit for distributing project information and soliciting public engagement and input.

The results of early public participation revealed that Californians are aware of transportation trends and the challenges facing the State, such as economic and job growth, air quality and climate impacts, human and environmental health, and freight movement. The public is equally supportive of a fully integrated, multimodal sustainable transportation system that considers mobility and accessibility, modal integration and connectivity, efficient management and operation, safety and security, and preservation.

In addition to public outreach efforts, two committees were formed during plan development – the Policy Advisory Committee (PAC) and the Technical Advisory Committee (TAC) – to serve in an advisory capacity.

Policy Advisory Committe and Technical Advisory Committee

The PAC and the TAC were convened during plan development to provide guidance, direction, and necessary approvals with respect to the continuing, comprehensive, and cooperative State transportation planning process required by federal law. The two multidisciplinary committees included representatives from federal, State, regional, and local agencies, and tribal governments; and transportation advocacy groups. Table 4 lists the groups and agencies represented by committee members.

Senate Bill 391 Consultation Agencies

SB 391 identifies specific agencies that should be consulted in the development of the CTP. While some of these groups served on the PAC or TAC, others wereasked to review the Plan during development and to provide feedback. The agencies consulted in compliance with SB 391 are as follows:

- California Transportation Commission;
- the Strategic Growth Council;
- the California Air Resources Board (ARB);
- the State Energy Resources Conservation Development Commission (California Energy Commission);
- air quality management districts;
- public transit operators; and
- Regional Transportation Planning Agencies.

TABLE 4. GROUPS AND AGENCIES REPRESENTED ON CTP 2040 ADVISORY COMMITTEES

POLICY ADVISORY COMMITTEE REPRESENTATION	
Association of Monterey Bay Area Governments	Inter-Tribal Council of California
Assembly Transportation Committee	Karuk Tribe
California Air Resources Board	Local Government Commission
California Coastal Commission	Metropolitan Transportation Commission
California Council of Governments	Native American Advisory Committee
California Department of Aging	National Resources Defense Council
California Department of Public Health	Rincon Band of Luiseno Indians
California Energy Commission	Sacramento Area Council of Governments
California High-Speed Rail Authority	San Diego Association of Governments
California State Transportation Agency	San Joaquin Council of Governments
California Transit Association	Senate Staff
California Transportation Commission	Shasta Regional Transportation Agency
California Walks	Southern California Association of Governments
Department of Housing and Community Development	Strategic Growth Council
Department of Rehabilitation	State Independent Living Council
Department of Water Resources	Tehama County Transportation Commission
El Dorado County Transportation Commission	The Nature Conservancy
Federal Highways Administration	Trinidad Rancheria
Glenn County Planning and Public Works Agency	US Environmental Protection Agency
Governor's Office of Planning and Research	
TECHNICAL ADVISORY COMMITTEE REPRESENTATION	
California Air Resources Board	Metropolitan Transportation Commission
California Energy Commission	Sacramento Area Council of Governments
California State Transportation Agency	San Diego Association of Governments
Federal Highway Administration	Shasta Regional Transportation Agency
Governor's Office of Planning and Research	Southern California Association of Governments

Endnotes

1. US DOT, "The Transportation Planning Process: Key Issues." http://www.planning.dot.gov/documents/briefingbook/bbook.htm.
2. http://www.hsr.ca.gov/docs/about/business plans/BPlan_2014_Business_Plan_Final.pdf

CHAPTER 2
THE TRANSPORTATION SYSTEM

California's transportation system is large and complex. The system supports transportation infrastructure, such as railways, roadways, and pipelines; facilities, such as airports and seaports; and a variety of transportation modes, including transit, bicycle, pedestrian, ferries, and vehicles. The transportation system is integrally tied to the physical shape and vitality of California's communities, and is influenced by local land use decisions. Cities, counties, port authorities, private businesses, regional agencies, transit agencies, tribal governments, the State, and the federal government share ownership and operating responsibility for the various parts of the transportation system.

Table 5 presents an overview of the transportation system. Chapter 2 includes more detail about the system's various components including the following:

- State Highway System
- Tribal Roads and Transportation
- Local Roads
- Public Transit
- Rail System
- Aviation
- Seaports
- Bicycle and Pedestrian Facilities

Photo: Caltrans

TABLE 5. CALIFORNIA TRANSPORTATION SYSTEM OVERVIEW

HIGHWAY AND ROAD CENTERLINE* MILES (2012)[1]	
State highway system (SHS)	15,147 miles or 50,486 lane miles
County roads	65,044 miles
City roads	75,572 miles
Federally owned roads	16,708 miles
Other jurisdictions	3,347 miles
TOTAL HIGHWAY AND ROADWAY DISTANCE	**175,818 MILES**
FREIGHT AND PASSENGER RAIL ROUTE MILEAGE[2]	
Passenger: state corridors	887 miles*
Passenger: interstate AMTRAK corridors	1,663 miles*
Freight: class 1 Railroads	3,928 miles*
Freight: regional and short line railroads	1,317 miles*
Freight: switching and terminal railroads	275 miles
AIR (2013)[3]	
Commercial service airports	29
General aviation airports	216
Special-use airports	66
Hospital heliports	160
Heliports (fire, police, commuter, private)	505
PORTS & BRIDGES[4]	
California seaports (Both inland and coastal)	12
State owned bridges and other structures (ferry boats, tunnels, tubes, large-crossing & small crossing bridges)	13,133

* Route miles are estimated by adding each agency or railroad company's reported operating route miles (for 2010, the last available year recorded). Thus total route miles are less than shown because some railroad route miles are shared by more than one railroad company or agency.

State Highway System

The California State Highway System (SHS) includes over 50,000 lane-miles of pavement; 12,559 bridges; 205,000 culverts and drainage facilities; 87 roadside rest areas; and 29,183 acres of roadside landscaping. While lane miles measure the total distance covered by through lanes, centerline miles measure just the length of the system. For example, a one-mile length of a three-lane highway would equal one centerline mile but three lane miles.

Approximately 61 percent of the SHS is multilane divided highway, three percent is multilane undivided highway, and 36 percent is two-lane road. Infrastructure for the SHS also includes Caltrans' maintenance stations, equipment shops, transportation laboratories, and other support facilities. Much of the SHS was built between 1950 and the early 1970s to serve the growing population and economy of the state. Many of these assets are reaching the end of their service life, and most are at an age where they are deteriorating at an accelerating rate.

Tribal Roads and Transportation

California's transportation system is of vital importance to tribal communities. Approximately 91 percent of tribal trust lands are within five miles of the SHS, 43 tribal trust lands are within five miles of a railroad, and 37 tribal trust lands are within five miles of an airport facility. An efficient, interconnected transportation system is therefore vital to tribal economic vitality. California Native American tribes have established a variety of transportation services for tribal members and non-Indian residents in the tribal community, including bus services, ferries, local roads programs, Amtrak Thruway connection service, and goods movement projects. Tribal transportation is a vibrant, diverse, and constantly changing field. (Read more about the state SHS in tribal communities in Chapter 4).

Local Roads

California's 58 counties and 483 cities own and maintain a network of 140,491 centerline miles of local streets and roads. Local roads account for 82 percent of the state's total publicly maintained centerline miles. Each year, about 146.4 billion vehicle miles – approximately 45 percent of the state's total vehicle miles – are traveled on this local street network. Conservatively, this network is valued at $271 billion.[5]

Public Transit

Public transit in California comprises over 500 local and regional transit providers; ferry boat operations; local, regional, and interregional commuter rail services; light rail services; paratransit agencies that provide transportation services for persons with special mobility needs; transit providers in non-urbanized and rural areas; and the often-isolated tribal communities. In 2010-11, California transit operators provided 1.35 billion unlinked passenger trips. California public transit systems provide connectivity to the National Railway system (Amtrak) as well.

Rail System

California's rail system performance over the past decade underscores the system's importance to the State. Intercity and commuter passenger rail ridership increased during that period and has been robust. At the same time, the freight rail network has become increasingly important for international, domestic, and intrastate trade.

Passenger and freight rail are positioned to help address the challenges of environmental, economic development, and population growth, such as increased travel demand, traffic congestion, and greenhouse gas emissions.

The advent of a statewide high-speed rail system that will be integrated into the existing passenger rail network provides additional opportunities to meet these challenges.

Passenger Rail

California's passenger rail system includes intercity and commuter rail and will eventually include the future California high-speed rail system currently in the planning phase. The three existing intercity rail routes include the Capitol Corridor, San Joaquin, and Pacific Surfliner routes. By 2029, high-speed rail should be implemented from San Francisco to Los Angeles Basin via the State's Central Valley.

The 2013 California State Rail Plan (CSRP) sets a blueprint on how to improve integration of commuter and intercity rail with public transit and other transportation systems – a priority for the State's high-speed rail system. Designing for connectivity enters into virtually every aspect of rail operations, marketing, and capital planning. Intercity and commuter rail systems generally share the same infrastructure with private freight railroads. Funding for intercity rail is supplied by the State. Commuter rail services are funded by local agencies. The high-speed rail system is initially being financed with State and federal funds.

Freight Rail

California is a key state in the national freight rail system. The major California seaports and border ports of entry are gateways to international trade. Trucks and trains move freight through intermodal connections to and from inland destinations. Unlike other modes of surface transportation, the freight rail system is largely in private ownership. The State generally participates in freight rail projects through its role administering federal funds and through a variety of public-private partnerships. With California freight revenues in 2009 of more than $378 billion; operating budgets for California's Class I (line haul freight) railroads rival budgets for many other states' departments of transportation.[6]

Aviation

The State does not own or operate any of the currently permitted 245 public-use airports in California, but monitors the conditions of the aviation system. Airport planning and aviation system planning are related, but they are different endeavors. An airport master plan describes the activities and needs of a particular airport. An aviation system plan describes all the airports in a network of airports, and it guides other plans that consider regional capacity, surface transportation (such as multimodal access to and from an airport), the movement of freight, and overall economic development.[7] The State helps with both types of planning efforts by monitoring and supporting the efforts of communities and airport managers to improve integration of their airports into planning and economic development programs.

State support typically includes reviewing land use compatibility plans within two miles of an airport; commenting on the aviation component of regional transportation plans;

suggesting potential roles for aviation in multimodal transportation solutions; and demonstrating how airports can play a role in smart growth, sustainable community strategies, and economic development concepts. A recent example is the publication of a report prepared through the Caltrans Division of Aeronautics entitled, "*Caltrans Airport Forecasting Study: The Role of California Airports in Smart Growth and Economic Vitality*". This study identified practices of airports around the State that are seeing economic success from incorporation of smart growth concepts. Airports are transforming from 'islands' within their communities into more robust community partners. The economic potential of California aviation is still expanding, and the integration of multimodal transportation systems tied to sustainable community's strategies is gaining momentum.

Seaports

California's system of seaports ("ports") extends along the California coast, from Humboldt in the north to San Diego in the south, and includes two inland ports that serve the interior of the State (Stockton and West Sacramento). The State is home to twelve deepwater ports, three with international significance (Port of Los Angeles, Port of Long Beach, and Port of Oakland). Nationally, the ports of Los Angeles and Long Beach rank first and second, and Oakland fifth, in the number of 20-foot equivalent units (TEUs) shipped annually.[8] Combined into one complex, the Ports of Los Angeles and Long Beach ship the sixth highest volume of TEUs in the world.[9]

Bicycle and Pedestrian Facilities

Bicycle and pedestrian facilities are integral components of the statewide transportation system. Analysis of data from the 2013 California Household Travel Survey found nearly 23 percent of household trips involved walking, biking, or taking public transportation. In 2000, that share was only 11 percent. As shown in Table 6, bicycling and walking for transportation purposes have both experienced a significant increase in popularity, with each doubling its mode share since 2000.[10]

Many California cities and counties have created bicycle and pedestrian plans. Some MPOs and RTPAs also have such plans, either included in or in addition to their RTP. Municipalities, the State, and planning organizations are working to standardize the collection of performance data, such as bicycle and pedestrian trip counts. A growing body of statistical information at local and regional levels backs the statewide increase in bicycling and walking identified in the California Household Survey.[11]

Photo: Caltrans

Bicycle and pedestrian facilities increasingly are included as standard elements in transportation projects. Notable projects include the relatively new east span of the San Francisco – Oakland Bay Bridge, which includes a bicycle and pedestrian pathway. Such facilities are becoming commonplace, not only in large projects but also in smaller projects, such as shoulder widening and intersection upgrades. Collectively, these facilities promote walking and bicycling. Over time, California will piece together a comprehensive network of bicycle and pedestrian facilities, making these modes a viable transportation choice for more people, more often.

TABLE 6. CALIFORNIA TRANSPORTATION MODE SHARE 2000 TO 2012

MODE	2010-2012 MODE SHARE	2000 MODE SHARE
Auto/van/truck driver	49.3%	60.2%
Auto/van/truck passenger	25.9%	25.8%
Walk trips	16.6%	8.4%
Public transportation trips	4.4%	2.2%
Bicycle trips	1.5%	0.8%
Private transportation trips	0.6%	N/A
School bus trips	0.6%	N/A
Carpool/vanpool	0.6%	N/A
All other	0.5%	0.7%
Total	**100.0%**	**100.0%**

Source: Caltrans Travel Forecasting and Analysis branch

Endnotes

1. Executive Fact Booklet, March 2014 http://onramp.dot.ca.gov/docs/2014_EFB-revised.pdf

2. 2013 California State Rail Plan, May 2013 http://californiastaterailplan.dot.ca.gov/docs/Final_Copy_2013_CSRP.pdf

3. US DOT, "The Transportation Planning Process: Key Issues." http://www.planning.dot.gov/documents/briefingbook/bbook.htm

4. Caltrans Mile Marker, January 2014 http://www.dot.ca.gov/ctjournal/MileMarker2014-1/index.html

5. 2011 Statewide Transportation System Needs Assessment, California Transportation Commission, Oct. 2011.

6. 2011 Statewide Transportation System Needs Assessment, California Transportation Commission, Oct. 2011

7. (NA, 2011 Statewide Transportation System Needs Assessment, California Transportation Commission, Oct. 2011)

8. ATEU is a unit of cargo capacity commonly used to describe the capacity of container ships. It is based on the volume of a 20-foot long container that can be seen stacked on ships and hauled on trucks and trains.

9. 2011 Statewide Transportation System Needs Assessment, California Transportation Commission, Oct. 2011

10. http://www.dot.ca.gov/hq/paffairs/news/pressrel/14pr021.htm

11. 2011 Statewide Transportation System Needs Assessment, California Transportation Commission, Oct. 2011

CHAPTER 3
TRENDS AND CHALLENGES

California's transportation system is influenced by many statewide, national, and international trends that affect travel demand, system operation, and implementation of new projects and services. These trends can present challenges and must be understood in order to accurately predict needs and gaps in the statewide multimodal transportation system. The sections below highlight some economic, demographic, and policy trends and challenges that influence today's transportation system and should be taken into account in long-range planning. These trends and challenge areas are:

- Demographics;
- Economic prosperity;
- Transportation funding;
- Climate change and GHG reduction;
- Freight mobility;
- Fuel, energy and technology;
- Sustainability in rural communities and small towns;
- Sustainability in tribal communities;
- Public health; and
- Housing and land use.

DEMOGRAPHICS

California is one of the most diverse states in the nation (see Table 7).[1] The annual growth rate is expected to be one percent throughout the forecasted years.[2] A growing and diversifying population will present challenges for transportation planners.

Transportation entities do not have sufficient resources to respond to anticipated increases in transportation demand by a population that is aging and diversifying. The States' transportation planning must serve the unique needs of all, while creating a system that can respond and adapt to future shifts in travel preference.

TABLE 7. CALIFORNIA ETHNIC DIVERSITY COMPARED TO NATIONAL ETHNIC DIVERSITY

ETHNIC GROUP	CALIFORNIA	USA
American Indian and Alaska Native alone	1.6%	1.2%
Asian alone	13.6%	5.2%
Black or African American alone	6.3%	12.9%
Hispanic or Latino	36.9%	16.7%
Native Hawaiian and Other Pacific Islander alone	0.5%	0.2%
White alone, not Hispanic or Latino	37.5%	61.4%
Two or more Races	3.6%	2.4%

Source: United States Census Bureau, U.S. Department of Commerce, 2010

POPULATION GROWTH

The State's population today is over 38 million,[3] and it is projected to reach 48 million by 2040.[4] There are approximately 24 million licensed drivers and 32 million vehicles registered annually in the State.[5]

Population growth amplifies the need to improve the transportation system's connectivity and efficiency to meet future demands. Today, approximately 95 percent of California's population lives in urbanized areas. By 2040, the most populous coastal metropolitan areas, such as the San Francisco Bay Area, Los Angeles and San Diego, will continue to house a majority of the population. However, population in the inland areas of the State are projected to grow at a faster rate (see Table 8),[6] driven in part by lower cost of living, land availability, and lower development costs. Higher rates of inland growth are expected to continue into the foreseeable future.

California's population growth before 1990 was largely driven by migration. Prior to 1990, more people moved into California from other states and countries annually than were gained from the net increase in births (natural increase) to existing California residents. Since 1990, gains from immigration have been offset by domestic migration losses, and the State's population growth has been fueled mostly by natural increase, despite declining fertility rates. This trend of natural increase is expected to account for most of the State's future population growth.

TABLE 8: 2010 -2040 PROJECTED POPULATION GROWTH IN HIGH GROWTH INLAND COUNTIES

COUNTY	2010 POPULATION	2040 PROJECTED POPULATION	CHANGE (PERCENT)
Kern	841,000	1,619,000	92%
Madera	151,000	278,000	84%
Sutter	95,000	172,000	82%
San Joaquin	687,000	1,214,000	77%
Merced	256,000	436,000	70%
Yuba	72,000	123,000	70%
Imperial	175,000	295,000	68%
Tulare	443,000	723,000	63%
Riverside	2,192,000	3,462,000	58%

Source: http://www.dof.ca.gov/research/demographic/reports/projections/P-1/

Millenials and Aging

Ranging in age from approximately 20-35, the demographic group commonly known as millennials is anticipated to have a unique impact on transportation. This generation has relied less than previous generations on automobiles – 69 percent of 19-year-olds obtained their drivers' license in 2011, compared to 87 percent of that group in 1989.[7] People born in the 1990s travel 18 percent fewer miles and take 4 percent fewer trips than previous generations.[8] There are many theories as to the reasons for this, including the impact of the Great Recession; high fuel prices; teen driving restrictions; new communication technologies; increased acceptance of telecommuting; environmental concerns; and changes in community development, land use, housing, and job center location.

This demographic shift will be significant for the CTP 2040 because millennials will account for a large portion of California's population in 2040. The recent economic recession may have contributed to people driving less, but factors such as an aging population, environmental concerns, and delayed marriage and childbirth also influence travel behavior. In order to adequately plan for a transportation system that meets the State's needs in 2040, demographic trends and influential factors should be closely monitored and addressed.

California will surpass the national average for age by 2040 even though it is currently the sixth youngest state in the nation with only 11 percent of its population 65 and older. Baby boomers are the primary reason for this demographic change, as they are projected to make up 19 percent of the population that is 65 years and older by 2030. The ratio between people over the age of 65 and people of working class age (25 to 64) is expected to increase to 36.0 seniors per 100 working age residents by 2030, compared to a 21.6 to 100 ratio in 2010. As people age, they are less likely to drive due to health limitations, requiring alternative transportation modes.

Alternative forms of transportation, such as high-speed rail, transit, carsharing, and active transportation, will be important to accommodate potential shifts in travel behavior. Demographic shifts demonstrate the need for the CTP 2040 to plan for a comprehensive transportation system that incorporates all transportation modes. The CTP 2040 presents an array of transportation options and system recommendations needed to create a comprehensive multimodal system that connects people to crucial destinations.

ECONOMIC PROSPERITY

California continues to recover from the "Great Recession" that lasted from December 2007 to June 2009. Since the Great Recession, unemployment and housing foreclosures have decreased and the credit rating of municipalities and the State has steadily improved. In 2013, the State regained its title as the eighth-largest economy in the world, with a gross domestic product of $2 trillion.[10] Even more promising is the State's expected $2.4 billion surplus in 2014.[11] California's positive economic outlook is sustainable by creating an attractive business climate, continuing to build confidence in the economy, and improving the transportation system. Transportation helps stimulate the economy by providing Californians with access to jobs, education, goods and services, and recreational facilities.

Goods and services reach international, national, tribal, and regional markets through the transportation system. California businesses export approximately $162 billion worth of goods to over 225 foreign countries.[12] With the recent positive economic outlook, businesses have begun to reinvest in the economy by increasing jobs and wages (see Table 9). Future advancements in transportation technology will continue to foster industrial growth and economic opportunities for Californians.

California's economy is dependent on the well-being of businesses and households. Businesses depend on a reliable transportation network to create products and offer services that ultimately reach consumers

TABLE 9. CALIFORNIA'S EMPLOYMENT STATISTICS

YEAR	POPULATION (THOUSANDS)	TOTAL JOBS (THOUSANDS)	TOTAL JOBS MEAN SALARY	TRANSPORTATION JOBS (THOUSANDS)	TRANSPORTATION JOBS MEAN SALARY
2003	35,389	14,513	$40,640	1,019	$27,680
2004	35,753	14,535	$41,510	1,039	$27,950
2005	35,986	14,724	$42,510	1005	$28,950
2006	36,247	15,066	$44,180	1,034	$29,360
2007	36,553	15,203	$45,990	1,013	$31,050
2008	36,857	15,213	$48,090	996	$32,190
2009	37,078	14,533	$49,550	916	$33,090
2010	37,309	14,002	$50,730	894	$33,620
2011	37,570	14,039	$51,910	891	$34,070
2012	37,872	14,304	$52,350	907	$34,170
2013	38,205	14,715	$53,030	947	$34,220

Source: Bureau of Labor Statistics

at a reasonable cost. Households depend on an integrated, accessible, and dependable transportation network to provide them access to education, jobs, and recreational activities. A sustainable, time-efficient, and cost-effective transportation system helps alleviate increasing business competition from neighboring states and Mexico. The CTP 2040 recommendations encourage policymakers to support an efficient and effective transportation network that is cost effective for businesses and households.

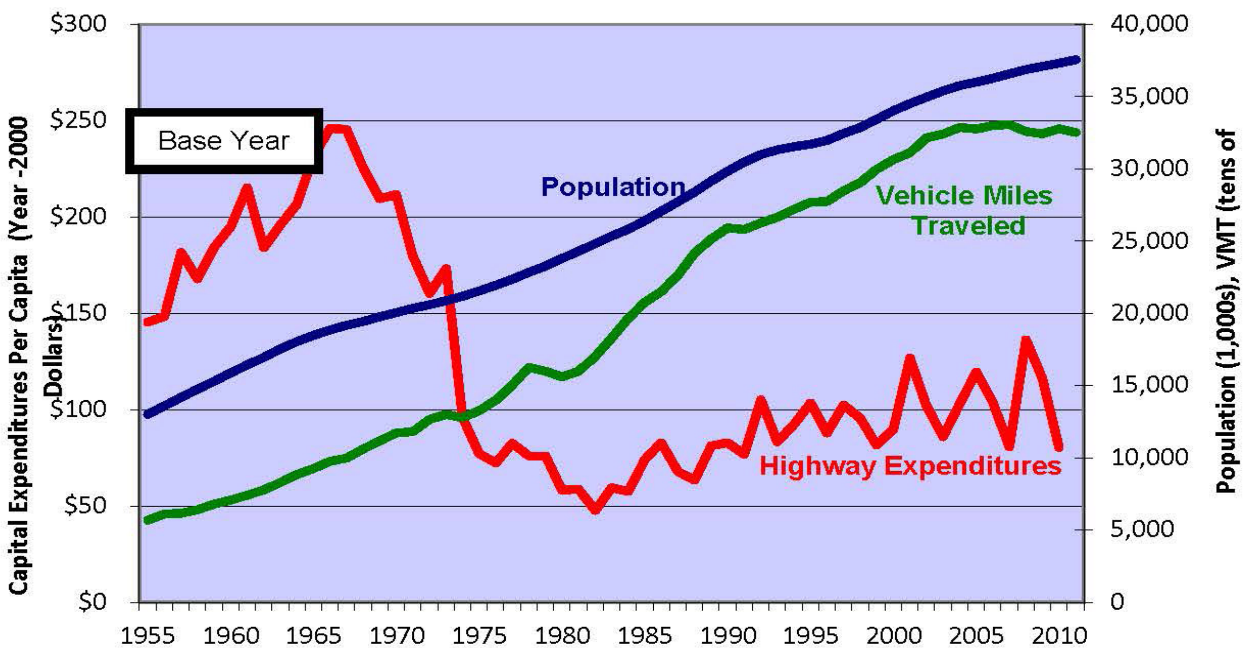
TRANSPORTATION FUNDING

The expected rise in transportation needs and decline in transportation funds present a fundamental problem for California. For nearly thirty years, transportation spending has been underfunded. Caltrans is working closely with the regional transportation agencies and the US Department of Transportation to maximize every dollar of investment in a multimodal system. Nevertheless, a recent assessment prepared by the CTC[13] highlights deep gaps in funding available for basic transportation system maintenance and operation alone, not to mention addressing population growth and transportation preference shifts. At the same time, the transportation system is under greater pressure to accommodate 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, more reliable revenue sources are needed. 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 if people drive fewer miles or vehicles become more fuel efficient (see Figure 1).

Legislative efforts such as AB 32 to reduce GHG emissions from all sources through improved technology and regulation, and SB 375 coordinating transportation and land use planning, attempt to decrease GHG emissions from automobiles by promoting active transportation and transit. While improving the natural environment, these legislative mandates also impact long-range funding of transportation projects. To reduce their "carbon footprint," individuals may buy vehicles that are more fuel efficient, 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 trans-

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

portation maintenance and improvements. Thus, new or modified sources of revenue must be developed.

When inflation is taken into account, fuel and excise taxes have not generated an increase in revenue for the past decade. Due to a 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 Proposition 1B, 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 decrease the amount of available funding for other programs or transportation projects in the long run and are not a sustainable option. Moreover, transportation revenues have been further decreased to pay down bond debt and help balance the State budget. These shifts in funding make it difficult to plan and deliver projects cost-effectively.

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 like states do. Moreover, tribal transportation projects are rarely included in RTPs, even if they overlap with other local agency projects. California tribes historically receive only one to two percent of the $450 million 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 US 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.[14]

Transit receives only 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. The Bay Area Metropolitan Transportation Commission's (MTC) recent RTP predicts the Commission will spend about 62 percent of its anticipated revenues maintaining and expanding its transit system in the coming decades. A 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.

CLIMATE CHANGE AND GREENHOUSE GAS REDUCTION

Climate change is one of the most significant issues facing the world today. Studies show that carbon dioxide (CO2) and GHG emissions contribute to climate change, and the transportation sector is the leading source of GHG emissions in the State.[15]

California's infrastructure is already stressed and will face additional burdens from climate risks. The frequency of extreme weather events – such as heat waves, droughts, and torrential rains – is expected to increase over the next century, potentially causing flooding, landslides, wildfires, pavement damage, bridge damage, and rail buckling. Even if the State's GHG emissions were to cease today, some of these effects would be still unavoidable.[16]

California is taking mitigation actions to reduce GHG emissions, but no matter how quickly this might happen, California's population will face increasing impacts from emissions that have already occurred. Therefore, we must also implement adaptation strategies to mitigate these impacts in California.[17]

Sea-level rise (SLR) is one of the most widely documented risks of climate change, and it will affect all modes of transportation. Sea levels are expected to rise an estimated average of 6.7 inches by 2030.[18] If SLR increases to the highest projected levels, it will put almost half a million Californians along the ocean coastline and the San Francisco Bay at risk from a 100-year flood event.[19] Adaptation will require that we use the best available science to estimate SLR impacts. These impacts must be addressed at all project planning stages, not just at final project delivery.[20]

California has achieved worldwide acclaim for its GHG emission reduction efforts. However, given the expected range of climate change impacts, public agencies throughout California, including Caltrans, are assessing the risks posed by potential SLR. Affected planning agencies need to address potential climate change-related vulnerabilities and incorporate climate change resiliency into their long-range transportation documents to reduce the likelihood, magnitude, duration, and cost of disruptions associated with extreme weather.[21]

Climate change will significantly increase the challenge for transportation managers who will need to ensure that reliable transportation routes are available. To effectively address the challenges that a changing climate will bring, climate adaptation and GHG reduction policies must complement one another. National efforts to reduce GHG emissions in transportation explore the use of alternative fuels, new vehicle technologies, pricing strategies, public transportation expansion, and increased use of bicycling and walking as transportation modes.

Transportation decision-makers at all levels are beginning to consider how climate change may affect the transportation system and the levels of investment required to produce successful “co-benefits” or “wins” simultaneously across economic, environmental, and social measures from within a strategy.[22] How these considerations are incorporated into the transportation planning process is emerging as an area of concern.[23]

Local Coastal Programs (LCPs) operate alongside general plans in the coastal zone and are the only standard of review for coastal development permits in their respective jurisdictions. Coastal communities should utilize LCPs to implement climate change adaptation measures in the coastal zone, where the impacts of SLR are most intense. Communities will be challenged with implementing many of the climate change adaptation measures to protect both infrastructure and coastal communities, as many of the strategies can be implemented only at the local level through changes in local development policies, including general plan updates. Successful implementation to reduce these impacts will require additional funding in the future.

California has already made a strong commitment to decrease GHG emissions through its Active Transportation Program, which funds active transportation projects and plans. As the climate continues to change, the decisions made today will impact the future.

FREIGHT MOBILITY

Today’s transportation infrastructure was built at a time when the current volume of goods traveling through California was unimaginable. The freight industry now demands an intricate network of ports, roadways, railways, and airports that not only handles large volumes of freight but also provides efficient, cost effective global shipping. Rail lines and cargo ships are predominately used to move goods over great distances; trucks are favored to move freight to intermodal facilities, distribution centers, manufacturing facilities, and final destinations. Trucks are the sole source of receiving and shipping goods for 78 percent of California communities.[24]

Freight movement presents many challenges to the natural environment and to local communities in the future. Capacity for freight movement is increasingly becoming an issue, as ports struggle to house containers and truck drivers struggle to find overnight parking. Demands for truck parking exceed the available capacity at public rest areas. Freight movement contributes to traffic congestion, traffic accidents, roadway wear-and-tear, climate change, and health issues. The federal government identified 15 major freight chokepoints and bottlenecks in California in 2011.[25] Traffic delay at these chokepoints and bottlenecks make travel reliability difficult, particularly in urbanized areas.

The movement of goods by the freight industry is an integral piece of the state's economy. Approximately 1.8 billion tons of goods with a value of $2 trillion are shipped each year from California[26], creating 800,000 freight jobs[27].

There are five key gross domestic product regions: the Los Angeles Basin ($925 billion), the San Francisco Bay Area ($594 billion), the San Diego region ($179 billion), the San Joaquin Valley ($132 billion), and the Sacramento region ($102 billion).[28] The production for these regions will grow over time as the economy naturally expands from productivity and technological innovations. The need to improve the freight network is imminent, as ports from Canada, Mexico, East Coast, and the Gulf Coast have increased their import value. In addition, the Panama Canal expansion (expected completion in 2016) could present a greater challenge to California's ports in the future.[29]

Although California faces competition, Caltrans anticipates the freight industry will continue to grow (see Table 10). By investing in its freight network, California can foster economic growth and remain competitive.

Efficiently moving freight minimizes impacts to the environment and communities and supports the State's economy. Federal and State policymakers have begun to address these challenges by developing the nation's Primary Freight Network to improve the efficiency of freight movement. In a collaborative effort with public and private entities, Caltrans published the California Freight Mobility Plan in December 2014. This plan guides freight movement planning activities and capital investments. More importantly, the plan established a foundation for an ongoing partnership with the freight industry. Improving advocacy and pooling resources, the partnership can improve freight movement and increase the State's freight industry's global competitiveness.

TABLE 10. FREIGHT FORECAST AND TRENDS[30]

Total shipments by weight (into, out of, and within CA) are projected to grow approx. 180% statewide between 2012 and 2040
Domestic and International outbound shipments from CA will grow faster than inbound shipments
Trucking is currently the predominant freight mode and carries the largest amount of goods, and this is forecast to continue through 2040
Freight moved by truck is expected to increase
Value of shipments is expected to grow two or three times as fast as the weight being transported
Value of shipments will rise, leading to an increase in truck congestion costs
Truck trips will increase, leading to additional damage to the roadways
Current developed and operated system cannot accommodate projected growth

FUEL, ENERGY, AND TECHNOLOGIES

On a per capita basis, consumption of gasoline has been steadily falling since 1990, which is attributed to increased vehicle efficiency. Gasoline consumption is likely to continue to decline and the demand for alternative fuels to increase. Ethanol fuel blends (E-85), electricity, and natural gas are each forecasted to grow at extremely fast rates in response to public demand. California currently has the largest alternative fuel network of any state, with over 1,900 electric vehicle charging and ten hydrogen fueling stations, and an increasing number of natural gas stations.[31] The CTP 2040 accounts for alternative transportation fuels and the services and infrastructure needed to find favor with the public.

Innovative technology provides opportunities to maximize utilization of the existing transportation system. Such technologies increase throughput on the existing transportation system, allowing for faster, more efficient movement of people and goods.

Two concepts currently being tested are “connected” vehicles – vehicles that can wirelessly communicate with surrounding vehicles, transportation infrastructure, and personal mobile devices – and autonomous driverless vehicles. These approaches leverage existing technologies – sensors, wireless communications systems, navigational software, and automated controls – that can be built into existing vehicles to help prevent crashes, improve traffic flow, and reduce fuel consumption and emis-

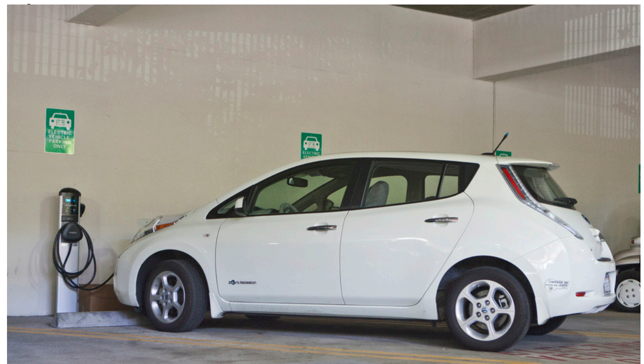


Photo: Caltrans

Technology is also changing how transportation systems are built and maintained. New materials and application methods are continually sought and developed to improve system performance and longevity, ultimately reducing costs to both transportation agencies and users. In addition, technologies are being implemented that allow better response to inclement weather and incidents. Mitigating or eliminating travel delays is a key component of transportation efficiency.

As the demand for economic and environmentally efficient vehicles grows, new technologies will enter the marketplace. In keeping with the vision of the CTP 2040, the State will continue to demonstrate its environmental stewardship and leadership, priming the market for new technologies with its own vehicle choices and through incentives and integration into transportation systems.

California’s transportation sector accounts for approximately 40 percent of the total energy consumed in the State, nearly all of which is fueled by petroleum. Gasoline and diesel fuel remain the primary transportation fuels. The Great Recession reduced the demand for gasoline at a faster rate than was previously anticipated. This manifested in a decrease in fuel consumption and change in preferred travel trends, such as choosing to walk or ride public transit. As California recovers from the recession, it remains to be seen whether this pattern toward reduced personal vehicle fuel consumption will continue.

Prior to the recession, California experienced steady growth in gasoline and diesel fuel purchases and vehicle miles traveled (VMT), regularly exceeding the rate of growth in the State's population. Since World War II, this trend has been disrupted only by economic recessions at the State and national levels. In 2005, annual consumption of gasoline fuel peaked at 15.9 billion gallons, and in 2007 annual consumption of diesel fuel peaked at just over 3 billion gallons. Similarly, annual statewide VMT peaked in 2007 at 330 billion miles. On a per-capita basis, consumption of gasoline has been steadily falling since 1990, which is attributed primarily to increased vehicle fuel efficiency. Consumption of diesel fuel appears to rise and fall roughly in direct proportion to the per-capita Gross State Product – in other words, to the economic climate in general.

The fleet of vehicles traveling California's highways and roadways is changing as a result of rising transportation fuel costs, governmental policy affecting fuel mileage and emission standards, and awareness of transportation's impact on the environment. For now, the system relies primarily on petroleum-based fuels, but this may change by 2040. Emerging alternatives include bio-methane and renewable diesel, hydrogen, butanol, and algae-based fuels. Commercial production of some alternatives is already underway. Market forces will ultimately determine if any become commercially viable. Success may depend on government subsidies or State or federal regulations and policies.

SUSTAINABILITY IN RURAL COMMUNITIES AND SMALL TOWNS

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

Over five million Californians, 13 percent of the State's population, live in rural areas.[32] 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.[33]

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, 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,[34] 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.[35] 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.

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.

For some rural residents, transit service is the only means of transportation. Rural entities are often challenged to provide transit and paratransit services to rural 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 in metropolitan areas where the majority of the State's population resides. Rural areas that are not covered by the requirement to adopt an RTP/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. The Sacramento Area Council of Governments (SACOG) is taking this approach through their successful Rural-Urban Connections Strategy (RUCS) program.

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.

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.

SUSTAINABILITY IN TRIBAL COMMUNITIES

Native American tribes consider sustainability an integral part of responsible living. California Native Americans place a high value on connection to the land, and protecting it is important. Cultural practitioners seek to protect gathering and sacred sites for generations. The State works with tribal communities to design transportation projects that respect environmental and cultural contexts. This is possible only through close collaboration between the State and individual tribal agencies on a government-to-government basis.

Fiscal sustainability is also integral to tribal transportation. Funding must be available so future generations can enjoy the same benefits as current users. To help facilitate this, sixteen tribes in Southern California have formed the Reservation Transportation Authority (RTA). Its purpose is to construct mutually beneficial projects, leverage limited government funds, and ensure that future needs are met through planning and project development.[36] The State can partner with tribes to help them address funding issues and achieve mutually beneficial goals.

Native American tribes face numerous challenges in working toward environmental and fiscal sustainability. While improved transportation allows tribal members access to services, it may also expose culturally valuable and sensitive sites to disturbance and create barriers to entering those sites. Fiscally sustainable funding sources are difficult to secure due to a constantly changing transportation landscape and scarce resources. Partnerships, collaboration, and cooperation will become more important in achieving sustainable tribal transportation. Despite these challenges, many tribes are making significant progress. The Yurok Tribe, for example, has developed a pioneering climate change plan to achieve sustainable development.[37]

PUBLIC HEALTH

Transportation systems profoundly affect public health, with impacts on communities, public safety, physical activity, the environment, and accessibility of vital goods and services. When properly planned and designed, transportation systems can have a positive effect on public health.[38] Major trends in public health and transportation involve forming new partnerships to address the impacts.

The transportation system helps shape communities and vice versa. Transportation and land use decisions can promote public health by making it easier and safer for people to walk, bike, and take public transit. As the connections are made, parties responsible for land use and transportation decisions tend to work together to coordinate plans, projects, and services.

Safety continues to be a major public health concern for transportation. Safety is a concern not only for drivers and passengers but also for pedestrians and bicyclists. The design of transportation infrastructure increasingly takes into consideration public health impacts as well as safe accommodation of all modes. All levels of government have stepped up efforts to encourage more responsible driving habits that will make transportation safer for all users. National and state campaigns have been launched to raise public awareness about the dangers of distracted driving and driving under the influence.[39]

Limited access to transportation can affect health, particularly among vulnerable populations, such as the poor, the elderly, children, the disabled, and various ethnic communities. These populations may not own cars, may be unable to drive, or may have no convenient, affordable access to reliable public or private transportation. Thus, it is critical to improve transportation access for all people to enjoy the benefits. A safe and accessible transportation system would allow reliable transportation for communities to travel to supermarkets for fresher foods, to integrate daily walking as a form of exercise to meet exercise goals,[40] and to access better health care facilities, education, jobs, recreation, and other needs that all link to improved health. Transportation solutions at the community level are needed to serve these basic, daily needs.[41]

Inactivity is a significant factor in obesity, which contributes to many chronic diseases. Creating opportunities for people to incorporate active transportation opportunities – walking, biking, and public transportation – into everyday travel is important to improving public health. Active transportation is a critical component in developing and implementing SCS's, reducing greenhouse gas emissions, and making regions more enjoyable to live, work, and play.


Photo: Ruben de Rijcke, WikiMedia Commons

The transportation sector is a major source of air pollution, which results from an accumulation of emissions and small particulates in the exhaust from fossil fuel combustion engines on most trucks, cars, trains, planes, and ships.[42] These emissions are linked to increased incidence of several chronic respiratory and cardiovascular diseases. Federal and State regulations have already done much to improve air quality, but additional improvements are needed. New technological advances in alternative fuels and vehicles, together with government policies and industry innovations to support them, are needed to further improve our air quality.[43]

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.[44] 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.[45] It is increasingly important to consider location efficiency and compact development patterns as methods of restraining housing and transportation costs. Another challenge is promoting a land use development pattern that aligns 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 calls 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, 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 an 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 "transit-oriented development" (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, 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.

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CHAPTER 4
NATIVE AMERICAN TRANSPORTATION[39]

There are 110 federally recognized Native American Tribes throughout California (see Table 11 in Appendix A), each with its own tribal government and whose communities have a variety of unique transportation needs.[1] Tribal governments are sovereign, meaning that they make their own laws and are governed by them. Most communities are in rural areas, and most have tribal lands on a state highway or very near one. To ensure that Native American tribes receive equal access to the transportation system, it is critical that State and local government agencies collaborate with tribal agencies during the transportation planning process. Tribal communities consist of tribal members, non-member Indians, and non-Indians who may be California citizens. Partnerships between tribes and the State are vital to the provision of safe, consistent, high-quality transportation facilities to all Californians. Native American communities rely on an efficient and productive transportation system. The CTP 2040 seeks to coordinate, consult, and cooperate with Native American tribes to promote the vitality of California's transportation system.

NATIVE AMERICAN TRIBES AND THE STATE OF CALIFORNIA

As a result of federal policies implemented in the 1970s to relocate Indians from reservations to urban centers, California has the largest Native American population of any state in the nation. Strong concentrations of Native Americans exist in major cities such as San Francisco, San Jose, and Los Angeles. From 2000 to 2010, the Native American population increased at a faster rate (18.4 percent) than the State's population as a whole (9.7 percent). In accordance with Governor Brown's EO B-10-11, the State of California engages with Native American groups in consultation and for advancement of environmental justice goals. The State is also required to engage in government-to-government consultation with federally-recognized tribes on State actions that may impact tribes. The State engages in consultation with individual tribal governments on matters affecting their respective lands, cultural heritage sites, and other matters particular to their interests.

Tribal consultation is a vital step in the transportation planning process. Federally recognized tribes are held to be sovereign nations. As such, they possess a right to self-governance—to make and be governed by their own laws. Each tribal government administers essential programs and provides services to both the tribal and non-tribal members of its community. Once a tribe achieves federal recognition status, the US by law, must engage with it in a formal, government-to-government relationship. The US government has a fiduciary obligation to protect tribal lands, assets, resources, and treaty rights for the benefit of tribes and their members.

In addition to supporting Federal laws, such as Section 106 of the National Historic Preservation Act which mandates consultation with tribal governments, Caltrans upholds several additional requirements imposed by the State. Caltrans also complies with

CalSTA's Tribal Consultation Policy, which obligates it to respect tribal sovereignty and pursue good-faith relations with tribes. In addition, Caltrans upholds Director's Policy 19, *"Working with Native American Communities," which requires the Department to "recognize and respect important California Native American rights, sites, traditions and practices."*

CONSULTATION, COORDINATION, AND ENGAGEMENT WITH TRIBAL GOVERNMENTS AND NATIVE AMERICAN COMMUNITIES

Cooperation between non-tribal and tribal governments has resulted in many beneficial transportation projects. For example, collaboration in Sonoma County's Alexander Valley between the County and the Dry Creek Rancheria produced a program for multimodal transportation improvements. Strong working relationships between regional agencies (MPOs and RTPAs) are particularly important because regional agencies control most transportation funds. Regional agencies have a responsibility to include tribal governments as sovereign governments and land use authorities in the transportation planning process. The San Diego Association of Governments (SANDAG) has successfully worked to respect and include tribes in the planning process. The SANDAG-Tribal Transportation Working Group is a model for Tribal-MPO partnership. In pursuing these partnerships, it is important to ensure that all government agencies involved in transportation, such as the Bureau of Indian Affairs (BIA) and Federal Highway Administration (FHWA), are included.

TRIBAL LANDS AND THE TRANSPORTATION SYSTEM

Tribal governments provided essential tribal input to the CTP2040 to guide its direction. Through ongoing coordination, tribal governments helped draft policies and practices that will ensure tribal transportation goals and needs are considered and addressed throughout all of the State's long-range plans. Engagement efforts during the development of the CTP 2040 included a series of Tribal listening sessions.

For more information on the Tribal listening sessions, see http://www.dot.ca.gov/hq/tpp/californiatransportationplan2040/native_american_tribal.html.

At the State level, consistency in consultation processes across state modal plans provides greater clarity and transparency in the planning process. Consultation also empowers tribal governments to help shape the transportation system for the benefit of their tribes and to preserve tribal sacred sites in advance of construction. At the planning stages, it is necessary to coordinate with and provide information to tribes about upcoming projects that affect them. During the consultation process, it is important to respect the diversity among California tribal governments and to avoid a one-size-fits-all approach.

Great expanses of California are considered sacred or spiritually significant to the State's Native American populations because they contain burial grounds, traditional foods and materials, or cultural resources. The federal government holds some of these lands in federal trust, and trust lands are located throughout the State but are heavily concentrated in the areas east and south of Los Angeles and along the Northern California coast. In general, most are situated in rural areas. Many tribal members live on these lands, but not all tribes have reservations or rancherias. Some tribal members from acknowledged or unacknowledged tribes live on allotment lands that the federal government holds in trust for individual allotment owners.

The Reservation Transportation Authority (RTA) is a tribal transportation agency formed by 16 tribes in Southern California. The RTA provides vital transportation infrastructure for the tribes and is a successful example of inter-tribal cooperation. Projects include transit, park and ride, and para-transit improvements.

The State's transportation system provides tribal lands with vital connectivity and access to services. However, given the rural location of most reservations and rancherias, tribal populations often have difficulty accessing the transportation system. This difficulty exists despite the proximity of many tribes to the SHS. About 91 percent of federally recognized tribes occupy trust land within five miles of a State route. Of the 110 federally recognized tribes, 86 (78 percent) occupy tribal land within two miles of State routes, and 39 tribal governments (35 percent) have trust land that actually intersects with the SHS.[2] Figures 3, 4 and 5 in Appendix A show the general location of Native American trust lands in California and their proximity to the SHS. (Due to their small size, many of the trust lands are not visible on the maps.)

Since over 90 percent of tribal lands are close to the State highways, improving tribal access to the State transportation systems represents a critical opportunity. Many tribal trust lands offer only one point of ingress and egress to the transportation network; thus, maintenance is crucial. Access is especially important for first responder emergency services, such as ambulance, police, and fire services.

Many tribal members have low incomes and cannot afford private vehicles. These members rely on transit services for access to medical services, socializing, and shopping. To meet the demand, tribes have established a variety of transit, paratransit, and other public transportation programs. The Chemehuevi Tribe, which occupies tribal lands straddling the Colorado River in Southern California, operates a ferry service across the river. Tribes have received federal grants to support transit. In Federal Fiscal Year 2013, five California tribes received $651,000 in discretionary funds (12.9 percent of the national total for discretionary funds).[3] In Federal Fiscal Year 2014, eight tribes received $531,845 in formula funds (2.1 percent of national total for formula funds).[4] Partnership opportunities also exist to enhance interregional transportation system access through expanded transit service. Caltrans can also partner with tribes to construct bicycle and pedestrian improvements on conventional highways through tribal lands. This would be in accordance with the Caltrans guidance on Complete Streets.[5] More funding is necessary to ensure the continued growth and viability of tribal transit services.

Transportation and Economic Development

Native American tribes can reduce unemployment through Tribal Employment Rights Ordinances (TEROs), which are legislative acts of the governing body of a federally-recognized tribe. Employment policies and programs pursuant to a TERO create opportunities for Native Americans. TEROs especially benefit Native Americans in rural counties and in regions with limited economic opportunities, high unemployment rates, and poverty. Examples of such policies include hiring preferences, job skills banks, and training. Caltrans supports these policies and programs and related implementation guidelines.[6] These guidelines mandate that when Caltrans constructs a project on tribal lands, Caltrans will work with a tribe to implement its TERO ordinance through a Memorandum of Understanding (MOU) with the tribe. This policy ensures that Caltrans partner with tribes to promote their economic development.

Tribal gaming has become a popular way to generate revenue and job opportunities. As of July 2014 the California Gambling Control Commission identified 60 active tribal casino gaming sites throughout the State. These gaming facilities with their complementary amenities generate significant freight activities for the shipment of food, supplies, building materials, and waste. In 2010, tribal gaming alone generated over \$7.5 billion through operations with more than half (\$3.9 billion) from direct spending at gaming operations and off-reservation trade.[7] In addition, tribal gaming has created over 52,000 jobs, generating over \$2.7 billion in annual tribal and non-tribal employment income. Many sites are clustered in Southern California and in northern portions of the state, with several scattered throughout the Central Valley. Due to their rural locations, many of these facilities possess only one route for ingress and egress, which is shared by freight, customers, emergency services, and employee traffic. Transportation is thus a vital component of gaming tribes' economic development and contributes to their well-being.

Diversity of California Tribal Communities and Transportation Needs

California tribal communities are scattered throughout the State and their transportation needs vary. Most communities are located in rural settings where members must travel far for goods and services; others are in urban locations with more convenient transit, bicycle, road, and pedestrian services. When working with tribal governments, it is important to recognize that each tribe has unique needs that may change over time. For example, the Agua Caliente Band of Cahuilla Indians are located in the urban Coachella Valley. Their transportation needs, which include improving bike lanes and supporting existing local transit services, are similar to those of other urban communities. The Yurok Tribe is located in rural Northern California, and much of their land lacks convenient local and interregional transportation access. The Yurok Tribe is therefore developing innovative water taxi services to suit their particular needs. Throughout the State, tribal governments are customizing transportation solutions that meet their communities' needs.

Endnotes

1. See Federal Register, Volume 79, Number 19, page 4748
2. California Division of Transportation Planning, March 2010
3. FTA, Fiscal Year 2013 Public Transportation on Indian Reservations Program Project Selections http://www.gpo.gov/fdsys/pkg/FR-2014-04-15/pdf/2014-08477.pdf
4. FTA, FY 2014 Apportionment Tables, http://www.fta.dot.gov/12853_14875.html
5. Caltrans Deputy Directive DD 64-R2
6. Caltrans Deputy Directive 19, http://dot.ca.gov/hq/tpp/offices/ocp/nalb/Images/TEROsigned.pdf; and Tribal Employment Rights Ordinance (TERO) guidance, http://dot.ca.gov/hq/tpp/offices/ocp/nalb/Images/TERO/TERO_Guide_03_02_2012.pdf, accessed on January 2, 2014.
7. California Nations Indian Gaming Association, http://www.cniga.com/media/pressrelease_detail.php?id=117

CHAPTER 5
REVENUE 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 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 substantial funding shortfall.

The State needs $538.1 billion worth of transportation improvements over the next ten years, according to the California Transportation Commission's 2011 Statewide Transportation System Needs Assessment. The Needs Assessment also projects the state will produce $242.2 billion in revenue for the same period – a shortfall of $296 billion. The exploration of new funding mechanisms and strategies is necessary to close the gap. This chapter 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

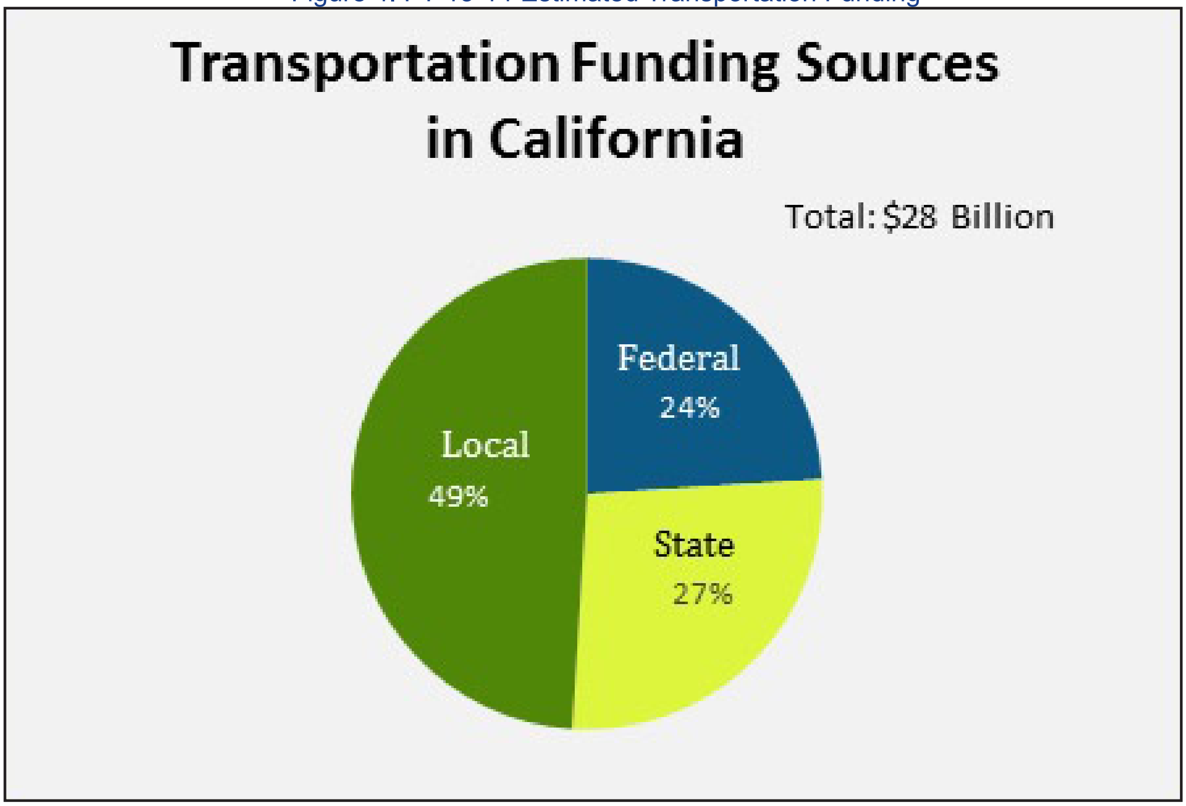
California's transportation system receives funding from a variety of federal, state and local sources. The State assumes responsibility for the federal and state highway system and some interregional rail systems, while local entities are responsible for streets, roads, and transit systems. The primary source of revenue for the upkeep of 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, 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 4).[1]

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 ap-

Figure 4. FY 13-14 Estimated Transportation Funding



Source: Legislative Analyst's Office, FY 2013-14 Overview of Transportation Funding

propriated to programs each fiscal year over a given period. The current authorization is MAP-21[2], which covers two fiscal years, from October 1, 2012, to September 30, 2014, and allocates $105 billion for transportation purposes. Under MAP-21, California received about $7 billion in funding for fiscal year 2013 and is projected to receive $5 billion for fiscal year 2014.

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 estimated that outlays from the highway account totaled $44 billion, while revenues amounted to only $33 billion in 2013. MAP-21 transferred $6 billion from the General Fund to shrink this gap. Since 2008, $41 billion has been transferred to the HTF; the figure is expected to grow to $53 billion by the end of 2014 under MAP-21. 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.

Tribal Government Funding Portion

Federally recognized tribes compete with other tribes for limited financial resources, including the programs listed below that are dedicated to tribal governments: Tribal Transportation Program, Federal Lands Transportation Program, Federal Lands Access Program, Federal Lands Planning Program,[3] Tribal High Priority Projects Program,[4] and Public Transportation on Indian Reservations (see Table 12).[5]

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 SAFETEA-LU, and the Tribal Transportation Program (TTP) pursuant to MAP-21. Tribes receive MAP-21 funds through TTP, a federal funding pool for tribes similar to the separate MAP-21 funding pool for states. Although California is home to 20 percent of the total number of tribes in the contiguous

TABLE 12. 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 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.

US, in FY 2008, it received just $5,817,473 – 1.88 percent – of the $301,828,758 allocated for the IRR Program. Amounts allocated to Pacific Region California tribes have gradually increased since then. In FY 2011, they received $21,769,438.79 of the total, $346,697,578 (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 is $23,516,937.65, 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 $13,061,663.31 for Pacific Region California tribes.

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, revenue collected from transportation sources, such as motor vehicle fuels or vehicle weight fees, 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. It consists 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 AB x8-6 and 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 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 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 generate approximately $6 billion, which is deposited into the State Highway Account (SHA). Table 13 illustrates the current gasoline tax per gallon.

For fiscal year 2014-15, the 36-cents-per-gallon State excise tax alone will generate a little over $2 billion.[6] 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. 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.

TABLE 13. 2014 GASOLINE TAXES PER GALLON

NAME OF TAX	AMOUNT PER GALLON
State Excise Tax (base state excise and price-based excise taxes)	36.00¢
Average state taxes and fees for local purposes (counties/special districts tax, Bradley-Burns local tax, local public safety fund, underground storage fee, etc.)	12.97¢
Total state taxes and fees	48.97¢
Total taxes and fees paid (including Federal 18.4¢)	67.37¢

Source: California Board of Equalization[7]

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. This tax will increase to 11 cents in FY 14-15. 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 current additional sales and use tax rate for diesel fuel is fixed at 1.75 percent, effective July 1, 2014. Table 14 illustrates the current diesel tax per gallon.

These taxes will generate approximately $156 million in 2015 to fund local mass transportation efforts through the State Transit Assistance (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.

TABLE 14. 2014 DIESEL TAXES PER GALLON

NAME OF TAX	AMOUNT PER GALLON
State Excise Tax	11.00¢
Statutory increase in sales tax rate	34.06¢
Total State Taxes and Fees	44.16¢
Total Taxes and Fees Paid (including Federal 24.4¢)	68.56¢

Source: California Board of Equalization[8]

Transportation Bonds

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 (backed either by the General Fund or by transportation taxes and fees) 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 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 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 CTC policy, GARVEE bonds have a maximum term of 12 years.

Truck Weight Fees

In addition to the federal heavy-vehicle utility tax (HVUT), commercial trucks pay State weight fees based on declared gross vehicle weight. This fee generates approximately $900 million per year. 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 State Highway Account to the General Fund to pay the debt-service cost on transportation bonds in 2011.

Vehicle License Fees

The vehicle license fee (VLF) was established in 1935 by the State 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 eleven years or until the title of the vehicle is transferred.[9]

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, Greenhouse gas emission 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 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 Transit and Intercity Rail Capital Program. The

Strategic Growth Council 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 15).[10] 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, while the remaining 40 percent of cap-and-trade revenue is not dedicated to any specific purpose. 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.[11]

TABLE 15. CAP AND TRADE: SUSTAINABLE COMMUNITIES AND CLEAN TRANSPORTATION PROGRAMS

DEPARTMENT	PROGRAM	FY 14-15 FUNDING AMOUNT (MILLIONS)
High-Speed Rail Authority	**High-Speed Rail Project** Covers initial construction of Central Valley segment and environmental and design work on the system. This program will receive 25% of future proceeds.	$250
Caltrans	**Low Carbon Transit Operations Program** Funds bus and rail service projects that target disadvantage communities, reduce greenhouse gases, and improve mobility. This program will receive 5% of future proceeds.	$25
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. This program will receive 10 percent of future proceeds.	$25
Strategic Growth Council	**Affordable Housing and Sustainable Communities Program** Funds “sustainable community” initiatives, such as transit-oriented development. This program will receive 20 percent of future proceeds; half must be spent on affordable housing projects.	$130
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

Active Transportation Program

Governor Jerry Brown signed SB 99 on September 26, 2013, allocating $129.5 million from the federal trust fund and the State Highway Account to create the Active Transportation Program (ATP). This program provides funding for non-motorized transportation, such as walking and bicycling, and includes "safe routes to school," and pedestrian, bicycle, and trail projects. Disadvantaged communities must receive 25 percent of the program's funding. The ATP Program also receives federal funds from Safe Routes to School (SRTS), the former Transportation Enhancement Program, and the Bikeway Account. The California Transportation Commission (CTC) is responsible for adopting guidelines and programming Active Transportation Program projects. Caltrans is responsible for recommending projects to 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; and
- 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 – much in the same way a Mello-Roos tax generates funding for public school infrastructure improvements or additional services by increasing the local residential property tax rate. Governor Brown enacted SB 628 on Sept. 29, 2014, directing IFDs to focus on specific infrastructure projects

Transportation Development Act

The Transportation Development Act (TDA) of 1971 allows counties to self-impose a 0.25 percent sales tax for general goods to be used for transportation purposes. The California Board of Equalization collects the revenue and returns the money to each participating county on a pro rata basis.

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 super-majority approval (more than 65 percent of 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.[12] 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 $3 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 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 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) high-speed rail.

Highways

From 2001-2011, the State spent about $56 billion on highway infrastructure projects that included design, construction, and staff oversight. Spending on highway projects has increased in recent years due to the infusion of 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' Regional Transportation Improvement Program (RTIP). Approximately 25 percent of overall STIP funding goes toward the ITIP, while 75 percent goes toward the RTIP. ITIP focuses on improving region-to-region transportation, and RTIP focuses on improving transportation within a region.
- State Highway Operation and Protection Plan (SHOPP) – Provides funding for pavement rehabilitation, operation, 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 distribution of more than $1 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 Transportation Development Act. 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 State Transit Assistance fund (STA) for operation and capital purpose.

Intercity Rail

Caltrans manages two intercity routes collectively known as Amtrak California: the Pacific Surfliner and the San Joaquin. The Pacific Surfliner operates between San Luis Obispo and San Diego, and the San Joaquin operates from Oakland to Bakersfield via Sacramento. Bus service is provided to connect these intercity rail lines. In addition, the State financially supports a third rail line, the Capitol Corridor (managed by the Capitol Corridor Joint Powers Authority). This line operates between San Jose and Auburn. These three services provide access for more than five million passengers annually to more than 130 destinations throughout California and parts of Nevada. From 2005 to 2009, over $2.8 billion had been either invested or reserved for capital funding for California's intercity passenger rail service.[13]

Photo: Caltrans

High-Speed Rail

Compared to other transportation expenditures, spending on high-speed rail has been minimal over the years. In the future, however, high-speed rail 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 California High-Speed Rail Authority through emission permit 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 State's highway system has steadily deteriorated over the past decades and has experienced increasing maintenance costs and congestion. Based on the 2013 Caltrans' State of the Pavement Report, it is estimated that 16 percent of California's highway miles are in poor condition, and that this figure may increase to 34 percent over the next 10 years. Pavement needs are expected to total $2.8 billion per year over the next decade, but only $685 million per year in funding will be available.[14] Caltrans spends only 10 percent (approximately $1.5 billion) of its annual budget on routine infrastructure maintenance. Further, local streets and roads will need $82 billion over the next 10 years for maintenance purposes alone. Through a combination of deteriorating infrastructure and increasing demand and bond debt, it is uncertain that California will be able to meet its future transportation needs.

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, and the decline in gasoline and diesel consumption due to the availability of more fuel-efficient and alternative-energy vehicles. Further, the economic recession led to a decrease in sales tax revenue, which correspondingly decreased transportation revenue. Revenue is expected to further decrease as a result of the Corporate Average Fuel Economy regulation passed in 2012, which requires an increase in car and light-truck fuel economy to 54.5 miles per gallon by 2025.[15] 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

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 State 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 FY 2013-14 Governor's budget decreased Caltrans' bond fund expenditures by approximately $1.5 billion, or 39 percent from previous years. 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 because of high recreational weekend travel, which is not usually counted in traffic studies; lack of funding; and rural locations. 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, much transportation funding is controlled by local governments or regional agencies. Tribes must therefore 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 helps ensure maximum benefits and efficiency for all. In addition, other creative solutions could empower tribal governments to develop their 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 hopes of closing the $296 billion revenue shortfall over the next decade, alternative funding sources such as pay-as-you-go taxes and fees, new excise taxes, sales taxes, and other user fees must be explored.

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. California's Legislature has begun to take the initiative to address this issue through the passage of AB 2032 (2004), which, for a fee, permits single-occupancy vehicles in selected areas to use designated high-occupancy vehicle lanes (carpool lanes) during peak commute periods. 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 an excise tax on alternative fuels, carbon, or vehicle miles traveled. As vehicles convert to alternative fuels, such as electricity or biodiesel, a kilowatt or per-gallon biodiesel excise tax should be considered. Decision makers are also exploring the idea of implementing a per-ton carbon tax that would generate around $3-4 billion a year. Finally, 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, which requires the Department of Motor Vehicles to develop and implement a pilot program to assess implementing a vehicle-miles-traveled tax by July 1, 2015.

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 State Legislature with more flexibility to allocate transportation revenue.[16] 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.

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CHAPTER 6
THE PLAN

California's transportation system must provide equitable and effective mobility and accessibility. To enhance California's economy and livability, it should be safe, sustainable, integrated and efficient. The CTP 2040 supports this vision with six core goals:

1. Improve multimodal mobility and accessibility for all people
2. Preserve the multimodal transportation system
3. Support a vibrant economy
4. Improve public safety and security
5. Foster livable and healthy communities and promote social equity
6. Practice environmental stewardship

FIGURE 5. TRANSFORMING "VISION" INTO "ACTION"

This chapter explains the goals, and presents the policies, implementation strategies, and performance measures designed to ensure their completion, as illustrated in Figure 5. Although the challenges and background of each issue were covered in previous chapters, they have been restated briefly under each goal so that transportation professionals wishing to consult the document in their daily work will find an easily accessible resource. The chapter also addresses equity, the environment, and the economy and demonstrates a commitment to a cooperative, continuing, and comprehensive planning process.

It is anticipated that the strategies outlined here will achieve California's goals for a more sustainable and equitable transportation system, achieve substantial 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 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 7: Analysis and Outcomes. 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 CHAPTER

The information in this chapter is structured and labeled in a hierarchical format from broad goals to specific strategies. Each goal is defined and explained in terms of tools that potentially can be used to achieve it. It is followed by a list of succinct policies, strategies, and performance measures that can be read at a glance.

- **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

What people want most from a transportation system is that it gets them where they need to go – reliably, safely, and at a reasonable cost, without sacrificing the environment, public health, or community character. Mobility and accessibility for the movement of goods and services is vital to the State's interests. The previous CTP emphasized that building new roads alone cannot provide for anticipated demand. Transportation planning must link with land use planning. Additionally, investments are needed for capacity enhancements, and to manage the system and demand efficiently, provide viable transportation choices, and increase connectivity among all modes. Reduced funding and the need to reduce GHG emissions make the case that adding automobile capacity is not the answer.

CONNECTED CORRIDORS PROGRAM

In collaboration with University of California Berkeley Partners for Advanced Transportation Technology, Caltrans is working to develop the Connected Corridors Program. The program will integrate new transportation management technologies with existing approaches for a coordinated transportation network with diverse traffic management options. A pilot site will assess the technical actions and policy changes needed to improve performance in congested state transportation corridors.

To make the most of the existing system, transportation investments must promote the greatest mobility and efficient use of the entire system. In rural areas, there must be a balance of viable and realistic transportation options. Improved multimodal mobility and accessibility is best achieved by providing a fluid, well-integrated multimodal option such as transit, and managing the existing system to optimize performance.

Traffic Managment System

Promoting a sustainable multimodal transportation system requires optimizing the existing system. Increasingly, 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.”

Some of the more widely used TMS tools include coordination of traffic signals along a corridor, changeable message signs that display real-time road and weather information, ramp meters that control the timing of vehicle entry onto highways, and traffic incident management. TMS can also refer to lane management strategies, such as high-occupancy vehicle lanes and toll lanes.

Optimizing multimodal system performance through TMS strategies is not a new concept; however, TMS offers much more potential to serve future mobility needs than has previously been leveraged. By investing in more TMS 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 is providing travelers with real-time data about traffic conditions via their mobile phones, allowing them to select the optimal mode of travel on a moment’s notice.

CALIFORNIA’S MILEAGE BASED PRICING STRATEGY

The State is exploring a new funding system, a usage-based charge, to replace the gas tax for highly fuel-efficient vehicles. Governor Jerry Brown signed into law SB 1077, “Vehicles: Road Usage Charge Pilot Program” which will explore the benefits and disadvantages. A first step is to create a Technical Advisory Committee. Its goal is to study gas tax alternatives and offer recommendations on how to design and assess a pilot program. The Transportation Agency mandates that the pilot program be implemented in California by January 1, 2017.

Giving the public accurate, real-time information allows them to become partners in multimodal system management.

Another new technology that supports predictive TMS is the innovative concept of connected vehicles, currently in its testing stage.

Photo: Caltrans

Connected vehicles will be able to communicate with one another as well as with the traffic management system itself to warn drivers and the system of potential hazards in time to avoid them. Another idea currently undergoing exploration is automated vehicle platooning, in which frequently updated sensor-generated information about the locations and motions of the other vehicles allows clusters of vehicles to drive very close together at "cruising" speed without colliding. The concept of Integrated Corridor Management (ICM) is also in development to improve traffic flow from highways to surface streets. Together, these technologies should pave the way for widespread deployment of fully automated vehicles.[1]

Another potential opportunity for enhancing system management is the development and implementation of Corridor System Management Plans (CSMP). 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.

For more information, visit http://www.dot.ca.gov/hq/tpp/corridor-mobility/

Transportation Demand Management

While TMS methods revolve around the system itself, Transportation Demand Management (TDM) strategies focus on travelers and how they use the system. Through incentives or disincentives of different types of travel, TDM measures often encourage travelers to reduce or eliminate single occupant vehicles trips, particularly during heavy commute periods. TDM strategies urge travelers to consider alternatives such as ridesharing options, using transit, telecommuting, working flexible hours, and biking or walking. 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. For travel demand strategies to be effective, travelers must have viable options for travel other than the single occupant vehicle. Some examples of TDMs include tolling, pricing and parking strategies, and high-occupancy toll (HOT) lanes. Ports have implemented some TDM strategies by charging truckers for peak-time service.]

Optimizing the existing system is critical for achieving transportation system sustainability. This system must also be truly multimodal with well-integrated transportation options. Promoting viable, affordable and easily accessible multimodal options serves to reduce vehicle miles traveled and lower GHG emissions, and to accommodate those who cannot or choose not to drive, thereby establishing a more equitable transportation system for users of all income levels.

Transit and Active Transportation (Bicycling and Walking)

Establishing a robust and flexible transit system is a critical component of an effective multimodal transportation system. Such a system includes commuter rail, intercity rail, ferry, and various types of bus services. Transit provides innumerable benefits to California – environmentally, economically, and socially. Benefits include GHG emission reductions, congestion relief, access to employment, and a social safety-net for people who cannot or choose not to drive. For many people living in rural areas and predominately isolated Native American tribal lands, transit services (often inefficient) are the only means for accessing health care and other vital resources. Many transportation agencies throughout the State recognize the inherent value in transit and are looking at improving transit.[2] Transit is often safer than driving and also contributes to VMT reduction.[3] California's high-speed rail will be integrated with local and regional rail systems to create a seamless traveling experience.

Innovative forms of transportation will become all the more important in the coming decades as California's demographics and attitudes about driving and vehicle ownership change. Much evidence shows that the millennial generation of younger people born in the 1980s to the early 2000s does not share their parents' and grandparents' passion for driving and car culture.[4] For many reasons including environmental concerns and financial savings, young people are choosing other transportation modes.

Active Transportation

A statewide effort is underway to identify long-term goals for mode shift to active transportation. The Health in All Policies Task Force will identify and explore existing goals from California's regions to support active transportation.

Bicycling and walking are attractive and flexible transportation options for shorter trips, and often share many of the same automobile facilities. Transportation options work even better when combined with a comprehensive transit system. Proximity to integrated facilities provide people with easy, quick, and inexpensive access to work, school, shopping, health care, social services, and other desirable destinations. There are transportation programs for students such as Safe Routes to Schools (SRTS), which aims to increase the number of children who walk or bicycle to school.

A proven best practice to ensure multimodal accessibility is having Complete Streets, which are roadways designed to enable safe access for all users. A Complete Street is planned, designed, operated, and maintained in a way that is appropriate to the function and context of the roadway, whether rural, suburban, or urban. With Complete Streets, bicycling, walking, and transit is integrated with and equal to automobile use and provides commuters with viable travel choices and an opportunity to decrease auto mode share, VMT, and GHG. The result is a more balanced and equitable transportation system among all modes of travel. In order to be truly balanced, considerations must also include freight access.

HIGH-SPEED RAIL INTEGRATION

The "Blended System" concept for HSR provides an overall framework for a statewide passenger rail system that integrates high-speed trains with existing intercity and commuter/regional rail systems. This integration entails coordinated infrastructure, scheduling, ticketing and operations, with the goal of providing a fully integrated trip from origin to destination.

Having easy access to desirable destinations and to needed goods and services is critical to a high quality of life for people of any age and level of ability. While many younger Californians are driving less by choice, by 2040 the number of older and disabled Californians who are physically unable to drive will dramatically increase. Older people and those with disabilities rely on transit, specialized transportation services, and volunteer drivers to remain healthy and socially engaged. The California Department of Aging suggests a systems approach to mobility called Mobility Management. Mobility Management emphasizes movement of people instead of vehicles. Mobility Management prioritizes the discrete travel needs of each individual consumer throughout an entire trip, not just the portion traveled on one mode or another. The focus is on improvements to the effectiveness, efficiency, and quality of the travel services being delivered and improvements in the availability of information about those services. Instrumental to the success of Mobility Management is a transportation plan that strengthens and enhances the effectiveness of Consolidated Transportation Services Agencies (CSTAs). CTSAs coordinate local and regional transportation services to the disabled, the elderly, youth, and low-income individuals.

Photo: Caltrans

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 Think in terms of the mobility of people and freight rather than the throughput of vehicles.

P1-S2 Implement transportation demand management: pricing measures, parking policies, traffic calming, complete streets policies, and telecommuting.

P1-S3 Implement programs to reduce vehicle trips while preserving personal mobility, such as employee transit incentives, telecommute programs, 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 passenger rail system, while providing for connectivity to a future high-speed rail 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 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 rehabilitation 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.

Performance Measures (PM)

PM1* 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: 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* CO_2 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 http://www.dot.ca.gov/hq/tpp/offices/ocp/ATLC/documents/august_15_2013/document_links/indicator.pdf

^ PMs identified in Smart Mobility 2010 A Call to Action for the New Decade http://www.dot.ca.gov/hq/tpp/offices/ocp/smf.html

G2: PRESERVE THE MULTIMODAL TRANSPORTATION SYSTEM

California's multimodal transportation system is in jeopardy. Investments to preserve it have not kept pace with the demands, and the underfunding has led to the decay of one of the State's greatest assets. Failing to adequately invest in the restoration of California's roads, highways, bridges, airports, seaports, railways, border crossings, bicycle and pedestrian facilities, and public transit infrastructure will only lead to further decay and a deterioration of service. As the multimodal transportation system grows increasingly unreliable, the state will become less attractive to businesses, residents, and tourists, exacerbating the revenue problems at a time when the State can least afford it.[5]

Maintaining the existing road system is one of the most significant transportation concerns in California. California ranked 48th in the nation in terms of highway conditions, with more than half of our highway lanes either in distressed condition or in need of preventive maintenance.[6] Roadway maintenance also continues to be one of the major issues in rural areas. Approximately 46 percent of the State's road miles are located in rural areas, and this proportion of road-miles-to-population creates huge economic challenges.

Poor roadway conditions are costly to motorists. Maintaining the highway system has a 10-to-1 return on investment over delayed replacement.[7] With increasing public scrutiny, government agencies are under great obligation to demonstrate their stewardship of public funds. The California State Transportation Agency (CalSTA) recommends regions and local governments fully implement the "fix-it first" policy to preserve the state highway system. Therefore, the new focus is on system maintenance rather than expansion.[8] Regional planning agencies are seeing the urgency and are already responding to this request. The Bay Area, for example, plans to spend nearly 90 percent of its available funding to support preservation of existing facilities.[9]

With limited resources, asset management carries rising importance as a strategic approach to managing our transportation infrastructure. The goal with asset management is to maximize the performance of the system with the limited resources available. The US Department of Transportation now requires states to develop a risk-based asset management plan for bridges and pavement on the National Highway System to preserve transportation assets and increase system performance.

Caltrans maintains 50,000 lane miles which carry nearly 35 million vehicles per year.

Life-cycle cost analysis (LCCA) is an analytical technique that identifies the most cost-effective pavement investment for the long term and is the key to maximizing project investments. As annual pavement maintenance needs far outpace dependable funding, Caltrans is turning to high-tech strategies, including recycling and innovative treatments, to make pavement last longer. Cold-in-place recycling allows Caltrans to recycle and reprocess existing pavement without leaving the construction site. This method, coupled with the use of rubberized hot-mix asphalt and warm-mix asphalt, has reduced GHG by more than 61,000 tons. By employing these aggressive, quick, and preventive treatments, we can avoid more costly repairs in the future. Another emerging technology to reduce GHG is "cool pavements." The term refers to paving materials that reflect more solar energy, enhance water evaporation, or have been otherwise modified to remain cooler than conventional pavements.[10]

Caltrans is also turning to advanced technology to keep the system in top condition. Pavement Management System software (PaveM) targets future repairs that do the most good for the least amount of money.[11]

Preservation of the state's transit system is more important than ever as baby boomers age, making them one of the fastest growing groups requiring transportation services. Regions are beginning to plan for the projected increase in the senior population with increased funding for transit and paratransit maintenance and preservation. Maintaining infrastructure that encourages non-motorized travel, such as complete streets policies, is another important factor in maintaining mobility for those unable to drive.[12]

Climate change is another serious threat to California's infrastructure. Extreme weather, including events such as heat waves, droughts, and torrential rains, is predicted for the future, which will add even more stress to pavement and bridge infrastructure.[13] Sea level rise (SLR) is perhaps the best documented and most accepted impact of climate change, putting all modes of transportation near the coast, Delta, and Bay at risk of flooding and erosion.[14] The level of change remains uncertain but is estimated to rise an average of 6.7 inches by 2030.[15] To improve public access planning efforts, more information is needed about how SLR could affect public access areas and recreation throughout the state. Many currently accessible beach areas have the potential to become inaccessible due to impacts from SLR. Shoreline armoring and emerging headlands could isolate connected beaches with sea-level rise, which will block lateral access.[16]

These uncertainties create huge challenges for transportation managers who need to ensure that reliable transportation routes are available.[17] This includes planning for freight infrastructure impacts on harbors and ports, freight highway routes, airports, access roads, freight rail tracks, and bridges.

A sustainable multimodal transportation system is one in good repair. California must meet the challenge of its decaying infrastructure with a large increase in capital investments by all levels of government and the private sector. Simply put, California needs a dedicated funding source that can keep up with preservation needs.

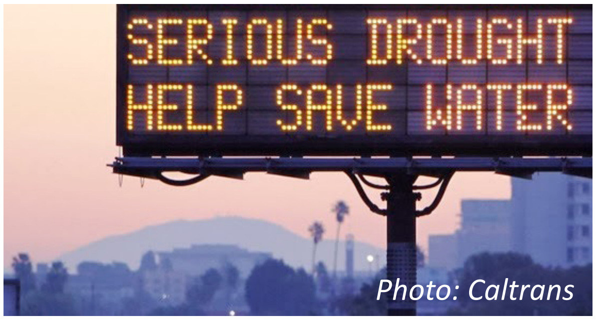


Photo: Caltrans

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 (e.g., the SHOPP program).

P2-S4 Implement a strategic approach for assessing and prioritizing transit assets to bring the public transit system into good repair (FTA MAP-21 Transit Asset Management Guide).

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 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 http://www.dot.ca.gov/hq/tpp/offices/ocp/ATLC/documents/august_15_2013/document_links/indicator.pdf

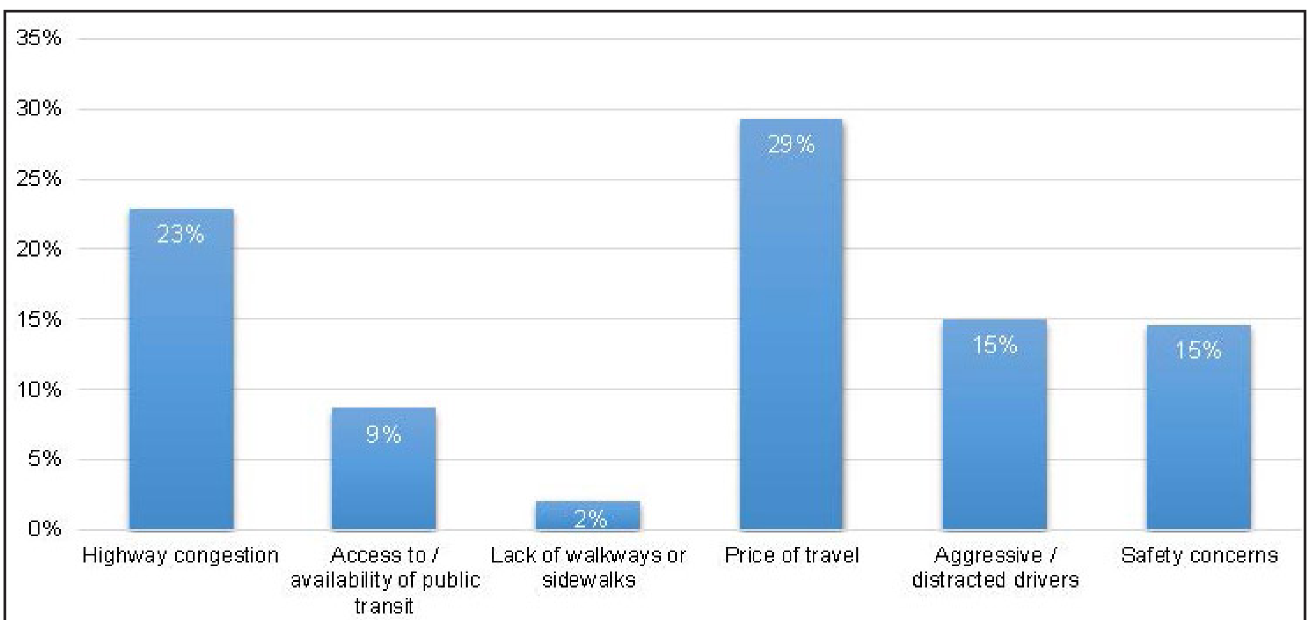
G3: SUPPORT A VIBRANT ECONOMY

Transportation is integral to the economy, providing households with access to jobs, education, training, markets, and leisure activities, and allowing businesses to conduct local, regional, and global transactions. However, transportation inefficiencies, such as service disruptions and congestion, result in economic and social costs that affect the state's environment and economy.

Supporting Households Through Transportation Choices

With respect to transportation, the chief concerns of California residents are the price of travel and highway congestion (see Figure 6).[18] Across all socioeconomic lines, California households spend roughly 15-19 percent of their income on travel, making it the second or third largest item in their budget.[19] Highway congestion leads to additional vehicle operation costs and productivity losses by restricting access to employment and retail markets.[20] A comprehensive multimodal transportation system provides everyone with efficient and economical travel options, such as walking, biking and transit, potentially reducing travel expenditures. A multimodal system also decreases congestion costs by distributing transportation traffic

FIGURE 6. RELATIVE IMPORTANCE OF TRANSPORTATION ISSUES AMONG THE PUBLIC



Source: Portillo, D. (2013). National Household Travel Survey California Data. Planning Horizons. Caltrans. Retrieved from http://www.dot.ca.gov/hq/tpp/offices/owd/past_files/PlanningHorizonsOFTA_12_11nopic.pptx across multiple modes. Reducing travel costs yields an increase to discretionary income and allows individuals the option to spend more on goods and services, further promoting a vibrant economy. Moreover, a comprehensive multimodal system increases access to education and employment opportunities, amenities, and health care (discussed in Goal 5), all of which enhance the quality of life, preserving California's image as a "dream" destination for people throughout the nation and around the globe.

Supporting Businesses Through Transportation Choices

Transportation is a key component in the State's business climate and economic growth. The growth of business clusters – such as Silicon Valley as a center of technology, the Central Valley's agriculture industry, and Southern California's entertainment industry – depend on a comprehensive transportation system to attract a skilled workforce and foster innovation in transportation logistic techniques.[21] For example, some employers recognize that providing shuttle services can improve the quality of their workforce by expanding their employment reach to neighboring regions. This type of service is attractive to the employer and employee alike because it removes household transportation commute barriers. Moreover, the ability to reach, attract, and retain a skilled workforce helps support innovative business clusters that can spur economic growth.

California is an attractive global gateway for businesses because of its geographic positioning and travel mode options. State, regional, and local economies rely on a well-connected, efficient, reliable, and flexible transportation system to meet consumption, affordability, and productivity demands by consumers and businesses. Goods can be imported and exported internationally through California ports and transferred nationally through rail to freight hubs such as Chicago, St. Louis, and New Orleans.[22] Failure to meet increased demand or improve service quality may cause businesses to relocate or establish in neighboring states or countries that can meet their transportation demands.

The integration of non-motorized modes can also induce Californians to support and shop at local businesses. The implementation of complete streets can serve as an attractor for local investment, business opportunities, and consumption,[23] leading to a stronger local economy. When consumers support locally-owned businesses, an increase in area wealth occurs through additional jobs, revenue, and the recirculation of money within the community.

Transportation costs affect prices for goods and services. An efficient and reliable transportation system results in lower consumer prices because businesses are able to increase productivity, while decreasing overhead costs.[24] Furthermore, capital is readily available for businesses to invest in other areas because there is no longer a need to keep a surplus of goods in stock with timely delivery.

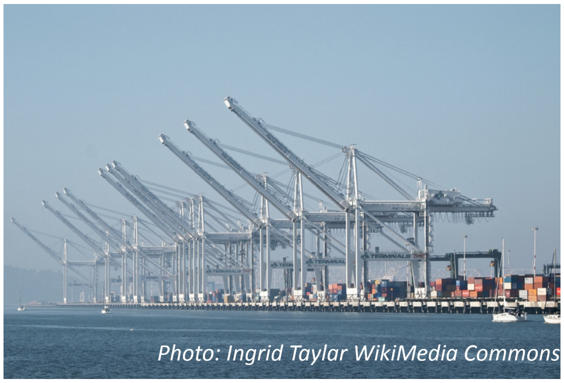


Photo: Ingrid Taylor WikiMedia Commons

California Benefits From a Multimodal System

An expansive multimodal transportation system can spur job and rural growth, increase income equality, and increase economic resilience. Roughly, 900,000 jobs are directly linked to transportation in California.[25] The design and construction of pedestrian pathways, bicycle routes, and rail and transit corridors can lead to job and middle-income wage growth for communities, while infusing money into the economy and enhancing the system. A well-connected transportation system also increases access to rural areas that depend on tourism, helping them to survive and thrive.

Multimodal connectivity is critical in linking local, regional, national, or international areas and reducing the burden on the State Highway System. The explosive increase in e-commerce, with goods delivered directly to consumers in widely dispersed locations, has created an increased demand for freight movement that shows no signs of slowing. In a vigorously competitive global marketplace, not fully funding the transportation system could place the state's economy at risk.

Funding and Collaboration Needed

Ensuring the long-term sustainability of the transportation system is difficult when funding is unstable and inflexible and collaboration efforts disjointed. Transportation funding is unstable because it is highly dependent on fuel excise taxes, sales taxes, bonds, and local self-help revenues (see Chapter 3). Moreover, statutory designations of some revenue sources further decrease funding flexibility.[26]

Limited funds and heavy restrictions on their use can result in reactive responses rather than collaborative, proactive planning for the long term.

Creation of stable and flexible revenue mechanisms allows decision makers to address emerging trends and needs that will support the State's economy. Additional transportation revenue that can be discretionarily applied can increase connectivity through innovative developments, such as a catenary system (overhead railway electrification) for moving goods, or expanding active transportation and transit. New, more stable revenue mechanisms can also help California address social and environmental issues, such as ARB's GHG emissions trading program (Cap and Trade).

Before implementing any new revenue mechanism such as a fee, or a tax, as identified in Chapter 3, decision makers must understand its impact on economic, equity and the environment. In addition, the allocations must be guided by the principle of maintaining the existing infrastructure while providing for the maintenance of any new infrastructure. If stable and flexible revenue mechanisms are achieved, decision makers could conduct long-range planning that fosters economic growth.

Successful long-term planning is achievable only through a collaborative process. Collaboration between public and private stakeholders ensures the built system addresses future needs and functions appropriately. Public-private partnerships can be beneficial when constructing a comprehensive transportation system by decreasing cost for the State and increasing returns for businesses. Failure to collaborate may result in lost economic opportunity.

Efforts to Support a Vibrant Economy

Goal 3 supports a vibrant economy by suggesting policies, strategies, and performance measures that enable Caltrans to adapt to emerging trends, while meeting the needs of all Californians. Careful consideration to households and businesses must be given when creating a dependable, reliable, and cost-effective transportation system that is supportive of a vibrant economy for all users.

Policies (P)

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 (S)

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, 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 active revenue sources that fully address current and future transportation system management needs.

P3-S9 Utilize reauthorization funding opportunities, such as Moving Ahead for Progress in the 21st Century (MAP-21), 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

^ PMs identified in the Smart Mobility 2010 A Call to Action for the New Decade

G4: IMPROVE PUBLIC SAFETY AND SECURITY

The safety portion of this goal is based on the overarching Caltrans Strategic Highway Safety Plan (SHSP), a comprehensive, data-driven effort to reduce fatalities and serious injuries on all public roads in California. Security refers to the system's ability to prevent and to have a plan for quick response and recovery from catastrophic natural and manmade events.

The SHSP captures data and identifies trends for the entire State, including serious injuries, fatalities, and fatality rates. This provides an opportunity to collaborate and develop meaningful strategies and performance measures with regional transportation partners, putting an emphasis on safety challenge areas. The SHSP will address strategies for managing and maintaining multimodal facilities, such as public local streets and roads, bus and rail transit, and bicycle and pedestrian travel ways. The CTP 2040 provides this high-level framework and is an opportunity to achieve consistency with State, tribal, regional, and local agency modal and strategic plans. In addition, the CTP 2040 allows for consistency at the federal level with US DOT, FHWA, FTA, and FAA in complying with rules and regulations for MAP-21.

MAP-21 strongly encourages states to develop safety and security strategies that reduce fatalities and serious injuries by improving emergency response and recovery times and increasing preparedness.

Equally important, the State is responsible for updating Transportation Systems Management and Operations (TSMO) strategies to improve the performance of existing transportation facilities for the purpose of relieving vehicular congestion and maximizing the safety and mobility of people and goods. Security integration improvements for new and existing regional, program, and project-level activities include lighting in or adjacent to a public transportation system, such as bus stops, subway stations, parking lots and garages as well as increased camera surveillance and emergency telephones of an area in or adjacent to the multimodal system. MAP-21 requires the State and metropolitan planning organizations (MPOs) to improve safety and security emergency management efforts focusing on securing the State's critical transportation infrastructure, such as California's highways and bridges, major seaports, airports, and transit systems and environmental considerations for safer transportation system best practices.

Caltrans has five statewide modal plans. Each modal plan defines and specifies the safety and security requirements and approaches that provide outreach and education, and performance measures and monitoring for each of these five plans. For example, the 2013 California State Rail Plan addresses developed and implemented safety and security programs, such as Be Track Smart, Positive Train Control, and at-grade crossing warning systems. Caltrans encourages a proactive approach addressing potential risks that concern the safety and security for all modes of travel within and through California.

Personal safety and security for all modes of travel is paramount in creating a safe and secure environment for all citizens, neighborhoods, and communities and ensuring peace of mind. The investment in safety and security improvements is a proactive and a preventative approach in prioritizing and implementing a course of action for the public's welfare. Caltrans, in collaboration with federal, State, tribal, regional, and local agencies, has seen positive results from the investment in safety improvements to the multimodal system from previous 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.

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 performance measures and targets that guide Caltrans divisions and transportation partner agency stakeholders to the most effective safety strategies and countermeasures.

P1-S2 Improve and update SHSP and develop performance-based measures.

P1-S3 Improve 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 older 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 intersection and road and rail crossings.

P2-S8 Improve outreach, education, and implementation of Crime Prevention through Environmental Design (CPTED) approach 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 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^ Multi-modal travel reliability

PM4^ Design and speed suitability

* PMs identified in the Statewide Performance Monitoring Indicators for Transportation Planning Final Report http://www.dot.ca.gov/hq/tpp/offices/ocp/ATLC/documents/august_15_2013/document_links/indicator.pdf

^ PMs identified in Smart Mobility 2010 A Call to Action for the New Decade http://www.dot.ca.gov/hq/tpp/offices/ocp/smf.html

G5: FOSTER LIVABLE AND HEALTHY COMMUNITIES AND PROMOTE SOCIAL EQUITY

A healthy and sustainable community promotes equity among people from all walks of life, strengthens the economy, protects the environment, and promotes public health and safety.[27] Healthy communities play an integral role in making California a “dream” destination for millions across the country and around the globe. Population growth, demographic changes, the health-related impacts of transportation policy, and costs of auto-focused development challenge efforts to maintain a state-of-the-art transportation system. Solutions must support community aesthetics, the natural and built environment, and sustainable living. In addition, social equity in a safe and healthy community must balance cultural and historic values when addressing transportation planning impacts. Such values include maintaining affordable housing, neighborhood preservation, rural character, agricultural lands, and access to healthy food, the vitality of downtowns and main streets, and protecting natural habitats. In particular, we must preserve culturally sensitive, historic, and Native American tribal lands and resources. Each community is different and may require individual strategies for fostering livability and social equity.

A key strategic tool is Caltrans *Smart Mobility 2010: A Call to Action for the New Decade*, commonly referred to as the Smart Mobility Framework (SMF). SMF core principles include location efficiency, reliable mobility, health and safety, environmental stewardship, social equity, and a robust economy. The SMF integrates transportation and land use by applying principles of location efficiency, complete streets, connected multimodal networks, housing near destinations for all income levels, and protection of parks and open space. This framework is designed to help keep California communities livable and supportive of healthy lifestyles while allowing each to maintain its unique community identity. State and federal laws such as AB 1358 require Caltrans and local agencies to promote and facilitate forms of "active transport," such as bicycling and walking, and to meet the transportation needs of all users. SMF planning ensures that transit, pedestrian, and bicycle routes are complete, safe, and accessible, promoting livable streets.

SMF calls for participation and partnership by agencies at all levels of government, the private sector, and the community.[28] In addition, a "context-sensitive solutions" (CSS) approach that engages the community to determine needs and solutions and ensure community support has been useful in the transportation planning and decision-making process. These approaches are innovative and inclusive; help balance community, aesthetic, historic, and environmental values; promote social equity; and support transportation safety, maintenance, and performance goals. Another tool, ITHiM (Integrated Transport and Health Impact Model), allows agencies to assess the success of transportation programs by changes in the residents' physical activity levels and provides information about health benefits and risks and GHG reductions.Together, these innovative tools make it possible for agencies across the State to integrate transportation and land use considerations with multimodal and sustainable transportation strategies.

Smart Mobility FRAMEWORK

Smart Mobility moves people and freight while enhancing California's economic, environmental, and human resources by emphasizing:

- *Convenient and safe multimodal travel*
- *Speed suitability*
- *Accessibility*
- *Management of the circulation network*
- *Efficient use of land*

URBANFOOTPRINT

UrbanFootprint is a modeling tool that allows for detailed mapping and 'painting' of land use and transport futures and can work at regional, sub-regional, and local planning scales. It includes the ability to analyze scenarios based on a full range of fiscal, environmental, and public health metrics.

The model is in use by a broad range of public agencies and organizations such as Sacramento Area Council of Governments (SACOG), San Diego Association of Governments (SANDAG), and the Southern California Association of Governments (SCAG).

The CTP 2040 synchronizes land use and transportation planning to support livable, healthy communities. This includes ensuring consistency with SCS land use decisions and State, regional, and local plans. Healthy community strategies include utilizing location-efficient development, encouraging development that uses less "green" or undeveloped land and more "brownfield" – redeveloped, recycled, or repurposed land. Current and future freight facilities should also have compatible surrounding land uses. Other strategies apply smart growth principles to help ensure access to public transportation and transportation options for accessing jobs and services, and support safe routes to schools.

The CTP 2040 puts forth strategies that assist maintaining and creating healthier communities throughout the State. A key component of healthy communities is incorporating the three E's (Equity, Environment, and Economy). This includes viable integration of transportation modes and land use development, as well as creating destinations closer to together. There needs to be a focus on improving interregional transit service and "first mile – last mile" transit access strategies that provide greater opportunities for transit supportive development at transit stations located along State highways. Historically, many lower income communities have had to bear negative impacts of transportation projects. Thus, it is crucial that an equal distribution of impacts and benefits be considered in communities across the State.

These approaches encourage community involvement to balance regional and local interest. By engaging the public early and throughout land use and transportation planning processes, decisions will be made that better reflect a community's values and interests. Fortunately, with new technologies, it is easier than ever for the public to get involved in planning their communities. Stakeholders and citizens often test and vote on land use scenarios created by simulated computer modeling. With inclusive engagement, the public can help define and implement their community's vision and goals that support livable and healthy communities.

The CTP 2040 specifically calls out public participation strategies as a way to ensure a diversity of stakeholders, including those traditionally underserved, are involved early and often in the transportation planning discussions. This supports the goal of fostering livable and healthy communities.

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 businesses, communities, community-based organizations, goods movement stakeholders, environmental justice 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 for multimodal transportation facilities and 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.

Photo: Caltrans

P2-S6 Where appropriate, promote housing and land use development in coordination with multimodal transportation options; includes implementing the Smart Mobility Framework 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 that locate near transit or housing; and developers that build housing near employment centers.

P2-S9 Target funding toward existing communities – through strategies like 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 (such as access to public transit, safe transportation, recreation, healthy food, economic opportunities, and medical services) to enhance current transportation system performance measures.

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 Environmental Justice (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. See http://www.dot.ca.gov/hq/tpp/offices/ocp/ATLC/documents/august_15_2013/document_links/indicator.pdf

^ PMs identified in Smart Mobility 2010 A Call to Action for the New Decade. See http://www.dot.ca.gov/hq/tpp/offices/ocp/smf.html

G6: PRACTICE ENVIRONMENTAL STEWARDSHIP

The built environment of transportation infrastructure and facilities is often perceived to be in conflict with the natural environment due to such things as heat island effects, flooding, and runoff. The CTP 2040 is anchored with the 3 E's of sustainable planning, including "environment." Planning for environmental sustainability includes strategies for new fuel technologies, alternative transportation modes to single-occupancy vehicles, cleaner freight vehicles, as well as conservation of natural resources.

Photo: Caltrans

ARB VISION TOOL

Vision for Clean Air: A Framework for Air Quality and Climate Planning takes a coordinated look at strategies to meet California's multiple air quality and climate goals well into the future. A quantitative demonstration of the needed technology and energy transformation provides a foundation for future integrated air quality and climate program development.

The purpose of this goal is to present strategies that preserve the State's valuable natural, cultural, and agricultural resources, while avoiding costly project overruns and delays in planning and developing transportation infrastructure. Sustainability involves planning for balanced and long-term stewardship of economic and environmental resources, now and for the future.

Natural and Cultural Resources

The CTP 2040 strategies ensure consideration for natural and historic resources during the project development phases. This includes Native American and other cultural resources. The CTP 2040 encourages those working in the transportation sector to address issues collaboratively with partners in the resources arena and to partner on solutions. The challenge ahead is balancing transportation and land use needs with GHG emissions reduction mandates while considering environmental resources. As Figure 7 indicates, environmental considerations should be included in all phases of a project.

Mitigation and Adaptation

Early consultation and evaluation of environmental resource data ensures that transportation plans are integrated with other regional planning efforts, such as habitat conservation plans, integrated regional water management plans, housing elements and local general plans, local coastal programs and state forestry plans. This proactive consultation helps to identify environmental impacts of planned infrastructure projects and early opportunities to avoid natural resource impacts, and guide mitigation and planning decision making. Regional Advance Mitigation Planning (RAMP) and Statewide Advance Mitigation Initiative (SAMI) are two examples of proactive regional or large-scale advance mitigation planning. In addition, shifts to active transportation contribute to both mitigation and adaptation.

The RAMP and SAMI programs plan ahead for anticipated mitigation requirements before projects are in the final stages of environmental review, when the need to identify specific mitigation measures can delay project approvals. Working together, natural resource and infrastructure agencies can identify appropriate mitigation early in project timelines, avoiding permitting and regulatory delays. This allows public mitigation dollars to stretch further by securing and conserving valuable natural resources on a more economically and ecologically efficient scale and before related real estate values escalate.

FIGURE 7. DEVELOPMENT OF A PROJECT[29]

A more integrated, proactive and consistent approach guided by landscape and watershed-level resource planning is needed. Most states, including California, have a State Wildlife Action Plan (SWAP) that can be used as a guide along with other federally developed or certified plans such as forest, coastal zone management, watershed management, and habitat conservation, which supports wildlife corridors and mitigation strategies. The California Department of Fish and Wildlife is presently updating the 2015 SWAP that creates an ecologically-based framework for decision making.

Greenhouse Gas Emissions and Climate Change

Depletion of fossil fuels is a greater conservation and stewardship discussion beyond just California's transportation planning. GHG emissions produced from fossil fuel use have a direct link to the environment through global warming and climate change. More than 30 million Californians living in coastal communities are vulnerable to accelerated sea level rise and shoreline erosion--

threats to major transportation corridors and ports as well as other critical infrastructure along the coast. California is also vulnerable to rising temperatures, changing precipitation patterns, and increased storm surge and intensity.

Transportation use is the largest source of carbon dioxide (CO2) from the combustion of fossil fuels, accounting for almost 40 percent of GHG emissions in California. Presently, the California Natural Resource Agency is preparing *Safeguarding California: Reducing Climate Risk* which provides policy guidance for state decision makers, and is part of continuing efforts to reduce impacts and prepare for climate risks. Agencies including Caltrans are preparing sea-level rise vulnerability studies.

ZERO-EMISSION VEHICLE (ZEV)

By 2025:

- *Over 1.5 million ZEVs will be on California roads and their market share will be expanding;*
- *Californians will have easy access to zero-emission vehicle infrastructure*
- *ZEVs include battery-electric vehicles, plug-in hybrid-electric vehicles, and hydrogen fuel-cell-electric vehicles. These technologies can be used in passenger cars, trucks and transit buses.*

In addition to the depletion of fossil fuels, transportation fuel use also has a direct impact on air quality, and in turn, overall community health. Transportation and "traditional" air quality planning must be fully integrated, including an understanding of the interrelationship between congestion, travel growth, and transportation-related emissions. The CTP 2040 encourages such integrated planning with partner agencies such as ARB. In June 2014, ARB adopted the first update to the climate change scoping plan. This describes the approach California will take to reduce GHG to achieve the goal of reducing emissions to 1990 levels by 2020. While air pollutant exhaust is decreasing due to improved vehicle emission controls and fuel requirements, an increase of vehicle miles traveled and congestion limit the effectiveness of emission control programs and generate increases in other emissions that are very difficult to control.

The Office of Planning and Research is currently developing new CEQA guidelines in response to SB 743 (Steinberg). SB 743 establishes criteria for determining the significance of transportation impacts of projects within transit priority areas that promote the "…reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses."

A challenge ahead at the State and the regional planning level is consultation and comparison of plans, maps, and data with natural resources and the resulting mitigation and consultation that may be required. The key will be determining how to mainstream the consideration of environmental issues during the early planning process in order to adequately address environmental concerns.

The CTP 2040 strategies respond to public opinion and State policy regarding lowering fuel consumption, institutionalizing energy efficiency measures into planning, project development, operations, and maintenance of State transportation facilities, fleets, buildings, and equipment. These strategies require an adequate level of funding beyond current programming, as well as a concerted effort and collaboration on the part of the State, regional, and local agencies.

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 greenhouse gas 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, 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 development that minimizes impacts to natural resources and ecological systems (as required by MAP-21). 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 California cap-and-trade program, high-speed rail, 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 SCSs to better integrate adaptation strategies into regional plans.

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

P4-S12 Provide early funding for ZEV charging and infrastructure.

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 (http://www.dot.ca.gov/hq/tpp/offices/ocp/ATLC/documents/august_15_2013/document_links/indicator.pdf)

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CHAPTER 7
ANALYSIS AND OUTCOMES

The CTP 2040 differs from predecessor plans by including analyses of transportation improvement strategies, fuels, and vehicle technologies that provide for the maximum feasible reductions in greenhouse gas (GHG) emissions, as required under SB 391. SB 391 requires Caltrans to analyze how to attain a statewide reduction of greenhouse gas emissions to 1990 levels by 2020, and 80 percent below 1990 levels by 2050. Additionally, CTP 2040 evaluates the economic benefits of the Plan's transportation, fuel, and vehicle technology strategies.

The CTP 2040 analytics were conducted using software tools such as the new California Statewide Travel Demand Model (CSTDM), ARB's Vision Model, and TREDIS (Transportation Economic Development Impact System). Additionally, prior research on the effects of transportation strategies was also consulted.

This chapter presents a summary of the analysis and outcomes. There is an appendix that follows (The Chapter 7 Analysis and Outcomes Technical Report) which shows more details about the findings and analysis.

CTP 2040 ALTERNATIVES

To model and analyze the potential effectiveness of various packages of VMT and GHG emission reduction strategies, projects, and vehicle technologies, Caltrans developed three alternatives. The CTP 2040 forecasts future travel behavior and strategies to identify how California will meet SB 391 goals.

CTP 2040 FUTURE LAND USE ASSUMPTIONS

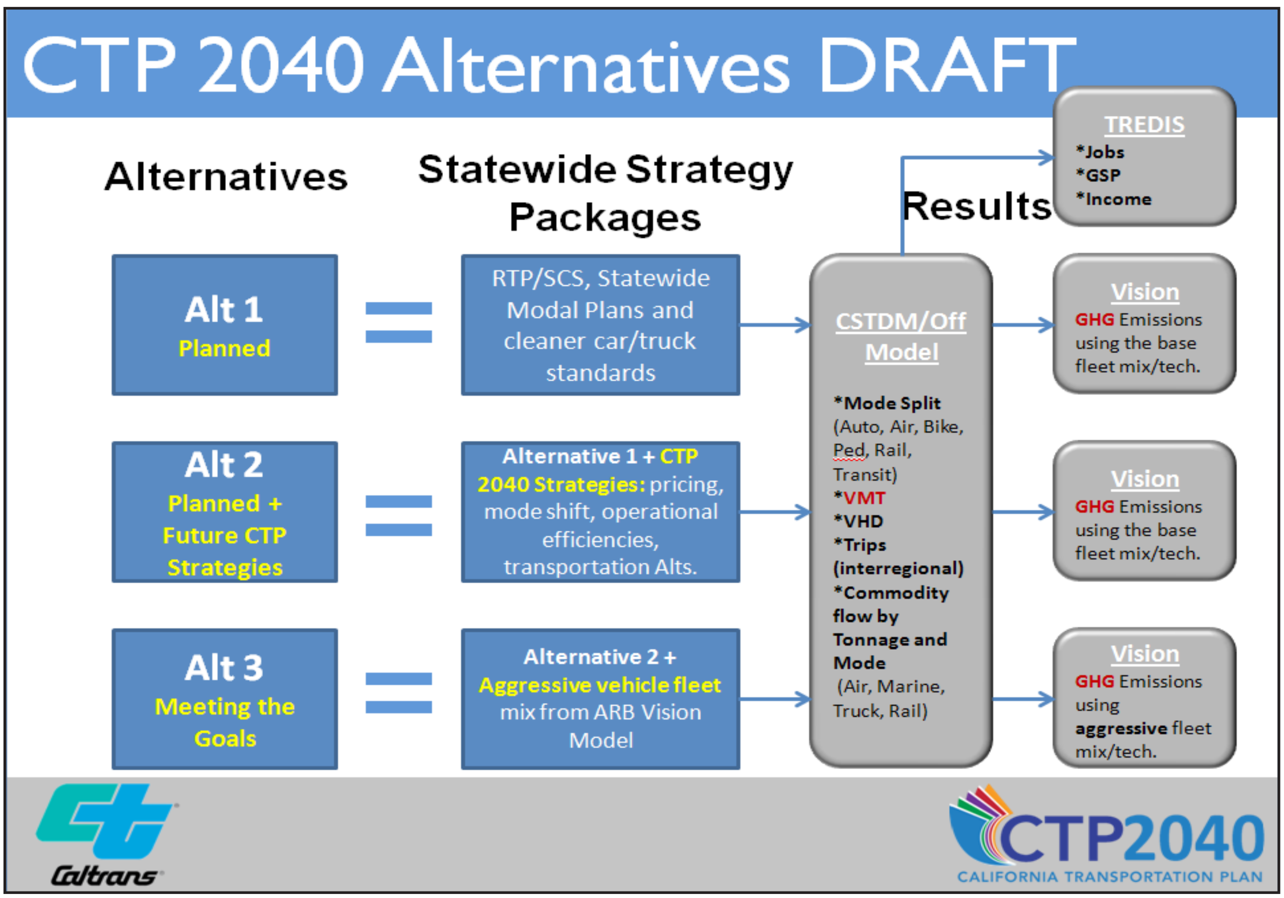
SB 391 is linked to MPO-level land use forecasting (through SB 375) by requiring Caltrans to assess how implementation of SCS will ultimately contribute to statewide GHG reductions. SCSs developed by California's MPOs have included significant changes to future land use assumptions and regional growth patterns compared with prior regional plans, including greater linkages between land use development and transportation planning to reduce dependence on auto travel and to reduce GHG emissions.

For the purposes of SB 391, Caltrans chose to use the SCS land use assumptions directly in the California CSTDM. Alternative land use strategies have not been assessed for the CTP 2040, given that land use planning is solely under the purview of local and regional agencies. However, recent research has shown that transportation-efficient land uses can reduce auto dependencies and also improves public health through more use of active transportation. Caltrans recognizes that growth in more transportation efficient land uses can provide even greater reductions in GHG emissions beyond those modeled in the CTP 2040.

Alternative 1 starts with SCSs from around the state, and the State modal plans. Alternative 2 applies statewide transportation strategies designed to reduce GHG emissions to the SCS's and State modal plans. Alternative 3 adds in future vehicle and fuel technologies to the statewide transportation strategies. These alternatives are designed to show the GHG reductions that may be achieved by different mixes of transportation strategies and technology. Each alternative will be evaluated for performance in a base year of 2010, 2020, 2040, and 2050. Figure 8 shows the alternatives, and how they feed into the models.

1. Alternative 1 - Planned (Current MPO SCSs and State Modal Plans)
2. Alternative 2 - Planned + Proposed Strategies (Current MPO SCSs and State Modal Plans plus Transportation Strategies)
3. Alternative 3 - Planned + Proposed Strategies + Future Vehicle and Fuel Technology (Meeting the Goals Through Vehicle and Fuel Technologies).

FIGURE 8. DRAFT CTP 2040 ALTERNATIVES MODELING (CALTRANS)



KEY COMPONENTS OF THE CTP 2040 ALTERNATIVES

Alternative 1: Current MPO and State Modal Plans

- MPO Sustainable Communities Strategies land use and transportation plans, effective Spring 2013. Caltrans' Modal Plans, including:
  - The California Aviation System Plan (CASP),
  - California Freight Mobility Plan (CFMP),
  - Interregional Transportation Strategic Plan (ITSP),
  - California State Rail Plan (CSRP), and
  - Statewide Transit
- The current mix of fuel efficiency and vehicle technology were determined by the ARB Advanced Clean Cars and In-Use Standards.

Alternative 2: Current Plans + Proposed Strategies

- MPO Sustainable Communities Strategies (same as Alternative 1)
- Caltrans' Modal Plans (same as Alternative 1)
- Fuel and vehicle technologies (same as Alternative 1)
- CTP 2040 package of GHG reduction transportation strategies

Alternative 3: Meeting the Goals

- MPO Sustainable Communities Strategies (same as Alternative 1 and 2)
- Caltrans' Modal Plans (same as Alternatives 1 and 2)
- CTP 2040 package of GHG reduction strategies (same as Alternative 2)
- A fleet mix of additional future fuel efficiencies and vehicle technologies, as assessed by ARBs Vision for Clean Air model, designed to meet the GHG emission reduction goals for 2020 and 2050

THE TOOLS

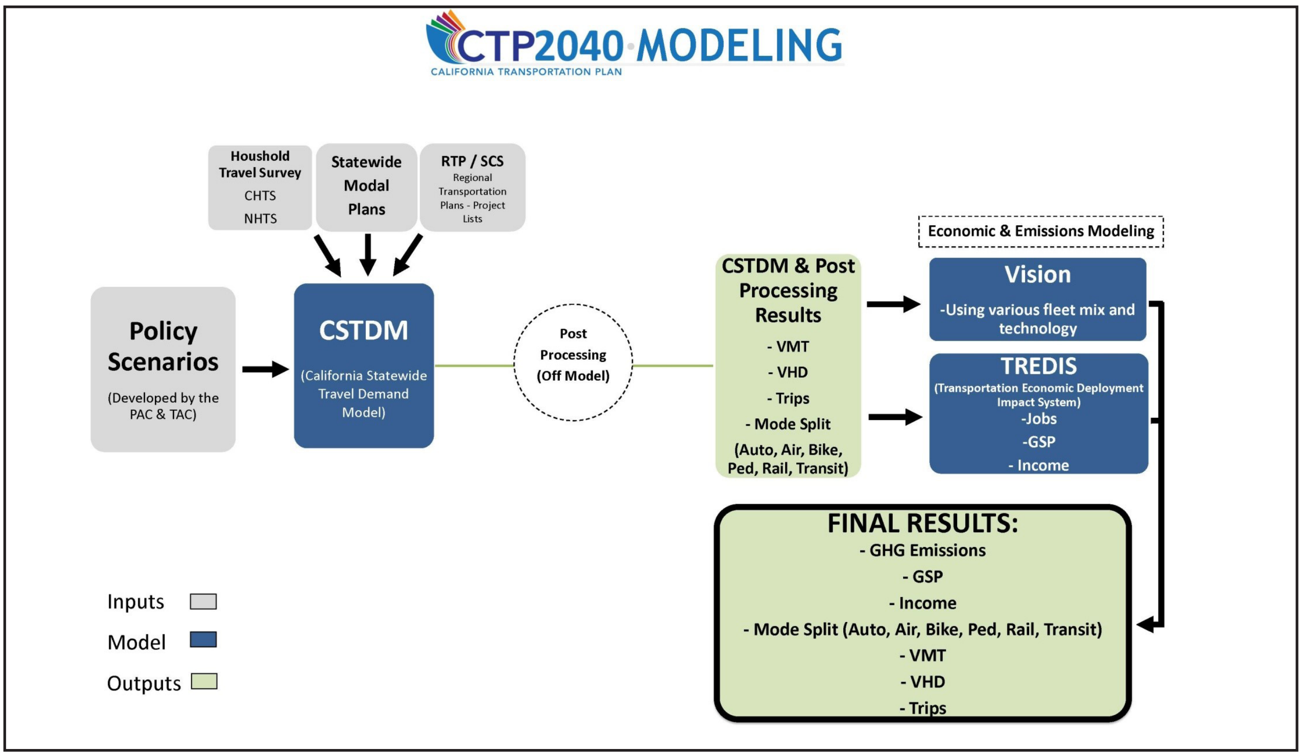
To address the new technical elements identified by SB 391, the CTP 2040 needed performance and analysis tools to estimate current and projected future impacts of transportation-related strategies on statewide GHG emissions, system performance, and economic activity. The tools used for the analysis include:

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

Induced and latent demands are two important and controversial topics for both environmentalists and transportation practitioners. Induced or latent demand is widely used to describe the observed increase in traffic volume that occurs soon after a new highway is opened or a previously congested highway is widened.[1] Additional information on how the CSTDM accounts for induced and latent demand can be found in the Chapter 7 Technical Report in Appendix B.

The following is a brief description of the tools, their individual functions, and how they contribute to the overall analysis. Figure 9 is a graphical representation of the modeling process information flows and interactions.

FIGURE 9. CTP 2040 MODELING PROCESS (CALTRANS)



California Statewide Travel Demand Model[2]

The CSTDM is a multimodal, tour-based, travel demand model covering the entire state that represents both personal and commercial travel. It incorporates statewide networks for roads, rail, bus, and air travel. It uses the 2011 California Household Travel Survey and the 2010 United States Census and incorporates regional estimates of zonal land use, employment, and population for model calibration and base-year assignment. The CSTDM outputs (vehicle miles traveled, vehicle hours of delay, trips, etc.) are used in the subsequent emissions and economic benefit analyses. The CSTDM addresses the vehicle activity aspect for the CTP 2040.

Emissions Factor[3]

The Emissions Factor (EMFAC) model is used to assess emissions from on-road passenger vehicles. The latest version of the model, EMFAC2011, was released in September 2011. The EMFAC2011 release is needed to support the ARB regulatory and air quality planning efforts and to meet the FHWA transportation planning requirements. EMFAC2011 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.[4] CSTDM outputs are then input to EMFAC2011 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[5]

The ARB VISION model is used for air quality and climate emissions planning. The model 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. It 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 will assess the economic impacts from the CSTDM as it relates to passenger and freight travel information. TREDIS addresses the economic forecasts from the vehicle activity of the CSTDM required by SB 391 for the CTP 2040.

VMT/GHG Reduction Strategies Used in the Alternatives

Regionally significant GHG reduction strategies pertaining to transportation are already being identified by the MPO RTPs/SCSs as required by SB 375. The CTP 2040, with guidance from the PAC and TAC, takes the regional analysis further with 15 statewide transportation strategies included in Alternatives 2 and 3 designed to provide maximum reductions in vehicle miles traveled (VMT), thus reducing green house gas (GHG) emissions. The transportation strategies were divided into four categories:

- Pricing;
- Transportation Alternatives;
- Mode Shift; and
- Operational Efficiency.

Table 17 shows the 15 transportation VMT reduction strategies and their categories. The CTP 2040 PAC and TAC were consulted and helped to guide the selection of specific strategies contained in Alternatives 2 and 3. During PAC and TAC involvement, additional input was gathered from all of the State's 44 MPOs and RTPAs. This was necessary to identify any gaps and overlap in regional transportation strategies. Based on this input, 15 transportation VMT reduction strategies were developed.

The transportation strategies comprise a range of options. A key element of the analysis was to convert the impact of each strategy into equivalent changes in VMT. Most of the strategies can be readily described in terms of VMT change; however, some measures had to be converted into equivalent VMT savings. Please see the Chapter 7 Technical Report for a more in-depth review of each transportation strategy.

Transportation strategy analyses were conducted using the CSTDM, or off-model from research gleaned from ARB Policy Briefs or MPO SCSs. One important consideration is whether the individual transportation strategies represented a policy or an objective. Policies were specific proposals that could be evaluated for potential effectiveness. For example, road pricing, i.e., a policy to increase the cost of driving, was evaluated using the CSTDM and produced a substantial decrease in statewide VMT. On the other hand, the transportation strategy to double the mode share of bicycling is an objective – and not based on a specific policy (or policies). Specific policies may ultimately be developed to achieve the objective of increasing bicycling usage.

The range of transportation strategies were narrowed to those presented in this chapter. Road capacity enhancing strategies were rejected due to concerns these would ultimately increase VMT. In addition, transportation strategies were intended to be assessed on a statewide basis – and not just in specific regions.

TABLE 17. DRAFT CTP 2040 TRANSPORTATION VMT REDUCTION STRATEGIES MATRIX

Category / Strategy	Assumption	Evaluation Method: Source	Policy or Objective	VMT Reduction (estimated)
Pricing				
Road Pricing Strategy	75% increase in auto operating cost	CSTDM	Policy	-17%
Transportation Alternatives				
Telecommute/ Work at Home	2.1% increase in work at home rate	Off-Model: SACOG	Objective	-0.39%
Increased carpoolers	5% increase in carpool vehicles	Off-Model: Calculated using CSTDM data	Objective	-2.9%
Increased Car Sharing	Net 5% increase in adoption rates -- short distance travel	Off-Model: MTC, CARB Draft Policy Brief	Objective	-1.1%
Mode Shift				
Transit Service Improvements	All transit services doubled; transit speeds doubled, free transfers, reduced transfer wait times	CSTDM	Policy	-6% (includes Transit Service Improvements and HSR fare reductions)
High Speed Rail	HSR fares reduced by 50%	CSTDM	Policy	Included as part of transit service improvements
Bus Rapid Transit	Ridership change from converting Local Bus Routes to BRT	Off Model: TCRP 118, CSTDM Data	Policy	-0.07%
Expand Bike	Doubled bicycle shares	Off Model: CSTDM Data	Objective	-0.41%
Expand Pedestrian	Double walk shares	Off Model: CSTDM Data	Objective	-0.43%
Carpool Lane Occupancy Requirements	Increase minimum 2+ occupancy to 3+	CSTDM	Policy	-0.80%
Increased HOV Lanes	Added HOV lanes, Interregional connectors; Fill missing gaps (mixed flow lanes converted to HOV)	CSTDM	Policy	TBD
Operational Efficiency				
Incident/Emergency Management	Implementation of Caltrans System Management and Operations Plan	Off Model: Caltrans	Policy	-1.0% equivalent VMT savings
Caltrans' (TMS) Master Plan	Implementation of TMS Master Plan	Off Model: Caltrans	Policy	-1.2% equivalent VMT savings
ITS/TSM	Implementation of ITS/ TSM strategies	Off Model: SACOG	Policy	-0.62%
Eco-driving	Reduced fuel consumption through changes in driving habits	Off Model: ARB Policy Brief	Objective	-0.23% equivalent VMT savings

Category 1: Pricing Strategies

ROAD PRICING STRATEGY

Industry analysts have predicted that road pricing will be among the most effective strategies in reducing VMT and GHG emissions. A forecast based on the CSTDM seemed to confirm this assumption, where the 73 percent increase on the cost of driving translated into a 17 percent reduction in VMT. The Chapter 7 Technical Report outlines the VMT reductions associated with different levels of increased road pricing strategies.

Category 2: Transportation Alternatives

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.[6] 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).[7] SACOG forecasted a 0.39 percent VMT reduction as a result of more people working from home. The CTP 2040 used this assumption.

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. The full set of assumptions used to calculate VMT reduction for increased carpooling is presented in the Chapter 7 Technical Report.

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.[8] 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, *"[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."*[9]

MTC analyzed carsharing as part of their 2012 Regional Transportation Plan.[10] They 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% increase in carsharing was assumed, and this resulted in a statewide reduction in VMT of 1.1 percent.

Category 3: Mode Shift

TRANSIT SERVICE IMPROVEMENTS STRATEGY

Many different transit service-related improvements can be used to increase transit ridership. For CTP 2040, an aggressive set of transit improvements was assumed for this draft strategy. Transit service levels were assumed to double over 2040 baseline conditions, transit speeds for all services were assumed to have been doubled, 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. However, the intention has been to identify the maximum VMT reductions from transportation strategies. Thus, the aggressive transit improvement strategy was devised. In particular, the transit strategy was also designed to help offset road pricing by making transit a more viable option.

Combined with the next strategy – reduced fares for high speed rail – this strategy reduced statewide VMT by 6.0 percent. More details are provided in the Chapter 7 Technical Report.

REDUCED HIGH-SPEED RAIL FARES STRATEGY

The HSR system in the CTP 2040 is the same as assumed in the 2013 California State Rail Plan 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 Alternative 1, but HSR fares are assumed to be reduced by 50 percent. The transit service improvements strategy appendix presents more details.

BUS RAPID TRANSIT STRATEGY

This strategy assumes that 20 percent of local bus services are converted to Bus Rapid Transit (BRT). *TCRP Report 118: Bus Rapid Transit Practitioner's Guide*[11] 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; 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.

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 assumed a VMT decrease statewide of 0.4 percent. Please see the Chapter 7 Technical Report in Appendix B for details.


Photo: Caltrans

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. Please see the Chapter 7 Technical Report for details in Appendix B.

CARPOOL LANE REQUIREMENTS STRATEGY

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 LANES

The high-occupancy vehicle (HOV) lane system is a strategy used to maximize the people-carrying capacity of California freeways. HOV lanes, often referred to as "carpool lanes," are managed lanes that limit access to vehicles with higher occupancy (currently these lanes vary between two or more, and three or more people). The high-occupancy toll (HOT), or express, lanes provide preferential access for HOV or toll payment.[12] The CTP 2040 assumes implementation of fully utilizing the existing capacity in the HOV and HOT lanes for complete system operational efficiencies.

Based on discussions with the TAC and PAC, it was assumed that the completion of the statewide HOV network will not result in additional highway capacity; rather, new HOV lanes will be converted from existing mixed flow lanes. These new HOV lanes will be primarily added in interregional corridors so carpool vehicles can travel on HOV lanes in a seamless manner between regions.

The VMT impacts of this strategy have not been evaluated using the CSTDM as of the current date of this report. This strategy will be evaluated in the near future, and included in a subsequent report revision.

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.[13] 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's TMS Master Plan focuses on three core processes that help regain lost productivity in congestion. The three core processes include 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 Caltran's traffic operations strategies, form a critical part of the overall system management strategy, and are the focus of this report.[14] 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.[15] The CTP 2040 assumes 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."* [16] The ARB referenced studies of fuel savings that found, on average, 2.3 percent fuel savings for drivers using eco-driving tactics. For the purpose of analysis for the CTP, eco-driving is analyzed as an off-model aspirational objective of a 10 percent adoption rate. Applying the 10 percent eco-driving adoption rate to the 2.3 percent fuel savings yields 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.

CSTDM Alternatives Equity Analysis

The CTP 2040 Alternatives 2 and 3 increase road pricing - expressed as auto operating costs (the costs of fuel and routine maintenance) - by 73 percent above Alternative 1 levels. This substantial increase in the cost of driving led some members of the PAC and TAC to question whether low-income travelers would be adversely impacted. To address these concerns, two transportation VMT reduction strategies were examined. First, just the road pricing strategy was tested, then both the road pricing strategy and the transit improvements strategies were tested together.

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 Alternative1 as shown in Table 18. Changes to non-auto modes also showed modest changes for low income travelers.

TABLE 18. YEAR 2040 SHORT DISTANCE PERSONAL TRAVEL MODEL MODE SHARES BY INCOME GROUPS (CSTDM)

		Drive Alone	HOV 2	HOV3+	Transit	Bike/ Walk	Total
Low Income	Alt 1	25%	28%	19%	10%	19%	100%
	Road Pricing (RP)	23%	27%	18%	11%	21%	100%
	RP + Transit	17%	26%	17%	17%	23%	100%
Med Income	Alt 1	34%	30%	22%	5%	9%	100%
	Road Pricing	33%	30%	22%	5%	10%	100%
	RP + Transit	28%	30%	21%	10%	11%	100%
High Income	Alt 1	44%	28%	20%	3%	5%	100%
	Road Pricing	43%	28%	20%	3%	6%	100%
	RP + Transit	38%	29%	20%	7%	6%	100%
All	Alt 1	36%	29%	21%	5%	9%	100%
	Road Pricing	34%	29%	21%	6%	10%	100%
	RP + Transit	29%	29%	20%	10%	11%	100%

When the road pricing 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 Alternative 1 to 11 percent for the road pricing strategy, and up to 17 percent for the road pricing strategy plus transit improvements.

This analysis indicated that effecting significant modal changes required both increases to the cost of driving and improvements to transit services. Thus, the impacts of the road pricing strategy can be mitigated—in terms of transportation accessibility—by simultaneously improving transit services. Additionally, the mix of road pricing strategy and improved transit services had the added benefit of also increasing bike/walk mode shares. Table 18 presents the mode share by percentage for income groups, while Table 19 shows the percent change in each mode related to the transportation strategies (road pricing and transit) relative to Alternative 1. This table helps to more clearly show the relative changes for each mode.

TABLE 19. YEAR 2040 SHORT DISTANCE PERSONAL TRAVEL MODE CHANGES IN MODE SHARES (COMPARED TO ALTERNATIVE 1) (CSTDM)

		Drive Alone	HOV 2	HOV3+	Transit	Bike/ Walk
Low Income	Road Pricing (RP)	-8%	-3%	-4%	11%	9%
	RP + Transit	-32%	-11%	-11%	65%	13%
Med Income	Road Pricing	-4%	0%	-1%	11%	11%
	RP + Transit	-20%	-2%	-3%	102%	19%
High Income	Road Pricing	-2%	1%	0%	10%	12%
	RP + Transit	-14%	1%	0%	155%	23%
Total	Road Pricing	-4%	0%	-1%	11%	11%
	RP + Transit	-19%	-2%	-3%	100%	18%

PERFORMANCE AND RESULTS OF THE CTP 2040 ALTERNATIVES

This evaluation shows the forecasted GHG emissions reduction, system performance, and economic benefits of the CTP 2040's three alternatives. For more in-depth documentation of the results and analysis, please refer to the Chapter 7 Technical Report in Appendix B.

VMT REDUCTIONS

VMT was calculated for CTP Alternatives 1 and 2 using the CSTDM. This data was then incorporated into ARB's VISION Model to determine total GHG emissions and fuel demand from 2010 to 2050. The types of vehicles highlighted in this analysis were light duty vehicles (LDV), heavy duty vehicles (HDV), HSR, aviation (intrastate), and rail (passenger and freight). The same VMT reduction numbers are used for Alternatives 2 & 3. Table 20 and Figure 10 below display total daily VMT in billions of miles for Alternative 1 in 2010 (the base year), 2020, and 2040, and the 2020 & 2040 VMT for Alternatives 2 & 3, as well as the percentage of reduction in VMT between Alternative 1 and Alternatives 2 & 3. CTP transportation strategies under Alternatives 2 & 3 resulted in a VMT reduction of 30 percent in 2040.

Vehicle miles traveled (VMT) is the total number of miles traveled on all roadways by all vehicles. VMT per capita is the total 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 second, by including all personal and truck travel. Personal VMT is expected to decline for Alternative 1 conditions due to the impacts of the regional SCSs. However, truck VMT is projected to increase over time, so total VMT per capita decreases somewhat less across CTP Alternatives when truck travel is included. See Table 21 and Figure 11 for a summary of the VMT results.

TABLE 20. TOTAL VMT FROM CSTDM FOR ALTERNATIVES 1 AND 2 IN BILLIONS OF MILES (CSTDM)

	2010	2020	2040
Alternative 1			
LDV	189.7	208	251
HDV	74	73.5	83
Total	**264**	**282**	**334**
% Difference from 2010		**7%**	**27%**
Alternatives 2 and 3			
LDV	-	204	161.9
HDV	-	73	71.3
Total	**-**	**276**	**233**
% Difference from 2010		**5%**	**-12%**

FIGURE 10. CHANGE IN DAILY VMT BY ALTERNATIVE RELATIVE TO 2010 (CSTDM)

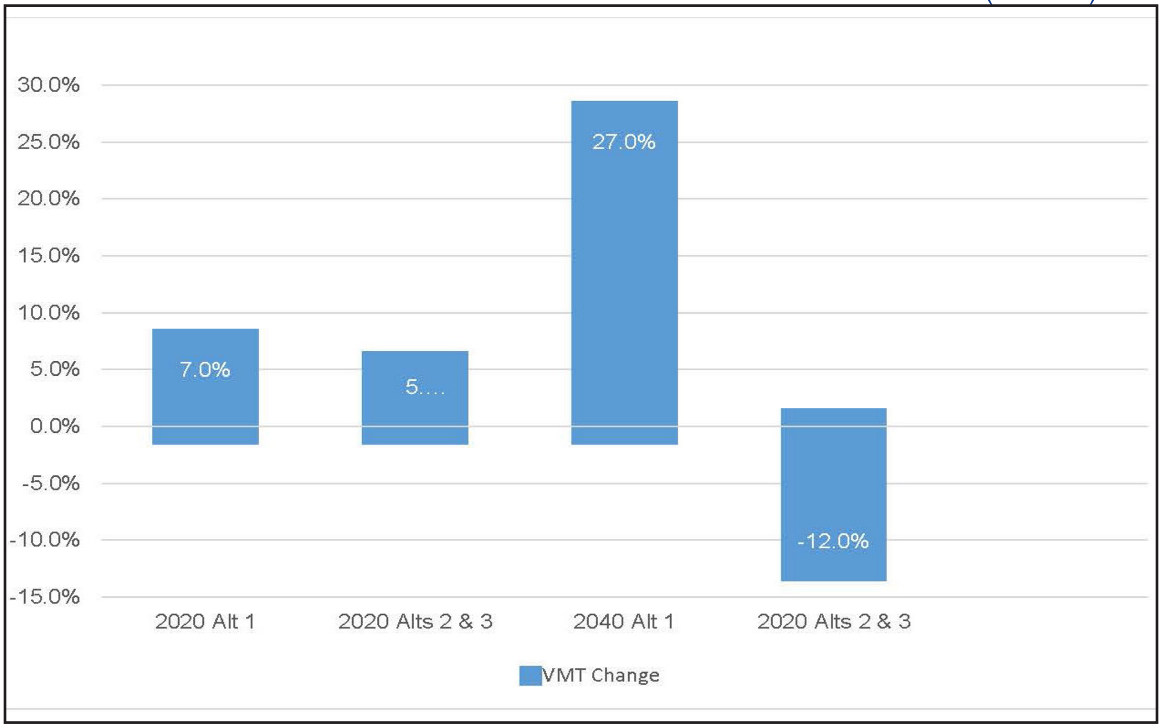
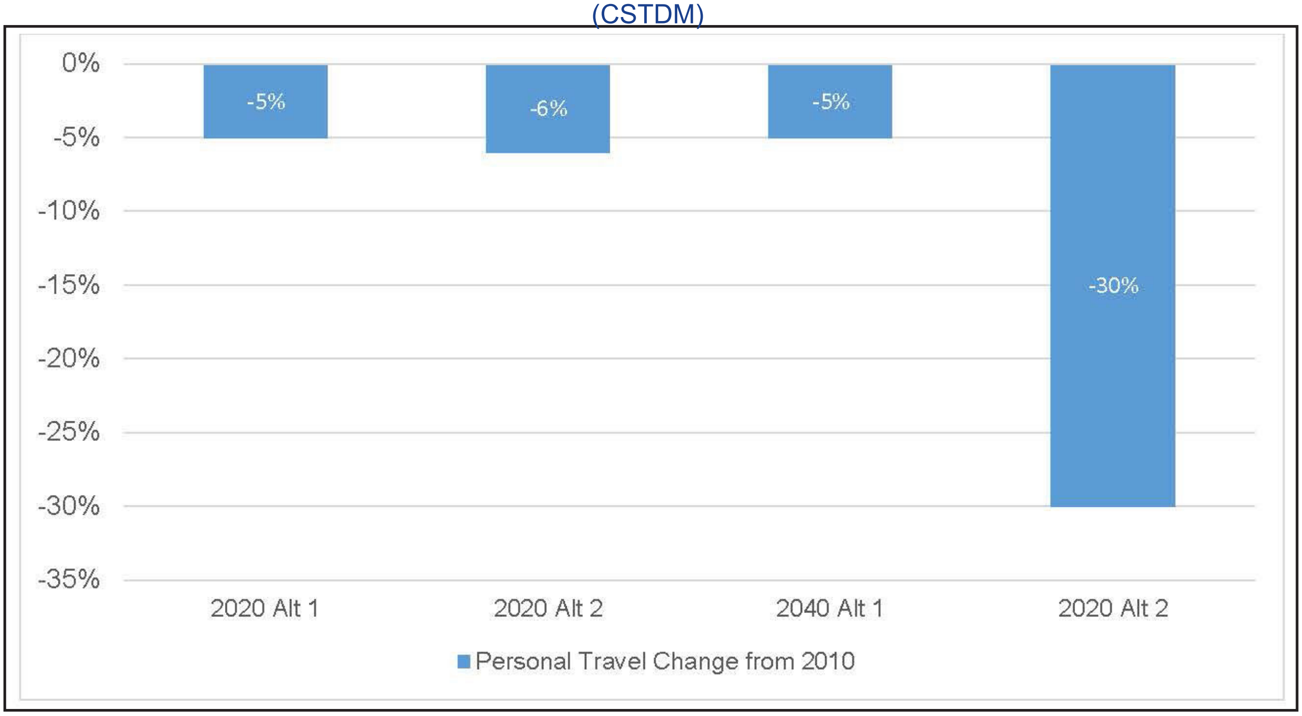


TABLE 21. VMT PER CAPITA (CSTDM)					
	Population	**VMT per capita - Personal Travel**	**Person-al Travel Change from 2010**	**VMT per capita - To-tal Travel**	**Total Travel Change from 2010**
2010	37,249,156	19.36	-	22.14	-
2020 Alt 1	41,559,731	18.37	-5%	21.41	-3%
2020 Alt 2&3	41,559,731	18.13	-6%	21.16	-4%
2040 Alt 1	50,357,006	18.41	-5%	21.58	-3%
2040 Alt 2&3	50,357,006	13.60	-30%	16.55	-25%

FIGURE 11. PERSONAL TRAVEL PER CAPITA VMT (CSTDM)



Vehicle-Hours-of-Delay (VHD)

Vehicle hours of delay (VHD) is a measure of congestion. One vehicle delayed for one hour equals one vehicle hour of delay. Many of the transportation VMT reduction strategies were intended to reduce VMT as a means to reduce GHG emissions. However, reducing vehicle hours of travel VHT and VHD can also reduce GHG emissions. VHD also serves as a useful measure of roadway congestion.

In 2010, approximately 898,000 vehicle hours of delay were estimated across the state, with delay more than doubling for 2040 Alternative 1. Alternative 2 transportation strategies are forecast to reduce delay to well below 2010 levels. Table 22 shows VMT and VHD in Alternatives 1 and 2.

TABLE 22 – VEHICLE HOURS OF TRAVEL AND DELAY (X 1,000) (CSTDM)

	VHT	VHD	% Congested
2010	14,459	898	6.2%
2020 Alt 1	15,329	965	6.3%
2020 Alt 2&3	15,329	965	6.3%
2040 Alt 1	19,322	1,929	10.0%
2040 Alt 2&3	13,634	587	4.3%

Greenhouse Gas Emissions

AB32 requires that the 2020 total GHG inventory be the same as the 1990 GHG inventory, then 80 percent below the 1990 GHG inventory by 2050 (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.

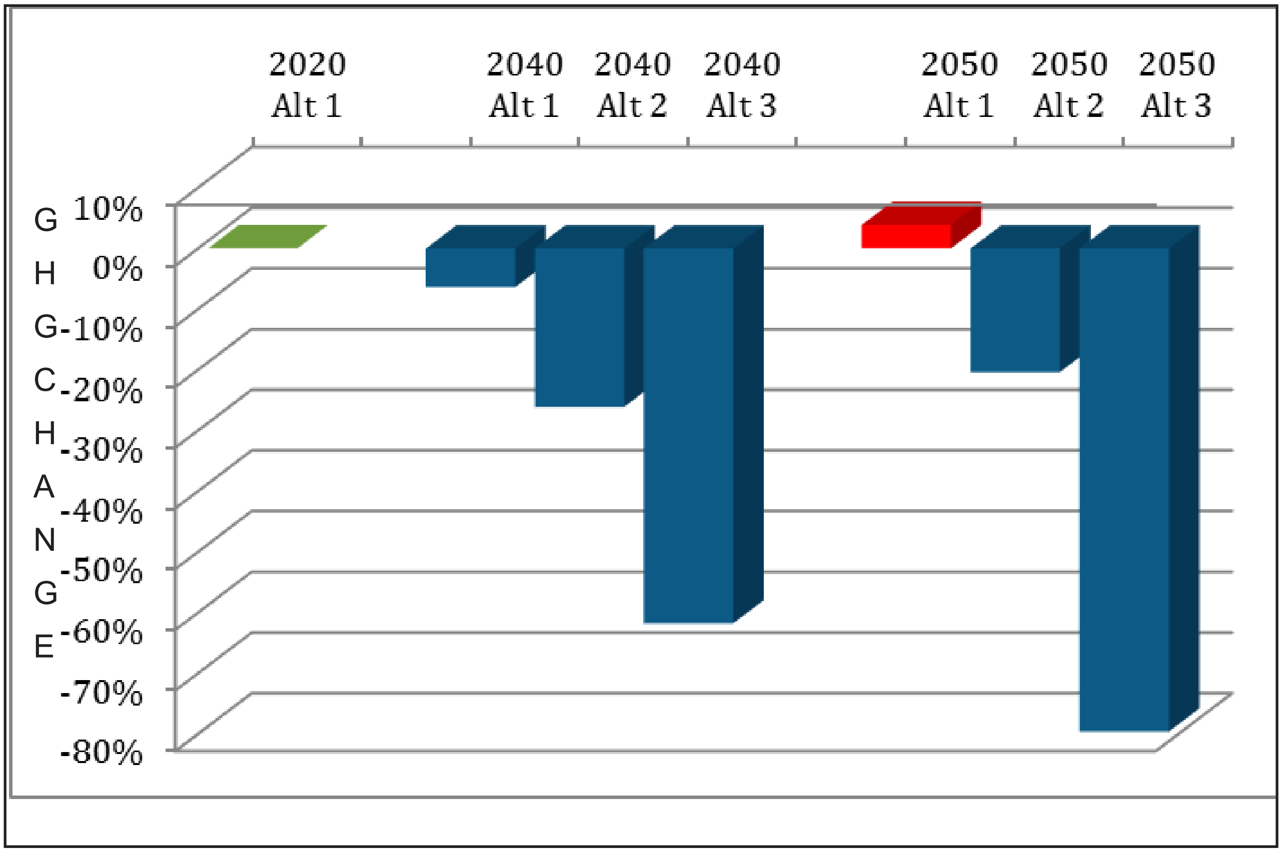
ARB calculated GHG reductions based on CSTDM VMT outputs for Years 2020 and 2040. EMFAC 2011 assumptions for GHG reductions were used for the draft version of this report. For the final report, new EMFAC 2015 assumptions will be used.

Preliminary GHG reductions are shown in Table 23 and Figure 12 below for Alternatives 1, 2, and 3. This table displays total GHG emissions (million metric tons, or MMT of CO2), and relative percentage reductions below 2020 for 2040 and 2050.

ARB assumed that the transportation sector 2020 GHG value calculated for Alternative 1 was the reference point for the 2050 GHG reductions

TABLE 23. DRAFT STATEWIDE GHG EMISSIONS BY CTP ALTERNATIVE (ARB)					
Alternative 1					
	2010	2012	2020	2040	2050
GHG Emissions (MMT CO2e / yr)					
Total	175	168	158	147	163
Target	-	-	-	-	32
GHG Relative Reduction Below Alternative* 20201 (%)					
Total	-	-	-	7%	-3%
Target	-	-	-	-	80%
Alternative 2					
GHG Emissions (MMT CO2e / yr)					
Total	174	168	157	116	125
Target	-	-	-	-	32
GHG Relative Reduction Below Alternative 1 20201 (%)					
Total	-	-	-	27%	21%
Target	-	-	-	-	80%
Alternative 3					
GHG Emissions (MMT CO2e / yr)					
Total	175	168	156	60	32
Target	-	-	-	-	32
GHG Relative Reduction Below Alternative 1 20201 (%)					
Total	-	-	-	62%	80%
Target	-	-	-	-	8%
* AB32 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 12. STATEWIDE GHG EMISSION CHANGES RELATIVE TO 2020
ALTERNATIVE 1 (ARB)



ECONOMIC IMPACT ANALYSIS OF CTP 2040

The economic impact analysis of the CTP 2040 focused on the pricing, mode shift and other transportation VMT reduction strategies described in Alternative 2. Pricing strategies target motorists by imposing additional costs for utilizing the roadway transportation system. The increased cost is offset by making active transportation modes a viable substitute to vehicle travel through capacity and network improvements. The changes in travel patterns resulting from the implementation of the strategies were estimated using the CSTDM. The outputs from the CSTDM analysis were used in the economic analysis.

Analysis Approach

The analysis was completed using the Transportation Economic Development Impact System (TREDIS) predictive impact model. TREDIS is an integrated economic impact and analysis tool covering a wide range of applications including benefits, costs, finance and macroeconomic impacts of alternative projects, plans and programs. The analysis started by establishing a baseline condition, Alternative 1, comprising of strategies identified in MPO/RTPA RTPs and State Modal Plans by year 2040. The changes in travel patterns due to increased travel costs result in wider economic impacts such as increased concentrations of businesses and labor markets, and access to intermodal facilities (such as ports, airports and rail transfer stations). Businesses benefit from closer proximity to suppliers, consumers and an expanded pool of labor, improving productivity of goods and services. The analysis generate a set of economic impact outcomes consisting of jobs, wages and income, and value added (Gross State Product equivalent) for the alternative scenarios. A comparative analysis between Alternative 1 and Alternative 2 analyzes the net economic impact from the pricing and mode shift strategies. The economic impacts of alternative 3 were not assessed because the financial impacts to travelers could not be quantified from the vehicle and fuel technology advancement identified in the Vision model.

Data Used in Analysis

The analysis was limited to passenger and freight vehicle movement on roadways and transit vehicles (including bus and rail), and also included bicycle and pedestrian usage. CSTDM results for CTP 2040 alternatives 1 and 2 included trips, VMT, vehicle hours traveled (VHT), and vehicle hours of delay (VHD) – all generated from the CSTDM. A fee or toll was assessed to each vehicle trip in Alternative 2 to simulate the increase in auto operating costs. Additional TREDIS default values were used, such as for the value of time, freight valuation, safety and environmental impacts. See the Chapter 7 Technical Report for more details on the TREDIS application methodology.

Analysis Results

The net effects of implementing the pricing and mode shift strategies identified in Alternative 2 over the analysis period result in net positive economic impacts. Travel cost increases to households and business are offset by greater access to production materials, as well as markets and labor from the reduction in travel and congestion, allowing businesses to increase productivity. The secondary benefits to the environment and public safety also offset additional pricing costs. However, the effects of positive marker and labor clusters decline and diminish over time as a growing populace and demand for travel erode the benefits previously gained from the implementation of Alternative 2.

TABLE 24. NET ECONOMIC IMPACTS FROM ALTERNATIVE 1 TO ALTERNATIVE 2 (2040) (TREDIS)

	2012/15	2016/20	2021/25	2026/30	2031/35	2036/40	Net Total (2040)
GSP ($mil)	$(2,000)	$16,000	$33,000	$23,000	$11,000	$(2,000)	$79,000
Jobs	(20)	87,000	2,200	(23,000)	(26,000)	(28,000)	13,000
Wage ($mil)	$(1,000)	$11,000	$23,000	$18,000	$10,000	$2,000	$64,000

Limitation of Analysis

Transportation's economic impact is only a fraction of the state's economy, as other exogenous variables effect economic growth. TREDIS only analyzes the economic impacts of transportation strategies. Broader impacts such as land use, market allocations, and reinvestments are not reflected in this analysis. Therefore, this analysis only serves as a barometer to the economy's response to the strategies identified in Alternative 2.

SUMMARY

This is the first CTP to analyze statewide alternatives intended to reduce VMT, hence reducing GHG emissions. At present, not all transportation strategies can be evaluated using the CSTDM. Additionally, the CSFFM was not available and therefore additional potential freight related transportation strategies were not included.

To model and analyze the potential effectiveness of various packages of VMT and GHG emission reduction strategies, projects, and vehicle technologies, Caltrans developed three alternatives.Tables 25-27 highlight the the three alternatives and how they performed. For more in-depth information on the analysis, please refer to the Chapter 7 Technical Report in Appendix B.

A series of recommendations from this analysis are included in Chapter 8. These recommendations include such things as data collection and analytic improvements to the CSTDM and CSFFM systems, and ways to reduce VMT and GHG emissions.

TABLE 25. ALTERNATIVE 1 RESULTS SUMMARY (CALTRANS)

Alternative 1 - Planned (Current MPO SCSs and State Modal Plans)					
	Alternative 1				2050 Target
	2010	*2020*	*2040*	*2050*	
Green House Gas Emissions (GHG) (MMT CO2/yr)	175	158	147	163	32
Vehicle Miles Traveled (VMT) (billions of miles)	264	282	334	-	-
Vehicle Hours of Travel (VHT) (hours x 1,000)	14,459	15,329	19,322	-	-
Vehicle Hours of Delay (VHD) (hours x 1,000)	898	965	1,929	-	-

TABLE 26. ALTERNATIVE 2 RESULTS SUMMARY (CALTRANS)

Alternative 2 - Planned + Proposed Strategies (Current MPO SCSs and State Modal Plans plus Transportation Strategies)					
	Alternative 2				2050 Target
	2010	*2020*	*2040*	*2050*	
Green House Gas Emissions (GHG) (MMT CO2/yr)	175	157	116	125	32
Vehicle Miles Traveled (VMT) (billions of miles)	264	276	233	-	-
Vehicle Hours of Travel (VHT) (hours x 1,000)	14,459	15,329	13,634	-	-
Vehicle Hours of Delay (VHD) (hours x 1,000)	898	965	587	-	-

TABLE 27, ALTERNATIVE 3 RESULTS SUMMARY (CALTRANS)					
Alternative 2 - Planned + Proposed Strategies + Future Vehicle and Fuel Technology (Meeting the Goals Through Vehicle and Fuel Technologies)					
	Alternative 3				**2050 Target**
	2010	***2020***	***2040***	***2050***	
Green House Gas Emissions (GHG) (MMT CO2/yr)	175	156	60	32	32
Vehicle Miles Traveled (VMT) (billions of miles)	264	276	233	-	-
Vehicle Hours of Travel (VHT) (hours x 1,000)	14,459	15,329	13,634	-	-
Vehicle Hours of Delay (VHD) (hours x 1,000)	898	965	587	-	-

Endnotes

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CHAPTER 8
RECOMMENDATIONS AND NEXT STEPS

"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."

The recommendations outlined in this chapter 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. 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 chapter is organized with the recommendations under broad-based themes or categories; many are provided within the context of the strategies from Chapter 6. Some of the recommendations can be implemented or adopted immediately, and others are longer term. 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, some recommendations appear in multiple categories.

SAFETY

Improve Public Safety and Security

Caltrans supports a proactive approach to improve and promote multimodal public safety and security. The focus on efforts to bring awareness to statewide importance of reducing fatalities and serious injuries has contributed to the reduction of such. However, there remains the need to reduce safety risks 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. ITSP, State Rail Plan, Freight Mobility Plan, 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 is evident in that California has experienced a

30.4 percent reduction in fatalities and 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 MAP-21 (Sections 1201, 1202 & 1203) that continue to promote safety and security, and encourage future reductions Towards Zero Deaths (TZD) and incorporating security approaches, such as Crime Prevention through Environmental Design (CPTED).

Lastly, Caltrans supports newer technologies investment 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 autonomous vehicles and interconnected multimodal systems.

Recommendations

SHORT-RANGE

- Invest in rail safety public awareness campaigns and social norming to change behavior related to impaired driving, railroad grade crossing safety improvements and safe operations for both passenger and freight rail.
- 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.[1]
- Identify hazardous materials transport routes that minimizes influence to communities and populated areas to the final destination.[1]
- Assess and minimize transportation security risks for hazardous materials shipment and appropriate measures to address the assessed risks.[1]
- Ensure 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.[2]
- 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.[4]
- Improve Positive Train Control (PTC) technology on all intercity and commuter passenger rail.
- Distribute safety data among planners to coordinate and find areas that could benefit from investments to improve the safety of the arterials, corridors, ramps, etc.

MID-RANGE

- Improve the quality, completeness, timeliness, and uniformity of safety data and the sharing among federal, state, and local agencies and stakeholders.[4]
- Fund regional EMS programs to ensure rural communities have access to the latest "state-of-the-art" rescue and extrication equipment.[5]
- Fund "corridor 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 Crime Prevention through Environmental Design (CPTED) approach deters crime and provides security through environmental design in transportation systems.
- Establish requirements, collaborate and support research for manufacturers of connect/autonomous vehicles, Self-Guided, Magnetic Bus Technology to meet specific safety requirements that has the potential to improve safety, costs, and efficiency in reducing passenger fatalities and traffic incidents as well as operational benefits.

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, allow for better transit and to be consistent with 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 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 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, environmental justice and public health impacts.
- Promote efficient infill housing development and redevelopment opportu¬nities to reduce urban sprawl consistent with SB 375, the Sustainable Community Strategies, and other regional and State policy guidance.
- Implement the Smart Mobility Framework principles statewide to integrate the transportation system and encourage non-motorized forms of transportation and Complete Streets.
- Identify potential pedestrian and bicyclist improvements on state highways and work toward development of those projects.[10]
- Promote the Affordable Housing and Sustainable Communities Program.
- Work with tribal governments using principles of coordination, collaboration, and engagement to improve transportation for tribal communities.
- Support infill development around High Speed Rail stations.

MID TO LONG RANGE

- Partner with industries and innovators involved in technological approaches to environmental improvement.
- Follow the model of the California Health in All Policies Task Force 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.
- 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, 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 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 and 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 air pollution 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 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 and storm events, and other climate change indicators that affect the future of com¬munities, infrastructure, and ecosystems.
- Support electrification of passenger rail, mode shift from planes and autos to high speed rail, and investments in renewable energy sources for transportation.
- Promote and expand strategies such as the Cap-And-Trade program and High Speed Rail, and enhance environmental stewardship locally, regionally, and statewide.

MID-RANGE

- Partner with State agencies to implement recommendations from the 2014 AB32 Scoping Plan Update.

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, and technological innovations. 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, such as general land uses.
- Prioritize funding toward transportation alternatives that enhance efficient and affordable mobility.
- Work with tribal governments to improve access to State highways from tribal lands.

MID TO LONG-RANGE

- Adjust the pricing of transportation modes to reflect the total cost for each mode, including health and environmental costs.
- 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.

Obtaining 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, it has been decades since motor fuel taxes have increased, let alone indexed 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 of a pricing strategy
- Establish and/or expand GHG Reduction Fund Programs.

LONG-RANGE

- Create a transportation State sales tax component
- Create a tax increment financing or transportation financing districts. This would be similar to a Mello-Roos tax

through which community districts would be able to finance transportation improvement projects.

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

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. Sea-level rise (SLR) is a significant risk of climate change and brings uncertainty of how SLR would affect 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 SHOPP and STIP programs and projects.
- Coastal communities must utilize Local Coastal Programs (LCPs) alongside general plans to implement climate change adaptation where impacts of SLR are most intense.
- Avoid planning, developing, or building in places where structures will require significant protection from sea level rise, storm surges, or coastal erosion during the expected life of the structure.[17]
- Focus on reliable transportation routes away from SLR impacts on harbors and ports[18], airports, access roads, trail tracks, and bridges.
- Track sea level rise and other climate change indicators such as interactive maps and modeling that identify transportation infrastructure that could be vulnerable to environmental and climate changes.

MID TO LONG-RANGE

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

MULTI-MODAL SYSTEM ENHANCEMENTS

Active Transporation System (Bicycling and Walking)

California must establish a flexible and efficient transit system that will play a role in bettering the multimodal transportation system. Transit is a key component of the CTP 2040. Stakeholders in California expect a lot from transit; it can function to serve a range of policy goals. Environmental, social, and economic goals require increased transit ridership, but the cost of increasing ridership falls squarely on the shoulders of California's public transit agencies. Agencies must increase ridership cost-effectively for the State to achieve its broader policy goals. This includes commuter rail, intercity rail, ferry and various types of bus service.

Often the transit system and active transportation such as bicycling and walking 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 participate in active transportation modes and help educate travelers on the benefits of not using a car.[19]
- Offer strategic planning workshops for best transit-oriented strategies at the local level.[20]
- Support local/regional multidisciplinary efforts to ensure safe active transportation is a priority for all jurisdictions in the State.

MID TO LONG-RANGE

- Fund and expand Active Transportation programs that promote carpooling, transit, walking and bicycling and other active modes of transportation.[21]
- Create safe and effective walking and bicycling facilities that create neighborhood connectivity and continuity.
- Leverage private sector investment to find more alternatives to automobiles.[18]
- Experiment and evaluate alternatives through providing pilot projects that allow for better understanding of successful and unsuccessful strategies to help improve current transit services.[19]
- Find ways to improve non-auto interregional and interstate travel modes.[19]
- Work with transit operators to help them understand real-time passenger information system, as well as offering grants that can help to offset initial costs of publishing data.[19]
- Division of Mass Transportation can work with local transit stakeholders throughout the state to evaluate and learn from the Bus Rapid Transit project, which can help identify best-practices.[19]

- Improve perception of transit services by working with other State and local agencies.[19]
- Report vanpool service data to attract federal funds.[19]
- Share successes and lessons learned to state-wide transit authorities in order to build momentum towards implementing strategies that will improve transit services.[19]
- Optimize traffic signal timing for transit or bicycle speeds to improve the multimodal efficiency on complete streets.[22]
- Improve transit payment methods to speed up vehicle boarding, which in turn can increase the efficiency of buses arriving on-time more often.[21]
- Create circulator service which specializes in transit to link popular and frequently visited destinations within universities and downtown areas.[21]
- Improve upon scheduled transfers between regional transit services.[21]
- The State can work with tribes to identify potential pedestrian and bicyclist improvements on state highways in Indian Country and work toward development of those projects.[23]

Expand Tranist Services and Operations

Perhaps the most cost-effective option to improving transit and intercity, commuter, and high speed rail service in California is to better leverage what has already been put into place. Transit operators throughout the state have experienced both successes and failures in identifying and implementing cost-effective means to increase patronage. Caltrans and University of California researchers have also researched roadway treatments such as bus-on-shoulder and bus-only lanes, and case studies of lessons learned. California's transit operators can build upon these experiences to avoid the expense of additional studies and the risks of uninformed experimentation. Access to such studies can help agencies identify and implement strategies to improve transit and achieve future ridership goals.

Transit operators have many options at their disposal that do not require trade-offs with automobiles, but some measures will require that Caltrans and local governments prioritize transit and high-occupancy vehicles over single-occupancy vehicles. These measures are likely to be a source of conflict throughout California as it moves toward a sustainable transportation future in pursuit of its social, environmental, and economic policy goals. Caltrans can support local governments and regions that chose to prioritize transit by accelerating the implementation of transit-priority measures on State-administered facilities

Recommendations

SHORT-RANGE

- Understand the implications of changing market demands for transit service and demographics.
- Coordinate with tribes to expand transit services.
- Work with other State agencies to improve the perception of transit in California.
- 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.
- Streamline reporting processes for State and federal grants and funding allocations.
- Provide statewide resources for customer service improvements like passenger information systems.
- Report publicly-sponsored vanpool service data in order to attract federal operating funds.
- Re-purpose underutilized space to transit.
- Support voluntary efforts to consolidate and coordinate non-core functions among multiple agencies.

MID TO LONG-RANGE

- Identify and implement rail capital improvements targeted at integrating existing passenger rail systems and supporting planned California High Speed Rail service
- Address institutional and operational barriers to implementing an integrated rail passenger network in California.
- Expanding funding for transit service operations and capital improvements.
- Support local-regional transit seamless transfers to and from high speed rail.

Improve Multimodal Mobility and Accessibility for All

Californians want a transportation system that is safe, reliable, and cost effective along with a sustainable environment that takes into consideration the health of the public and the community's character. Mobility and accessibility are important factors in transporting goods and services through the state. 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 and managing to optimize the State's existing highway system.

The cost of travel is a leading concern for many Californians. Moreover, transportation inequity becomes a concern for stakeholders when Californians with lower socioeconomic status 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 tourism economy

Recommendations

SHORT-RANGE

- Create modal plans and programs that synchronously improve safety and system operations while taking the community, environmental and economic goals in mind.
- Implement land use strategies that reduce impedance through the reduction of distances in consumer activities (ex: shopping, recreation, etc.).[24]
- Create public spaces with bicycle/pedestrian and transit access in order to reduce automobile dependency.[23]
- Work with tribal nations and communities to improve multimodal accessibility and mobility by integrating the tribal transportation network into the overall transportation network.
- Create new transportation demand management strategies that improve travel efficiency;
- Increase subsidies for projects or programs that provide greater access and connections for the public to desired destinations.

MID-RANGE

- Focus on transit-oriented development projects that capitalize on incorporating high-density, mixed use areas that reduces individual dependency on cars encourages the use of transit.[23]
- Support infill development to slow urban sprawl and increase density which will reduce distances between consumer activities, thus encouraging more people to take advantage of transit services, bicycling and walking.[23]
- Increase the efficiency and reliability of transit service trips by having signal timing to favor public transit. [25]
- Re-design the current roadways to integrate medians, channelized islands, and roundabouts to increase automobile throughput and multimodal accessibility.[24]
- Ensure that an interconnected, multi-modal transportation network serves all segments of the State's population as well as the significant number of tourists that visit each year from various destinations.
- Add bicycle lanes, and change signal timing/countdown to increase safety at cross intersections.[24]
- Look at ways to develop more rideshare programs and efficient parking management strategies that will allow more people to move with the existing infrastructure in place.[24]

- Work with tribes to improve multimodal accessibility and mobility.

Promote Sustainability in Rural Communities and Small Towns

CTP 2040 supports sustainable and active transportation options for all California's residents; however, rural communities and small towns have special transportation challenges due to the sparse and widely spread populations. Communities must work towards planning a balanced, interregional, and interconnected transportation system through maintaining the existing road system which faces severe weather conditions. These factors jeopardize pavement integrity as well as the travel safety. CTP 2040 recommends strategies and options to address 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]
- Provide accessibility to regional jobs markets, which can allow the transport of local made goods to urbanized areas as well as build connectivity for tourists and consumers for rural community businesses.[27]
- Create efficient and sustainable transportation solutions that embrace communities' unique context and culture.[28]
- Integrate planning for the aging population in rural community and agency projects and services.[29]
- Educate rural residential developers about integrating bicycling, walking and public transit into rural projects and plans.[27]
- Increase the frequency of transit services that are available to riders at a level that can support their daily activities.[27]

MID-RANGE

- Increase the State Transit Assistance 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.[25]
- Develop rural roadways to support multi-modal accessibility for bicyclists, walking pedestrians, transit and automobiles.
- Encourage private sector companies to invest within the existing rural and small town communities.[28]
- Link areas that have labor shortages with communities that have a surplus amount in labor.[30]
- Increase connectivity to medical care and social services, employment and educational facilities to increase health and quality of life within the rural residential communities. Also build proper accessibility to employment and educational facilities.[28]

- Partner with local, regional, and tribal governments on planning rural transit improvements with rural transit agencies.

SYSTEM EFFICIENCY AND TECHNOLOGY

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 quickly advance projects that will reduce GHG emissions by improving the efficiency of the environmental review process.
- Develop implementation guidance for SB 226 (expanding SB 375 CEQA streamlining provisions) with the Governor's Office of Planning and Research.
- Develop advance-mitigation-planning programs among Caltrans and other State departments that will allow simultaneous consideration of the environmental effects of several planned infrastructure projects.

Coordinate Data and Analysis

The CTP 2040 performance measures should be used statewide to compare like metrics across regions. The CSTDM (see Chapter 7) is a key tool for better understanding statewide travel and the cumulative effects of regional planning efforts on the transportation 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 available data statewide.

Systemize Traffic Management

The CTP 2040 shows that Traffic Management Systems (TMS) are an effective and economical way to improve the current transportation system within California through: 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 TMS technology and the maintenance of current devices. The management of the SHS can move from reactive to active traffic management, finally finding a predictive method/technology that will allow engineers to relieve traffic congestion before it occurs.

Recommendations

MID-RANGE

- Develop a performance-based framework that prioritizes TMS work activities and funding.[31]
- Create a TMS infrastructure that fosters high-performance and good maintenance which will improve real-time system management.[30]
- Develop and implement real-time corridor-wide strategies that optimize traffic flow, pedestrian safety and the reduction of GHG's while working in cooperation with jurisdictional stakeholders.[30]

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 and traffic at conventional toll booths.[32]
- Adopt adaptive traffic signal controls which can help with the reduction in delays and GHG emissions. Using adaptive control over traffic signals through real-time can improve the efficiency of corridors and traffic conditions through optimized algorithms.[31]

LONG RANGE

- Explore the technology of Connected Vehicles and Vehicle Platooning.

Manage Transportation Demand

The CTP 2040 supports Transportation Demand Management (TDM) tools to develop ways pedestrians can participate in sustainable and environmentally friendly modes of travel through: ridesharing, transit, telecommuting, biking and walking.

Recommendations

SHORT-RANGE

- TDM strategies must be incorporated into general planning.[33]
- Congestion management systems should incorporate TDM strategies that enhance regional mobility and accessibility to maximize transportation efficiency.[32]
- Make TDM strategies that address mobility and accessibility a part of the public involvement dialogue to gain broadened community support.[32]
- Implement TDM 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.[32]
- Implement strategies that limit automobile traffic through reducing total vehicle mileage.[32]
- Inform companies of the benefits of offering alternative work arrangement strategies to employees, such as: telecommuting, flextime, and compressed work weeks.[32]

MID-RANGE

- Put forth strategies that will shift travel to be more transit focused and rideshare oriented to provide better road safety benefits.[32]

Invest Strategically

The CTP 2040 sets a strategy for Caltrans and its partners to address mobility needs on interregional 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 State Highway Operations and Protection Program (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 because of limited funding. 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]

Recommendations

SHORT-RANGE

- Avoid funding projects that add road capacity and increased maintenance costs.
- Use California State Transportation Demand Model (CSTDM) findings (see Chapter 7) to make sound investments in communities.
- Preservation of the existing transportation system should always be high priority when making investment decisions on maintenance and rehabilitation.[35]
- Maintain the existing SHS and roads which would also include 46 percent of the state's road miles in rural areas.
- Make quick and preventive treatments to avoid more costly maintenance in the future. Utilize and install new operational strategies and technologies to optimize the use of system capacity.[36]
- Gain efficiency from better coordination of diverse services, better features, and greater ridership.[37]

LONG-RANGE

- Target rail capital improvements that serve to integrate the network, that have system-wide benefits and that maximize the use of existing infrastructure capacity.

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 of fifteen major freight chokepoints and bottlenecks throughout California. Total shipment by weight is expected to grow by 180 percent by 2040. This growth leads to concerns about the State's ability to meet freight movement demands.

SHORT-RANGE

- Incorporate 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 Management 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.

MID-RANGE

- Create a dedicated, reliable, and long-term freight funding program.
- Maximize resource in 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 pubic roadways.
- Preserve light-density 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.[40]

MID TO LONG-RANGE

- Preserve light-density freight rail lines, identify and implement improvements in shared-use corridors allowing expansion of both freight and passenger rail operations to meet market demands, and invest in dedicated freight rail infrastructure in heavily used corridors.

MID TO LONG-RANGE

- Preserve light-density freight rail lines, identify and implement improvements in shared-use corridors allowing expansion of both freight and passenger rail operations to meet market demands, and invest in dedicated freight rail infrastructure in heavily used corridors.

Long Distance Multimodal Transportation

Multi-modal long distance transportation includes ground access, air and rail. Together, these modes create a long-distance transportation network. The multimodal transportation system continues to be a visible and important part of the State. Aside from the familiar use of meeting commercial passenger and air cargo needs, California's General Aviation airports are redefining themselves to better support community job growth and economic sustainability. In addition, High Speed Rail is making its way into the future transportation system.

Recommendations

SHORT-RANGE

- Serve as transfer 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.
- Sitting law enforcement, fire and medical support services in an area that accommodates aviation training and operations.

RECOMMENDATIONS FROM MODELING ANALYSIS

Reduce VMT

SHORT-RANGE

- Create policies to incentivize employers to provide greater telecommuting options, and alternative work schedules designed to reduce work-related travel reduce drive-alone commuting to work.
- Secure additional funding to implement significant transit improvement strategies, including, but not limited to, increasing speeds, decreasing fares, increasing BRT, and improving transfer times.
- 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.

MID-RANGE

- Create legislation to implement an aggressive mix of VMT reduction strategies, including, but not limited to, road pricing strategies, increasing car sharing, increasing the minimum carpool requirements, and increasing HOV lanes.
- Utilize funds from the road pricing strategies to fund improvements for driving alternatives.

- Expand High Speed Rail

Reduce GHG Emissions in the Transportation Sector

LONG-RANGE

- Create incentives for drivers of Zero Emissions Vehicles (ZEVs), to greatly increase the percentage of these vehicles 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, hydrogen, 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.

Advance Modeling and Data

SHORT-RANGE / ONGOING

- Secure stable funding for statewide 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, CSFFM, EMFAC, and Vision 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 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.
- 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.

CONCLUSION

The goals, strategies, policies and recommendations for the CTP 2040 respond to the rapidly changing demands of transportation services and the transportation system in California. The CTP 2040 is a plan for all of California and seeks to provide a unified approach to statewide transportation planning and policy. The recommendations give the people of California a guide for how Caltrans, along with other State, regional and local agencies, and individuals contribute to transportation planning in a way that meets GHG emissions reduction targets and the meet the vision for a transportation system that is safe, sustainable and globally competitive.

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ABBREVIATIONS AND ACRONYMS

ARB	Air Resources Board
APS	Alternative Planning Strategy
ATP	Active Transportation Program
BIA	Bureau of Indian Affairs
BOE	California Board of Equalization
BRT	Bus Rapid Transit
CalSTA	California State Transportation Agency
Caltrans	California Department of Transportation
Cal VIUS	California Commercial Vehicle Inventory Survey
CARB	California Air Resources Board
CASP	California Aviation System Plan
CEQA	California Environmental Quality Act
CFMP	California Freight Mobility Plan
CHSRA	California High Speed Rail Authority
CHTS	California Household Travel Survey
CIB	California Interregional Blueprint
CO2	Carbon Dioxide
CPTED	Crime Prevention through Environmental Design
CSFFM	California Statewide Freight Forecasting Model
CSMP	Corridor System Management Plans
CSTA	Consolidated Transportation Services Agencies
CSTDM	California Statewide Travel Demand Model
CSRP	California State Rail Plan
CSS	Context Sensitive Solutions
CTC	California Transportation Commission
CTP	California Transportation Plan
CTIP	California Transportation Infrastructure Priorities
E-85	Ethanol Fuel Blends
EGPR	Governor’s Environmental Goals and Policy Report

EJ	Environmental Justice
EMFAC	ARB's Emission FACtors model
EMS	Emergency Medical Services
EOP	Emergency Operations Plan
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GARVEE	Grant Anticipation Revenue Vehicles (bonds)
GHG	Greenhouse gas
GIS	Geographic Information System
GSP	Gross State Product
HDV	Heavy Duty Vehicles
HOT	High Occupancy Toll lanes
HOV	High Occupancy Vehicle
HSR	High-speed rail
HTF	Highway Trust Fund
HVTU	Heavy vehicle use tax
ICM	Integrated Corridor Management
ICS	Incident Command System
IFD	Infrastructure Financing District
IRR	Indian Reservations Roads program
IRS	Internal Revenue Service
ITHiM	Integrated Transport and Health Impact Model
ITIP	Interregional Transportation Improvement Program
ITS	Intelligent Transportation Systems
ITSP	Interregional Transportation Strategic Plan
LCCA	Life-cycle Cost Analysis
LCP	Local Coastal Programs
LDV	Light Duty Vehicles
LOS	Level of Service
MAP-21	Moving Ahead for Progress in the 21st Century

MMT	Million Metric Tons
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organizations
MTC	Bay Area Metropolitan Transportation Commission
MTP	Metropolitan Transportation Plan
NHTS	National Household Travel Survey
OPR	Office of Planning and Research
OWP	Overall Work Programs
PAC	Policy Advisory Committee
PaveM	Pavement Management System Software
PeMS	Caltrans Performance Measurement System
PPP	Public Participation Plan
PTA	Public Transportation Account
PTC	Positive Train Control
RAMP	Regional Advance Mitigation Planning
RTA	Reservation Transportation Authority
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
RTPA	Regional Transportation Planning Agencies
RUCS	Rural-Urban Connections
SACOG	Sacramento Area Council of Governments
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAMI	Statewide Advance Mitigation Initiative
SANDAG	San Diego Association of Governments
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategies
SFTI	Sustainable Freight Transport Initiative
SHA	State Highway Account
SHOPP	State Highway Operations Protection Program

SHS	State Highway System
SHSP	Strategic Highway Safety Plan
SLR	Sea Level Rise
SMF	Smart Mobility Framework
SRTS	Safe Routes to School
STA	State Transit Assistance
STIP	State Transportation Improvement Program
SWAP	State Wildlife Action Plan
TAC	Technical Advisory Committee
TCRP	Traffic Congestion Relief Program
TEROs	Tribal Employment Rights Ordinances
TEUs	20-foot Equivalent Units
TDA	Transportation Development Act
TDM	Transportation Demand Management
TMS	Caltrans's Traffic Management System Master Plan Strategy
TOD	Transit-Oriented Development
TREDIS	Transportation Economic Development
TSMO	Transportation System Management and Operations
TTP	Tribal Transportation Program
TZD	Towards Zero Deaths
USDOT	United States Department of Transportation
V2I	Vehicles connected to transportation infra-structure
V2V	"Connected" Vehicles
VHD	Vehicle-Hours-of-Delay
VHT	Vehicle Hours of Travel
VISION	ARB's Vision for Clean Air
VLF	Vehicle License Fee
VMT	Vehicle Miles Traveled
ZEV	Zero-Emission Vehicle

TABLE 11. CALIFORNIA TRIBES

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	Enterprise Rancheria of Maidu Indians
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	Smith River Rancheria of California
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
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

TABLE 11. CALIFORNIA TRIBES

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 Manches-ter-Point Arena Rancheria
Mendocino	Pinoleville Pomo Nation
Mendocino	Potter Valley Tribe
Mendocino	Redwood Valley Rancheria of Pomo Indians
Mendocino	Round Valley Indian Tribes
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

TABLE 11. CALIFORNIA TRIBES

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
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

TABLE 11. CALIFORNIA TRIBES

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

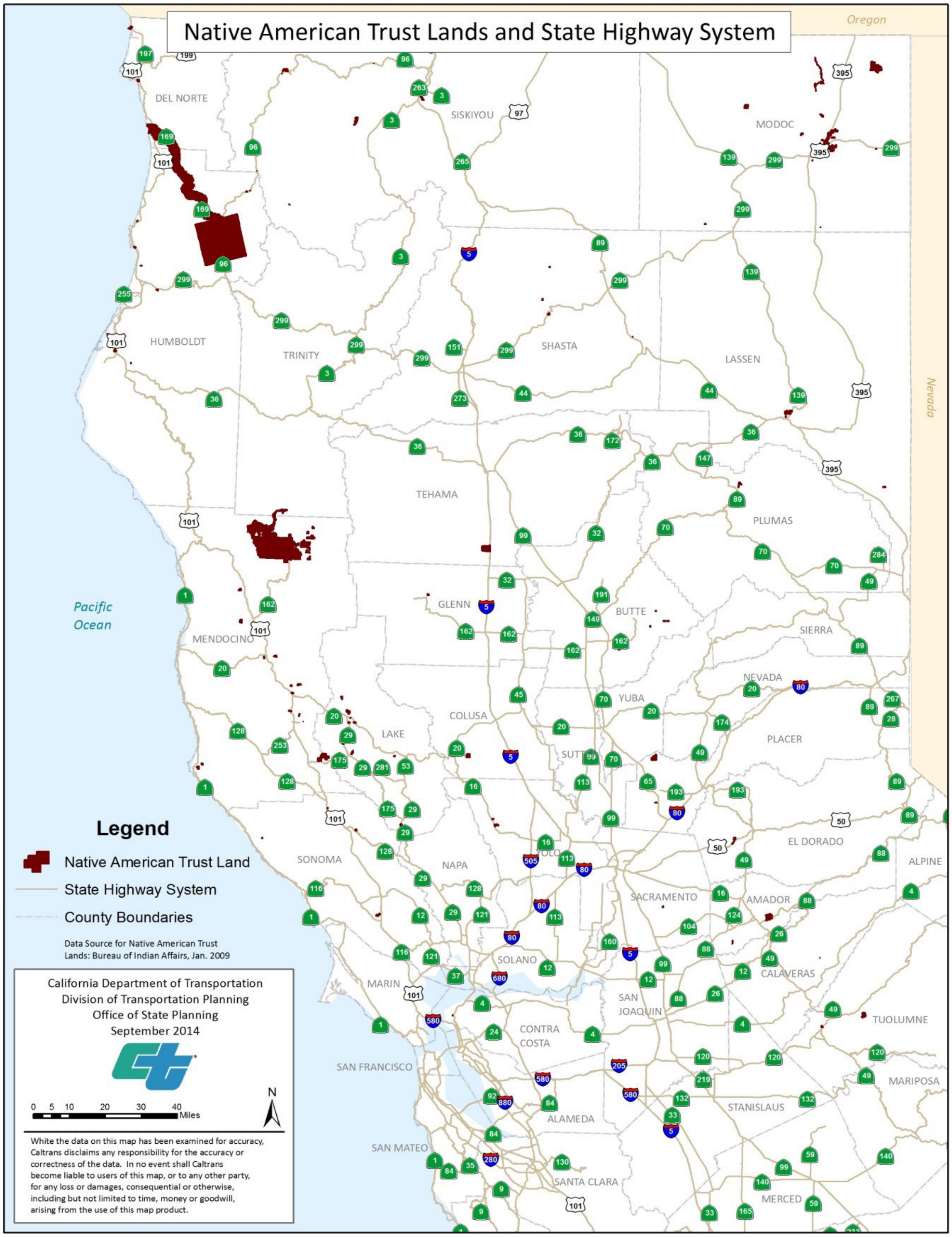

FIGURE 2. NATIVE AMERICAN TRUST LANDS AND HIGHWAYS – CENTRAL CALIFORNIA

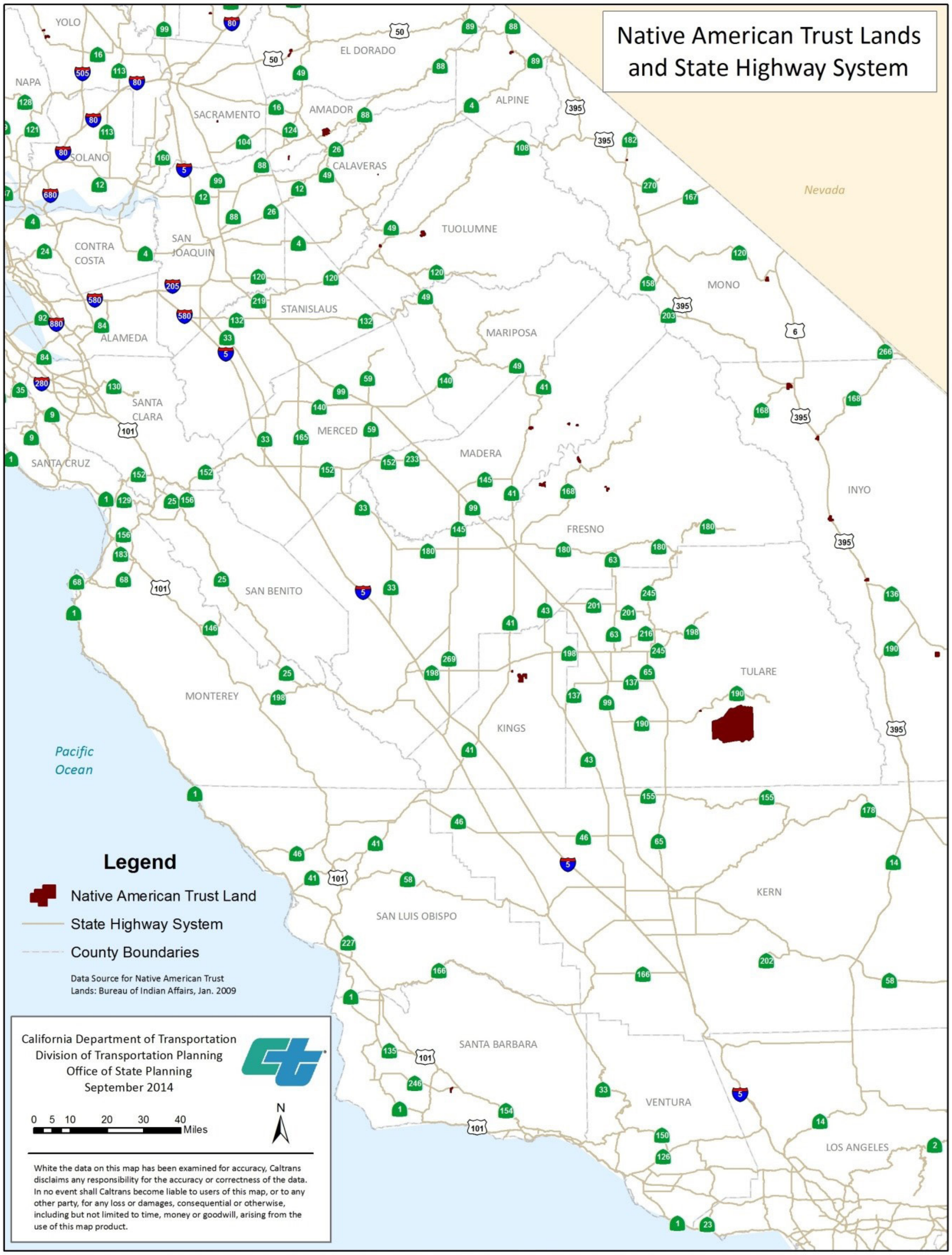

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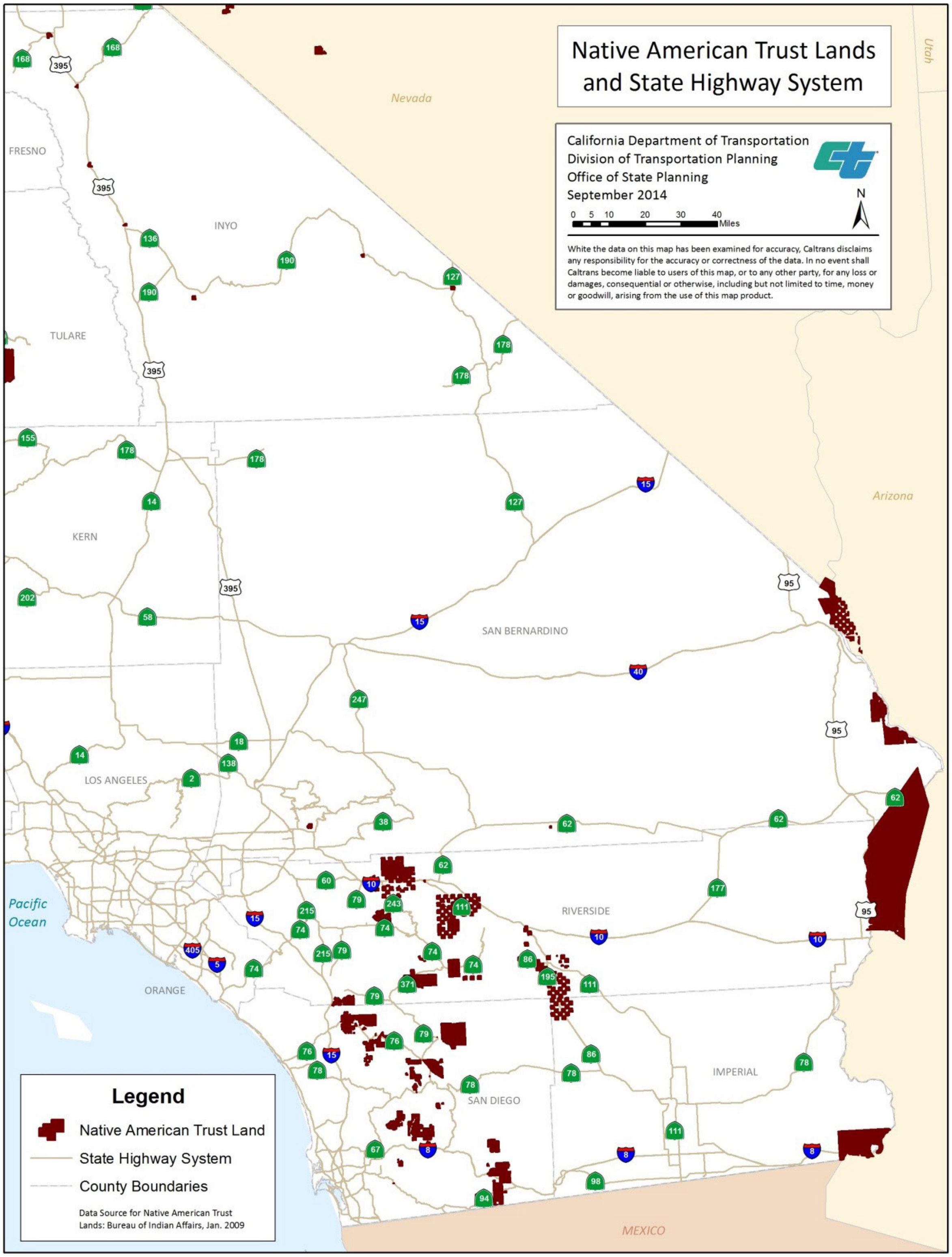
FIGURE 3. NATIVE AMERICAN TRUST LANDS AND HIGHWAYS – SOUTHERN CALIFORNIA



INTRODUCTION

This report focuses on the technical analyses conducted to evaluate VMT and GHG reduction strategies, and economic benefits contained in the CTP Alternatives. Key technical analyses were centered on the California Statewide Travel Demand Model (CSTDM), ARB's Emissions Factor (EMFAC) and VISION Models, and the Transportation Economic Development Impact Software (TREDIS).

CALIFORNIA STATEWIDE TRAVEL DEMAND MODEL

The CSTDM was recently updated using the most current information from the 2012 California Household Travel Survey, the 2010 US Census, and assumptions from California MPO Sustainable Community Strategies (SCSs), effective Spring 2013. The CSTDM (dubbed CSTDM Version 2.0) is documented at the 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)

The CSTDM also includes all mode of transportation including bicycle, walk and transit to trucks and high-speed rail (high-speed rail 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 high speed rail is excluded from short distance personal travel.

TABLE 1. CSTDM MODES OF TRAVEL FOR EACH MODEL COMPONENT.

	Models				
Travel Modes	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 & urban rail)	√				
Bicycle	√				
Walk	√				
Air		√			
Intercity Rail		√			
Trucks (3 classes x weight)			√	√	√

The CSTDM was used to evaluate some of the 16 transportation strategies designed to reduce statewide VMT. Other strategies were evaluated off-model with prior research or from MPO SCS assumptions.

Transportation Strategies

Many regionally significant GHG reduction strategies pertaining to transportation were and are being identified by the MPOs RTP/SCS, as required by SB 375. For the most part these strategies address regional passenger travel. The CTP 2040, with guidance from the PAC and TAC, has taken the regional analyses further with 16 statewide transportation-related GHG reduction strategies for Alternatives 2 and 3. Transportation strategies were divided into four categories: pricing, transportation alternatives, mode shift, and operational efficiency.

Strategies were evaluated using the CSTDM, or with off-model approaches. Off-model approaches represented either specific policies that could not be tested using CSTDM, or were evaluated from an aspirational standpoint. Policies were specific proposals that could be evaluated for potential effectiveness. For example, a road user charge, i.e., a policy to increase the cost of driving, was evaluated using the CSTDM which produced a decrease in statewide VMT. On the other hand, the transportation strategy to double the mode share of bicycling is an objective – and not based on a specific policy (or policies). Specific policies may be developed post hoc to achieve bicycling mode share objective. Put another way, a test of a policy is an input that produces an output performance measure; an objective states the direct output performance measure without testing.

Transportation strategies were summarized by equivalent VMT reductions. Most of the strategies could be expressed directly in terms of VMT reductions; however, some strategies were expressed in other measures of effectiveness (such as fuel savings), and were subsequently converted to equivalent VMT reduction. Expressing all strategies in terms of a single measure of effectiveness allows for direct comparison of the effectiveness and relative importance to GHG reductions.

Table 2 shows the 16 VMT reduction transportation strategies and their categories. Assumptions for each strategy are discussed below.

TABLE 2. CTP 2040 VMT REDUCTION TRANSPORTATION STRATEGIES MATRIX

Category / Strategy	Assumption	Evaluation Method: Source	Policy or Objective	VMT Reduction (estimated)
Pricing				
Road User Charge	75% increase in auto operating cost	CSTDM	Policy	-17%
Transportation Alternatives				
Telecommute/ Work at Home	2.1% increase in work at home rate	Off-Model: SACOG	Objective	-0.39%
Increased carpoolers	5% increase in carpool vehicles	Off-Model: Calculated using CSTDM data	Objective	-2.9%
Increased Car Sharing	Net 5% increase in adoption rates -- short distance travel	Off-Model: MTC, CARB Draft Policy Brief	Objective	-1.1%
Mode Shift				
Transit Service Improvements	All transit services doubled; transit speeds doubled, free transfers, reduced transfer wait times	CSTDM	Policy	-6% (includes Transit Service Improvements and HSR fare reductions)
High Speed Rail	HSR fares reduced by 50%	CSTDM	Policy	Included as part of transit service improvements
Bus Rapid Transit	Ridership change from conversing Local Bus Routes to BRT	Off Model: TCRP 118, CSTDM Data	Policy	-0.07%
Expand Bike	Doubled bicycle shares	Off Model: CSTDM Data	Objective	-0.41%
Expand Pedestrian	Double walk shares	Off Model: CSTDM Data	Objective	-0.43%
Carpool Lane Occupancy Requirements	Change 2+ occupancy to 3+	CSTDM	Policy	-0.80%
Increased HOV Lanes	Added HOV lanes, Interregional connectors; Fill missing gaps (mixed flow lanes converted to HOV)	CSTDM	Policy	TBD
Operational Efficiency				
Incident/Emergency Management	Implementation of Caltrans System Management and Operations Plan	Off Model: Caltrans	Policy	-1.0% equivalent VMT savings
Caltrans' (TMS) Master Plan	Implementation of TMS Master Plan	Off Model: Caltrans	Policy	-1.2% equivalent VMT savings
ITS/TSM	Implementation of ITS/TSM strategies	Off Model: SACOG	Policy	-0.62%
Eco-driving	Reduced fuel consumption through changes in driving habits	Off Model: ARB Policy Brief	Objective	-0.23% equivalent VMT savings

The Transportation Research Board's (TRB) National Cooperative Highway Research Program (NCHRP) report 20-24(59) was chosen as a framework for identifying alternative strategies that could be analyzed using the tools discussed later in this chapter. The CTP 2040 PAC and TAC were consulted and helped to guide the selection of specific strategies contained in Alternatives 2 and 3. During PAC and TAC involvement, additional input was gathered from all of the State's 44 MPOs and RTPAs to help identify any gaps and overlap in regional transportation strategies.

Pricing Strategies

Three road-pricing strategies were initially evaluated: a road user charge (RUC) assessed to all vehicles; a gas or fuel tax (also applied to all vehicles); and congestion pricing (applied only on roadways during congested periods). RUC was used for the CTP analysis for applicability to the CSTDM, and for comprehensiveness (applied to all vehicles). The other two methods of road pricing could only be applied on a more limited basis. A gas tax could only be applied to carbon-based fuels such as gasoline and diesel, and congestion pricing would only be applied to the most congested highways. As such, the RUC was chosen as a comprehensive means to increase the cost of driving for all vehicles.

ROAD USER CHARGE

Road pricing was modeled in the CSTDM using an automobile operating cost variable; thus RUC and auto operating cost terms may be used interchangeably for the CTP 2040 road pricing analyses. Auto operating costs are a function of gasoline price projections with Corporate Average Fuel Economy (CAFÉ) standards forecasted for all CSTDM horizon years (through 2050). The auto operating costs were based on peer-reviewed assumptions developed for the California High-Speed Rail Authority[1]. Auto operating cost assumptions were adopted into the CSTDM, and summarized in Table 3 for Years 2010, 2020 and 2040.

Changes in auto operating costs primarily impacted auto travel. On the commercial travel side, the CSTDM includes only truck travel. The statewide freight model – which could predict goods movement mode choice (such as rail versus truck) – was not available for this project. Thus commercial travel mode changes (such as shippers switching from truck to rail) could not be analyzed under this context.

TABLE 3. 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**

Industry analysts have predicted that road pricing will be among the most effective strategies in reducing vehicle miles of travel (VMT) and greenhouse gas (GHG) emissions. A forecast based on the CSTDM seems to confirm this assumption. A 2010 base-year sensitivity test was conducted that doubled auto operating costs, and additional 2040 tests were conducted to raise auto operating costs by 2, 8 and 16 cents per mile. These results are summarized in Table 4. Alternative 2 includes the 16 cent increase in auto operating costs – a 73% increase in the cost for auto travel compared to Alternative 1.

TABLE 4. AUTO OPERATING COST ASSUMPTIONS

SCENARIO	CHANGE IN AUTO OPERATING COST	CHANGE IN VMT
Year 2010 Double Auto Operating Costs	+100%	-22.5%
2040 – 16 cent Increase	+73%	-17.3%
2040 – 8 cent Increase	+36%	-10.6%
2040 – 2 cent Increase	+9%	-2.8%

Transportation Alternatives

Transportation alternatives include telecommuting, increasing the number of carpool vehicles, and increasing carsharing adoption rates. ARB and CAPCOA have documented VMT and GHG reductions associated with implementation of these strategies.

TELECOMMUTING

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, either by telephone, email, text message or video-conference. 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.[2] CTP 2040 assumes an aggressive 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).[3] SACOG used an off-model approach to forecast reduced VMT resulting from increased work at home shares – above and beyond that assumed in SACOG's SCS. SACOG noted the adjustment for increased work at home shares did not count flexible or compressed work schedules (considered part of a TDM adjustment). SACOG determined that working at home resulted in an average daily decrease of between 5 and 7 VMT per worker. SACOG then calculated a range of GHG reductions of 0.13 to 0.39 percent, assuming variable increased rates of telecommuting. For the purposes of CTP 2040, the GHG reductions assumed by SACOG for telecommuting were converted to VMT for purposes of comparability with other transportation strategies. An implicit assumption of a one-to-one GHG to VMT reduction was assumed. The more aggressive SACOG travel reduction assumptions was applied on a statewide basis for CTP 2040 Alternatives 2 and 3. See Table 5.

TABLE 5. 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.

CARPOOLING

Carpooling, or ridesharing strategies promote carpooling or vanpooling as a method of increasing vehicle occupancies to reduce VMT. A relatively new concept known as "peer-to-peer ridesharing" has recently gained popularity. Peer-to-peer ridesharing allows drivers and riders traveling to the same place at the same time to connect efficiently via the Internet or mobile devices to share rides and share travel costs.

A more traditional form of ridesharing is casual carpooling, in which riders queue at designed pickup points in the early morning and late afternoon, as if at a taxi stand, and drivers heading to the desired destination give them a ride.[4] Casual carpooling has been popular in the San Francisco Bay Area for decades for travelers using the Westbound San Francisco-Oakland Bay Bridge during the AM peak period (tolled direction).

The CTP 2040 assumes an aggressive implementation to increase carpooling participation by 5 percent statewide. The carpooling transportation strategy has been assessed as an off-model aspirational objective; that is, specific policies are not directly assumed. Rather, the VMT effects of the increased carpool participation are assessed. Policies would need to be implemented at some future point in order to realize the objective of the carpool transportation strategy.

The following summarizes the methodology for calculating the VMT effects of increased carpooling participation rates. Increased carpooling has been assumed to come from solo occupant vehicles; that is, 5 percent of solo-occupant drivers have been assumed to switch from the drive along mode to carpool mode. The change in person-trips is shown in Table 6. Five percent of solo-occupant person trips were assumed to transfer to carpools, but total auto-based person-trips did not change. Non-auto travel modes were assumed to be unaffected by the increased carpooling assumption. Transportation modes unaffected by the carpooling transportation strategy included bicycle, walk, transit, truck, commercial airplane, conventional rail, and high-speed rail. To increase carpooling by 5 percent, solo occupant travelers were reduced by 7.0 percent for short distance personal travel, and by 12 percent for long distance personal travel.

The auto-based person-trips were converted to vehicle trips, assuming 2.0 persons per two person carpool vehicle and 3.75 persons per three-plus person vehicle. These calculations resulted in a statewide reduction of personal vehicle travel of 2.7 percent. See Table 7.

Multiplying average trip lengths for each mode of travel by the number of trips under the increased carpooling strategy yielded the change in vehicle miles of travel. The total change in VMT was -2.9 percent.

TABLE 6. CHANGE IN PERSON-TRIPS BY MODE WITH 5% INCREASE IN CARPOOLERS

	SOV	HOV2	HOV3+	Total
Short Distance Personal Travel				
Daily Person Trips	64,213,062	52,898,520	37,426,353	154,537,935
+5% Carpoolers	59,696,818	55,543,446	39,297,671	154,537,935
	-7.0%	5.0%	5.0%	
	SOV	HOV2	HOV3+	Total
Long Distance Personal Travel				
Daily Person Trips	88,106	108,180	105,193	301,479
+5% Carpoolers	77,437	113,589	110,453	301,479
	-12.1%	5.0%	5.0%	
	Other Modes	Total All Modes		
Daily Person Trips	40,297,025	195,136,439		
+5% Carpoolers	40,297,025	195,136,439		

TABLE 7. CHANGE IN VEHICLE TRIPS BY MODE WITH 5% INCREASE IN CARPOOLERS

	SOV	HOV2	HOV3+	Total
Short Distance Personal Travel				
Daily Vehicle Trips	64,213,062	26,449,260	9,980,361	100,642,683
+5% Carpoolers	59,696,818	27,771,723	10,479,379	97,947,920
	-7.0%	5.0%	5.0%	-2.7%
	SOV	HOV2	HOV3+	Total
Long Distance Personal Travel				
Daily Vehicle Trips	88,106	54,090	28,051	170,247
+5% Carpoolers	77,437	56,795	29,454	163,686
	-12.1%	5.0%	5.0%	-3.9%
	Other Modes	Total All Modes		
Daily Vehicle Trips	14,038,168	100,812,930		
+5% Carpoolers	14,038,168	98,111,606		
Total Change in Vehicle Trips		-2.7%		

CARSHARING

Carsharing allows people to rent cars by the hour for as little as 30 minutes up to a full week. Carsharing services have been available in the California since 2001, and in that time the number of subscribers and available vehicles has grown.[5]

CTP 2040 assumes an aggressive implementation to increase the use of carsharing. This transportation strategy was assessed using an off-model approach with assumptions developed for the MTC Region and applied statewide.

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, *"[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."* [6]

MTC analyzed carsharing as part of their 2013 Regional Transportation Plan.[7] MTC's analysis 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. MTC's analysis specifically noted higher rates of car sharing in urbanized areas, but that car sharing would also be expanded to suburban locations. See Table 8.

TABLE 8. INCREASED CAR SHARING 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

MTC cited research showing that carsharing reduced per-mile fuel consumption by 29 percent. ARB's research referenced another study that found nearly 35% in fuel consumption savings. For CTP 2040, the lower 29 percent VMT reduction figure was used, and a one-to-one rate of fuel consumed to VMT savings applied. The 29 percent VMT reduction was applied to 5 percent of short-distance person travel, yielding an overall total VMT reduction statewide of 1.1 percent.

Mode Shift

Mode shift strategies include various improvements to facilitate, transit, bicycling, walking, and carpooling. The strategies include aggressive improvements to public transportation in California. Twenty percent of local bus routes were converted to Bus Rapid Transit, and 2040 High-Speed Rail fares are assumed to be reduced to fifty percent. Additionally, improvements for bicycling, walking and carpooling modes are also analyzed.

TRANSIT SERVICE IMPROVEMENTS

Many different transit service-related improvements can be used to increase transit ridership. For CTP 2040, an aggressive set of transit improvements was assumed for this draft strategy. Note that high-speed rail is not considered under this strategy. Non-high speed rail transit service levels were assumed to double over 2040 baseline conditions, transit speeds for all services except high-speed rail were assumed to have been doubled, transit fares for all services excluding high-speed rail were assumed to be free, and widespread timed transfers were also included.

For the Year 2040 high-speed rail system, fares were assumed be reduced by 50 percent below those assumed in the 2013 State Rail Plan. No other changes to high-speed rail were assumed.

The intention of the transit improvement strategy was to identify the maximum VMT reductions from transportation strategies. Thus, the aggressive transit improvement strategy was devised. In particular, the transit strategy was also designed to help offset the road user charge by making transit a more viable option.

The transit service improvements combined with reduced high speed rail fares resulted in a statewide VMT reduction of 6.0 percent.

REDUCED HIGH-SPEED RAIL FARES STRATEGY

The high speed rail (HSR) system in CTP 2040 is the same as assumed in the 2013 California State Rail Plan 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 Alternative 1, but Alternatives 2 and 3 HSR fares are assumed to be reduced by 50 percent.

BUS RAPID TRANSIT

This strategy assumed that 20 percent of local bus services were converted to Bus Rapid Transit (BRT). *TCRP Report 118: Bus Rapid Transit Practitioner's Guide*[8] was used as a reference guide for documenting ridership changes for BRT improvements to local bus systems. Specific sets of improvements were not considered, as BRT systems vary from operator to operator and route to route. A combination of local bus to BRT improvements were assumed to meet the assumption of this strategy. The combination of improvements was determined in the TCRP report to be a requirement of high-quality BRT services required to substantially improve transit ridership for Alternatives 2 and 3. BRT improvements can include:

- Exclusive rights-of-way, including busways, exclusive lanes, and bypass/queue jumping lanes to reduce vehicle running time;

- Limited-stop service, including express service and skip-stopping;
- Intelligent transportation technology, such as signal priority, automatic vehicle location systems, system security, and customer information;
- Advanced technology vehicles and new, specially designed vehicles with doors on each side;
- Design of stations;
- Off-board, fare-payment smart cards or proof-of-payment systems;
- "Branding" the system;
- Vehicle guidance systems (mechanical, electronic, or optical); and
- Other strategies that enhance customer satisfaction.

The following calculations were used to determine VMT reductions associated with converting local bus services to BRT. The first assumption was to estimate the percentage of total transit ridership on local buses. Given a 2040 forecast of approximately 6.5 million total transit trips in Alternative 1, an estimate of 3.0 million local bus trips – slightly less than 50 percent of total transit ridership.

Given the prior assumption that 20 percent of all local bus trips would be converted to BRT, 600,000 daily local bus trips would be affected. With a conversion to high quality BRT services, the 600,000 daily transit trips would be expected to double. This increase in ridership is in line with guidance from TCRP Report 118 for high BRT investments of multiple components.

Of these new transit riders, 25 percent were assumed to have been car drivers for Alternative 1, but switch to BRT under Alternatives 2 and 3. An average BRT trip length of 5.0 miles was also assumed. The latter two assumptions were made for simplification purposes and are not based on actual data. These assumptions may be varied to produce different VMT savings. However, using these estimates, this strategy produces a modest statewide VMT reduction of 0.07percent. See Table 9.

TABLE 9. VMT CHANGES DUE TO BRT IMPROVEMENTS (INCLUDES ASSUMPTIONS)

1. Total Local bus trips (separate from existing BRT, express routes and rail)	3,000,000
2. Estimate % change in conversion of local bus to BRT	20%
= number of new local bus trips	600,000
3. Estimate % change of new BRT trips that were auto mode	25%
= reduced number of vehicle trips	150,000
4. Average trip length (miles)	5.0
= Calculated VMT savings	750,000
= Estimated VMT savings (as % of total daily 2040 VMT)	0.07%

EXPANSION OF BICYCLE USE

Strategies that facilitate increased bicycle use fall into two categories: 1) infrastructure projects that improve bicycle accessibility, safety, and convenience, either while traveling or at the end of the trip, and 2) programs that promote bicycling directly or indirectly through education, community events, advertising, and other activities.[9] CTP 2040 assumes an aggressive implementation of the expansion of bicycle strategies.

Expanded bicycle use was considered in two ways. The CTP 2040 team considered trying to add up all the bicycle investments contained in regional transportation plans and assessing the impact to increased bicycle use. However, this proved to be too daunting a task, so a simplified aspiration objective of doubling the bicycle mode share over Alternative 1 was assumed. As with the other aspirational objectives, a desired outcome is stated (doubled bicycle mode shares). Specific policies would need to be enacted to achieve this outcome.

Table 10 describes the assumptions used for calculating VMT savings due to the increased bicycling mode share. Average bicycle trip length comes from the 2012 California Household Travel Survey.

TABLE 10. VMT CHANGES DUE TO INCREASED 2040 BICYCLE MODE SHARE (INCLUDES ASSUMPTIONS)

Change in mode share - bike	100%
New bike trips	2,499,528
Average Bike Trip Length (miles)	**3.03**
% of new bike trips that were formerly auto	50%
Reduced Auto trips - bike	1,249,764
Reduced Auto VMT - bike	3,786,785
% Reduction Auto VMT - bike	**0.41%**

EXPANSION OF PEDESTRIAN ACTIVITIES

The expansion of pedestrian strategies should enhance the walking environment. This can be accomplished directly with improvements to the pedestrian infrastructure, such as sidewalks pathways, and crossings. Other street improvements include street trees and lighting for enhanced pedestrian comfort and security, which may encourage walking. Traffic calming techniques that reduce vehicle speeds and/or volume also enhance comfort and security for pedestrians, again potentially encouraging walking.[10]

CTP 2040 assumes an aggressive implementation of the expansion of pedestrian strategies. In line with the bicycle strategy assumption, a doubling of pedestrian mode shares has been assumed. Table 11 summarizes the calculations used to arrive at VMT savings associated with this transportation strategy.

The pedestrian strategy was developed as an aspirational objective. As with the other aspirational objectives, a desired outcome is stated (doubled walk mode shares). Specific policies would need to be enacted to achieve this outcome.

TABLE 11. VMT CHANGES DUE TO INCREASED 2040 PEDESTRIAN MODE SHARE (INCLUDES ASSUMPTIONS)

Change in mode share - walk	100%
New walk trips	14,511,263
Average Walk Trip Length (miles)	**0.55**
% of new walk trips that were formerly auto	50%
Reduced Auto trips - walk	7,255,632
Reduced Auto VMT - walk	3,990,597
% Reduction Auto VMT - walk	**0.43%**

CARPOOL LANE REQUIREMENTS

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. The higher standard had the effect of improving aggregate carpool lane performance; however, increased carpool lane occupancy requirements also included forcing some 2-person carpools to solo driving (or to using mixed-flow traffic lanes). This result was seen most clearly for long-distance travel vehicle-hours of delay where drive alone and shared ride 2 person vehicles showed increased delay, while 3+-person carpools had reduced delays.

HIGH OCCUPANCY VEHICLE LANE EXPANSION

The high-occupancy vehicle (HOV) lane system is a strategy used to maximize the people-carrying capacity of California freeways. HOV lanes, often referred to as carpool lanes, are managed lanes that limit access to vehicles with higher occupancy (currently these lanes vary between two or more, and three or more people). The emphasis of this strategy will be connecting HOV gaps within and between metropolitan areas. This strategy has not yet been evaluated, but will be tested using the CSTDM. The complete list of new HOV lanes is still under development. Based on consultation with the CTP TAC and PAC, no new freeway lanes will be added; mixed flow traffic lanes will be converted to HOV in all cases.

Operational Efficiency

Strategies for operational efficiency included improved response times to incidents and emergency management, Caltrans TMS Master Plan, intelligent transportation system elements, and eco-driving. Each of the operation efficiency strategies were evaluated off-model.

INCIDENT AND EMERGENCY MANAGEMENT

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 the dispatch of 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.[11] 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 (TMS) SYSTEM MASTER PLAN

Caltrans' Transportation Management System Master Plan focuses on three core processes that help regain lost productivity in congestion. The three core processes include traffic control and management systems, incident management systems, and advance traveler information systems. All three processes rely on real-time, advance detection systems. These TMS processes and their associated detection systems represent a nucleus for the Department's traffic operations strategies, form a critical part of the overall system management strategy, and are the focus of this report.[12] The TMS Master Plan is one component of Caltrans' Transportation System Management and Operation (TSMO) program. The CTP 2040 assumes the implementation of all components of TSMO.

INTELLIGENT TRANSPORTATION SYSTEM (ITS) ELEMENTS

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.[13] The CTP 2040 assumes an aggressive deployment of ITS.

ECO-DRIVING

For an ARB Policy Brief, Eco-driving has been defined 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."*[14]

The ARB referenced studies of fuel savings that found, on average, 2.3 percent fuel savings for drivers using eco-driving tactics. For the purpose of analysis for the CTP, eco-driving is analyzed as an off-model aspirational objective of a 10 percent adoption rate. Applying to the 10 percent eco-driving adoption rate to the 2.3 percent fuel savings yields 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.

EMFAC[15]

The Emissions Factor (EMFAC) model is used to assess emissions from on-road passenger vehicles. The latest version of the model, EMFAC2011, was released in September 2011. The EMFAC2011 release is needed to support the ARB regulatory and air quality planning efforts and to meet the FHWA transportation planning requirements. EMFAC2011 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.[16] CSTDM and CSFFM outputs are then input to EMFAC2011 to calculate future transportation-related emissions for California. The EMFAC model addresses the emissions quantification of the vehicle activity from both CSTDM and CSFFM, as required by SB 391.

ARB VISION[17]

The ARB Vision model 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.

ARB Staff prepared a memo summarizing preliminary GHG emissions for CTP Alternatives 1, 2, and 3 using EMFAC and Vision model outputs. That memo is included in its entirety starting on page 153.

Transportation Systems Planning
Air Quality Planning and Science Division
California Air Resources Board
January 28, 2015

To: California Department of Transportation
CTP 2040 Staff

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

Summary

Preliminary results for CTP 2040 Alternatives 1, 2, and 3 have been completed. The baseline, Alternative 1, achieved a 7% reduction in GHG emissions by 2040, but shows a slight increase of 3% in 2050 over the 2020 base year. Alternative 2 reduced GHG emissions, with 27% and 21% 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 CO_{2e} 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 below is a pie graph of the 2012 official Air Resources Board (ARB) greenhouse gas (GHG) emission inventory for all sectors. Total GHG emissions in 2012 were estimated to be 459 MMT CO_{2e} of which transportation accounted for 37% (167 MMT CO_{2e}) and industrial emissions, which include refineries and oil and gas extraction, accounted for 19% (89 MMT CO_{2e}) 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 light-duty vehicles (LDV) and heavy-duty vehicles (HDV) account for 92% (154 MMT CO_{2e}) of the transportation sector emissions with LDV contributing the greatest portion (71% or 118 MMT CO_{2e}). From Figure 3, refineries and oil and gas extraction contribute ~50% of the industrial sector emissions (46 MMT CO_{2e}). 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 (214 MMT CO_{2e}) in the 2012 emission inventory.

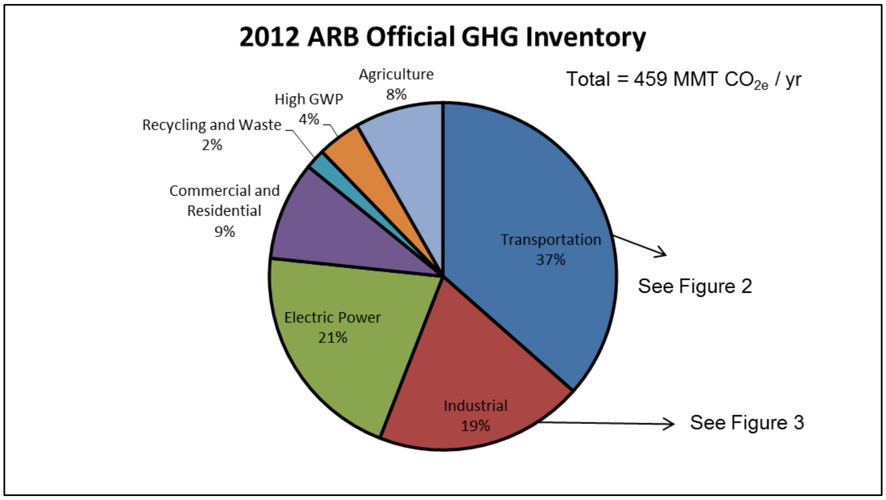


Figure 1: 2012 ARB Official GHG Inventory

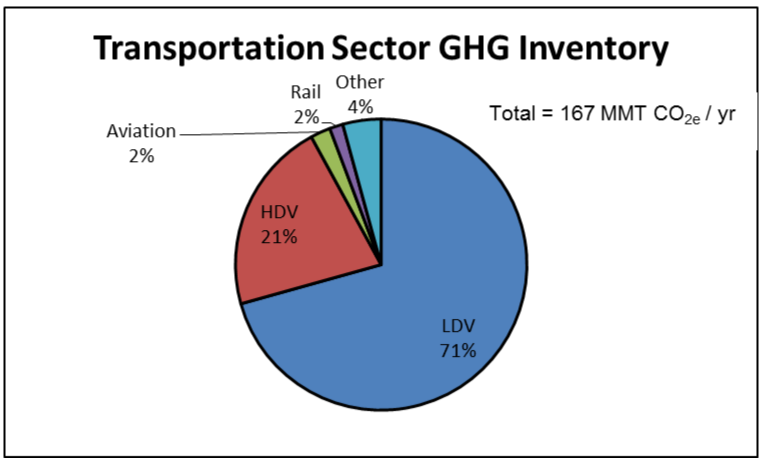


Figure 2: Transportation Sector GHG Inventory

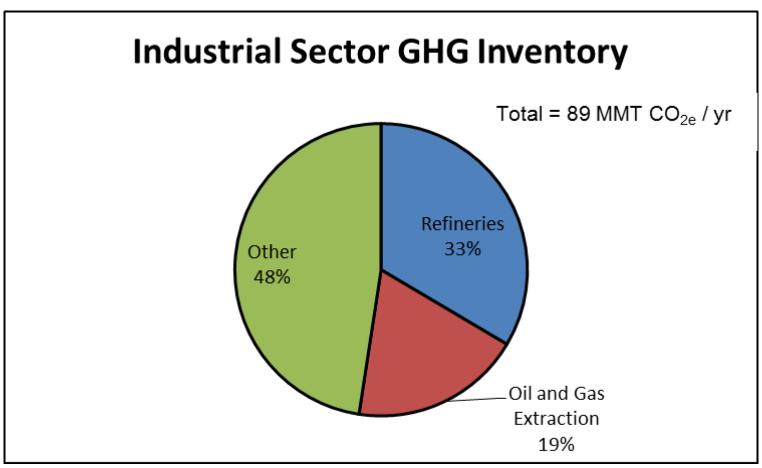


Figure 3: Industrial Sector GHG Inventory

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.

LDV and HDV activity data was supplied to ARB from the Caltrans CSTDM model, which gave VMT by speed bin for three select years (2010, 2020, and 2040). Table 1 below 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 30% 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.

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	251
HDV	74	73.5	83
Total	264	282	334
Alternatives 2 and 3			
LDV	-	-	161.9
HDV	-	-	71.3
Total	-	-	**233**
% Reduction			**30%**

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).

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 billion gallons gasoline equivalent ("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).

Alternatives 1 and 2 Results

Preliminary results are shown in Tables 2 and 3 below for Alternatives 1 and 2, respectively. The table displays total fuel demand (quadrillion BTUs or "quads" and billion gallons gasoline equivalent or "BGGE"), GHG emissions (MMT $CO2_e$ / yr), and relative percent reduction below Alternative 1 2020 for 2040 and 2050.

Table 2: Alternative 1 Results

Alternative 1					
	2010	2012	2020	2040	2050
Fuel Demand (Quads)					
Gasoline (CaRFG)[1]	1.31	1.25	1.10	0.76	0.83
Diesel (ULSD)[2]	0.61	0.61	0.69	0.87	0.98
Jet Fuel	0.47	0.46	0.51	0.68	0.77
Electric Power	0.000	0.001	0.008	0.026	0.033
Hydrogen	0.000	0.000	0.001	0.007	0.009
Fuel Demand (BGGE)					
Gas (CaRFG)[1]	11.7	11.1	9.8	6.8	7.4
Diesel (ULSD)[2]	5.5	5.5	6.2	7.8	8.8
Jet Fuel	4.2	4.1	4.6	6.1	6.9
Electric Power	0.00	0.01	0.07	0.23	0.30
Hydrogen	0.00	0.00	0.01	0.07	0.08
GHG Emissions (MMT CO_{2e} / yr)					
LDV + Bus	114	108	94	66	73
HDV	50	49	50	60	64
Rail	2	3	3	5	6
Aviation	4	4	5	6	7
Other Transportation	4	4	6	10	14
Total	**175**	**168**	**158**	**147**	**163**
Target	**-**	**-**	**-**	**-**	**32**
GHG Relative Reduction Below Alternative 1 2020[3] (%)					
LDV + Bus	-	-	-	30%	23%
HDV	-	-	-	-19%	-27%
Rail	-	-	-	-53%	-91%
Aviation	-	-	-	-26%	-40%
Other Transportation	-	-	-	-70%	-129%
Total	-	-	-	**7%**	**-3%**
Target	-	-	-	**-**	**80%**

[1]California Reformulated Gasoline (CaRFG) includes 10% ethanol blended by volume
[2]Diesel includes 5% biodiesel by volume
[3]AB32 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.

21% in 2050. LDV emissions were reduced by 54% in 2040 and 49% in 2050, while HDV increased by 3% and 2%.

Figure 4 below 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.

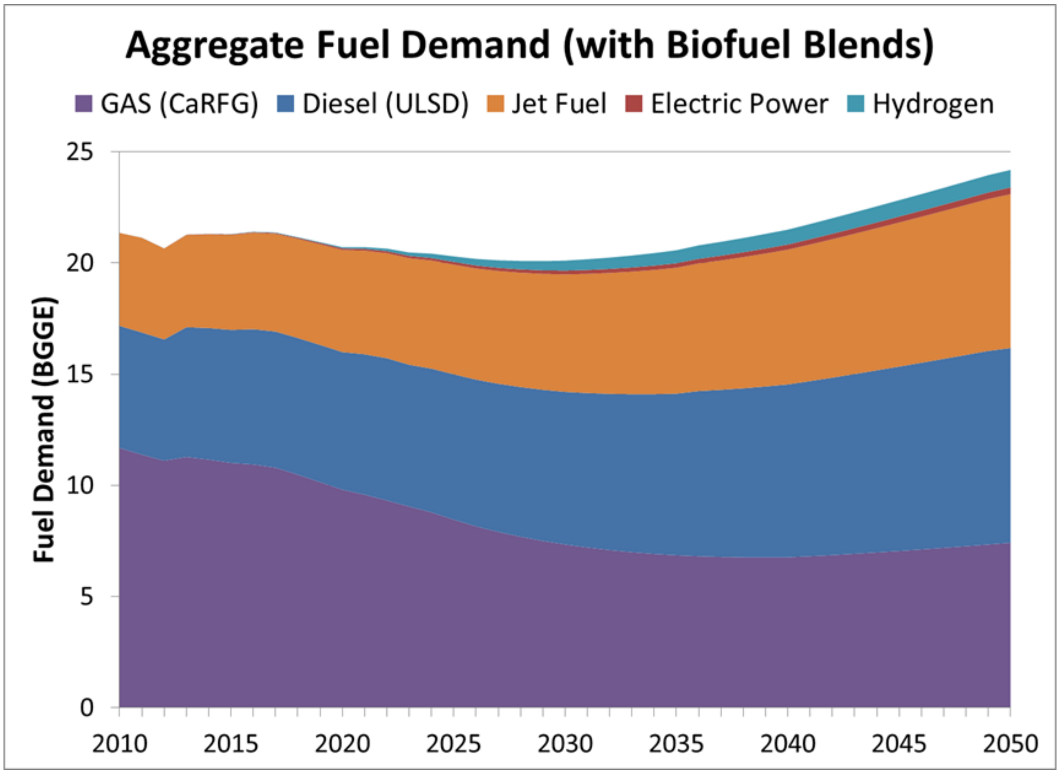


Figure 4: Aggregate Fuel Demand by sector for Alternative 1

Figures 5 and 6 below 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. Overall, there is a slight decrease in GHG emissions for this alternative from 2010. 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 CO_{2e} in 2050. Furthermore, the more aggressive Alternative 2 would still need to reduce GHG emissions by more than 50% to reach the expected goal.

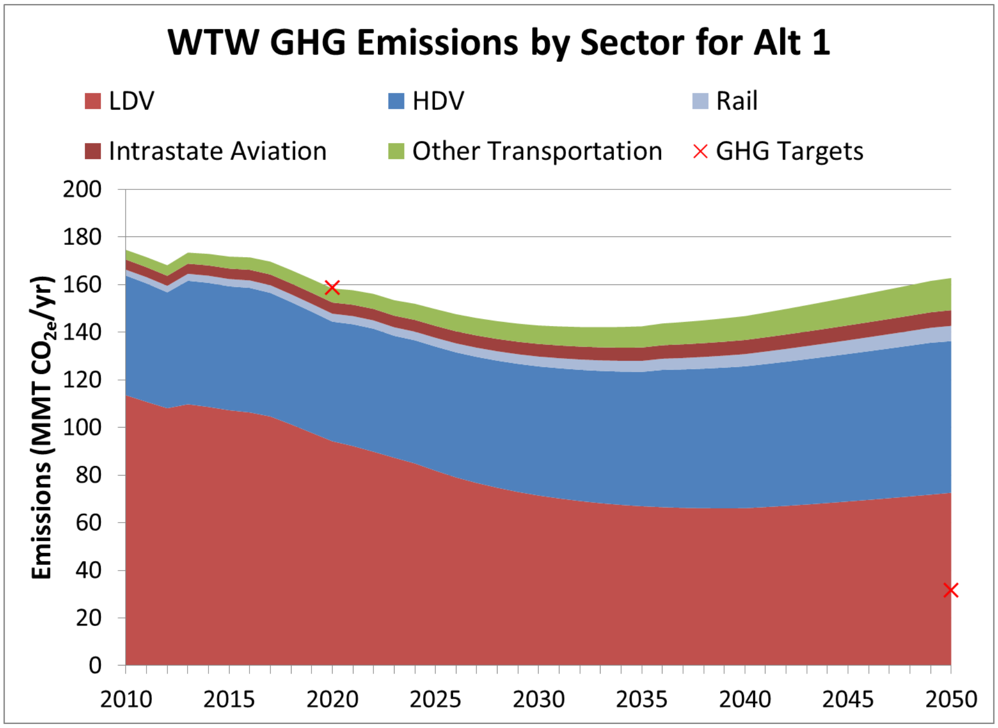


Figure 5: WTW GHG Emissions by Sector for Alternative 1

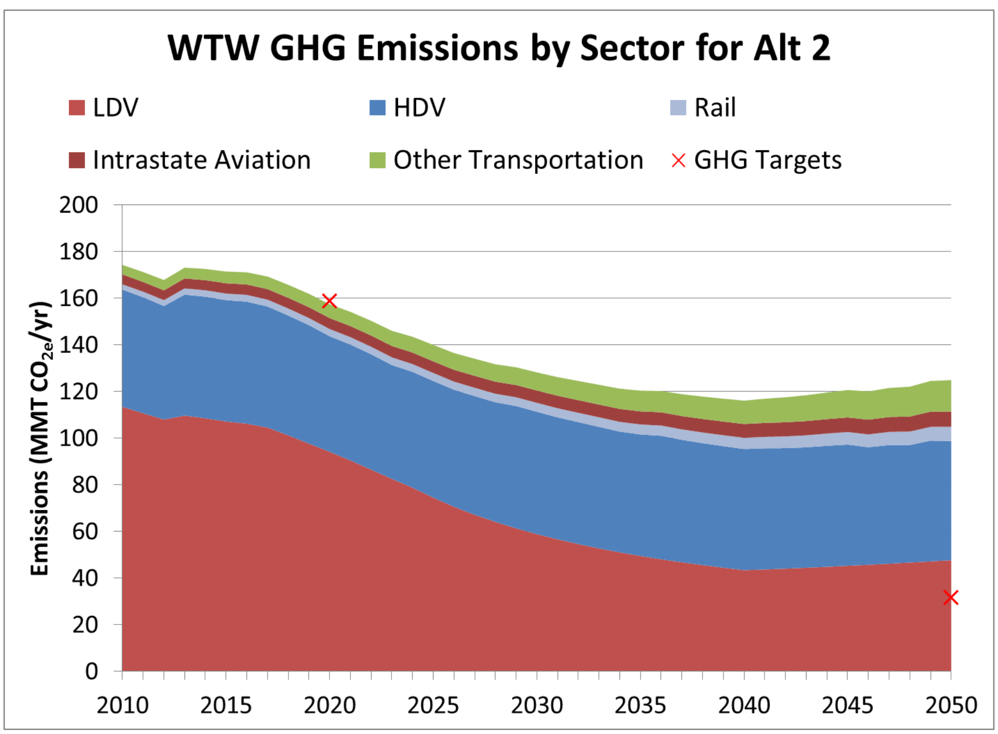


Figure 6: WTW GHG Emissions by Sector for Alternative 2

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Alternative 3 Results

Preliminary results are shown in Table 4 below for Alternative 3. The table displays total fuel demand (quadrillion BTUs or "quads" and billions gallons gasoline equivalent or "BGGE"), GHG emissions (MMT CO_{2e} / yr), and relative percent reduction below 2020 for 2040 and 2050.

Table 4: Alternative 3 Results

Alternative 3					
	2010	2012	2020	2040	2050
Fuel Demand (Quads)					
Gasoline (CaRFG)[1]	1.31	1.25	1.10	0.30	0.17
Diesel (ULSD)[2]	0.61	0.61	0.68	0.67	0.67
Jet Fuel	0.47	0.46	0.44	0.38	0.35
Electric Power	0.000	0.001	0.011	0.060	0.097
Hydrogen	0.000	0.000	0.001	0.032	0.052
Fuel Demand (BGGE)					
Gasoline (CaRFG)[1]	11.7	11.1	9.8	2.6	1.5
Diesel (ULSD)[2]	5.5	5.4	6.0	6.0	6.0
Jet Fuel	4.2	4.1	3.9	3.4	3.1
Electric Power	0.00	0.01	0.10	0.54	0.88
Hydrogen	0.00	0.00	0.01	0.28	0.46
GHG Emissions (MMT CO_{2e} / yr)					
LDV + Bus	114	108	94	23	11
HDV	50	49	49	26	12
Rail	2	3	3	3	3
Aviation	4	4	4	2	2
Other Transportation	4	4	6	5	4
Total	**175**	**168**	**156**	**60**	**32**
Target	**-**	**-**	**-**	**-**	**32**
GHG Relative Reduction Below Alternative 1 2020[3] (%)					
LDV + Bus	-	-	-	75%	88%
HDV	-	-	-	47%	76%
Rail	-	-	-	13%	22%
Aviation	-	-	-	52%	62%
Other Transportation	-	-	-	12%	28%
Total	-	-	-	**62%**	**80%**
Target	-	-	-	**-**	**80%**

[1]California Reformulated Gasoline (CaRFG) includes 10% ethanol blended by volume
[2]Diesel includes 5% biodiesel by volume
[3]AB32 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.

For Alternative 3, LDV GHG emissions are reduced by 75% in 2040 and 88% in 2050, while HDV emissions decrease by 47% and 76%. For all transportation sectors, there is a 62% reduction in GHG emissions by 2040 and 80% reduction by 2050.

Figure 7 below 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.

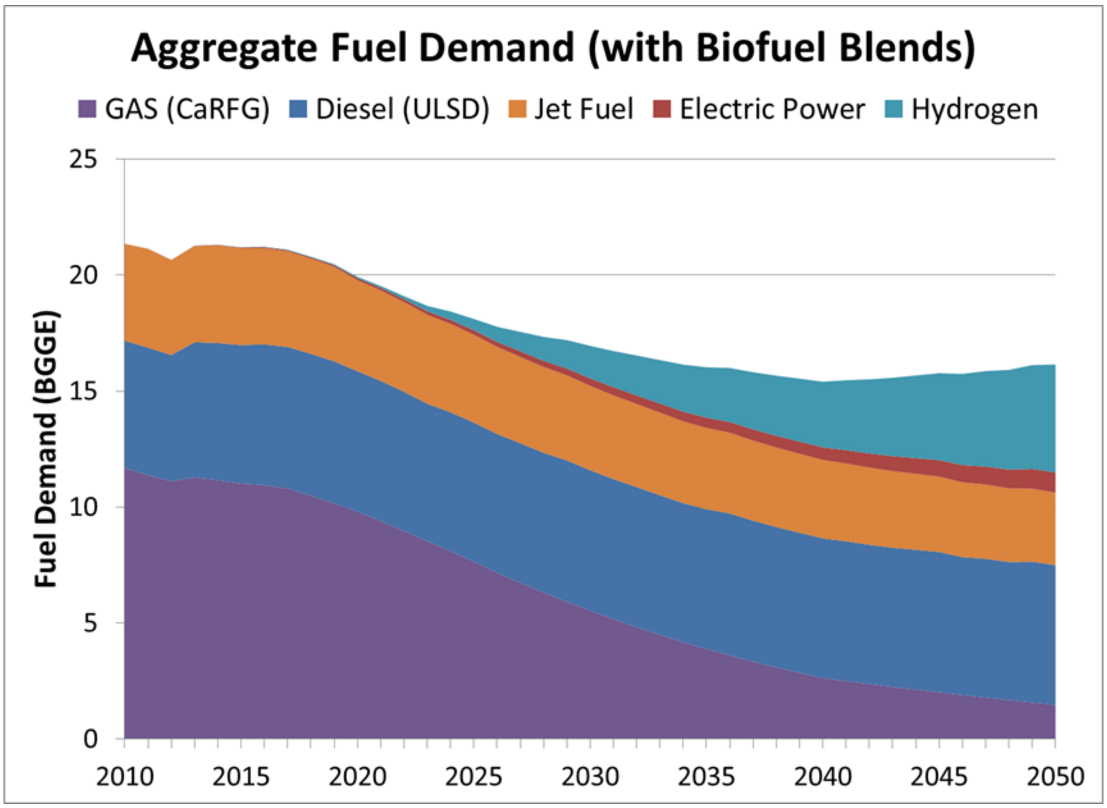

Figure 7: Aggregate Fuel Demand by sector for Alternative 3

Figure 8 below 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 CO_{2e}. As a reference, the figure contains red “X’s”, which represent the 2020 and 2050 targets (see explanation above).

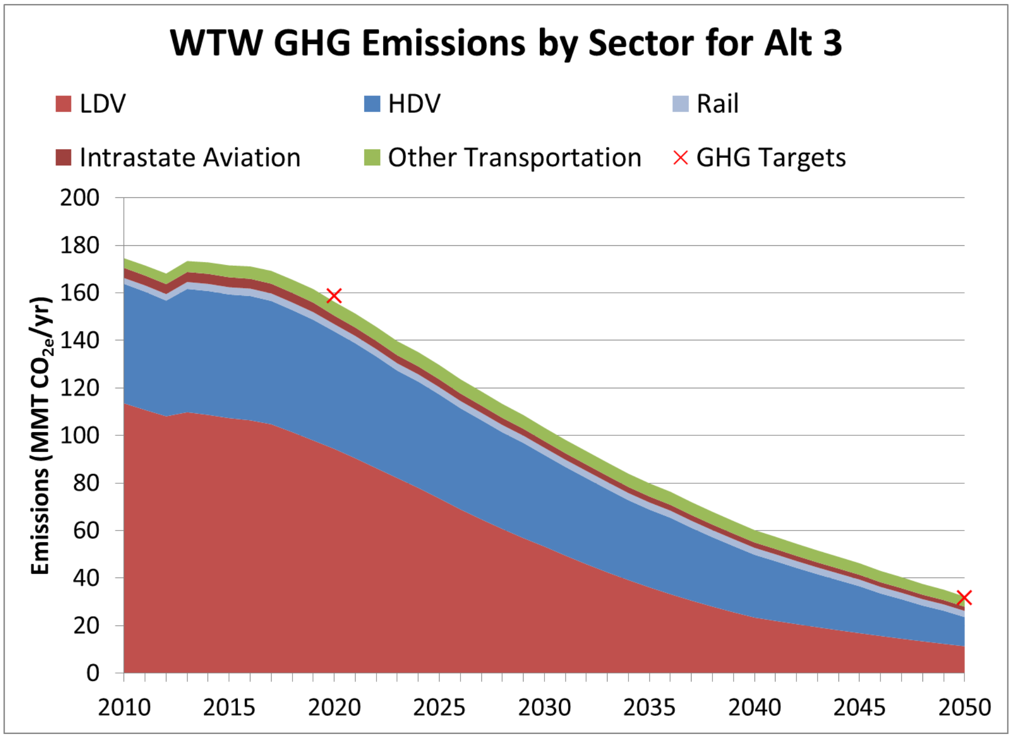

Figure 8: WTW GHG Emissions by Sector for Alternative 3

Conclusions

The 2050 GHG target for CTP2040 is 80% below the 2020 data point for Alternative 1, or a target of approximately 32 MMT CO_{2e} 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 mode nearly attained its "equal share" target but because the other modes did not reach their "equal share" the alternative did not reach the 2050 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 CO_{2e} 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. As a result, CSTDM Alternative 1 VMT for HDVs is approximately double what ARB estimates in EMFAC 2014 statewide. Alternative 1 LDV VMT is approximately 20% lower than EMFAC 2014. For the next draft, as an improvement to CSTDM, the base year should be validated against these records.

TREDIS

TREDIS is the Transportation Economic Development Impact System 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 like 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 will assess the economic impacts from the CSTDM as it relates to passenger and freight travel information. TREDIS addresses the economic forecasts from the vehicle activity of the CSTDM required by SB 391 for CTP 2040

Endnotes

1. 2013, Cambridge Systematics memorandum to California High Speed Rail Ridership and Revenue Peer Review Panel, Revised forecasts of gasoline prices and fuel efficiency for use in 2014 Business Plan Model Runs and Forecasts, Oakland, CA

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

3. 2012, Sacramento Association of Governments, 2012 Metropolitan Transportation Plan, Final Environmental Impact Report, Appendix C-4, Model Reference Report, Sacramento, CA.

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

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

6. 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.

7. 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.

8. 2007, Transit Cooperative Research Program, TCRP Report 118: Bus Rapid Transit Practitioner's Guide, Washington DC.

9. http://www.arb.ca.gov/cc/sb375/policies/bicycling/bicycling_brief.pdf

10. http://www.arb.ca.gov/cc/sb375/policies/ped/ped_brief.pdf

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

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

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

14. 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.

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

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

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

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

AUG 27 2015

OFFICE OF THE
REGIONAL ADMINISTRATOR

Carrie Bowen, Director
Department of Transportation, District 7
100 S. Main Street, MS-16A
Los Angeles, California 90012

Subject: EPA Comments on the Draft Environmental Impact Statement for the SR 710 North Study, Los Angeles County, California (CEQ #20150061)

Dear Ms. Bowen:

The Environmental Protection Agency (EPA) has reviewed the above-referenced document pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act. The California Department of Transportation (Caltrans) granted EPA an extension until August 28, 2015 to submit comments on this document. Our detailed comments are enclosed. EPA appreciates Caltrans' consideration of transit and tunnel alternatives that seek to reduce the adverse air quality and health impacts that additional lane capacity may create. Our review of this project has identified missing information that is needed to demonstrate that the project can meet this goal. EPA believes that transit options in conjunction with regionwide zero- and near-zero emissions corridors, can collectively contribute to long term strategies for improved air quality in the South Coast Air Basin, which has some of the worst air quality in the nation. Capturing and controlling roadway emissions through tunneling and ventilation technology may also reduce some of the project's impact.

Freeway Tunnel Alternative
The proposed ventilation system with air scrubbers has the potential to substantially mitigate operational air quality impacts from the Freeway Tunnel Alternative. However, the Draft EIS does not fully evaluate whether the project alternatives could cause or contribute to localized National Ambient Air Quality Standard (NAAQS) exceedances in the project area, such as near the entrances to the tunnel or in the vicinity of the SR 710/I-10 and I-210/SR 134 interchanges. The additional materials provided by Caltrans to EPA during our review of the Draft EIS supported the need for refined analysis and disclosure to the public of impacts in anticipated hotspot locations, as well as the potential need for Freeway Tunnel Alternative design changes to eliminate identified impacts.

For these reasons, and because the project area's existing air quality is so poor, we have rated the Freeway Tunnel Alternative as "3"- *Inadequate Information*, and recommend preparation of a focused Supplemental Draft EIS, to 1) analyze whether or not the project will contribute to NAAQS exceedances, 2) demonstrate how the tunnel design and emissions controls will reduce and capture emissions to the highest extent possible, and 3) commit to mitigation to reduce remaining air quality impacts. We also provide several recommendations to further analyze and disclose impacts related to tunneling, including impacts from construction and haul routes. These issues are common to all design options that include tunneling.

EPA appreciates Caltrans' responsiveness to EPA through interagency coordination during the review period of this Draft EIS and we encourage continued coordination to further address the issues raised in this letter. We note that preliminary information shared with EPA during interagency coordination indicates that the Freeway Tunnel Alternative may impact the $PM_{2.5}$ NAAQS, and as a result, face conformity challenges. We understand that Caltrans intends to demonstrate that the preferred action meets the Clean Air Act requirements of EPA's transportation conformity regulations prior to publication of a Final EIS for this project and we encourage Caltrans to continue working on this issue and consider including a conformity determination in a Supplemental Draft EIS.

Light Rail Transit (LRT) Alternative
We commend Caltrans and Metro on the inclusion of transit alternatives that could address some of the traffic issues in the project area, as well as reduce emissions from single occupant vehicles. However, we have concerns with potential community impacts from the above-ground portions of the Light Rail Transit Alternative, including disruption of community cohesion and the number of displaced businesses. In light of these issues, the enclosed detailed comments recommend including a more robust discussion of the transit alternatives that were considered, but rejected, from further analysis in the Draft EIS. As noted above, we also provide several recommendations to further analyze and disclose impacts related to tunneling, including impacts from construction and haul routes. We have rated the Light Rail Transit (LRT) Alternative as EC-2, *Environmental Concerns, Insufficient Information.*

Transportation System Management/Transportation Demand Management (TSM/TDM) and Bus Rapid Transit (BRT) Alternatives
EPA provides no further comments on the Transportation System Management/Transportation Demand Management (TSM/TDM) and Bus Rapid Transit (BRT) Alternatives and provides a rating of LO, *Lack of Objections* for these alternatives.

We appreciate the opportunity to review this Draft EIS. When the Supplemental Draft EIS and/or Final EIS is released for public review, please send one hard copy and one electronic copy to the address above (mail code: ENF-4-2). If you have any questions, please contact Carolyn Mulvihill, the lead reviewer for this project, at 415-947-3554 or mulvihill.carolyn@epa.gov.

Sincerely,

Jared Blumenfeld

Enclosures:
Summary of EPA Rating Definitions
EPA's Detailed Comments

cc via email: Malcolm Dougherty, Caltrans
Ron Kosinksi, Caltrans
Brenda Powell-Jones, Caltrans
Vince Mammano, FHWA
Bryan Pennington, Metro
Dr. Barry Wallerstein, South Coast Air Quality Management District
Susan Nakamura, South Coast Air Quality Management District
Kurt Karperos, California Air Resources Board
LB Nye, Los Angeles Regional Water Quality Control Board
Hasan Ikhrata, Southern California Association of Governments
Dr. Paul Simon, Los Angeles County Department of Public Health

SUMMARY OF EPA RATING DEFINITIONS*

This rating system was developed as a means to summarize the U.S. Environmental Protection Agency's (EPA) level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the Environmental Impact Statement (EIS).

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

ADEQUACY OF THE IMPACT STATEMENT

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, Policy and Procedures for the Review of Federal Actions Impacting the Environment.

EPA provides the following comments and recommendations for consideration as Caltrans finalizes the environmental review process for this project.

I. Freeway Tunnel Alternative
II. Light Rail Alternative
III. Other Comments

I. Freeway Tunnel Alternative

Demonstrating Tunnel Design/Effectiveness in Reducing Air Quality Impacts

The Draft EIS does not fully evaluate whether the Freeway Tunnel Alternative could cause or contribute to localized National Ambient Air Quality Standard (NAAQS) exceedances in the immediate project area, such as near the entrances to the tunnel or in the vicinity of the SR 710/I-10 and I-210/SR 134 interchanges. Furthermore, the Draft EIS and Tunnel Systems Report describe the goals and general design of the tunnel ventilation system and controls, but further information is needed for purposes of ensuring air quality mitigation and evaluating the modeling analysis.

Air Quality Modeling –Presentation of Impacts

The Draft EIS presents quantitative modeling results in Tables 5.8-5.10; however, the Draft EIS doesn't provide any information to the public describing what these modeling results mean in terms of air quality. The Draft EIS does not include predicted concentrations for several of the design variations: (1) Single-Bore Tunnel without Tolls, (2) Single-Bore Tunnel without Tolls, without Trucks, (3) Dual-Bore Tunnel with Tolls, without Trucks and (4) Dual-Bore Tunnel with Tolls with express bus. Further, the modeling results presented in the Draft EIS mischaracterize the full impacts of the project. The results presented in the tables do not appear to include background concentrations combined with the predicted modeled concentrations. Based on EPA's understanding of ambient air quality concentrations within the study area, it appears that the total concentrations would be above the NAAQS for particulate matter smaller than 2.5 micrometers ($PM_{2.5}$) standards. Presenting the modeled concentrations without background values does not clearly indicate to the public the full impacts from the project.

In addition, there is no information regarding where the impacts of the projects were predicted and why some design variations show higher or lower PM concentrations. For example, it is not clear why the results from the tunnel variations, without trucks, are higher than with trucks. The Draft EIS should clearly present information showing where localized concentrations will both increase and decrease, such as due to the shifting of traffic from existing roadways to the tunnel. The Draft EIS should explain these results so that the public understands the regional air quality impacts of the project.

We appreciate the additional information that Caltrans shared with EPA during our review of the Draft EIS, including preliminary modeled $PM_{2.5}$ concentrations from the build minus no-build alternatives focused on areas with the largest potential concern, such as the tunnel entrances. We encourage Caltrans to provide these additional maps, analyses, and conclusions to the public and decision-makers.

Recommendations:

- Clearly present information showing where localized concentrations will both increase and decrease and explain these results for the public and decision-makers. Include maps with modeled isopleths showing the full (background plus modeled) concentrations for the study area as well as anticipated changes (future build minus future no-build) in concentrations for 24-hour and annual $PM_{2.5}$ and PM_{10}. In addition to presenting information on the entire study area, include maps that include isopleths targeted to the areas of largest potential impact, such as the tunnel entrances, and provide clear information on the locations of the proposed tunnel and ventilation towers.

- Include more information explaining the differences in modeled concentrations for each of the design variations and why some concentrations are not included
- Please continue to consult with EPA on the emissions and air quality modeling, including the presentation of results for the public and decision-makers.

Air Quality Modeling - Design Assumptions, Modeling Inputs, and Verification of Results
There is not enough information in the Draft EIS for EPA to validate the modeling results. The Draft EIS does not contain maps or figures showing spacing and location of emission sources and tunnel vents, and there are no details regarding how emissions at tunnel entrances and exits were estimated and handled in modeling. It is not clear how fugitive emissions were determined and if centerline miles or VMT were used to predict growth in fugitive $PM_{2.5}$ and PM_{10} emissions.

The Draft EIS states that the tunnel ventilation tower emissions for the north and south tunnel portals were modeled as point sources, however there is no information provided regarding how these point sources were characterized, such as emissions rate, release height, exit temperature, etc. There is also no information about how the emissions at the tunnel entrances and exits were treated in the modeling. The Supplemental Draft EIS or Final EIS should include information on the tunnel entrances and exits displayed with the modeling outputs (e.g. concentration isopleths), to facilitate evaluation of the modeling treatment and performance in the entrance areas.

The Tunnel Systems Report emphasizes that the primary purpose of the tunnel ventilation system is to reduce the level of harmful gases within the tunnel, such as carbon monoxide (CO) from routine tunnel operations, or smoke from a tunnel fire. The Report also acknowledges an additional goal of "avoid[ing] concentration of noxious gases outside the tunnel at the portal areas." While maintaining safe air quality levels within the tunnel is critical, we also encourage Caltrans to consider ambient air quality (i.e. air quality outside of the tunnel) as a primary design goal, to further insure that the predicted effectiveness of the air ventilation system and controls are achieved in practice. Furthermore, while the Draft EIS and Tunnel Systems Report appear to only commit to particulate matter controls via an electrostatic precipitator, we note that it is also critical for the ventilation system to capture and control oxides of nitrogen (NO_x), volatile organic carbons (VOCs), and air toxic emissions, due to the project's location in the air basin with the worst ozone air quality in the U.S.

Recommendations:

- Clarify that ambient air quality is a primary purpose of the tunnel ventilation system, in addition to air quality within the tunnel.
- Commit to implementing tunnel ventilation system controls for particulate matter, CO, NOx, VOCs, and air toxics.
- Provide additional information regarding how emissions from the tunnel ventilation towers were characterized in AERMOD and the resulting modeled concentrations in the vicinity of the towers for each tunnel variation. In the presentation of modeling results, label the sources of emissions.
- Provide additional information regarding the characterization of emissions leading up to and immediately inside of the tunnel entrances and exits and the resulting modeled concentrations in the nearby vicinity.

- Include calculations used to determine the emissions modeled for each alternative.
- Provide information supporting assumptions on the effectiveness of the tunnel's air ventilation system and the control efficiency of the tunnel ventilation towers. To the extent that similar tunnel ventilation systems and controls are in operation in other locations, provide information on the effectiveness of those systems for capturing and controlling air pollutant emissions.

Air Quality Modeling - Potential Incorrect Use of Volume Emission Source
The Draft EIS states that "The operational vehicle exhaust emissions from roadways were modeled as a line of volume sources. The line source spacing, or separation of the volume sources, was twice the width of each individual volume source." While either area or volume sources can be used to represent roadways, in general, we recommend using area sources rather than volume sources as area sources are easier to characterize correctly. Spacing the volume sources twice the width is incorrect; the volume sources should be one source width apart. The additional modeling output isopleths that Caltrans provided to EPA indicate that the volume sources were potentially treated incorrectly in the modeling.

Recommendations:
- Before a Supplemental Draft EIS or a Final EIS is issued, a PM hot-spot analysis that meets the requirements of EPA's transportation conformity regulations is necessary. Please continue to consult with EPA on the development of this analysis. See additional comments about the PM hot-spot analysis below.
- Provide information in the Supplemental Draft, or Final EIS, on the results of the PM hot-spot analysis. Indicate how the emission sources were modeled graphically. The following link contains examples of how to characterize and model the emission sources: http://www.epa.gov/otaq/stateresources/documents/hotspot-leasons-learned-trb.pdf.
- Make AERMOD input and output files available for public review along with these results in the Supplemental Draft or Final EIS.

Construction – Complete Characterization of Construction Impacts
In the Draft EIS, Tables 5.1 – 5.5 indicate that daily construction emissions for the build alternatives increase significantly with the Freeway Tunnel Alternative variations, however a complete characterization of the emissions is not provided. The construction emission tables provided show only the maximum daily emissions in lb/day, but the duration of construction for each alternative is different. Alternatives that take longer to build will produce higher total construction emissions.

Construction of the Freeway Tunnel Alternative would be from 2020-2025. We note that the years 2021 and 2025 are important milestone years for attainment of the 2012 $PM_{2.5}$ standard. Evaluation of whether the area has attained the 2012 $PM_{2.5}$ NAAQS will be based on ambient data from 2019, 2020, and 2021. Minimization and mitigation of emissions impacts from construction will be important to help insure that the area will attain the standard. Compliance with South Coast Air Quality Management District (SCAQMD) Rule 403 and standard construction measures to reduce fugitive emissions should be discussed in the context of what options are appropriate, given the current drought conditions. Additional mitigation should also be considered to reduce NOx emissions.

Recommendations:
- The duration of construction for each alternative should be incorporated into the tables to show the total construction emissions for each alternative.
- Discuss whether, due to current drought conditions, dust control during construction will occur under additional requirements, such as use of recycled water, or use of non-water dust

palliative compounds. If water control methods aren't proposed, then discuss the relative effectiveness of other compounds in dust mitigation.

- Include additional mitigation measures in Chapter 6, including the following as applicable:
    - Meet and ideally go beyond CARB requirements for in-use diesel engines and equipment, particularly for non-road construction fleets.
    - Insure that all construction equipment meets or exceeds equivalent emissions performance to that of U.S. EPA Tier 4 standards for non-road engines.
    - Implement a strong anti-idling policy at *all* construction sites for this project.
    - Provide training for contractors and their employees on air quality impacts from construction activities and potential health risks to nearby receptors, and ways to reduce emissions (e.g., no idling, using PM filters, using alternative fuels, etc.).
    - Solicit construction bids that include use of energy and fuel-efficient fleets and zero-emission technologies.
    - Use lighting systems that are energy efficient, such as LED technology.
    - Use the minimum feasible amount of greenhouse gas (GHG)-emitting construction materials.
    - Use cement blended with the maximum feasible amount of flash or other materials that reduce GHG emissions from cement production.
    - Use lighter-colored pavement where feasible.
    - Recycle construction debris to the maximum extent feasible.
    - Plant shade trees in or near construction projects where feasible.

Tunnel Air Quality

Section 3.13 of the Draft EIS does not address air quality in the tunnel. However, the Tunnel Systems Report provides extensive information about the tunnel ventilation system, tunnel air quality, and standards for the ventilation system. Page 38 of the Tunnel Systems Report states, "When CO emissions are controlled, other air contaminants are also maintained at acceptable levels." More detail should be provided on the other air contaminants in the tunnel and what is defined as acceptable levels, including any relevant ventilation or air quality standards.

Recommendation:

- Section 3.13 should be revised to include a description of air quality in the tunnel, including relevant ventilation and air quality standards and predicted concentrations of CO, NO_x, air toxics, and $PM_{2.5}$.

Recommendations for Interagency Completion of Project-Level Transportation Conformity Analysis and Associated Consultation

Discussion of Conformity

As the Draft EIS states, the Freeway Tunnel Alternative with either the Single or Dual-Bore design variations were determined to be projects of air quality concern (POAQC) by the Southern California Association of Government's Transportation Conformity Working Group (TCWG), meaning they require a PM hot-spot analysis. The language in the Draft EIS implies that this analysis has not yet been conducted, yet also seems to indicate that conformity was completed and demonstrated by the modeling results included in the Draft EIS: (see italic text below) and in several other sections of the document.

> If the Freeway Tunnel Alternative with either the single-bore or dual-bore design variation is identified as the preferred alternative, a quantitative PM hot-spot analysis *will be conducted* to demonstrate that the project would not delay attainment of or worsen existing violation of or cause an exceedance of the PM2.5 or PM10 national ambient air quality standards and meets

conformity requirements. *In addition to the demonstration of conformity requirement, PM2.5 and PM10, 24-hour PM2.5, annual PM2.5, and 24-hour PM10 concentration values were calculated* along the existing and proposed roadways within the project area. These values were calculated based on the EPA Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas (EPA Guidance November 2013).

Since this is a major new transportation facility located in an area that is designated as nonattainment for multiple ozone and $PM_{2.5}$ standards as well as maintenance for CO and PM_{10}, it is critically important that impacts to air quality be accurately analyzed, disclosed, and reduced as much as possible. As discussed, the SCAG TCWG has already determined that there are multiple project design variations that have been determined to be POAQCs. However, despite the referenced section of the Draft EIS included above, it has not yet been shown that these design variations meet the Clean Air Act requirements for transportation projects in PM nonattainment areas. Furthermore, the results presented in the Draft EIS are not presented for all receptors, included only the contribution from the project, and do not demonstrate that conformity was met.

Completion of $PM_{2.5}/PM_{10}$ Hot Spot Conformity Analysis We understand that Caltrans has just started coordinating with the TCWG to address this issue by sharing a modeling protocol for the project. EPA's quantitative PM hot-spot guidance describes a series of analytical and modeling steps that a project sponsor can follow to ensure that the project meets the statutory and regulatory conformity requirements. First, impacts of the project should be modeled, combined with background concentrations as described in Section 9 of EPA's guidance, and compared to the relevant NAAQS. A hot-spot analysis for this project should consider traffic impacts not only in the tunnel, but also on facilities outside the tunnel, including at the tunnel approaches. The information in Appendix D indicates that some of the largest truck traffic increases are north or south of the tunnel portals, regardless of design variation. If the design values for the build scenario are less than or equal to the relevant NAAQS at all receptors, the project meets the conformity rule's hot spot requirements and no further modeling is needed.

If the build scenario results in design values greater than the NAAQS, then the no-build scenario will also need to be modeled. The modeling results of the build and no-build scenarios should be combined with background concentrations as appropriate. If the design values for the build scenario are less than or equal to the design values for the no-build scenario on a receptor by receptor basis, then the project meets the conformity rule's hot spot requirements.

Once the SCAG TCWG has concurred on the analysis, the quantitative analysis is typically considered as being acceptable for inclusion in the NEPA document.

Recommendations:

- The Supplemental Draft EIS or Final EIS should: 1) state that the conformity analysis is completed and concurred upon by the SCAG TCWG; and 2) accurately assess and disclose whether the proposed tunnel design variations will cause or contribute to any new localized violation of the PM NAAQS.
- Include predicted concentrations for *all* proposed Freeway Tunnel Alternative design variations, including background concentrations at all receptor locations near the tunnel facility.
- If the PM Hot-Spot Analysis is not completed upon publishing a Supplemental Draft EIS or Final EIS, a status of the analysis should be provided.

Construction Emissions Considerations for Conformity
Section 93.123(c)(5) of the conformity rule states that construction-related PM emissions due to a particular project are not required to be included in a hot-spot analysis, if such emissions are considered temporary (i.e., emissions which occur only during the construction phase and last five years or less at any individual site). The Draft EIS states that construction is predicted to last 57-59 months for the Freeway Tunnel Alternative, which is just short of the 5-year limit for including impacts in conformity. Considering that a 1-3 month delay would push the project period beyond 5 years, EPA encourages Caltrans to consider the potential need for construction-related emissions to be addressed in the conformity analysis.

Recommendations:

- In light of the need to include construction emissions in conformity-related analyses if the construction window is in excess of 60 months, EPA recommends that Caltrans provides more information on construction phasing.
- Confirm that there is no likelihood of construction delay. For example, include a schedule or timeline for various construction phases, and a description of how time estimates for each phase were developed. Discuss whether any potential delays have already been accounted for in this timeline.

Tolling
The Draft EIS does not include an equity assessment of the toll lanes included in the tolled variations of the Freeway Tunnel Alternative. In considering the implementation of high-occupancy/toll (HOT) lanes, there are nearby examples where analyses were completed in order to insure that a new toll system is implemented with awareness of possible disproportionate effects. For example, on the I-10 and I-15 corridors, the San Bernardino Association of Governments conducted an equity assessment to determine if the proposed I-10 and I-15 HOT lanes would benefit or adversely affect low-income travelers. For the impacts that were considered adverse, the equity assessment recommended measures to address the identified impacts. Metro also conducted an equity assessment to address concerns about fairness to low-income residents with regard to the proposed HOT lane on the I-5 North corridor.

The Draft EIS is also lacking information on how revenue from the tolls would be used, which could be helpful in describing equitable implementation of a tolling program. The Freeway Tunnel Alternative is included in the Southern California Association of Governments' regional transportation plan (RTP) and the tolled operational variation of the dual bore Freeway Tunnel Alternative is consistent with the scope in the RTP. Forecasted revenues in the RTP's financial plan include toll revenues from the proposed freeway tunnel.

Recommendations:

- If a tolled variation of the Freeway Tunnel Alternative is chosen as the preferred alternative, Caltrans should conduct an equity assessment of the toll lanes to better inform equitable implementation of future tolling. Alternatively, if the equity issues related to the I-10, I-15 and I-5 HOT lanes are similar enough to what is proposed for the Freeway Tunnel Alternative, then the recommendations from the previous equity assessments could be characterized and discussed within the context of this project.
- Describe the range of additional services or improvements that would be funded by possible tolling revenues, including who would benefit from those services or improvements.

Health Effects

Health Effects - Mobile Source Air Toxics During Construction

The Air Quality Assessment Report does not appear to include the quantification of temporarily elevated MSATs during the construction period. While toxic air contaminants are mentioned in the introductory paragraph, they are not mentioned throughout the rest of the section. TACs, and particularly diesel PM, should be mentioned when discussing the pollutants generated by heavy trucks and construction equipment.

Recommendations:

- Reference MSATs (or TACs) as appropriate. For example, in the paragraph that begins, "Site preparation and construction…," the following edit should be made: "If not properly controlled, these activities would temporarily generate PM_{10}, $PM_{2.5}$, ~~and small amounts of~~ *as well as* CO, SO_2, NO_x, VOCs, *and TACs, including diesel particulate matter*." Alternatively, clarify how it was determined that only small amounts of these pollutants would be emitted.
- Include TAC emissions, including diesel PM, in the analysis of construction emissions. Report results along with the other pollutants in Tables 5.1-5.5.
- Discuss TACs, including diesel PM, in the analysis of long-term regional emissions.

EPA recommends removing "Qualitative" from the title of Section 5.4 since there is a quantitative estimation of emissions in this section. However, the quantitative estimation of MSAT emission impacts during the construction phase of each of the build alternatives (Section 5.4.4)) is not presented. The short-term criteria pollutant impacts analysis presented in Section 5.1 (and in Tables 5.1 – 5.5) indicates that concentrations of criteria pollutants in the study area would increase by a significant amount, which suggests that MSAT emissions in these areas would increase as well. An expansion of the existing discussion, by including MSATs in the scope of short-term impacts analysis, would inform the public and decision-makers about possible location-specific increases in MSAT emissions.

Recommendations:

- EPA recommends that MSATs be included in the discussion of short-term impacts related to the construction of each build alternative.
- Specifically, discuss what impacts receptors would experience directly adjacent to the construction sites and how this compares with impacts they may experience currently, in the absence of an adjacent high-intensity construction project. This type of analysis is especially relevant to potential environmental justice communities adjacent to the build alternatives and in determining locations for prioritizing mitigation.

Health Effects - Mobile Source Air Toxics During Operation

Regarding long-term air quality impacts, page 5-29 of the Draft EIS states that MSAT emissions are estimated to decline by as much as 73 percent in the study area due to existing vehicle and fuel regulations coupled with fleet turnover (and not due to the build alternatives). Despite the fact that, as stated in the Draft EIS, with each build alternative, "regionwide MSAT levels [would be] substantially lower than they are today," there would be increases in localized MSAT emissions in each of the build alternatives relative to the no build alternative.

Recommendation:

- Clarify where increases in localized MSAT emissions would result from the build alternatives.

As stated above with regard to decreases in MSATs over time due to vehicle and fuel regulations and fleet turnover, the Health Risk Assessment states that the no build and build alternatives would cause a net decrease in cancer risks compared to 2012 existing conditions. Chapter 4.2.3 is also misleading regarding its conclusions that the build alternatives would "cause" a net decrease in cancer risks impacts. This statement should be rephrased, as discussed above. As demonstrated in the air quality analysis, there would be increases in localized MSAT emissions in each of the build alternatives relative to the no build alternative. Furthermore, in the Health Risk Assessment (see Table 3-4), maximum risks from the Freeway Tunnel Alternative have the potential to be greater than 100-in-a-million compared to the no build alternative. The Supplemental Draft EIS or Final EIS should clarify whether or not the build alternatives truly yield less than significant impacts in light of the information presented.

Recommendation:

- EPA recommends comparing the build alternatives and the no build alternative to determine the incremental impact from the alternatives themselves.
- Text should be revised to state that the build alternatives would not cause the decrease in cancer risks. EPA recommends rephrasing to say that "Cancer risks in both the no build and build alternatives decrease compared to 2012 existing conditions due to existing control requirements and fleet turnover."

Health Effects – Children's Health

Executive Order 13045 on Children's Health and Safety directs each Federal agency, to the extent permitted by law, to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, and to ensure that its policies, programs, activities, and standards address these risks. Analysis and disclosure of these potential effects under NEPA is recommended because some physiological and behavioral traits of children render them more susceptible and vulnerable than adults to environmental health and safety risks. Although the Draft EIS identifies communities and schools located near the proposed project area, the Draft EIS does not clearly describe the potential direct, indirect, and cumulative impacts of the project on children's health.

Recommendations:

- Evaluate the potential direct, indirect, and cumulative health impacts of the construction and operation of the various project alternatives on children's health. Obtain and discuss relevant health data (e.g., asthma data) for children living near the proposed project area, if available. The analysis may consider the following:
    - Potential respiratory impacts, including asthma, from air pollutant emissions and generation of fugitive dust;
    - Potential noise impacts to health and learning, especially in areas where the alternatives are located near homes, schools, childcare centers, and parks; and
    - Potential impacts from the use of chemicals, such as dust suppressants, and hazardous materials to children living near the proposed project areas.
- Further evaluate the proposed project alternatives in order to compare potential impacts to children's health. Clearly identify the project alternatives that have the least impact to children, as well as those alternatives that have the least impact on areas already significantly impacted by existing air pollution, high disease rates, and indicators of social vulnerability.
- Identify mitigation measures to reduce impacts from the proposed project's construction and operation to schools and child care centers near the proposed project area, including measures identified in the voluntary EPA School Siting Guidelines (http://www.epa.gov/schools/guidelinestools/siting/), and voluntary EPA Guidelines for States: Development and Implementation of a School Environmental Health Program

(http://www.epa.gov/schools/guidelinestools/ehguide/). Engage local school districts, child care providers, and others to discuss mitigation measures.

On March 6, 2015, California's Office of Environmental Health Hazard Assessment (OEHHA) adopted a new "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments," which can be found here: http://oehha.ca.gov/air/hot_spots/hotspots2015.html. The guidance was updated to reflect advances in science which have shown that early-life exposures to air toxics contribute to an increased lifetime risk of developing cancer or other adverse health effects, compared to exposures that occur in adulthood. Children are typically more sensitive than adults to chemicals and this is true of air toxics. Children's defenses are not as developed, they breathe more air and eat and drink more per pound of body weight, and they are far more active than adults. In addition, they have a longer lifetime ahead of them, during which delayed health effects may become apparent. We also note that the Health Risk Assessment in the Draft EIS does not include an assessment of the risks associated with the construction impacts of each build alternative.

Along with the updated guidance, OEHHA and CARB updated its "Hotspots Analysis Reporting Program" (HARP) to reflect the updates. The latest version of HARP can be downloaded here: http://www.arb.ca.gov/toxics/harp/harp.htm.

Recommendations:

- The Health Risk Assessment may incorporate the updates identified above into the health risk analysis.
- The analysis may also be revised to include health impacts during construction.

Integration of Tunnel Alternative with 710 South Corridor Project

Because the proposed project is located directly north of the proposed 710 South Corridor Project and that project has the potential to directly affect the proposed project, the analysis should be more clear regarding the integration of the two projects.

Recommendation:

- If the Freeway Tunnel Alternative is selected as the preferred alternative, discuss how this project will integrate with the proposed I-710 South Corridor Project. For example, discuss how infrastructure to support zero emissions vehicles, which is being discussed for I-710 South, could be integrated into this project.

II. Light Rail (LRT) Alternative Comments

Property Acquisition and Business Displacement

EPA notes that the LRT Alternative will result in a large amount of property acquisitions. The Draft EIS states that because the LRT Alternative would result in a minimal number of nonresidential displacements, it would not adversely affect the character or cohesion of most of the communities in which the project would be located. It also states that the LRT Alternative would not result in permanent adverse effects related to relocations and real property acquisitions.

Table 3.3.6 indicates that Property Acquisitions Required for the LRT Alternative would result in the displacement of 73 businesses and 645 employees. The Draft EIS states that the LRT Alternative would result in the displacement of 15 neighborhood-oriented businesses in the community of East Los Angeles, adversely affecting community character and cohesion, and disrupting the social fabric of the community, due to the lack of relocation opportunities in the immediate vicinity and the high percentage of transit-dependent residents in the area. However, the Draft EIS concludes that most of the business displacements in other cities (Monterey Park, Pasadena, South Pasadena) "would not disrupt the social fabric of the communities" due to the nonessential nature of businesses or other businesses offering the same services in the vicinity. EPA has concerns about the displacements that would result from construction of the LRT Alternative in all of the communities discussed. These displacements would likely adversely impact both businesses and customers as relationships likely exist between neighboring businesses and neighboring residents. Regardless of the nature of the services, the displacement of many businesses in these communities could adversely affect community character and cohesion and negatively impact businesses that would have to relocate.

Recommendations:

- EPA recommends that Caltrans consider a more comprehensive analysis of community character and cohesion that includes other impacts, including visual, noise, and transportation, including the impacts of haul trucks during construction.
- If the LRT Alternative is chosen as the preferred alternative, additional efforts should be made to avoid and minimize property acquisition and business displacement. We encourage Caltrans to work with the local communities to encourage transit oriented development that could accommodate displaced businesses.
- The Final EIS should include information about whether partial acquisitions of property would impact the operations of businesses that exist on those properties, including information from business owners.

The Draft EIS states that the southern portion of the LRT Alternative is elevated due to the difficulty of getting a tunnel boring machine in to the area and the necessity of excavating a hill if the southern portion were to be tunneled. Due to the significant impacts to properties that would result from the elevated section of the LRT, if LRT is chosen as the preferred alternative, Caltrans should describe the other LRT alternatives that were considered and why they were eliminated from further study.

Recommendation:

- If the LRT Alternative is chosen as the preferred alternative, include a discussion in the Final EIS of the other LRT alternatives that were considered and why they were eliminated from further study, including quantitative information about what impacts led to those alternatives being eliminated.

III. Other Comments

Transportation Impacts

The Draft EIS states that in 2035, the TSM/TDM, BRT, and LRT Alternatives would all result in minor increases in AM and PM peak-hour vehicles miles traveled (VMT) in the project study area. The Freeway Tunnel Alternative single-bore variation would result in a 1 percent increase in combined AM and PM peak-period VMT and the dual-bore variation would result in a 2 percent increase. The Draft EIS states that by shifting trips to freeways, the Freeway Tunnel Alternative would divert VMT from local arterials; however, the Draft EIS does not quantify the amount of VMT that would be shifted from local arterials to the Freeway Tunnel Alternatives in the Executive Summary and other summary statements. Tables 3.5.6 and 3.5.11 include daily volumes of vehicles that would travel on arterials and freeways and other quantitative information about travel on arterials. This information should be summarized in the text conclusions for increased clarity for the public.

The transportation section also does not include information about annual average daily traffic on individual segments of freeway and arterials in the study area. This information is important to determine whether certain areas of the study area, for instance the areas where the new freeway alignment would connect to the existing freeway under the Freeway Tunnel Alternative, would experience significant increases in traffic and resulting air quality and noise impacts.

Recommendations:

- The Final EIS Executive Summary and other summary text should include a discussion, including percentages and other quantitative data, on how much traffic would be diverted from local arterials to the Freeway Tunnel Alternative.
- The Final EIS should include information about annual average daily traffic on individual segments of freeway and arterials in the study area, including which segments would experience increases in traffic and potential impacts resulting from that traffic.

Community Impacts Along Haul Routes

The Draft EIS states that the Freeway Tunnel Alternative would result in between 380 (single-bore variation) and 620 (dual-bore variation) haul trips per day during excavation, to transport excavated soil to the proposed disposal sites, two former rock quarries in Irwindale. The Draft EIS does not, however, appear to quantify the number of haul trips that would be required under the LRT Alternative. Tunnel boring operations, and subsequent haul trips, could occur 24 hours a day, 7 days a week. EPA is concerned that this amount of haul trips would have adverse impacts on communities near the disposal sites. Although the routes to the disposal sites would primarily run along freeways, EPA is concerned about the segments that run along local streets, and about traffic and community impacts in general along the haul routes.

Recommendation:

- If the LRT or Freeway Tunnel Alternatives are chosen as the preferred alternative, Caltrans should include a discussion in the Final EIS of the land uses on the local streets near the proposed disposal sites. The discussion should analyze potential impacts to residents and businesses in those areas and commit to mitigation measures for noise, air, traffic, and other potential impacts.

Environmental Justice Impacts

The Draft EIS states that no environmental justice (EJ) impacts were identified with any of the alternatives. Chapter 7 of the Community Impact Assessment contains maps which show each of the alternatives overlaid on (1) Racial Minority Population; (2) Hispanic/Latino Population; (3) Low Income Population; and (4) Census Tracts with One or More Environmental Justice Population Characteristics. These maps are very helpful in understanding potential impacts to the EJ communities. The local communities may be concerned about the location of the tunnel vents and the haul routes (rail and truck) for the tunnel bore material. Therefore, EPA recommends that these features also be indicated on the EJ maps for the LRT or Freeway Tunnel Alternative. As discussed above, the Freeway Tunnel Alternative with the dual-bore design variation would result in approximately 620 haul trips per day. Any EJ communities and/or sensitive populations located along the haul route could be impacted by the increased truck traffic.

Recommendations:

- Include maps in the EJ section of the Final EIS that show the preferred alternative overlaid on the various data included in the Community Impact Assessment. If the Freeway Tunnel Alternative is chosen, include the location of tunnel vents and haul routes on the maps.
- If the LRT Alternative is chosen as the preferred alternative, the Final EIS should also include a map in the EJ section of Chapter 3.3 that overlays EJ communities with proposed property acquisitions and haul routes.

- Any potential impacts to these communities should be discussed and mitigated, especially if there are any sensitive receptors impacted, such as schools, child care centers, or senior centers.

Dewatering During Tunnel Construction

The Draft EIS states that temporary dewatering will be required during construction of the LRT and Freeway Tunnel Alternatives. It states that the Los Angeles Regional Water Quality Control Board requires a permit for discharging wastes to surface waters from activities involving groundwater extraction. Order No. R4-2013-0095 (NPDES No. CAG994004) covers treated or untreated groundwater generated from permanent or temporary dewatering operations or other appropriate wastewater discharge not specifically covered in other general National Pollutant Discharge Elimination System (NPDES) permits in the Los Angeles region.

To be eligible for coverage under this order, a discharger must:

- Demonstrate that pollutant concentrations in the discharge shall not cause violation of any applicable water quality objective for the receiving waters, including discharge prohibitions;
- Demonstrate that the discharge shall not exceed, or have the reasonable potential to exceed, the applicable water quality objectives/criteria for the receiving waters; and
- Conduct water quality screening of a representative sample of the discharge to prove that a reasonable potential for discharge of toxics does not exist.

The Draft EIS states that the soil conditioners that may be injected into the ground at the face of the excavation would be nontoxic and biodegradable, and therefore would not adversely impact groundwater quality. Groundwater monitoring will be performed routinely during tunnel excavation to ensure that the activities are not affecting groundwater levels and quality.

The Draft EIS states that the concrete lining of the LRT and Freeway Tunnel Alternatives would be designed and constructed to be watertight and that after excavation the space between the outside of the tunnel lining and the soil is typically grouted to prevent groundwater flow along the tunnel bores. The Draft EIS states that no permanent dewatering would be required. Because groundwater basins in the area are already impaired by VOCs, nitrates, and other contaminants, it is critical that Caltrans insure no pollutants will enter groundwater during construction and operation of the project.

Recommendations:

- The Final EIS should discuss whether Caltrans/Metro have submitted a notice of intent (NOI) to be covered under the permit and how Caltrans will fulfill the requirements of the above Order (R4-2013-0095 (NPDES No. CAG994004), given the existing impairment of the local groundwater basins.
- The Final EIS should discuss how much dewatering is expected (duration or amount), whether the groundwater will be reused or re-injected, and whether there are any additional requirements on dewatering due to the existing statewide drought.
- Clearly identify what actions will be taken if groundwater monitoring indicates groundwater levels and/or quality are impacted during tunnel excavation.

Soil Disposal During Tunnel Construction

The Draft EIS states that the "excavated soil would be disposed of at the Manning and Olive Pits in the City of Irwindale. These pits are former rock quarries that have been previously environmentally cleared and licensed to accept clean soil from construction projects." However, no detail is provided about the environmental clearance. Page 2-53 states that "The Manning Pit is accessible by both rail and truck."

However, no additional information is provided about whether rail or trucks will be used for hauling bore material to the Manning Pit, or the potential environmental impacts of rail versus trucks.

Recommendations:

- The Final EIS should provide detailed information on the environmental clearance that has been completed for the Manning and Olive Pits in the City of Irwindale, including whether any additional permits will be required for soil disposal resulting from this project.
- As these sites have been licensed to accept clean soil, the Final EIS should discuss alternative disposal sites for soil that is found to be contaminated, and the timing and haul routes for that disposal, if necessary.
- The Final EIS should also discuss potential environmental impacts associated with hauling excavated soil by rail versus truck, and discuss how the decision will be made about whether rail or trucks are used.

Noise and Vibration Impacts

The Draft EIS discusses the locations of receptors that would experience noise impacts due to the various alternatives. It also discusses which locations were considered for noise abatement, and where noise barriers are considered reasonable and feasible, according to characteristics of the sites and cost considerations. We note that many of the noise barrier locations considered feasible were not found to be reasonable based on cost considerations. EPA encourages the consideration of noise barriers and other mitigation of noise impacts in areas of sensitive receptors, and in particular in areas of sensitive receptors located in environmental justice communities. The Cumulative Impact section discusses projects that have the potential to contribute to cumulative noise impacts. Again, we encourage mitigation of noise impacts in particular in areas that would experience cumulative noise impacts from this project and other projects.

With regard to temporary impacts, EPA is concerned about potential noise impacts along the haul routes during construction and vibration impacts from tunneling. The Draft EIS considers a 24-hour operation, and the resulting number of trucks per hour (30 trucks). The Final EIS should discuss whether adverse noise impacts would occur if a 24 hour operation does not occur and there were more trucks per hour.

Recommendations:

- EPA recommends that Caltrans include noise barriers and other mitigation of noise and vibration impacts in areas of sensitive receptors, and in particular in areas of sensitive receptors located in environmental justice communities or in areas that would experience cumulative noise impacts. We encourage mitigation of both permanent impacts from operation of the project alternative, and temporary impacts from construction.
- Include an analysis in the Final EIS of potential noise impacts resulting from different construction operations, including a less than 24-hour operation, which would result in more trucks per hour on roads and increased noise levels. If adverse impacts were to occur under those conditions, we encourage Caltrans to provide mitigation for those impacts.

Wetlands and Water Quality

Wetlands and Waters of the US

The Draft EIS states that while the total area of wetland and nonwetland areas meeting the criteria for US Army Corps of Engineers (USACE) jurisdiction in the Biological Study Area is approximately 4.8 acres (0.4 acre of wetlands and 4.4 acres of nonwetland waters of the US), potential impacts are much less, with the highest impacts being 0.5 acre of permanent and 0.2 acre temporary nonwetland water impacts anticipated from the dual-bore design variation of the Freeway Tunnel Alternative. The Draft

EIS also states that the alternatives would not permanently alter the values and functions of the waters in the area, which primarily function as conveyance of urban runoff and stormwater flows. EPA appreciates that, as stated in the Draft EIS, the Freeway Tunnel Alternative variations were refined during design development to avoid and minimize impacts to wetlands and other waters in the Laguna Channel.

Recommendation:

- Once a preferred alternative is selected, Caltrans should coordinate with the USACE to verify the jurisdictional delineation of wetlands and impacts in the study area, prior to publication of the Final EIS. Caltrans should also coordinate with USACE and EPA to determine appropriate mitigation for wetland impacts.

Water Quality

The Draft EIS states that best management practices would treat widely varying percentages of newly created or replaced impervious surfaces under the various alternatives.

Recommendation:

- Include a discussion in the Final EIS of the percentage of imperious surface that will be treated for the preferred alternative and how that fulfills local permit requirements.

Climate Change

The Draft EIS states that neither EPA nor the Federal Highway Administration (FHWA) have issued guidance or methods to conduct project-level greenhouse gas (GHG) analysis; however, the Council on Environmental Quality released revised draft guidance in December 2014 that describes how Federal departments and agencies should consider the effects of GHG emissions and climate change in their NEPA reviews. EPA recommends that Caltrans review that guidance to see whether it can be used to help outline the framework for its analysis of these issues. EPA appreciates the quantitative analysis included in the CEQA Evaluation chapter of the Draft EIS and encourages Caltrans to include this information as a part of the NEPA review. We support Caltrans' and Metro's efforts to reduce energy consumption and GHG emissions. As Caltrans continues to assess the risks to transportation facilities from climate change effects, we encourage Caltrans to adapt the design standards of this project to mitigate any effects.

Recommendations:

- We believe the Council on Environmental Quality's December 2014 guidance discussed above outlines a reasonable approach, and we recommend that Caltrans use that draft guidance to help outline the framework for its analysis of these issues.
- EPA encourages Caltrans to include the information in the CEQA Evaluation chapter as a part of the NEPA review.
- EPA encourages Caltrans to adapt the design standards of this project to mitigate climate change effects as feasible.

Other Items: **Please address the following in the Final EIS.**

Monitored Air Quality. The Draft EIS contains information regarding monitoring stations and air quality trends in the study area, however it is not clear in the document where the stations are located with respect to the new transportation facilities.

Recommendation:

- The Final EIS should include a map showing the local air quality monitoring stations discussed (i.e., the South Wilson Avenue Pasadena Station, the North Main Street Los Angeles Station, and any other stations located within the project study area) and their relationship to the project location.

Air Quality – Identification of Sensitive Receptors. The Draft EIS includes one paragraph describing where sensitive receptors are expected to occur in the study area but does not include any specifics on where those receptors are located.

Recommendation:

- The Final EIS should include a map showing sensitive receptors.

Air Quality Management Plan. The Draft EIS discusses the 2012 AQMP but not the most recent update or state or federal actions on that plan.

Recommendation:

- The Final EIS should update the information to include ARB adoption and EPA actions on the 2012 AQMP.

CO Screening Analysis. The flow chart was used incorrectly in the Level 4 portion of the analysis.

Recommendation:

- Since the study area is a CO Maintenance area, the lower part of the flow chart (levels 3 and 4) should be used. Please reapply the flow chart correctly and update the CO air quality analysis in the Final EIS.

Transportation Conformity. The Draft EIS indicates that SO_2 is a transportation-related criteria pollutant, which is not correct. The document also references national rulemakings regarding the transportation conformity rule, and ozone and particulate standard that occurred in 2003-2004. Multiple major federal rulemakings that have occurred since this time. Overall the discussion of EPA and ARB standards on pages 2-9 and 2-10 appears to conflate conformity and NAAQS updates.

Recommendation:

- The Final EIS should correct the text to indicate that SO_2 and lead are not required to be included in transportation conformity analyses. In addition, please update the document to include the most recent updates to federal and state NAAQS and the most recent amendments to the transportation conformity rule. Information on the conformity regulations can be found here: http://www.epa.gov/otaq/stateresources/transconf/conf-regs.htm. The latest NAAQS updates can be found here: http://www.epa.gov/air/criteria.html.

David H. Weibel

To: Laurel L. Impett
Subject: RE: Transportation model project list

From: Courtney Aguirre [mailto:Aguirre@scag.ca.gov]
Sent: Monday, December 14, 2015 8:04 AM
To: Margaret Lin
Subject: RE: Transportation model project list

Margaret,

To achieve federal conformity, SCAG is required to model regionally significant and federally funded projects contained within the Federal Transportation Improvement Program (FTIP), including the Los Angeles County Metropolitan Transportation Authority's (LA Metro's) SR-710 North Project Study Alternatives project (RTP Project ID: 1M0101). The SR-710 North Project Study Alternatives project is currently modeled as four toll lanes in each direction as a place holder for this project based on its current description in the 2012 RTP/SCS, which is at present the conforming plan for the region. We understand that the project is currently under environmental review and that a preferred alternative is to-be-determined through this process. As with other projects included within the Draft 2016 RTP/SCS Project List, once the SR-710 North Project Study environmental process is complete, the 2016 RTP/SCS will be updated to reflect the Locally Preferred Alternative as identified within the environmental document.

Sincerely,

Courtney Aguirre
Senior Regional Planner
SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS
818 West 7th Street, 12th Floor, Los Angeles, CA 90017
T: (213) 236-1804
E: aguirre@scag.ca.gov

Stay Connected

From: Margaret Lin [mailto:mlin@southpasadenaca.gov]
Sent: Tuesday, December 8, 2015 3:44 PM
To: Courtney Aguirre <Aguirre@scag.ca.gov>
Subject: Transportation model project list

Courtney,

Would you mind sending me the project details that were included in the transportation model associated with the following projects please:

- FTIP and RTP Project ID: 18790
- RTP Project ID: 1M0101

Please let me know if you have any questions or comments.

Sincerely,

Margaret Lin
Principal Management Analyst
City of South Pasadena
1414 Mission Street
South Pasadena, CA 91030
(626) 403-7236
MLin@SouthPasadenaCA.gov

CITY OF SOUTH PASADENA

OFFICE OF THE CITY MANAGER
1414 MISSION, SOUTH PASADENA, CA 91030
TEL: 626.403.7210 ▪ FAX: 626.403.7211
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April 7, 2015

Lijin Sun
Southern California Association of Governments
818 West 7th Street, 12th Floor
Los Angeles, CA 90017

RE: Notice of Preparation of a Program Environmental Impact Report for the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy

Dear Ms. Sun,

The City of South Pasadena (City) appreciates the opportunity to comment on the Southern California Association of Governments' (SCAG) Notice of Preparation (NOP) for the Program Environmental Impact Report (PEIR) of the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The City would like to raise the following issues of concern regarding the 2016-2040 RTP/SCS PEIR:

1. Faulty Assumption that "SR-710 North Extension (tunnel)" should be included in the 2016-2040 RTP/SCS.

   The NOP asserts that the 2016-2040 RTP/SCS "will largely embody the goals, objectives, and transportation improvements that have been considered in the adopted 2012 RTP/SCS, last amended in September 2014 (Amendment No. 2 to the 2012 RTP/SCS)." This assertion pretends that the law, state policy, and activities in the SR-710 corridor have been unchanged in the past four years, and that whatever assumptions and premises governed in 2012 should be repeated now.

   To prepare an adequate PEIR on the 2016-2040 RTP/SCS, SCAG must recognize, as detailed below, the flawed assumptions built into the 2012 RTP. These include the premises, questioned in greater detail below, that the SR-710 project is a "gap closure," and that the tunnel project qualifies for inclusion in the "financially constrained" list. As a preliminary matter, however, regardless of the error of including the SR-710 tunnel in the 2012 plan, that error should no longer be perpetuated in the 2016 PEIR. Inclusion of the SR-710 tunnel places a heavy and unlawful finger on the scale by which alternatives for the SR-710 corridor are to be evaluated in the just-commenced "SR 710 North Study" draft EIS/EIR.

The SR-710 North Study declares that "[t]he purpose of the proposed action is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles." Putting aside whether that North Study fulfills that purpose, its stated intent is to compare several alternatives on a neutral field of functional capability and environmental and economic impact. But that study's actual comparison of build alternatives relies on the 2012 RTP/SCS to create a "valid" inconsistency of all non-tunnel alternatives (and the single-bore tunnel variation-alternative) with SCAG policies and objectives (SR-710 North Study 29, 2-89.). The flawed 2012 RTP will thus be argued as justifying a decision to select the tunnel, not because it is the superior project, but because only that choice avoids a conflict with SCAG. Furthermore, the recently released SR-710 North Study Draft Environmental Impact Report has stated that no preferred alternative has been identified or selected.

While the City recognizes that the 2016-2040 RTP/SCS "does not specifically analyze potential environmental effects that any of the transportation projects may cause," it nonetheless "includes individual transportation projects." In order for the PEIR to become a valid program EIR its program must not include a SR-710 project or any project that pre-empts the selection process that is to occur through the SR-710 North Study.

2. Faulty Assumption that a Corridor Project "Will Close [the] 710 Freeway Gap."

If the 2016 RTP/SCS DEIR includes projects as described in the 2012 RTP/SCS and amendments, it will perpetuate the error that the 710 Route Study and SR-710 North Extension serve to "close the freeway gap" (2012 RTP FTIP project list.28; 2012 Financially-Constrained RTP project list 164; Draft 2015 FTIP project list 11.). The SR-710 freeway ends at Valley Boulevard; the construction in Pasadena was allowed by judicial order that treats the construction as part of the I-210 interchange.

In the 1974-1998 EIS/EIR documents for the previously proposed surface route, the project was characterized as the extension of the existing I-710 north of Valley Boulevard. Los Angeles County Metropolitan Transportation Authority (LACMTA) adopted that terminology when the project changed from surface to tunnel, and was made a subject of Measure R. SCAG, however, continued in 2012, as it did in 2008, to refer to the project as a “gap closure”, presumably on the premise that part of the I-710 freeway was completed south of the I-210 interchange. The 1976 judicial order that allowed the freeway component between I-210 and Del Mar Boulevard to be opened to traffic, however, treated this freeway component as part of the I-210 project, as its opening was funded by an I-210 contract. In the words of the court, "only the southern portion of the Long Beach Freeway has been completed and it now terminates at Valley Boulevard” (City of South Pasadena v. Volpe, 418 F. Supp. 854, 858 (C.D. Cal. 1976).

Moreover, opening of that freeway portion was conditioned on the premise that opening the freeway segment "will have no effect on the decision as to the ultimate freeway location and will not foreclose reasonable alternatives to the proposed ultimate Route 7 Freeway” (Id. at 864.).

To label the SR-710 project as a "gap closure" ignores the reality that the freeway construction north of Del Mar was never accomplished in compliance with National Environmental Protection Act (NEPA) and California Environmental Quality Act (CEQA), and was only allowed by the court as part of the 210 interchange and not to be used in favor of completing a I-710 freeway. The term "gap closure" is designed to create a sense of inevitability or priority for this project over competing ones, will have effect on the ultimate decision in the SR-710 North Study and 2016 RTP/SCS PEIR, and should be removed in the environmental documentation.

3. Faulty Assumption that a SR-710 Tunnel Project Is "Financially-Constrained."

   The 2012 RTP/SCS continued to represent the fiction that a tunnel project qualifies as a constrained project. While in 2012 some financing might have been deemed more "reasonably available" than previously because of the passage of Measure R and state legislation enabling a toll facility, Measure R accounts for no more than one-sixth of projected cost. SCAG failed in 2012 to provide evidence that private investors would consider entering into a Public Private Partnership for this project in light of competing projects of higher social and transportation value, and with greater promises of return. Moreover, the intervening years since 2012 have produced no further public financial commitments to the project, short of authorizing the SR-710 North Study, which is emphatically not funding any of the alternatives to be examined there.

   The appropriate federal regulation, 23 C.F.R. § 450.104 offers the following definitions (emphasis added):

   > “Financially constrained” or “fiscal constraint” means that the metropolitan transportation plan, TIP, and STIP includes sufficient financial information for demonstrating that projects in the metropolitan transportation plan, TIP, and STIP can be implemented using committed, available, or reasonably available revenue sources, with reasonable assurance that the federally supported transportation system is being adequately operated and maintained. For the TIP and the STIP, financial constraint/fiscal constraint applies to each program year. Additionally, projects in air quality nonattainment and maintenance areas can be included in the first two years of the TIP and STIP only if funds are ``available'' or “committed."

   If anything, since 2012 the "reasonably available revenue sources" have become even more remote. Measure J failed at the ballot, and a second failure might be risked by including a tunnel in Measure R's successor. Moreover, the SR-710 North Study now introduces several previously-unstudied alternatives to a tunnel, and a more attractive alternative may emerge from the DEIR public circulation. LACMTA has represented that the Measure R funds are not required to be devoted to a tunnel. The increasing competition for these funds in the SR-710 corridor make any 2012 assumptions of "reasonably available," faulty as they were then, even less rational today.

   The 2016 RTP/SRS EIR must not treat an SR-710 tunnel alternative as a "financially constrained" project.

4. Need to Emphasize Greenhouse Gas (GHG) Reduction and Vehicle Miles Traveled (VMT) Reduction as Paramount Program Purposes.

   The NOP seems to focus on "mobility" as the primary criterion of success, with equal billing given to "sustainability" and "economy." "Sustainability" will be "defined in the broadest way possible," and "economy" seems to make as a program purpose the construction of projects per se.

   The City recognizes that the NOP also refers to Senate Bill 375 (SB 375) and the need to meet GHG reduction targets. To ensure that result, the PEIR's analysis must be driven by developing the 2016-2040 RTP/SCS to attain the overriding goal of GHG reductions. Given developing land use and technological methodologies, the SB 375 targets should be treated as floors, not ceilings. Consistently with Senate Bill 743 (ch. 386, 2013 Cal. Stats.), program elements must be measured not just by their ability to improve Level of Service (LOS), but primarily by their ability to minimize VMT and trip generation. While by its terms SB 743's mandates apply in transit priority areas (Pub. Res. Code, § 21099(b)), enough of those areas are embraced within SCAG's area of responsibility to render SB 743's specifications applicable to the 2016-2040 RTP/SCS PEIR. Moreover, even beyond the letter of section 21099, general principles of CEQA assessment require that this contemporary methodology, designed to address the compelling contemporary environmental challenge, be applied in the new PEIR.

These observations do not preclude the inclusion of LOS and congestion analyses, provided that they take appropriate account of induced demand over time. Indeed, the proposed Office of Planning and Research (OPR) Guidelines for Implementing SB 743 expressly call out, as have the consensus of academic literature and several judicial decisions, the need to account for induced demand in transportation analysis. (See OPR Proposed CEQA Guideline 15064.3.) Both sound policy and legal compliance call for adherence to that requirement, since induced demand will be a required factor in the CEQA Guidelines before SCAG adopts its 2016 RTP/SCS, and independently judicially enforceable.

Thank you for your consideration of these comments. If you have any questions or comments please feel free to contact Margaret Lin, Principal Management Analyst, at MLin@SouthPasadenaCA.gov or (626)403-7236.

Sincerely,

Sergio Gonzalez
City Manager

cc: South Pasadena City Council

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

SENT VIA EMAIL AND USPS: AUGUST 5, 2015

August 5, 2015

Garrett Damrath, Chief Environmental Planner
Caltrans District 7, Division of Environmental Planning
100 South Main St., MS-16A
Los Angeles, CA 90012

Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the State Route 710 North Study

The South Coast Air Quality Management District (SCAQMD) staff appreciates the opportunity to comment on the above-mentioned document. The following comments are intended to provide guidance to the lead agency and should be incorporated into the Final Environmental Impact Report/Statement (Final EIR/EIS) as appropriate.

The California Department of Transportation (Caltrans), in cooperation with the Los Angeles County Metropolitan Transportation Authority (Metro), proposes transportation improvements to enhance mobility and relieve congestion. The study area for the SR-710 North Study is approximately 100 square miles and generally bounded by I-210 on the north, I-605 on the east, I-10 on the south, and I-5 and SR-2 on the west. The proposed alternatives for the project include the No Build Alternative, the Transportation System Management/Transportation Demand Management (TSM/TDM) Alternative, the Bus Rapid Transit (BRT) Alternative, the Light Rail Transit (LRT) Alternative, and the Freeway Tunnel Alternative. Components of the TSM/TDM Alternative will also be included with the BRT, LRT, and Freeway Tunnel Alternatives.

After reviewing the Draft EIR/EIS, SCAQMD staff is very concerned about the inadequate analysis of two key aspects of the CEQA document. First, the Health Risk Assessment (HRA) for the project shows that the tunnel alternatives will present a significant health risk to local residents when compared to a No Build scenario, however the Draft EIR/EIS concludes that this impact is less than significant, and no mitigation is required. Second, localized air quality impacts are not adequately analyzed, and decision-makers would not be able to use the EIR/EIS as written to determine if the project will adversely affect air quality in the local area. For example, there is no quantitative analysis of localized impacts for the freeway tunnel alternatives to determine if ambient air quality standards are exceeded for NO2 or CO. For these reasons, the analysis should be revised, taking into consideration comments contained in this letter and additional detailed comments presented in the attachment.

Finally, the proposed air pollution control equipment for the freeway tunnel alternatives in the Draft EIR/EIS will require permits from SCAQMD. As a responsible agency, we request that the project proponents meet with SCAQMD staff to discuss details of the permitting requirements so that they can be included in the Final EIR/EIS.

Staff is available to work with the lead agency to address these issues (including the detailed comments in the attachment) and any other air quality questions that may arise. Please contact me at (909) 396-3244, if you have any questions regarding these comments.

Sincerely,

Ian V. MacMillan

Ian MacMillan
Planning and Rules Manager

Attachment
IM:JW:JC
LAC150306-02
Control Number

Attachment

Health Risk Assessment Demonstrates Significant Impact But Draft EIR/EIS Concludes Impacts Are Not Significant

1. SCAQMD staff appreciates that the lead agency chose to include a Health Risk Assessment (HRA) with this Draft EIR/EIS. Table 3-4 of this HRA shows the incremental cancer risk between project alternatives and the No Build alternative. This table shows that cancer risks could reach up to 149 chances per million at the maximum exposed residential receptor, which is above SCAQMD's recommended CEQA threshold of 10 chances per million for all freeway alternatives. Despite this conclusion, the Draft EIR/EIS determines that cancer risks are less than significant, based on an inappropriate consideration of the CEQA baseline.

   The Draft EIR/EIS incorrectly uses a static 2012 year in comparison to project impacts. This approach is inappropriate because existing regulations (e.g., ARB's Truck and Bus Rule) will lower this health risk, even in the absence of this project. By using a static 2012 baseline, the Draft EIR/EIS is taking credit for other projects (e.g., ARB regulations) as a component of the build alternatives for the SR710. This approach is inconsistent with previous LA Metro projects. For example, LA Metro successfully defended a case in the California Supreme Court on this very issue, holding that use of a future baseline was proper in some cases (*Neighbors for Smart Rail v. Exposition Metro Line Construction* (2013) 57 Cal.4th 439). Because the No Build-Build Alternative comparison shows health risk impacts that are substantially above SCAQMD's recommended significance thresholds, SCAQMD staff recommends that the lead agency find that this impact is significant, and identify mitigation to reduce this impact to a less than significant level.

Localized Air Quality Impacts Not Analyzed

2. The proposed project is surrounded by sensitive land uses (i.e., residential dwellings north, south, east and west of the project site); however, the Draft EIR/EIS did not evaluate potential localized air quality impacts that could result from construction and operation of the proposed project. Without this analysis, the lead agency does not have information to make a determination of significance about potential air quality impacts from this project. This lack of analysis is especially concerning as the tunnel alternatives will focus all of the vehicle emissions along the entire tunnel to the portal and ventilation stack areas.

   Therefore, SCAQMD staff recommends that the lead agency revise the air quality analysis to include an assessment of potential localized air quality impacts during construction and operation of the proposed project. This issue was raised in Technical Advisory Committee meetings and in a direct meeting between SCAQMD staff and LA Metro and Caltrans staff. This type of localized analysis is regularly conducted by other lead agencies for CEQA and was also conducted for the I-710 Corridor project Draft EIR/EIS just south of this project site.

   These potential localized air quality impacts should be assessed using SCAQMD's Localized Significance Methodology and compared to the localized significance thresholds specific to the project area[1]. Furthermore, the lead agency should ensure that all future projects include a localized air quality analysis, if warranted. In the event that the lead agency determines the proposed project will result in significant localized construction and operational air quality impacts, the SCAQMD staff recommends that the lead agency require mitigation to minimize these impacts to a less than significant level.

<u>SCAQMD is not Listed as a Responsible Agency</u>

3. The Draft EIR/EIS does not discuss SCAQMD's role as a responsible agency for the tunnel alternatives for this project. These alternatives are proposing to install ventilation stacks with air pollution control devices that require permits from SCAQMD. It is our understanding from discussions at Technical Advisory Committee meetings that the lead agency would meet directly with SCAQMD staff to discuss SCAQMD's role regarding permitting requirements for this project. As a responsible agency, we will need to rely on the EIR/EIS for this project before any permits can be issued. We recommend that the lead agency schedule a meeting with us to discuss the detailed permitting requirements for this project.

<u>Health Risk Assessment Methodology</u>

4. The HRA conducted for this Draft EIR/EIS used an older methodology from the state Office of Environmental Health Hazard Assessment for calculating risks. This older methodology was replaced with a newer version in March 2015. This updated HRA guidance uses more recent scientific findings to evaluate children's greater susceptibility to cancer risks from exposure to air pollution. In general, residential cancer risks from pollutants like diesel particulate matter are found to increase between two and three times compared to the old methodology. The EIR should consider revising the calculated cancer risks using this updated guidance.

<u>Air Quality Analysis Does Not Include All Areas Potentially Impacted by This Project or Cumulative Impacts from Other Projects</u>

5. While the 710-North study area primarily covers northeast Los Angeles and western San Gabriel Valley, the lead agency did not analyze impacts from the tunnel alternatives in the surrounding areas. Completing the SR 710 would result in traffic and air quality impacts throughout wide portions of Los Angeles County. For example, the Draft EIR/EIS states that regardless of build alternatives, passenger vehicles will continue using arterial roads to transverse north and south through the region. This project includes alternatives which will allow trucks to now travel on the SR-710 between I-10 and I-210 and would introduce new truck trips in the area which did not exist without the project. In conjunction with Cumulative Projects such as the I-710 South Corridor Project and Port expansion projects, overall traffic and demand would increase along the I-710. SCAQMD staff recommends that the lead agency expand the study area and provide a more robust analysis of the potential cumulative air quality impacts in the surrounding areas from this project and other reasonably foreseeable projects.

[1] The Localized Significance Threshold (LST) methodology and Mass Rate LST Look Up Tables are available at: http://www.aqmd.gov/ceqa/handbook/LST/LST.html

Transportation Conformity

6. The quantitative transportation conformity analysis contained within the Draft EIR/EIS has not yet been approved or submitted to the Transportation Conformity Working Group (TCWG). The protocol for this project was only submitted July 22, 2015 to the TCWG, but it has not yet been approved. SCAQMD staff identified potential errors in the conformity analysis contained within the Draft EIR/EIS, as identified below. This comment does not preclude any comments we may provide to the TCWG on either the protocol or the conformity analysis.

   The conformity analysis results as presented in Table 5.8 through 5.10 in the Air Quality Assessment Report only show a comparison between maximum concentrations for each scenario, without accounting for where the maximum impact occurs. The conformity analysis must instead demonstrate that there are no increased air quality impacts at any receptor, not just a comparison between the maximum receptors, which may be located miles apart from one another.

Dispersion Modeling

7. Some of the receptors were incorrectly placed within the volume source exclusion zone and their results would be invalid. Since there are modeled volume sources which extend beyond the Project boundary, care should be taken to ensure that no receptors are placed within the volume source exclusion zone. This can be done by using smaller, adjacent volume sources or by using an area source instead to model the freeway emissions.

8. Highway Interchanges were modeled with a 30 foot release height to capture over and under passes of the interchange. The lead agency should instead use an elevated volume release height to properly model emissions from trucks on an interchange.

9. AERMOD file SR710_RoadwaysOperation_DTA_5yrs_OTHER.DTA models the scrubber/ventilation system with a stack velocity ranging from 14.72 – 34 m/s and a flow rate of 565 – 1,312 m^3/s. The Tunnel System Report describes the system as having an exiting stack velocity of 1,780 – 3,690 ft/min (9.04 – 18.75 m/s) and a flow rate ranging from 762,800 – 1,652,700 cfm (360 – 780 m^3/s). The modeled scrubber/ventilation system stack velocities and flow rates are greater than the proposed values identified in the Tunnel System Report. A higher exit velocity and flow rate would tend to result in an underestimation of modeled concentrations. SCAQMD staff recommends the lead agency revise the modeling by using the actual exit velocity and flow rate in the report.

Emission Estimation

10. In the Health Risk Assessment (HRA), when comparing project impacts to a 2012 CEQA baseline, health risks were estimated using a long-term average emission rate based on a weighted average after calculating emissions each year. However, when comparing project impacts to the NEPA No Build baseline, long-term average emissions were linearly interpolated using values only for years 2012, 2020, 2025 and 2035. Because emission

estimates do not follow linear patterns over time, the estimation methodology may underestimate potential health risks. SCAQMD staff recommends using a consistent emission estimate methodology (i.e. analyze emissions every year, rather than just milestone years) for both the CEQA and NEPA baselines.

Scrubber/Ventilation System

Although the DEIR/EIS has scrubber/ventilation system design discussion in the Tunnel Systems Report, specifics are unclear and additional information is required.

11. The proposed air pollution control system does not control gaseous pollutants, and it is not as effective at reducing ultrafine particles as it is with coarser particulate matter. If pollution from the entire tunnel system will be vented through limited release points, then additional controls should be added that will also reduce gaseous pollutants and ultrafine particles. The EIR should review studies prepared for SCAQMD that evaluate different types of controls for roadway tunnel pollution, and implement any that are found feasible for this project.[2]

12. According to the *Development of Electrostatic Precipitator* [ESP] *for Road Tunnel*[3] the type of electrodes (wire or spike plate type) used is a factor for the proper operation of the ESP. A spike plate type electrode provides an optimum electrode configuration with stable and uniform corona discharge. As a result, spike plate electrodes have greater performance, reliability and stability. The Tunnel Systems Report for the Freeway Tunnel Alternative does not discuss or analyze electrode type. SCAQMD staff recommends evaluating and considering both plate styles.

13. The operation of an ESP would generate ground-level ozone (O_3) which adversely affects human health. Since ozone generation is directly related to ESP power consumption, increased ESP power consumption would create higher ozone emissions. SCAQMD staff recommends additional discussion and details on minimizing ozone generated in the ESP[4].

14. With high flow rates indicated in the Tunnel Systems Report for the Freeway Tunnel Alternative, the efficiency is expected to only be as low as approximately 80%. The flow through the ESP should be slow and evenly distributed for adequate particle collection (2-8 ft/sec). Normally gas velocity is reduced by expansion in the inlet plenum.

15. To prevent re-entrainment of the particles, the aspect ratio (length to height of ESP) should be greater than 1. SCAQMD staff recommends maintaining an aspect ratio greater than 1 during the ESP design stages.

16. Additionally, there may be a need to remove the large particles (chunks of rubber, etc.,) to prevent clogging the ESP. SCAQMD staff recommends analyzing particle size distribution found in tunnels. The lead agency should discuss the impacts of large particles on the ESP.

[2] Near-Road Mitigation Measures and Technologies studies and webcast found here:
http://www.aqmd.gov/home/library/technology-research/technology-forums
[3] Miyake, A (2006) Development of Electrostatic Precipitator for Road Tunnel [PDF]
http://www.isesp.org/ICESP%20X%20PAPERS/PDFS/Paper%2010B1%20030%20Miyake.pdf
[4] Ibid

17. The Tunnel Systems Report indicates that a waste water treatment system will be required to maintain the air cleaning equipment. The lead agency does not discuss the materials collection and discharge process. Furthermore, the lead agency should provide additional discussion and design specifications of the waste water treatment system and cleaning process.

18. Since moisture can lower the efficiency of the ESP as well as the resistivity and affect the operation, the lead agency should address measures to remove high moisture from the inlet gas stream.

19. The lead agency should discuss and evaluate the potential reduction of NO2 with dry adsorbent that has been used in tunnels with ESP in Japan (Delivery Truck Record).[5]

20. While the Tunnel Systems Report addresses the fire and safety features procedures for the tunnel, it does not explore the potential for explosions due to build-up carbon or carbon monoxide in the ESP (Electrostatic Precipitators).[6] The lead agency should discuss equipment maintenance and equipment breakdown procedures and the risk of upset events. Additionally, the lead agency should evaluate the need for back-up power, redundant systems and any associated equipment.

Modification of Construction Mitigation Measures

21. Section 4.2.3 of the CEQA Evaluation III(b) states that short-term degradation of air quality may occur during construction activities and Measures AQ-1 through AQ-5 would reduce construction emissions to less than significant levels. Table 3.13.4 of the Draft EIR/EIS and Tables 5.1-5.5 of the Air Quality Analysis also indicate that construction emissions exceed the daily maximum construction emission thresholds. While SCAQMD staff appreciates the Green Construction Policy that LA Metro has committed to using for this project, the Draft EIR/EIS did not provide any supporting documentation or emissions calculations to support claims that Measures AQ-1 through AQ-5 would reduce construction emissions to less than significant levels. SCAQMD staff recommends updating the Air Quality Analysis to demonstrate that the mitigation measures are adequate to reduce impacts to a less than significant level. In addition, the mitigation measures proposed for this project should be modified to include the underlined comments in numbers 22-25 below.

22. Measure AQ-1 – Fugitive Dust (applies to all four Build Alternatives)
    During clearing, grading, earthmoving, or excavation operations, the Resident Engineer will require the construction contractor to control excessive fugitive dust emissions by regular watering or other dust preventive measures using the following procedures, as specified in the South Coast Air Quality Management District Rule 403. The Construction Contractor will be required to:

[5] Delivery Truck Record. Retrieved July 22, 2015.
http://panasonic.net/ecosolutions/air/tunnel/records.html
[6] Buekens, A (Pollution Control Technologies – Vol. I – Electrostatic Precipitators
http://www.eolss.net/sample-chapters/c09/e4-14-01-08.pdf

- Prevent dust from being visible in the atmosphere beyond the property line of the emission source
- Prevent dust emissions from exceeding 20 percent opacity
- Prevent track-out from extending 25 feet or more in cumulative length from the point of origin from an active operation
- Utilize best available control measures included in Table 1, 2, & 3 of SCAQMD Rule 403
- Submit Large Operations Notification (Form 403N)
- Comply with all Large Operations requirements

23. Measure AQ-2 – Equipment and Vehicle Emissions (applies to all four Build Alternatives) During all site preparation, grading, excavation, and construction, either the Resident Engineer for the TSM/TDM, BRT, and LRT Alternatives or the Resident Engineer for the Freeway Tunnel Alternative, as applicable, will require the Construction Contractor to:
    - Require the use of 2010 and newer diesel haul trucks (e.g., material delivery trucks and soil import/export) and if the lead agency determines that 2010 model year or newer diesel trucks cannot be obtained, the lead agency shall use trucks that meet EPA 2007 model year NOx emissions requirements.

24. Measure AQ-4 – California Department of Transportation (Caltrans) Standard Specification for Construction (applies to ~~Freeway Tunnel Alternative~~ all Build Alternatives)

25. Measure AQ-5 – Metro Green Construction Policy (applies to ~~TSM/TDM, BRT, and LRT Alternatives~~ all Build Alternatives)

COUNTY OF LOS ANGELES
Public Health

AIR QUALITY RECOMMENDATIONS FOR LOCAL JURISDICTIONS

Development of new schools, housing, and other sensitive land-uses in proximity to freeways

Studies indicate that residing near sources of traffic pollution is associated with adverse health effects such as exacerbation of asthma, onset of childhood asthma, non-asthma respiratory symptoms, impaired lung function, reduced lung development during childhood, and cardiovascular morbidity and mortality.[1] These associations are diminished with distance from the pollution source.

Given the association between traffic pollution and health, the California Air Resources Board recommends that freeways be sited at least 500 feet from residences, schools, and other sensitive land uses.[2] Other reputable research entities such as the Health Effects Institute indicate that exposure to unhealthy traffic emissions may in fact occur up to 300 to 500 meters (984 to 1640 feet). The range reported by HEI reflects the variable influence of background pollution concentrations, meteorological conditions, and season.[3]

Based on this large body of scientific evidence, the Los Angeles County Department of Public Health strongly recommends:

- A buffer of at least 500 feet should be maintained between the development of new schools, housing or other sensitive land uses and freeways. Consideration should be given to extending this minimum buffer zone based on site-specific conditions, given the fact that unhealthy traffic emissions are often present at greater distances.[*] Exceptions to this recommended practice should be made only upon a finding by the decision-making body that the benefits of such development outweigh the public health risks.

- New schools, housing or other sensitive land uses built within 1500 feet of a freeway should adhere to current best-practice mitigation measures to reduce exposure to air pollution which may include: the use of air filtration to enhance heating, ventilation and air conditioning (HVAC) systems, and the orientation of site buildings and placement of outdoor facilities designed for moderate physical activity as far from the emission source as possible.[4]

Development of parks and active recreational facilities in proximity to freeways

Parks and recreational facilities provide great benefits to community residents including increased levels of physical activity, improved mental health, and opportunities to strengthen social ties with neighbors.[5,6,7] However, siting parks and active recreational facilities near freeways may increase public exposure to

[*] Conditions along a freeway and on different freeways are subject to considerable variation. Vehicle types on the roadway (diesel, gas, electric, or hybrid vehicles), average speeds, average daily traffic volumes and other factors all impact the levels of pollution generated by a freeway, and thus the necessary buffer zone to reduce health risks.

harmful pollutants, particularly while exercising. Studies show that heavy exercise near sources of traffic pollution may have adverse health effects.[8, 9, 10] However, there are also substantial health benefits associated with exercise.[11] Therefore, DPH recommends the following cautionary approach when siting parks and active recreational facilities near freeways:

- New parks with athletic fields, courts, and other outdoor facilities designed for moderate to vigorous physical activity, should be sited at least 500 feet from a freeway. Consideration should be given to extending this minimum buffer zone based on site-specific conditions given the fact that unhealthy traffic emissions are often present at greater distances. Exceptions to this recommended practice should be made only upon a finding by the decision-making body that the benefits of such development outweigh the public health risks.

- New parks built within 1500 feet of freeways should adhere to best-practice mitigation measures that minimize exposure to air pollution. These include the placement of athletic fields, courts, and other active outdoor facilities as far as possible from the air pollution source.

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[1] Health Effects Institute. 2010. Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. HEI Special Report. p.1-11

[2] California Environmental Protection Agency. California Air Resources Board. Air Quality and Land Use Handbook: A Community Health Perspective. April 2005.

[3] Health Effects Institute. 2010. Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. HEI Special Report. p.1-11

[4] California Environmental Protection Agency. California Air Resources Board. Status of Research on Potential Mitigation Concepts to Reduce Exposure to Nearby Traffic Pollution. August 23, 2012.

[5] L. Frank et al. 2005. Linking Objectively Measured Physical Activity with Objectively Measured Urban Form: Findings From SMARTRAQ. American Journal of Preventive Medicine, at 117-1255.

[6] Tabbush R and E O'Brien. 2003. Health and Well-being: Trees, Woodlands, and Natural Spaces. Forestry Commission, Edinburgh.

[7] E. Kuo et al. 1998. Transforming Inner-City Neighborhoods: Trees, Sense of Safety, and Preference. Environmental Behavior. 30(1): 28-59.

[8] McConnell R, Berhane K, Gilliland F, London SJ, Islam T, Gauderman WJ, Avol E,Margolis HG, Peters JM. Asthma in exercising children exposed to ozone: a cohort study. Lancet. 2002 Feb 2;359(9304):386-91.

[9] Sharman JE, Cockcroft JR, and JS Coombes. Cardiovascular implications of exposure to traffic air pollution during exercise. Q J Med 2004; 97:637–643.

[10] Rundell KW, Caviston R, Hollenbach AM, and K Murphy. Vehicular Air Pollution, Playgrounds, and Youth Athletic Fields. 2006, Vol. 18, No. 8 , Pages 541-547.

[11] de Hartog JJ, Boogaard H, Nijland H, and G Hoek. Do the Health Benefits of Cycling Outweigh the Risks? Environmental Health Perspectives. 2010; 118(8): 1109-1116.

SANDAG

Final Environmental Impact Report

State Clearinghouse Number: 2010041061

SAN DIEGO FORWARD

THE REGIONAL PLAN

San Diego FORWARD The Regional Plan

~~DRAFT~~ FINAL ENVIRONMENTAL IMPACT REPORT
SAN DIEGO FORWARD: THE REGIONAL PLAN

State Clearinghouse #: 2010041061

~~May~~ October 2015

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4.8 GREENHOUSE GAS EMISSIONS

This section evaluates the greenhouse gas emissions (GHG) impacts of the proposed Plan. The information presented was compiled from multiple sources, including the Energy Policy Initiatives Center (EPIC) at the University of San Diego School of Law. A related topic, the impacts of increasing GHG emissions on global climate change, is discussed in Appendix F of the EIR.

4.8.1 EXISTING CONDITIONS

California law defines GHGs as any of the following compounds: CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) (H&SC Section 38505(g)). CO_2, followed by CH_4 and N_2O, is the most common GHG. Atmospheric concentrations of GHGs have been increasing since measurements began in the 1970s. As of 2014, globally averaged annual mean concentration of atmospheric CO_2 is approximately 397 parts per million (ppm), CH_4 is approximately 1840 parts per billion (ppb), and N_2O is approximately 327 ppb (NOAA 2015).

Global warming potential (GWP) is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to another gas; the GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time that the gas remains in the atmosphere ("atmospheric lifetime"). The GWP of each gas is measured relative to CO_2, the most abundant GHG. GHGs with lower emissions rates than CO_2 may still contribute to climate change because they are more effective at absorbing outgoing infrared radiation than CO_2. When accounting for GHGs, emissions are expressed in terms of CO_2 equivalents (CO_2e). The concept of CO_2e is used to account for the different GWP of GHGs to absorb infrared radiation. The reference gas for GWP is CO_2; therefore, CO_2 has a GWP of 1. The other main GHGs that have been attributed to human activity include CH_4, which has a GWP of 21, and N_2O, which has a GWP of 310.

Sources of CO_2 include combustion of fossil fuels (coal, oil, natural gas, gasoline, and wood). CH_4 is the main component of natural gas and also arises naturally from anaerobic decay of organic matter. Sources of N_2O include combustion of fossil fuels and industrial processes such as nylon production and production of nitric acid. Other GHGs are present in trace amounts in the atmosphere and are generated from various industrial or other uses.

4.8.1.1 EXISTING GHG EMISSIONS

Global GHG Emissions

The World Resources Institute (WRI 2014) estimated that worldwide emissions in 2011 were 43.8 billion metric tons (MT) CO_2e, of which the United States contributed the greatest percentage after China. Table 4.8-1 shows the top 10 emitters by country, which contribute 63 percent of global emissions. When accounting for GHGs, emissions are typically quantified in MT or millions of metric tons (MMT) and are shown as MMT CO_2e.

Table 4.8-1
Top 10 GHG-Emitting Countries, 2011

Country or Area	MMT CO_2e in 2011[1]	Percent
China	10,552	24
United States	6,550	15
India	2,486	6
Russia	2,374	5
Japan	1,307	3
Brazil	1,131	3
Germany	883	2
Indonesia	835	2
Canada	716	2
Iran	716	2

Source: WRI 2014

California GHG Emissions

In 2012, California accounted for approximately seven percent of U.S. emissions. The State of California GHG Inventory, prepared by ARB, identified and quantified statewide GHG emissions. The inventory includes estimates for CO_2, CH_4, N_2O, SF_6, HFCs, and PFCs, and is summarized in Table 4.8-2 (ARB 2014a). The inventory is divided into eight broad categories of emissions: Agriculture, Commercial, Electricity Generation, Industrial, Residential, Transportation, Recycling and Waste, and High GWP Gases. Transportation was the sector with the largest percentage of GHG emissions (36 percent), followed by electricity generation (21 percent), and industrial sources (19 percent). The remaining sectors each accounted for less than 10 percent of overall emissions.

Table 4.8-2
State of California Greenhouse Gas Emissions by Sector - 2012

Sector	Total 2012 Emissions ($MMTCO_2e$)	Percent of Total 2012 Emissions
Agriculture and Forestry	37.86	8%
Commercial	14.20	3%
Electricity Generation	95.09	21%
Industrial	89.16	19%
Residential	28.09	6%
Transportation	167.38	36%
Recycling and Waste	8.49	2%
High GWP Gases	18.41	4%
Total	**458.68**	**100%**

Source: ARB 2014a

San Diego Region GHG Emissions

Regional GHG emissions for existing conditions (2012) are calculated based on the current GHG inventory. The inventory is based on existing sources and activity within the region. GHG emissions are divided into 16 categories. Calculations and assumptions are described in Appendix G-1 to the EIR. Total GHG emissions in the San Diego region as of 2012 are ~~over~~ about 35 MMT CO_2e as shown in Table 4.8-3.

Table 4.8-3
Total Greenhouse Gas Emissions in the San Diego Region, 2012

Sector	Annual Emissions ($MMTCO_2e$)	Percentage of Annual Emissions
~~On-Road Transportation~~ Passenger Cars & Light Duty Vehicles	~~15.76~~13.14	~~43.7~~37.2%
Electricity	7.97	22.6~~1~~%
Natural Gas	2.84	~~7.9~~8.0%
Heavy Duty Trucks & Vehicles	1.89	5.4%
Solid Waste	1.75	4.~~8~~9%
Other Fuels	1.64	4.6%
Industrial	1.43	4.1~~0~~%
Aviation	1.37	3.9~~8~~%
Off-Road Equipment and Vehicles	0.92	2.6%
Wildfire	0.81	2.3~~2~~%
Other – Thermal Cogeneration	0.64	1.8%
Water Supply and Conveyance	0.52	1.5~~4~~%
Wastewater	0.16	0.5~~4~~%
Rail	0.11	0.3%
Agriculture	0.08	0.2%
Marine Vessels (excluding pleasure craft)	0.05	0.1%
Development + Sequestration	-0.65	n/a
Total	**~~35.4~~34.7**	**100%**

Source: Appendix G-1 to the EIR.
Note:
The revised numbers in this table reflect the minor modifications to the project description and the new version of EMFAC2014 (v1.0.7) released by ARB in May 2015. On-road GHG emissions in the Draft EIR were calculated using EMFAC2014 (v1.0.1).

4.8.1.2 CLIMATE CHANGE

A related topic, the impacts of increasing GHG emissions on climate change, is discussed in Appendix F to the EIR. As discussed in Appendix F, during the timeframe of the proposed Plan, climate change effects likely to exacerbate the proposed Plan's impacts on selected resource areas include, but are not limited to:

- Higher annual average temperature
- More days of extreme high temperatures
- Longer and more humid heat waves
- More intense and frequent drought
- Increased evaporation from soil, surface waters
- More frequent, severe wildfires
- Sea level rise
- Less frequent, more intense rainstorms, more frequent watershed flood events
- More frequent and severe coastal flooding
- Spreading of pests and vector-borne diseases

In general, the effects listed above would increase between 2020 and 2050.

4.8.2 REGULATORY SETTING

4.8.2.1 FEDERAL LAWS, REGULATIONS, PLANS, AND POLICIES

Energy Policy and Conservation Action of 1975 and Corporate Average Fuel Standards

The Energy Policy and Conservation Act of 1975 (42 USC Section 6201 [1975]) establishes fuel economy standards for on-road motor vehicles sold in the United States.

Compliance with federal fuel economy standards is determined through the Corporate Average Fuel Economy (CAFE) program on the basis of each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the United States.

On April 1, 2010, USDOT and USEPA established new federal rules that set the first-ever national GHG emissions standards and significantly increased the fuel economy of all new passenger cars and light trucks sold in the United States. The standards set a requirement to meet an average fuel economy of 34.1 miles per gallon by 2016. In August 2012, the federal government adopted the second rule that increases fuel economy for the fleet of passenger cars, light-duty trucks, and medium-duty passenger vehicles for model years 2017 to 2025 to average fuel economy of 54.5 miles per gallon by 2025. Because NHTSA cannot set standards beyond model year 2021 due to statutory obligations and the rules' long timeframe, a mid-term evaluation is included in the rule. Standards for model years 2022 through 2025 have not been formally adopted by NHTSA. In August 2011, NHTSA and USEPA released medium- and heavy-duty vehicle standards for model years 2014 to 2018. Tighter standards for these vehicles for model years after 2018 are expected to be developed and issued by March 2016.

Energy Policy Act of 1992

The Energy Policy Act of 1992 (40 USC Section 13201 [1992]) (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain government and private fleets to purchase light-duty AFVs. Federal tax deductions were created for businesses and individuals to cover the incremental cost of AFVs. EPAct also established the Clean Cities Program. The primary goal of the Program is to cut petroleum use in the United States by 2.5 billion gallons per year by 2020 with the following three strategies:

- Replace petroleum with alternative and renewable fuels,
- Reduce petroleum consumption through smarter driving practices and fuel economy improvements, and
- Eliminate petroleum use through idle reduction and other fuel-saving technologies and practices.

As part of the federal Clean Cities Program, the San Diego Regional Clean Cities Coalition works with vehicle fleets, fuel providers, community leaders, and other stakeholders to reduce petroleum use in transportation in the San Diego region (San Diego Regional Clean Cities Coalition 2014).

Energy Policy Act of 2005

The EPAct of 2005 (42 USC Section 15801 [2005]) includes several requirements that support the use of alternatively fueled vehicles, including requirements for federal fleets and expansion of compliance options under EPAct 1992 by allowing fleets to choose a petroleum reduction path that achieves petroleum reductions equivalent to AFVs running on alternative fuels 100 percent of the time. The EPAct of 2005 funds research programs for AFVs and provides tax incentives for purchase of AFVs. It also provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 (EISA) (42 USC Section 17381 [2007]) includes provisions to increase the supply of renewable alternative fuel sources by setting a mandatory Renewable Fuel Standard, which requires transportation fuel sold in the United States to contain a minimum of 36 billion gallons of renewable fuels annually by 2022. EISA includes grant programs to encourage the development of cellulosic biofuels, plug-in hybrid electric vehicles, and other emerging electric vehicle technologies. EISA codifies into law the energy reduction goals for federal agencies put forth in Executive Order 13423 (USEPA 2007), and creates new requirements related to Corporate Average Fuel Economy Standards, the Renewable Fuel Standard, and efficiency standards for lighting and appliances. The law is projected to reduce GHG emissions by 9 percent from 2005 levels by 2030 (DOE 2014).

Clean Air Act

USEPA began regulating GHGs under the Clean Air Act (CAA) (42 USC Section 7401 et seq. [1970]) in 2011. USEPA's GHG regulations include regulations governing transportation and mobile sources, renewable fuels, carbon pollution standards for existing power plants, the GHG tailoring rule governing new and existing industrial facilities, and GHG reporting requirements. Standards for mobile sources have been established pursuant to Section 202 of the CAA, and GHGs from stationary sources are currently controlled under the authority of Part C of Title I of the act.

In 2013, USEPA issued proposed regulations to cut carbon pollution from new power plants. In 2014, USEPA proposed a plan to cut carbon pollution from existing or modified power plants. The proposed rule includes state-specific rate-based goals for CO_2 emissions from the power sector, as well as guidelines for states to follow in developing plans to achieve state-specific carbon reduction goals. Nationwide, by 2030, this rule would achieve CO_2 emission reductions from the power sector of approximately 30 percent from CO_2 emission levels in 2005 (USEPA 2014a). USEPA anticipates issuing a final rule on existing power plants and carbon pollution standards for new, modified, and reconstructed power plants by the summer of 2015 (USEPA 2015).

Federal Highway Administration/Federal Transit Administration

The Federal Transit Administration (FTA) works with public transportation providers and other key stakeholders to implement strategies that reduce GHG emissions from the transportation sector. FTA provides funding to support public transportation projects and provides technical assistance, research, and policy development on alternative fuels, high fuel efficiency vehicles, climate change mitigation and adaptation in the transportation sector. In cooperation with the FTA, the USEPA has developed information regarding clean passenger vehicles (USEPA 2014b).

The Federal Highway Administration (FHWA) has conducted climate change adaptation and resilience case studies and pilot projects throughout the country to test a climate change vulnerability assessment model. The FHWA conceptual model guided transportation agencies through the process of collecting and integrating climate and asset data in order to identify critical vulnerabilities. FHWA used the pilot projects to adopt its Climate Change & Extreme Weather Vulnerability Assessment Framework (FHWA 2015a). FHWA has also conducted a number of case studies to assess various climate adaptation strategies, including the Flood Levee System Improvements study in Washington, DC (FHWA 2015b); the Surfers Point Managed Shoreline Retreat Project in Ventura, California (FHWA 2015c); and Climate Change Adaptation Strategies for the New York State Department of Transportation (Columbia University Earth Institute 2011).

Executive Order 13514

On October 5, 2009, the President signed Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance (3 CFR 13514). The Executive Order set sustainability goals for federal agencies and focuses on making improvements in their environmental, energy, and economic performance. The Executive Order required federal agencies to submit a 2020 GHG pollution reduction target within 90 days, and to increase energy efficiency, reduce fleet petroleum consumption, conserve water, reduce waste, support sustainable communities, and leverage federal purchasing power to promote environmentally responsible products and technologies.

The Executive Order requires agencies to measure, manage, and reduce GHG emissions toward agency-defined targets. It describes a process by which agency goals will be set and reported to the President by the Chair of Council on Environmental Quality (CEQ). The Executive Order requires agencies to meet a number of energy, water, and waste reduction targets, including:

- 30 percent reduction in vehicle fleet petroleum use by 2020;
- 26 percent improvement in water efficiency by 2020;
- 50 percent recycling and waste diversion by 2015;
- 95 percent of all applicable contracts will meet sustainability requirements;
- Implementation of the 2030 net-zero-energy building requirement;
- Implementation of the stormwater provisions of the Energy Independence and Security Act of 2007, section 438; and
- Development of guidance for sustainable federal building locations in alignment with the Livability Principles put forward by the Department of Housing and Urban Development, DOT, and USEPA.

Executive Order 13693

On March 19, 2015, the President signed Executive Order 13693, Planning for Federal Sustainability in the Next Decade. The Executive Order sets a goal of reducing Federal agency GHG emissions by 40 percent over the next decade. The Executive Order sets agency GHG reduction targets and sustainability goals, including:

- Percentage reduction targets must be proposed by each Federal agency, including FHWA, FTA, and FRA, for agency-wide GHG emissions reductions by the end of fiscal year 2025 relative to a fiscal year 2008 baseline.

- Sustainability goals for each Federal agency, including:

  - Promoting building energy conservation, efficiency, and management;
  - Requiring the use of renewable and alternative energy for electric and thermal energy in Federal buildings by up to 25 percent by fiscal year 2025;
  - Requiring the use of renewable and alternative energy for total building energy consumption in Federal buildings by up to 30 percent by fiscal year 2025;
  - Improving Federal agency water efficiency and management to reduce water consumption by 36 percent by fiscal year 2025;
  - Improving Federal agency vehicle fleet efficiency and management to reduce GHG emissions by 30 percent by fiscal year 2025;
  - Promoting sustainable acquisition and procurement practices; and
  - Advancing waste prevention and pollution prevention by diverting at least 50 percent of non-hazardous solid waste.

Off-road Vehicle and Equipment Regulations

Federal regulations that govern off-road vehicles such as locomotives, heavy equipment, etc. are discussed in Section 4.3, Air Quality. These regulations would also result in reductions in GHG emissions, and are summarized below.

Locomotive Engine Emission Standards: USEPA has adopted locomotive engine exhaust emission standards (40 CFR Part 1033 et seq.) that apply to line haul and switching locomotives with total rated horsepower of 750 kilowatts (1006 horsepower [hp]) or greater. These emission standards apply to hydrocarbons, NO_X, particulate matter, and CO, and would also reduce emissions of GHG through requiring more efficient locomotive engines.

Non-Road Compression-Ignition Engine Emission Standards: USEPA has also adopted emission standards for compression-ignition engines that apply to engines with a total rated horsepower of 11 hp to engines with a rating greater than 1207 hp (40 CFR Part 89.112; Part 1039.101; Part 1039.102). These emission standards apply to hydrocarbons, NO_X, particulate matter, and CO, and would also reduce emissions of GHG through requiring more efficient non-road engines.

4.8.2.2 STATE LAWS, REGULATIONS, PLANS, AND POLICIES

Executive Order S-3-05

Executive Order S-3-05, among other things, established the following GHG emission reduction goals for California: reduction to 2000 levels by 2010; to 1990 levels by 2020; and to 80 percent below 1990 levels by 2050.

Executive Order B-16-12

Executive Order B-16-12 orders State entities under the direction of the Governor including ARB, the Energy Commission, and Public Utilities Commission to support the rapid commercialization of zero emission vehicles. It directs these entities to achieve various benchmarks related to zero emission vehicles, including:

- Infrastructure to support up to one million zero emission vehicles by 2020,
- Widespread use of zero emission vehicles for public transportation and freight transport by 2020,
- Over 1.5 million zero emission vehicles on California roads by 2025,
- Annual displacement of at least 1.5 billion gallons of petroleum fuels by 2025, and

It also sets a state GHG emissions reduction target for the transportation sector of 80 percent below 1990 levels by 2050.

Executive Order B-30-15

Executive Order B-30-15, among other things, establishes a new interim statewide greenhouse gas emission reduction target to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050.

It further orders that all state agencies with jurisdiction over sources of greenhouse gas emissions to implement measures, pursuant to statutory authority, to achieve reductions of greenhouse gas emissions to meet the 2030 and 2050 greenhouse gas emissions reductions targets. It also directs ARB to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of carbon dioxide equivalent (MMTCO2e). Finally, it requires the Natural Resources Agency to update the state's climate adaptation strategy, Safeguarding California, every three years, and to ensure that its provisions are fully implemented.

California Global Warming Solutions Act and Climate Change Scoping Plan

The California Global Warming Solutions Act of 2006, widely known as AB 32 (Assembly Bill 32, Chapter 488, Statutes of 2006), requires ARB to develop and enforce regulations for reporting, verifying, and reducing statewide GHG emissions. The heart of the legislation is the requirement that statewide GHG emissions be reduced to 1990 levels by 2020. The Legislature also intended that that the statewide GHG emissions limit continue in existence and be used to maintain and continue reductions in emissions of greenhouse gases beyond 2020 (Health and Safety Code Section 38551(b)). The law requires ARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG reductions.

AB 32 requires that ARB develop a Climate Change Scoping Plan (Scoping Plan) consisting of the main strategies California will implement to reduce statewide GHG emissions to 1990 levels by 2020. It must be updated every five years. ARB approved the initial Scoping Plan in 2008 (ARB 2008). The Scoping Plan functions as a roadmap for ARB's plans to achieve GHG reductions in California.

ARB approved the first update to the Scoping Plan in 2014 (ARB 2014b). The update defines ARB's climate change priorities for the next five years. The update describes progress made to meet the near-term objectives of AB 32 and defines California's climate change priorities and activities for the next several years. The update concludes that California is on track to meet the 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020. A support document for the update includes ARB's estimates for the statewide GHG reductions to be achieved by a number of measures in order reach the AB 32 emissions level by 2020, as summarized in Table 4.8-4. Of the over 55 MMTCO2e in reductions needed to meet the statewide 2020 emissions target, ARB estimates that 3.0 MMTCO2e (5.5 percent) of the reductions will come from statewide implementation of the SB 375 targets (the initial Scoping Plan estimated a 5 MMTCO2e reduction.)

Table 4.8-4
ARB Scoping Plan Update: Meeting the Statewide 2020 Emissions Target

Category	2020 (MMTCO2e)
AB 32 Baseline 2020 Forecast Emissions (2020 BAU)	509
Expected Reductions from Sector-Based Measures	**55.2**
Transportation	***22.9***
Advanced Clean Cars	3.1
Low Carbon Fuel Standard	15.2
Regional Targets (SB 375)	3.0
Tire Pressure Program	0.6
Ship Electrification	0.2
Heavy Duty Aerodynamics	0.9
Electricity and Natural Gas	***25.0***
Energy Efficiency and Conservation	12.2
Solar Hot Water	0.1
Renewable Electricity Standard (20%-33%)	11.5
Million Solar Roofs	1.1
High Global Warming Potential (GWP) Gases	***5.4***
Waste	***1.8***
Cap-and-Trade Reductions	**23.0**
2020 Limit	431

Source: ARB 2014b

The update identifies eight key focus areas comprising the major areas of California's economy and recommendations for developing additional requirements to meet the 2050 goals expressed in Executive Order S-3-05. The update frames activities and issues facing the State as it develops an integrated framework for achieving both air quality and climate goals in California beyond 2020. While the update discusses setting a mid-term target between 2020 and 2050, it does not recommend any numeric post-2020 targets, nor does it recommend a specific plan or specific actions showing how the state would meet the 2050 Executive Order goal.

Cap-and-Trade Program

ARB adopted its Cap-and-Trade Regulation (17 CCR 95802 et seq.) in 2012 as one of the strategies to achieve the 2020 target established by AB 32. Under cap-and-trade, an overall limit on GHG emissions from capped sectors has been established and facilities subject to the cap are able to trade permits (allowances) to emit GHGs. The cap will decline approximately 3 percent each year beginning in 2013. The first auction of allowances occurred in 2013. ARB estimates reductions from the Cap-and-Trade regulation will amount to 23 MMT CO_2e in 2020 (ARB 2014b).

REGIONAL TRANSPORTATION PLANNING

Senate Bill 375 (Chapter 728, Statutes of 2008)

SB 375 provides for a planning process to coordinate land use planning and RTPs to help California meet the GHG reductions established in AB 32. SB 375 requires RTPs prepared by MPOs, including SANDAG, to incorporate an SCS in their RTPs that demonstrates how the region would achieve GHG emission reduction targets set by ARB.

SB 375 has three major components: (1) using the regional transportation planning process to achieve reductions in GHG emissions from passenger vehicles consistent with AB 32's goals; (2) offering incentives under CEQA to encourage projects that are consistent with a regional plan that achieves GHG emission reductions; and (3) coordinating the regional housing need allocation process with the regional transportation planning process while maintaining local authority over land use decisions.

On September 23, 2010, ARB adopted regional targets for major MPOs. SANDAG's current targets are per capita CO_2 emission reductions from passenger vehicles of 7 percent by 2020 and 13 percent by 2035 relative to 2005 levels. SANDAG adopted the 2050 RTP/SCS to comply with SB 375 in 2011. ARB reviewed the adopted RTP/SCS and determined that, if implemented, it would achieve the reduction targets for the San Diego region in compliance with the law. ARB is required to update the SB 375 GHG emissions reduction targets at least every 8 years and is currently working on updates to the targets. As of October 2014, ARB is planning to update the 2035 targets for specified agencies including SANDAG in late 2015, but make these targets effective for their SCSs starting in 2019 (ARB 2014h).

2010 California Transportation Commission RTP Guidelines

The California Transportation Commission is authorized under statute (California Government Code Section 14522) to prescribe areas for analysis and evaluation by regional transportation agencies and guidelines for the preparation of RTPs. The Commission, in consultation with Caltrans and ARB, is also required to maintain guidelines for travel demand models used in the development of RTPs by MPOs.

On April 7, 2010, the Commission adopted revisions to the RTP Guidelines (California Transportation Commission 2010). The 2010 update to the guidelines reflects revisions to address the planning requirements of SB 375 and other planning practices. In addition to addressing SB 375, the guidelines set forth a uniform transportation planning framework throughout the state that identifies state and federal requirements for the development of RTPs. The updated guidelines recognize that the reduction of GHG emissions is a key priority in the transportation planning process.

Caltrans Climate Action Program

In December 2006, the California Department of Transportation Business, Transportation, and Housing Agency issued a Climate Action Program (Caltrans 2010). The goal of the Climate Action Program is to promote clean and energy-efficient transportation, and provide guidance for mainstreaming energy and climate change issues into business operations. The Climate Action Program seeks to reduce GHG emissions from transportation through system improvements, lowered congestion, and utilization of intelligent transportation systems; and also seeks to reduce GHG emissions from land use sources by increasing efficiency of facilities, fleets, and equipment through reduction measures and technology. Caltrans has issued a report summarizing its activities to address climate change in 2013 (Caltrans 2013).

VEHICLE EFFICIENCY AND TRANSPORTATION FUELS

Executive Order S-01-07 (Low Carbon Fuel Standard)

Executive Order S-01-07 (17 CCR 95480 et seq.) requires the state to achieve a 10 percent or greater reduction by 2020 in the average fuel carbon intensity for transportation fuels in California regulated by ARB. ARB identified the Low Carbon Fuel Standard (LCFS) as a discrete early action item under AB 32, and the final ARB resolution (No. 09-31) adopting the LCFS was issued on April 23, 2009. ARB is currently considering amendments to the LCFS and plans to consider re-adoption of the LCFS in 2015.

California Advanced Clean Cars/Zero Emission Vehicle Program

Assembly Bill (AB) 1493 (Chapter 200, Statutes of 2002), also known as the Pavley regulations, required ARB to adopt regulations by January 1, 2005, that would result in the achievement of the “maximum feasible” reduction in GHG emissions from vehicles used in the state primarily for noncommercial, personal transportation.

In January 2012, ARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global warming gases and requirements for greater numbers of zero-emission vehicles into a single package of standards called Advanced Clean Cars (13 CCR 1962.1 and 1962.2). The Advanced Clean Cars requirements include new GHG standards for model year 2017 to 2025 vehicles. ARB anticipates that the new standards will reduce motor vehicle GHG emissions by 34 percent in 2025 (ARB 2014c).

The Advanced Clean Cars Program also includes the LEV III amendments to the LEV regulations (13 CCR 1900 et seq.), Zero Emission Vehicle Program and the Clean Fuels Outlet Regulation. The Zero Emission Vehicle Program is designed to achieve California’s long-term emission reduction goals by requiring manufacturers to offer for sale specific numbers of the very cleanest cars available. These zero-emission vehicles, which include battery electric, fuel cell, and plug-in hybrid electric vehicles, are just beginning to enter the marketplace. They are expected to be fully commercial by 2020. Most vehicle manufacturers agree that providing a selection of these technologies will be necessary to meet climate goals by 2050 (ARB 2014d). The Clean Fuels Outlet regulation ensures that fuels such as electricity and hydrogen are available to meet the fueling needs of the new advanced technology vehicles as they come to market.

Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Regulation

The Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Regulation (17 CCR Sections 95300 et seq.) reduces GHG emissions by improving the fuel efficiency of heavy-duty tractors that pull 53-foot or longer box-type trailers. Fuel efficiency is improved through improvements in tractor and trailer aerodynamics and the use of low rolling resistance tires. ARB expects the regulation to reduce statewide GHG emissions by approximately 0.7 million metric tons CO2e by 2020. The tractors and trailers subject to this regulation must use U.S. Environmental Protection Agency SmartWay^{SM} certified tractors and trailers, or retrofit their existing fleet with SmartWay verified technologies

Tire Pressure Regulation

On September 1, 2010, the Tire Pressure Regulation (17 CCR Section 95550) took effect. The purpose of this regulation is to reduce GHG emissions from vehicles operating with under inflated tires by inflating them to the recommended tire pressure rating. The regulation applies to vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less.

ENERGY USE AND GENERATION

Renewable Portfolio Standard

California law (SB X1-2, Statutes of 2011) requires retail suppliers of electricity to procure at least 33 percent of annual retail sales from eligible renewable energy sources by 2020.

Title 24 Energy Standards

Energy Conservation Standards for new residential and nonresidential buildings were first adopted by the CEC in June 1977 and were most recently revised in 2013 (Title 24, Part 6 of the California Code of Regulations [Title 24]). Title 24 governs energy consumed by commercial and residential buildings in California. This includes the heating, ventilation, and air conditioning (HVAC) system; water heating; and some fixed lighting. Nonbuilding energy use, or “plug-in” energy use, is not covered by Title 24. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods. California's Building Energy Efficiency Standards are updated on an approximate 3-year cycle. The most recent update was in 2013. The 2013 Title 24 standards went into effect July 1, 2014, and improve on the 2008 Title 24 standards. The CEC estimates that the 2013 Standards are 25 percent more energy-efficient than the previous standards for residential construction and 30 percent more efficient for nonresidential construction (CEC 2014a, 2014b).

Appliance Efficiency Regulations

California’s 2009 Appliance Efficiency Regulations (20 CCR 1601–1608) were adopted by the CEC on December 3, 2008, and approved by the California Office of Administrative Law on July 10, 2009. The regulations include standards for both federally regulated appliances and nonfederally regulated appliances.

Green Building Standards

The 2013 California Green Building Standards Code (24 CCR Part 11 [CALGREEN]) took effect January 1, 2014. These comprehensive regulations will achieve major reductions in GHG emissions, energy consumption, and water use. CALGREEN will require that every new building constructed in California reduce water consumption by 20 percent, divert 50 percent of construction waste from landfills, and install low-pollutant-emitting materials. They also require separate water meters for nonresidential buildings' indoor and outdoor water use, with a requirement for moisture-sensing irrigation systems for larger landscape projects and mandatory inspections of energy systems (e.g., heat furnace, air conditioner, and mechanical equipment) for nonresidential buildings larger than 10,000 square feet to ensure that all are working at their maximum capacity and according to their design efficiencies. ARB estimates that the mandatory provisions will reduce GHG emissions from buildings by approximately 3 MMT CO_2e in 2020 in comparison with GHG emissions without implementation of the Green Building Standards (ARB 2014e).

Energy Efficiency in Existing Buildings

Assembly Bill 758 (Chapter 470, Statutes of 2009) requires the CEC to develop and implement a comprehensive energy efficiency plan for all of California's existing buildings. In 2015, the CEC released the Draft Existing Buildings Energy Efficiency Action Plan, which provides a ten-year blueprint for reducing energy consumption in all existing buildings in the single-family, multi-family, commercial and public buildings sectors. The goal of the plan is to double energy savings in California's buildings, which is equivalent to a 17 percent reduction in statewide building energy use in 2030 compared to projected levels of usage. AB 758 complements the existing energy efficiency programs implemented by California's investor-owned utilities (IOUs) that target both residential and non-residential sectors.

Performance Standard for Baseload Power Generation

SB 1368 (Chapter 598, Statutes of 2006) required the California Public Utilities Commission (PUC) to establish a GHG emissions performance standard for "baseload" generation from investor-owned utilities of 1,100 lbs CO_2/MWh. The CEC established a similar standard for local publicly owned utilities. All electricity provided to California, including imported electricity, must be generated from plants that meet or exceed this standard.

Senate Bill 1 (Chapter 132, Statutes of 2006)

The California Solar Initiative (Senate Bill 1, Chapter 132, Statutes of 2006), also known as the "Million Solar Roofs" legislation, set a goal of installing 3,000 megawatts of new solar capacity by 2017.

Off-road Vehicle and Equipment Regulations

State regulations that govern off-road vehicles such as locomotives and heavy equipment are discussed in Section 4.3, Air Quality. These regulations also result in reductions in GHG emissions, and include the following standards.

Small Offroad Engine Exhaust Emission Standards: The ARB has adopted regulations (13 CCR Sections 2400 et seq.) to control emissions from small off-road engines such as lawn, garden and other maintenance utility equipment (ARB 2015b). The rules affect engines less than 25 horsepower and regulate emissions of hydrocarbons, NOx, and CO. The emission standards also reduce GHGs by requiring more efficient engines.

Offroad Compression-Ignition Diesel Engine Exhaust Emission Standards: The ARB has adopted regulations (13 CCR Sections 2400 et seq.) to control emissions from off-road compression-ignition diesel engines found in a wide variety of off-road applications such as farming, construction, and industrial. The regulations require off-road engines to meet emission standards for hydrocarbons, NOx, CO and PM in "Tiers", which require engines to meet increasingly stringent emission levels. The regulations also reduce GHG emissions by requiring more efficient engines.

SOLID WASTE AND WATER

Solid Waste Diversion

AB 341 (Chapter 476, Statutes of 2011) set a goal that 75 percent of the solid waste generated be reduced, recycled or composted by 2020.

Landfill Methane Control Measure

The Landfill Methane Control Measure (17 CCR Sections 95460 et seq.) reduces emissions of methane from municipal solid waste (MSW) landfills. The regulation became effective June 17, 2010 and requires owners and operators of uncontrolled MSW landfills to install gas collection and control systems, and requires existing and newly installed gas and control systems to operate in an optimal manner.

Water Conservation

State water conservation legislation and regulations are reviewed in Section 4.16 Water Supply.

HIGH GLOBAL WARMING POTENTIAL GASES

Refrigerant Management Program

ARB's Refrigerant Management Program (17 CCR Sections 95380 et seq.) works to reduce the release of currently use high-global warming potential (GWP) gases. The Program requires facilities with refrigeration systems to inspect and repair leaks, maintain service records, and in some cases report refrigerant use.

Motor Vehicle Air-Conditioning

In January 2009, ARB approved the mobile air conditioning regulation (17 CCR Sections 95360 et seq.) to reduce emissions associated with the use of small container of automotive refrigerant. The regulation applies to the sale, use, and disposal of small container with a GWP greater than 150.

Consumer Products Regulation

Limiting the use of high GWP compounds in consumer products is part of ARB's larger Consumer Products Program. In 2009, ARB approved amendments to the Consumer Products Regulation to prohibit the use of compounds with GWP values greater than 150. (ARB Resolution 09-51.)

Sulfur Hexafluoride Leak Reduction and Recycling

Sulfur hexafluoride (SF_6) is a potent greenhouse gas, with a global warming potential (GWP) of 23,900, the highest identified by the Intergovernmental Panel on Climate Change. ARB approved sulfur hexafluoride reductions from non-electric and non-semiconductor applications as an early action measure. Accordingly, ARB approved the Regulation for Reducing Sulfur Hexafluoride Emissions (17 CCR Sections 95340 et eq.) in February 2009 to reduce sulfur hexafluoride emissions from other uses including magnesium die-casting, fume vent hood testing, tracer gas use, and other niche uses.

<u>Public Resources Code Section 30253</u>

<u>Public Resources Code Section 30253, part 4, establishes a policy that development within the Coastal Zone shall minimize energy consumption and vehicle miles traveled.</u>

4.8.2.3 REGIONAL AND LOCAL LAWS, REGULATIONS, PLANS, AND POLICIES

SANDAG Climate Action Strategy

In 2010, SANDAG published a Climate Action Strategy (Strategy) that was prepared under a partnership with the CEC (SANDAG 2010). The Strategy is a guidance document and not a binding plan. The Strategy serves as a guide to help policymakers address climate change as they make decisions to meet the needs of our growing population, maintain and enhance our quality of life, and promote economic stability. As stated in the Strategy introduction, the policy measures contained in the Strategy are intended to be a list of potential options (tools in the toolbox) for consideration as SANDAG and local governments update their various plans. The policy measures are not requirements for SANDAG, local governments, or any other entity.

The Strategy identifies goals, objectives, and policy measures in the areas of transportation, land use, buildings, and energy use. Also addressed are measures and resources to help local governments reduce emissions from their operations and in their communities. The policy measures contained in this document are intended to be a list of potential options to reduce GHG emissions. Because local governments have greater control over some categories of GHG emission sources, the Strategy emphasizes those areas where the greatest impact can be made at the local and regional level. These areas include land use patterns, transportation infrastructure, and related public investment; building construction and energy use; and local government operations.

Within the three areas, goals, objectives, and policy measures are included in the Strategy to further describe how GHG emissions reductions could be achieved. The goals identified in the Strategy include the following:

<u>Transportation Sector</u>

- Reduce total miles of vehicle travel
- Minimize GHG emissions when vehicles are used
- Support increased use of low carbon alternative fuels
- Protect transportation infrastructure from climate change impacts

<u>Clean Energy and Efficient Buildings</u>

- Reduce energy use in residential and commercial buildings
- Increase use of renewable energy
- Reduce water-related energy use and GHGs
- Protect energy infrastructure from climate change impacts

<u>SANDAG and Local Government Operations</u>

- SANDAG and local governments lead by example

SANDAG Regional Energy Strategy

SANDAG has adopted a Regional Energy Strategy (RES), which serves as the energy policy blueprint for the region through 2050 (SANDAG 2009b). The RES addresses some of the goals identified in the 2014 Scoping Plan Update. It establishes long-term goals in 11 topic areas including energy efficiency, renewable energy, distributed generation, transportation fuels, land use and transportation planning, border energy issues, and the green economy. In 2014, a technical update of the RES was completed to inform development of the proposed Plan (SANDAG 2014a). This technical update demonstrates progress toward attaining the RES goals, updates existing conditions and future projections data, and recommends priorities for the region. The RES goals include the following:

- Energy Efficiency and Conservation – Reduce per capita electricity consumption by 20 percent by 2030 in order to keep total electricity consumption flat.
- Renewable Energy – Support the development of renewable energy resources to meet a 33 percent renewable portfolio standard (RPS) by 2020 and exceed 33 percent beyond 2020.
- Distributed Generation – Increase the total amount of clean distributed generation (renewable and nonrenewable) to reduce peak demand and diversify electricity resources in the region.
- Energy and Water – Reduce water-related energy use.
- Peak Demand – Implement cost-effective steps and incentives to utilize demand response and energy efficiency measures to reduce peak demand.
- Smart Energy – Modernize the electricity grid with smart meters, smart end-use devices, and interactive communication technologies.
- Natural Gas Power Plants – Increase overall efficiency of electricity production and support replacement of inefficient power plants consistent with California’s preferred loading order.
- Transportation Fuels – Substantially increase the deployment of alternative transportation fuels and vehicles.

- Land Use and Transportation Planning – Reduce the energy demand of the built environment through changes in land use and transportation planning.
- Energy and Borders – Integrate energy considerations into existing and future collaborative border initiatives.
- Clean Energy Economy – Collaborate with workforce entities, employers, technical and vocational schools, and labor unions to identify and expand local job placement mechanisms in the Clean Energy Sector.

Regional Alternative Fuel Planning

On-road transportation represents approximately 44.5 percent of the region's GHG emissions and, as such, the proposed Plan and RES both call for SANDAG to undertake coordinated planning for electric vehicle charging and alternative fueling infrastructure in the region.

Infrastructure needs were identified in a 2009 assessment of how to accelerate deployment of alternative fuel vehicles in and around San Diego entitled the Regional Alternative Fuels, Vehicles and Infrastructure Report (SANDAG 2009a). The report recommended public–private partnerships and collaborative approaches to infrastructure planning and increasing alternative fuels in fleets. Its findings were incorporated into the regional energy and climate strategies.

San Diego Regional Plug-In Electric Vehicle Readiness Plan

In 2012, SANDAG established the San Diego Regional Electric Vehicle Infrastructure Working Group (REVI) as part of a CEC grant to perform regional Plug-In Electric Vehicle (PEV) readiness planning. The REVI completed the San Diego Regional Plug-in Electric Vehicle Readiness Plan, which was accepted by the SANDAG Board in January 2014. As part of another CEC grant, SANDAG will build on the success of the REVI and undertake regional readiness planning for all alternative fuels in partnership with the San Diego Regional Clean Cities Coalition. A regional alternative fuels coordinating council will be established to advise on regional alternative fuel infrastructure needs, barriers, and solutions.

SANDAG Energy Roadmap Program for Local Governments

The Energy Roadmap Program is a collaboration between SANDAG and San Diego Gas & Electric (SDG&E). It is funded primarily by California utility customers under the auspices of the PUC. Transportation components of the program are funded by SANDAG. The roadmap program was developed with the help of the Energy Working Group and three pioneering cities: Carlsbad, Poway, and Solana Beach. These cities served as early pilots in energy management planning, which became the roadmap program in 2010. All cities within the San Diego region are now participating in the program.

The SANDAG Energy Roadmap Program provides free energy assessments and energy management plans, or "energy roadmaps," to SANDAG member agencies. Each energy roadmap provides a framework for a local government to reduce energy use in municipal operations and in the community, and can result in economic savings and environmental benefits. Within the energy roadmap are eight general categories:

1. Saving Energy in City Buildings and Facilities
2. Demonstrating Emerging Energy Technologies

3. Greening the City Vehicle Fleet
4. Developing Employee Knowledge of Energy Efficiency
5. Promoting Commuter Benefits to City Employees
6. Leveraging Planning and Development Authority
7. Marketing Energy Programs to Local Residents and Businesses
8. Supporting Green Jobs and Workforce Training

Upon receiving their energy roadmap, SANDAG assists municipalities in developing projects and/or programs presented in the eight general categories.

Local Greenhouse Gas Inventories and Climate Action Plans

In the San Diego region, all 19 jurisdictions (18 cities and County of San Diego) have completed a GHG inventory covering both government operations and the community as a whole, many prepared as part of the San Diego Foundation's Climate Initiative (City of Carlsbad 2011, City of Chula Vista 2006, City of Chula Vista 2013a, City of Del Mar 2011, City of El Cajon 2011, City of Encinitas 2011b, City of Escondido 2011, City of Imperial Beach 2011, City of La Mesa 2011, City of National City 2009, City of Oceanside 2011, City of Poway 2011, City of San Marcos 2013b, City of Santee 2011, City of Solana Beach 2011, County of San Diego 2011). In addition, the Border Environment Cooperation Commission (BECC) has worked with the Center for Climate Strategies to complete GHG inventories for all six Mexican border states. Each inventory identifies emissions sources, and sets a baseline for evaluating reductions.

More than half of the local jurisdictions in the San Diego region, representing over 75 percent of the region's population, are developing or have adopted a climate action plan (CAP) (City of Carlsbad 2015; City of Chula Vista 2000, 2008, 2013b; City of Encinitas 2011a; City of Escondido 2013; City of National City 2011; City of San Diego 2005; City of San Marcos 2013a; County of San Diego 2012[1]; City of Vista 2012). A CAP typically includes specific measures or actions to reduce GHG emissions toward an identified target, and offers streamlining opportunities for future development projects under CEQA. Table 4.8-5 summarizes each jurisdiction's climate planning efforts. In addition to the efforts of the 18 cities and the County of San Diego, the Port of San Diego and the San Diego County Water Authority have developed GHG inventories and CAPs.

Table 4.8-5
Status of Climate Action Planning

Jurisdiction	% of 2012 Regional Population	Completed GHG Inventory	Climate Action Plan	
			Adoption year	Developing
Chula Vista	7.9	√	2008	√
Encinitas	1.9	√	2011	n/a
Escondido	4.6	√	2013	n/a
National City	1.9	√	2011	n/a
San Diego	42.0	√	2005	√
County of San Diego (unincorporated)	15.8	√	n/a[1]	√
Vista	3.0	√	2012	n/a
San Marcos	2.7	√	2013	n/a
Carlsbad	3.4	√	~~n/a~~2015[2]	√

[1] The County of San Diego rescinded its Climate Action Plan in April 2015 and is currently preparing a new plan.
[2] The City of Carlsbad adopted a Climate Action Plan on September 22, 2015.

Del Mar	0.1	√	n/a	√
La Mesa	1.9	√	n/a	√
Santee	1.7	√	n/a	√
Solana Beach	0.4	√	n/a	√
Coronado	0.7	√	n/a	n/a
El Cajon	3.2	√	n/a	n/a
Imperial Beach	0.8	√	n/a	n/a
Lemon Grove	0.8	√	n/a	n/a
Oceanside	5.4	√	n/a	n/a
Poway	1.5	√	n/a	n/a

Source: ARB 2014b

4.8.3 SIGNIFICANCE CRITERIA

Appendix G of the CEQA Guidelines and Guidelines Section 15064.4 provide criteria for evaluating the significance of a project's environmental impacts on GHGs. Unless otherwise noted, the significance criteria specifically developed for this EIR are based on the checklist questions in Appendix G and Guidelines Section 15064.4. In some cases, SANDAG has combined checklist questions, edited their wording, or changed their location in the document in an effort to develop significance criteria that reflect the programmatic level of analysis in this EIR and the unique nature of the proposed Plan.

Appendix G addresses GHGs under Greenhouse Gases (VII. (a) and (b)). The criteria below build on the Appendix G questions and Guidelines Section 15064.4 to analyze the impact of the proposed Plan in relation to the GHG targets established by AB 32, Executive Order B-30-15, Executive Order S-3-05, SB 375, and local climate action plans. For the purposes of this EIR, implementation of the proposed Plan would have a significant GHG impact if it would:

GHG-1 Directly or indirectly result in an increase in GHG emissions compared to existing conditions (2012).

GHG-2 Conflict with AB 32, SANDAG Climate Action Strategy, or Local Climate Action Plans.

GHG-3 Conflict with SB 375 GHG emission reduction targets.

GHG-4 Be inconsistent with the State's ability to achieve the Executive Order B-30-15 and S-3-05 goals of reducing California's GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

When setting the above thresholds, SANDAG also considered the following factors listed in CEQA Guidelines Section 15064.4:

- Whether the project may increase or decrease GHG emissions compared to the existing environmental setting (Impacts GHG-1 and GHG-4)
- Whether GHG emissions exceed a threshold of significance that the lead agency determines applies to the project (Impacts GHG-1 through GHG-4)
- The extent to which the project complies with requirements adopted to implement certain specified plans for the reduction of GHG emissions (Impacts GHG-2 and GHG-3)

4.8.4 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

GHG-1 DIRECTLY OR INDIRECTLY RESULT IN AN INCREASE IN GHG EMISSIONS COMPARED TO EXISTING CONDITIONS (2012).

ANALYSIS METHODOLOGY

GHG emission projections are based on the proposed Plan, including forecasted regional growth and land use change and planned transportation network improvements and programs. The inventory also accounts for the Renewable Portfolio Standard that requires retail suppliers of electricity to increase renewable energy resources to 33 percent by 2020. The inventory also includes implementation programs such as Title 24 building standards, water conservation programs, solid waste diversion programs, and other regulatory requirements and programs designed to reduce GHG emissions. The GHG emissions inventory and supporting assumptions are included as EIR Appendix G-1.

It should be noted that the current GHG inventory shows lower projected GHG emissions than the inventory presented in the 2050 RTP/SCS Environmental Impact Report (SANDAG 2011) for several reasons. The original inventory was prepared in 2011 and took into account information on the regulatory environment and technology that was available at the time. The original inventory was based on “business as usual” conditions as of 2010. The current inventory is not based on business as usual emissions, but takes into account implementation of currently adopted regulations, programs, and policies that will lead to reductions in GHG emissions. As stated above, the current inventory is based on the Series 13 Regional Growth Forecast, which has slightly lower population projections than the 2050 RTP/SCS. The inventory accounts for additional certainty regarding the regulatory environment, including future projections for renewable energy, building energy efficiency, water conservation programs, and solid waste diversion. The current inventory for on-road vehicles is also based on the ARB’s EMFAC2014 model, which is the most recent update to the state’s mobile source emissions inventory tool. The model accounts for programs that will lead to further reductions from on-road vehicles, including the ARB’s Advanced Clean Cars Program.

In the Final EIR, revised numbers for on-road transportation GHG emissions reflect the minor modifications to the project description and the new version of EMFAC2014 (v1.0.7) released by ARB in May 2015. In the Final EIR, the updated version of EMFAC2014 also was used to update the estimate of 2012 on-road GHG emissions. These numbers were slightly different from those in the Draft EIR because on-road GHG emissions in the Draft EIR were calculated using EMFAC2014 (v1.0.1). On-road emissions in the Final EIR were also broken down to reflect two categories of on-road GHG emissions: (1) passenger cars and light duty vehicles and (2) heavy duty trucks and vehicles.

It should also be noted that, while the current inventory takes into account regulations, programs, and policies that are in place at this time, there is substantial uncertainty in projecting emissions for future horizon years, especially for 2050; in general, the uncertainty in future emissions increases from 2020 to 2050. The inventory projects emissions based on reasonable assumptions regarding future conditions; however, it does not account for future regulatory initiatives, technologies, or market drivers that may affect GHG emissions in the future over the next 35 years. For example, even though further reductions may be achieved through future legislation or regulations, the Renewable Portfolio Standard for renewable electricity generation does not set targets beyond 2020, and the ARB Advanced Clear Cars Program does not address passenger vehicles beyond the 2025 model year. The following analysis is therefore considered conservative and may overstate actual GHG emission trends in future years.

For the purpose of evaluating impacts under Impact GHG-1, because regional growth and land use change and the transportation network together impact overall GHG emissions, the impact assessment includes both regional growth and land use change and the transportation network improvements. Emission calculations are provided in Appendix G-1 to the EIR.

Regional Greenhouse Gas Emissions Methodology

GHG emissions from the proposed Plan are calculated based on standard approaches for estimating GHG emissions that are documented in Appendix G-1 to the EIR. To the extent possible, the inventory followed the ICLEI U.S. Community Protocol[2] methods for the following emissions categories:

- On-road transportation, including:
  - Passenger cars and light duty vehicles
  - Heavy duty trucks and vehicles
- Electricity and natural gas
- Water consumption
- Solid waste
- Wastewater
- Civil Aviation

The remaining categories were calculated based on California Air Resources Board methods and methods based on San Diego region data:

- Other Fuels
- Cogeneration
- Industrial
- Off-Road
- Land Use and Wildfires
- Rail
- Agriculture
- Marine Vessels

Construction emissions include emissions from off-road equipment that are part of the emission inventory under the off-road category, and vehicles that are part of the on-road transportation category. In addition, indirect GHG emissions from operation of the Trolley are included under electricity use. GHG emission reductions are also projected for development and sequestration.

GHG emissions associated with operation of planned transportation network improvements and programs are calculated using estimated total VMT under the proposed Plan, using ARB's EMFAC2014 model, which represents ARB's current understanding of motor vehicle travel activities and their associated emission levels. It represents ARB's current understanding of how vehicles travel and how much they pollute. Emissions are estimated for 2012 (baseline), 2020, 2035, and 2050. EMFAC2014 includes the latest data on California's car and truck fleets and accounts for emissions reductions due to implementation of statewide vehicular regulations, including on-road diesel fleet rules, Advanced Clean Car Standards, zero emission vehicle regulations, and the Smartway/Phase I Heavy Duty Vehicle Greenhouse Gas Regulation. The model also includes updates to truck emission factors based on the latest surveillance data (ARB 2014f).

[2] U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (2013) available at http://www.icleiusa.org/tools/ghg-protocol/community-protocol.

During the timeframe of the proposed Plan, climate change effects that are likely to exacerbate the proposed Plan's greenhouse gas emissions impacts include but are not limited to increases in temperatures and frequency, duration, and intensity of heatwaves, and increased frequency and intensity of wildfires. In general, these climate change effects would increase between 2020 and 2050. Climate change effects are discussed in more detail in Appendix F to the EIR.

2020

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

From 2012 to 2020, the region is forecasted to increase by 292,292 people; 83,874 housing units; and 118,535 jobs. Under implementation of the proposed Plan, total GHG emissions in the San Diego region are projected to be approximately 28.1~~8~~ MMT CO_2e in 2020, or about 19 percent lower than GHG emissions in 2012 (Table 4.8-6).

While population and development in the region is increasing in 2020 relative to 2012, GHG emissions are projected to decrease due to regulations and programs implemented on the state and regional levels to reduce emissions of GHGs. These programs include implementation of the RPS, Advanced Clean Cars regulations, the Low Carbon Fuel Standard, Cap-and-Trade program, energy efficiency standards for buildings, continued growth in solar photovoltaic installations, water conservation measures, solid waste diversion, refrigerant programs, and emission standards for off-road equipment. In addition, the SCS land use pattern and transportation network improvements and programs play an important role by decreasing per capita vehicle miles traveled. The decrease in per capita VMT is attributable to a number of factors considered in the proposed Plan's transportation modeling: proposed Plan investments in transit and managed lanes; TDM programs such as carpooling, vanpooling, mobility hubs, and teleworking; and demographic (e.g., aging population) and economic e.g., fuel prices factors.

Table 4.8-6
Total Greenhouse Gas Emissions in the San Diego Region, 2012 to 2020

GHG Emissions Category	2012 (Annual MMTCO2e)	2020 (Annual MMTCO2e)
~~On-Road Transportation~~Passenger Cars & Light Duty Vehicles	~~15.76~~13.14	~~13.72~~11.18
Electricity	7.97	6.41
Natural Gas	2.84	2.79
Heavy Duty Trucks & Vehicles	1.89	1.89
Solid Waste	1.75	0.84
Other Fuels	1.64	1.64
Industrial	1.43	1.45
Aviation	1.37	1.52
Off-Road Equipment and Vehicles	0.92	0.95
Wildfire	0.81	0.81
Other - Thermal Cogeneration	0.64	0.65
Water Supply and Conveyance	0.52	0.57
Wastewater	0.16	0.12
Rail	0.11	0.15
Agriculture	0.08	0.06
Marine Vessels (excluding pleasure craft)	0.05	0.05
Development + Sequestration	-0.65	-0.62
Low Carbon Fuel Standard	n/a	-1.39
Cap-and-Trade	n/a	-0.50
High GWP Gases	n/a	-0.43
Total	**~~35.4~~34.7**	**~~28.8~~28.1**
% Increase (Decrease) from 2012 to 2020	**(18.8~~6~~%)**	

Source: Appendix G-1 to the EIR

Note:
The revised numbers in this table reflect the minor modifications to the project description and the new version of EMFAC2014 (v1.0.7) released by ARB in May 2015. On-road GHG emissions in the Draft EIR were calculated using EMFAC2014 (v1.0.1).

2020 Conclusion

As shown in Table 4.8-6, implementation of the proposed Plan would result in a less than significant impact because the proposed Plan would not directly or indirectly result in an increase in GHG emissions compared to existing conditions. Therefore, this impact (GHG-1) in the year 2020 is less than significant.

2035

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

From 2012 to 2035, the region is forecasted to increase by 710,269 people, 230,220 housing units, and 319,025 jobs. Under the proposed Plan, total GHG emissions for the region in 2035 are projected to be approximately 25.5 MMT CO_2e, or ~~28~~ 26.5 percent lower than GHG emissions in 2012 (Table 4.8-7).

While population in the region is increasing in 2035 relative to 2012, GHG emissions are projected to decrease due to regulations and programs implemented on the state and regional levels to reduce emissions of GHGs. These programs include implementation of the RPS, Advanced Clean Cars regulations, the Low Carbon Fuel Standard, Cap-and-Trade program, energy efficiency standards for buildings, continued growth in solar photovoltaic installations, water conservation measures, solid waste diversion, refrigerant programs, and emission standards for off-road equipment. In addition, the

SCS land use pattern and transportation network improvements and programs play an important role by decreasing per capita vehicle miles traveled. The decrease in per capita VMT is attributable to a number of factors considered in the proposed Plan's transportation modeling: proposed Plan investments in transit and managed lanes; TDM programs such as carpooling, vanpooling, mobility hubs, and teleworking; and demographic (e.g., aging population) and economic e.g., fuel prices factors.

Table 4.8-7
Total Greenhouse Gas Emissions in the San Diego Region, 2012 to 2035

Category	**2012 (Annual MMTCO$_2$e)**	**2035 (Annual MMTCO$_2$e)**
~~On-Road Transportation~~Passenger Cars & Light Duty Vehicles	~~15.76~~13.14	~~9.68~~7.69
Electricity	7.97	6.05
Natural Gas	2.84	2.73
Heavy Duty Trucks & Vehicles	1.89	2.03
Solid Waste	1.75	0.93
Other Fuels	1.64	1.66
Industrial	1.43	1.49
Aviation	1.37	1.72
Off-Road	0.92	1.47
Wildfire	0.81	0.81
Other - Thermal Cogen	0.64	0.71
Water	0.52	0.63
Wastewater	0.16	0.15
Rail	0.11	0.23
Agriculture	0.08	0.03
Marine Vessels (excluding pleasure craft)	0.05	0.05
Development + Sequestration	-0.65	-0.56
Low Carbon Fuel Standard	n/a	-1.39
Cap-and-Trade	n/a	-0.50
High GWP Gases	n/a	-0.43
Total	**~~35.4~~34.7**	**25.5**
% Increase (Decrease) from 2012 to 2035	**(26.5~~8.0~~%)**	

Source: Appendix G-1 to the EIR
Note:
The revised numbers in this table reflect the minor modifications to the project description and the new version of EMFAC2014 (v1.0.7) released by ARB in May 2015. On-road GHG emissions in the Draft EIR were calculated using EMFAC2014 (v1.0.1).

2035 Conclusion

Table 4.8-7 shows the total GHG emissions in 2035 versus existing conditions. As shown in Table 4.8-7, implementation of the proposed Plan would result in a less than significant impact because the proposed Plan would not directly or indirectly result in an increase in GHG emissions compared to existing conditions. Therefore, this impact (GHG-1) in the year 2035 is less than significant.

2050

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

From 2012 to 2050, the region is forecasted to increase by 925,330 people, 327,921 housing units, and 460,492 jobs. Total GHG emissions in 2050 are projected to be ~~25.9~~26 MMT CO_2e, or ~~26.8~~25.9 percent lower than GHG emissions in 2012 (Table 4.8-8).

Table 4.8-8
Total Greenhouse Gas Emissions in the San Diego Region, 2012 to 2050

Category	2012 (Annual MMTCO$_2$e)	2050 (Annual MMTCO$_2$e)
~~On-Road Transportation~~Passenger Cars & Light Duty Vehicles	~~15.76~~13.14	~~9.64~~7.46
Electricity	7.97	5.76
Natural Gas	2.84	2.69
Heavy Duty Trucks & Vehicles	1.89	2.33
Solid Waste	1.75	0.98
Other Fuels	1.64	1.66
Industrial	1.43	1.60
Aviation	1.37	1.82
Off-Road	0.92	1.79
Wildfire	0.81	0.81
Other - Thermal Cogen	0.64	0.77
Water	0.52	0.67
Wastewater	0.16	0.15
Rail	0.11	0.30
Agriculture	0.08	0.02
Marine Vessels (excluding pleasure craft)	0.05	0.05
Development + Sequestration	-0.65	-0.51
Low Carbon Fuel Standard	n/a	-1.39
Cap-and-Trade	n/a	-0.50
High GWP Gases	n/a	-0.43
Total	**~~35.4~~34.7**	**~~25.9~~26.0**
% Increase (Decrease) from 2012 to 2050	**(~~26.8~~24.9%)**	

Source: Appendix G-1 to the EIR

Note:
The revised numbers in this table reflect the minor modifications to the project description and the new version of EMFAC2014 (v1.0.7) released by ARB in May 2015. On-road GHG emissions in the Draft EIR were calculated using EMFAC2014 (v1.0.1).

While population in the region is increasing in 2050 relative to 2012, GHG emissions are projected to decrease due to regulations and programs implemented on the state and regional levels to reduce emissions of GHGs. These programs include implementation of the RPS, Advanced Clean Cars regulations, the Low Carbon Fuel Standard, Cap-and-Trade program, energy efficiency standards for buildings, continued growth in solar photovoltaic installations, water conservation measures, solid waste diversion, refrigerant programs, and emission standards for off-road equipment.

In addition, the SCS land use pattern and transportation network improvements and programs play an important role by decreasing per capita vehicle miles traveled. The decrease in per capita VMT is attributable to a number of factors considered in the proposed Plan's transportation modeling: proposed Plan investments in transit and managed lanes; TDM programs such as carpooling, vanpooling, mobility hubs, and teleworking; and demographic (e.g., aging population) and economic e.g., fuel prices factors.

2050 Conclusion

As shown in Table 4.8-8, implementation of the proposed Plan would result in a less than significant impact because the proposed Plan would not directly or indirectly result in an increase in GHG emissions compared to existing conditions. Therefore, this impact (GHG-1) in the year 2050 is less than significant.

GHG-2 CONFLICT WITH AB 32, SANDAG CLIMATE ACTION STRATEGY, OR LOCAL CLIMATE ACTION PLANS.

ANALYSIS METHODOLOGY

The analysis evaluates any conflicts of the proposed Plan with AB 32, SANDAG's Climate Action Strategy, and adopted local Climate Action Plans.

The AB 32 analysis evaluates whether the proposed Plan would conflict with the State's ability to achieve the AB 32 target of reducing statewide GHG emissions to the 1990 levels by 2020. In addition to establishing a statewide emissions limit to be achieved by 2020, AB 32 also includes a provision stating the intent of the Legislature that the statewide GHG emissions limit continue in existence and be used to maintain and continue reductions in GHG emissions beyond 2020 (HSC Section 38551[b]). Statewide goals for GHG emissions reductions beyond 2020 have since been expressed in Governor's Executive Orders, including goals of 40 percent below 1990 levels by 2030 (EO-B-30-15) and goals of 80 percent below 1990 levels by 2050 (EO-S-3-05), which are evaluated in Impact GHG-4. Therefore, the AB 32 analysis in Impact GHG-2 analysis focuses on whether the region would achieve a regional reference point based on the 2020 target.

The 1990 GHG emissions in the San Diego region was 29 MMT CO_2e (see Appendix G-1 to the EIR).[3] The analysis compares 2020 GHG emissions under the proposed Plan to the region's 1990 levels. Note that there is no requirement that the SANDAG region's emissions be reduced by the same percentage ("equal share") as the statewide percentage in order for the State to achieve the AB 32 target. The impacts of the proposed Plan are nevertheless considered significant if the region's total emissions in 2020 exceed the 1990 reference point of 29 MMT CO_2e.

For purposes of evaluating impacts under Impact GHG-2, because the AB 32 target includes both regional growth and land use change and the transportation network, the analysis has not been separated into two categories. The impact assessment includes both regional growth and land use change and planned transportation network improvements and programs.

Emissions calculations are provided in Appendix G-1 to the EIR. The AB 32 analysis also evaluates the proposed Plan for any conflicts with applicable recommendations for achieving GHG reductions in the ARB's Scoping Plan Update "transportation focus area".

The other components of Impact GHG-2 evaluate the proposed Plan for any conflicts with SANDAG's Climate Action Strategy (Strategy) goals, objectives, and policy measures for GHG reductions, and local climate action plan policies for GHG reductions. The analysis of the Strategy and local climate actions plans is provided for 2020, 2035, and 2050. For the purpose of evaluating impacts under Impact GHG-2, because the Climate Action Strategy and local climate action plans establish goals, objectives, and policy measures for both regional growth and land use change and the transportation network improvements, the analysis of conflicts with SANDAG's Climate Action Strategy and local climate action plans has not been separated into the two categories. The impact assessment includes both regional growth and land use change and the transportation network improvements.

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[3] The 1990 GHG emissions estimate of 25 MMT CO_2e in the 2050 RTP/SCS FEIR was estimated as 15 percent below 2005 levels and based on EMFAC2011 emissions data for vehicles for the region. The 1990 GHG emissions estimate has been updated to align with ARB updates to the statewide 1990 emissions inventory and to utilize the best available data for 1990~~the EMFAC2014 model, as well as other updated information~~.

During the timeframe of the proposed Plan, climate change effects that are likely to exacerbate the proposed Plan's greenhouse gas emissions impacts include but are not limited to increases in temperatures and frequency, duration, and intensity of heatwaves (which could lead to increases in GHG emissions from local fossil fuel-fired power plants to meet electricity demands); and wildfires (which release GHG emissions). In general, these climate change effects would increase between 2020 and 2050. Climate change effects are discussed in more detail in Appendix F.

2020

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

As discussed under Impact GHG-1, under implementation of the proposed Plan, total GHG emissions for the San Diego region in 2020 are projected to be approximately 28.1~~8~~ MMT CO_2e. To be in line with its "equal share" of the state emissions reduction target set forth in AB 32, regional GHG emissions would need to decrease to 29 MMT CO_2e by 2020. Therefore, the proposed Plan would not conflict with the AB 32 target of reducing statewide emissions to 1990 levels by 2020.

In addition, the proposed Plan would not conflict with applicable recommendations in the ARB's Scoping Plan Update for the Transportation focus area. The 2014 Scoping Plan Update identified several recommended actions within the Transportation sector to achieve future GHG reductions, with the recommendations primarily focused on achieving major technological and regulatory changes in order to reduce GHG emissions from all types of vehicles and transportation fuels, including more efficient vehicles, low-carbon fuels like electricity and hydrogen, and supporting infrastructure. The Update also identified the following applicable recommendations for transportation:

- Caltrans and regional transportation agencies will increase investment in expanded transit and rail services, active transportation, and other VMT-reduction strategies in their next regional transportation plans.
- ARB, Caltrans, the Strategic Growth Council, and the Department of Housing and Community Development, along with other State, local and regional agencies, will coordinate planning and support to ensure that the expected GHG emission reductions from approved SCS are achieved or exceeded.

The proposed Plan would not conflict with the recommendation to increase investment in expanded transit and rail services, active transportation, and other VMT-reduction strategies in their regional transportation plans. From 2012 to 2020, the proposed Plan includes increased investment in transit and rail services, active transportation, and other VMT-reduction strategies including double-tracking along the LOSSAN rail corridor, increases in COASTER frequencies, completion of the Mid-Coast Trolley Extension from Old Town to University City, the South Bay Rapid Bus from the Otay Mesa ITC to Downtown San Diego, Rapid Bus Route 905 from Iris to the Otay Mesa POE, increases in local bus service frequencies, express bus routes to SDIA and Tijuana International Airport, a San Marcos shuttle, and construction of two transit-only lanes on SR 15 between I-805 and I-8. By 2020, the proposed Plan also includes investments in approximately 24 regional active transportation projects. Additional major transportation network improvements would include new Managed Lanes along I-5 from Manchester Avenue to SR 78 and I-805 from Carroll Canyon Road to SR 52, new toll lanes on SR 11 to the Otay Mesa POE, new general purpose lanes along a portion of SR 76, and a new freeway connector at SR 11 and SR 905. By 2020, these improvements would decrease average daily VMT per capita from 25.2 in 2012 to 24.7 in 2020. Also, the proposed Plan's SCS exceeds the regional SB 375 GHG reduction targets, as shown in Impact GHG-3.

Based on the above analysis, the proposed plan would not conflict with the AB 32 target of reducing statewide emissions to 1990 levels by 2020 or with the recommendations of the Scoping Plan Update. This impact is less than significant.

SANDAG Climate Action Strategy

The Climate Action Strategy is a guide for SANDAG on climate change policy (SANDAG 2010). The Climate Action Strategy identifies a range of potential policy measures for consideration in long-term planning documents such as the proposed Plan. The Strategy helps SANDAG identify land use, transportation, and related policy measures and investments that reduce GHG emissions from transportation and land use.

The Climate Action Strategy includes nine goals designed to address the impacts of GHG emissions and climate change in the region. The Strategy's goals include five specific goals relating to regional growth and land use change: Goals 5, 6, 7, 8, and 9. These goals have informed the development of the proposed Plan's policies relative to regional growth and land use change. Accordingly, the proposed Plan would not conflict with the Climate Action Strategy. The proposed Plan's programs and strategies are designed to be consistent with Climate Action Strategy goals and objectives, and would support their implementation. The proposed Plan therefore contributes to achieving the goals of the Strategy.

Table 4.8-9 presents the Climate Action Strategy goals and objectives that cover regional growth and land use change and transportation network improvements and programs, and an analysis of whether proposed Plan features would conflict with any of the goals and objectives.

Table 4.8-9
Evaluation of Proposed Plan for Conflicts with the SANDAG Climate Action Strategy

Climate Action Strategy Goals and Objectives	Conflict?
GOAL 1. REDUCE TOTAL MILES OF VEHICLE TRAVEL	
Objective 1a. Build Smart Growth Neighborhoods and Communities in which Basic Daily Needs and Public Transit Service are Safely Accessible on Foot or by Bicycle	From 2012 to 2050, the proposed Plan would increasingly locate population and employment within close proximity to public transit and bike facilities; total time engaged in transportation-related physical activity would increase; the percentage of peak period work trips via transit, walking and biking would increase. The proposed Plan land use pattern would accommodate 79 percent of all housing and 86 percent of all jobs within the Urban Area Transit Strategy (UATS). See proposed Plan Appendix N for measures documenting the proposed Plan's support for smart growth neighborhoods and communities.
Objective 1b. Expand and Develop New Systems for Low Carbon Modes of Transportation	The proposed Plan makes major investments in low carbon modes of transportation, including completion of double-tracking on the LOSSAN and SPRINTER rail corridors, five major expansions of the Trolley system, substantial investments in *Rapid* transit, major improvements in local bus service, and full build-out of the Regional Bike Network. More than half of proposed Plan revenues are for transit operations, transit capital projects, and active transportation.
Objective 1c. Reduce Demand for Single Occupancy Vehicle Travel	From 2012 to 2050, the proposed Plan would increase the percentage of peak period work trips completed by transit, walking and biking, and carpools; the percentage of drive alone trips would decrease over the same period.

GOAL 2. MINIMIZE GREENHOUSE GASES WHEN VEHICLES ARE USED	
Objective 2a. Reduce Traffic Congestion	The proposed Plan's investments in transit, active transportation, managed lanes and general purpose lanes would reduce traffic congestion that would otherwise occur. Average travel times to work would generally remain flat over the life of the proposed Plan, and daily vehicle delay per capita would be one minute lower by 2050 relative to 2012.
Objective 2b. Promote Efficient Driving Practices	The proposed Plan would not conflict with efforts to promote efficient driving practices.
GOAL 3. PROMOTE USE OF LOW CARBON ALTERNATIVE FUELS	
n/a	The proposed Plan identifies continuing actions including building a network of electric vehicle charging stations and developing a regional alternative fuels plan, promoting the use of both zero-emission vehicles and alternative fuels.
GOAL 4. PROTECT TRANSPORTATION INFRASTRUCTURE FROM CLIMATE CHANGE IMPACTS	
Objective 4a. Protect Transportation Infrastructure from Damage Due to Extreme Heat	The proposed Plan identifies continuing actions including developing strategies to enhance the region's ability to adapt to the consequences of climate change, including planning and design strategies to help communities cope with hazardous events such as storms, heat waves, wildfires, and ongoing drought.
Objective 4b. Protect Transportation Infrastructure from Sea Level Rise and Higher Storm Surges	
Objective 4c. Protect Transportation Infrastructure from Wildfire-Associated Mudslides	
GOAL 5. REDUCE ENERGY USE IN RESIDENTIAL AND COMMERCIAL BUILDINGS	
Objective 5a. Retrofit Existing Buildings to Reduce Energy Use	The proposed Plan identifies continuing actions including support for the efforts of local jurisdictions to implement their Energy Roadmap Programs to save energy in their own operations and in their communities.
Objective 5b. Maximize Efficiency in New Residential and Commercial Construction	The proposed Plan identifies continuing actions including support for the efforts of local jurisdictions to implement their Energy Roadmap Programs to save energy in their own operations and in their communities.
GOAL 6. INCREASE USE OF RENEWABLE ENERGY	
Objective 6a. Promote Installation of Clean, On-site Energy Systems	The proposed Plan identifies continuing actions including support for the efforts of local jurisdictions to implement their Energy Roadmap Programs to save energy in their own operations and in their communities.
Objective 6b. Promote Large-Scale Renewable Energy Projects	The proposed Plan would not conflict with development of large-scale renewable energy projects
GOAL 7. REDUCE WATER-RELATED ENERGY USE AND GREENHOUSE GASES	
Objective 7a. Integrate Measures that Save Water and Energy into Building Retrofit Programs	The proposed Plan would not conflict with programs to promote water conservation in existing buildings
Objective 7b. Use Reclaimed Water to Decrease the Amount of Greenhouse Gases Attributed to Meeting Water Needs	The proposed Plan would not conflict with the use of reclaimed water
GOAL 8. PROTECT ENERGY INFRASTRUCTURE FROM CLIMATE CHANGE IMPACTS	
Objective 8a. Support Modernization of the Electricity Grid	The proposed Plan would not conflict with modernization of the electricity grid
Objective 8b. Utilize Demand Response and Energy Efficiency Measures to Reduce Greenhouse Gases during Peak Periods	The proposed Plan would not conflict with demand response and energy efficiency measures during peak periods
Objective 8c. Study the Range of Impacts on Energy Infrastructure	The proposed Plan would not conflict with study of the range of impacts on energy infrastructure

GOAL 9. SANDAG AND LOCAL GOVERNMENTS LEAD BY EXAMPLE	
Objective 9a. Local Governments Prepare and Adopt Climate Action Plans	See below in Impact GHG-2 for analysis of the proposed Plan for conflicts with local climate action plans.
Objective 9b. Assess the Energy Use of SANDAG Operations	The proposed Plan would not conflict with programs to assess energy use of SANDAG operations
Objective 9c. Local Governments Use Cleaner Energy Supplies and Reduce Energy Use	The proposed Plan identifies continuing actions including support for the efforts of local jurisdictions to implement their Energy Roadmap Programs to save energy in their own operations and in their communities.

The Strategy's goals include four specific goals relating to transportation: Goals 1, 2, 3, and 4. These goals have informed the development of the proposed Plan's policies relative to the transportation network improvements and programs. Accordingly, the proposed Plan's transportation network improvements and programs would not conflict with the Climate Action Strategy. The proposed Plan's transportation network improvements and programs are designed to adopt Climate Action Strategy policies and would support their implementation. The proposed Plan therefore contributes to achieving the goals of the Strategy, and would not conflict with SANDAG's adopted Climate Action Strategy, and would support implementation of the Strategy.

Local Climate Action Plans

To date, there are ~~seven~~ eight cities within the region with adopted Climate Action Plans. An analysis of whether the proposed Plan would conflict with the measures and policies in adopted local Climate Action Plans is provided in Appendix G-2. As shown in Appendix G-2, the proposed Plan would not conflict with adopted local Climate Action Plans.

2020 Conclusion

Implementation of regional growth and land use change and transportation network improvements and programs under the proposed Plan would not conflict with AB 32, the SANDAG Climate Action Strategy, or adopted local Climate Action Plans. Therefore, this impact (GHG-2) in the year 2020 is less than significant.

2035

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

SANDAG Climate Action Strategy

As shown in Table 4.8-9, the proposed Plan would not conflict with SANDAG's Climate Action Strategy goals and objectives related to land use or transportation. By 2035, the proposed Plan would continue to be consistent with the Climate Action Strategy.

Local Climate Action Plans

As shown in Appendix G-2, the proposed Plan would not conflict with adopted local Climate Action Plans. By 2035 the proposed Plan would continue to support the measures and policies within adopted local Climate Action Plans.

2035 Conclusion

Implementation of regional growth and land use change and transportation network improvements and programs under the proposed Plan would not conflict with AB 32, the SANDAG Climate Action Strategy, or adopted local Climate Action Plans. Therefore, this impact (GHG-2) in the year 2035 is less than significant.

2050

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

<u>SANDAG Climate Action Strategy</u>

As shown in Table 4.8-9, the proposed Plan would not conflict with SANDAG's Climate Action Strategy goals and objectives related to land use and transportation. By 2050, the proposed Plan would continue to be consistent with the Climate Action Strategy.

<u>Local Climate Action Plans</u>

As shown in Appendix G-2, the proposed Plan would not conflict with adopted local Climate Action Plans. While most local adopted Climate Action Plans do not set specific policies that extend to 2050, because the proposed Plan is consistent with the current plans and policies to reduce GHG emissions, the proposed Plan would continue to support the goals of local Climate Action Plans in 2050.

2050 Conclusion

Implementation of regional growth and land use change and transportation network improvements and programs under the proposed Plan would not conflict with AB 32, the SANDAG Climate Action Strategy, or adopted local Climate Action Plans. Therefore, this impact (GHG-2) in the year 2050 is less than significant.

GHG-3 CONFLICT WITH SB 375 EMISSION REDUCTION TARGETS

ANALYSIS METHODOLOGY

The analysis evaluates whether the proposed Plan would conflict with SB 375 GHG emission reduction targets. SB 375 required ARB to develop regional GHG emission reduction targets compared to 2005 emissions, for passenger vehicles for 2020 and 2035. The targets established for SANDAG by ARB are to reduce per capita CO_2 emissions 7 percent below 2005 levels by 2020 and 13 percent below 2005 levels by 2035 (ARB 2011). ARB has not developed any post-2035 targets (ARB 2014h). The SB 375 technical methodology for estimating GHG emissions is included in Appendix G-3 to the EIR. Because SB 375 does not require 2050 GHG emissions reduction targets, the EIR does not present a 2050 analysis of conflicts with SB 375.

For the purpose of evaluating impacts under Impact GHG-3, because the SB 375 targets include both regional growth and land use change and the transportation network improvements, the analysis of conflicts with SB 375 emission reduction targets has not been separated into the two categories. The impact assessment includes both regional growth and land use change and the transportation network improvements.

2020

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

ARB requires SANDAG to reduce per capita CO_2 emissions from passenger cars and light-duty trucks 7 percent below 2005 levels by 2020. Per capita emissions from passenger cars and light-duty trucks were 26.0 lbs CO_2/person/day in 2005. Under implementation of the proposed Plan, GHG emissions would be reduced to 22.5~~21.4~~ lbs CO_2/person/day in 2020, a~~n~~ 15~~18~~ percent reduction from 2005 levels. The GHG emissions reductions under the proposed Plan would exceed the ARB target of a 7 percent reduction by 2020 (Table 4.8-10). Therefore, implementation of regional growth and land use change and transportation network improvements and programs would not conflict with SB 375 GHG emission reduction targets. This impact is less than significant impact.

Table 4.8-10
SB 375 GHG Reduction Targets and GHG Emissions under the Proposed Plan, 2020

	lbs CO_2 per person per day, 2020
Per Capita Emissions under the proposed Plan	22.5~~21.4~~
Percent Reductions under the proposed Plan	-15%~~-18%~~
ARB Target	-7%

Source: Appendix G-3 to the EIR
Note: Average weekday per capita CO2 reductions for passenger cars and light-duty trucks from 2005 level of 26.0 pounds per person per day.
The revised emissions and percentages in this table have been decreased by 2% per ARB requirement that EMFAC2014 model results be revised with 2% percent adjustment factor.

2020 Conclusion

Implementation of the proposed Plan would not conflict with SB 375 emission reduction targets for 2020. Therefore, this impact (GHG-3) in the year 2020 is less than significant.

2035

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

ARB requires SANDAG to reduce per capita CO_2 emissions from passenger cars and light-duty trucks 13 percent below 2005 levels by 2035. Under implementation of the proposed Plan, GHG emissions would be reduced to 20.3~~19.8~~ lbs CO_2/person/day, a 18~~24~~ percent reduction from 2005 levels. The GHG emissions reductions under the proposed Plan would exceed the ARB target of a 13 percent reduction by 2035 (Table 4.8-11). Therefore, implementation of the regional growth and land use change and transportation network improvements and programs would not conflict with SB 375 GHG emission reduction targets. This impact is less than significant impact.

Table 4.8-11
SB 375 GHG Reduction Targets and GHG Emissions under the Proposed Plan, 2035

	lbs CO_2 per person per day, 2035
Per Capita Emissions under the proposed Plan	20.3 ~~19.8~~
Percent Reductions under the proposed Plan	-21% ~~-24%~~
ARB Target	-13%

Source: Appendix G-3 to the EIR
Note: Average weekday per capita CO2 reductions for passenger cars and light-duty trucks from 2005 level of 26.0 pounds per person per day.
The revised emissions and percentages in this table have been decreased by 2% per ARB requirement that EMFAC2014 model results be revised with 2% percent adjustment factor.

2035 Conclusion

Implementation of the proposed Plan would not conflict with SB 375 emission reduction targets for 2035. Therefore, this impact (GHG-3) in the year 2035 is less than significant.

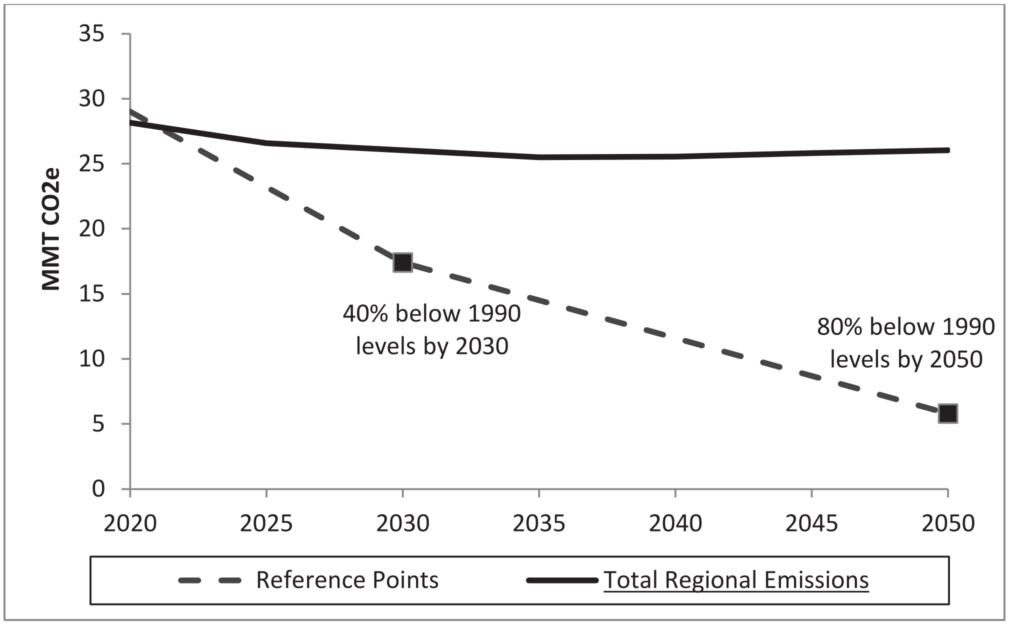
GHG-4 BE INCONSISTENT WITH THE STATE'S ABILITY TO ACHIEVE THE EXECUTIVE ORDER B-30-15 AND S-3-05 GOALS OF REDUCING CALIFORNIA'S GHG EMISSIONS TO 40 PERCENT BELOW 1990 LEVELS BY 2030 AND 80 PERCENT BELOW 1990 LEVELS BY 2050

ANALYSIS METHODOLOGY

The analysis evaluates whether the proposed Plan is inconsistent with the State's ability to achieve the Executive Order S-3-05 goal of reducing California's GHG emissions to 80 percent below 1990 levels by 2050. The analysis also evaluates whether the proposed Plan is inconsistent with the State's ability to achieve the Executive Order B-30-15 goal of reducing California's GHG emissions to 40 percent below 1990 levels by 2030.

The Executive Order S-3-05 goal of reducing California's GHG emissions to 1990 levels by 2020 was adopted in AB 32, and is evaluated in Impact GHG-2. Therefore, this analysis focuses on whether the region would achieve the 2050 goal. 2035 is also addressed in Impact GHG-4 as an interim year using the Executive Order B-30-15 goal of reducing California's GHG emissions to 40 percent below 1990 levels by 2030.

To perform this analysis, SANDAG identified estimated 2035 and 2050 emissions reduction reference points for the region. Note that there is no requirement that the SANDAG region's emissions be reduced by the same percentage ("equal share") as the statewide percentage in order for the State to achieve the Executive Order's goal. The proposed Plan's impacts nevertheless are considered significant if total emissions in the San Diego region exceed the estimated 2035 or 2050 GHG reduction reference points. A graph comparing regional emissions projected in the proposed Plan versus the Executive Order-based reference points is provided as Figure 4.8-1.



Source: Appendix G-1 to the EIR.
Note: the solid black line has been relabeled from "proposed Plan emissions" to "total regional emissions" and reflects the revised GHG emissions based on the minor modifications to the project description and the new version of EMFAC2014 (v1.0.7) released by ARB in May 2015. On-road GHG emissions in the Draft EIR were calculated using EMFAC2014 (v1.0.1).

Figure 4.8-1. Regional GHG Reductions Required to Meet Executive Order Reference Points for 2035 and 2050 vs. ~~Proposed Plan~~Total Regional Emissions

SANDAG identified the 2050 reference point by applying an 80 percent reduction to the San Diego region's 1990 emissions level. The 40 percent reduction was applied to the region's 1990 emissions level to identify a 2030 reference point, which was then used to develop a 2035 reference point by using a straight line trajectory from the 2030 goal to the 2050 goal.

As described in Impact GHG-2, the San Diego region's 1990 GHG emissions totaled 29 MMT CO_2e (see Appendix G-1 to the EIR). By applying the methodology described above, the 2035 reference point was identified as 14.5 MMT CO_2e, and the 2050 reference point was identified as 5.8 MMT CO_2e.

For the purpose of evaluating impacts under Impact GHG-4, because the Executive Order goals include both regional growth and land use change and the transportation network, the analysis has not been separated into the two categories. The impact assessment includes both regional growth and land use change and the transportation network. Emission calculations are provided in Appendix G-1.

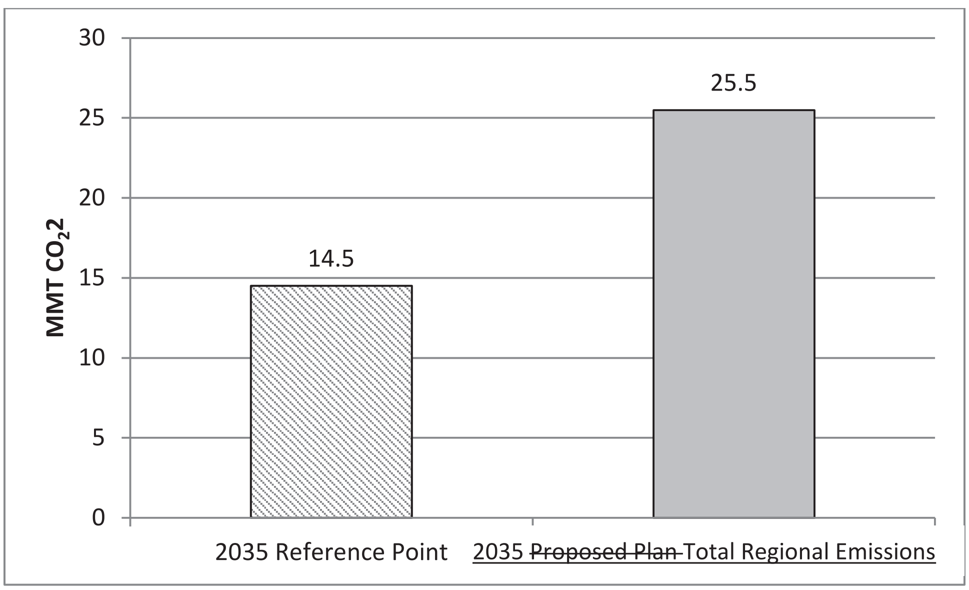
During the timeframe of the proposed Plan, climate change effects that are likely to exacerbate the proposed Plan's greenhouse gas emissions impacts include but are not limited to increases in temperatures and frequency, duration, and intensity of heatwaves (which could lead to increases in GHG emissions from local fossil fuel-fired power plants to meet electricity demands); and wildfires (which release GHG emissions of criteria pollutants. In general, these climate change effects would increase between 2020 and 2050. Climate change effects are discussed in more detail in Appendix F.

2035

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

As discussed under Impact GHG-1, under implementation of the proposed Plan, total GHG emissions for the San Diego region in 2035 are projected to be approximately 25.5 MMT CO_2e, or 28 percent lower than GHG emissions in 2012 (Table 4.8-7). To be in line with its "equal share" of the state emissions reduction goals set forth in Executive Orders S-3-05 and B-30-15, regional GHG emissions would need to decrease to 14.5 MMT CO_2e by 2035.

Figure 4.8-1 shows a projection of "equal share" reductions for the San Diego region, compared to estimated proposed Plan emissions. In addition, Figure 4.8-2 compares the Executive Order-based 2035 reference point for the region with projected GHG emission under the proposed Plan. This is a significant impact.



Source: Appendix G-1 to the EIR

Figure 4.8-2. 2035 GHG Emissions Reference Point vs. ~~Proposed Plan~~Total Regional Emissions

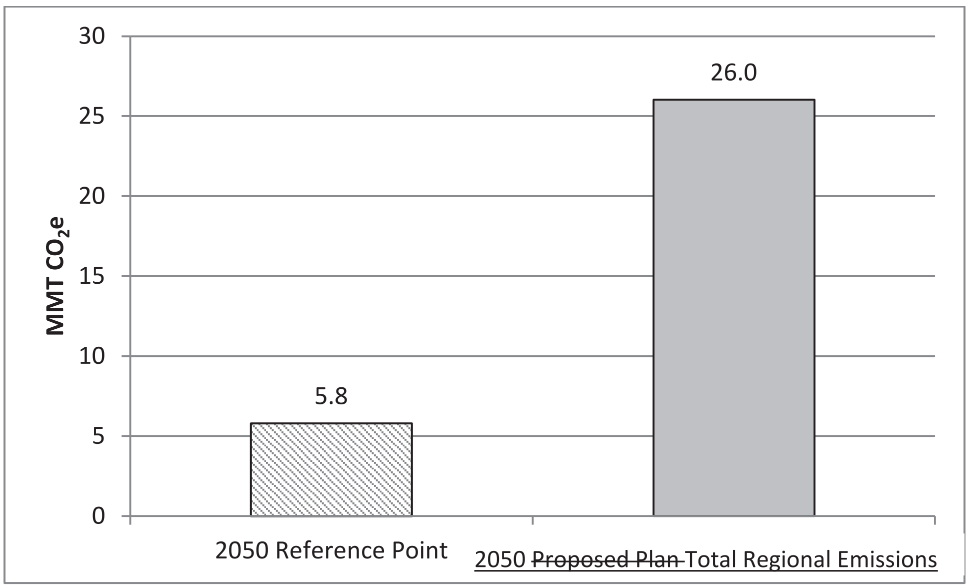
2035 Conclusion

Because the total emissions in the San Diego region of 25.5 MMT CO_2e in 2035 would exceed the regional 2035 GHG reduction reference point of 14.5 MMT CO_2e (which is based on EO-B-30-15 and EO-S-3-05), the proposed Plan's 2035 GHG emissions would be inconsistent with state's ability to achieve the Executive Orders' GHG reduction goals. Therefore, this impact (GHG-4) in the year 2035 is significant.

2050

Regional Growth and Land Use Change and Transportation Network Improvements and Programs

As discussed under Impact GHG-1, under implementation of the proposed Plan, total GHG emissions for the San Diego region in 2050 are projected to be ~~25.9~~ 26.0 MMT CO_2e, or ~~26.8~~ 24.9 percent lower than GHG emissions in 2012 (Table 4.8-8). To be in line with its "equal share" of the state 2050 emissions reduction goal set forth in Executive Order S-3-05, regional GHG emissions would need to decrease to 5.8 MMT CO_2e in 2050. Figure 4.8-1 shows a projection of "equal share" reductions for the San Diego region, compared to estimated proposed Plan emissions. In addition, Figure 4.8-3 compares the Executive Order based reference point for the region for 2050 with projected GHG emission under the proposed Plan. This is a significant impact



Source: Appendix G-1 to the EIR

Figure 4.8-3. 2050 GHG Emissions Reference Point vs. ~~Proposed Plan~~Total Regional Emissions

2050 Conclusion

Because the total emissions in the San Diego region of ~~25.9~~26 MMT CO_2e in 2035 would exceed the regional 2035 GHG reduction reference point of 5.8 MMT CO_2e (which is based on EO-S-3-05), the proposed Plan's 2050 GHG emissions would be inconsistent with state's ability to achieve the Executive Order's GHG reduction goals. Therefore, this impact (GHG-4) in the year 2050 is significant.

MITIGATION MEASURES

GHG-4 Inconsistency with State Agency 2030 and 2050 GHG Reduction Goals

2035 and 2050

Basis for Selection of GHG Mitigation Measures

Overview. Many features currently included in the proposed Plan (e.g., the SCS, increased transit and active transportation investments) have the effect of reducing GHG emissions that might otherwise occur. Mitigation measures presented in this section are additional feasible GHG reduction measures not included in the proposed Plan that SANDAG would or other agencies could implement. Presented below are three types of feasible GHG reduction mitigation measures:

- Plan- and policy-level mitigation measures SANDAG has committed to implement;
- Mitigation measures for transportation network improvements and programs, which SANDAG has committed to implement for its projects and which other transportation project sponsors can and should implement for their projects and
- Mitigation measures for development projects implementing regional growth and land use changes, which local jurisdictions can and should implement.

While SANDAG has the authority to implement the mitigation measures it has committed to, it has no legal authority to require other transportation project sponsors or local jurisdictions to implement mitigation measures for specific projects for which they have responsibility and jurisdiction. As explained in Section 4.0, mitigation can include measures that are within the responsibility and jurisdiction of another public agency. SANDAG in its CEQA findings may find that those measures assigned to other agencies can and should be adopted by those other agencies (CEQA Guidelines Section 15091(a)(2)).

Other potential mitigation measures to reduce GHG emissions are included as components of the project alternatives in Chapter 6.0, rather than as individual mitigation measures in this section.[4] These include still more compact land use patterns, accelerated and increased transit investments, reduced or no highway investments, and policies to reduce transit fares, increase parking prices, and establish road user fees.

Achieving the EO-S-3-05 GHG Reduction Goal. The state currently has no plan (e.g., analogous to the AB 32 Scoping Plan) for achieving the EO-B-30-15 and EO-S-3-05 GHG reduction goals. However, recent studies have shown that achieving these goals, whether statewide or within the San Diego region, would require major changes in clean technologies utilization, markets, and state and federal regulations.

For example, a recent study (Greenblatt 2015) presented an aggressive set of 49 policies intended to achieve the statewide 2050 goal, though implementing all these policies still fell short of the goal. These policies included major increases in energy efficiency, reduced GHG intensities of both fuel and electricity, and a shift away from direct fuel combustion and toward electricity, particularly in transportation. For example, the most aggressive scenario, Scenario 3, included policies such as increasing the average fleet gasoline efficiency to 54 MPG, doubled high-speed rail deployment, replacing all natural gas use in buildings with electric heat pumps by 2050, 50% residential zero net energy retrofits by 2030, adding 2.2 GW nuclear power capacity by 2050, and building 8 carbon capture and sequestration (CCS) facilities at power plants.

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[4] Alternatives and mitigation measures are two alternative means for avoiding or reducing a project's significant environmental impacts. See CEQA Guidelines Section 15002(h).

Similarly, Greenblatt and Long (2012) in an older study found that achieving the 2050 EO goal would likely require maximizing efficiency in all economic sectors, electrification of much of the transportation sector and many stationary uses of heat, a doubling of electricity production with nearly zero emissions, and development of low-carbon fuels. They concluded that achieving the EO goal would require a combination of strategies; although some are available now, they conclude others would require substantial research and development to realize. These include electricity load balancing, substantially increasing biomass fuel supply, and making CCS 100% effective and economical to implement on a large scale.

Achieving the EO B-30-15 GHG Reduction Goal. A recent study commissioned by state agencies focused on scenarios for deep reductions in GHG emissions in 2030. (Energy+Environmental Economics 2015).The study found that up to 38% reductions in GHG emissions (close to the EO B-30-15 goal of 40%) by 2030 could be achieved with “significant progress” in energy efficiency, switching to low carbon fuel sources, producing lower carbon electricity and fuels, and reducing non-energy GHGs. “Significant progress” included measures such as doubled energy efficiency in buildings by 2030, 50%-60% of electricity sales from renewable energy by 2030, and rapid penetration of near-zero and zero-emissions vehicles.

The study noted that scenarios implementing these measures would rely on existing technologies, and were consistent with a continuation of current lifestyles and economic growth. The pace of emissions reductions would, however, require that key low-carbon technologies be commercialized, produced at scale, and achieve broad market adoption in the next 10-15 years.

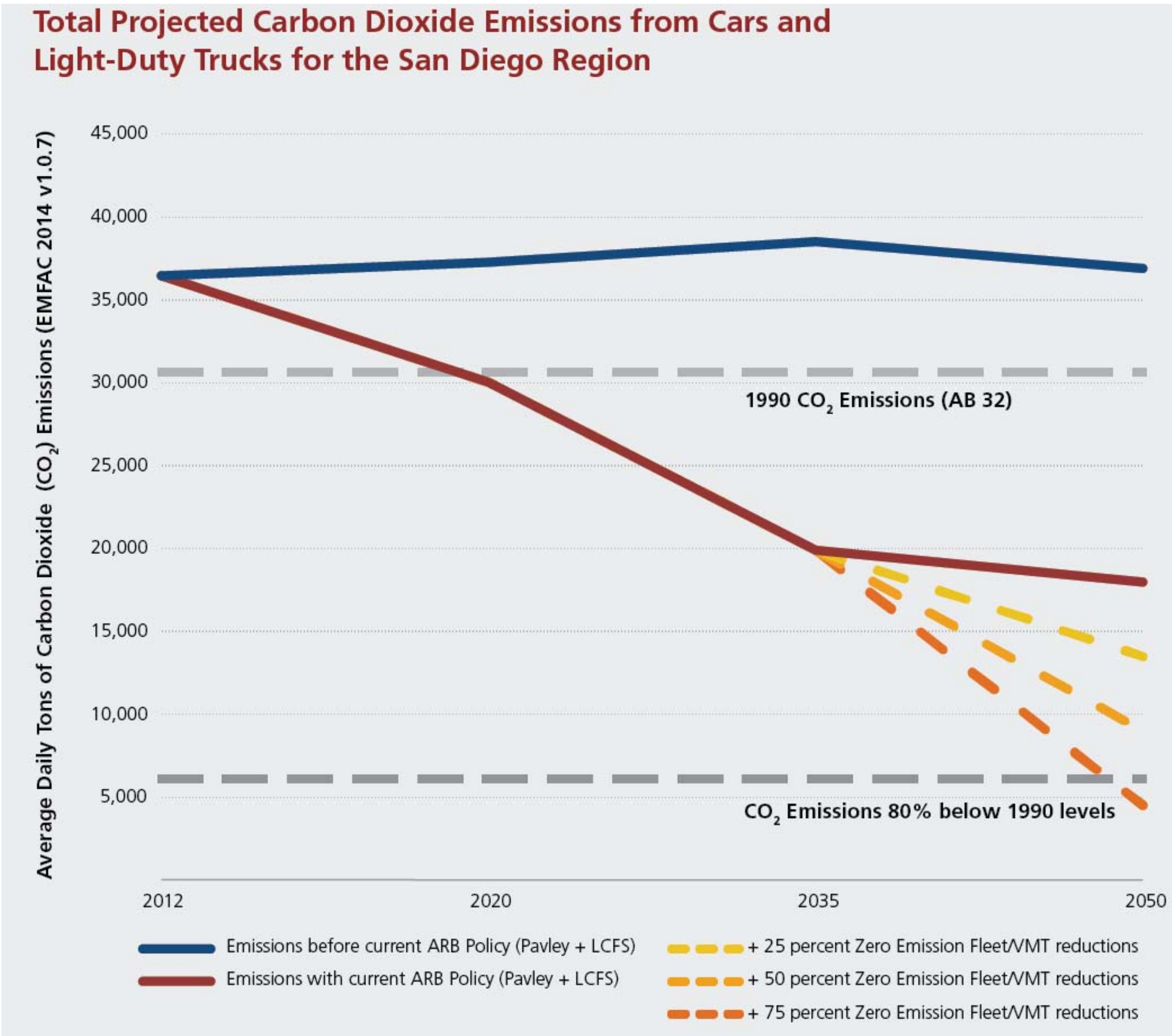
Regional Scenarios. The GHG inventory prepared for the proposed Plan (Appendix G-1) analysis is based on implementation of current regulations, policies, and programs. An alternative scenario (“Scenario 3”) for the San Diego region is presented in Appendix G-4. It assumes major changes in the technologies, markets, and state and federal regulations. For example, strategies included a move toward 100 percent renewable electricity, 100 percent zero emission vehicle passenger fleet, and 90 percent landfill waste diversion. With implementation of these measures, regional emissions would be reduced to 77% below 1990 emissions, but would still fall short of the 80% below 1990 emissions reference point based on EO-S-3-05. In this scenario, electricity and passenger vehicles contribute zero emissions; emissions remain primarily from industrial sources, natural gas, aviation, and off-road fuel use.

Focusing on the transportation sector, Chapter 2 of the proposed Plan includes scenarios for how statewide GHG emissions specifically from the transportation sector could be reduced by 80% below 1990 levels.[5] Scenarios developed under the ARB Vision Program and the Draft California Transportation Plan (CTP) envision how this goal might be achieved statewide given an aggressive set of strategies requiring major VMT reduction, as well as improvements in vehicle and fuel technologies. For example, the Draft CTP’s VMT reduction strategies include a 75% increase in auto operating costs, and doubling of all transit services and speeds.

Using the ARB Vision and Draft CTP frameworks, Chapter 2 of the proposed Plan discusses scenarios for the SANDAG region showing how an 80% reduction in mass GHG emissions from passenger vehicles might be met by highly aggressive implementation of ZEV penetration and VMT reduction measures.

[5] Looking Past 2035—Possible Pathways for Additional Greenhouse Gas Emissions Reductions. This section and associated appendix information are hereby incorporated by reference into the EIR.

See Figure 4.8-4. Achieving these additional emission reductions would require major changes in clean technologies utilization, markets, and state and federal policies and regulations. The proposed Plan does set forth ambitious but currently feasible TSM, electric vehicle, and other programs that can be implemented now and in the future aligned with the 2050 GHG reduction scenarios in the various studies discussed above.



Source: SANDAG 2015

Note: This figure has been updated to reflect the revised GHG emissions based on the new version of EMFAC2014 (v1.0.7) released by ARB in May 2015. On-road GHG emissions in the Draft EIR were calculated using EMFAC2014 (v1.0.1).

Figure 4.8-4. Total Projected Carbon Dioxide Emissions from Cars and Light Duty Trucks for the San Diego Region.

Conclusion. Full implementation of many of the measures that could result in a 40% reduction of GHG emissions by 2030 and an 80% reduction of GHG emissions by 2050 in the San Diego region would require major changes in clean technologies utilization, markets, and state and federal policies and regulations. The following mitigation measures would help reduce regional GHG emissions through reducing VMT, increasing use of alternative fuels, and other measures; they would reduce inconsistency of the propose Plan's GHG emissions with the state's ability to achieve the EO B -30-15 and EO-S-3-05 GHG reduction goals. However, full implementation of changes required to achieve the Executive Orders' goals is beyond SANDAG's or local agencies' current ability to implement.

GHG-4A Allocate Competitive Grant Funding to Projects that Reduce GHG Emissions (SANDAG)

Mitigation Measure Text. SANDAG shall revise the *TransNet* Smart Growth Incentive and Active Transportation Grant Programs in the following ways to achieve GHG reductions:

- Adopt new or revised grant criteria to give greater weight to a project's ability to directly reduce GHG emissions. Criteria include, but are not limited to, awarding points to projects that directly implement local climate action plans that reduce GHG emissions, or that directly implement parking strategies that reduce GHG emissions.
- Require locally adopted CAPs and complete streets policies as prerequisites to be eligible for grant funding. The locally adopted CAPs shall include measures to reduce GHG emissions to 1990 levels by 2020, and achieve further reductions beyond 2020 consistent with adopted regional or local GHG reduction targets.
- If a local jurisdiction does not have an adopted CAP or complete streets policy, SANDAG shall make available competitive funding through the grant programs for preparation of a CAP and/or complete streets policy.
- In addition to grant funding, SANDAG shall provide technical assistance to local jurisdictions for the preparation of CAPs as described in GHG-4E.
- These changes shall be adopted and effective for the fourth cycle of funding for both programs, which is expected to be released in December 2016.

Mitigation Measure Effectiveness. It is not possible to precisely quantify the effectiveness of this mitigation measure because SANDAG does not know the specific details of grant applications that local jurisdictions will submit in future funding cycles. However, this measure would result in GHG reductions as explained below. It requires that jurisdictions have locally adopted climate action plans in order to be eligible for grant funding. As shown below, locally adopted climate action plans in the San Diego region routinely require that GHG emissions be reduced to 1990 levels by 2020 (also expressed as 15 percent below 2005 levels) and continued reductions after 2020. Quantified estimates of metric tons of GHG reduction estimated to result from local actions in adopted climate action plans in the San Diego region also are presented below.

In the most recent cycle of funding awarded in July 2015, SANDAG awarded $15 million to 29 projects in 14 local jurisdictions including both capital and non-capital smart growth and active transportation projects.[6] This mitigation measure will result in GHG reductions by aligning future funding allocations under SANDAG's smart growth incentive and active transportation grant programs with smart growth and active transportation projects that result in GHG emissions reductions within local jurisdictions that are implementing adopted climate action plans.

[6] http://www.sandag.org/uploads/meetingid/meetingid_4082_19498.pdf

- The City of San Diego's adopted Climate Action and Protection Plan (CPAP)[7] establishes a 15 percent reduction goal below 1990 levels, and its July 2015 Draft Climate Action Plan establishes the following targets: 25 percent below 2010 levels by 2020, 41 percent below 2010 levels by 2030, and 50 percent below 2010 levels by 2035. The local actions identified in the City of San Diego's draft climate action plan (Table 3.1) would achieve about 3.5 million metric tons of GHG reduction annually by 2035.[8]
- The City of Chula Vista's adopted year 2000 climate action plan establishes a reduction goal of 20 percent below 1990 levels by 2010. In 2014, Chula Vista identified additional actions that would result in up to 166,000 metric tons of additional GHG reduction annually by 2020.[9]
- The City of Encinitas' adopted climate action plan establishes a target to reduce city-wide GHG emissions 12 percent below 2005 levels by 2020, with local actions resulting in about 51,000 metric tons of GHG reduction annually by 2020.[10]
- The City of Escondido's adopted climate action plan sets a goal to reduce emissions to 1990 levels by 2020, and continued reductions after 2020, with local actions resulting in about 36,000 metric tons of GHG reduction annually by 2020.[11]
- The City of National City's adopted climate action plan adopts a reduction target of 15 percent below 2005 levels by 2020, with additional reductions by 2030. Local actions would result in about 137,137 metric tons of GHG reduction annually by 2020, and 156,127 metric tons annually by 2030.[12]
- The City of Vista's adopted climate action plan establishes a target of reducing emissions to 15 percent below 2005 levels by 2020, with local actions resulting in about 32,000 metric tons of GHG reduction annually by 2020.[13]
- The City of San Marcos' adopted climate action plan establishes GHG reduction targets of 15 percent below 2005 levels by 2020 and 28 percent below 2005 levels by 2030. Local actions would result in about 800 metric tons of GHG reduction annually by 2020, and 1,300 metric tons annually by 2030.[14]
- The City of Carlsbad's adopted climate action plan sets targets of 15 percent below 2005 levels by 2020 and 49 percent below 2005 levels by 2035. Local general plan policies and actions would result in about 9,250 metric tons of GHG reduction annually by 2020, and about 8,300 metric tons annually by 2035. Additional local CAP measures would achieve an additional 13,336 metric tons of CO_2e reduction by 2035.[15]
- The City of La Mesa's May 2015 draft climate action plan is based on the target of reducing emissions to 15 percent below 2005 levels by 2020 (or 16 percent below 2010 levels by 2020), which was adopted as the City's target as part of its General Plan Update EIR. Local actions would result in about 15,400 metric tons of GHG reduction annually by 2020.[16]

[7] http://www.sandiego.gov/environmental-services/sustainable/pdf/action_plan_07_05.pdf
[8] http://www.sandiego.gov/planning/genplan/cap/pdf/draft_cap_july_2015.pdf
[9] http://38.106.5.202/home/showdocument?id=7058
[10] http://www.encinitasca.gov/modules/showdocument.aspx?documentid=1938
[11] http://www.escondido.org/Data/Sites/1/media/PDFs/Planning/ClimateActionPlan/AdoptedClimateActionPlan.pdf
[12] http://www.ci.national-city.ca.us/index.aspx?page=548
[13] http://www.cityofvista.com/home/showdocument?id=84
[14] http://www.ci.san-marcos.ca.us/modules/showdocument.aspx?documentid=9922
[15] http://www.carlsbadca.gov/civicax/filebank/blobdload.aspx?BlobID=23294
[16] http://cityoflamesa.com/DocumentCenter/View/7097

GHG-4B Adopt a Detailed Regional Mobility Hub ~~Strategy~~ Implementation Plan to Reduce GHG Emissions (SANDAG)

Mitigation Measure Text. Mobility hubs are places of connectivity, where different modes of transportation—walking, biking, ridesharing, and transit—come together to connect people to their jobs, school, shopping, errands, recreation, and back home; they reduce GHG emissions through reducing VMT and increasing transit use and alternative transportation. To implement the general "Regional Mobility Hub Implementation Strategy" listed as a proposed Plan near-term action, once this general strategy is developed, ~~mobility hub concepts outlined in the proposed Plan,~~ SANDAG shall develop and adopt a detailed Mobility Hub ~~Strategy~~ implementation plan no later than 2017 that includes:

1. Identification of mobility hub features and infrastructure requirements
2. Selection of 20 mobility hub locations that align with the smart growth place types identified in the Smart Growth Concept Map. Three mobility hubs will be implemented by 2020, and 17 more will be implemented by 2035.
3. Establishment of first mile/last mile transportation networks for each candidate mobility hub site based on travel patterns, access catchment areas, and adjacent land uses
4. Development of design guidelines for each candidate mobility hub site
5. Recommendation of specific mobility hub improvements and preparation of conceptual designs and capital cost estimates for each candidate mobility hub site
6. ~~Strategies for implementation, including the potential for public-private partnerships and a phasing strategy~~Site-specific implementation strategies

Mitigation Measure Effectiveness. While it is not possible to precisely quantify future GHG reductions from implementation of this mitigation measure, this measure would reduce GHG emissions because the implementation of mobility hubs would promote increased trips by walking, biking, transit, and carpooling, which reduce VMT, and in turn reduce GHG emissions. For example, research shows that increasing access to transit can reduce VMT anywhere from 0.5 to 24.5 percent.[17]

GHG-4C Fund Electric Vehicle Charging Infrastructure (SANDAG)

Mitigation Measure Text. To implement the proposed Plan action calling for building a network of electric vehicle chargers to promote the use of electric vehicles, SANDAG shall set aside approximately $30 million of Congestion Management and Air Quality (CMAQ) Improvement Program funds expected between 2020 and 2050 (approximately $1 million annually) to fund the installation of publicly available electric vehicle charging infrastructure. Increasing the number of publicly available electric vehicle charging points would reduce GHG emissions by extending the electric range of plug-in hybrid electric vehicles that would replace gasoline-powered internal combustion engines. The funding that would be provided is an incentive for installation of Level 1 and Level 2 electric vehicle chargers in publicly accessible locations throughout the region. Level 1 charging (similar to a standard wall outlet) adds about 2 to 5 miles of range to an electric vehicle per hour of charging time while Level 2 (240 V circuit) adds about 10 to 20 miles of range per hour of charging time. A detailed program will be developed and presented to the SANDAG Board of Directors before the adoption of the next Plan update with funding becoming available by 2020. Available funding will be leveraged to install up to 36,000 EV chargers by 2035 and an additional 44,000 chargers by 2050.

[17] http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

Mitigation Measure Effectiveness. This expanded charging network would reduce on-road emissions by an estimated 390,000 lbs CO_2 (177 metric tons) by 2035 and 455,000 lbs CO_2 (206 metric tons) by 2050 through the extended range of plug-in hybrid electric vehicles (See Regional Plan Appendix C).

GHG-4D Adopt a Plan for Transportation Fuels that Reduce GHG Emissions (SANDAG)

Mitigation Measure Text. SANDAG shall adopt a regional readiness plan for the deployment of infrastructure for all alternative fuels by 2016. The plan will identify barriers to developing alternative fuel infrastructure, and include recommendations and resources for stakeholders to overcome these barriers. The plan will build on the regional readiness plan for plug-in electric vehicles accepted by the Board in 2014. This plan will contribute to reductions in GHGs through developing recommendations for facilitating access to alternative fuels, which will reduce emissions from vehicles.

Also, SANDAG has received a notice of proposed award from CEC for additional funding to implement the PEV Readiness Plan over 2 years. SANDAG shall provide technical assistance to local government staff, contractors, and property managers on permitting, inspection, and installation for EV charging and general PEV awareness activities. This funding is included in the Fiscal Year 16 budget.

Mitigation Measure Effectiveness. While the precise GHG reductions associated with GHG-4D cannot be quantified because SANDAG does not know the timing and future penetration rates of alternative fuels, the readiness plan and resources will build upon the efforts to date of the San Diego Regional Clean Cities Coalition. The Coalition estimates that GHG reductions from the use of alternative fuels (excluding electricity) by fleets in the San Diego region amounted to 20,051 $MTCO_2$ in 2013 (DOE 2013). See Mitigation Measure GHG-4C for quantification of GHG reductions from installation of charging infrastructure for electric vehicles.

GHG-4E Assist in the Preparation of Climate Action Plans and Other Measures to Reduce GHG Emissions (SANDAG)

Mitigation Measure Text. SANDAG shall assist local governments in the preparation of CAPs, and other policies/measures to reduce GHG emissions. SANDAG shall assist local governments in identifying all feasible measures to reduce GHG emission to 1990 levels by 2020, and achieve further reductions beyond 2020 consistent with adopted regional or local GHG reduction targets. Specific forms of SANDAG assistance include, but are not limited to:

- Assisting its member agencies in obtaining funding for, directly funding, updating and implementing CAPs and other climate strategies through continued implementation of the SANDAG Energy Roadmap Program.
- Providing funding and energy planning assistance to local governments to implement projects that save energy and reduce energy-related GHG emissions.
- As described in GHG-4A, for local jurisdictions that do not have an adopted CAP, SANDAG shall make available competitive funding througnh the grant programs for preparation of a CAP.

Mitigation Measure Effectiveness

- Implementing CAPs: The Energy Roadmap Program has assisted the following cities in obtaining funding for CAP related activities. These activities increase the GHG reduction benefits described for GHG-4A, and would continue to advance GHG reductions with continued program implementation.

- Assisted the cities of National City and Vista in obtaining funding for CAP implementation activities.
- Assisted cities of Del Mar, Encinitas, La Mesa, Santee, and Solana Beach in obtaining funding for CAP development; and
- Assisted cities of El Cajon, Lemon Grove, and Oceanside in obtaining funding for updated GHG emission inventories.

- Energy Plans and Projects: Providing funding and energy planning assistance to local governments to implement projects that save energy and reduce energy-related GHG emissions. To date, SDG&E estimates that SANDAG's energy roadmap program has resulted in up to about 3.4 million kWh of annual energy savings and about 1,200 MTCO2e of annual GHG reduction (SDG&E 2015). Implementation of the Energy Roadmap Program has helped the following cities realize energy savings (and related GHG reductions) at their municipal facilities as reported below. These benefits would continue and increase with continued program implementation:
    - City of Carlsbad: about 49,000 kilowatt hours (kWh) and 14,000 therms of annual energy savings and about 95 $MTCO_2e$ of annual GHG reduction
    - City of Coronado: about 130,000 kWh and 4,100 therms of annual energy savings and about 70 $MTCO_2e$ of annual GHG reduction
    - City of El Cajon: about 406,000 kWh of annual energy savings and about 142 $MTCO_2e$ of annual GHG reduction
    - City of Encinitas: about 70,000 kWh of annual energy savings and 24 MTCO2e of annual GHG reduction
    - City of Escondido: about 270,000 kWh and 25,000 therms of annual energy savings and about 246 $MTCO_2e$ of annual GHG reduction
    - City of Imperial Beach: about 2,600 kWh of annual energy savings and about 1 $MTCO_2e$ of annual GHG reduction
    - City of National City: about 140,000 kWh of annual energy savings and 50 $MTCO_2e$ of annual GHG reduction
    - City of Oceanside: about 317,000 kWh of annual energy savings and 112 $MTCO_2e$ of annual GHG reduction
    - City of Poway: about 207,000 kilowatt hours (kWh) of annual energy savings and about 73 $MTCO_2e$ of annual GHG reduction
    - City of San Marcos: about 900,000 kWh and 2,200 therms of annual energy savings and 330 $MTCO_2e$ of annual GHG reduction
    - City of Santee: about 580,000 kilowatt hours (kWh) of annual energy savings and about 206 $MTCO_2e$ of annual GHG reduction
    - City of Solana Beach: about 110,000 kWh of annual energy savings and 40 $MTCO_2e$ of annual GHG reduction
    - City of Vista: about 190,000 kilowatt hours (kWh) annual energy savings and about 66 $MTCO_2e$ of annual GHG reduction
- CAP Preparation. See Mitigation Measure GHG-4A for discussion of GHG reductions associated with local jurisdictions CAPs.

GHG-4F Implement Measures to Reduce GHG Emissions from Transportation Projects (SANDAG)

During the planning, design, project-level CEQA review, construction, and operation of transportation network improvements, SANDAG shall implement measures to reduce GHG emissions, including but not limited to, applicable transportation project measures on the Attorney General's list of project specific measures (California Attorney General's Office 2010), as well as the CAPCOA reference, Quantifying Greenhouse Gas Mitigation Measures (CAPCOA 2010). These include, but are not limited to, the following:

- Implement construction measures through construction bid specifications, including the following topics:
    - Use energy and fuel efficient vehicles and equipment;
    - Use alternative fuel vehicles and equipment;
    - Use lighting systems that are energy efficient, including LED technology;
    - Use lighter-colored pavement, binding agents that are less GHG-intensive than Portland cement, and less-GHG intensive asphalt pavements; and
    - Recycle construction debris.
- Install efficient lighting (including LEDs) for traffic, street, and other outdoor lighting.
- Incorporate infrastructure electrification into project design (e.g., electric vehicle charging; charging for electric bikes).
- Incorporate electric vehicle supply equipment (EVSE) into projects that include commuter parking areas.
- Design measures to reduce GHG emissions from solid waste management through encouraging solid waste recycling and reuse.
- Design measures to reduce energy consumption and increase use of renewable energy, such as solar-powered toll booths and other facilities, including those listed in Mitigation Measure~~s EN-2A and~~ EN-3B~~C~~.
- Design measures to reduce water consumption, such as drought-resistant landscaping, smart irrigation systems, and other measures including those listed in Mitigation Measure WS-1A.
- Construct buildings to Leadership in Energy and Environmental Design (LEED) certified standards or equivalent standards.

Funding for those measures that SANDAG selects would be included in individual project budgets.

GHG-4G Implement Measures to Reduce GHG Emissions from Transportation Projects (Other Transportation Project Sponsors)

During the planning, design, project-level CEQA review, construction, and operation of transportation network improvements, other transportation project sponsors can and should implement measures to reduce GHG emissions, including, but not limited to, those described in Mitigation Measure GHG-4F.

GHG-4H Implement Measures to Reduce GHG Emissions from Development Projects (Local Governments)

During the planning, design, project-level CEQA review, construction, and operation of development projects, the County of San Diego and cities can and should implement measures to reduce GHG emissions, including but not limited to, applicable land use measures on the Attorney General's list of project specific measures (California Attorney General's Office 2010), as well as the CAPCOA reference, Quantifying Greenhouse Gas Mitigation Measures (CAPCOA 2010). These measures include, but are not limited to, the following:

- Construction measures, including those listed in Mitigation Measure GHG-4F.
- Measures that reduce VMT by increasing transit use, carpooling, bike-share and car-share programs, and active transportation, including:
  - Building or funding a major transit stop within or near development, in coordination with transit agencies;
  - Developing car-sharing and bike-sharing programs;
  - Providing transit incentives, including transit passes for MTS/NCTD buses and trolleys;
  - Consistent with the Regional Bicycle Plan, incorporating bicycle and pedestrian facilities into project designs, maintaining these facilities, and providing amenities incentivizing their use; and planning for and building local bicycle projects that connect with the regional network;
  - Implementing complete streets consistent with the SANDAG Regional Complete Streets Policy, including adopting local complete streets policies;
  - Implementing mobility hubs consistent with the Regional Mobility Hub Strategy;
  - Improving transit access to bus and trolley routes by incentives for construction of transit facilities within developments, and/or providing dedicated shuttle service to trolley and transit stations; and
  - Implementing employer trip reduction measures to reduce employee trips and VMT such as vanpool and carpool programs, providing end-of-trip facilities, and telecommuting programs.
- Measures that reduce VMT through parking strategies based on the SANDAG Regional Parking Management Toolbox, including:
  - Parking pricing strategies consistent with the Toolbox;
  - Reduced minimum parking requirements;
  - Residential parking permit programs;
  - Designate a percentage of parking spaces for ride-sharing vehicles or high-occupancy vehicles, and provide adequate passenger loading and unloading for those vehicles;
  - Provide adequate bicycle parking;
  - Other strategies in the SANDAG Regional Parking Management Toolbox

- Measures that reduce VMT through Transportation Systems Management (TSM), including measures included in proposed Plan Appendix E.
- Land use siting and design measures that reduce GHG emissions, including:
    - Developing on infill and brownfields sites;
    - Building high density and mixed use developments near transit; and
    - Retaining on-site mature trees and vegetation and planting new trees.
- Measures that increase vehicle efficiency or reduce the carbon content of fuels, including constructing electric vehicle charging stations or neighborhood electric vehicle networks or charging for electric bicycles consistent with SANDAG's regional readiness planning for alternative fuels.
- Measures to reduce GHG emissions from solid waste management through encouraging solid waste recycling and reuse.
- Measures to reduce energy consumption and increase use of renewable energy, including those listed in Mitigation Measures EN-~~2~~3A and EN-3B~~C~~.
- Measures to reduce water consumption, including those listed in Mitigation Measure WS-1A~~XX~~.

Mitigation Measures AQ-4A, AQ-4B, and AQ-4C would also reduce emissions of GHGs by reducing overall pollutant emissions from equipment and vehicles. These measures include:

- Mitigation Measure AQ-4A. Reduce Exposure to Localized Particulate and/or TAC Emissions.
- Mitigation Measure AQ-4B. Reduce diesel emissions during construction from off-road equipment.
- Mitigation Measure AQ-4C. Reduce diesel emissions during construction from on-road vehicles.

Mitigation Measures EN-3B would also reduce emissions of GHGs by reducing conventional energy use and therefore reducing emissions associated with combustion of fossil fuels used in conventional power plants.

Mitigation Measure WS-1A would increase water conservation, and thereby reduce GHG emissions associated with water supply conveyance, storage, treatment, and distribution.

SIGNIFICANCE AFTER MITIGATION

2035 and 2050

Implementation of Mitigation Measures GHG-4A through GHG-4H, as well as Mitigation Measures AQ-4A, AQ-4B, AQ-4C, EN-3B and WS-1A, would reduce GHG emissions. The effectiveness of a number of the project-specific measures in reducing GHG emissions has been quantified by CAPCOA (2010). Based on the studies cited in the introduction to the mitigation section, however, even full implementation of all identified mitigation measures would not be sufficient to reduce the proposed Plan's GHG emissions below the regional 2030 and 2050 GHG reduction reference points based on EO B- 30-15 and EO-S-3-05. Because the proposed Plan's 2035 GHG emissions would remain inconsistent with state's current ability to achieve the Executive Orders' GHG reduction goals, this impact (Impact GHG-4) remains significant and unavoidable.

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Growing Cooler: The Evidence on Urban Development and Climate Change

Reid Ewing, Keith Bartholomew, Steve Winkelman, Jerry Walters, and Don Chen

with Barbara McCann and David Goldberg

Urban Land Institute

Smart Growth America
Better Choices For Our Communities

Center for Clean Air Policy
Dialogue. Insight. Solutions.

National Center for Smart Growth Research & Education

This new book documents how key changes in land development patterns could help reduce vehicle greenhouse gas emissions. Based on a comprehensive review of dozens of studies by leading urban planning researchers, the book concludes that urban development is both a key contributor to climate change and an essential factor in combating it. The authors make the case that one of the best ways to reduce vehicle travel is compact development: building places in which people can get from one place to another without driving. This includes developments with a mix of uses and pedestrian-friendly designs. Changing demographics, shrinking households, rising gas prices, and lengthening commutes are contributing to the demand for smaller homes and lots, townhouses, and condominiums near jobs and other activities. Current government policies and regulations encourage sprawling, auto-dependent development. The book recommends changes that can be made to make green neighborhoods more available and more affordable.

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The policy recommendations presented in this book do not necessarily reflect the opinions of the Urban Land Institute.

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Reid Ewing
College Park, Maryland

Contents

Executive Summary

The phrase "you can't get there from here" has a new application. For climate stabilization, a commonly accepted target would require the United States to cut its carbon dioxide (CO_2) emissions by 60 to 80 percent as of 2050, relative to 1990 levels. Carbon dioxide levels have been increasing rapidly since 1990, and so would have to level off and decline even more rapidly to reach this target level by 2050. This publication demonstrates that the U.S. transportation sector cannot do its fair share to meet this target through vehicle and fuel technology alone. We have to find a way to sharply reduce the growth in vehicle miles driven across the nation's sprawling urban areas, reversing trends that go back decades.

This publication is based on an exhaustive review of existing research on the relationship between urban development, travel, and the CO_2 emitted by motor vehicles. It provides evidence on and insights into how much transportation-related CO_2 savings can be expected with compact development, how compact development is likely to be received by consumers, and what policy changes will make compact development possible. Several related issues are not fully examined in this publication. These include the energy savings from more efficient building types, the value of preserved forests as carbon sinks, and the effectiveness of pricing strategies—such as tolls, parking charges, and mileage-based fees—when used in conjunction with compact development and expanded transportation alternatives.

The term "compact development" does not imply high-rise or even uniformly high density, but rather higher average "blended" densities. Compact development also features a mix of land uses, development of strong population and employment centers, interconnection of streets, and the design of structures and spaces at a human scale.

The Basics

Scientific consensus now exists that greenhouse gas accumulations due to human activities are contributing to global warming with potentially catastrophic consequences (IPCC 2007). International and domestic climate policy discussions have gravitated toward the goal of limiting the temperature increase to 2°C to 3°C by cutting greenhouse gas emissions by 60 to 80 percent below 1990 levels by the year 2050. The primary greenhouse gas is carbon dioxide, and every gallon of gasoline burned produces about 20 pounds of CO_2 emissions.

Driving Up CO_2 Emissions

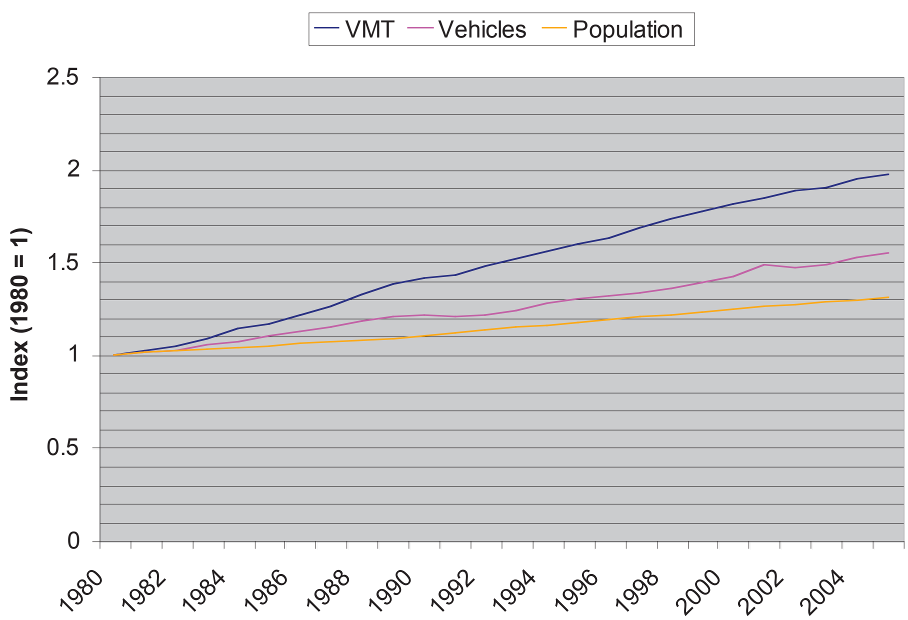
The United States is the largest emitter worldwide of the greenhouses gases that cause global warming. Transportation accounts for a full third of CO_2 emissions in the United States, and that share is growing as others shrink in comparison, rising from 31 percent in 1990 to 33 percent today It is hard to envision a "solution" to the global warming crisis that does not involve slowing the growth of transportation CO_2 emissions in the United States.

The Three-Legged Stool Needed to Reduce CO2 from Automobiles

Transportation CO2 reduction can be viewed as a three-legged stool, with one leg related to vehicle fuel efficiency, a second to the carbon content of the fuel itself, and a third to the amount of driving or vehicle miles traveled (VMT). Energy and climate policy initiatives at the federal and state levels have pinned their hopes almost exclusively on shoring up the first two legs of the stool, through the development of more efficient vehicles (such as hybrid cars) and lower-carbon fuels (such as biodiesel fuel). Yet a stool cannot stand on only two legs.

As the research compiled in this publication makes clear, technological improvement in vehicles and fuels are likely to be offset by continuing, robust growth in VMT. Since 1980, the number of miles Americans drive has grown three times faster than the U.S. population, and almost twice as fast as vehicle registrations (see Figure 0-1). Average automobile commute times in metropolitan areas have risen steadily over the decades, and many Americans now spend more time commuting than they do vacationing.

Figure 0-1 Growth of VMT, Vehicle Registrations, and Population in the United States relative to 1980 Values
Source: FHWA 2005.



This raises some questions, which this report addresses. Why do we drive so much? Why is the total distance we drive growing so rapidly? And what can be done to alter this trend in a manner that is effective, fair, and economically acceptable?

The growth in driving is due in large part to urban development, or what some refer to as the built environment. Americans drive so much because we have given ourselves little alternative. For 60 years, we have built homes ever farther from workplaces, created schools that are inaccessible except by motor vehicle, and isolated other destinations—such as shopping—from work and home. From World War II until very recently, nearly all new development has been planned and built on the assumption that people will use cars virtually every time they travel. As a larger and larger share of our built environment has become automobile dependent, car trips and distances have increased, and walking and public transit use have declined. Population growth has been responsible for only a quarter of the increase in vehicle miles driven over the last couple of decades. A larger share of the increase can be traced to the effects of a changing urban environment, namely to longer trips and people driving alone.

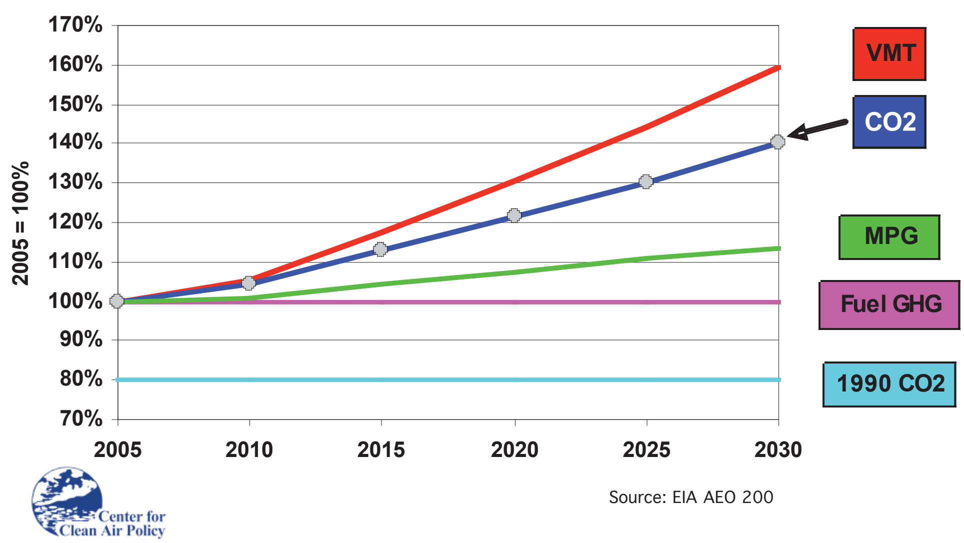
As with driving, land is being consumed for development at a rate almost three times faster than population growth. This expansive development has caused CO_2 emissions from cars to rise even as it has reduced the amount of forest land available to absorb CO_2.

How Growth in Driving Cancels Out Improved Vehicle Fuel Economy

Carbon dioxide is more difficult to control through vehicle technology than are conventional air pollutants. Conventional pollutants can be reduced in automobile exhaust with sophisticated emission control systems (catalytic converters, on-board computers, and oxygen sensors). Carbon dioxide, meanwhile, is a direct outcome of burning fossil fuels; there is no practical way to remove or capture it from moving vehicles. At this point in time, the only way to reduce CO_2 emissions from vehicles is to burn less gasoline and diesel fuel.

An analysis by Steve Winkelman of the Center for Clean Air Policy, one of the coauthors of this publication, finds that CO_2 emissions will continue to rise, despite technological advances, as the growth in driving overwhelms planned improvements in vehicle efficiency and fuel carbon content. The U.S. Department of Energy's Energy Information Administration (EIA) forecasts that driving will increase 59 percent between 2005 and 2030 (red line, Figure 0-2), outpacing the projected 23 percent increase in population. The EIA also forecasts a fleetwide fuel economy improvement of 12 percent within this time frame, primarily as a result of new federal fuel economy standards for light trucks (green line, Figure 0-2). Despite this improvement in efficiency, CO_2 emissions would grow by 41 percent (dark blue line, Figure 0-2).

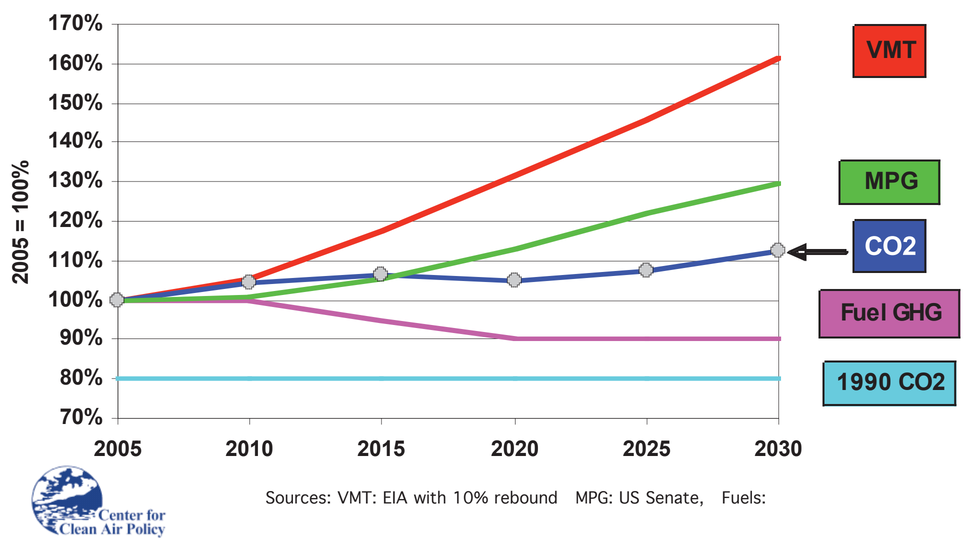
Figure 0-2 Projected Growth in CO_2 Emissions from Cars and Light Trucks
Source: EIA 2007.



U.S. fuel economy has been flat for almost 15 years, as the upward spiral of car weight and power has offset the more efficient technology. Federal and state efforts are underway to considerably boost vehicle efficiency and reduce greenhouse gas emissions. In June 2007, the U.S. Senate passed corporate average fuel economy (CAFE) standards that would increase new passenger vehicle fuel economy from the current 25 miles per gallon (mpg) to 35 mpg by 2020. (As of this writing, the House has not acted.). California plans to implement a low carbon standard for transportation fuels, specifically a 10 percent reduction in fuel carbon content by 2020.

Even if these more stringent standards for vehicles and fuels were to go into effect nationwide, transportation-related emissions would still far exceed target levels for stabilizing the global climate (see Figure 0-3). The rapid increase in driving would overwhelm both the increase in vehicle fuel economy (green line) and the lower carbon fuel content (purple line). In 2030, CO_2 emissions would be 12 percent *above* the 2005 level, and 40 percent above the 1990 level (turquoise line). For climate stabilization, the United States must bring the CO_2 level to 15 to 30 percent *below* 1990 levels by 2020 to keep in play a CO_2 reduction of 60 to 80 percent by 2050.

Figure 0-3 Projected Growth in CO_2 Emissions from Cars and Light Trucks Assuming Stringent Nationwide Vehicle and Fuel Standards*
Source: EIA 2007



As the projections show, the United States cannot achieve such large reductions in transportation-related CO_2 emissions without sharply reducing the growth in miles driven.

Changing Development Patterns to Slow Global Warming

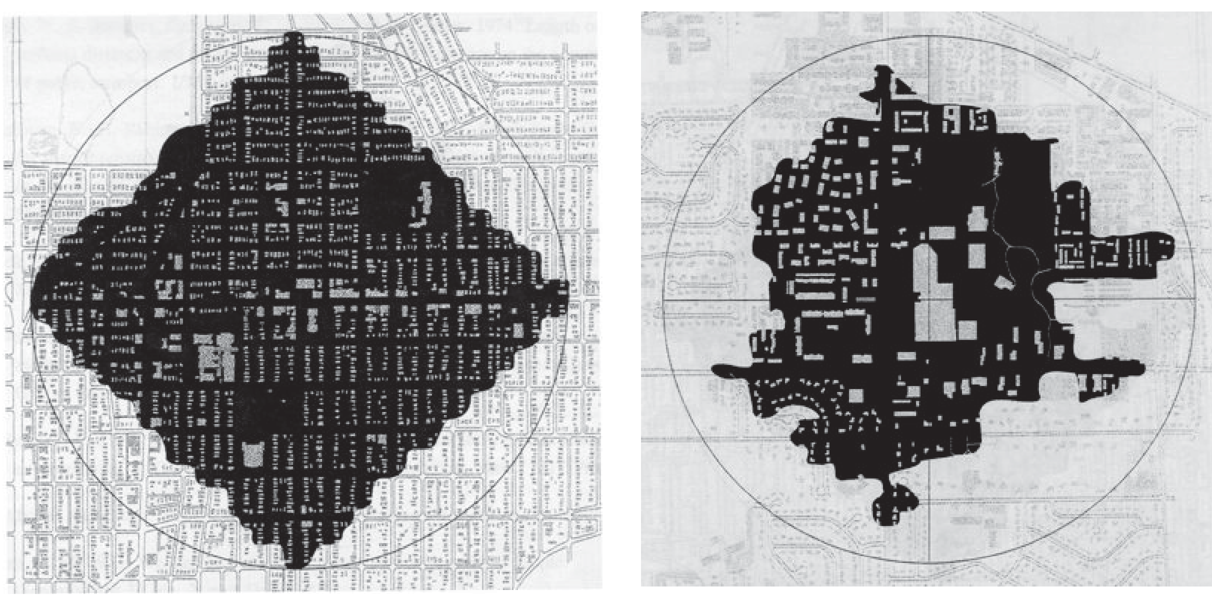
Recognizing the unsustainable growth in driving, the American Association of State Highway and Transportation Officials (AASHTO), representing state departments of transportation, is urging that the growth of vehicle miles driven be cut in half. How does a growing country—one with 300 million residents and another 100 million on the way by mid-century—slow the growth of vehicle miles driven?

Aggressive measures certainly are available, including imposing ever stiffer fees and taxes on driving and parking or establishing no-drive zones or days. Some countries are experimenting with such measures. However, many in this country would view such steps as punitive, given the reality that most Americans do not have a viable alternative to driving. The body of research surveyed here shows that much of the rise in vehicle emissions can be curbed simply by growing in a way that will make it easier for Americans to drive less. In fact, the weight of the evidence shows that, with more compact development, people drive 20 to 40 percent less, at minimal or reduced cost, while reaping other fiscal and health benefits.

How Compact Development Helps Reduce the Need to Drive

Better community planning and more compact development help people live within walking or bicycling distance of some of the destinations they need to get to every day—work, shops, schools, and parks, as well as transit stops. If they choose to use a car, trips are short. Rather than building single-use subdivisions or office parks, communities can plan mixed-use developments that put housing within reach of these other destinations. The street network can be designed to interconnect, rather than end in culs-de-sac and funnel traffic onto overused arterial roads. Individual streets can be designed to be "complete," with safe and convenient places to walk, bicycle, and wait for the bus. Finally, by building more homes as condominiums, townhouses, or detached houses on smaller lots, and by building offices, stores and other destinations "up" rather than "out," communities can shorten distances between destinations. This makes neighborhood stores more economically viable, allows more frequent and convenient transit service, and helps shorten car trips.

Figure 0-4 Destinations within One-Quarter Mile of Center for Contrasting Street Networks in Seattle
Source: Moudon et al. 1997.



Sightline Institute

Sightline Research Backgrounder

Increases in greenhouse-gas emissions from highway-widening projects

October 2007
By Clark Williams-Derry, Research Director

Summary

Road-building proponents often suggest that adding lanes to a highway will reduce greenhouse gas emissions. By easing congestion, they argue, new lanes will reduce the amount of fuel that vehicles waste in stop-and-go traffic, leading to lower releases of climate-warming gases from cars and trucks.

Over the short term—perhaps 5 to 10 years after new lanes are opened to traffic—this argument may hold some slim merit. But considering the increased emissions from highway construction and additional vehicle travel, adding one mile of new highway lane will increase CO2 emissions by more than 100,000 tons over 50 years.

Carbon dioxide emissions from building one lane-mile of urban highway, over 50 years	
Construction, building materials, and maintenance	3,500 tons
Net congestion relief	-7,000 tons
Additional vehicle travel on the facility	90,000 tons
Induced vehicle travel off the facility	30,000-100,000 tons
TOTAL	116,500-186,500 tons

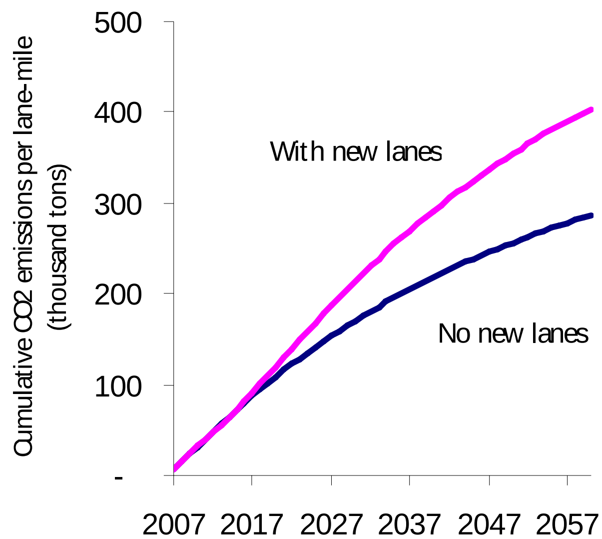
At current rates of emissions, 100,000 tons of CO2 equals the 50-year climate footprint of about 100 typical US residents.

Because future traffic volumes, vehicle technologies, and land use patterns are inherently uncertain, these estimates should be taken as rough approximations. Yet under almost any set of plausible assumptions, widening a highway in a congested urban area will substantially increase long-term greenhouse gas emissions.

Analysis and Discussion

To estimate changes in vehicle emissions resulting from highway lane expansion, Sightline developed a spreadsheet model covering 50 years of highway-related CO2 emissions. Using this model, Sightline developed a mid-point estimate for highway CO2 emissions per lane mile, based on a plausible range of possible future travel characteristics. Sightline's model predicts changes in CO2 emissions as follows (see Method Notes for details of our assumptions and analysis):

After new lanes are completed, emissions from additional traffic quickly overwhelm short-term congestion relief.



1) <u>The highway itself</u>: 3,500 tons of CO2 from road construction and maintenance

Two recent international studies of the life-cycle energy costs of highway construction have estimated that, after accounting for the manufacturing of concrete, steel, and other energy-intensive construction materials, as well as fuel consumed by construction equipment, between 1,400 and 2,300 tons of CO2 per lane-mile of new roadway. Long-term maintenance and road reconstruction added between 3,100 and 5,200 tons of CO2 emissions.

Based on these figures, and a more conservative estimate of annual maintenance-related emissions than these studies assume, Sightline estimates that constructing 1 lane-mile of highway and maintaining it for 50 years releases roughly 3,500 tons of CO2.

2) <u>Net congestion relief</u>: 7,000 fewer tons of emissions from efficiency gains.

Highway construction and maintenance projects can create substantial congestion and traffic delays, reducing the fuel efficiency of the vehicles on the road.[1] However, for these estimates, Sightline assumed that construction projects would cause fairly minor, intermittent delays, and that traffic volumes would not decrease during construction. On net, we estimate that congestion resulting from construction and maintenance delays would increase vehicle-related CO2 emissions modestly, by roughly 500 tons over 50 years.

Sightline assumes that rush hour traffic will flow more freely after new lanes are opened, and that congestion relief will raise the effective fuel efficiency of vehicles on the roadway. However, consistent with academic findings and real-world experience, we also assume that new highway capacity in a metropolitan area will gradually be filled by new trips, and that congestion and stop-and-go driving will gradually increase to approximately the same level experienced prior to the highway expansion.[2] Over the course of 50 years, CO2 emissions reductions related to congestion relief may total some 7,500 tons, compared with a "baseline" highway that is not widened. The large majority of these emissions reductions occur within the first decade in which a new lane is open to traffic.

On net, then, we expect that changes in congestion associated with highway expansion (including both congestion created by construction and maintenance, and congestion relieved after construction) will reduce emissions by about 7,000 tons.

3. <u>New traffic</u>: 90,000 tons of emissions from additional travel on the highway.

It is well documented that highway expansion can result in an increase in the number of vehicle trips on a roadway, particularly in congested urban areas. Indeed, accommodating additional trips is typically the point of adding new lanes to a highway. Still, the speed at which additional traffic floods new lanes often comes as a surprise. One recent California study estimated that more than roughly 90 percent of new lane capacity in congested urban areas is filled within five years after a project is completed. Other studies have found similar "induced traffic" effects from adding lanes to congested roads.

However, not all of the additional traffic on new lanes represents genuinely new travel. Very shortly after a new road or lane opens, for example, some trips that had been taken on other streets and roads shift to the new facility. To account for this effect, Sightline assumes that for the two years after new lanes are opened, none of the additional trips taken on a new facility are genuinely new, but were simply rerouted from nearby roads onto the new facility.

The greenhouse gas impacts of future travel will be affected by changes in vehicle technology and fuel efficiency. Yet even assuming that average vehicle fuel economy improves by 2.5 percent a year (an optimistic assumption, given that the average fuel economy of passenger vehicles has stagnated for decades), Sightline estimates that new vehicle travel on each lane-mile of new highway will release 83,000 tons of CO2 over the next 50 years. Adding in energy associated with vehicle manufacture and maintenance, this total rises to approximately 90,000 additional tons of CO2 per lane mile associated with new vehicle trips on an expanded facility.[3]

4. <u>Indirect fuel consumption</u>: 30,000-100,000 tons of CO2 from induced travel off the highway itself.

Travel patterns off the expanded highway are the most difficult to project, since they involve the greatest uncertainties.

Cars that travel on a new highway lane will need to travel on other streets and roads to get to and from the highway; this will result in some additional vehicle mileage beyond the driving that takes place on the highway itself. As a conservative value, Sightline estimated that for each 10-mile trip on a highway, the vehicle is driven a total of 1 mile to and from the highway on- and off-ramps.

In addition, adding lanes—particularly on roads leading to low-density suburbs and undeveloped land on the urban fringe—tends to accelerate low-density sprawling development. Many studies have linked lower-density land use patterns with increased driving. In a sprawling suburb, virtually every trip must be taken by car, and everyday trips can require many miles of travel. In contrast, residents of more compact suburbs and urban neighborhoods typically drive less, and can walk or use transit for many trips, which reduces the carbon emissions from their daily transportation. Accordingly, low-density development is associated with increased vehicle fuel consumption.[4]

Sightline estimates that if as little as one-tenth of new highway trips represent a net shift to lower-density land use patterns (i.e., new sprawling suburban development with modestly higher per-household driving than in compact suburbs), then greenhouse gas emissions from additional off-facility driving could rival or exceed the increases from driving on the facility itself. Regardless of the precise figures, the impacts of off-facility driving enabled by highway expansion are likely to be significant, long-lasting, and far larger than the modest reductions in emissions resulting from congestion relief.

Conclusions

Our estimates suggest that, over the course of five decades, adding new highway lanes will lead to substantial increases in vehicle travel and CO2 emissions from cars and trucks. Claims about fuel savings from congestion relief may hold slim merit over horizons of a decade or less. But over the long term, new traffic will fill the added road space, leading to long-term increases in vehicle emissions totaling tens of thousands of tons per lane-mile.

Future refinements in Sightline's emissions model, and the data that it relies on, may affect the specifics of these estimates. Yet under most plausible assumptions for future travel patterns and vehicle efficiencies, Sightline's model predicts that added emissions from new traffic will overwhelm the modest greenhouse gas reductions from congestion relief.

Method Notes:

To estimate changes in vehicle emissions resulting from highway lane expansion, Sightline developed a spreadsheet model covering 50 years of highway-related CO2 emissions. This model relied on the following assumptions and inputs:

Number of lanes: Sightline's model considers an existing metro-area highway with two lanes in each direction that is widened to three lanes in each direction.[5]

Per-mile fuel consumption: Given today's vehicle and fuel technologies, Sightline estimates that the average passenger vehicle creates 1.1 pounds of CO2 emissions per mile. This covers emissions throughout the "well-to wheels" emissions of the vehicle fuel, including drilling, transporting, and refining petroleum, as well as the end-use consumption of gasoline in passenger vehicles.[6]

- **Improvements in vehicle efficiency:** Sightline assumes that, over 50 years, average vehicle CO2 emissions per mile will decline to less than one-third of today's levels, through a combination of improved vehicle efficiency and lower-carbon fuels.[7]
- **Congestion-related efficiency losses:** When vehicles are operating on a congested highway, Sightline estimated that emissions per mile increase by about one-third—comparable the difference between "city" and "highway" miles-per-gallon ratings.[8] Note, however, that even for highways that experience rush-hour congestion, fewer than half of all trips take place during peak travel hours.[9]
- **Emissions from vehicle manufacturing:** Roughly 9 tons of CO2 are released during the manufacture a passenger vehicle.10 Sightline assumes that today's cars and light trucks average 180,000 miles of travel over their usable life spans,[11] and that vehicle manufacturing emissions will decline in the future by 1 percent per year.
- **Emissions from road construction and maintenance:** Sightline used recent peer-reviewed studies to estimate CO2 emissions from road construction and maintenance.[12]
- **Traffic volumes:** Sightline assumed that daily traffic volumes on existing lanes would start at between 15,000 and 20,000 daily vehicle trips per lane, rising to a steady state somewhere between 18,000 and 24,000 vehicles per lane over time. Once new lanes are open to traffic, Sightline estimated that 10 percent of any remaining highway capacity would be filled with traffic each year.[13]
- **Off-highway driving:** For every highway trip, vehicles must travel some distance to and from the highway. In addition, new highway construction can promote scattered, low-density residential and commercial development, which in turn requires residents to drive more miles.[14] Because of the high degree of uncertainty for both effects, Sightline makes conservative estimates for off-highway driving. For new trips resulting from increased capacity, Sightline assumes that vehicles travel one-tenth of a mile of off-highway driving for every mile of on-highway driving. Sightline's low-end estimate of emissions from land

use effects assumes that only 5 percent of new trips represent new low-density households, and that these households drive 15 percent more than their higher-density counterparts.

Sightline found that the model's outputs were most strongly affected by three inputs: trends in vehicle fuel efficiency; the difference between current vs. maximum traffic per lane; and the rate at which new lanes are filled by new traffic. In addition, assumptions about off-highway driving and land-use impacts strongly affected total emissions. However, these latter factors are the most inherently uncertain, since they are dependent on geographic, regulatory, and economic factors that are outside the scope of this analysis.

To avoid the chance of overestimating the CO2 impacts of lane expansion, Sightline's estimates are conservative in a number of ways, including:

- **Slow rate of induced traffic:** Sightline's midpoint estimates are based on the assumption that 10 percent of any remaining road capacity will be filled per year after a new lane opens—meaning that less than half of added lane capacity is filled within 5 years of completion. In contrast, many recent studies have found that as much as 90 percent of new capacity may be filled within 5 years after a new lane is opened.15 Assuming faster rates of induced travel would reduce estimated benefits of congestion relief, while increasing total emissions from generated traffic.
- **Low maintenance-related emissions:** Sightline assumes a lower total energy consumption from road maintenance and repair than is assumed by several academic studies.
- **Assuming no induced travel on parallel roadways:** Sightline's model assumes that all new traffic entering a roadway for the first year and half after new lanes are opened represents trips rerouted from nearby routes, rather than genuinely new travel. However, Sightline's model does not assume that rerouted traffic represents a permanent reduction of travel on parallel roadways—an assumption that is inherently conservative, since traffic on parallel roadways is likely to grow as congestion increases on new lanes.

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1 For four highway-widening projects analyzed by the Surface Transportation Policy Project in the late 1990s, the "payback" period—the period after which time savings due to added road capacity equaled time lost during road construction—ranged from 2.75 years to infinity. In the latter case, travelers never recouped the time lost to congestion during construction. See STPP, "Road Work Ahead: Is Construction Worth the Wait?" at *http:www.transact.org/report.asp?id=169*.

2 An excellent of the literature on "induced" or "generated" traffic can be found in Todd Litman, "Generated Traffic and Induced Travel: Implications for Transport Planning" at *http://www.vtpi.org/gentraf.pdf*. See especially pages 7 and 8 for estimates of "generated traffic" from highway expansion. Also see page 4 for a discussion of how a congested roadways tend to reach an equilibrium daily traffic volume.

3 Carbon intensities for future vehicle and fuel technologies are impossible to predict, since they depend on regulatory, economic, technological, and geological factors that are outside the scope of this report. Yet even if effective vehicle fuel economy rises to 100 mpg over 50 years, GHG emissions from new traffic on the lane will still total some 60,000 tons—far more than the relatively modest greenhouse gas benefits from congestion relief.

4 For more on the relationship between urban form and vehicle travel, see:

Frank, Lawrence and Company, Inc. (2005). “Achieving Sustainability Through Healthy Community Design.” King County, WA. September 27, 2005.

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5 Note that the end results do not depend heavily on these assumptions. Other configurations of highway expansion lead to virtually identical results.

6 Current average passenger vehicle fuel economy is approximately 21 mpg; see *http://www.epa.gov/otaq/fetrends.htm* and *http://www.washingtonpost.com/wp-dyn/content/graphic/2006/07/18/GR2006071800596.html*. This is likely a conservative estimate of highway vehicle emissions, since it represents only passenger vehicles, while ignoring heavy trucks that emit significantly more CO2 per mile. Life-cycle CO2 emissions per gallon of gas estimated at 25.6 pounds; derived from

http://www.environmentaldefense.org/documents/3986_CAautocarbonburden.pdf, p. 11.

7 It is possible that future vehicle and fuel technologies may achieve even better results. However, given that US vehicle fuel economy has stagnated for roughly two and a half decades, any improvement in the fuel

economy of the vehicle fleet is, at this point, purely a matter of speculation. If carbon emissions from vehicle travel fall more slowly than Sightline assumes, then Sightline's analysis may substantially understate eventual carbon emissions resulting from highway expansion.

8 City vs. highway fuel economy derived from data downloaded from the US Department of Energy, at *http://www.fueleconomy.gov/feg/download.shtml*. Note, however, that hybrid gas-electric engines are actually more efficient in stop-and-go city driving than in free-flowing traffic—suggesting that the fuel-conserving benefits of congestion reduction may fall over time as these technologies are used more widely.

9 In a study of 75 US metropolitan areas, just over 40 percent of vehicle travel in 2000 took place at times when major roadways typically experience congestion, and 25.5 percent of all travel took place under congested conditions. See Anthony Downs, Still Stuck in Traffic: Coping With Peak-Hour Traffic Congestion, Washington, DC, Brookings Institution Press, 2004, p. 16. Similarly, data for the Puget Sound region show that roughly 42 percent of total travel on the region's busiest highways in 2005 took place during peak periods (6 to 9 a.m. and 3 to 7 p.m. inclusive); see *http://depts.washington.edu/hov/2005/WkdyVehVol/2005_WkdyVehVol.pdf*. And data from the US Bureau of transportation statistics suggests that 43 percent of all trips nationwide take place during the morning and afternoon peak periods; see *http://www.bts.gov/publications/journal_of_transportation_and_statistics/volume_06_number_01/html/paper_02/table_02_02.html* and *http://www.bts.gov/publications/highlights_of_the_2001_national_household_travel_survey/html/table_a12.html*. Considering both the increases in per-mile emissions caused by congestion, with , Sightline estimates that peak-hour congestion increases fuel-related CO_2 emissions on a roadway by about 15 percent.

10 Sightline's estimates for the carbon intensity of vehicle manufacture are based on a number of published sources, including:

Argonne National Laboratory, F. Stodolsky et al., "Life-Cycle Energy Savings Potential from Aluminum-Intensive Vehicles," at *http://www.transportation.anl.gov/pdfs/TA/106.pdf*.

Environmental Defense, John DeCicco and Kate Larsen, "Automaker Carbon Burdens in California," 2004, available at *http://www.environmentaldefense.org/documents/3986_CAautocarbonburden.pdf*.

Web page, "Life cycle assessment: Toyota's comprehensive analysis of vehicle CO_2 emissions over the life of the vehicle reveals some surprizes [sic]," Automotive Industries, Feb. 2005, at *http://findarticles.com/p/articles/mi_m3012/is_2_185/ai_n12937459*.

Web page, "Automobiles: Electric vs. Gasoline; Seikei University (Tokyo), 2001" Institute for Lifecycle Environmental Analysis, at *http://ilea.org/lcas/taharaetal2001.html.*

Web page, "Report 5: How Do We Contribute Individually to Global Warming," The Hinkle Charitable Foundation, at *http://www.thehcf.org/emaila5.html*.

Web page, "Car Companies and Climate Change: Measuring the Carbon Intensity of Sales and Profits," World Resources Institute, at *http://earthtrends.wri.org/features/view_feature.php?theme=5&fid=53*.

11 Lifetime mileage per vehicle from National Highway Traffic Safety Administration, "Vehicle Survivability and Travel Mileage Schedules," January 2006, at

http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/Rpts/2006/809952.pdf. Note that the 180,000 mile per vehicle figure currently applies to light trucks, rather than cars, which are typically driven just 152,000 over their lifetimes; to be conservative, applied the higher figure applies to all passenger vehicles.

12 Life-cycle road construction and maintenance emissions estimated from:

Graham J. Treloar et al., "Hybrid Life-Cycle Inventory for Road Construction and Use," Journal of Construction Engineering and Management, Vol. 130, No. 1, January/February 2004, pp. 43-49 , (DOI 10.1061/(ASCE)0733-9364(2004)130:1(43)),

Kwangho Park et al., "Quantitative Assessment of Environmental Impacts on Life Cycle of Highways," Journal of Construction Engineering and Management , Vol 129, January/February 2003, pp 25-31, (DOI: 10.1061/(ASCE)0733-9364(2003)129:1(25)).

13 As noted in the above review, recent studies have found that three-quarters or more of new road capacity will be filled after the first few years of operation, particularly in crowded urban areas with significant "latent" demand. One California study estimated that 90 percent of new road capacity will be filled within five years. In this context, the estimates used in Sightline's spreadsheet model (i.e., that 10 percent of additional road capacity will be filled per year after a new lane opens) is fairly conservative. See also note 4.

14 See note 4.

15 See note 2.

Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions

Policy Brief

Susan Handy, University of California, Davis
Marlon G. Boarnet, University of Southern California

September 30, 2014

Policy Brief:
http://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_brief.pdf

Technical Background Document:
http://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_bkgd.pdf

California Environmental Protection Agency
Air Resources Board

Policy Brief on the Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions

Susan Handy, University of California, Davis
Marlon G. Boarnet, University of Southern California

Policy Description

Because stop-and-go traffic reduces fuel efficiency and increases greenhouse gas (GHG) emissions, strategies to reduce traffic congestion are sometimes proposed as effective ways to also reduce GHG emissions. Although transportation system management (TSM) strategies are one approach to alleviating traffic congestion,[1] traffic congestion has traditionally been addressed through the expansion of roadway vehicle capacity, defined as the maximum possible number of vehicles passing a point on the roadway per hour. Capacity expansion can take the form of the construction of entirely new roadways, the addition of lanes to existing roadways, or the upgrade of existing highways to controlled-access freeways.

One concern with this strategy is that the additional capacity may lead to additional vehicle travel. The basic economic principles of supply and demand explain this phenomenon: adding capacity decreases travel time, in effect lowering the "price" of driving; when prices go down, the quantity of driving goes up (Noland and Lem, 2002). An increase in vehicle miles traveled (VMT) attributable to increases in capacity is called "induced travel." Any induced travel that occurs reduces the effectiveness of capacity expansion as a strategy for alleviating traffic congestion and offsets any reductions in GHG emissions that would result from reduced congestion. If the percentage increase in VMT matches the percentage increase in capacity, congestion (a function of the ratio of VMT to capacity) is not alleviated at all.

Conversely, some communities have decreased roadway capacity, in part motivated by the goal of reducing VMT. While temporary reductions in highway capacity are common (e.g. through the closure of lanes for construction or emergencies), permanent reductions are relatively rare. San Francisco eventually removed two elevated freeway segments damaged in the 1989 Loma Prieta earthquake, replacing them with street-level boulevards. Many European cities have closed selected streets in their

[1] See the separate policy brief on traffic incident clearance programs: http://arb.ca.gov/cc/sb375/policies/policies.htm

commercial cores to car traffic. This strategy is less common in U.S. cities, but one notable example is the recent elimination of vehicle traffic in Times Square in New York City. Increasingly common in the U.S. are “road diet” projects that re-allocate a portion of the public right-of-way for modes other than cars, though such projects do not necessarily decrease the capacity of the roadway as measured by vehicle throughput.

Impacts of Highway Capacity Expansion

Increased highway capacity can lead to increased VMT in the short run in several ways: if people shift from other modes to driving, if drivers make longer trips (by choosing longer routes and/or more distant destinations), or if drivers make more frequent trips (Noland and Lem, 2002; Gorham, 2009; Litman, 2010). Longer-term effects may also occur if households and businesses move to more distant locations or if development patterns become more dispersed in response to the capacity increase. Capacity expansion can lead to increases in commercial traffic as well as passenger travel (Duranton and Turner, 2011).

The induced-travel impact of capacity expansion is generally measured with respect to the change in VMT that results from an increase in lane miles, determined by the length of a road segment and its number of lanes (e.g. a two mile segment of a four-lane highway equates to eight lane miles). Effect sizes are usually presented as the ratio of the percent change in VMT associated with a one percent change in lane miles. The expectation is that this ratio, also called an “elasticity,” will be positive: an increase in lane miles will lead to an increase in VMT. An elasticity of 1 or greater means that the new capacity is entirely filled by additional VMT, producing no reduction in congestion or GHG emissions; for elasticities between 0 and 1, the closer the elasticity is to zero, the smaller the increase in VMT relative to the increase in capacity, and thus the greater the reduction in congestion and GHG emissions.

Impacts are also sometimes measured as the change in VMT associated with the change in travel time (that results from the change in highway capacity). Many studies analyze the change in the number of vehicles per day on that road segment (a metric called “average daily traffic”). No studies focused on travel time or average daily traffic are included here.

Effect Size

Studies consistently show that increased capacity induces additional VMT. Elasticity estimates of the short-run effect of increased highway capacity range from 0.3 to 0.6, though one study produced a lower estimate of 0.1 (Table 1). Estimates of the long-run effect of increased highway capacity are considerably higher, mostly falling into the range from 0.6 to just over 1.0. The more recent studies have produced the highest estimates of long-run elasticities using more sophisticated methodologies that are better able to illuminate the impact of highway capacity on VMT (as discussed in the accompanying Technical Background Document). Thus, the best estimate for the long-run effect of highway capacity on VMT is an elasticity close to 1.0, implying that in congested metropolitan areas, adding new capacity to the existing system of limited-access highways is unlikely to reduce congestion or associated GHG in the long-run.

Table 1. Impact of Capacity Expansion on VMT

Study	Study location	Study year(s)	Results	
			Change in VMT/ change in lane miles	*Time period*
Duranton and Turner, 2011	U.S.	1983 - 2003	1.03	10 years
Cervero, 2003	California	1980 - 1994	0.10	Short term
			0.39	Long term
Cervero and Hansen, 2002	California	1976 - 1997	0.59	Short term (1 year)
			0.79	Intermediate term (5 years)
Noland, 2001	U.S.	1984 - 1996	0.30 to 0.60	Short term
			0.70 to 1.00	Long term
Noland and Cowart, 2000	U.S.	1982 - 1996	0.28	Short term
			0.90	Long term
Hansen and Huang, 1997	California	1973 - 1990	0.20	Short term
			0.60 to 0.70	Long term – counties
			0.90	Long term – metro areas

Even the earlier studies were skeptical about the potential of capacity expansion to reduce VMT, particularly in the long-run. In 1997, Hansen and Huang found that population growth is the most consistent contributor to VMT growth, but that the contribution from increases in lane miles is significant: "…Our results suggest that the urban [state highway lane miles] added since 1970 have, on the whole, yielded little in the way of level of service improvements." Noland (2001) concluded that "Increased capacity clearly increases vehicle miles of travel beyond any short run congestion relief

that may be obtained." More recently, Duranton and Turner (2011) echoed these earlier studies: "We conclude that increased provision of roads… is unlikely to relieve congestion."
The effect size appears to depend on the size (whether in terms of population or geographic extent) of the metropolitan area. On a percentage basis, the effects are larger for smaller areas (Schiffer, et al. 2005), likely for a number of reasons. In smaller areas, capacity increases are likely to represent larger percentage increases in total capacity, which then produce larger percentage increases in VMT (Noland and Cowart, 2000). Note that the amount (rather than the percentage) of induced travel is likely to be greater in larger areas than in smaller areas (Hansen and Huang, 1997).

Other factors may also influence the effect size. As noted above, the effect is larger in the long-run than in the short-run, with one study concluding that the full impact of capacity expansion on VMT materializes within five years (Hansen and Huang, 1997) and another concluding that the full effect takes as long as ten years (Durantan and Turner, 2011). The level of congestion is important, as capacity expansion will produce a larger reduction in travel time and thus a larger increase in VMT when congestion is high than when it is low and driving speeds are unconstrained (Schiffer, et al. 2005). In addition, the effect size may depend on fuel prices: when fuel prices are lower, the induced travel effects of expanded capacity tend to be higher, as travel time is a greater share of the cost of travel in this situation (Noland and Lem, 2002). Whether the form of capacity expansion (i.e. new roads or expanded roads) matters is not clear (Schiffer, et al., 2005).

An important question is whether increased VMT on highways following capacity expansion is partially offset by decreases in VMT on other roads. This would be the case if drivers shifted from slower and more congested roads to the new or newly expanded highways. However, Hansen and Huang (1997) found "no conclusive evidence that increases in state highway lane-miles have affected traffic on other roads," while more recently Duranton and Turner (2011) concluded that "increasing lane kilometers for one type of road diverts little traffic from other types of road." In other words, capacity expansion leads to a net increase in VMT, not simply a shifting of VMT from one road to another.

Another important question is whether increased highway capacity impacts public transit ridership, or vice versa. The potential interactions are complex. Increased highway capacity could lead public transit riders to shift to driving, thereby contributing to the induced travel effect. Conversely, increased public transit service could entice drivers to replace some driving with public transit, thereby reducing highway traffic and in effect freeing up additional capacity that could then lead to induced traffic. Duranton and

Turner (2011) found no evidence that public transit service affects VMT, suggesting that whatever interactions do occur tend to cancel each other out. In other words, adding transit capacity does not help to reduce congestion, as any freed up capacity is consumed by additional driving.

As noted, some communities have decreased roadway capacity, in part motivated by the goal of reducing VMT. Evidence on the effects of roadway removals or capacity decreases is sparse, however. A 1998 study of 60 locations where road space was taken away from cars in the UK, Canada, Tasmania, and Japan found that, on average, 25 percent of VMT seemed to go away, though the effect size varied widely (Goodwin, et al. 1998). A study of a fourteen-month closure of an important bridge in Calgary, Canada found only a small reduction in trips and little change in behavior with respect to mode (Hunt et al., 2001). Researchers also found limited changes in behavior during the temporary closing for construction of a stretch of Interstate 5 through downtown Sacramento in 2008 (Ye et al., 2012). Studies of the removal of the Central Freeway in San Francisco documented a significant drop in traffic: counts on the boulevard that replaced the freeway were roughly 50 percent less than counts on the freeway (Cervero et al., 2009). Effects on VMT rather than traffic counts have not been assessed.

Evidence Quality

The quality of the evidence linking highway capacity expansion to VMT increases is relatively high, although tying changes in VMT to changes in capacity is challenging. The cited studies use time-series data and sophisticated econometric techniques to estimate the effect size. These studies control for other factors that might also affect VMT, including population growth, increases in income, other demographic effects, and changes in transit service (Noland and Lem, 2002).

Although these studies show a strong correlation between capacity increases and increases in VMT, the direction of causality is an important question in that the anticipation of growth in VMT is generally the rationale for capacity expansion. One study showed that a 10 percent increase in VMT is associated with a 3.3 percent increase in lane-miles (Cervero and Hansen, 2002). However, Fulton, et al. (2000) found that growth in lane-miles precedes growth in VMT, and Duranton and Turner (2011) concluded that “roads are assigned to [metropolitan areas] with little or no regard for the prevailing level of traffic.” The cited studies have found a significant influence of capacity expansion on VMT even after accounting for the reverse effect.

Caveats

Many of the studies focus on California, and the results for these studies are similar to those for the national studies, suggesting that the effects are relatively uniform across the U.S. However, as noted above, the effect size may depend on size of the metropolitan area, existing levels of congestion, and fuel prices, and it is likely to be higher in the long run than in the short run.

GHG Emissions

The effect of capacity expansion on GHG emissions depends on two competing effects: the increase in VMT (which increases GHG emissions), and the reduction in traffic congestion (which tends to decrease GHG emissions). As noted above, any induced travel that occurs reduces the effectiveness of capacity expansion as a strategy for alleviating traffic congestion and offsets any reductions in GHG emissions that would result from improved traffic flow. Noland (2001) predicted that the growth in VMT attributable to increased lane miles would produce an additional 43 million metric tons of CO_2 emissions in 2012 nationwide. Conversely, any reductions in VMT resulting from reductions in capacity will reduce GHG emissions, though if traffic congestion increases as a result of the capacity reduction, the benefits will be offset to some degree.

Co-benefits

Given the induced travel effect, capacity expansion has limited potential as a strategy for reducing congestion. The additional vehicle travel induced by capacity expansion increases GHG emissions as well as other environmental effects, including increased air, water, and noise pollution. On the other hand, capacity expansion potentially generates economic and social benefits, at least in the short run, even if the new capacity is completely filled by induced travel. The additional benefits derive from the fact that the expanded highway is carrying more people, each of whom benefits from his or her travel. However, most studies of the impact of capacity expansion on development in a metropolitan region find no net increase in employment or other economic activity, though highway investments do influence where within a region development occurs (Handy, 2005; Funderberg et al., 2010).

In addition, the construction process itself generates both positive and negative effects. Most obviously, highway construction projects create jobs that can boost the local economy. On the other hand, highway construction projects often have substantial negative effects on the communities through which they are sited, particularly if construction necessitates the removal of homes or businesses. Historically, low-income and/or minority communities were and continue to be disproportionately affected by such projects.

In contrast, reductions in road capacity tend to produce positive social and environmental effects, and they can also generate economic benefits. For example, many cities in Europe have adopted the strategy of closing streets in the central business district to vehicle traffic as an approach to economic revitalization (Hajdu, 1988; Rodriguez, 2011). Road diet projects are becoming increasingly popular in California and elsewhere in the U.S. as a way to support modes other than driving and enhance the local environment, though their economic impacts have not yet been systematically documented.

Examples

California continues to expand its highway system, though at a far slower rate than during the era of interstate highway construction. According to the national Bureau of Transportation Statistics, California had 31,435 miles of freeways, highways, and arterial roadways in 2010, a 1.6 percent increase from 2005.

As noted above, San Francisco removed two segments of elevated freeway damaged in the 1989 Loma Prieta earthquake. The Central Freeway was replaced with Octavia Boulevard, while the removal of the Embarcadero Freeway enabled substantial improvements to the at-grade Embarcadero Boulevard. Both projects sparked an on-going revitalization of their surrounding areas (Cervero, et al. 2009).

The strategy of closing central business district streets to car traffic is uncommon in California but not unknown. Cities in California that have or have had “pedestrian malls” include Burbank, Oxnard, Pomona, Redding, Redlands, Sacramento, and Santa Cruz. The Fulton Mall in downtown Fresno, closed to traffic in the 1960s, has struggled, despite several revitalization efforts. In contrast, Santa Monica’s Third Street Promenade, closed to traffic in the 1960s, is widely seen as a success in promoting economic activity and creating a thriving community core.

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