Analyzing the 2012 California Household Travel Survey using R: Summary

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Chapter 1

Introduction

The 2010-12 CHTS, which resulted from a statewide, collaborative effort, enabled the collection of travel information from 42,560 Californian households. This rich dataset has helped update regional and statewide travel and will help update environmental models.

In 2014, the Institute of Transportation Studies at Irvine (ITS) and Caltrans initiated the "Enhancing the Value of the 2010-12 California Household Travel Survey (CHTS)" contract. This contract was motivated by the idea that potential value of the CHTS is not always well understood by Caltrans staff and that some Caltrans staff from the Office of Travel Forecasting and Analysis may benefit from updating their knowledge of statistical modeling to comfortably query CHTS data and to estimate some common transportation econometrics models.

The specific elements of the contract included the following deliverables:

1. a systematic diagnostic review of the 2010-12 CHTS database for unlikely observations;
2. a set of interviews with staff at Caltrans headquarters and visits to three selected Caltrans Districts to better understand how they could benefit from using 2010-12 CHTS data and to help promote its use in their work;
3. hands-on statistical training and consulting to selected Caltrans staff in the Office of Travel Forecasting and Analysis in Sacramento;
4. on-call statistical support to Caltrans staff from the Office of Travel Forecasting and Analysis; and
5. a reference book of useful statistical commands based on actual case studies to make it easier to put the 2010-12 CHTS to work for Caltrans staff.

The book you are reading now is the last of these deliverables. It provides numerous examples of how to perform various types of statistical analysis on the CHTS. In chapter 2, we discuss the computation of statistical weights for various subpopulations in the CHTS—a critical component of any analysis involving the CHTS. In chapter 3, we cover the creation of a "linked trip" dataset, which provides a means for analyzing CHTS data in a manner that is compatible with conventional 4-step, trip based models. Finally, chapter 4 describes the solution of a number of statistical queries that were answered under task 4 statistical support tasks.

Chapter 2

Calculating Weights

2.1 County Level Person Weights

This document explains how county-level weights are developed using the R statistical software for people who participated in the 2012 CHTS. The purpose of these weights is to scale up information provided by respondents to the population of each county based on the socio-economic variables listed below. The person level weights were developed at the county level. Users of these weights are cautioned that these weights should not be applied to lower-level geographies such as cities or zip codes. Similar weights can be developed for these geographies if they contain enough CHTS respondents.

2.1.1 Methodology

Person-level county weights are calculated by raking at the person level. These weights adjust the relative importance of responses to reflect the different probabilities of selecting respondents, and align the sample distributions to population distributions based on the 2010 Census. In particular, person-level weights were adjusted so that the sum of these weights equals known population totals for certain subgroups of the population of each county. Variables used for raking at the person level are:

- Hispanic Status (Hispanic, Non-Hispanic) - County-wide distribution;
- Ethnicity (White, African American, Asian, Other) - County-wide distribution;
- Age (less than 20 years, 20 - 24 years, 25 - 34 years, 35 - 54 years, 55 - 64 years, 65 years or older) - County -wide distribution;
- Employment Status (Part-time or full-time Employed, Not-employed)- County-wide distribution; and
- Gender (Male, Female)- County-wide distribution

After the raking procedure, very large weights are capped to be no more than five times the mean of weight. To check whether the new weights represent the total population of the counties, we perform

some random checks for different variables and the results show that the new weights align with the county populations.

We use this new county wide person weight to calculate the final trip weight which is an outcome of `Trip Correction Factor (TCF) * New County Wide Person Weight`.

2.2 County Level Household Weights

This document explains how to develop county-level household weights using the R statistical software for households who participated in the 2012 CHTS. The purpose of these weights is to scale up information provided by respondents to the population of each county based on the socio-economic variables listed below. Users of county-level household weights are cautioned that these weights should not be applied to lower-level geographies such as cities or zip codes. Similar weights can be developed for these geographies using the approach described below if they contain enough CHTS respondents.

2.2.1 Methodology

Household-level county weights are calculated by raking at the household level. These weights adjust the relative importance of responses to reflect the different probabilities of selection of CHTS respondents, and they align sample distributions to population distributions based on the 2010 Census. In particular, household weights were adjusted so that the sums of adjusted weights are equal to known population totals for some subgroups of the population of each county. Following NuStats' work for Caltrans, the variables used for raking at the household level are:

- Household size (1, 2, 3, 4 or more) - County wide distribution;
- Household income (Less than $24,999, $25,000 - $49,999, $50,000 - $74,999, $75,000-$99,999, $100,000-$149,999, $150,000 or above) - County wide distribution;
- Total number of workers in the household (0, 1, 2, 3 or more) - County wide distribution; and
- Total number of vehicles in the household (0, 1, 2, 3 or more) - County wide distribution.

After the raking procedure, very large weights are capped to be no more than five times the mean of weights. To check whether the new weights represent the total population of a county, we perform some random checks for different variables. The results show that the new weights align well with the population of the different counties.

2.3 Weights for Other Geographies

2.3.1 Overview

This section explains how person-level weights are developed for the City of Los Angeles (LA) using the R statistical software. The purpose of these weights is to scale up information provided by 2012 CHTS respondents to the population of City of Los Angeles based on the socio-economic variables listed below. Users of these weights are cautioned that these weights should not be applied to lower-level geographies such as zip codes.

2.3.2 Methodology

Weights are calculated by raking at the person level. These weights adjust the relative importance of responses to reflect the different probabilities of selection of respondents, and align the sample distributions to population distributions, based on the 2010 Census. In particular, the weights are adjusted so that the sums of adjusted weights are equal to known population totals for selected subgroups of the population of the City of Los Angeles. Since detailed sampling information is not available for the City of Los Angeles, we assume equal probability of selection. Variables used for raking at the person level are:

- Hispanic Status (Hispanic, Non-Hispanic)-LA City-wide distribution.
- Ethnicity (White, African American, Asian, Other)-LA City-wide distribution.
- Age (less than 20 years, 20 to 24 years, 25 to 34 years, 35 to 54 years, 55 to 64 years, 65 years or older)-LA City-wide distribution.
- Employment Status (Part-time or full-time Employed, Not-employed)-LA City-wide distribution
- Gender (Male, Female) - LA City-wide distribution

Following the raking procedure, very large weights are capped to be no more than five times the mean of weights. To check whether the new weights represent the total population of the City of Los Angeles, we perform some random checks for different variables and the results show that the new weights align well with the population of the City of Los Angeles. We use these new person weights to calculate the final trip weights from `Trip Correction Factor (TCF)` * `New Person Weight of LA City`.

2.4 Weights for Long Distance Trips

2.4.1 Overview

This document explains how county-level weights are developed for long distance trips using the R statistical software for people who participated in the 2012 CHTS. The purpose of these weights is to scale up information provided by respondents to the population of each county based on the socio-economic variables listed below. The person level weights are generated for long distance trips at county level. Long distance travel file did not properly identify the person identification number. So we have to rely on variable `LNINI1` (person who made the trip) and there are 1310 missing observations. Users of these weights are cautioned that these weights should not be applied to lower-level geographies such as cities or zip codes. Similar weights can be developed for these geographies if they contain enough CHTS respondents.

2.4.2 Methodology

County wide Weights for Long distance trips are calculated by raking at the person level. These weights adjust the relative importance of responses to reflect the different probabilities of selecting respondents, and align the sample distributions to population distributions based on the 2010 Census. In particular, long distance person-level weights were adjusted so that the sum of these weights equals known population totals for certain subgroups of the population of each county. Variables used for raking at the person level are:

- Hispanic Status (Hispanic, Non-Hispanic) - County-wide distribution;
- Ethnicity (White, African American, Asian, Other) - County-wide distribution;
- Age (less than 20 years, 20 - 24 years, 25 - 34 years, 35 - 54 years, 55 - 64 years, 65 years or older) - County -wide distribution;
- Employment Status (Part-time or full-time Employed, Not-employed)- County-wide distribution; and
- Gender (Male, Female)- County-wide distribution

After the raking procedure, very large weights are capped to be no more than five times the mean of weight.

Chapter 3

Linked Trip Tables

3.1 Introduction

This document describes the method used to determine the linked trip table. The 2001 CHTS included a linked trip table with the following fields, for which we summarize how we anticipate computing comparable information from the CHTS 2011 data.

Table 3.1: Mapping between 2001 and 2011 linked trip data

CHTS.2001	CHTS.2011
Sampn	SAMPN
PerNo	PERNO
DayNo	N/A
Source_Act	To be computed from ACTNO
Dest_Act	To be computed from ACTNO
Source_PlaNo	To be computed from PLANO
Dest_PlaNo	To be computed from PLANO
Source_LocNo	N/A
Dest_LocNo	N/A
DType	Unknown values in {1,2}
MODE	Interpreted as mode of longest distance trip in set of linked trips
MAPPED_MODE	Definition unclear. Values: in {S,W,L,D,I,B,P,T,A,O}
TripType	Mapping between conventional 4-step model trip ends: ‘{HW,HS,OO,WO,HO}
Dep_Hr	Departure hour: DEP_HR
Dep_Min	Departure minute: DEP_MIN
Arr_Hr	Arrival hour: ARR_HR
Arr_Min	Arrival minute: ARR_MIN
TrpDur	Total duration of all linked trips combined
IgnoredActDur	Duration of all ignored activities (those with APURP=c(21,22))
VehAvail	Whether a vehicle we available for this trip. It’s unclear if we can compute this
VehNo	Household vehicle used for trip (if any)

CHTS.2001	CHTS.2011
Party	Number of people on the linked trip. We will assume this refers to the primary trip
DOM_WDWGT	Day of month weekday weight? Unclear whether there is a 2011 analogue
DOM_WEWGT	Day of month weekend weight? Unclear whether there is a 2011 analogue
DOM_SDWGT	Day of month ? weight? Unclear whether there is a 2011 analogue
DOM_AWDWGT	Day of month ? weight? Unclear whether there is a 2011 analogue
DOM_ASDWGT	Day of month ? weight? Unclear whether there is a 2011 analogue
Orig_DOM_AWDWGT	Original(?) Day of month ? weight? Unclear whether there is a 2011 analogue
Orig_DOM_WEWGT	Original(?) Day of month ? weight? Unclear whether there is a 2011 analogue
PHASE	?

3.2 Methodological Overview

In the 2001 CHTS, linked trips were defined as follows:

> For the purposes of the 2000-2001 California Statewide Travel Survey the definition of a "linked" trip is when a person changes travel mode to reach the "real" destination, or when a driver makes a stop to serve a passenger (drop off or pick up) on the way to the actual or ultimate destination. In a linked trip, the trip to the location where the travel mode change or serve passenger occurs is combined (or linked) with the trip continuing from this location to the ultimate destination. A linked trip may include more than one stop to change travel mode or serve a passenger.

To recreate a table of linked trips for the 2010 CHTS dataset, we performed a number of steps. Before summarizing these steps below, we will clarify some definitions.

First, for the purposes of this discussion, a non-linked trip describes a single person's movement from one place to another. In the 2010 CHTS dataset, every non-linked trip has a single record (`place`) in the PLACE table.

Second, for the purposes of this discussion, a non-linked trip purpose is characterized by the purposes of the activities performed at the `place` to which the trip takes the individual. A person will have one or more activities associated with each `place`. Each `activity` is characterized by a record (`activity`) in the ACTIVITY table. Thus, there is potential for a trip to have multiple trip purposes depending on the number and purposes of the activities performed at the destination place.

3.2.1 Identifying linked trips

By the definitions above, any trip whose purpose is a linkable purpose (either a mode switch or a pick-up/drop off activity) should be "linked" to the trip following it. Though there may be more

than one `activity` at a given `place`, we assume that if any of those activities have a linkable purpose then the trip trip should be linked to the following trip.

Our method for creating linked trips creates a unique index (linked trip number: `LTNO`) for each group of trips. Very generally, we order the activities reported for each person and increment a the `LTNO` every time a linked-trip without a linkable purpose is observed. This defines a mapping between unlinked trips (i.e. places) and linked trips.

3.2.2 Linked trip MODE (Identifying the principal trip)

For a linked trip, we need some heuristic to determine which mode is most important and should be called the mode for that trip. Our assumption is that that trip with the longest distance from the set of trips in a linked trip should be the one whose mode is associated with the linked trip. To compute this, we rank (order) the unlinked trips that make up each linked trip and select the longest one as the principal trip.

We use the MODE of this trip, as well as various other trip-related characteristics, to describe the corresponding attribute of the linked trip.

3.2.3 Linked trip origin and destination

In the 2001 linked trip table, there are records of the origin place and activity for every linked trip. We also compute this for the 2011 dataset by selecting the last `place` and `activity` of the prior linked trip grouping as the origin `place` and `activity` for a given linked trip.

There are also linked trip destinations to produce. We defined the linked trip destination as the *first* `activity` at the last `place` traveled to in the linked trip.

As an illustration consider this trip/activity sequence:

1. Start at home
2. Perform personal activities
3. Drive to child's school
4. Drop off child
5. Drive to work
6. Perform work activity
7. Eat lunch
8. Perform work activity
9. Drive to soccer field
10. Pick up child
11. Drive home
12. Prepare dinner
13. Eat dinner

This will be converted into two linked trips:

1. LTNO=1, From [1,1] (home, personal activities) to [3,1] (work, work activity)

2. LTNO=2, From [3,3] (work, work activity) to [5,1] (home, prepare dinner)

Places 2 and 4 will be attached to LTNO = 2 and 4 respectively.

3.2.4 Trip type (or purpose)

The trip purposes reported for linked trips in 2001 are designed to map the activity-based reporting of the CHTS onto more conventional trip purpose definitions typical in transportation planning:

- **HO:** Home-based other trips
- **HS:** Home-based shopping trips
- **HW:** Home-based work trips
- **OO:** Other-other trips
- **WO:** Work-based other trips

Recall that trips in the `place` table do not have purposes assigned and, instead, trip purposes must be inferred from the activities performed at the destination. Thus, our first step was to define a mapping between `place`,`activity` purpose combinations at the linked trip ends and the four-step trip purpose defintions above (Home, Shop, Work, and Other).

We approached this using a hierarchy of factors. The first is that since we know the home location of every person, then if a trip-end (origin or destination) occurs at that location, then that trip-end is `HOME` by definition.

The second hierarchy is used to determine `WORK`, `SHOP`, and `OTHER` purposes. In this case, we defined a mapping between activity purposes and four-step trip purposes. However, when there is more than one `activity` reported at a `place`, we need to select the most important activity at that location as the purpose. Following convention in transportation planning, we rank trip purposes in the following order of importance:

1. Home
2. Work
3. Shop
4. Other

Thus, if a given place has activities with both `WORK` and `SHOP` purposes (according to our activity-purpose to trip-purpose mapping), we characterize that trip-end as being a `WORK` purpose. Similarly, if a given place has activities with both `SHOP` and `OTHER` purposes, we assign it a `SHOP` purpose.

Once we characterize the trip-end purpose for each PLACE in the dataset, we can construct the purpose for every linked trip by simply combining the trip-ends and mapping them to four-step trip types using the following hierarchy:

1. Any trip with a `HOME` trip-end is a home-based trip regardless of origin and destination (HS, HW, HO)

2. Any trip without a `HOME` trip-end but with a `WORK` trip-end is a work-based other trip (WO)

3. Any trip without a `HOME` or `WORK` trip-end is an other-other trip (OO)

There are some edge cases involving looping trips from home to home (HH) or work to work (WW) that are made possible by the linked-trip definition. For example, it is perfectly reasonable that someone drives from home, drops a child at school, and returns home. This is a linked trip from home to home with the same origin and destination. We chose to leave these in the linked trip table as they may have relevance for policy analysis even though by conventional definitions they are a trip from and to the same location. An analyst may choose to explode these specific linked trips back into their constituent un-linked trips to capture travel demand that would otherwise go unanalyzed.

3.2.5 Linked Trip Statistics

In the last step of our linked-trip computation, we compute various linked-trip statistics by selecting the relevant value from the principal (longest leg) of the linked-trip, or by aggregating across all trips making up the linked trip. The relevant values are as follows:

- `ltmode`: The mode of the principal trip
- `ltTCF`: The trip correction factor of the principal trip
- `dTCF`: The trip correction factor of the last (destination) trip
- `tripdist`: The distance traveled across all legs of the linked trip
- `tripdur`: The travel time across all legs of the linked trip (not including activity durations)
- `ignoredactdur`: The amount of time spent performing ignored pick-up/drop-off or mode change activities during the linked trip
- `MAXTR`: The maximum number of travelers across all legs of a linked trip
- `MINTR`: The minimum number of travelers across all legs of a linked trip
- `DEP_HR`: The departure hour from the origin of this linked trip
- `DEP_MIN`: The departure minute from the origin of this linked trip
- `ARR_HR`: The arrival hour to the destination of this linked trip
- `ARR_MIN`: The arrival minute to the destination of this linked trip

Chapter 4

Data Analysis Requests

The following sections provide R solutions to the questions asked by various districts during the course of the project.

4.1 Data Request for Santa Cruz County

4.1.1 Question

This question asked for the following information for Santa Cruz county:

1. Trips by Mode
2. Modal split for driving alone
3. Trip distance by Mode
4. Trip duration by Mode
5. Trips by Purpose
6. Work trips by mode

4.1.2 Summary and Methodology

In this sub-section, we generate tables by mode for the following: total number of trips, total trip distance, average trip distance, total trip duration, average trip duration, and total number of trips for driving alone. To calculate the "drive alone"" numbers we extract data for total travelers and drivers of cars, trucks, or motorcycles. We also generate tables for the total number of trips by trip purpose and for work trips by mode. Here, we actually generate tables for the total number of trips by activity purpose since the trip purpose is given in the database as the activity purpose and although many trips are associated with more than one activity, We consider each activity as a trip. We only consider the work trips . We generate every table for both trips originating in and ending in Santa Cruz County. We use the new county wide weights of Santa Cruz County to generate weighted results for trips that originated in Santa Cruz County and statewide weights to generate weighted results for trips that originated outside of Santa Cruz County.

4.1.3 Results

Table 4.1: Mode Code

Code	Mode	Code	Mode
1	Walk	16	Express Bus/Commuter Bus
2	Bike	17	Premium Bus
3	Wheelchair/Mobility Scooter	18	School Bus
4	Other Non-Motorized	19	Public Transit Shuttle
5	Auto/Van/Truck Driver	20	Air BART/LAX Fly Away
6	Auto /Van/Truck Passenger	21	Dial-a-Ride/Paratransit
7	Carpool/Vanpool	22	Amtrak Bus
8	Motorcycle/Scooter/Moped	23	Other Bus
9	Taxi/Hired Car/Limo	24	BART,Metro Red/Purple Line
10	Rental Car/Vehicle	25	ACE, Amtrak, Cal train
11	Private shuttle	26	Metro
12	Greyhound Bus	27	Street Car/Cable Car
13	Plane	28	Other Rail
14	Other Private Transit	29	Ferry / Boat
15	Local Bus,Rapid Bus		

Table 4.2: Activity Purpose Code

Code	Purpose	Code	Purpose
1	Personal Activities	21	Change Type Of Transportation/Transfer
2	Preparing Meals/Eating	22	Pickup/Drop Off Passenger(S)
3	Hosting Visitors/Entertaining Guests	23	Drive Through Meals
4	Exercise	24	Drive Through Other (ATM, Bank)
5	Study/Schoolwork	25	Work-Related
6	Work For Pay At Home Using	26	Service Private Vehicle
7	Using Computer/Telephone/Cell Or Smart Phone	27	Routine Shopping
8	All Other Activities At My Home	28	Shopping For Major Purchases
9	Work/Job Duties	29	Household Errands
10	Training	30	Personal Business
11	Meals At Work	31	Eat Meal at Restaurant/Diner
12	Work-Sponsored Social Activities	32	Health Care
13	Non-Work Related Activities	33	Civic/Religious Activities
14	Exercise/Sports	34	Outdoor Exercise
15	Volunteer Work/Activities	35	Indoor Exercise
16	All Other Work-Related Activities At My Work	36	Entertainment
17	In School/Classroom/Laboratory	37	Social/Visit Friends/Relatives
18	Meals At School/College	38	Other
19	After School Sports/Physical Activity	39	Loop Trip
20	All Other After School Related Activities	99	Don’t Know/Refused

Table 4.3: Total number of trips originating in Santa Cruz County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	3,035	523,006	58.90	53.42
Auto /Van/Truck Passenger	1,096	239,190	21.27	24.43
Walk	624	138,456	12.11	14.14
Bike	218	30,820	4.23	3.15
Local Bus,Rapid Bus	48	13,170	0.93	1.35
Carpool/Vanpool	38	12,281	0.74	1.25
School Bus	26	9,885	0.50	1.01
Motorcycle/Scooter/Moped	24	4,029	0.47	0.41
Other Non-Motorized	10	3,237	0.19	0.33
Dial-a-Ride/Paratransit	2	1,122	0.04	0.11
Wheelchair/Mobility Scooter	8	933	0.16	0.10
Plane	1	678	0.02	0.07
Express Bus/Commuter Bus	4	645	0.08	0.07
Other Bus	5	506	0.10	0.05
Rental Car/Vehicle	5	338	0.10	0.03
Taxi/Hired Car/Limo	5	323	0.10	0.03
Street Car/Cable Car	2	263	0.04	0.03
Other Private Transit	1	139	0.02	0.01
Private shuttle	1	104	0.02	0.01
Total	**5,153**	**979,123**	**100.00**	**100.00**

Table 4.4: Modal split (drive alone) of trips originating in Santa Cruz County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	2,173	358,744	98.55	98.74
Motorcycle/Scooter/Moped	23	3,842	1.04	1.06
Carpool/Vanpool	6	590	0.27	0.16
Rental Car/Vehicle	3	163	0.14	0.04
Total	**2,205**	**363,339**	**100.00**	**100.00**

Table 4.5: Trip distance (mi) by mode for trips originating in Santa Cruz County

Mode	Trip Dist UW	Trip Dist W	Percent UW	Percent W	Avg Dist UW	Avg Dist W
Auto/Van/Truck Driver	24,964	3,695,031	68.20	62.64	8.23	7.06
Auto /Van/Truck Passenger	9,329	1,659,613	25.48	28.13	8.51	6.94
Carpool/Vanpool	549	135,335	1.50	2.29	14.45	11.02
Plane	178	120,795	0.49	2.05	178.23	178.23
Local Bus,Rapid Bus	272	78,838	0.74	1.34	5.67	5.99
Walk	338	67,696	0.92	1.15	0.54	0.49
Bike	379	54,163	1.04	0.92	1.74	1.76
School Bus	109	34,547	0.30	0.59	4.18	3.49
Motorcycle/Scoot	184	17,235	0.50	0.29	7.65	4.28
Express Bus/Commuter Bus	95	11,033	0.26	0.19	23.76	17.11
Rental Car/Vehicle	106	8,446	0.29	0.14	21.18	25.01
Dial-a-Ride/Para	9	4,854	0.02	0.08	4.33	4.33
Street Car/Cable Car	33	4,343	0.09	0.07	16.51	16.51
Private shuttle	31	3,241	0.09	0.05	31.14	31.14
Other Non-Motorized	6	1,559	0.02	0.03	0.65	0.48
Other Bus	8	985	0.02	0.02	1.62	1.95
Taxi/Hired Car/Limo	9	587	0.02	0.01	1.82	1.82
Other Private Transit	3	425	0.01	0.01	3.06	3.06
Wheelchair/Mobil Scooter	2	225	0.01	0.00	0.24	0.24
Total	**36,605**	**5,898,948**	**100.00**	**100.00**	**333.52**	**320.91**

Table 4.6: Trip duration (min) by mode for trips originating in Santa Cruz County

Mode	Trip Dur UW	Trip Dur W	Percent UW	Percent W	Avg Dur UW	Avg Dur W
Auto/Van/Truck Driver	61,145	9,174,425	61.55	56.12	20.15	17.54
Auto /Van/Truck Passenger	21,607	4,011,792	21.75	24.54	19.71	16.77
Walk	8,077	1,534,130	8.13	9.38	12.94	11.08
Bike	3,743	495,391	3.77	3.03	17.17	16.07
Local Bus,Rapid Bus	1,425	383,709	1.43	2.35	29.69	29.14
Carpool/Vanpool	1,098	290,541	1.11	1.78	28.89	23.66
School Bus	794	244,981	0.80	1.50	30.54	24.78
Motorcycle/Scoote	520	74,361	0.52	0.45	21.67	18.46
Other Non-Motorized	115	31,573	0.12	0.19	11.50	9.76
Express Bus/Commuter Bus	176	21,096	0.18	0.13	44.00	32.72
Plane	30	20,333	0.03	0.12	30.00	30.00
Rental Car/Vehicle	196	14,541	0.20	0.09	39.20	43.07
Street Car/Cable Car	102	13,412	0.10	0.08	51.00	51.00
Wheelchair/Mobili Scooter	102	12,918	0.10	0.08	12.75	13.85
Other Bus	68	7,735	0.07	0.05	13.60	15.30
Private shuttle	59	6,141	0.06	0.04	59.00	59.00
Dial-a-Ride/Parat	10	5,608	0.01	0.03	5.00	5.00
Taxi/Hired Car/Limo	75	4,838	0.08	0.03	15.00	15.00
Other Private Transit	5	693	0.01	0.00	5.00	5.00
Total	**99,347**	**16,348,215**	**100.00**	**100.00**	**466.81**	**437.18**

Table 4.7: Total number of work trips (APURP=9) for trips originating in Santa Cruz County

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Personal Activities	1,485	280,672	22.84	22.36
Preparing Meals/Eating	531	100,917	8.17	8.04
Routine Shopping	561	95,907	8.63	7.64
Pickup/Drop Off Passenger(S)	307	86,155	4.72	6.86
Work/Job Duties	437	85,202	6.72	6.79
Social/Visit Friends/Relatives	339	56,737	5.21	4.52
Change Type Of Transportation/Transfer	211	55,971	3.24	4.46
Eat Meal at Restaurant/Diner	295	53,365	4.54	4.25
All Other Activities At My Home	248	52,322	3.81	4.17
In School/Classroom/Laboratory	126	40,277	1.94	3.21
Using Computer/Telephone/Cell Or Smart Phone	207	37,173	3.18	2.96
Outdoor Exercise	225	32,927	3.46	2.62
Household Errands	149	28,338	2.29	2.26
Work-Related	156	27,084	2.40	2.16
Loop Trip	166	22,907	2.55	1.82
Study/Schoolwork	55	19,367	0.85	1.54
Indoor Exercise	96	18,892	1.48	1.50
Personal Business	119	18,886	1.83	1.50
Entertainment	113	15,647	1.74	1.25
Meals At Work	73	14,947	1.12	1.19
Work For Pay At Home Using	63	14,377	0.97	1.15
Health Care	88	13,291	1.35	1.06
Other	61	10,559	0.94	0.84
Civic/Religious Activities	62	9,643	0.95	0.77
Service Private Vehicle	61	8,550	0.94	0.68
Drive Through Meals	40	8,301	0.62	0.66
Meals At School/College	25	6,937	0.38	0.55
Shopping For Major Purchases	39	5,385	0.60	0.43
All Other After School Related Activities	22	5,326	0.34	0.42
Exercise	30	5,027	0.46	0.40
Hosting Visitors/Entertaining Guests	35	4,936	0.54	0.39
After School Sports/Physical Activity	13	4,121	0.20	0.33
Non-Work Related Activities	11	3,861	0.17	0.31
Drive Through Other (ATM, Bank)	17	3,399	0.26	0.27
Don’t Know/Refused	8	2,812	0.12	0.22
All Other Work-Related Activities At My Work	8	1,359	0.12	0.11
Exercise/Sports	6	1,221	0.09	0.10

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Work-Sponsored Social Activities	5	1,014	0.08	0.08
Volunteer Work/Activities	9	883	0.14	0.07
Training	1	620	0.02	0.05
Total	**6,503**	**1,255,317**	**100.00**	**100.00**

Table 4.8: Total number of trips by activity purpose for trips originating in Santa Cruz County

Mode	Obs UW	Obs W	Pct UW	Pct W
Auto/Van/Truck Driver	350	66,959	80.09	78.59
Walk	30	6,129	6.86	7.19
Auto /Van/Truck Passenger	19	5,076	4.35	5.96
Bike	23	3,654	5.26	4.29
Carpool/Vanpool	11	2,978	2.52	3.49
Motorcycle/Scooter/Moped	3	369	0.69	0.43
Rental Car/Vehicle	1	38	0.23	0.04
Total	**437**	**85,202**	**100.00**	**100.00**

Table 4.9: Total number of trips ending in Santa Cruz County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	3,037	519,091	58.70	53.06
Auto /Van/Truck Passenger	1,100	239,063	21.26	24.44
Walk	624	138,508	12.06	14.16
Bike	218	30,820	4.21	3.15
Local Bus,Rapid Bus	49	14,199	0.95	1.45
Carpool/Vanpool	40	12,546	0.77	1.28
School Bus	26	9,460	0.50	0.97
Motorcycle/Scooter/Moped	27	4,300	0.52	0.44
Other Non-Motorized	10	3,237	0.19	0.33
Plane	2	1,903	0.04	0.19
Dial-a-Ride/Paratransit	2	1,122	0.04	0.11
Express Bus/Commuter Bus	5	1,005	0.10	0.10
Wheelchair/Mobility Scooter	8	933	0.15	0.10
Rental Car/Vehicle	10	518	0.19	0.05
Other Bus	5	506	0.10	0.05
Taxi/Hired Car/Limo	5	323	0.10	0.03
Street Car/Cable Car	2	263	0.04	0.03
ACE, Amtrak, Cal train	1	211	0.02	0.02
Other Private Transit	1	139	0.02	0.01
Amtrak Bus	1	105	0.02	0.01
Private shuttle	1	77	0.02	0.01
Total	**5,174**	**978,324**	**100.00**	**100.00**

Table 4.10: Modal split (drive alone) of trips ending in Santa Cruz County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	2,173	353,290	98.46	98.65
Motorcycle/Scooter/Moped	24	4,016	1.09	1.12
Carpool/Vanpool	6	634	0.27	0.18
Rental Car/Vehicle	4	190	0.18	0.05
Total	**2,207**	**358,129**	**100.00**	**100.00**

Table 4.11: Trip distance (mi) by mode for trips ending in Santa Cruz County

Mode	Trip Dist UW	Trip Dist W	Percent UW	Percent W	Avg Dist UW	Avg Dist W
Plane	7,915	9,369,321	15.84	59.34	3,957.29	4,924.34
Auto/Van/Truck Driver	26,397	3,832,389	52.85	24.27	8.69	7.38
Auto /Van/Truck Passenger	11,219	1,781,041	22.46	11.28	10.20	7.45
Carpool/Vanpool	1,072	359,449	2.15	2.28	26.80	28.65
Local Bus,Rapid Bus	309	114,700	0.62	0.73	6.30	8.08
Rental Car/Vehicle	1,356	77,280	2.71	0.49	135.57	149.32
Walk	338	67,696	0.68	0.43	0.54	0.49
Bike	379	54,163	0.76	0.34	1.74	1.76
Motorcycle/Scoot	547	48,710	1.09	0.31	20.25	11.33
School Bus	113	34,405	0.23	0.22	4.36	3.64
Express Bus/Commuter Bus	126	22,003	0.25	0.14	25.24	21.89
ACE, Amtrak, Cal train	48	10,090	0.10	0.06	47.89	47.89
Dial-a-Ride/Para	9	4,854	0.02	0.03	4.33	4.33
Street Car/Cable Car	33	4,343	0.07	0.03	16.51	16.51
Amtrak Bus	27	2,842	0.05	0.02	26.98	26.98
Private shuttle	34	2,565	0.07	0.02	33.51	33.51
Other Non-Motorized	6	1,559	0.01	0.01	0.65	0.48
Other Bus	8	985	0.02	0.01	1.62	1.95
Taxi/Hired Car/Limo	9	587	0.02	0.00	1.82	1.82
Other Private Transit	3	425	0.01	0.00	3.06	3.06
Wheelchair/Mobil Scooter	2	225	0.00	0.00	0.24	0.24
Total	**49,950**	**15,789,631**	**100.00**	**100.00**	**4,333.60**	**5,301.09**

Table 4.12: Trip duration (min) by mode for trips ending in Santa Cruz County

Mode	Trip Dur UW	Trip Dur W	Percent UW	Percent W	Avg Dur UW	Avg Dur W
Auto/Van/Truck Driver	61,858	9,175,099	58.37	51.39	20.37	17.68
Auto /Van/Truck Passenger	23,910	4,236,257	22.56	23.73	21.74	17.72
Walk	8,077	1,535,092	7.62	8.60	12.94	11.08
Plane	700	816,979	0.66	4.58	350.00	429.39
Carpool/Vanpool	1,786	569,532	1.69	3.19	44.65	45.40
Bike	3,743	495,391	3.53	2.77	17.17	16.07
Local Bus,Rapid Bus	1,505	456,515	1.42	2.56	30.71	32.15
School Bus	751	233,768	0.71	1.31	28.88	24.71
Motorcycle/Scoote	949	112,224	0.90	0.63	35.15	26.10
Rental Car/Vehicle	1,818	82,396	1.72	0.46	181.80	159.20
Express Bus/Commuter Bus	227	41,966	0.21	0.24	45.40	41.76
Other Non-Motorized	115	31,573	0.11	0.18	11.50	9.76
Street Car/Cable Car	102	13,412	0.10	0.08	51.00	51.00
Wheelchair/Mobili Scooter	102	12,918	0.10	0.07	12.75	13.85
ACE, Amtrak, Cal train	60	12,643	0.06	0.07	60.00	60.00
Other Bus	68	7,735	0.06	0.04	13.60	15.30
Dial-a-Ride/Parat	10	5,608	0.01	0.03	5.00	5.00
Private shuttle	73	5,589	0.07	0.03	73.00	73.00
Taxi/Hired Car/Limo	75	4,838	0.07	0.03	15.00	15.00
Amtrak Bus	34	3,581	0.03	0.02	34.00	34.00
Other Private Transit	5	693	0.00	0.00	5.00	5.00
Total	**105,968**	**17,853,809**	**100.00**	**100.00**	**1,069.67**	**1,103.16**

Table 4.13: Total number of work trips (APURP=9) for trips ending in Santa Cruz County

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Personal Activities	2,967	274,657	32.71	22.02
Routine Shopping	583	100,938	6.43	8.09
Preparing Meals/Eating	1,058	100,278	11.66	8.04
Pickup/Drop Off Passenger(S)	304	85,515	3.35	6.86
Work/Job Duties	410	76,922	4.52	6.17
Change Type Of Transportation/Transfer	212	58,207	2.34	4.67
Eat Meal at Restaurant/Diner	305	57,022	3.36	4.57
Social/Visit Friends/Relatives	388	55,261	4.28	4.43
All Other Activities At My Home	370	50,157	4.08	4.02
In School/Classroom/Laboratory	134	41,153	1.48	3.30
Using Computer/Telephone/Cell Or Smart Phone	339	35,996	3.74	2.89
Outdoor Exercise	233	32,473	2.57	2.60
Household Errands	145	28,520	1.60	2.29
Work-Related	150	27,025	1.65	2.17
Loop Trip	216	23,601	2.38	1.89
Indoor Exercise	102	19,815	1.12	1.59
Study/Schoolwork	76	19,175	0.84	1.54
Personal Business	139	18,669	1.53	1.50
Entertainment	126	15,696	1.39	1.26
Meals At Work	74	14,971	0.82	1.20
Work For Pay At Home Using	114	13,805	1.26	1.11
Health Care	89	13,559	0.98	1.09
Other	75	10,906	0.83	0.87
Civic/Religious Activities	68	10,082	0.75	0.81
Drive Through Meals	41	8,803	0.45	0.71
Service Private Vehicle	56	7,732	0.62	0.62
Meals At School/College	25	6,978	0.28	0.56
All Other After School Related Activities	25	5,588	0.28	0.45
Hosting Visitors/Entertaining Guests	65	5,317	0.72	0.43
Shopping For Major Purchases	35	4,831	0.39	0.39
Exercise	65	4,381	0.72	0.35
After School Sports/Physical Activity	15	4,257	0.17	0.34
Non-Work Related Activities	9	3,606	0.10	0.29
Drive Through Other (ATM, Bank)	16	3,359	0.18	0.27
Don’t Know/Refused	8	2,812	0.09	0.23
All Other Work-Related Activities At My Work	12	1,998	0.13	0.16
Exercise/Sports	5	1,083	0.06	0.09
Volunteer Work/Activities	12	954	0.13	0.08

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Training	1	620	0.01	0.05
Work-Sponsored Social Activities	3	615	0.03	0.05
Total	**9,070**	**1,247,335**	**100.00**	**100.00**

Table 4.14: Total number of trips by activity purpose for trips ending in Santa Cruz County

Mode	Obs UW	Obs W	Pct UW	Pct W
Auto/Van/Truck Driver	315	59,699	78.75	77.61
Walk	30	6,129	7.50	7.97
Auto /Van/Truck Passenger	22	5,026	5.50	6.53
Bike	23	3,654	5.75	4.75
Carpool/Vanpool	7	2,045	1.75	2.66
Motorcycle/Scooter/Moped	3	369	0.75	0.48
Total	**400**	**76,922**	**100.00**	**100.00**

4.2 Data Request for Del Norte County

4.2.1 Question

This question asked for the following information for Del Norte county:

1. Trips by Mode
2. Modal split for driving alone
3. Trip distance by Mode
4. Trip duration by Mode
5. Trips by Purpose
6. Work trips by mode

4.2.2 Summary and Methodology

In this subsection we generate tables by mode for total number of trips, total trip distance, average trip distance, total trip duration, average trip duration, and total number of trips for driving alone. To calculate the drive alone numbers we extract data for total travelers and drivers of cars, trucks, or motorcycles . We also generate tables for the total number of trips by trip purpose and for work trips by mode. More specifically, we generate tables for total number of trips by activity purpose since the trip purpose is given in the database as activity purpose and there is more than one activity in many single trips. We consider each activity as a trip and only consider the work trips. We generate every table for both trips originating in and ending in Del Norte County. We use the new county wide weights for Del Norte County to generate weighted results for trips that originated in Del Norte County and statewide weights to generate weighted results for trips that originated outside of Del Norte County.

4.2.3 Results

Table 4.15: Mode Code

Code	Mode	Code	Mode
1	Walk	16	Express Bus/Commuter Bus
2	Bike	17	Premium Bus
3	Wheelchair/Mobility Scooter	18	School Bus
4	Other Non-Motorized	19	Public Transit Shuttle
5	Auto/Van/Truck Driver	20	Air BART/LAX Fly Away
6	Auto /Van/Truck Passenger	21	Dial-a-Ride/Paratransit
7	Carpool/Vanpool	22	Amtrak Bus
8	Motorcycle/Scooter/Moped	23	Other Bus
9	Taxi/Hired Car/Limo	24	BART,Metro Red/Purple Line
10	Rental Car/Vehicle	25	ACE, Amtrak, Cal train
11	Private shuttle	26	Metro
12	Greyhound Bus	27	Street Car/Cable Car
13	Plane	28	Other Rail
14	Other Private Transit	29	Ferry / Boat
15	Local Bus,Rapid Bus		

Table 4.16: Activity Purpose Code

Code	Purpose	Code	Purpose
1	Personal Activities	21	Change Type Of Transportation/Transfer
2	Preparing Meals/Eating	22	Pickup/Drop Off Passenger(S)
3	Hosting Visitors/Entertaining Guests	23	Drive Through Meals
4	Exercise	24	Drive Through Other (ATM, Bank)
5	Study/Schoolwork	25	Work-Related
6	Work For Pay At Home Using	26	Service Private Vehicle
7	Using Computer/Telephone/Cell Or Smart Phone	27	Routine Shopping
8	All Other Activities At My Home	28	Shopping For Major Purchases
9	Work/Job Duties	29	Household Errands
10	Training	30	Personal Business
11	Meals At Work	31	Eat Meal at Restaurant/Diner
12	Work-Sponsored Social Activities	32	Health Care
13	Non-Work Related Activities	33	Civic/Religious Activities
14	Exercise/Sports	34	Outdoor Exercise
15	Volunteer Work/Activities	35	Indoor Exercise
16	All Other Work-Related Activities At My Work	36	Entertainment
17	In School/Classroom/Laboratory	37	Social/Visit Friends/Relatives
18	Meals At School/College	38	Other
19	After School Sports/Physical Activity	39	Loop Trip
20	All Other After School Related Activities	99	Don’t Know/Refused

Table 4.17: Total number of trips originating in Del Norte County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	758	57,420	66.26	55.15
Auto /Van/Truck Passenger	285	33,523	24.91	32.20
Walk	59	9,006	5.16	8.65
School Bus	17	2,365	1.49	2.27
Motorcycle/Scooter/Moped	8	956	0.70	0.92
Rental Car/Vehicle	4	299	0.35	0.29
Local Bus,Rapid Bus	2	220	0.17	0.21
Plane	4	190	0.35	0.18
Bike	7	137	0.61	0.13
Total	**1,144**	**104,116**	**100.00**	**100.00**

Table 4.18: Modal split (drive alone) of trips originating in Del Norte County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	536	36,719	98.53	97.46
Motorcycle/Scooter/Moped	8	956	1.47	2.54
Total	**544**	**37,675**	**100.00**	**100.00**

Table 4.19: Trip distance (mi) by mode for trips originating in Del Norte County

Mode	Trip Dist UW	Trip Dist W	Percent UW	Percent W	Avg Dist UW	Avg Dist W
Auto /Van/Truck Passenger	5,926	1,831,549	34.18	60.37	20.79	54.64
Auto/Van/Truck Driver	7,643	922,303	44.08	30.40	10.08	16.06
Plane	2,951	213,509	17.02	7.04	737.73	1,123.56
Rental Car/Vehicle	650	48,630	3.75	1.60	162.52	162.52
Walk	46	9,852	0.27	0.32	0.79	1.09
School Bus	74	5,266	0.42	0.17	4.33	2.23
Motorcycle/Scoot	17	2,120	0.10	0.07	2.07	2.22
Bike	28	429	0.16	0.01	3.96	3.13
Local Bus,Rapid Bus	4	386	0.02	0.01	1.76	1.76
Total	**17,339**	**3,034,045**	**100.00**	**100.00**	**944.04**	**1,367.20**

Table 4.20: Trip duration (min) by mode for trips originating in Del Norte County

Mode	Trip Dur UW	Trip Dur W	Percent UW	Percent W	Avg Dur UW	Avg Dur W
Auto /Van/Truck Passenger	8,777	2,137,212	33.56	57.29	30.80	63.75
Auto/Van/Truck Driver	14,329	1,330,131	54.80	35.66	18.90	23.16
Walk	710	97,355	2.72	2.61	12.03	10.81
Rental Car/Vehicle	960	71,814	3.67	1.93	240.00	240.00
School Bus	448	41,743	1.71	1.12	26.35	17.65
Plane	502	30,212	1.92	0.81	125.50	158.98
Motorcycle/Scoote	130	13,627	0.50	0.37	16.25	14.25
Bike	274	6,127	1.05	0.16	39.14	44.73
Local Bus,Rapid Bus	20	2,196	0.08	0.06	10.00	10.00
Total	**26,150**	**3,730,416**	**100.00**	**100.00**	**518.98**	**583.34**

Table 4.21: Total number of work trips (APURP=9) for trips originating in Del Norte County

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Personal Activities	323	32,987	22.97	24.00
Routine Shopping	135	14,654	9.60	10.66
Pickup/Drop Off Passenger(S)	80	12,651	5.69	9.20
Preparing Meals/Eating	118	12,190	8.39	8.87
Eat Meal at Restaurant/Diner	51	11,421	3.63	8.31
Work/Job Duties	121	7,165	8.61	5.21
Social/Visit Friends/Relatives	59	4,477	4.20	3.26
Change Type Of Transportation/Transfer	42	4,372	2.99	3.18
In School/Classroom/Laboratory	37	4,293	2.63	3.12
All Other Activities At My Home	46	4,276	3.27	3.11
Service Private Vehicle	32	2,987	2.28	2.17
Using Computer/Telephone/Cell Or Smart Phone	32	2,653	2.28	1.93
Loop Trip	31	2,492	2.20	1.81
Work-Related	40	2,110	2.84	1.54
Personal Business	21	2,051	1.49	1.49
Outdoor Exercise	28	2,044	1.99	1.49
Meals At School/College	11	1,811	0.78	1.32
Household Errands	38	1,743	2.70	1.27
Drive Through Meals	19	1,370	1.35	1.00
Other	13	1,359	0.92	0.99
Entertainment	13	1,130	0.92	0.82
Health Care	19	1,055	1.35	0.77
Civic/Religious Activities	24	981	1.71	0.71
Study/Schoolwork	8	958	0.57	0.70
Work For Pay At Home Using	7	780	0.50	0.57
After School Sports/Physical Activity	4	676	0.28	0.49
All Other After School Related Activities	5	657	0.36	0.48
Meals At Work	12	431	0.85	0.31
Indoor Exercise	8	370	0.57	0.27
Exercise	5	324	0.36	0.24
Don’t Know/Refused	4	296	0.28	0.22
Hosting Visitors/Entertaining Guests	8	235	0.57	0.17
Volunteer Work/Activities	5	151	0.36	0.11
Exercise/Sports	1	109	0.07	0.08
Non-Work Related Activities	2	74	0.14	0.05
Shopping For Major Purchases	2	68	0.14	0.05
All Other Work-Related Activities At My Work	1	24	0.07	0.02
Drive Through Other (ATM, Bank)	1	21	0.07	0.02

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Total	**1,406**	**137,446**	**100.00**	**100.00**

Table 4.22: Total number of trips by activity purpose for trips originating in Del Norte County

Mode	Obs UW	Obs W	Pct UW	Pct W
Auto/Van/Truck Driver	113	6,532	93.39	91.17
Auto /Van/Truck Passenger	6	520	4.96	7.26
Plane	1	97	0.83	1.35
Bike	1	15	0.83	0.21
Total	**121**	**7,165**	**100.00**	**100.00**

Table 4.23: Total number of trips ending in Del Norte County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	756	55,960	66.96	57.73
Auto /Van/Truck Passenger	279	28,230	24.71	29.12
Walk	59	9,006	5.23	9.29
School Bus	17	2,365	1.51	2.44
Motorcycle/Scooter/Moped	8	956	0.71	0.99
Local Bus,Rapid Bus	2	220	0.18	0.23
Bike	7	137	0.62	0.14
Plane	1	63	0.09	0.07
Total	**1,129**	**96,937**	**100.00**	**100.00**

Table 4.24: Modal split (drive alone) of trips ending in Del Norte County

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	537	36,675	98.53	97.46
Motorcycle/Scooter/Moped	8	956	1.47	2.54
Total	**545**	**37,632**	**100.00**	**100.00**

Table 4.25: Trip distance (mi) by mode for trips ending in Del Norte County

Mode	Trip Dist UW	Trip Dist W	Percent UW	Percent W	Avg Dist UW	Avg Dist W
Auto/Van/Truck Driver	6,274	482,948	53.63	52.80	8.30	8.63
Auto /Van/Truck Passenger	3,402	296,712	29.08	32.44	12.19	10.51
Plane	1,855	117,027	15.86	12.79	1,854.99	1,854.99
Walk	46	9,852	0.40	1.08	0.79	1.09
School Bus	74	5,266	0.63	0.58	4.33	2.23
Motorcycle/Scoot	17	2,120	0.14	0.23	2.07	2.22
Bike	28	429	0.24	0.05	3.96	3.13
Local Bus,Rapid Bus	4	386	0.03	0.04	1.76	1.76
Total	**11,699**	**914,741**	**100.00**	**100.00**	**1,888.39**	**1,884.55**

Table 4.26: Trip duration (min) by mode for trips ending in Del Norte County

Mode	Trip Dur UW	Trip Dur W	Percent UW	Percent W	Avg Dur UW	Avg Dur W
Auto/Van/Truck Driver	13,071	938,960	61.16	53.38	17.29	16.78
Auto /Van/Truck Passenger	6,547	648,148	30.63	36.85	23.47	22.96
Walk	710	97,355	3.32	5.53	12.03	10.81
School Bus	448	41,743	2.10	2.37	26.35	17.65
Motorcycle/Scoote	130	13,627	0.61	0.77	16.25	14.25
Plane	172	10,851	0.80	0.62	172.00	172.00
Bike	274	6,127	1.28	0.35	39.14	44.73
Local Bus,Rapid Bus	20	2,196	0.09	0.12	10.00	10.00
Total	**21,372**	**1,759,007**	**100.00**	**100.00**	**316.54**	**309.17**

Table 4.27: Total number of work trips (APURP=9) for trips ending in Del Norte County

Activity Purpose	Obs UW	Obs W	Pct UW	Pct W
Personal Activities	741	25,761	35.29	21.30
Pickup/Drop Off Passenger(S)	82	13,862	3.90	11.46
Routine Shopping	131	11,148	6.24	9.22
Preparing Meals/Eating	225	10,670	10.71	8.82
Work/Job Duties	120	7,059	5.71	5.84
Eat Meal at Restaurant/Diner	53	4,960	2.52	4.10
Social/Visit Friends/Relatives	76	4,730	3.62	3.91
Outdoor Exercise	32	4,371	1.52	3.61
In School/Classroom/Laboratory	37	4,293	1.76	3.55
Change Type Of Transportation/Transfer	34	3,852	1.62	3.18
All Other Activities At My Home	90	2,972	4.29	2.46
Other	45	2,691	2.14	2.22
Using Computer/Telephone/Cell Or Smart Phone	69	2,668	3.29	2.21
Service Private Vehicle	29	2,506	1.38	2.07
Loop Trip	38	2,492	1.81	2.06
Work-Related	41	1,874	1.95	1.55
Personal Business	22	1,841	1.05	1.52
Meals At School/College	11	1,811	0.52	1.50
Household Errands	38	1,743	1.81	1.44
Drive Through Meals	18	1,255	0.86	1.04
Entertainment	28	1,132	1.33	0.94
Health Care	12	1,091	0.57	0.90
Civic/Religious Activities	24	981	1.14	0.81
Study/Schoolwork	12	958	0.57	0.79
Work For Pay At Home Using	16	798	0.76	0.66
After School Sports/Physical Activity	4	676	0.19	0.56
All Other After School Related Activities	5	657	0.24	0.54
Meals At Work	12	431	0.57	0.36
Indoor Exercise	8	370	0.38	0.31
Exercise	16	324	0.76	0.27
Don’t Know/Refused	5	296	0.24	0.24
Hosting Visitors/Entertaining Guests	14	235	0.67	0.19
Volunteer Work/Activities	5	151	0.24	0.12
Exercise/Sports	1	109	0.05	0.09
Non-Work Related Activities	2	74	0.10	0.06
Shopping For Major Purchases	2	68	0.10	0.06
All Other Work-Related Activities At My Work	1	24	0.05	0.02
Drive Through Other (ATM, Bank)	1	21	0.05	0.02
Total	**2,100**	**120,957**	**100.00**	**100.00**

Table 4.28: Total number of trips by activity purpose for trips ending in Del Norte County

Mode	Obs UW	Obs W	Pct UW	Pct W
Auto/Van/Truck Driver	113	6,524	94.17	92.41
Auto /Van/Truck Passenger	6	520	5.00	7.37
Bike	1	15	0.83	0.22
Total	**120**	**7,059**	**100.00**	**100.00**

4.3 Long Distance Trips Questions

In this subsection, we generate tables for number of non-commute, long distance trips by trip mode for counties in the following geographic areas:

- District 1 - Del Norte, Humboldt, Lake, Mendocino
- District 2 - Lassen, Modoc, Plumas, Shasta, Siskiyou, Tehama, Trinity
- District 3 - Butte, Colusa, El Dorado, Glenn, Nevada, Placer, Sacramento, Sierra, Sutter, Yolo, Yuba
- District 4 - Alameda, Contra Costa, Marin, Napa, San Mateo, San Francisco, Santa Clara, Solano, Sonoma
- District 5 - Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz
- Southern California - Fresno, Madera, Kings, Tulare, Kern, Los Angeles, Orange, San Diego, Imperial, Ventura, Riverside and a portion of San Bernardino
- District 9 - Inyo, Mono and the rest of San Bernardino County.

4.3.1 Summary and Methodology

We generate weighted and unweighted tables for trips originating in and ending in the above districts, using the long distance recall survey data. Note that in the long distance recall survey, trips 50 miles or longer are classified as long distance trips. We exclude work trips to calculate non-commute trips and use the new countywide long distance weights described previously to generate weighted results.

4.3.2 Results

Table 4.29: Modal split of trips originating in District 1

Long Distance Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	1,244	352,212	69.69	59.57
Plane	217	114,620	12.16	19.39
Auto /Van/Truck Passenger	199	58,109	11.15	9.83
Rental Car/Vehicle	38	18,075	2.13	3.06
Carpool/Vanpool	7	11,549	0.39	1.95
Ferry / Boat	7	8,595	0.39	1.45
Greyhound Bus	7	7,164	0.39	1.21
Motorcycle/Scooter/Moped	14	4,017	0.78	0.68
ACE, Amtrak, etc	9	3,974	0.50	0.67
School Bus	6	2,714	0.34	0.46
Taxi/Hired Car/Limo	4	2,401	0.22	0.41
Other Private Transit	7	1,461	0.39	0.25
Other Rail	5	1,357	0.28	0.23
Bike	5	1,100	0.28	0.19
Don’t Know/Refused	2	875	0.11	0.15
Public Transit Shuttle	4	856	0.22	0.14
Amtrak Bus	3	631	0.17	0.11
Local Bus,Rapid Bus	2	471	0.11	0.08
Private shuttle	1	360	0.06	0.06
BART,Metro Red/Purple Line	**1**	**273**	**0.06**	**0.05**
Express Bus/Commuter Bus	1	206	0.06	0.03
Other Bus	1	192	0.06	0.03
Other Non-Motorized	1	NA	0.06	NA
NA	1,785	591,210	100.00	100.00

Table 4.30: Modal split of trips originating in District 2

Long Distance Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	1,615	320,420	72.78	61.52
Plane	179	94,778	8.07	18.20
Auto /Van/Truck Passenger	300	64,439	13.52	12.37
Rental Car/Vehicle	37	14,005	1.67	2.69
Greyhound Bus	9	8,744	0.41	1.68
Motorcycle/Scooter/Moped	20	5,299	0.90	1.02
Carpool/Vanpool	8	2,896	0.36	0.56
Other Bus	1	2,551	0.05	0.49
Taxi/Hired Car/Limo	5	2,145	0.23	0.41
Private shuttle	8	1,945	0.36	0.37
Other Private Transit	8	804	0.36	0.15

Long Distance Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Don't Know/Refused	2	666	0.09	0.13
ACE, Amtrak, etc	2	420	0.09	0.08
Walk	5	414	0.23	0.08
Other Rail	2	313	0.09	0.06
Public Transit Shuttle	1	267	0.05	0.05
School Bus	11	227	0.50	0.04
Bike	2	218	0.09	0.04
Amtrak Bus	2	186	0.09	0.04
Dial-a-Ride/Paratransit	**1**	**93**	**0.05**	**0.02**
Local Bus,Rapid Bus	1	25	0.05	0.00
NA	2,219	520,854	100.00	100.00

4.4 Travel Statistics along the SR-1 Corridor

4.4.1 Summary and Methodology

The purpose of this subsection is to show how 2012 CHTS data can be used to generate useful statistics in a corridor provided enough CHTS observations are available in that corridor. We used ArcGis 10.2 to select the households located within 1 km buffer of each side of selected portion of SR 1 corridor (San Francisco Golden Gate Bridge to Pacifica). We used Open street map and California road network GIS map (downloaded from http://www.dot.ca.gov/hq/tsip/gis/datalibrary/#Highway) for GIS operations. We imported the x-y coordinates of the location of CHTS household respondents to ArcMap and converted it into a shapefile. We then created a 1 Km buffer around the SR 1 corridor. Next we did a intersect operation in ArcGis to sub set the sample of respondents who reside within 1 km of the corridor. We found 269 household respondents (622 person respondents) including 98 GPS respondents within 1 km on each side of the SR1 (San Francisco Golden Gate Bridge to Pacifica). The size of this sample is sufficient to generate tables by mode for 1) total number of trips; 2) total trip duration; 3) average trip duration; 4) total trip distance; and 5) average trip distance. We also created tables for the total number of trips by trip purpose (task 6) and for work trips by mode (task 7). We generated tables for total number of trips by activity purpose since the trip purpose is given in the database as activity purpose and there is more than one activity in many single trips. We considered each activity as a trip. We only considered work trips. We generated every table for both unweighted and weighted results using countywide weights for the latter.

4.4.2 Results

Table 4.31: Modal split through the SR1 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	1,093	403,822	39.89	36.92
Walk	852	376,079	31.09	34.38

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto /Van/Truck Passenger	412	157,507	15.04	14.40
Local Bus,Rapid Bus	115	52,023	4.20	4.76
BART,Metro	70	30,450	2.55	2.78
Metro	50	20,440	1.82	1.87
Bike	53	20,132	1.93	1.84
Private shuttle	13	5,810	0.47	0.53
Other Rail	6	4,059	0.22	0.37
Street Car	17	4,008	0.62	0.37
ACE, Amtrak etc	12	3,574	0.44	0.33
Motorcycle	6	2,825	0.22	0.26
Carpool/Vanpool	7	2,617	0.26	0.24
Rental Car/Vehicle	6	2,579	0.22	0.24
School Bus	10	2,330	0.36	0.21
Express Bus	4	1,267	0.15	0.12
Taxi/Hired Car/Limo	5	1,174	0.18	0.11
Plane	3	851	0.11	0.08
Ferry / Boat	2	836	0.07	0.08
Other Private Transit	1	678	0.04	0.06
Other Non-Motorized	2	604	0.07	0.06
Public Transit Shuttle	1	214	0.04	0.02
Total	**2,740**	**1,093,880**	**100.00**	**100.00**

Table 4.32: Total trip duration of trips through the SR1 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	20,844	7,190,358	45.86	43.62
Walk	7,892	3,070,543	17.36	18.63
Auto /Van/Truck Passenger	7,597	2,944,186	16.71	17.86
Local Bus,Rapid Bus	2,096	868,893	4.61	5.27
BART,Metro	1,660	724,006	3.65	4.39
Metro	1,028	385,428	2.26	2.34
ACE, Amtrak etc	974	314,632	2.14	1.91
Bike	807	240,351	1.78	1.46
School Bus	680	149,291	1.50	0.91
Rental Car/Vehicle	277	123,525	0.61	0.75
Private shuttle	197	87,210	0.43	0.53
Plane	325	84,216	0.71	0.51
Street Car	313	68,329	0.69	0.41
Carpool/Vanpool	170	57,601	0.37	0.35
Express Bus	143	40,038	0.31	0.24
Other Rail	38	38,203	0.08	0.23

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Motorcycle	135	30,996	0.30	0.19
Taxi/Hired Car/Limo	145	25,912	0.32	0.16
Ferry / Boat	36	15,120	0.08	0.09
Public Transit Shuttle	70	14,964	0.15	0.09
Other Non-Motorized	23	6,896	0.05	0.04
Other Private Transit	5	3,389	0.01	0.02
Total	**45,455**	**16,484,087**	**100.00**	**100.00**

Table 4.33: Total trip distance of trips through the SR1 corridor

Mode	Distance Unweighted	Distance Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	6,934	2,337,936	49.77	49.63
Auto /Van/Truck Passenger	2,008	661,425	14.41	14.04
Plane	1,997	567,419	14.34	12.05
BART,Metro	798	362,839	5.73	7.70
ACE, Amtrak etc	658	218,963	4.72	4.65
Local Bus,Rapid Bus	380	160,636	2.72	3.41
Walk	341	140,169	2.45	2.98
Metro	238	91,439	1.71	1.94
Rental Car/Vehicle	130	56,271	0.93	1.19
Bike	83	21,901	0.59	0.46
Private shuttle	45	17,087	0.32	0.36
Carpool/Vanpool	69	16,054	0.50	0.34
Street Car	62	13,556	0.45	0.29
School Bus	42	10,426	0.30	0.22
Taxi/Hired Car/Limo	70	9,857	0.50	0.21
Motorcycle	32	8,246	0.23	0.18
Express Bus	26	6,793	0.19	0.14
Other Rail	5	5,603	0.04	0.12
Ferry / Boat	4	1,792	0.03	0.04
Public Transit Shuttle	8	1,755	0.06	0.04
Other Non-Motorized	1	362	0.01	0.01
Other Private Transit	0	236	0.00	0.00
Total	**13,931**	**4,710,766**	**100.00**	**100.00**

Table 4.34: Total purpose splits for trips through the SR1 corridor

Purpose	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Change Type Of Transportation/Transfer	544	243,196	12.34	18.53
Personal Activities	1,251	231,564	28.37	17.64
Work/Job Duties	254	108,442	5.76	8.26
Preparing Meals/Eating	468	89,085	10.61	6.79
Routine Shopping	233	79,403	5.28	6.05
Pickup/Drop Off Passenger(S)	181	74,607	4.10	5.68
All Other Activities At My Home	184	47,325	4.17	3.61
Eat Meal at Restaurant/Diner	117	44,628	2.65	3.40
Social/Visit Friends/Relatives	102	39,216	2.31	2.99
Work-Related	78	38,910	1.77	2.96
Using Computer/Telephone/Cell	163	35,837	3.70	2.73
Outdoor Exercise	84	33,174	1.90	2.53
In School/Classroom/Laboratory	77	29,879	1.75	2.28
Meals At Work	49	23,639	1.11	1.80
Household Errands	76	23,065	1.72	1.76
Personal Business	56	20,767	1.27	1.58
Drive Through Meals	31	19,404	0.70	1.48
Loop Trip	73	17,700	1.66	1.35
Civic/Religious Activities	37	14,783	0.84	1.13
Indoor Exercise	46	12,766	1.04	0.97
Entertainment	44	10,897	1.00	0.83
Study/Schoolwork	36	10,217	0.82	0.78
Health Care	37	9,242	0.84	0.70
Other	27	7,891	0.61	0.60
Work For Pay At Home	33	7,794	0.75	0.59
Service Private Vehicle	22	6,502	0.50	0.50
Meals At School/College	16	6,451	0.36	0.49
Shopping For Major Purchases	16	5,932	0.36	0.45
All Other Work-Related Activities	9	4,583	0.20	0.35
Drive Through Other (ATM, Bank)	3	2,378	0.07	0.18
All Other After SchoolActivities	7	2,353	0.16	0.18
Hosting Visitors	13	2,331	0.29	0.18
After School Sports/Physical Activity	6	2,137	0.14	0.16
Exercise/Sports	4	1,811	0.09	0.14
Volunteer Work/Activities	5	1,590	0.11	0.12
Non-Work Related Activities	4	1,398	0.09	0.11
Training	4	1,089	0.09	0.08
Exercise	18	342	0.41	0.03

Purpose	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Work-Sponsored Social Activities	1	184	0.02	0.01
Don't Know/Refused	1	142	0.02	0.01
Total	**4,410**	**1,312,657**	**100.00**	**100.00**

Table 4.35: Travel mode for work trips through the SR1 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	137	55,462	54.58	51.14
Walk	91	43,476	36.25	40.09
Auto /Van/Truck Passenger	9	4,208	3.59	3.88
Bike	8	1,880	3.19	1.73
Motorcycle	1	1,110	0.40	1.02
Private shuttle	1	876	0.40	0.81
Ferry / Boat	2	800	0.80	0.74
Rental Car/Vehicle	1	506	0.40	0.47
Carpool/Vanpool	1	124	0.40	0.11
Total	**251**	**108,442**	**100.00**	**100.00**

4.5 Travel Statistics along the SR-17 Corridor

4.5.1 Summary and Methodology

In this subsection, we show how 2012 CHTS data can be used to generate useful statistics in the SR-17 corridor. This is another illustration of how to put the 2012 CHTS data for Caltrans. Steps of this analysis are similar to those for the analysis of the SR-1. We found 74 household respondents (177 person respondents) including 8 GPS respondents within a 1 km buffer on each side of the SR-17. To delineate the SR-17 corridor, we relied on Caltrans' definition. We generated tables by mode for: total number of trips, total trip duration, average trip duration, total trip distance, and average trip distance. We also generated tables for the total number of trips by trip purpose and for work trips by mode. For these, we generated tables for total number of trips by activity purpose since trip purpose is given in the data as activity purpose and there is more than one activity for many single trips. We considered each activity as a trip. For work trips, we only considered work/job duties. We generated every table for both weighted and unweighted results. We used countywide weights to generate weighted results.

4.5.2 Results

Table 4.36: Modal split through the SR17 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	338	64,163	57.00	49.09
Auto /Van/Truck Passenger	112	29,522	18.89	22.58
Walk	76	25,434	12.82	19.46
Bike	38	5,527	6.41	4.23
Carpool/Vanpool	10	3,724	1.69	2.85
Express Bus/Commuter Bus	3	658	0.51	0.50
Rental Car/Vehicle	10	607	1.69	0.46
School Bus	1	462	0.17	0.35
Taxi/Hired Car/Limo	1	425	0.17	0.33
Local Bus,Rapid Bus	2	105	0.34	0.08
Other Bus	1	47	0.17	0.04
Plane	1	41	0.17	0.03
Total	**593**	**130,714**	**100.00**	**100.00**

Table 4.37: Total trip duration of trips through the SR17 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	6,768	982,746	55.82	51.87
Auto /Van/Truck Passenger	1,837	360,908	15.15	19.05
Walk	774	231,006	6.38	12.19
Carpool/Vanpool	329	114,769	2.71	6.06
Bike	671	112,665	5.53	5.95
Express Bus/Commuter Bus	190	40,607	1.57	2.14
Rental Car/Vehicle	1,389	32,550	11.46	1.72
Taxi/Hired Car/Limo	20	8,498	0.16	0.45
School Bus	10	4,619	0.08	0.24
Plane	75	3,071	0.62	0.16
Local Bus,Rapid Bus	47	2,442	0.39	0.13
Other Bus	15	708	0.12	0.04
Total	**12,125**	**1,894,589**	**100.00**	**100.00**

Table 4.38: Total trip distance of trips through the SR17 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	2,499	355,648	52.07	55.67
Auto /Van/Truck Passenger	791	143,486	16.49	22.46

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Carpool/Vanpool	180	54,911	3.74	8.59
Express Bus/Commuter Bus	94	20,296	1.96	3.18
Bike	103	19,112	2.14	2.99
Plane	463	18,955	9.65	2.97
Rental Car/Vehicle	615	14,542	12.81	2.28
Walk	37	9,175	0.76	1.44
Taxi/Hired Car/Limo	4	1,592	0.08	0.25
Local Bus,Rapid Bus	14	722	0.29	0.11
School Bus	1	439	0.02	0.07
Other Bus	0	0	0.00	0.00
Total	**4,799**	**638,879**	**100.00**	**100.00**

Table 4.39: Total purpose splits for trips through the SR17 corridor

Purpose	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Personal Activities	291	26,307	27.87	15.90
Pickup/Drop Off Passenger(S)	51	16,733	4.89	10.11
All Other Activities At My Home	38	11,316	3.64	6.84
Preparing Meals/Eating	111	11,312	10.63	6.84
Social/Visit Friends/Relatives	45	10,090	4.31	6.10
Change Type Of Transportation/Transfer	27	9,656	2.59	5.84
Work/Job Duties	49	9,529	4.69	5.76
Routine Shopping	54	9,464	5.17	5.72
Using Computer/Telephone/Cell	41	6,916	3.93	4.18
In School/Classroom/Laboratory	17	6,317	1.63	3.82
Eat Meal at Restaurant/Diner	33	6,072	3.16	3.67
Loop Trip	44	4,722	4.21	2.85
Work-Related	24	4,027	2.30	2.43
Health Care	12	2,906	1.15	1.76
Study/Schoolwork	12	2,469	1.15	1.49
Outdoor Exercise	26	2,394	2.49	1.45
Don’t Know/Refused	5	2,295	0.48	1.39
Household Errands	15	2,268	1.44	1.37
Meals At Work	13	2,051	1.25	1.24
Shopping For Major Purchases	4	1,830	0.38	1.11
Personal Business	12	1,813	1.15	1.10
Service Private Vehicle	9	1,646	0.86	0.99
Drive Through Meals	7	1,616	0.67	0.98
Indoor Exercise	12	1,544	1.15	0.93
Meals At School/College	2	1,234	0.19	0.75
Work For Pay At Home	17	1,194	1.63	0.72

Purpose	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
After School Sports/Physical Activity	3	1,152	0.29	0.70
Exercise	6	1,112	0.57	0.67
All Other Work-Related Activities	3	977	0.29	0.59
Hosting Visitors	15	806	1.44	0.49
Non-Work Related Activities	2	759	0.19	0.46
Other	25	749	2.39	0.45
Training	1	620	0.10	0.37
All Other After SchoolActivities	2	473	0.19	0.29
Entertainment	9	430	0.86	0.26
Exercise/Sports	2	393	0.19	0.24
Volunteer Work/Activities	1	120	0.10	0.07
Drive Through Other (ATM, Bank)	1	61	0.10	0.04
Civic/Religious Activities	2	46	0.19	0.03
Work-Sponsored Social Activities	1	43	0.10	0.03
Total	**1,044**	**165,466**	**100.00**	**100.00**

Table 4.40: Travel mode for work trips through the SR17 corridor

Mode	Observed Unweighted	Observed Weighted	Percent Unweighted	Percent Weighted
Auto/Van/Truck Driver	36	6,504	73.47	68.26
Carpool/Vanpool	2	1,014	4.08	10.64
Bike	4	916	8.16	9.62
Walk	4	667	8.16	7.00
Auto /Van/Truck Passenger	1	274	2.04	2.88
Rental Car/Vehicle	2	153	4.08	1.60
Total	**49**	**9,529**	**100.00**	**100.00**

4.6 Data Request for the City of Los Angeles

4.6.1 Question

This question asked for the following information:

1. Total number of linked trips, by mode, whose origin was in the City of Los Angeles. This will include trips whose origin and destination were in the City of Los Angeles. If possible, we would be interested in also seeing the total duration and total distance of these associated trips.

2. Total number of linked trips, by mode, whose destination was in the City of Los Angeles, but whose origin was outside the City of Los Angeles. If possible, we would be interested in also seeing the total duration and total distance of these associated trips.

3. Total number of linked trips, by mode, whose origin and destination was outside the City of Los Angeles that passed through the City of Los Angeles. If possible, we would be interested in also seeing the total duration and total distance of these associated trips.

4.6.2 Summary and Methodology

We have generated weighted results for the first two requests. First we generated specific person level weights for the City of Los Angeles. Weights were calculated by raking at the person level. These weights adjust the relative importance of responses to reflect the different probabilities of selection of respondents, and align the sample distributions to population distributions, based on the 2010 Census. In particular, the aforementioned weights are adjusted so that the sums of the adjusted weights are equal to known population totals for certain subgroups of the population of the City of Los Angeles. Since sampling information was not available for the City of Los Angeles, we assumed equal probability here. Variables used for raking at the person level are:

- Hispanic Status (Hispanic, Non-Hispanic) – LA City-wide distribution.
- Ethnicity (White, African American, Asian, Other) – LA City-wide distribution.
- Age (less than 20 years, 20 – 24 years, 25 – 34 years, 35 – 54 years, 55 – 64 years, 65 years or older) – LA City -wide distribution.
- Employment Status (Part-time or full-time Employed, Not-employed) - LA City-wide distribution
- Gender (Male, Female) - LA City-wide distribution

Following the raking procedure, very large weights were capped to be no more than five times the mean weight. To check whether the new weights represent the total population of the City of Los Angeles, we did some random checking for different variables and the results showed that the new weights align with the population of the City of Los Angeles.

To calculate the total number of linked trips we generated linked trip table following the CHTS 2001 methodology (detail methodology is in separate document). Since linked trip table does not contain the origin and destination city name, we merged it with the place level file which contains those information. We then merged this new data set with new weights of the City of LA based on sample number and person number. We used this merged data set to generate linked trips whose origin was in the City of Los Angeles, destination was in the City of Los Angeles, origin and destination both were in the City of Los Angeles and finally destination was in the City of Los 2 Angeles but origin was outside the City of Los Angeles. To do this, we generated different sub sets of data based on different origin-destination conditions. The variables used for sub-setting the data are `PPrimaryCity` (origin) and `City` (destination) which renamed later as `oCity` and `dCity` respectively. We used the new weights of the City of Los Angeles to generate weighted results for trips originated in the City of Los Angeles. We then used statewide weights to generate weighted results for trips originated outside of the City of Los Angeles. We generated tables by mode for the following: total number of linked trips, total linked trip distance and total linked trip duration assuming that all requests were by mode. We used R programming (RStudio). The codes used for generating weights and the requested tables are given below:

4.6.3 Results

Table 4.41: Mode Code

Code	Mode	Code	Mode
1	Walk	16	Express Bus/Commuter Bus
2	Bike	17	Premium Bus
3	Wheelchair/Mobility Scooter	18	School Bus
4	Other Non-Motorized	19	Public Transit Shuttle
5	Auto/Van/Truck Driver	20	Air BART/LAX Fly Away
6	Auto /Van/Truck Passenger	21	Dial-a-Ride/Paratransit
7	Carpool/Vanpool	22	Amtrak Bus
8	Motorcycle/Scooter/Moped	23	Other Bus
9	Taxi/Hired Car/Limo	24	BART,Metro Red/Purple Line
10	Rental Car/Vehicle	25	ACE, Amtrak, Cal train
11	Private shuttle	26	Metro
12	Greyhound Bus	27	Street Car/Cable Car
13	Plane	28	Other Rail
14	Other Private Transit	29	Ferry / Boat
15	Local Bus,Rapid Bus		

Table 4.42: Linked Trips Originating from the City of Los Angeles

Mode	Number of Linked-Trips(UW)	Number of Linked-Trips(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	5,980	3,906,575	48.12	52.79
Auto /Van/Truck Passenger	2,832	1,335,932	22.79	18.05
Walk	1,949	1,176,720	15.68	15.90
Other Private Transit	867	561,382	6.98	7.59
Bike	158	134,160	1.27	1.81
BART,Metro Red/Purple Line	113	61,863	0.91	0.84
Amtrak Bus	79	44,509	0.64	0.60
Carpool/Vanpool	79	32,997	0.64	0.45
School Bus	37	27,253	0.30	0.37
Motorcycle/Scooter/Mopec	26	21,336	0.21	0.29
Premium Bus	53	19,349	0.43	0.26
Other Non-Motorized	19	14,625	0.15	0.20
Greyhound Bus	19	10,703	0.15	0.14
Express Bus/Commuter Bus	26	8,872	0.21	0.12
Taxi/Hired Car/Limo	29	7,995	0.23	0.11
Dial-a-Ride/Paratransit	5	6,643	0.04	0.09
Air BART/LAX Fly Away	23	6,504	0.19	0.09
Other Bus	39	4,909	0.31	0.07
Private shuttle	23	4,475	0.19	0.06
Local Bus,Rapid Bus	21	3,653	0.17	0.05
ACE, Amtrak, Cal train	7	2,342	0.06	0.03
Rental Car/Vehicle	13	2,045	0.10	0.03
Metro	1	1,775	0.01	0.02
Plane	23	1,212	0.19	0.02
Public Transit Shuttle	1	1,099	0.01	0.01
Wheelchair/Mobility Scooter	5	595	0.04	0.01

Table 4.43: Total Linked-Trip Distance for Trips Originating from the City of Los Angeles

Mode	Linked-Trip Distance (Miles)(UW)	Linked-Trip Distance (miles)(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	61,066	29,918,661	47.24	47.57
Plane	21,763	16,128,973	16.84	25.65
Auto /Van/Truck Passenger	28,937	9,816,687	22.38	15.61
Local Bus,Rapid Bus	5,545	3,561,416	4.29	5.66
Walk	1,527	788,876	1.18	1.25
Metro	1,413	637,434	1.09	1.01
ACE, Amtrak, Cal train	2,897	425,190	2.24	0.68
Bike	419	349,910	0.32	0.56
BART,Metro Red/Purple Line	812	267,670	0.63	0.43
Carpool/Vanpool	1,392	211,525	1.08	0.34
Motorcycle/Scooter/Moped	252	142,625	0.19	0.23
School Bus	492	129,421	0.38	0.21
Premium Bus	337	122,809	0.26	0.20
Express Bus/Commuter Bus	550	78,063	0.43	0.12
Ferry / Boat	36	64,199	0.03	0.10
Public Transit Shuttle	87	56,231	0.07	0.09
Taxi/Hired Car/Limo	159	48,342	0.12	0.08
Other Bus	20	40,772	0.02	0.06
Private shuttle	702	30,764	0.54	0.05
Dial-a-Ride/Paratransit	161	27,465	0.12	0.04
Other Rail	109	16,762	0.08	0.03
Other Private Transit	525	10,525	0.41	0.02
Other Non-Motorized	11	9,323	0.01	0.01
Rental Car/Vehicle	57	6,689	0.04	0.01
Wheelchair/Mobility Scooter	3	336	0.00	0.00

Table 4.44: Total Linked-Trip Distance for Trips Originating from the City of Los Angeles

Mode	Linked-Trip Duration (Min)(UW)	Linked-Trip Duration(Min)(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	170,856	97,295,394	46.98	50.46
Auto /Van/Truck Passenger	79,299	33,205,839	21.80	17.22
Local Bus,Rapid Bus	38,190	24,135,028	10.50	12.52
Walk	32,477	20,029,627	8.93	10.39
Bike	4,860	3,700,377	1.34	1.92
Metro	5,819	2,992,541	1.60	1.55
Plane	3,982	2,711,623	1.09	1.41
BART,Metro Red/Purple Line	3,679	1,891,889	1.01	0.98
ACE, Amtrak, Cal train	5,794	885,711	1.59	0.46
School Bus	2,566	885,101	0.71	0.46
Public Transit Shuttle	1,263	878,890	0.35	0.46
Carpool/Vanpool	3,539	812,044	0.97	0.42
Premium Bus	1,605	570,776	0.44	0.30
Motorcycle/Scooter/Moped	779	481,691	0.21	0.25
Air BART/LAX Fly Away	371	407,552	0.10	0.21
Dial-a-Ride/Paratransit	1,210	360,454	0.33	0.19
Taxi/Hired Car/Limo	1,734	342,882	0.48	0.18
Express Bus/Commuter Bus	1,633	338,855	0.45	0.18
Other Bus	170	264,548	0.05	0.14
Other Non-Motorized	323	260,936	0.09	0.14
Private shuttle	1,554	129,934	0.43	0.07
Ferry / Boat	60	106,475	0.02	0.06
Other Private Transit	1,245	55,269	0.34	0.03
Other Rail	279	48,371	0.08	0.03
Rental Car/Vehicle	336	25,089	0.09	0.01
Wheelchair/Mobility Scooter	72	8,562	0.02	0.00

Table 4.45: Linked Trips Terminating in the City of Los Angeles

Mode	Number of Linked-Trips(UW)	Number of Linked-Trips(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	7,160	4,300,432	50.40	51.06
Auto /Van/Truck Passenger	3,295	1,722,001	23.20	20.45
Walk	2,036	1,295,320	14.33	15.38
Other Private Transit	849	577,594	5.98	6.86
Bike	193	159,733	1.36	1.90
Other Bus	122	78,296	0.86	0.93
Dial-a-Ride/Paratransit	75	57,194	0.53	0.68
Carpool/Vanpool	91	53,078	0.64	0.63
School Bus	39	28,551	0.27	0.34
Premium Bus	64	27,659	0.45	0.33
Motorcycle/Scooter/Mopec	31	17,992	0.22	0.21
Other Non-Motorized	22	15,567	0.15	0.18
Express Bus/Commuter Bus	27	15,363	0.19	0.18
Local Bus,Rapid Bus	26	11,703	0.18	0.14
Amtrak Bus	31	10,343	0.22	0.12
Taxi/Hired Car/Limo	28	9,806	0.20	0.12
Private shuttle	26	9,206	0.18	0.11
Public Transit Shuttle	21	9,060	0.15	0.11
Greyhound Bus	18	5,901	0.13	0.07
Air BART/LAX Fly Away	6	5,372	0.04	0.06
Plane	22	4,795	0.15	0.06
Rental Car/Vehicle	13	3,630	0.09	0.04
ACE, Amtrak, Cal train	6	1,815	0.04	0.02
Wheelchair/Mobility Scooter	3	912	0.02	0.01
BART,Metro Red/Purple Line	1	493	0.01	0.01

Table 4.46: Total Linked-Trip Distance for Trips Terminating in the City of Los Angeles

Mode	Linked-Trip Distance (Miles)(UW)	Linked-Trip Distance (miles)(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	73,230	37,996,033	50.61	53.44
Auto /Van/Truck Passenger	34,318	17,073,458	23.72	24.02
Plane	19,661	6,463,602	13.59	9.09
Local Bus,Rapid Bus	5,716	3,836,697	3.95	5.40
Metro	1,659	1,030,515	1.15	1.45
Walk	1,580	898,109	1.09	1.26
Carpool/Vanpool	1,416	819,393	0.98	1.15
ACE, Amtrak, Cal train	1,961	636,148	1.36	0.89
BART,Metro Red/Purple Line	749	506,955	0.52	0.71
Bike	451	347,590	0.31	0.49
Express Bus/Commuter Bus	742	283,958	0.51	0.40
School Bus	569	230,770	0.39	0.32
Premium Bus	367	225,409	0.25	0.32
Private shuttle	641	150,083	0.44	0.21
Motorcycle/Scooter/Moped	302	130,694	0.21	0.18
Other Private Transit	511	93,976	0.35	0.13
Taxi/Hired Car/Limo	227	92,823	0.16	0.13
Public Transit Shuttle	97	65,252	0.07	0.09
Dial-a-Ride/Paratransit	167	61,714	0.12	0.09
Rental Car/Vehicle	143	58,851	0.10	0.08
Other Bus	52	44,061	0.04	0.06
Other Rail	108	36,927	0.07	0.05
Other Non-Motorized	15	10,922	0.01	0.02
Wheelchair/Mobility Scooter	3	663	0.00	0.00

Table 4.47: Linked-Trip Duration for Trips Terminating from the City of Los Angeles

Mode	Linked-Trip Duration (Min)(UW)	Linked-Trip Duration (Min)(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	197,923	113,402,462	48.99	49.25
Auto /Van/Truck Passenger	94,095	47,568,871	23.29	20.66
Local Bus,Rapid Bus	38,095	25,880,023	9.43	11.24
Walk	33,824	21,934,385	8.37	9.53
Bike	5,541	4,177,468	1.37	1.81
Metro	6,716	4,047,912	1.66	1.76
BART,Metro Red/Purple Line	3,490	2,755,745	0.86	1.20
Carpool/Vanpool	3,378	1,935,348	0.84	0.84
School Bus	3,013	1,279,209	0.75	0.56
ACE, Amtrak, Cal train	3,682	1,227,326	0.91	0.53
Public Transit Shuttle	1,309	909,737	0.32	0.40
Premium Bus	1,423	891,882	0.35	0.39
Plane	2,428	785,285	0.60	0.34
Express Bus/Commuter Bus	1,825	783,364	0.45	0.34
Dial-a-Ride/Paratransit	1,295	510,716	0.32	0.22
Taxi/Hired Car/Limo	1,014	386,250	0.25	0.17
Motorcycle/Scooter/Moped	815	351,982	0.20	0.15
Private shuttle	1,219	309,332	0.30	0.13
Other Bus	323	277,131	0.08	0.12
Other Non-Motorized	349	248,232	0.09	0.11
Other Private Transit	1,151	215,840	0.28	0.09
Wheelchair/Mobility Scooter	330	125,323	0.08	0.05
Rental Car/Vehicle	425	96,400	0.11	0.04
Other Rail	274	91,495	0.07	0.04
Street Car/Cable Car	93	45,813	0.02	0.02

Table 4.48: Linked Trips Originating and Terminating in the City of Los Angeles

Mode	Number of Linked-Trips(UW)	Number of Linked-Trips(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	3,235	2,776,699	41.67	49.11
Walk	1,699	1,107,114	21.89	19.58
Auto /Van/Truck Passenger	1,722	987,300	22.18	17.46
Other Private Transit	661	453,731	8.51	8.02
Bike	114	118,342	1.47	2.09
Dial-a-Ride/Paratransit	51	41,838	0.66	0.74
Other Bus	51	41,664	0.66	0.74
School Bus	35	25,819	0.45	0.46
Carpool/Vanpool	37	24,490	0.48	0.43
Premium Bus	44	18,788	0.57	0.33
Motorcycle/Scooter/Mope	12	12,929	0.15	0.23
Other Non-Motorized	16	12,631	0.21	0.22
Taxi/Hired Car/Limo	23	7,511	0.30	0.13
Express Bus/Commuter Bus	12	6,457	0.15	0.11
Public Transit Shuttle	15	6,284	0.19	0.11
Air BART/LAX Fly Away	4	3,864	0.05	0.07
Private shuttle	10	3,229	0.13	0.06
Rental Car/Vehicle	7	2,045	0.09	0.04
Local Bus,Rapid Bus	3	1,740	0.04	0.03
Plane	8	978	0.10	0.02
BART,Metro Red/Purple Line	1	507	0.01	0.01
Wheelchair/Mobility Scooter	1	119	0.01	0.00
Amtrak Bus	1	108	0.01	0.00
Greyhound Bus	1	NA	0.01	NA

Table 4.49: Total Linked-Trip Distance for Trips Originating and Terminating in the City of Los Angeles

Mode	Linked-Trip Distance (Miles)(UW)	Linked-Trip Distance (Miles)(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	17,824	16,019,010	53.69	63.25
Auto /Van/Truck Passenger	8,435	4,715,883	25.41	18.62
Local Bus,Rapid Bus	3,594	2,485,878	10.82	9.81
Walk	1,324	742,242	3.99	2.93
Metro	359	325,325	1.08	1.28
Bike	212	256,376	0.64	1.01
BART,Metro Red/Purple Line	333	250,741	1.00	0.99
School Bus	279	110,715	0.84	0.44
Carpool/Vanpool	184	107,389	0.55	0.42
Public Transit Shuttle	84	55,839	0.25	0.22
Motorcycle/Scooter/Moped	49	52,550	0.15	0.21
Premium Bus	99	51,407	0.30	0.20
Taxi/Hired Car/Limo	127	45,707	0.38	0.18
Private shuttle	51	26,141	0.15	0.10
Dial-a-Ride/Paratransit	83	25,463	0.25	0.10
Express Bus/Commuter Bus	34	18,167	0.10	0.07
Other Bus	10	13,411	0.03	0.05
Other Non-Motorized	9	8,725	0.03	0.03
Rental Car/Vehicle	16	6,689	0.05	0.03
Other Private Transit	82	6,468	0.25	0.03
Other Rail	6	3,197	0.02	0.01
ACE, Amtrak, Cal train	5	583	0.02	0.00
Wheelchair/Mobility Scooter	1	145	0.00	0.00
Plane	0	NA	0.00	NA

Table 4.50: Linked-Trip Duration for Trips Originating and Terminating from the City of Los Angeles

Mode	Linked-Trip Duration (Min)(UW)	Linked-Trip Duration (Min)(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	70,957	62,395,150	39.34	47.41
Auto /Van/Truck Passenger	38,950	21,370,756	21.59	16.24
Walk	28,299	18,937,705	15.69	14.39
Local Bus,Rapid Bus	26,786	18,366,643	14.85	13.95
Bike	3,387	3,157,596	1.88	2.40
BART,Metro Red/Purple Line	2,008	1,780,090	1.11	1.35
Metro	2,298	1,751,474	1.27	1.33
Public Transit Shuttle	1,207	836,303	0.67	0.64
School Bus	1,951	820,637	1.08	0.62
Carpool/Vanpool	921	542,573	0.51	0.41
Dial-a-Ride/Paratransit	865	353,842	0.48	0.27
Premium Bus	544	315,756	0.30	0.24
Taxi/Hired Car/Limo	666	222,775	0.37	0.17
Other Non-Motorized	263	214,086	0.15	0.16
Motorcycle/Scooter/Moped	191	181,662	0.11	0.14
Other Bus	120	125,591	0.07	0.10
Private shuttle	339	94,498	0.19	0.07
Express Bus/Commuter Bus	104	65,256	0.06	0.05
Other Private Transit	296	44,752	0.16	0.03
Rental Car/Vehicle	165	25,089	0.09	0.02
Other Rail	23	11,669	0.01	0.01
Wheelchair/Mobility Scooter	20	2,378	0.01	0.00
ACE, Amtrak, Cal train	21	2,265	0.01	0.00
Plane	10	NA	0.01	NA

Table 4.51: Linked Trips Originating Elsewhere and Terminating in the City of Los Angeles

Mode	Number of Linked-Trips(UW)	Number of Linked-Trips(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	3,925	1,523,733	60.93	55.06
Auto /Van/Truck Passenger	1,573	734,701	24.42	26.55
Walk	337	188,206	5.23	6.80
Other Private Transit	188	123,864	2.92	4.48
Bike	79	41,390	1.23	1.50
Other Bus	71	36,632	1.10	1.32
Carpool/Vanpool	54	28,588	0.84	1.03
Dial-a-Ride/Paratransit	24	15,355	0.37	0.55
Amtrak Bus	30	10,235	0.47	0.37
Local Bus,Rapid Bus	23	9,963	0.36	0.36
Express Bus/Commuter Bus	15	8,906	0.23	0.32
Premium Bus	20	8,871	0.31	0.32
Private shuttle	16	5,977	0.25	0.22
Greyhound Bus	17	5,901	0.26	0.21
Motorcycle/Scooter/Mope	19	5,063	0.29	0.18
Plane	14	3,817	0.22	0.14
Other Non-Motorized	6	2,936	0.09	0.11
Public Transit Shuttle	6	2,776	0.09	0.10
School Bus	4	2,732	0.06	0.10
Taxi/Hired Car/Limo	5	2,295	0.08	0.08
Rental Car/Vehicle	6	1,585	0.09	0.06
Air BART/LAX Fly Away	2	1,508	0.03	0.05
ACE, Amtrak, Cal train	5	1,308	0.08	0.05
Wheelchair/Mobility Scooter	2	793	0.03	0.03
BART,Metro Red/Purple Line	1	493	0.02	0.02

Table 4.52: Total Linked-Trip Distance for Trips Originating Elsewhere and Terminating in the City of Los Angeles

Mode	Linked-Trip Distance (Miles)(UW)	Linked-Trip Distance (Miles)(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	55,405	21,977,023	49.70	48.02
Auto /Van/Truck Passenger	25,883	12,357,575	23.22	27.00
Plane	19,661	6,463,602	17.64	14.12
Local Bus,Rapid Bus	2,122	1,350,818	1.90	2.95
Carpool/Vanpool	1,232	712,004	1.11	1.56
Metro	1,300	705,190	1.17	1.54
ACE, Amtrak, Cal train	1,956	635,564	1.75	1.39
Express Bus/Commuter Bus	708	265,791	0.64	0.58
BART,Metro Red/Purple Line	416	256,214	0.37	0.56
Premium Bus	268	174,002	0.24	0.38
Walk	256	155,867	0.23	0.34
Private shuttle	589	123,942	0.53	0.27
School Bus	290	120,055	0.26	0.26
Bike	238	91,214	0.21	0.20
Other Private Transit	429	87,508	0.39	0.19
Motorcycle/Scooter/Moped	253	78,143	0.23	0.17
Rental Car/Vehicle	128	52,163	0.11	0.11
Taxi/Hired Car/Limo	100	47,115	0.09	0.10
Dial-a-Ride/Paratransit	84	36,251	0.08	0.08
Other Rail	102	33,730	0.09	0.07
Other Bus	42	30,650	0.04	0.07
Public Transit Shuttle	13	9,413	0.01	0.02
Other Non-Motorized	6	2,197	0.01	0.00
Wheelchair/Mobility Scooter	1	518	0.00	0.00

Table 4.53: Linked-Trip Duration for Trips Originating Elsewhere and Terminating from the City of Los Angeles

Mode	Linked-Trip Duration (Min)(UW)	Linked-Trip Duration (Min)(W)	Percent(UW)	Percent(W)
Auto/Van/Truck Driver	126,966	51,007,311	56.77	51.72
Auto /Van/Truck Passenger	55,145	26,198,115	24.66	26.56
Local Bus,Rapid Bus	11,309	7,513,380	5.06	7.62
Walk	5,525	2,996,680	2.47	3.04
Metro	4,418	2,296,438	1.98	2.33
Carpool/Vanpool	2,457	1,392,775	1.10	1.41
ACE, Amtrak, Cal train	3,661	1,225,061	1.64	1.24
Bike	2,154	1,019,872	0.96	1.03
BART,Metro Red/Purple Line	1,482	975,654	0.66	0.99
Plane	2,418	785,285	1.08	0.80
Express Bus/Commuter Bus	1,721	718,109	0.77	0.73
Premium Bus	879	576,127	0.39	0.58
School Bus	1,062	458,572	0.47	0.46
Private shuttle	880	214,833	0.39	0.22
Other Private Transit	855	171,088	0.38	0.17
Motorcycle/Scooter/Moped	624	170,320	0.28	0.17
Taxi/Hired Car/Limo	348	163,475	0.16	0.17
Dial-a-Ride/Paratransit	430	156,874	0.19	0.16
Other Bus	203	151,539	0.09	0.15
Wheelchair/Mobility Scooter	310	122,945	0.14	0.12
Other Rail	251	79,826	0.11	0.08
Public Transit Shuttle	102	73,434	0.05	0.07
Rental Car/Vehicle	260	71,311	0.12	0.07
Street Car/Cable Car	93	45,813	0.04	0.05
Other Non-Motorized	86	34,147	0.04	0.03