

Memorandum

TO: Kalin Pacheco, Caltrans

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RE: Auto Occupancy Rates

This memo describes the method of calculating auto occupancy rates for vehicles with three or more people using the California Household Travel Survey (CHTS) data. The CSTDM has three type of auto trips - drive-alone, shared ride with 2 people (HOV2), and shared ride with 3 or more people (HOV3). The auto occupancy rates for the first two modes are 1 and 2 respectively, but for HOV3 trips, the auto occupancy rate is unknown and has to be determined from the CHTS survey data.

Methodology

The trip diary obtained from CHTS contained detailed information on all trips made by all household members during the survey period. In order to determine the average HOV3 occupancy rate, all HOV3 trips were first extracted from the CHTS trip data for analysis. Each trip contained information on the total number of persons travelling together for HOV3 trips. Simplistically, the HOV3 occupancy rate can be calculated by simply taking the average from all these HOV3 trips, but this method would result in over-counting of HOV3 trips that are made by different members of the same household. In order to prevent this over-counting, identical trips were flagged by identifying the household number, trip origin, trip destination, trip start-time and trip end-time. If all these characteristics matched for a set of trips, only one of them was kept and the remaining trips were discarded. This filtering process ensured no trips were double counted. In addition, there were some trips with very high occupancy rates, most likely from group bus trips that were likely to skew the results. All trips that had more than 7 people were discarded in order to prevent this skew. The resulting trip list was then weighted using CHTS expansion factors and HOV3 occupancy rates were calculated from the weighted data set. In order to understand the effect of *trip-length*, *key-geography* and *area-type* on HOV3 auto occupancy rates, the calculation was done on the entire data set as well as separately for each of these categories. The results of these calculations are summarized in Table 1.

Table 1. CHTS Average Auto Occupancy,

		HOV3 Auto Occupancy	Raw Trips	Weighted Trips
<i>Overall</i>		3.60	10,190	8,938,666
Short Distance		3.60	9,922	8,839,286
Long Distance		3.79	268	99,380
Trip Origin Area Type	Rural	3.64	1,267	729,919
	Sub-rural	3.65	2,761	2,271,268
	Suburban	3.58	5,964	5,796,384
	Urban	3.77	82	68,021
	CBD	3.53	48	32,026
Trip Origin Key Geography	Coastal	3.78	101	54,635
	North Eastern	3.71	78	14,116
	I-5 Corridor (North)	3.59	283	138,220
	SACOG	3.48	501	684,797
	Tahoe	3.48	43	7,079
	MTC	3.59	2,949	1,724,322
	San Joaquin Valley	3.70	1,395	1,049,621
	Eastern Sierra	3.69	119	30,914
	CentralCoast	3.59	489	318,246
	SCAG	3.58	3,703	4,255,706
	SANDAG	3.71	461	619,962

Results

The results show very little variation by trip-length, area-type or key-geography. Since the CHTS did not have sufficient number of observed trips in some of these categories, the ones with the highest number of raw trips were assumed to have the highest degree of accuracy. From these results, it is evident that the average auto occupancy rate is ~3.60 with very little variation. The rate for long distance trips is a bit higher than that of short distance trips but only by a very small margin. Based on the results, an average HOV3 auto-occupancy rate of 3.60 was chosen for implementation in CSTDM V2.0.