
CSTDM09 - California Statewide Travel Demand Model

Model Development

Zonal Properties

Final System Documentation: Technical Note

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1. Introduction

This document provides background information and a description of the base zonal properties input file for the California Statewide Travel Demand Model (CSTDM09). Detailed descriptions of the development of these data are described in the Parking Cost, Population, Employment, and School Enrollment documentation. This Zonal properties document describes the attributes of the population and employment specific to each zone. In model operation, a preparation script in Python is used. The script works by taking a single-point input file (the "Base" file described in this document) containing the minimum set of necessary data, and it produces 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.

2. 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 1 below.

Table 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
	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

These 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 below.

Table 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
Health	Healthcare Occupations	29	Healthcare practitioners and technicians occupations
		31	Healthcare support occupations
ServNS	Service (Non-	33	Protective service occupations

	Sales) 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:

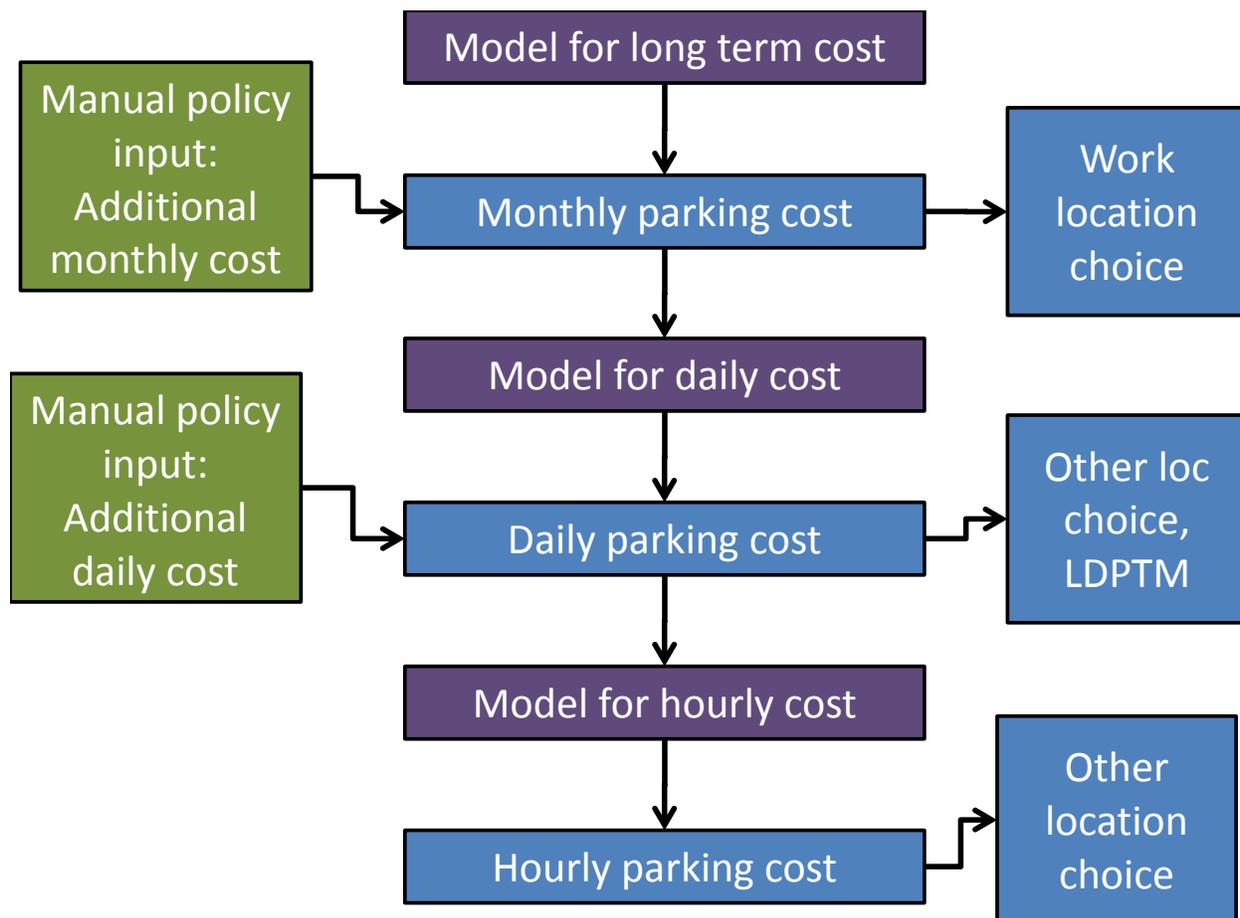
- E_K8 - enrollment in kindergarten and grades 1-8
- E_912 - enrollment in grades 9-12
- E_PSE - enrollment in post-secondary education

2.5 Additional Parking Costs

A base "market" price for parking is determined in each zone, based on a model. The model first determines a 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. The 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.

Two additional parking costs are specified in the zonal properties file. The first one, "Park_Add_Base", is added to the base monthly cost, and can be used to adjust all parking costs. Possible uses for this include representing blanket parking policies, and representing parking at specific locations with a non-market parking policy (such as hospitals and college campuses). The other additional cost, "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 are increased by the base and by the 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). Figure 1 below shows the flow of additional and model parking costs.

Figure 1: Parking cost calculations



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
- 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 10 different geographic groups, aggregated for different purposes. The detailed values of these are shown in table 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_22: Areas defined for SDPTM calibration; area interaction factors are based on these. There are both numeric codes and full descriptions (the latter appended with the tag _Name).
- LD_County, LD_Region, LD_Dist: Areas defined for the LDPTM, which are used for various generation and interaction effects.
- LUZ: PECAS Land Use Zone, which is kept for the model connectivity with the land use model.

These values 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 3: Zone Groupings

County	FAF_Area	Calib_5_Name	Calib_22_Name	Calib_5	Calib_22	LD_County	LD_Region	LD_Dist
Alameda	CA SF	MTC	MTC - Alameda	3	8	1	13	13
Alpine	CA Rem	Remainder	Western Sierra Nevada	1	13	2	12	12
Amador	CA Rem	Remainder	Western Sierra Nevada	1	13	3	12	12
Butte	CA Rem	Remainder	Far North	1	1	4	3	3
Calaveras	CA Rem	Remainder	Western Sierra Nevada	1	13	5	12	12
Colusa	CA Rem	Remainder	Far North	1	1	6	3	3
Contra Costa	CA SF	MTC	MTC - Contra Costa	3	7	7	13	14
Del Norte	CA Rem	Remainder	Far North	1	1	8	3	3
El Dorado	CA Sac	SACOG	SACOG	2	2	9	8	8
Fresno	CA Rem	Remainder	SJV - Fresno / Madera	1	11	10	4	4
Glenn	CA Rem	Remainder	Far North	1	1	11	3	3
Humboldt	CA Rem	Remainder	Far North	1	1	12	3	3

Imperial	CA Rem	SCAG	SCAG - Imperial	4	20	13	14	20
Inyo	CA Rem	Remainder	Western Sierra Nevada	1	13	14	12	12
Kern	CA Rem	Remainder	SJV - Kern / Kings / Tulare	1	12	15	5	5
Kings	CA Rem	Remainder	SJV - Kern / Kings / Tulare	1	12	16	6	6
Lake	CA Rem	Remainder	Far North	1	1	17	3	3
Lassen	CA Rem	Remainder	Far North	1	1	18	3	3
Los Angeles	CA LA	SCAG	SCAG - Los Angeles	4	17	19	14	21
Madera	CA Rem	Remainder	SJV - Fresno / Madera	1	11	20	4	4
Marin	CA SF	MTC	MTC - Marin / Sonoma / Napa	3	4	21	13	15
Mariposa	CA Rem	Remainder	Western Sierra Nevada	1	13	22	12	12
Mendocino	CA Rem	Remainder	Far North	1	1	23	3	3
Merced	CA Rem	Remainder	SJV - Merced / San Joaquin / Stanislaus	1	10	24	7	7
Modoc	CA Rem	Remainder	Far North	1	1	25	3	3
Mono	CA Rem	Remainder	Western Sierra Nevada	1	13	26	12	12
Monterey	CA Rem	Remainder	AMBAG	1	14	27	1	1
Napa	CA SF	MTC	MTC - Marin / Sonoma / Napa	3	4	28	13	15
Nevada	CA Sac	Remainder	Far North	1	1	29	3	3
Orange	CA LA	SCAG	SCAG - Orange	4	21	30	14	22
Placer	CA Sac	SACOG	SACOG	2	2	31	8	8
Plumas	CA Rem	Remainder	Far North	1	1	32	3	3
Riverside	CA LA	SCAG	SCAG - Riverside	4	19	33	14	23
Sacramento	CA Sac	SACOG	SACOG	2	2	34	8	8
San Benito	CA SF	Remainder	AMBAG	1	14	35	1	1
San Bernardino	CA LA	SCAG	SCAG - San Bernardino	4	18	36	14	24
San Diego	CA SD	SANDAG	SANDAG	5	22	37	9	9
San Francisco	CA SF	MTC	MTC - San Francisco	3	5	38	13	16
San Joaquin	CA Rem	Remainder	SJV - Merced / San Joaquin / Stanislaus	1	10	39	10	10
San Luis Obispo	CA Rem	Remainder	Central Coast	1	15	40	2	2
San Mateo	CA SF	MTC	MTC - San Mateo	3	6	41	13	17
Santa Barbara	CA Rem	Remainder	Central Coast	1	15	42	2	2
Santa Clara	CA SF	MTC	MTC - Santa Clara	3	9	43	13	18
Santa Cruz	CA SF	Remainder	AMBAG	1	14	44	1	1
Shasta	CA Rem	Remainder	Far North	1	1	45	3	3
Sierra	CA Rem	Remainder	Far North	1	1	46	3	3
Siskiyou	CA Rem	Remainder	Far North	1	1	47	3	3
Solano	CA SF	MTC	MTC - Solano	3	3	48	13	19
Sonoma	CA SF	MTC	MTC - Marin / Sonoma / Napa	3	4	49	13	15
Stanislaus	CA Rem	Remainder	SJV - Merced / San Joaquin / Stanislaus	1	10	50	11	11
Sutter	CA Rem	SACOG	SACOG	2	2	51	8	8
Tehama	CA Rem	Remainder	Far North	1	1	52	3	3

Trinity	CA Rem	Remainder	Far North	1	1	53	3	3
Tulare	CA Rem	Remainder	SJV - Kern / Kings / Tulare	1	12	54	6	6
Tuolumne	CA Rem	Remainder	Western Sierra Nevada	1	13	55	12	12
Ventura	CA LA	SCAG	SCAG - Ventura	4	16	56	14	25
Yolo	CA Sac	SACOG	SACOG	2	2	57	8	8
Yuba	CA Rem	SACOG	SACOG	2	2	58	8	8