

**California Statewide Travel Demand Model,
Version 2.0**

Zonal Properties and Other Inputs

**final
report**

prepared for

California Department of Transportation

prepared by

Cambridge Systematics, Inc.

and

HBA Specto, Inc.

final report

California Statewide Travel Demand Model, Version 2.0

Zonal Properties and Other Inputs

prepared for

California Department of Transportation

prepared by

Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

date

May 2014

Table of Contents

1.0	Introduction.....	1-1
2.0	Base Zonal Properties File	2-1
2.1	File description.....	2-1
2.2	Employment by Industry	2-1
2.3	Employment by Occupation	2-2
2.4	School Enrollment Data.....	2-3
2.5	Parking Costs	2-3
2.6	Other Zonal Properties	2-7
2.7	Zone Groupings	2-7
3.0	Auto Operating Costs.....	3-1
3.1	Gasoline Prices	3-1
3.2	Vehicle Fuel Economy	3-3
3.3	Non-Fuel Component.....	3-4
3.4	Auto Operating Cost Assumptions for Modeling.....	3-5

List of Tables

Table 1.1	Assumed Auto Operating Costs per Mile by Year (\$2010)	1-2
Table 2.1	Employment by Industry.....	2-1
Table 2.2	Employment by Occupation.....	2-2
Table 2.3	Zone Groupings.....	2-8
Table 3.1	Historic and Forecast U.S. Transportation Motor Gasoline Prices, 2000-2050, in 2011 Dollars.....	3-1
Table 3.2	Auto Operating Cost Estimates for CSTDM, Version 2.0.....	3-5

List of Figures

Figure 2.1	Base Parking Costs	2-5
Figure 2.2	Additional Daily Parking Costs	2-6
Figure 2.3	Land Use Zones (LUZ).....	2-11
Figure 2.4	National Park Area (square miles)	2-12
Figure 2.5	Coastal Zones.....	2-13
Figure 2.6	Ski Zones	2-14
Figure 3.1	Annual Retail Gasoline Prices (dollars per gallon), 2000-2012 (nominal dollars)	3-2
Figure 3.2	Forecast Motor Gasoline Price in California, in 2011 Dollars.....	3-2
Figure 3.3	Projections of Fuel Economy of Light-Duty Vehicles	3-4

1.0 Introduction

This report provides background information and a description of the base zonal properties input file for the California Statewide Travel Demand Model (CSTDM), Version 2.0, as well as other scenario-specific inputs such as auto operating costs¹. This zonal properties document describes the population and employment attributes specific to each zone. In model operation, a Python preparation script is used by taking a single-point input file (the “Base” file described in this document) containing the minimum set of necessary data. This Python script will produce individual zonal property files for each of the CSTDM submodels (excluding the LDCVM), as well as the zonal properties file loaded by Cube in the model run.

The CSTDM Version 2.0, included updated assumptions for gasoline prices and fuel efficiency forecasts in California with the latest U.S. Energy Information Administration (EIA) projections. This report documents the latest forecasts and the approach of combining gasoline prices and fuel efficiency forecasts factors into auto operating costs for CSTDM base and future year forecasts. The approach for forecasting auto operating costs is consistent with the methodology and forecasts used for the 2014 Business Plan for the California High Speed Rail Authority². The auto operating cost projections recognize the following:

- The most current motor gasoline price projections. The projected motor gasoline prices in California were based on the 2013 Annual Energy Outlook (AEO). EIA’s forecasts extended through 2040 and were extrapolated by Cambridge Systematics to forecast to 2050.
- The final Corporate Average Fuel Economy (CAFE) standards. The 2013 AEO forecasts included the adopted fuel efficiency standards for model year (MY) 2017 through MY 2025.

The assumed auto operating costs for the base and forecast years are summarized in Table 1.1.

¹ Detailed descriptions of the zonal properties data are described in the Parking Cost and Population, Employment, and School Enrollment documentation.

² Cambridge Systematics memo 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, September 23, 2013.

Table 1.1 Assumed Auto Operating Costs per Mile by Year (\$2010)

Year	Auto Operating Cost
2000	\$0.19
2010	\$0.23
2015	\$0.24
2020	\$0.24
2035	\$0.21
2040	\$0.22
2050	\$0.22

2.0 Base Zonal Properties File

2.1 FILE DESCRIPTION

The base zonal properties file is a CSV format file, in which each row represents a TAZ and each column represents a zonal property. The first row contains the “headers” for each of the properties. These short names describe what the specific property is. It is vital that these names are maintained: the Python script refers to the columns by name when preparing the other files. The column with the header “TAZ” contains the TAZ ID numbers.

2.2 EMPLOYMENT BY INDUSTRY

Nine columns are used to represent the number of employees working in each zone, with groups based on the two-digit North American Industry Classification System (NAICS) categories. The first eight totals are for civilian employees, with all military employees, regardless of stated industry, reported in the final total (“Military”). A list of these industry groupings is shown in Table 2.1 below.

Table 2.1 Employment by Industry

Header	NAICS code	NAICS Description
PrimSec	11	Agriculture, Forestry, Fishing and Hunting
	21	Mining, Quarrying, and Oil and Gas Extraction
	23	Construction
	31-33	Manufacturing
Whole	42	Wholesale Trade
Retail	44-45	Retail Trade
Tran_U	22	Utilities
	48-49	Transportation and Warehousing
Office	51	Information
	52	Finance and Insurance
	53	Real Estate and Rental and Leasing
	54	Professional, Scientific, and Technical Services
	55	Management of Companies and Enterprises
	56	Administrative and Support and Waste Management and Remediation Services

Header	NAICS code	NAICS Description
	92	Public Administration
EduMed	61	Educational Services
	62	Health Care and Social Assistance
LeisHosp	71	Arts, Entertainment, and Recreation
	72	Accommodation and Food Services
OthServ	81	Other Services (except Public Administration)
Military	n/a	Military employment, all industries

2.3 EMPLOYMENT BY OCCUPATION

Employment by occupation fields are an aggregation of the 23 top-level occupation groups in the 2000 Standard Occupation Coding (SOC) system. These data represent the number of workers working in a zone, by the occupation they perform, rather than the industry they work in.

These occupation totals represent civilian workers only. Military workers are classified based on their industry, so the “Military” category for employment by industry is also used where employment by occupation is needed. (Military occupations, in the SOC coding, are only occupations unique to the military, like sniper or rear admiral, but not cook or logistics clerk. For this reason, it is more appropriate to treat military workers as a totally separate workforce.) The employment by occupation data is most notably used in the long term decision portion of the SDPTM: workers only choose workplace locations that have appropriate occupations for them. The categories are documented in Table 2.2 below.

Table 2.2 Employment by Occupation

Header	Description	SOC Code	SOC Group
ManBus	Managerial and Business Occupations	11	Management occupations
		13	Business and financial operations specialists
ProfTech	Professional and Technical Occupations	15	Computer and mathematical occupations
		17	Architecture and engineering occupations
		19	Life, physical, and social science occupations
		21	Community and social service occupations
		23	Legal occupations
Education	Education Occupations	25	Education, training, and library occupations

Header	Description	SOC Code	SOC Group
Health	Healthcare Occupations	29	Healthcare practitioners and technicians occupations
		31	Healthcare support occupations
ServNS	Service (Non-Sales) Occupations	33	Protective service occupations
		37	Building and grounds cleaning and maintenance occupations
		39	Personal care and service occupations
SalesFE	Sales, Food and Entertainment Occupations	27	Arts, design, entertainment, sports, and media occupations
		35	Food preparation and serving related occupations
		41	Sales and related occupations
Clerical	Clerical Occupations	43	Office and administrative support occupations
BluCol	Blue Collar Occupations	45	Farming, fishing, and forestry occupations
		47	Construction and extraction occupations
		49	Installation, maintenance, and repair occupations
		51	Production occupations
		53	Transportation and material moving occupations
n/a	n/a	55	Military Specific Occupations

2.4 SCHOOL ENROLLMENT DATA

Three fields are required for school enrollment data at the school location, i.e., the number of students attending school in the zone by level. The three levels of school enrollment data are:

- E_K8 - enrollment in kindergarten and grades 1-8;
- E_912 - enrollment in grades 9-12; and
- E_PSE - enrollment in post-secondary education.

2.5 PARKING COSTS

Parking costs are a major policy constraint, and an important external input to the CSTDM system. Zones without a manually specified parking price will have no parking charge applied to them. The primary price for parking is called the "base price", which represents 1/20 of the cost for parking purchased monthly, and which is used in the SDPTM for work and school purposes where parking is typically purchased on a long-term basis. This parking price is specified in the zonal properties file as "Park_Base", in base year dollars. For 2010, this ranges up

to almost \$24 (corresponding to \$480/month parking). A regression model then develops daily and hourly prices based on the base price. These are used in the SDPTM for other purposes, such as shopping and recreation. The daily parking rate is also used in the LDPTM.

An additional cost that can be specified in the zonal properties file, "Park_Add_Daily," is added to the daily and proportionally to the hourly cost only, leaving the base unadjusted. This can be used to represent areas with pay parking for visitors, but not for workers - airports are a location that this may apply to. The parking costs are additive (i.e., if both are specified with nonzero values, then daily/hourly costs use both the base and the additional daily cost). Negative parking costs can also be specified, to represent a reduction in parking cost - although caution should be used with this feature, to avoid possible negative parking costs in some areas (that would be interpreted in the model as if a sum of money was handed to people for visiting the location). Figures 2.1 and 2.2 graphically show the distribution of base year parking costs from Park_Base and the additional costs from Park_Add_Daily, respectively.

Figure 2.1 Base Parking Costs

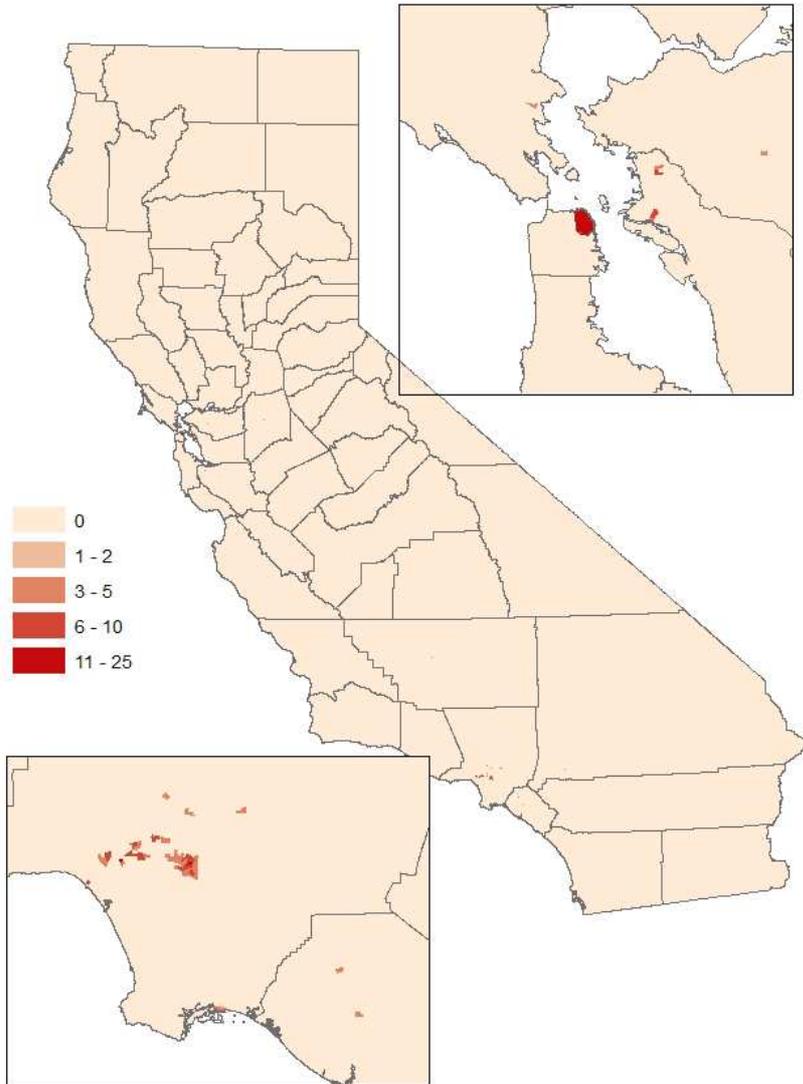
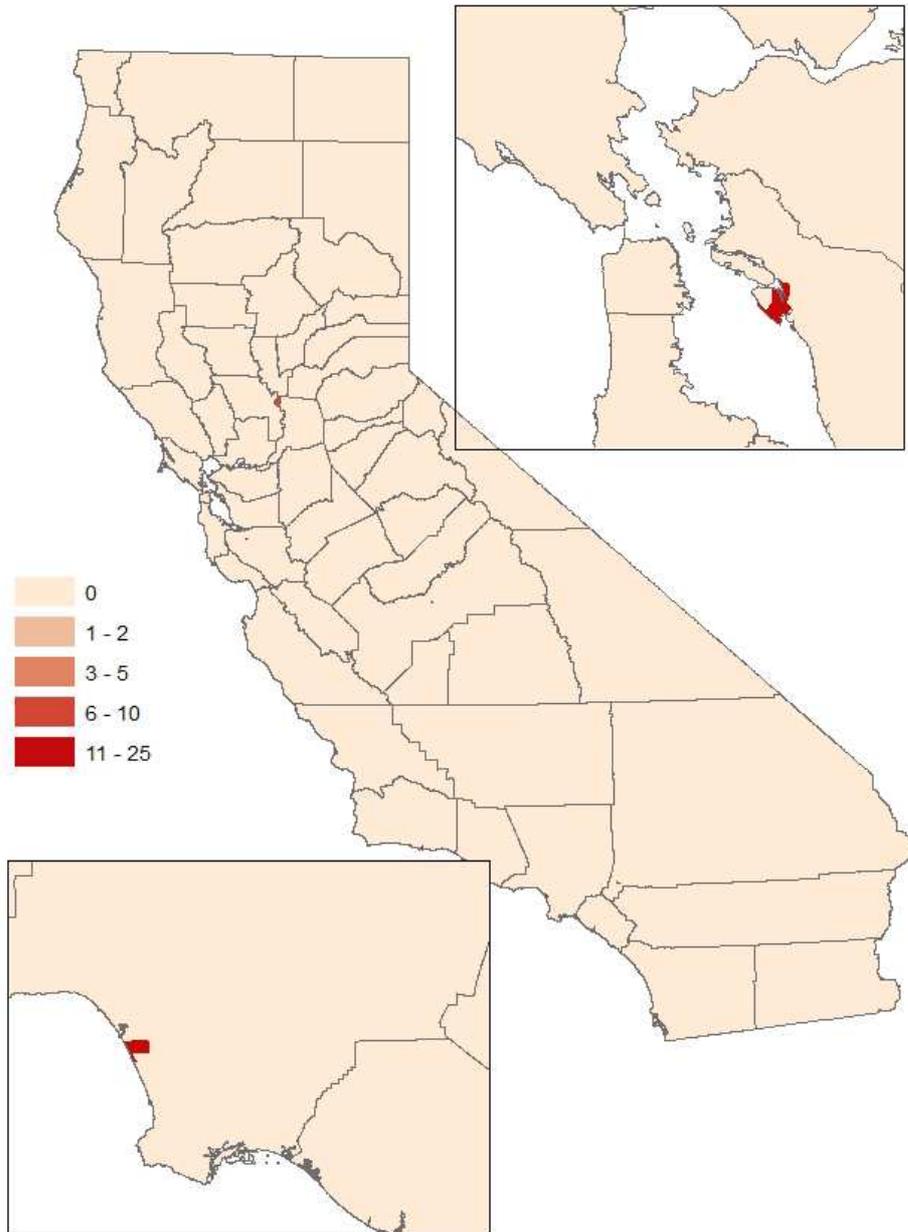


Figure 2.2 Additional Daily Parking Costs



2.6 OTHER ZONAL PROPERTIES

A small number of other zonal properties are specified in the zonal properties file to represent some intrinsic properties of the zone:

- Area_SqMi: Area of the zone, in square miles;
- Long: Longitude of the zone, decimal degrees;
- Lat: Latitude of the zone, decimal degrees; and
- x-meters, y-meters: coordinates for the zone, measured in meters.

These values should not change, with the exception of changes to the underlying zone system, in which case the values would need to be recalculated for the split or aggregated zones.

2.7 ZONE GROUPINGS

Zones are assigned to different geographic groups, aggregated for different purposes. The detailed values of these are shown in Table 2.3 below, but the general groups are:

- County: County name.
- FAF_Area: Areas defined by the Freight Analysis Framework, associated with the Commodity Flow Study.
- Calib_5, Calib_7, Calib_8, Calib_22 Calib_36: Areas defined for SDPTM and LDPTM calibration; area interaction factors are based on these. There are both numeric codes and full descriptions (the latter appended with the tag _Name).
- LUZ: PECAS Land Use Zone, which is kept for the model connectivity with the land use model. See Figure 2.4.
- The following are a list of major attractions that are referred to in the LDPTM:
 - NP_Area: Provides square miles of the zone that is a designated national park. See Figure 2.5.
 - Coastline: Denotes coastal zones. See Figure 2.6.
 - Disney: Denotes zone that includes California's Disneyland.
 - Ski: Denotes zones with major ski resorts. See Figure 2.7.
 - ConvCent: Denotes zones with the major convention centers in San Francisco, Los Angeles, Orange, and San Diego Counties.

The values for these generalized groupings should not change, with the exception of changes to the underlying zone system – in this case, zones that are split or aggregated can use the appropriate values for the county the zone is located in.

Table 2.3 Zone Groupings

County	FAF_Area	Calib_5_Name	Calib_7_Name	Calib_8_Name	Calib_22_Name	Calib_36_Name
Alameda	CA SF	MTC	MTC	MTC	MTC - Alameda	MTC - Alameda
Alpine	CA Rem	Remainder	North-Sierras	Sierras	Western Sierra Nevada	Western Sierra Nevada - C Sierras
Amador	CA Rem	Remainder	North-Sierras	Sierras	Western Sierra Nevada	Western Sierra Nevada - C Sierras
Butte	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Valley
Calaveras	CA Rem	Remainder	North-Sierras	Sierras	Western Sierra Nevada	Western Sierra Nevada - C Sierras
Colusa	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Valley
Contra Costa	CA SF	MTC	MTC	MTC	MTC - Contra Costa	MTC - Contra Costa
Del Norte	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Coast
El Dorado	CA Sac	SACOG	SACOG	SACOG	SACOG	SACOG - Placer/El Dorado
Fresno	CA Rem	Remainder	SJV	SJV	SJV - Fresno / Madera	SJV - Fresno / Madera
Glenn	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Valley
Humboldt	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Coast
Imperial	CA Rem	SCAG	SCAG	SCAG	SCAG - Imperial	SCAG - Imperial
Inyo	CA Rem	Remainder	North-Sierras	Sierras	Western Sierra Nevada	Western Sierra Nevada - S Sierras
Kern	CA Rem	Remainder	SJV	SJV	SJV - Kern / Kings / Tulare	SJV - Kern
Kings	CA Rem	Remainder	SJV	SJV	SJV - Kern / Kings / Tulare	SJV - Kings/Tulare
Lake	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Wine
Lassen	CA Rem	Remainder	North-Sierras	North	Far North	Far North - N Sierras
Los Angeles	CA LA	SCAG	SCAG	SCAG	SCAG - Los Angeles	SCAG - Los Angeles
Madera	CA Rem	Remainder	SJV	SJV	SJV - Fresno / Madera	SJV - Fresno / Madera
Marin	CA SF	MTC	MTC	MTC	MTC - Marin / Sonoma / Napa	MTC - Marin
Mariposa	CA Rem	Remainder	North-Sierras	Sierras	Western Sierra Nevada	Western Sierra Nevada - C Sierras
Mendocino	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Wine
Merced	CA Rem	Remainder	SJV	SJV	SJV - Merced / San Joaquin / Stanislaus	SJV - Merced
Modoc	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Shasta

County	FAF_Area	Calib_5_Name	Calib_7_Name	Calib_8_Name	Calib_22_Name	Calib_36_Name
						Cascade
Mono	CA Rem	Remainder	North-Sierras	Sierras	Western Sierra Nevada	Western Sierra Nevada - S Sierras
Monterey	CA Rem	Remainder	Coast	Coast	AMBAG	AMBAG - Monterey
Napa	CA SF	MTC	MTC	MTC	MTC - Marin / Sonoma / Napa	MTC - Sonoma/Napa
Nevada	CA Sac	Remainder	North-Sierras	North	Far North	Far North - N Sierras
Orange	CA LA	SCAG	SCAG	SCAG	SCAG - Orange	SCAG - Orange
Placer	CA Sac	SACOG	SACOG	SACOG	SACOG	SACOG - Placer/El Dorado
Plumas	CA Rem	Remainder	North-Sierras	North	Far North	Far North - N Sierras
Riverside	CA LA	SCAG	SCAG	SCAG	SCAG - Riverside	SCAG - Riverside
Sacramento	CA Sac	SACOG	SACOG	SACOG	SACOG	SACOG - Sacramento
San Benito	CA SF	Remainder	Coast	Coast	AMBAG	AMBAG - SB/SC
San Bernardino	CA LA	SCAG	SCAG	SCAG	SCAG - San Bernadino	SCAG - San Bernadino
San Diego	CA SD	SANDAG	SANDAG	SANDAG	SANDAG	SANDAG
San Francisco	CA SF	MTC	MTC	MTC	MTC - San Francisco	MTC - San Francisco
San Joaquin	CA Rem	Remainder	SJV	SJV	SJV - Merced / San Joaquin / Stanislaus	SJV - San Joaquin
San Luis Obispo	CA Rem	Remainder	Coast	Coast	Central Coast	Central Coast - SLO
San Mateo	CA SF	MTC	MTC	MTC	MTC - San Mateo	MTC - San Mateo
Santa Barbara	CA Rem	Remainder	Coast	Coast	Central Coast	Central Coast - StaBa
Santa Clara	CA SF	MTC	MTC	MTC	MTC - Santa Clara	MTC - Santa Clara
Santa Cruz	CA SF	Remainder	Coast	Coast	AMBAG	AMBAG - SB/SC
Shasta	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Shasta Cascade
Sierra	CA Rem	Remainder	North-Sierras	North	Far North	Far North - N Sierras
Siskiyou	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Shasta Cascade
Solano	CA SF	MTC	MTC	MTC	MTC - Solano	MTC - Solano
Sonoma	CA SF	MTC	MTC	MTC	MTC - Marin / Sonoma / Napa	MTC - Sonoma/Napa
Stanislaus	CA Rem	Remainder	SJV	SJV	SJV - Merced / San Joaquin / Stanislaus	SJV - Stanislaus

County	FAF_Area	Calib_5_Name	Calib_7_Name	Calib_8_Name	Calib_22_Name	Calib_36_Name
Sutter	CA Rem	SACOG	SACOG	SACOG	SACOG	SACOG - Yuba-Sutter
Tehama	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Shasta Cascade
Trinity	CA Rem	Remainder	North-Sierras	North	Far North	Far North - Shasta Cascade
Tulare	CA Rem	Remainder	SJV	SJV	SJV - Kern / Kings / Tulare	SJV - Kings/Tulare
Tuolumne	CA Rem	Remainder	North-Sierras	Sierras	Western Sierra Nevada	Western Sierra Nevada - C Sierras
Ventura	CA LA	SCAG	SCAG	SCAG	SCAG - Ventura	SCAG - Ventura
Yolo	CA Sac	SACOG	SACOG	SACOG	SACOG	SACOG - Yolo
Yuba	CA Rem	SACOG	SACOG	SACOG	SACOG	SACOG - Yuba-Sutter

Figure 2.3 Land Use Zones (LUZ)

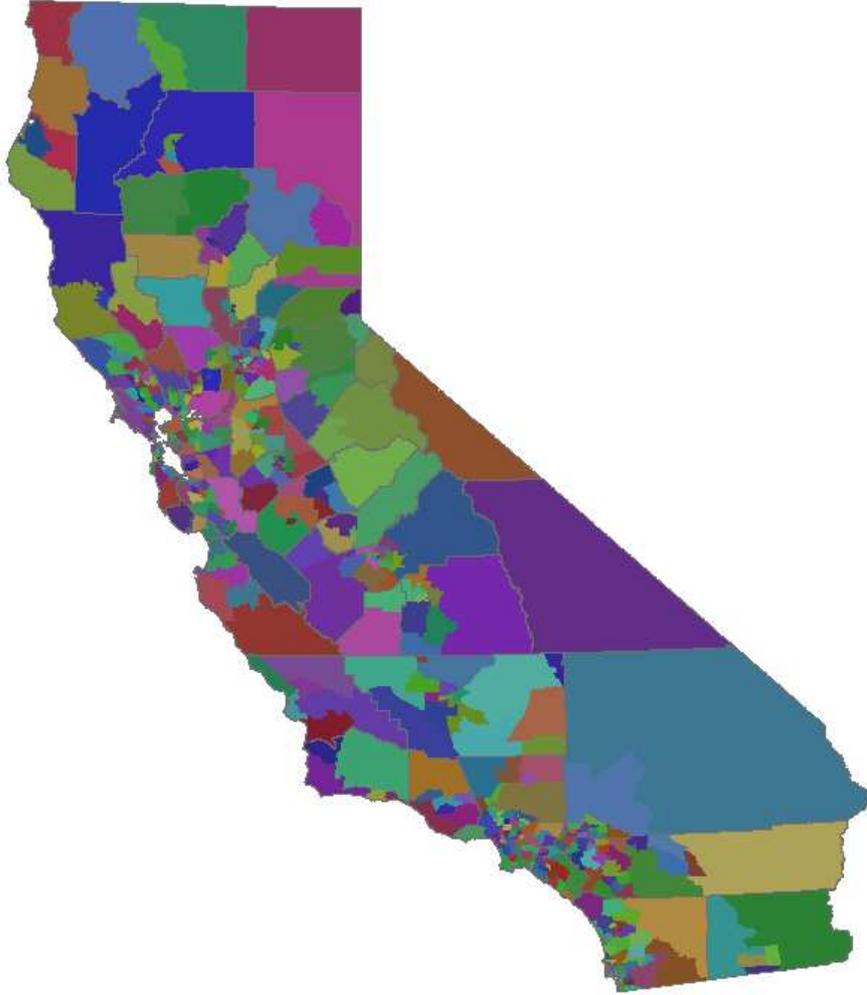


Figure 2.4 National Park Area (square miles)

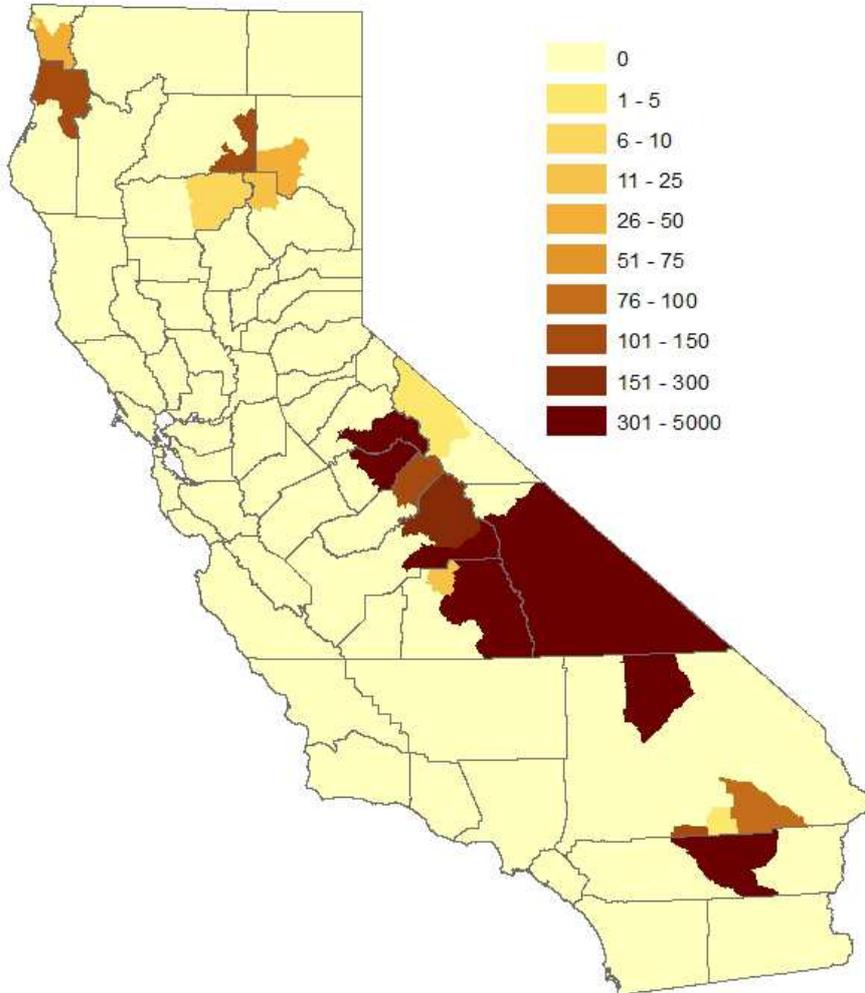


Figure 2.5 Coastal Zones



Figure 2.6 Ski Zones



3.0 Auto Operating Costs

3.1 GASOLINE PRICES

The U.S. Energy Information Administration (EIA) forecasts motor gasoline prices through 2040 for three different scenarios in its 2013 Annual Energy Outlook (AEO): reference, low, and high. Table 2 shows the EIA 2013 price forecasts from 2020 to 2040 in 2011 dollars. CS extrapolated the forecasts to 2050 using the projected average annual growth rate from 2020 to 2040.

Table 3.1 Historic and Forecast U.S. Transportation Motor Gasoline Prices, 2000-2050, in 2011 Dollars

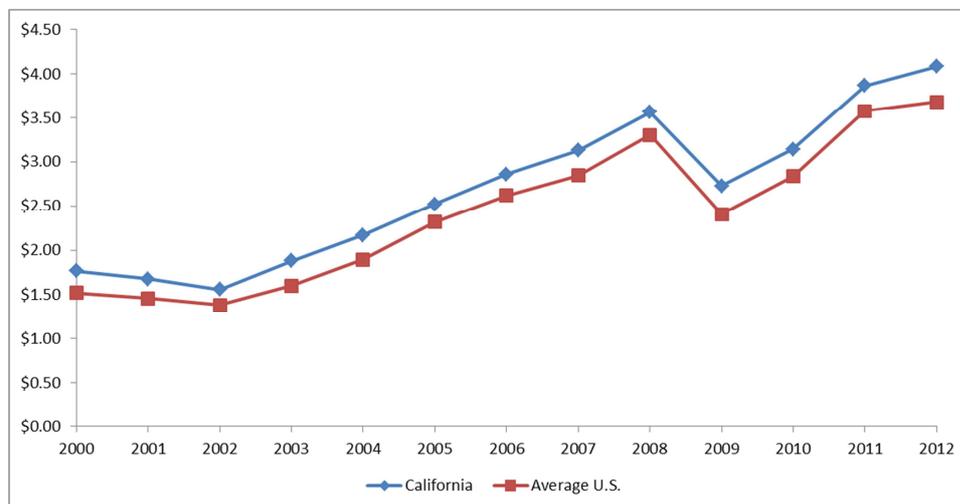
Year	Reference	High	Low
2000	\$1.52		
2010	\$2.84		
2015	\$3.12	\$3.88	\$2.77
2020	\$3.32	\$4.29	\$2.61
2035	\$3.94	\$5.33	\$2.60
2040	\$4.32	\$5.86	\$2.64
2050	\$4.90	\$6.83	\$2.66

Source: Annual Energy Outlook 2013 and CS extrapolation for 2050

Notes: (1) Sales weighted-average price for all grades. Includes Federal, State and Local taxes.
 (2) CAGR = compounded annual growth rate.

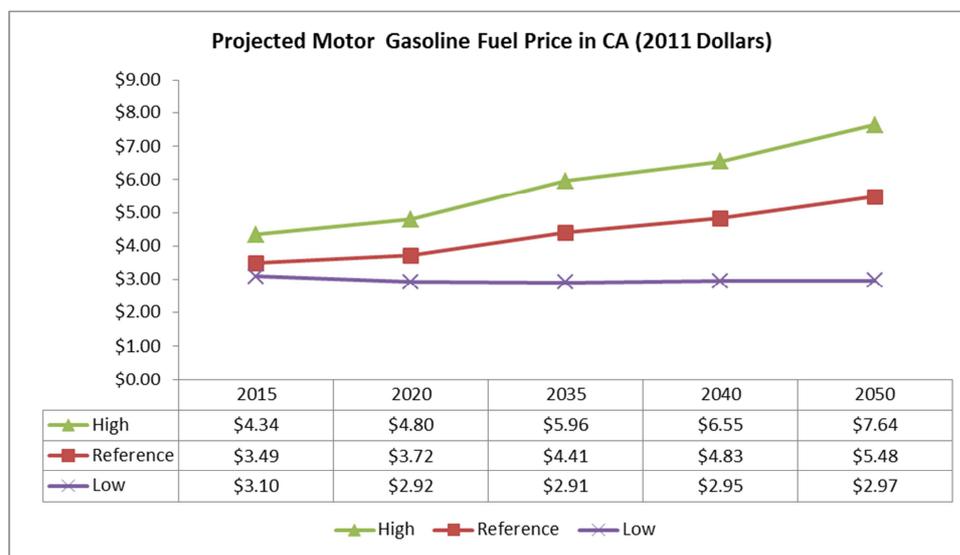
Historically, California retail gasoline prices have been higher than the U.S. average (Figure 3-1); the overall average for California prices over the US average prices over the 2000 to 2012 time period has been 12 percent. CS developed a forecast of California gasoline prices by taking the forecasts from EIA (from Table 3-1) and increasing them by 12 percent (Figure 3-2).

Figure 3.1 Annual Retail Gasoline Prices (dollars per gallon), 2000-2012 (nominal dollars)



Source: U.S. Energy Information Administration: Annual All Grades All Formulations Retail Gasoline Prices

Figure 3.2 Forecast Motor Gasoline Price in California, in 2011 Dollars



Source: Analysis of Annual Energy Outlook 2013

3.2 VEHICLE FUEL ECONOMY

The U.S. Energy Information Administration also provides projections for fuel economy (mpg) for light-duty vehicles through year 2040 for two cases:

- Reference Case - The AEO2013 Reference case includes the final CAFE standards for model years 2012 through 2016 (promulgated in March 2010) and the final standards adopted in October 2012 for model years 2017 through 2025, with subsequent CAFE standards for years 2026-2040 vehicles calculated using 2025 levels. In 2010, California accepted compliance with federal greenhouse gas (GHG) emission standards as meeting similar state standards and incorporated the national standards into their motor vehicle emissions program.³⁴ We interpret this to mean that in the future, national and California standards will be the same.
- Extended policy - The Reference case assumes that the CAFE standards are held constant at Model Year (MY) 2025 levels in subsequent model years, although the fuel economy of new light-duty vehicles (LDVs) would continue to rise modestly over time. The Extended case modifies the assumption assuming continued increases in CAFE standards after MY 2025. CAFE standards for new LDVs are assumed to increase by an annual average rate of 1.4 percent.

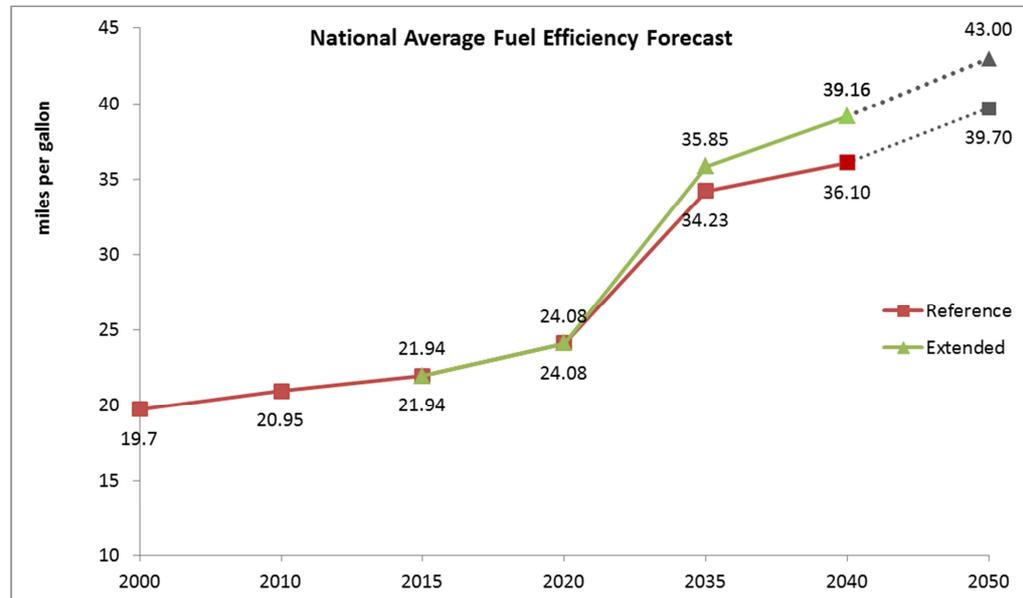
Figure 3-3 shows the fuel economy projections for the Reference and Extended policy case for the entire “on-the-road” fleet of vehicles (not only new vehicles). The average annual growth rate from 2035 to 2040 for the Reference case is 1.1 percent. The extrapolated fuel efficiency projections to year 2050 assumed a 1.0 percent Compound Annual Growth Rate for both scenarios.

³ EPA

(<http://yosemite.epa.gov/opa/admpress.nsf/1e5ab1124055f3b28525781f0042ed40/6f34c8d6f2b11e5885257822006f60c0!OpenDocument>)

⁴ California Air Resources Board, Statement of the California Air Resource Board Regarding Future Passenger Vehicle Greenhouse Gas Emission Standards, May 21, 2010.

Figure 3.3 Projections of Fuel Economy of Light-Duty Vehicles



Source: Annual Energy Outlook 2013, Transportation Sector Key Indicators and Delivered Energy Consumption

Notes: Combined "on-the-road" estimate for all cars and light trucks

3.3 NON-FUEL COMPONENT

For the original California High Speed Rail Ridership and Revenue Model calibration effort in 2006-2007, non-fuel operating costs⁵ were assumed to be 67 percent of the gasoline operating cost.⁶ For the estimation of the California High Speed Rail Ridership and Revenue Model-Version 2, being used for the 2014 Business Plan forecasts, an estimate of 20 cents per mile, in 2005 dollars, was used for auto operating cost for the 2010 base year. That auto operating cost was based on a \$2.80 per gallon average cost of fuel in 2005 dollars⁷, an average fuel efficiency of 22 miles per gallon⁸, and a 7.5 cent per mile non-fuel cost. Since the

⁵ Non-fuel costs include maintenance and repair, motor oil, parts, and accessories.

⁶ Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study, Levels-of-Service Assumptions and Forecast Alternatives, prepared for Metropolitan Transportation Commission and California High-Speed Rail Authority, prepared by Cambridge Systematics, Inc., August 2006, Table 2-1, page 2-2.

⁷ Equates to \$3.22 per gallon in 2011 dollars. Source is U.S. Energy Information Administration estimate for California.

⁸ Source: California Motor Vehicle Stock, Travel, and Fuel Forecast, 2008, Table 7, Page 63.

non-fuel operating costs are likely to be less volatile than fuel prices, it is reasonable to keep them as a constant amount, modified only by inflation over time. Non-fuel costs were rounded to 8 cents per mile in 2005 dollars, which equates to 9 cents per mile in 2010 or 2011 dollars.

3.4 AUTO OPERATING COST ASSUMPTIONS FOR MODELING

The Reference case from the Vehicle Fuel Economy Forecasts and the Reference case of gas prices were assumed to develop auto operating costs for use in the CSTDM system.

Table 3-2 summarizes the auto operating cost estimates from 2000 to 2050. Costs are expressed in:

- 2010\$ - consistent with what is used in the CSTDM, Version 2
- 2011\$ - consistent with the dollar amounts in the EIA projections

The currency conversions use the California consumer price index (CPI)⁹ values of:

- 226.92 for 2010
- 232.93 for 2011

Table 3.2 Auto Operating Cost Estimates for CSTDM, Version 2.0

Auto Operating Costs by Component	Reference/Base	
	2010\$	2011\$
Motor Gasoline in California	\$2.30	\$2.36
Fuel Efficiency (mpg)	20.5	20.5
Gas Operating Cost (\$/mile)	\$0.11	\$0.11
Non Gasoline Operating Cost (\$/mile)	\$0.08	\$0.08
2000 Auto Operating Cost (\$/mile)	\$0.19	\$0.19
Motor Gasoline in California	\$3.14	\$3.22
Fuel Efficiency (mpg)	22	22
Gas Operating Cost (\$/mile)	\$0.14	\$0.15
Non Gasoline Operating Cost (\$/mile)	\$0.09	\$0.09

⁹ State of California, Department of Industrial Relations
(<http://www.dir.ca.gov/OPRL/capriceindex.htm>)

Auto Operating Costs by Component	Reference/Base	
	2010\$	2011\$
2010 Auto Operating Cost (\$/mile)	\$0.23	\$0.23
Motor Gasoline in California	\$3.40	\$3.49
Fuel Efficiency (mpg)	21.9	21.9
Gas Operating Cost (\$/mile)	\$0.15	\$0.16
Non Gasoline Operating Cost (\$/mile)	\$0.09	\$0.09
2015 Auto Operating Cost (\$/mile)	\$0.24	\$0.25
Motor Gasoline in California	\$3.62	\$3.72
Fuel Efficiency (mpg)	24.1	24.1
Gas Operating Cost (\$/mile)	\$0.15	\$0.15
Non Gasoline Operating Cost (\$/mile)	\$0.09	\$0.09
2020 Auto Operating Cost (\$/mile)	\$0.24	\$0.24
Motor Gasoline in California	\$4.29	\$4.41
Fuel Efficiency (mpg)	34.2	34.2
Gas Operating Cost (\$/mile)	\$0.13	\$0.13
Non Gasoline Operating Cost (\$/mile)	\$0.09	\$0.09
2035 Auto Operating Cost (\$/mile)	\$0.21	\$0.22
Motor Gasoline in California	\$4.71	\$4.83
Fuel Efficiency (mpg)	36.1	36.1
Gas Operating Cost (\$/mile)	\$0.13	\$0.13
Non Gasoline Operating Cost (\$/mile)	\$0.09	\$0.09
2040 Auto Operating Cost (\$/mile)	\$0.22	\$0.22
Motor Gasoline in California	\$5.34	\$5.48
Fuel Efficiency (mpg)	39.7	39.7
Gas Operating Cost (\$/mile)	\$0.13	\$0.14
Non Gasoline Operating Cost (\$/mile)	\$0.09	\$0.09
2050 Auto Operating Cost (\$/mile)	\$0.22	\$0.23