Final Fresno COG VMIP 2
Model Development Report

Prepared for:
Fresno COG

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FEHR PEERS

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OVERVIEW

The San Joaquin Valley Model Improvement Plan (VMIP 1) began in 2010 and resulted in substantial enhancements to the modeling capabilities of the Metropolitan Planning Organizations (MPOs) within the San Joaquin Valley (SJV). Due to the timing of the original VMIP 1, many data sources pertinent to understanding travel behavior and developing travel forecasting models were not available. As such, older sources were used to supplement data for the base year, making calibration and validation difficult due to the economic downturn relative to the 2001/2003 California Household Travel Survey (CHTS) and 2000 Census which were collected before calibration efforts commenced. VMIP 2 not only takes advantage of the most recent Census and CHTS data and the model structure enhancements developed as part of the VMIP 1, but also new Big Data.

This document provides guidance on the model specifications and data used in developing the components for the San Joaquin Valley Model Improvement Plan, Phase 2 (VMIP 2). The objective of this document is to provide an overview and full technical details of the VMIP 2 models: this includes aspects common to all VMIP 2 models as well as specific calibration and model validation for the Fresno Council of Governments (Fresno COG) model. Changes between the original VMIP 1 models and the VMIP 2 models receive special emphasis.

In addition to the updated data, VMIP 2 implemented changes to the model structure are based on feedback from the Air Resources Board (ARB) provided during the Regional Transportation Plan (RTP) and Sustainable Communities Strategy (SCS) review process, and MPO staff who applied the models over the last several years. Key enhancements to model sensitivity and usability include:

- Land Use: Simplified residential and employment categories and addition of group quarters population
- Socio-economic: Employee salary and household income relationship for home-work trips
- Inter-regional Travel: Improved control over scenario evaluation of inter-regional assumptions
- Updated Scenario Development: Created single scenario spreadsheets and clear documentation
- Sensitivity to the "Ds:" Used GIS centerline network and included accessibility variables
- Refined Post-Processors: Added flexibility to summary processes including select link assignment

Listed below are recommendations for updating the model, data, or usability beyond VMIP 2.

- Refine trip generation such that person trips and vehicle trips account for under-reporting of travel in the CHTS, and assigned traffic volumes reflect roadway counts.
- Refine economic factors at a more specific geography and calibrate the land use allocation model using the refined data.
- Continue to collect traffic count and transit ridership data, land use development (residential, school, and employees) to perform near-term forecasts.
- Review and update the highway and transit networks for future years, creating a link between the RTP projects and the model.
- Coordinate with other MPOs and update the inter-regional travel components as needed.
- Track demographics, economics, and related Ds variables over time to inform future scenario development.
- Evaluate shifts in future assumptions such as autonomous vehicles, demographics, fuel price, and land use development patterns.

The following sections describe the data collected for model estimation, calibration, and validation.

DATA ACQUISITION, REVIEW, AND SUMMARY

This section describes the data collection, review processes, and provides a summary of the data used in the estimation, calibration, and validation of the VMIP 2 models.

2010 CENSUS/2012 ACS

Updated land use cross-classification tables used 2012 ACS Census data and the finest available geography. Most required data were available at the level of census block group or census tract, but a few multi-dimension tables were only available at the Public Use Microdata Areas (PUMA) level. These cross-classification tables are in a percentage format. Each MPO/County provides the control totals for demographic variables including total population, total numbers of households, and total number of residential units at transportation analysis zone (TAZ) level. The base year for most models is 2008, although some MPOs/Counties have opted to update model base years to 2014 under separate contracts. ACS 2012 cross-classified tables represent demographic characteristic of each TAZ regardless of the model base year. The control total can easily be updated to a new base year after each MPO/County provides recent demographic data at the TAZ level.

2012 CHTS

The original VMIP 1, completed before 2012 CHTS data were available, used the 2001/2003 CHTS for validation of household variables. VMIP 2 used newer data from the 2012 CHTS to re-estimate most model components.

PREPARATION AND CLEANING OF CHTS DATA

The publically available version of the 2012 CHTS required a substantial amount of preparation, including re-weighting, before it was suitable for model development. Details of the data preparation are in Appendix A: Preparation of California Household Travel Survey Data. Data dictionaries for the cleaned and prepared CHTS data, including households, trips, and persons files, are in Appendix B: California Household Travel Survey Data Dictionary.

The following pages describe portions of the CHTS data preparation most relevant to VMIP 2; for full details please see the appendices.

Identification of Trip Purposes

The 2012 CHTS data does not describe trip purposes directly; instead, it contains a "place" file whose attributes include a listing of up to three activities the respondent participated in at that place. A small list of place purposes was distilled from this activity information: HOME, WORK, COLLEGE, K12, SHOP, or OTHER.

Once the purpose for each place has been determined, assigning a purpose to each trip is straightforward.

- If one end of the trip is "HOME" and the other is "WORK," the trip is home-based work ("HBW").
- If one end of the trip is "HOME" and the other is "K12," the trip is home-based K-12 ("HBK").
- If one end of the trip is "HOME" and the other is "COLLEGE," the trip is home-based college ("HBC").
- If one end of the trip is "HOME" and the other is "SHOP," the trip is home-based shop ("HBS").
- If one end of the trip is "HOME" and the other is either "OTHER" or "HOME," the trip is home-based other ("HBO").
- If one end of the trip is "WORK" and the other end is anything but "HOME," the trip is work-based other ("WBO").
- In all other cases, the trip is non-home-based ("NHB").

Identification and Consolidation of Transit Trip Chains

In recording transit trips, the CHTS treats each portion of the transit trip chain as a separate trip. For example, a trip in which the traveler drives to a rail station, takes the train to a second rail station, and then walks to a workplace is listed in the survey as three separate consecutive trips, with three separate modes. This method of record-keeping makes it possible to track the mode of access and egress for a transit trip, but for most travel behavior analyses it is preferable to consider these three trips as a single unit or linked trip. Thus, a necessary step of data preparation is identification and consolidation of chains which make up a single linked transit trip. Details of this process are in Appendix A: Preparation of California Household Travel Survey Data.

Estimation of Survey Weights

Surveys capture the characteristics of an entire population by randomly sampling a small proportion of the population. Often, a perfectly random sample is hard to achieve — some groups are difficult to survey and are under-represented, other groups are over-represented. To balance this bias, estimated sample weights "reshape" the sample. Fehr & Peers estimated household sample weights for the CHTS to balance the survey

sample to match county-level percentages for several variables as reported in the 2012 ACS 5-year estimates. Listed below are variables used as controls for the re-weighting.

- Household size (one to seven or more).
- Household income (nine income categories).
- Number of workers per household (zero to three or more).
- Number of vehicles owned per household (zero to four or more).
- Household residential unit type (three categories).
- Household size (one to five or more) cross-classified by household income (five categories).
- Household size (one to five or more) cross-classified by number of vehicles per household (zero to four or more).
- Household size (one to five or more) cross-classified by number of workers per household (zero to three or more).

Details of the survey weight estimation are in Appendix A: Preparation of California Household Travel Survey Data.

Census Designated Places

Census Designated Places (CDPs) are a useful identification that includes cities as well as unincorporated but named places. The fact that publically-available CHTS data is geo-coded only by census tract made the process of identifying a CDP for each location slightly more complex. Because the boundaries of CDPs do not neatly match census tracts, each census tract may have multiple CDPs associated with them. In cases where multiple CDPs make up a single census tract, the CDP with the largest population in the tract (as identified at the census block level) is used. The CDP is identified as an unincorporated portion of the relevant county if the largest population in the tract is outside all named CDPs.

Place Type

In addition to locating households and trip ends using census tracts, CDPs, and counties, each household location and trip end is assigned a place type category. The place type is based on the number of jobs and the working-age population accessible from the household or trip end. These accessibility metrics are available as part of the EPA Smart Location Database (http://www2.epa.gov/smartgrowth/smart-location-mapping#SLD), and are weighted so nearby jobs and population are more influential than distant jobs and population. The resulting sum of accessible jobs and potential workers are categorized into the following place types.

1. Under 40,000 jobs + workers.
2. 40,000 – 100,000 jobs + workers.
3. 100,000 – 200,000 jobs + workers.
4. 200,000 – 450,000 jobs + workers.
5. Over 450,000 jobs + workers.

"Work" Trips Made by Non-Workers

The CHTS collects both employment data for each participant and trip purpose data for all trips undertaken. However, the survey does not ensure these values are in agreement with one another. There are a small number of persons whose employment status is either not reported (or reported as "retired" or "unemployed") whose trips are categorized as work trips. Because this is not optimal for modeling purposes, any work trips made by a non-employed person is re-categorized; HBW trips are re-assigned as HBO trips, and WBO trips are re-assigned as OBO trips.

ESTIMATION DATASET

The estimation dataset for VMIP 2 consists of a portion of the statewide CHTS data. Only CHTS records which satisfy the following criteria were used.

- For household-level variables, only residents of the eight SJV counties and the six Sacramento Area Council of Governments (SACOG) counties are included. The six SACOG counties had to be included to ensure an adequate sample size.
- Only weekday trips are included.
- Trips are included from the full year of the CHTS, including winter and summer.
- Trips with both trip ends outside the 14-county SJV + SACOG region are excluded.

Table 1 shows the distribution of CHTS households in the estimation counties, the households reported in the ACS, and percentage of samples in the estimation set. Note the table shows the (unweighted) number of households in the estimation set and the full CHTS, while the value in the final column represents the percentage of the overall samples by county.

TABLE 1: GEOGRAPHIC SCALE FOR NEW TAZ VARIABLES

County	Households in Estimation Set	Total households in CHTS	Total households in County (2012 ACS)	Percentage of Estimation Set
Fresno	718	1,115	287,082	14%
Kern	961	1,544	253,178	12%
Kings	199	293	40,767	2%
Madera	205	311	42,063	2%
Merced	297	474	74,496	3%
San Joaquin	468	629	213,632	12%
Stanislaus	383	552	165,999	8%
Tulare	537	799	129,996	6%
Sacramento	567	825	512,496	25%
El Dorado	151	208	67,846	2%
Placer	290	385	131,775	7%
Sutter	130	168	31,635	2%
Yuba	137	205	24,133	1%
Yolo	186	246	70,090	4%
Total	**5,229**	**7,754**	**512,496**	**100%**

CHTS SUMMARIES

Several broad summaries of CHTS data were produced and are suitable both for model development and for general information. Separate summaries were produced for the 14-county estimation region, the eight-county SJV region, the three-county Three County Model region, and each of the eight SJV counties individually. The "simple" and "flat" summaries contain one record per geography, and is suitable for joining to GIS. The "simple" summary contains a smaller number of metrics, while the "flat" summary contains many more details. The "filterable" summary contains many records per geography, and is viewable in Excel. Details and data dictionaries for these summaries are in Appendix C: Simple Summaries of CHTS Data, Appendix D: Flat Summaries of CHTS Data, and Appendix E: Filterable Summaries of CHTS Data.

CHTS SIMPLIFIED DATA

In addition to being useful for model estimation, calibration, and validation, the CHTS data is useful for a wide range of other purposes. To that end, we have provided simplified versions of CHTS data together with instructions for processing that data in Excel. The format is designed to be flexible, easy to use, and able to produce a variety of commonly-requested summaries such as mode shares, trip lengths and origin/destination tables. More information about the simplified data and instructions for using it in Excel is in Appendix F: Simplified CHTS Data.

HOUSING AFFORDABILITY, EMPLOYMENT AND JOBS/HOUSING BALANCE

Demographic and employment data are critical components to any land use, transportation, or integrated land use-transportation modeling effort. An appropriately detailed description of the people who live and work in each geographic zone is essential to understanding their travel behavior and in predicting the region's evolution over time, especially the relationship between the locations of employers paying a given range of wages and the residence locations of workers with similar income levels. There are many sources for this data, necessitating a data merge and verifying its compatibility with other datasets. CoStar led this effort. They used surveyors to call and visit residential, office, and commercial buildings and combined multiple demographic and transportation databases into a single web-accessible dashboard. CoStar continuously updates the data and keeps the historic data so changes in rents, vacancies, and other relevant variables can be evaluated. This data were used to calibrate the bid/rent functions of the land use allocation/disaggregation model, and to assist in the estimation and calibration of trip generation and distribution, allowing additional functionality to better match jobs and household income. The income of households and job salaries are described later in the calibration step.

REFINE MODEL INPUT DATA

TRANSPORTATION ANALYSIS ZONES

The TAZ system for each model is largely unchanged from the original VMIP 1. New TAZ attributes were developed to refine the model's trip distribution, including the matching of jobs to workers by income level and the distribution of trips entering and leaving the model area. In addition, the VMIP 2 models include both accessibility pre-processors and in-model accessibility calculations at the TAZ level, described below.

TAZ ATTRIBUTES

New attributes in the TAZ-level input data are listed below.

- Total acreage of the TAZ (including undeveloped land).
- Percentage of trips produced by the TAZ which enter or leave the model area, by trip purpose.
- Percentage of trips attracted to the TAZ which enter or leave the model area, by trip purpose.
- Percentage of jobs in the TAZ which are high-, medium-, and low-income, by employment category.

Table 2 below describes the geographic scale at which the trips produced/attracted and employment income variables are implemented in the model. The model user can change variables to apply at a different scale if desired, as described in the table.

TABLE 2: GEOGRAPHIC SCALE FOR NEW TAZ VARIABLES

Variables	Description	Scale of current implementation	Scale of potential implementation
HBWH_ix, HBWH_xi, HBWM_ix, HBWM_xi, etc.	Percentages of trips produced & attracted to TAZ, by trip purpose	CDP	TAZ
EMP_EDUH, EMP_EDUM, EMP_EDUL, etc.	Percentages of employment that are high, medium, and low income, by job sector	County	TAZ

The full data dictionary for TAZ-level inputs is in Appendix G: Data dictionary for TAZ data inputs.

ACCESSIBILITY

The VMIP 2 models include two accessibility pre-processors. These are Python scripts, operating on the input TAZ and network shapefiles to produce accessibility metrics.

- Intersections.py produces a count of the number of intersections per TAZ.
- RoadwayMiles.py produces the sum of walkable network miles.

These script outputs, in data base format (DBF), are used during the model input preparation stage to calculate a variety of accessibility metrics at the TAZ level.

A third input file, VMTseed, contains an estimate of the average commuting VMT generated per worker in the TAZ. The starting estimates can be approximate because this estimate is updated throughout the model process.

During the input preparation phase of the model, TAZ-level accessibility metrics and built environment ("D variable") metrics are produced. These metrics are updated as the model runs through its feedback loops. Some of the accessibility metrics are implemented later in the model; others are provided as model outputs. **Table 3** below shows the accessibility metrics used later in the model.

TABLE 3: ACCESSIBILITY METRICS USED IN VMIP 2 MODELS

Metric	Description	Where used
EMP_30AUT	Jobs within 30 minutes by auto	Place Type calculation
WRK_30AUT	Working-age population within 30 minutes by auto	Place Type Calculation
ATYPE	Place Type categorization of job+worker to five categories. (See Table 4 below).	Trip Generation
LOG_EMPD	Log of employment density (jobs per developed acre)	Auto Ownership, Mode Choice
INTDEN	Intersection density (intersections per square mile)	Auto Ownership, Mode Choice
EMP_30TRN	Jobs within 30 minutes by transit	Auto Ownership, Mode Choice
COMMUTECOST	Average annual commute cost	Auto Ownership

Place type is calculated from the sum of jobs within 30 minutes by auto- and working-age population within 30 minutes by auto, and categorized into the five categories listed in **Table 4** below.

TABLE 4: PLACE TYPES

Place Type Category	Alternate Name	Description
1	POP1	Under 40,000 jobs + working-age population within 30 minutes by auto
2	POP2	Between 40,000 and 100,000 jobs + working-age population within 30 minutes by auto
3	POP3	Between 100,000 and 200,000 jobs + working-age population within 30 minutes by auto
4	POP4	Between 200,000 and 450,000 jobs + working-age population within 30 minutes by auto
5	POP5	Over 450,000 jobs + working-age population within 30 minutes by auto

A full data dictionary of the accessibility metrics calculated in the model is in Appendix H: Accessibility Variables.

LAND USE INPUTS

During the original VMIP 1, Census 2000 land use data were used in combination with the CHTS 2001/03 to estimate and calibrate the trip generation rates. After Census 2000, the Census Bureau not only developed continuous sampling and reporting via the American Community Survey, but they also changed the format, variables, and detail of reported data. In 2012 it was discovered all of the variables used in the MIP models are not available at the same cross-classification detailed level as was reported in 2000. As such, we have updated the residential demographic variables at the same time we re-estimated trip generation equations.

In addition to the availability of data provided by the ACS and Census, updating the land use inputs at the same time trip information is estimated and calibrated allowed the opportunity to expand the capabilities to take advantage of the job salary and household mortgage/expense data. While the Census and ACS provide the information for the base year recalibration, the VMIP 2 models can now also use Cube Land to disaggregate the base year land use to reflect the validation conditions, allowing future forecasts of residential demographics to vary based on land use and transportation system changes.

Although the land use data and Cube Land model were implemented for each model, the application of Cube Land is not required. It can be used to disaggregate land use while keeping the totals by zone nearly identical, test brand new scenarios by allocating the control total for each land use type, or a middle scenario where some areas do not change and others can be allocated based on Cube Land.

Table 5 below describes the land use variables used as model inputs:

TABLE 5: LAND USE INPUT VARIABLES

Type	Attribute	Description	Units
Geographic	TAZ	Transportation Analysis Zone ID	
	STATE	State	
	COUNTY	County	
	PUMA	Census Public Use Microdata Area	
	CITY	City	
	TRACT	Census tract ID	
	BLOCK	Census block ID	
	MODEL	Model ID	
	PLACETYPE [1]	Placetype category	
Residential	TOTHH	Total Households	Households
	RU1, RU2, … RU10 [2]	Households by Residential Unit Type	Households
	RUG1, RUG2, RUG3 [2]	Households by Residential Unit Type Groups	Households
	RUG1SPARE, … RUG7SPARE	Unused in current model but available for expanding grouping of residential unit types.	
Non-residential[3]	TOTEMP	Total employees	Employees
	EMPEDU	Educational Services (61-63)	Employees
	EMPFOO	Accommodations (721), Food Services (722), Arts, Entertainment and Recreation (71)	Employees
	EMPGOV	Public Administration (92)	Employees
	EMPIND	Utilities (22), Construction (23), Other Services Except Public Administration (81), Wholesale Trade (42), Transportation and Warehousing (48-49)	Employees
	EMPMED	Health Care and Social Assistance (62)	Employees
	EMPOFC	Information (51), Finance and Insurance (52), Real Estate, Rental and Leasing (53), Professional, Scientific, and Technical Services (54), Management of Companies and Enterprises (55), Administrative/Support, Waste Management & Remediation (56)	Employees
	EMPOTH	Mining, Quarrying, Oil and Gas Extraction (21), Manufacturing (31-33)	Employees

TABLE 5: LAND USE INPUT VARIABLES

Type	Attribute	Description	Units
	EMPRET	Retail Trade (44-45)	Employees
	EMPAGR	Agriculture, Forestry, Fishing and Hunting (11)	Employees
	EMPSPARE1, … EMPSPARE8	Unused in current model but available for expanding employment categories	
	POPDORM	Group Quarters population: School (Dormitory, Fraternity, Sorority)	People
	POPASSIST	Group Quarters Population: Medical (Assisted living, retirement home)	People
	POPMILITARY	Group Quarters Population: Military (Military base if not special generator)	People
	POPINST	Group Quarters Population: Institutionalized population (prison, mental health, etc.)	People
	ELEM	Elementary and middle school enrollment	Student Enrollment
	HS	High school enrollment	Student Enrollment
	COLLEGE	College enrollment	Student Enrollment
Scenario	YEAR	Scenario year	
	SCEN	Scenario name	
	MPO	MPO	
	Comments	Scenario comments	

Notes:

1. See Table 4 for place type categories.
2. See Table 8 for residential unit type categories.
3. Non-residential description contains NAICS sector number(s).

The land use inputs above are combined with the Census cross-classification rates to create the SE Detail file, described in **Table 6** below.

TABLE 6: SOCIO-ECONOMIC DETAIL

Type	Attribute	Description	Units
Geographic	TAZ	Transportation Analysis Zone ID	
	STATE	State	
	COUNTY	County	
	PUMA	Census Public Use Microdata Area	

TABLE 6: SOCIO-ECONOMIC DETAIL

Type	Attribute	Description	Units
Residential	CITY	City	
	TRACT	Census tract ID	
	BLOCK	Census block ID	
	MODEL	Model ID	
	PLACETYPE [1]	Placetype category	
	TOTHH	Total Households	Households
	RUG1, RUG2, RUG3 [2]	Households by Residential Unit Type Groups	Households
	RUG1SPARE, … RUG7SPARE	Unused in current model but available for expanding grouping of residential unit types.	
	RU1_HHPOP, RU3_HHPOP, RU6_HHPOP [2]	Population in households by residential unit type	People
	RUSPARE1, … RUSPARE7	Unused in current model but available for expanding grouping of residential unit types	
	RU1_HHSIZE1_INC1, RU9_HHSIZE5_INC5 [2,3,4]	Households cross-classified by Residential Unit Type, Household Size, and Household Income	Households
	RU1_AGE1524, … RU9AGE75 [2,5]	Households cross-classified by Residential Unit Type and Household Age category.	Households
	POP0005, … , POP75 [6]	Population by age range	People
Non-residential [7]	TOTEMP	Total employees	Employees
	EMPEDU	Educational Services (61-63)	Employees
	EMPFOO	Accommodations (721), Food Services (722), Arts, Entertainment and Recreation (71)	Employees
	EMPGOV	Public Administration (92)	Employees
	EMPIND	Utilities (22), Construction (23), Other Services Except Public Administration (81), Wholesale Trade (42), Transportation and Warehousing (48-49)	Employees
	EMPMED	Health Care and Social Assistance (62)	Employees

TABLE 6: SOCIO-ECONOMIC DETAIL

Type	Attribute	Description	Units
	EMPOFC	Information (51), Finance and Insurance (52), Real Estate, Rental and Leasing (53), Professional, Scientific, and Technical Services (54), Management of Companies and Enterprises (55), Administrative/Support, Waste Management & Remediation (56)	Employees
	EMPOTH	Mining, Quarrying, Oil and Gas Extraction (21), Manufacturing (31-33)	Employees
	EMPRET	Retail Trade (44-45)	Employees
	EMPAGR	Agriculture, Forestry, Fishing and Hunting (11)	Employees
	EMPSPARE1, … EMPSPARE8	Unused in current model but available for expanding employment categories	
	POPDORM	Group Quarters population: School (Dormitory, Fraternity, Sorority)	People
	POPASSIST	Group Quarters Population: Medical (Assisted living, retirement home)	People
	POPMILITARY	Group Quarters Population: Military (Military base if not special generator)	People
	POPINST	Group Quarters Population: Institutionalized population (prison, mental health, etc.)	People
	ELEM	Elementary and middle school enrollment	Student Enrollment
	HS	High school enrollment	Student Enrollment
	COLLEGE	College enrollment	Student Enrollment
Scenario	YEAR	Scenario year	
	SCEN	Scenario name	
	MPO	MPO	
	Comments	Scenario comments	

Notes:

1. See Table 7 for place type categories.
2. See Table 8 for residential unit type categories.
3. See Table 9 for household size categories.
4. See Table 10 for household annual income categories.
5. See Table 11 for household age categories.
6. See Table 12 for population distribution by age range categories.
7. Non-residential description contains NAICS sector number(s).

If desired, preliminary place type descriptions may be included in the land use input. Within the VMIP 2 models, place type is re-calculated as part of the accessibility module described in Accessibility / D Variables.

TABLE 7: PLACE TYPES

Place Type Category	Alternate Name	Description
1	POP1	Under 40,000 jobs + working-age population within 30 minutes by auto
2	POP2	Between 40,000 and 100,000 jobs + working-age population within 30 minutes by auto
3	POP3	Between 100,000 and 200,000 jobs + working-age population within 30 minutes by auto
4	POP4	Between 200,000 and 450,000 jobs + working-age population within 30 minutes by auto
5	POP5	Over 450,000 jobs + working-age population within 30 minutes by auto

TABLE 8: RESIDENTIAL UNIT TYPE

Name	Grouping	Alternate Grouping Name	Description
RU1	RUG1 (SF)	RU1	1, detached
RU2			1, attached
RU3	RUG2 (MF)	RU3	2 units
RU4			3 to 4 units
RU5			5 to 9 units
RU6			10 to 19 units
RU7			20 to 49 units
RU8			50+ units
RU9	RUG3 (Other)	RU9	Mobile home
RU10			Boat, RV, van, etc.

Data sources:
Model input: MPO land use inputs
Estimation: CHTS
Calibration: Census

TABLE 9: HOUSEHOLD SIZE

Category	Description
HHSIZE1	1 person household
HHSIZE2	2 person household
HHSIZE3	3 person household
HHSIZE4	4 person household
HHSIZE5	5 or more person household

Source:
Model Input: MPO land use inputs + census cross-classification percentages
Estimation: CHTS
Calibration: Census

TABLE 10: HOUSEHOLD ANNUAL INCOME

High-med-low grouping	5-category grouping	10-category grouping	Description
LOWINC	INCG1	INC1	Less than $10,000
		INC2	$10,000 to $24,999
	INCG2	INC3	$25,000 to $34,999
		INC4	$35,000 to $49,999
MEDINC	INCG3	INC5	$50,000 to $74,999
	INCG4	INC6	$75,000 to $99,999
HIGHINC	INCG5	INC7	$100,000 to $149,999
		INC8	$150,000 to $199,999
		INC9	$200,00 or more
		INC10	SPARE -- unused

Data sources:
Model Input: MPO land use inputs + census cross-classification percentages
Estimation: CHTS
Calibration: Census

TABLE 11: HOUSEHOLD AGE

Category	Description
Age1524	No household member over age 25 but at least one household member age 15-24.
Age2564	Household has at least one member age 25-64
Age6574	Household has no member age 25-64 but at least one member age 65-74.
Age75	Household has no member age 25-74 but at least one member age 75 or older.

Data sources:
Model Input: MPO land use inputs + census cross-classification percentages
Estimation: CHTS
Calibration: Census

TABLE 12: POPULATION BY AGE RANGE

Category	Description
POP0005	People 0 to 5 years
POP0514	People 5 to 14 years
POP1517	People 15 to 17 years
POP1824	People 18 to 24 years
POP2554	People 25 to 54 years
POP5564	People 55 to 64 years
POP6574	People 65 to 74 years
POP75	People 75 years and over

Source:
Model Input: MPO land use inputs + census cross-classification percentages
Estimation: CHTS
Calibration: Census

Appendix I: Comparison of land use categories shows the residential land use data elements and how the VMIP 2 grouping compares to other data sources including the CHTS, ACS, and VMIP 1 categorization.

NETWORK UPDATE

As part of the VMIP 1, integration of GIS for each of the models took a substantial step forward by utilizing a geodatabase for background data and for storing model outputs. However, the highway and transit networks remained simplistic link and node representations of the actual networks. As part of VMIP 2, the highway network was based on a true shape centerline file in a geodatabase and updated variables to reflect the master network from the RTP/SCS. The transit lines were also updated to match the more detailed highway network and are contained in the geodatabase. The benefits of this are more accurate mapping and distances, easy linkage and comparisons to speed data, and inclusion of local streets for sub-TAZ level analysis. In addition, the GIS network contains many variables to complement those already part of the travel model network, including auto, HOV, transit, truck, bike, and walk accessibility designations. Advanced models such as Activity Based Models (ABMs) and Dynamic Traffic Assignment (DTA) also greatly benefit from the network accuracy and detail.

TABLE 13: STANDARD MASTER HIGHWAY NETWORK VARIABLES

Attribute	Description
Nodes	
X	X-coordinate of node in Nad 83
Y	Y-coordinate of node in Nad 83
N	Node number
TAZ	Traffic Analysis Zone Number
DISTRICT	Super district number used for aggregation
SOI	Sphere of influence used to number TAZs alphabetically
STDID	Study location number used to record turning movements when non-zero
COUNTY	County where node is located
JURISDICTION	Political jurisdiction where node is located
COMMUNITY	Community/district name
Links	
A	A node
B	B node
DISTANCE	Distance in miles
NAME	Local street name
ROUTE	Numerical state route number
TERRAIN	Terrain (F=Flat , R=Rolling, M=Mountain)
JURISDICTION	Political jurisdiction where link is located location
SCREENLINE	Screenline by direction (See Figures 3-1.1 through 3.1.10)
XXXX_PRJID [1]	RTP Project ID number
XXXX_PRJYR [1]	RTP Project Opening Year
XXXX_FACTYP [1]	Facility type by year [2]
XXXX_AREATYP [1]	Area type by year [2]
XXXX_LANES [1]	Number of directional through travel lanes by year [2]
XXXX_AUX [1]	Auxiliary lane (0=no, 1=yes)
XXXX_SPEED [1]	Free-flow speed in miles-per hour by year [3]

TABLE 13: STANDARD MASTER HIGHWAY NETWORK VARIABLES

Attribute	Description
XXXX_CAPCLASS [1]	Capacity class by year (derived from Terrain, Facility type, and Area Type) [2]
XXXX_CAPACITY [1]	Vehicle per hour (calculated based on Lanes and CapClass) [4]
XXXX_USE [1]	Identifies vehicle prohibitions by year [5]
XXXX_TOLL [1]	Code used for cost on toll facilities by year [3]

Notes:

1. XXXX represents BASE (calibration/validation year), IMP1 (status after first improvement), and IMP2 (status after second improvement). In addition to calibration/validation year which varies by MPO, the years required to be covered by improvement are 05, 20, 35, and 40.
2. See Table 14 for details on CapClass by Terrain, Facility Type, and Area Type.
3. See Table 15 for Speed ranges by Terrain, Facility Type, and Area Type.
4. See Table 16 for details on Capacity by Terrain, Facility Type, and Area Type.
5. 0 or 1=facility open to all ("general purpose") ; 2=Carpool 2; 3=Carpool 3+; 4=Combination trucks prohibited; 5=Walk or bike only

TABLE 14: CAPACITY CLASS BY TERRAIN, FACILITY TYPE, AND AREA TYPE

Facility Type	Area Type				
	Rural (R)	Suburban (SU)	Urban (U)	Fringe (F)	Central Business District (CBD)
Flat					
Freeway	1	11	21	31	41
Highway	2	12	22	32	42
Expressway	3	13	23	33	43
Arterial	4	14	24	34	44
Collector	5	15	25	35	45
Local	6	16	26	36	46
Ramp: Freeway-Freeway	7	17	27	37	47
Ramp: Slip	8	18	28	38	48
Ramp: Loop	9	19	29	39	49
Connector: Dist. ≤ 0.25	10	N/A	N/A	N/A	N/A
Connector: Dist. > 0.25	20	N/A	N/A	N/A	N/A

TABLE 14: CAPACITY CLASS BY TERRAIN, FACILITY TYPE, AND AREA TYPE

Facility Type	Area Type				
	Rural (R)	Suburban (SU)	Urban (U)	Fringe (F)	Central Business District (CBD)
Rolling					
Freeway	51	61	71	81	91
Highway	52	62	72	82	92
Expressway	53	63	73	83	93
Arterial	54	64	74	84	94
Collector	55	65	75	85	95
Local	56	66	76	86	96
Ramp: Freeway-Freeway	57	67	77	87	97
Ramp: Slip	58	68	78	88	98
Ramp: Loop	59	69	79	89	99
Connector: Dist. ≤ 0.25	60	N/A	N/A	N/A	N/A
Connector: Dist. > 0.25	70	N/A	N/A	N/A	N/A
Mountain					
Freeway	101	111	121	131	141
Highway	102	112	122	132	142
Expressway	103	113	123	133	143
Arterial	104	114	124	134	144
Collector	105	115	125	135	145
Local	106	116	126	136	146
Ramp: Freeway-Freeway	107	117	127	137	147
Ramp: Slip	108	118	128	138	148
Ramp: Loop	109	119	129	139	149
Connector: Dist. ≤ 0.25	110	N/A	N/A	N/A	N/A
Connector: Dist. > 0.25	120	N/A	N/A	N/A	N/A

TABLE 15: TYPICAL SPEEDS BY TERRAIN, FACILITY TYPE, AND AREA TYPE

Facility Type	Area Type				
	Rural (R)	Suburban (SU)	Urban (U)	Fringe (F)	Central Business District (CBD)
Flat					
Freeway	70	65-70	55-65	55-65	55-65
Highway	40-45	40-45	40-45	40-45	40-45
Expressway	55	45-55	45-55	45-55	40-45
Arterial	40-45	30-45	25-45	30-45	25-45
Collector	50	50	35-40	35-40	35-40
Local	25-40	25-40	25-40	25-40	25-40
Ramp: Freeway-Freeway	50	50	50	50	50
Ramp: Slip	50	50	50	50	50
Ramp: Loop	45	45	45	45	45
Connector: Dist. ≤ 0.25	35	35	35	35	35
Connector: Dist. > 0.25	15	15	15	15	15
Rolling					
Freeway	65-70	65-70	65-70	65-70	65-70
Highway	40-45	40-45	40-45	40-45	40-45
Expressway	50-65	50-65	50-65	50-65	50-65
Arterial	30-45	30-45	30-45	30-45	30-45
Collector	50	50	50	50	50
Local	50	50	50	50	50
Ramp: Freeway-Freeway	50	50	50	50	50
Ramp: Slip	50	50	50	50	50
Ramp: Loop	45	45	45	45	45
Connector: Dist. ≤ 0.25	35	35	35	35	35
Connector: Dist. > 0.25	15	15	15	15	15
Mountain					

TABLE 15: TYPICAL SPEEDS BY TERRAIN, FACILITY TYPE, AND AREA TYPE

Facility Type	Area Type				
	Rural (R)	Suburban (SU)	Urban (U)	Fringe (F)	Central Business District (CBD)
Freeway	65	65	65	65	65
Highway	40-45	40-45	40-45	40-45	40-45
Expressway	40-55	40-55	40-55	40-55	40-55
Arterial	30-45	30-45	30-45	30-45	30-45
Collector	25-40	25-40	25-40	25-40	25-40
Local	25-40	25-40	25-40	25-40	25-40
Ramp: Freeway-Freeway	50	50	50	50	50
Ramp: Slip	45	45	45	45	45
Ramp: Loop	35	35	35	35	35
Connector: Dist. ≤ 0.25	15	15	15	15	15
Connector: Dist. > 0.25	25	25	25	25	25

Note: Speed shown as miles per hour (MPH)

TABLE 16: DEFAULT CAPACITY BY TERRAIN, FACILITY TYPE, AND AREA TYPE

Facility Type	Area Type				
	Rural (R)	Suburban (SU)	Urban (U)	Fringe (F)	Central Business District (CBD)
Flat					
1. Freeway	2,000	2,000	1,800	1,750	1,750
2. Highway	1,800	1,800	1,600	1,500	1,300
3. Expressway	1,100	1,100	1,000	900	800
4. Arterial	900	900	900	800	750
5. Collector	700	700	800	800	700
6. Local	600	600	700	700	600

TABLE 16: DEFAULT CAPACITY BY TERRAIN, FACILITY TYPE, AND AREA TYPE

Facility Type	Area Type				
	Rural (R)	Suburban (SU)	Urban (U)	Fringe (F)	Central Business District (CBD)
7. Ramp: Freeway-Freeway	1,800	1,800	1,800	1,800	1,800
8. Ramp: Slip	1,500	1,500	1,500	1,500	1,500
9. Ramp: Loop	1,250	1,250	1,250	1,250	1,250
10. Connector: Internal	N/A	N/A	N/A	N/A	N/A
Rolling					
20. Connector: External (except major gateways)	N/A	N/A	N/A	N/A	N/A
21. Freeway	1,800	1,800	1,620	1,580	1,580
22. Highway	1,460	1,460	1,300	1,220	1,060
23. Expressway	890	890	810	730	650
24. Arterial	730	730	730	650	610
25. Collector	570	570	650	650	570
26. Local	550	550	640	640	550
27. Ramp: Freeway-Freeway	1,800	1,800	1,800	1,800	1,800
28. Ramp: Slip	1,500	1,500	1,500	1,500	1,500
29. Ramp: Loop	1,250	1,250	1,250	1,250	1,250
Mountain					
31. Freeway	1,500	1,500	1,350	1,310	1,310
32. Highway	790	790	700	660	570
33. Expressway	480	480	440	390	350
34. Arterial	390	390	390	350	330
35. Collector	310	310	350	350	310
36. Local	330	330	380	380	330

TABLE 16: DEFAULT CAPACITY BY TERRAIN, FACILITY TYPE, AND AREA TYPE

Facility Type	Area Type				
	Rural (R)	Suburban (SU)	Urban (U)	Fringe (F)	Central Business District (CBD)
37. Ramp: Freeway-Freeway	1,800	1,800	1,800	1,800	1,800
38. Ramp: Slip	1,500	1,500	1,500	1,500	1,500
39. Ramp: Loop	1,250	1,250	1,250	1,250	1,250

Note: Capacity shown as vehicles per hour per lane (VPHPL)

ESTIMATION, CALIBRATION, AND VALIDATION

This section covers the model estimation with the enhancements of integrating D variables within the sub-models and a revised inter-regional process to capture the interaction between household income and job salary. Values presented in this section are those estimated based on the entire survey data set, and **Appendix L** contains the resulting calibrated values.

ECONOMIC LAND USE FORECASTING

VMIP 1 developed and implemented an integrated transportation and standard socioeconomic land use forecasting model structure by expanding the pilot project for Kern COG. This system supports the travel demand models by allocating study area forecast control totals of households and jobs by type to zones within the study area based upon bid-rent economic principles. This approach to land use forecasting provides a way of recognizing the important effects that linkages between spatial distributions of housing costs, household incomes, and job industries have on intra- and inter-regional travel. It also provides a way to automate the otherwise tedious and error-prone process of disaggregating land use assumptions developed through scenario visioning exercises into more detailed household and job type stratifications for travel modeling.

TRAVEL MODEL ESTIMATION

VMIP 2 re-estimated the trip generation, auto availability, and mode choice model components using data from the 2012 CHTS. The fairly limited sample size, particularly for transit and non-motorized trips, precluded the estimation of county-specific mode choice model coefficients. Instead, models were estimated using data from all eight San Joaquin Valley counties, together with the six SACOG counties. Each model was then calibrated to fit local conditions using CHTS data for its county/counties alone. Calibration values are in Appendix L: Calibrated Parameters.

The table below shows the re-estimated model components for VMIP 2, including a description of the model structure and a list of variables used. Detailed descriptions of each model component and its estimation are in the following sections.

TABLE 17: RE-ESTIMATED MODEL COMPONENTS

	Vehicle Availability	Trip Generation	Mode Choice
Model Structure	Disaggregate: multinomial logit	Aggregate: 4-dimensional cross-class models or regression models. Stratified by productions vs attractions and trip purpose.	Disaggregate: multinomial logit. Stratified by trip purpose and vehicle availability + household size.
Household Size	HH1, HH2, HH3, HH4, HH5	HH1, HH2, HH3, HH4, HH5	
Household Income	INCG1, INCG2, INCG3, INCG4, INCG5	INCG1, INCG2, INCG3, INCG4, INCG5	
Housing Type	RUG1, RUG3, RUG6	RUG1, RUG3, RUG6	
Accessibility / D variables	Intersection density, transit accessibility to jobs, employment density	Place Types based on auto accessibility to jobs and workers: pop1, pop2, pop3, pop4, pop5	Intersection density, transit accessibility to jobs, employment density
Age of population		POP0005, POP0514, POP1517, POP1824, POP2554, POP5564, POP75	
Employment		EMPEDU, EMPFOO, EMPGOV, EMPIND, EMPMED, EMPOFC, EMPRET, EMPOTH, EMPAGR	
School Enrollment		ELEM, HS, COLLEGE	
In-vehicle travel time			Applies to all modes. Transit amenities, if any, can be discounted here.
Out of vehicle time			Access/egress/transfer walk and waiting time for transit, parking time for drive-to-transit, and passenger pickup for shared ride.
Cost	Commute cost proportion of household income		Transit fare, plus toll and parking costs as well as auto operating costs for drive modes.

ACCESSIBILITY / D VARIABLES

All three of the re-estimated model components make use of built environment ("D variables"), particularly the inclusion of accessibility. The table below describes the variables used.

TABLE 18: ACCESSIBILITY METRICS USED IN VMIP 2 MODELS

Metric	Description	Where used
EMP_30AUT	Jobs within 30 minutes by auto	Place Type calculation
WRK_30AUT	Working-age population within 30 minutes by auto	Place Type Calculation
ATYPE	Place Type categorization of job+worker to five categories. (See table 19 below).	Trip Generation
LOG_EMPD	Log of employment density (jobs per developed acre)	Auto Ownership, Mode Choice
INTDEN	Intersection density (intersections per square mile)	Auto Ownership, Mode Choice
EMP_30TRN	Jobs within 30 minutes by transit	Auto Ownership, Mode Choice
COMMUTECOST	Average annual commute cost	Auto Ownership

Place type is calculated from the sum of jobs within 30 minutes by auto and working-age population within 30 minutes by auto, and categorized into the five categories listed below.

TABLE 19: PLACE TYPES

Place Type Category	Alternate Name	Description
1	POP1	Under 40,000 jobs + working-age population within 30 minutes by auto
2	POP2	Between 40,000 and 100,000 jobs + working-age population within 30 minutes by auto
3	POP3	Between 100,000 and 200,000 jobs + working-age population within 30 minutes by auto
4	POP4	Between 200,000 and 450,000 jobs + working-age population within 30 minutes by auto
5	POP5	Over 450,000 jobs + working-age population within 30 minutes by auto

A full data dictionary of the accessibility metrics calculated in the model is in Appendix H: Accessibility Variables.

VEHICLE AVAILABILITY AND TRIP GENERATION

The original VMIP 1 resulted in all models generating person trips by vehicle availability from a very consistent set of land uses. Household trips were generated for eight different purposes, and truck trips were generated for light, medium, and heavy trucks. With the new CHTS data we have re-estimated the vehicle availability and trip generation rates. In addition to the cross-classifications currently used in the models we have added place classifications that relate jobs/housing, income and long distance commuting, and other factors that were not available in previous data sets. To better link jobs and housing, the HBW trip purpose was split into three purposes corresponding to high, medium, and low income households and jobs.

Auto Operating Cost

Auto operating costs were determined using the methodology outlined in the memo prepared by MTC, SCAG, SACOG, and SANDAG in October 2014 titled *Automobile Operating Cost for the Second Round of Sustainable Communities Strategies*. The method uses county specific base year fuel prices, fleet mix and fuel efficiency from EMFAC, and a consistent growth factor for fuel and non-fuel maintenance and operating costs. See Appendix K: Memo on Auto Operating Cost for the full memo and methodology. The resulting values for years ranging from 2005 to 20420 for each MPO is in Appendix L: Calibrated Parameters.

Vehicle Availability

The vehicle availability model is a disaggregate multinomial logit model which predicts the probability of a household owning 0, 1, 2, or 3, or 4+ vehicles based on the following variables:

TABLE 20: VARIABLES IN VMIP 2 VEHICLE AVAILABILITY MODEL

Category	Variable	Description
Cost Variable	Commute Cost Ratio	Average annual commute cost divided by household income
Accessibility Variables	Intersection Density	Intersections per square mile
	Transit Accessibility	Jobs within 30 minutes via transit
	Employment Density	Log of (jobs per developed acre)
Household Demographic Variables	Household Size	See size categories in Table 9
	Household Income	See income categories in Table 10
	Household Residential Unit Type	See residential unit type groups in Table 11

The commute cost ratio variable is an estimate of the proportion of a household's income required to own vehicles. It is derived from a county-level estimate of per-mile auto ownership costs, tract-level estimates of commuting VMT derived from the EPA's Smart Location Calculator, an annualization factor of 250 working days per year, and the household income. The variable is applied on a per-vehicle basis, so that owning no vehicles incurs no cost, owning two vehicles incurs twice the cost of owning one vehicle, and so on.

The table below provides the coefficients of the auto ownership model. In its draft form the model was estimated without alternative-specific constants. These constants were set for each model individually during model calibration.

TABLE 21: VMIP 2 AUTO OWNERSHIP MODEL COEFFICIENTS

	0 Vehicles	1 Vehicle	2 Vehicles	3 Vehicles	4+ Vehicles
Alternative-Specific Constant					
CommuteCostRatio	7.51	3.95	0.00	0.00	0.00
PedOrIntDens	0.009	0	0	-0.004	-0.004
TransitAccessibility (x1000)	0.009	0.010	0	-0.051	-0.112
LogEmpDensity	0.39	0.24	0	0.00	-0.19
RUGroup=RU1	0	0	0	0	0
RUGroup=RU3	1.27	0.53	0	-1.53	-1.53
RUGroup=RU6	0.27	-.27	0	0	0
HH_size=1	-1.16	1.5	0	-3.15	-4.94
HH_size=2	-3.03	-0.42	0	-2.26	-4.19
HH_size=3	-3.37	-0.24	0	-1.34	-3.40
HH_size=4	-4.02	-0.66	0	-1.61	-3.13
HH_size=5+	-3.50	-0.89	0	-1.32	-2.44
HH_inc=IncG1	0	0	0	0	0
HH_inc=IncG2	-1.33	-0.28	0	0.86	0.98
HH_inc=IncG3	-3.87	-0.93	0	1.2	2.35
HH_inc=IncG4	-2.98	-1.55	0	1.55	2.35
HH_inc=IncG5	-4.23	-1.96	0	1.44	2.87

Note the model uses owning two vehicles as its base, and calculates the relative probability of owning fewer or greater vehicles; thus the model coefficients describe relative probabilities as in the example below:

$$\ln\left(\frac{Prob(0\ vehicles)}{Prob(2\ vehicles)}\right) = 7.51(CommuteCostRatio) + 0.0093(PedOrIntDensity) + \ ...$$

The coefficients for this model are generally intuitive in direction and scale.

- Higher commuting cost increases the probability of owning 0 or 1 vehicles, and decreases the probability of owning 3 or 4 vehicles, as compared to the baseline of 2 vehicles.
- Higher scores for the three accessibility variables, indicating generally better accessibility by non-auto modes, increase the probability of owning 0 vehicles (and sometimes also 1 vehicle) relative to owning 2; and decrease the probability of owning 3 or 4.
- Household income is the demographic variable which has the largest influence in auto ownership. Generally as incomes go up, probabilities of owning 0 or 1 vehicles go down, and probabilities of owning 3 or 4 vehicles go up.
- Household size behaves in the expected way, with probability of owning 0 or 1 vehicles going down as household size increases and probability of owning 3 or 4 vehicles going up.
- Multi-family unit types are more likely to own 0 or 1 vehicles, and less likely to own 3 or 4 vehicles, than single family. There weren't enough records in the RUG6 "other" category (RV, mobile home, etc.) to distinguish them from single family, and they were generally more similar to single family than multi-family uses, so they share the same coefficients as single family.

An important consideration for future model development is that car sharing and transportation network companies (i.e., UBER, LYFT, etc.) are changing auto availability dynamics and potentially long-term auto ownership. As more data becomes available it may be appropriate to modify the auto ownership model to recognize these changes and focus more on auto availability across multiple sub modes and costs per mile.

Trip Generation

The VMIP 2 models generate person-trips from a consistent set of land uses, using cross-classified residential data, for a number of purposes including non-home-based purposes, K-12 and college trip purposes, and generate small, medium, and heavy truck trips. We have re-estimated trip generation rates, excluding truck rates, with the new CHTS data. The most significant changes in trip generation as compared to original VMIP 1 are listed below.

- Trip generation considers accessibility using the place type variable described in
- Accessibility / D Variables.

- Non-home based trip generation is based on the new categorization of employment.
- HBW trips are expanded into three new categories: HBW-High, HBW-Medium, and HBW-Low. These categories are based on household income on the production side and proportions of worker incomes for each employment category on the attraction side.
- Trips are classified as internal to internal (II), internal to external (IX), or external to internal (XI) based on percentages calculated from CHTS data. These percentages are calculated by trip purpose and by CDP.

Home-Based Productions: Cross-Classification Models

Three of the home-based trip productions (HBW, HBS, and HBO) were estimated using cross-classification models. These models are applied to socio-economic-demographic (SED) data which has been cross-classified by four variables: household size, household income, residential unit type, and place type (as described in section Accessibility / D Variables.

Estimation of trip rates using cross-classification models must ensure all cross-classification groups have large enough sample sizes to produce sufficient variability to obtain a stable average trip rate. Because not all cross-classifications of the variables above do in fact have a large enough sample size, some cross-classifications were estimated in aggregate, resulting in identical trip rates being estimated for some cross-classification combinations.

Variables were added to the cross-classification model sequentially, and with each added variable existing groups were only subdivided if there was sufficient sample size (generally at least 40 households) to support a split. The order in which variables were added to the cross-classification models was as follows.

- Household size
- Household income
- Place Type
- Residential unit type

Although the model is coded to allow for five income categories and five place types, the data available did not allow for distinctions to be determined this finely either because of a lack of sufficient amount of data, or differences which weren't statistically significant, or both. In effect, this means the estimated trip rates differ only among three income categories: low (under $50,000), medium ($50,000 - $100,000), and high (over $100,000); and only between two groups of place types: types 1 and 2 (with fewer than 100,000 workers+jobs within a 30-minute auto trip); and types 3, 4, and 5 (with more than 100,000 workers+jobs

within a 30-minute auto trip). In addition, only a few combinations of household size, household income, and place type yielded different trip rates by residential unit type.

The tables below provide the resulting person-trip production rates:

TABLE 22: HBW HOUSEHOLD PERSON TRIP PRODUCTION RATES (DAILY TRIPS PER HOUSEHOLD)

	1-person HH	2-person HH	3-person HH	4-person HH	5+-person HH
Low Income; Place Types 1 and 2	0.42 (SF) 0.24 (MF)	0.62 (SF) 0.45 (MF)	0.87	1.28	1.50
Low Income; Place Types 3, 4, 5	0.55 (SF) 0.43 (MF)	0.80 (SF) 0.92 (MF)	1.35	1.27	1.49
Medium Income; Place Types 1 and 2	0.79	1.13	1.57	1.72	2.40
Medium Income; Place Types 3, 4, 5	0.68	1.17	1.62	1.47	2.25
High Income; Place Types 1 and 2	0.61	1.42	1.63	1.75	1.84
High Income; Place Types 3, 4, 5	0.61	1.26	2.04	1.62	1.84

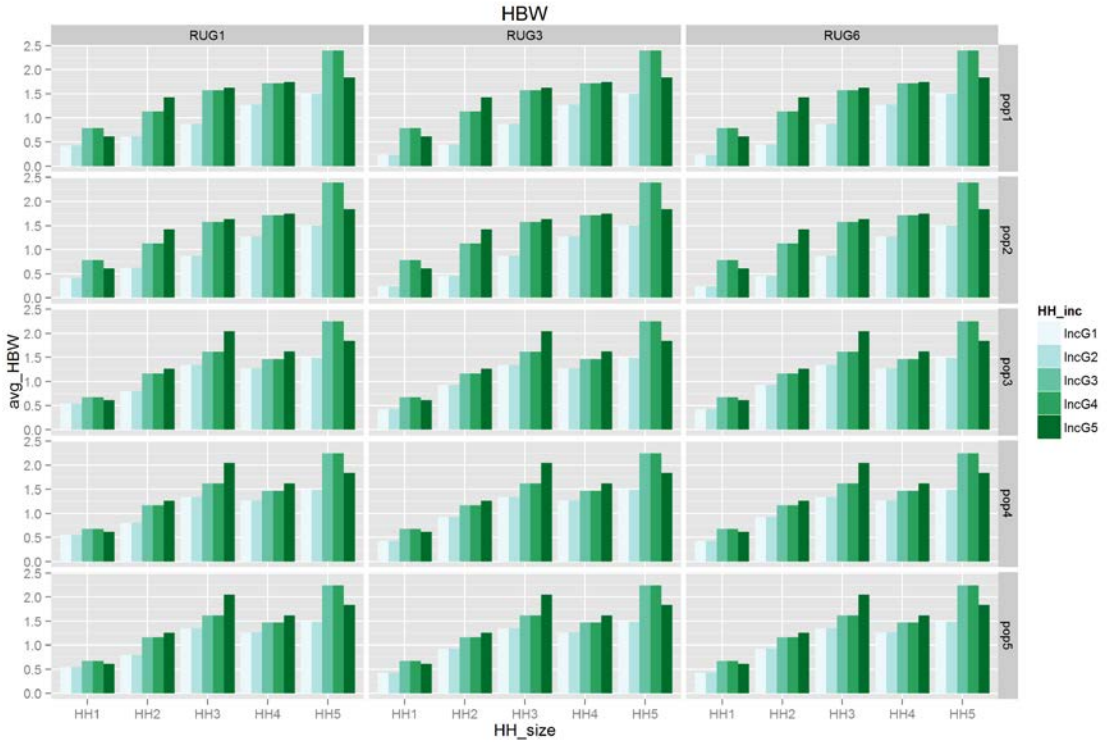
TABLE 23: HBS HOUSEHOLD PERSON TRIP PRODUCTION RATES (DAILY TRIPS PER HOUSEHOLD)

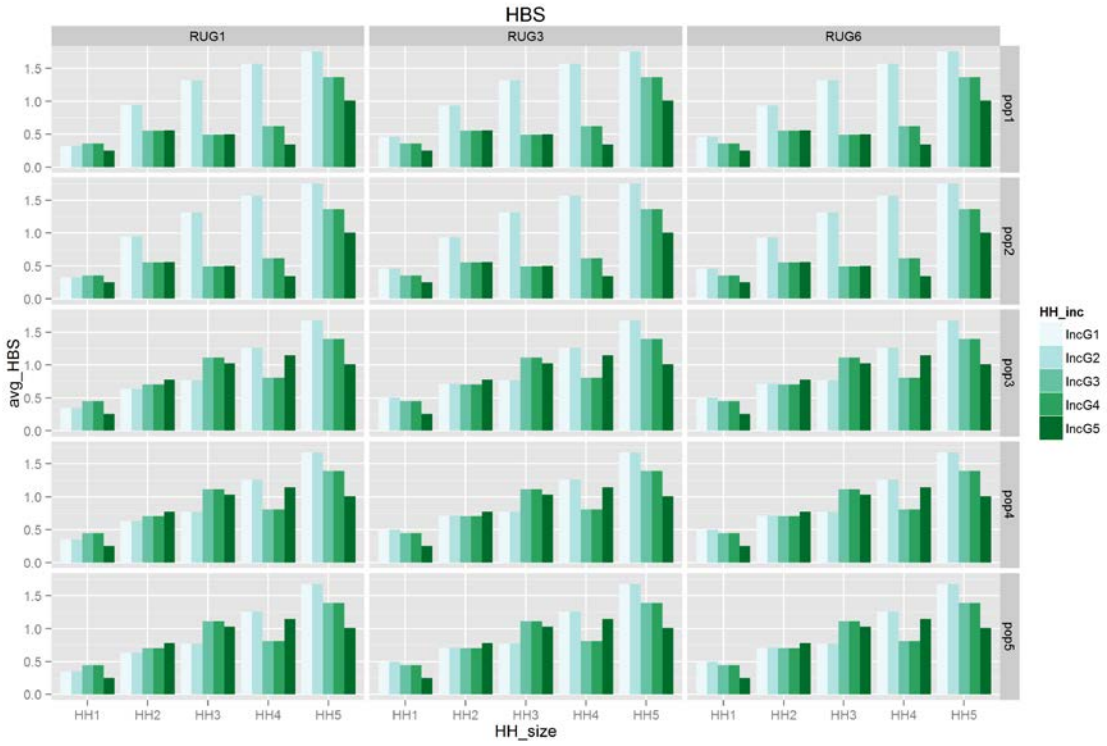
	1-person HH	2-person HH	3-person HH	4-person HH	5+-person HH
Low Income; Place Types 1 and 2	0.32 (SF) 0.46 (MF)	0.95 (SF) 0.93 (MF)	1.32	1.57	1.75
Low Income; Place Types 3, 4, 5	0.34 (SF) 0.50 (MF)	0.63 (SF) 0.71 (MF)	0.77	1.26	1.67
Medium Income; Place Types 1 and 2	0.36	0.55	0.49	0.62	1.37
Medium Income; Place Types 3, 4, 5	0.45	0.70	1.11	0.81	1.39
High Income; Place Types 1 and 2	0.25	0.56	0.50	0.34	1.01
High Income; Place Types 3, 4, 5	0.25	0.78	1.03	1.14	1.01

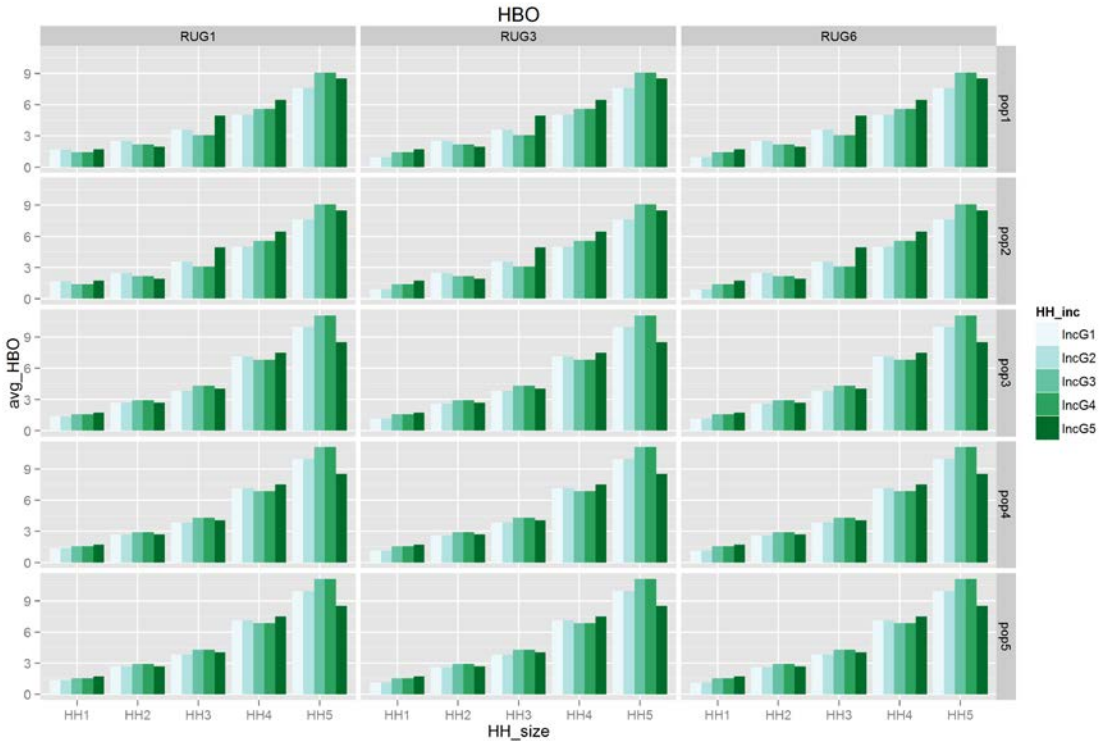
TABLE 24: HBO HOUSEHOLD PERSON TRIP PRODUCTION RATES (DAILY TRIPS PER HOUSEHOLD)

	1-person HH	2-person HH	3-person HH	4-person HH	5+-person HH
Low Income; Place Types 1 and 2	1.68 (SF) 0.92 (MF)	2.50	3.57	5.02	7.61
Low Income; Place Types 3, 4, 5	1.35 (SF) 1.14 (MF)	2.69 (SF) 2.59 (MF)	3.83	7.13	9.94
Medium Income; Place Types 1 and 2	1.44	2.17	3.09	5.59	9.06
Medium Income; Place Types 3, 4, 5	1.57	2.92	4.30	6.84	11.10
High Income; Place Types 1 and 2	1.73	1.94	4.94	6.45	8.51
High Income; Place Types 3, 4, 5	1.73	2.69	4.04	7.50	8.51

The graphs below show the cross-classified trip production rates.







Home-Based Productions: School Purposes

The remaining home-based trip productions, HBK and HBC, were estimated using regression models. The units of analysis for these models were households, and the explanatory variables were the numbers of household members in various age categories: Age 0-4, Age 5-14, Age 15-17, Age 18-24, and Age 25-54.

Two separate models were estimated for each trip purpose, one for households in place types 1 and 2 (with fewer than 100,000 workers+jobs within a 30-minute auto trip); and one for households in place types 3, 4, and 5 (with more than 100,000 workers+jobs within a 30-minute auto trip).

The table below lists the resulting trip production rates per person in the age ranges specified. Note that while one might reasonably expect each child to make two school trips per day (to and from), the actual trip rates are somewhat lower: the survey includes days when individual children don't go to school due to school holidays or illness. Furthermore, if children make intermediate stops between school and home, the resulting trips will not appear as HBK trips in the household survey but rather as multiple trips (e.g., OBO and HBO).

TABLE 25: HBK AND HBC TRIP RATES (PER PERSON)

	HBK (Place Types 1 and 2)	HBK (Place Types 3 and 4)	HBC (Place Types 1 and 2)	HBC (Place Types 3 and 4)
Age 0-4	0.15	0.24		
Age 5-14	1.18	1.07		
Age 15-17	0.93	1.06		0.06
Age 18-24	0.07	0.11	0.23	0.24
Age 25-54			0.02	0.02

Attractions and Non-Home-Based Productions

Trip attractions, along with trip productions for non-home-based trips, were estimated using either ordinary linear regression models or partial linear regression models. Unlike ordinary linear regression, partial linear regression can be used even when explanatory variables are strongly correlated with one another. Because the VMIP 2 models include a large number of employment categories highly correlated with one another this model form resulted in more reasonable models than ordinary linear regression for some trip purposes.

Units of analysis for both kinds of regression models were groups of census tracts; the techniques used to group census tracts are described below. The explanatory variables for these models were the total number of jobs in each of the nine employment categories, school enrollment totals at the K-12 and university levels, and the total number of households. The table below lists the nine employment categories used:

TABLE 26: EMPLOYMENT CATEGORIES FOR VMIP 2 MODELS

Category	Description and NAICS code(s)
EMPEDU	Educational Services (61)
EMPFOO	Accommodation and Food Service (72), Art, Entertainment, and Recreation (71),
EMPAGR	Agriculture, Forestry, Fishing and Hunting (11)
EMPOTH	Mining (21), and Manufacturing (31-33)
EMPMED	Health Care and Social Assistance (62)
EMPIND	Utilities (22), Construction (23), Wholesale Trade (42), Transportation and Warehousing (48-49), Other Services (81)
EMPRET	Retail Trade (44-45)

TABLE 26: EMPLOYMENT CATEGORIES FOR VMIP 2 MODELS

Category	Description and NAICS code(s)
EMPOFC	Information (51), Finance and Insurance (52), Real Estate Rental and Leasing (53), Professional, Scientific, and Technical Services (54), Management of Companies and Enterprises (55), and Administrative and Support and Waste Management and Remediation Services (56)
EMPGOV	Public Administration (92)

The units of analysis for these regression models were defined using a combination of geography (census tracts, census designated places, or counties) and place type (as measured by jobs+workers within a 30-minute auto trip). A "rolling up" process was used where the smallest possible analytic units with sufficient sample size were used. Where census tracts attracted at least 50 trips of a given purpose, they were used as analytic units; otherwise census places or full counties, grouped by place type, were used instead.

Data for school enrollments was only available at the full county level. For the home-based school and home-based college trip purposes, this data was used with analytic units equal to counties, despite the fact that this resulted in models with very few analytic units. However, for other trip purposes which used school enrollments as explanatory variables, school enrollments were distributed among those census tracts which had HBK or HBC trip attractions. The countywide total of school enrollments was kept constant, with each tract receiving a portion commensurate with its HBK or HBC trip attractions. The result, while not as accurate as using enrollment data at the tract level, allows trip purposes such as HBO and WBO to have a larger number of analytic units and nevertheless use the school enrollment data.

The table below summarizes the number of analytic units used for each regression model, by trip purpose and attraction (A) versus production (P). For example, the 61 analytic units used for the HBW attractions model includes 6 individual census tracts (with sufficiently many work trips attracted to each), 34 subsets of census places with the same Place Type (e.g., Fresno, type 4; Stockton, type 3; Hanford type 2; Unincorporated Tulare County type 2), and 21 subsets of counties grouped by Place Type (e.g., Sacramento County, types 2 and 3 or San Joaquin County, type 2).

TABLE 27: GEOGRAPHIC UNITS USED IN MODEL ESTIMATION

Trip Purpose	Census Tracts	Census Places by Place Type	Counties by Place Type	Total
HBW (A)	6	34	21	61
HBK (A)	0	0	14	14
HBC (A)	0	0	0	14
HBS (A)	0	24	18	42
HBO (A)	32	78	14	124
WBO (P)	2	21	19	42
WBO (A)	1	20	18	39
OBO (P)	9	43	21	73
OBO (A)	10	47	18	75

Employment data used for model estimation was obtained from the EPA's Smart Location Database (SLD). The employment categories in the SLD do not fully match those in the model, so the model's Construction, Agricultural, and Industrial categories are combined; the resulting trip rate for the combined category is then applied to each of the three model categories. Additional explanatory variables tested include the number of households per tract, and the school enrollment per tract. School enrollment data was obtained from the California Department of Education (K12, public school enrollments only) and from the California Postsecondary Education Commission (college, public and private 2- and 4-year institutions).

All of the regression models estimated were either simple linear regressions with no intercept, or partial linear regressions with no intercept. In the case of non-home-based trips (WBO and OBO), the same variables were used for the production and the attraction models. **Table 28** lists the person trip rates estimated for each model. As an example of interpreting these models, the home-based other attraction model states that each retail, service, and public sector job will attract roughly 2 HBO trips, each K-12 school enrollment will attract roughly 1.5 HBO trips, and each household will attract roughly 1.1 HBO trips.

TABLE 28: ESTIMATED ATTRACTION AND NON-HOME BASED PRODUCTION MODELS

	HBW-A	HBS-A	HBK-A	HBC-A	HBO-A	WBO-P	WBO-A	OBO-P	OBO-A
AGR employment	1.17				0.34				
EDU employment	1.17								
FOO employment	1.17	2.15			1.25	0.12	0.12	8.19	7.66
GOV employment	1.17					0.07	0.09	0.16	0.22
IND employment	1.17				0.34				
MED employment	1.17				3.45	0.18	0.18	0.16	0.22
OFC employment	1.17				5.16	0.33	0.41	0.16	0.22
OTH employment	1.17				0.34				
RET employment	1.17	5.76			1.2	0.15	0.16	8.19	7.66
ELEM enrollment			1.1		0.66	0.8	0.76	0.14	0.05
HS enrollment			1.1		0.66	0.8	0.76	0.14	0.05
COLLEGE enrollment				0.35					
Total households					0.95				

HBW Segmentation by Household Income

Following trip generation, HBW trips were further segmented by household income. On the production side, this segmentation was already achieved by virtue of the fact that household income was one of the variables present in cross-classification. On the attraction side, HBW trip attractions for each employment category were separated into high, medium, and low income based on the percentages in the table below.

Proportion of II, IX, and XI Trips

Once the base trip production and attraction rates were established, trip productions for each TAZ were further segmented into II and IX trips, while trip attractions were further segmented into II and XI trips. This segmentation was calculated separately for each trip purpose and each CDP as described below. Note this segmentation simply describes the proportion of trips which enter or leave the county from each listed CDP; it does not govern the location of those trips, which is still determined by the trip distribution model.

First, all CHTS trip ends and households were associated with a CDP or were determined to fall in unincorporated areas. This process was made more complicated by the fact that the publicly-available version of the CHTS has all locations geocoded by census tract; however, census tract boundaries may not align with CDP boundaries, and each census tract may have multiple CDPs associated with it. In cases where multiple CDPs are associated with a single census tract, the CDP with the largest population in the tract (identified at the census block level) is used. If the largest population in the tract is outside all named CDPs, the tract is identified as an unincorporated portion of the relevant county. Note that some named CDPs are not the largest population center in any census tract, and thus do not appear in the summaries of CHTS data, having been aggregated into either neighboring CDPs or the unincorporated portion of the county.

Next, trip productions for each CDP and trip purpose were segmented into II and IX trips; while trip attractions were segmented into II and XI trips. In cases where the CHTS contains fewer than 30 trips for the place/purpose combination, the county-wide average II versus IX or II versus XI percentage was substituted.

TRIP DISTRIBUTION

The current gravity model trip distribution process and factors for each existing MPO model was mostly maintained for consistency. The required revisions are:

- Add friction factors for additional trip purposes resulting in the jobs housing relationship – segmenting by income level as well as by IX and XI parameters.
- Ensure friction factors for non-work trips do not screen out short trips which are likely candidates for non-motorized travel, particularly in models which have only used vehicle trip generation.

For models without mode choice components, the composite travel time will be estimated using walk time based on distance and an average of walk and drive time for origin-destination pairs where walk is competitive with auto. In addition, the sub-TAZ level of detail available in the GIS network will be used in combination with TAZ size.

The required revisions are listed below.

- Add friction factors for additional trip purposes and income group for home-work.
- Revise friction factors to be continuous and better match survey data.
- Adjust impedance inputs to be based on a composite of person travel times by all modes as well as travel costs, instead of just travel time by auto.

MODE CHOICE

In general, the mode choice functionality is the same as the VMIP 1 model. The primary changes to the mode choice model are listed below.

- The number of transit sub-modes in the model has been expanded from two to four. The prior Transit-Walk and Transit-Drive submodes have been replace with the following modes,
  - Transit-Walk-Bus
  - Transit-Walk-Rail (including the possibility of rail access via bus)
  - Transit-Drive-Bus
  - Transit-Drive-Rail (including the possibility of rail access via bus)
- In the current implementation, Transit-Walk-Bus and Transit-Walk-Rail are combined into a single mode prior to assignment; as are Transit-Drive-Bus and Transit-Drive Rail. This report recommends future model updates assign these modes separately, with the Rail submodes requiring the presence of at least one rail leg.
- Accessibility and built environment variables have been incorporated into the mode choice model.

The VMIP 2 mode choice model is segmented by trip purpose and vehicle availability, using three vehicle availability categories as described in the table below:

TABLE 29: VEHICLE AVAILABILITY SEGMENTS IN VMIP 2 MODE CHOICE MODELS

Name	Description
0veh	Households which own no vehicles
1veh	Households which have one vehicle but more than one person
Others	Households with either one vehicle and one person, or more than one vehicle

The table below lists the modes available in the VMIP 2 models.

TABLE 30: MODES AVAILABLE IN VMIP 2 MODE CHOICE MODELS

Category	Name	Segments Available	Trip Purposes	Description
Auto	da	1Veh, Other	All	Drive alone
	s2	All	All	Shared ride, 2 persons
	s3	All	All	Shared ride, 3+ persons
Transit	twb	All	All	Transit, walk-access, bus
	tdb	All	All	Transit, drive-access, bus
	twr	All	All but HBK, HBC	Transit, walk-access, rail
	tdr	All	All but HBK, HBC	Transit, drive-access, rail
	sb	All	HBK only	School bus
Active	walk	All	All	Walk
	bike	All	All	Bike

The variables used in each of the mode choice model segments are listed in the table below. Not all variables are used in all trip purposes models. For the accessibility and built environment variables, the table notes whether the variable is measured at the trip production (P) or trip attraction (A). Note that value of time is a direct consequence of the relationship between in-vehicle time and cost. As such, it is not estimated directly but is instead a consequence of the in-vehicle time (IVT) and cost coefficients. For model implementation purposes, only value of time (VOT) is used in the mode choice utility equation; for clarity, both are reported in the tables below.

TABLE 31: VARIABLES IN VMIP 2 MODEL CHOICE MODELS

Variable	Purposes	Description
(Constants)	All	Alternative-specific constants
IVT	All	In-vehicle time
OVT	All	Out-of-vehicle time (access, transfer, egress, and waiting times)
Cost	All	Total cost, including auto operating cost, parking cost and tolls, and transit fares.
VOT	All	Value of time (conversion between cost variables and time variables)
TransitAccess	HBW, WBO, OBO	Jobs available within 30 minutes via transit, decay-weighted (P)
LogEmpDensity	HBW, HBS, HBO	Log (employment density of block group) (A)
IntDensity	HBK, HBC	Pedestrian-oriented intersection density (A)

The form of the VMIP 2 mode choice models is multinomial logit. A nested logit form might have been preferred for theoretical reasons, given the strong relationships among drive, transit, and active modes. However, no satisfactory nested logit models were estimated, likely because of severe constraints on the amount of transit data available. Multinomial logit models produced generally more sensible results and were used instead. Even the multinomial logit models produced some un-intuitive results. Rather than use un-intuitive coefficients, these were replaced by results from VMIP 1 mode choice models, pooled models involving multiple segments or multiple trip purposes, or were omitted altogether.

Home-Based Work

The table below lists model coefficients for HBW segments. Drive-alone was used as a reference mode for all segments, including the 0-vehicle segment where this mode is not permitted. In this segment, utility calculations were carried out without the drive alone mode.

TABLE 32: HBW MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
Constant	da	x	0	0
	s2	0.710	-1.839	-2.340
	s3	-0.229	-2.587	-2.936

TABLE 32: HBW MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
	twb	-1.900	-1.602	-2.754
	tdb	-1.900	-1.602	0.000
	twr	-1.900	-4.173	-5.937
	tdr	-1.900	-0.444	-5.432
	bike	-2.438	-2.898	-3.763
	walk	1.477	0.030	-1.075
IVT	All	-0.035	-0.040	-0.040
OVT	All	-0.070	-0.080	-0.080
OVT/IVT	All	2	2	2
Cost	All	-0.003	-0.002	-0.001
VOT	All	6	10.055	18
	da	x	0	0
	s2	0.828	0.329	0.506
	s3	0.458	0.408	0.506
	twb	1.873	0.586	1.066
LogEmpDensity	tdb	1.873	0.586	1.066
	twr	1.202	0.850	1.202
	tdr	1.066	0.189	1.202
	bike	2.147	0.765	0.506
	walk	1.025	0.178	0.005
	da	0	0	0
	s2	0.013	0.013	0.005
	s3	0.013	0.013	0.005
TransitAccess	twb	0.158	0.027	0.032
	tdb	0.158	0.027	0.032
	twr	0.158	0.027	0.032

TABLE 32: HBW MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
	tdr	0.158	0.027	0.032
	bike	0.136	0.031	0.062
	walk	0.136	0.031	0.062

Home-Based Shop

The table below lists model coefficients for HBS segments. Drive-alone was used as a reference mode for the 1-vehicle and 2-vehicle segments, while walk was used as a reference mode for the 0-vehicle segment.

TABLE 33: HBS MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
Constant	da	x	0	0
	s2	-3.420	-0.495	-0.889
	s3	-4.269	-0.380	-1.009
	twb	-2.439	-3.542	-5.834
	tdb	-2.439	-3.542	-5.834
	twr	-2.439	-3.542	-5.834
	tdr	-2.439	-3.542	-6.961
	bike	-5.341	-3.756	-2.972
	walk	0	2.191	-0.684
IVT	All	-0.025	-0.025	-0.025
OVT	All	-0.050	-0.050	-0.050
OVT/IVT	All	2	2	2
Cost	All	-0.005	-0.003	-0.002
VOT	All	3	6	6.319
LogEmpDensity	da	x	0	0

TABLE 33: HBS MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
	s2	-0.040	0.297	0.161
	s3	0.957	0.026	0.161
	twb	0.732	0.916	1.141
	tdb	0.732	0.916	1.141
	twr	0.866	0.866	0.750
	tdr	0.866	0.866	0.750
	bike	1.274	1.171	0.594
	walk	0	0.190	0.458

Home-Based School (K-12)

The table below lists model coefficients for HBK segments. The reference mode for the 0- and 1-vehicle segments is walk; the reference mode for the 2-vehicle segment is shared-ride 3.

TABLE 34: HBK MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
Constant	da	x	-4.874	-2.110
	s2	-3.560	-1.710	-0.703
	s3	-3.115	-1.540	0
	twb	-0.887	-7.657	0.316
	tdb	-0.887	-7.657	0.316
	bike	-4.456	-4.456	-2.876
	walk	0	0	0.273
	sb	-1.198	-1.346	0.449
IVT	All	-0.025	-0.025	-0.025
OVT	All	-0.050	-0.050	-0.050

TABLE 34: HBK MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
OVT/IVT	All	2	2	2
Cost	All	-0.005	-0.003	-0.002
VOT	All	3	6	9
IntDensity	da	x	-0.004	0
	s2	0	-0.004	0.004
	s3	0	-0.004	-0.019
	twb	-0.019	0.003	0.004
	tdb	0	0	0
	bike	0.003	0.009	0.005
	walk	-0.008	0.000	0.005
	sb	-0.012	-0.004	-0.003

Home-Based College

The table below lists model coefficients for HBC segments. Because of the very small number of HBC trips in the household survey data, all vehicle ownership segments were pooled for model estimation purposes, with distinctions between segments left for adjustment during model calibration. Drive-alone was used as a reference mode. In the 0-vehicle segment, utility calculations were carried out without the drive alone mode.

TABLE 35: HBC MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
Constant	da	x	0	0
	s2	-2.230	-2.230	-2.230
	s3	-2.396	-2.396	-2.396
	twb	-0.521	-0.521	-0.521
	tdb	-0.521	-0.521	-0.521

TABLE 35: HBC MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
	bike	-3.848	-3.848	-3.848
	walk	-1.126	-1.126	-1.126
IVT	All	-0.025	-0.025	-0.025
OVT	All	-0.050	-0.050	-0.050
OVT/IVT	All	2	2	2
Cost	All	-0.005	-0.003	-0.002
VOT	All	3	6	9
	da	x	0	0
	s2	-0.004	0.004	0.004
	s3	-0.004	-0.019	-0.019
IntDensity	twb	0.003	0.004	0.004
	tdb	0	0	0
	bike	0.009	0.005	0.005
	walk	0	0.005	0.005

Home-Based Other

The table below lists model coefficients for HBO segments. Drive-alone was used as a reference mode for the 2-vehicle segment, while walk was used as a reference mode for the 0- and 1-vehicle segments.

TABLE 36: HBO MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
	da	x	-1.538	0
	s2	-3.032	-1.086	-0.151
Constant	s3	-3.354	-1.250	0.014
	twb	-4.518	-3.406	-3.174

TABLE 36: HBO MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
	tdb	-8.953	-5.947	-3.341
	twr	-6.684	-6.405	-7.221
	tdr	-6.684	-6.405	-7.221
	bike	-3.368	-3.596	-1.963
	walk	0	0	0.561
IVT	All	-0.025	-0.025	-0.025
OVT	All	-0.050	-0.050	-0.050
OVT/IVT	All	2	2	2
Cost	All	-0.005	-0.003	-0.002
VOT	All	3	6	9
	da	x	-0.455	0
	s2	-0.455	-0.455	0
	s3	-0.614	-0.614	0
	twb	0.387	0.277	0.315
LogEmpDensity	tdb	0.924	0.277	0.315
	twr	-0.407	0.277	0.363
	tdr	-0.407	0.277	0.363
	bike	-0.143	0.559	0.455
	walk	0	0	0.455

Work-Based Other

The table below lists model coefficients for WBO segments. Because of the small number of WBO, 0-vehicle household trips in the household survey data, the 0-vehicle and 1-vehicle segments were pooled for model estimation purposes, with distinctions between them left for adjustment during model calibration. Drive-alone was used as a reference mode. In the 0-vehicle segment, utility calculations were carried out without the drive alone mode.

TABLE 37: WBO MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
Constant	da	x	0	0
	s2	-1.226	-1.226	-1.308
	s3	-1.857	-1.857	-1.969
	twb	0.000	0.000	-2.453
	tdb	-4.305	-4.305	-2.453
	twr	-3.518	-3.518	-3.285
	tdr	-3.518	-3.518	-2.497
	bike	-3.424	-3.424	-5.431
	walk	-2.108	-2.108	-2.153
IVT	All	-0.035	-0.035	-0.030
OVT	All	-0.089	-0.089	-0.076
OVT/IVT	All	2.515	2.515	2.515
Cost	All	-0.004	-0.001	-0.001
VOT	All	6.076	16.618	18
TransitAccess	da	0	0	0
	s2	0	0	0
	s3	0	0	0
	twb	0.084	0.084	0.023
	tdb	0.084	0.084	0.023
	twr	0.144	0.144	0.062
	tdr	0.144	0.144	0.078
	bike	0.063	0.063	0.045
	walk	0.063	0.063	0.072

Other-Based Other

The table below lists model coefficients for OBO segments. Walk was used as a reference mode for the 0- and 1-vehicle segments; drive-alone was used as a reference mode for the 2-vehicle segment.

TABLE 38: OBO MODE CHOICE MODEL COEFFICIENTS

Variable	Mode	0-Vehicle	1-Vehicle, 2+ person HH	All Others
Constant	da	x	-0.732	0
	s2	-1.975	-0.223	-0.228
	s3	-2.353	-0.732	-0.388
	twb	-2.764	-3.899	-4.442
	tdb	-2.764	-3.899	-4.442
	twr	-4.017	-3.899	-5.409
	tdr	-4.017	-3.899	-5.409
	bike	-3.036	-4.219	-3.627
	walk	0	0	-0.444
IVT	All	-0.030	-0.030	-0.074
OVT	All	-0.061	-0.061	-0.147
OVT/IVT	All	2	2	2
Cost	All	-0.004	-0.003	-0.005
VOT	All	5.191	6	9
TransitAccess	da	x	-0.200	0
	s2	-0.200	-0.200	0
	s3	-0.369	-0.369	0
	twb	0.027	0.097	0.025
	tdb	0.027	0.097	0.025
	twr	0.027	0.097	0.025
	tdr	0.027	0.097	0.025
	bike	0.043	0.150	0.039
	walk	0	0	0.039

PRICING

The auto operating cost was updated based on the Big 4 MPO methodology. The change includes the non-fuel pricing, fuel cost and vehicle fleet determined for each individual county, and a constant price increase for fuel and non-fuel costs applied to forecast the future. More details are found in the memo from the Big 4 in Appendix K: Memo on Auto Operating Cost.

The household income and commute cost was also included in the model for the auto ownership. More details on this are included in the estimation section.

TRIP ASSIGNMENT

Trip assignment includes traffic and transit assignments.

Traffic Assignment

The traffic assignment process in each model was reviewed. During implementation of VMIP 1 it was noticed the addition of distance to the path assignment resulted in routes that did not reflect traffic counts or local knowledge. For VMIP 2, the traffic assignment method was modified to include congested travel time and link or node costs, removing distance.

To allow for a different value of time, traffic assignments by vehicle availability was implemented for a multi-class assignment which separately evaluates and reports the following five vehicle types:

- Drive Alone
- Drive Alone Toll
- Shared Ride 2
- Shared Ride 3+
- Truck

Traffic assignment was modified to remove distance from the path cost function, leaving time and pricing (converted to time using the value of time).

Transit Assignment

The transit assignment has not changed from VMIP 1 and includes the following variables:

- Transit networks, real or synthetic
- Transit attributes (mode, operator, vehicle type)

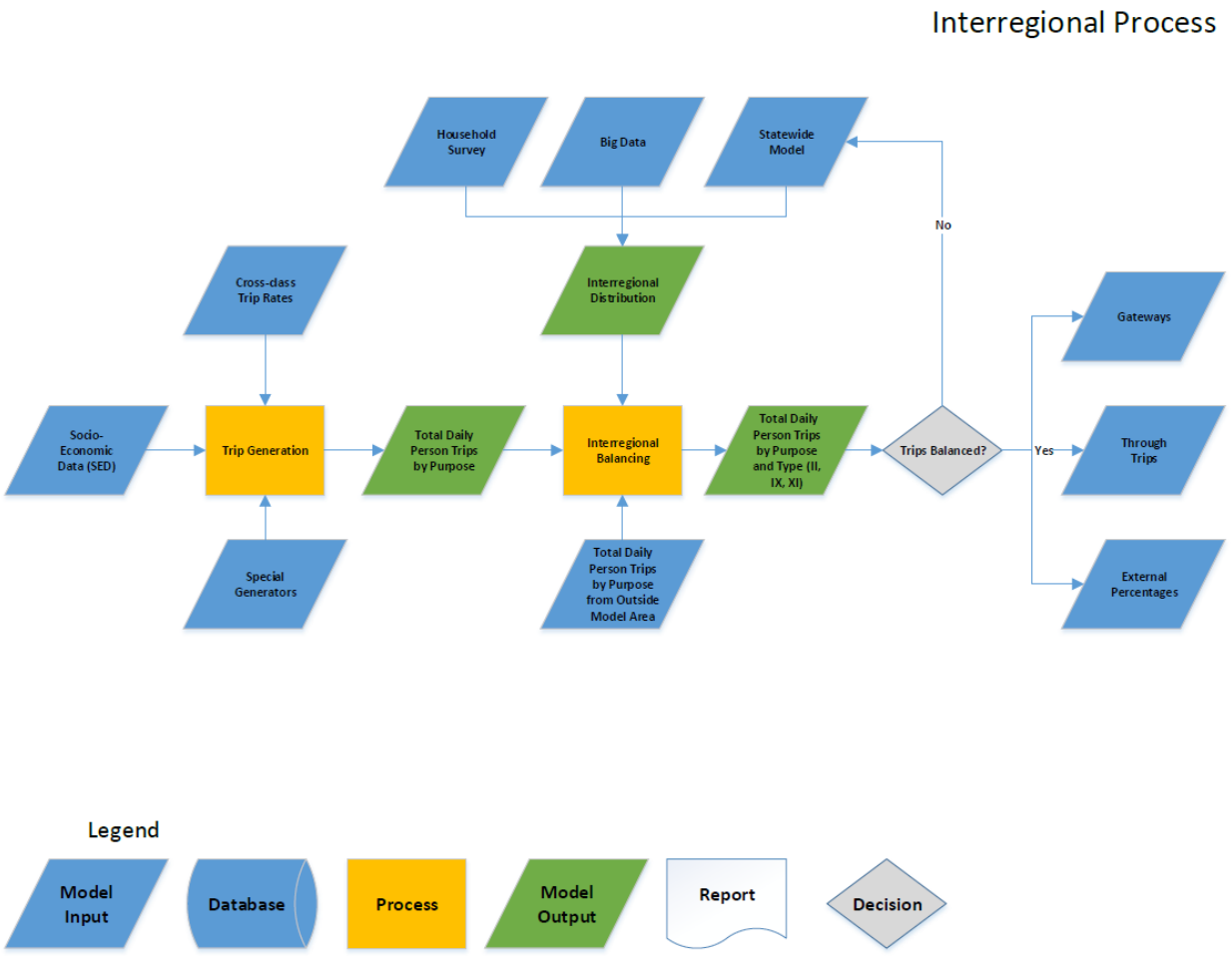
- Transit access links (coded into network? How does this work)
- Fares
- User classes (this needs to reflect types of MPO questions, such as sensitivity to fares or value of time)
- Transfer and wait rules

FEEDBACK LOOP

The feedback loop ensures the travel times used as input to trip distribution are consistent with the travel times on the final reported congested road network, as required for air quality conformity analysis. No changes were made during VMIP 2.

INTER-REGIONAL COORDINATION

In VMIP 1, each of the eight SJV counties used its own estimates of travel growth at the county boundaries and the proportions of through traffic. These forecasts of growth and through trips may be very different, even for adjacent counties, making it difficult to consistently identify inter-regional travel and possibly consolidate travel forecasts from multiple MPOs. The basis of the inter-regional coordination in VMIP 2 is the California Statewide Travel Demand Model (CSTDM), which provides a baseline distribution of passenger vehicle trips entering, leaving, or passing through each model area. The statewide model may not need to be re-run for every scenario run in a VMIP 2 model; the process illustrated and described below shows the decision process for whether the statewide model needs to be re-run.



- First, trips internal to the model (ii trips) should be balanced to one another.
- Next, inter-regional trips produced and attracted to the model are compared to the number of IX and XI trips passing through model gateways. If balance can be achieved by re-distributing IX and XI trips among gateways, then there is no need to re-run the statewide model.
- However, if the number of IX trips produced by the model varies significantly from the number of IX trips attracted to gateways, or the number of XI trips attracted by the model is too different from the number of XI trips produced from gateways, then the statewide model must be re-run to account for land use changes which have changed inter-regional travel patterns.

The process outlined above was only partly implemented during VMIP 2 since the CSTDM has not been updated recently and does not include the land use developed for the RTP/SCS for any of the MPOs in the SJV. This report recommends that once the CSTDM (passenger) and California Statewide Freight Forecasting Model (CSFFM) are updated, new through trip tables are implemented in the model.

MODEL CALIBRATION

Calibration is an iterative process where model settings are adjusted so the output of the model matches observed travel patterns. Model calibration helps overcome issues of data quality, sample size, or aggregation bias and results in model outcomes tailored to local travel characteristics.

CALIBRATION TARGETS

The first calibration step is to verify the model is producing reasonable travel behavior across household dimensions:

- Household size
- Household income

A cross-classification comparison of the model outcomes and validation behavior for each of the household dimensions is prepared. The model is calibrated in an iterative method by reducing or increasing the 2012 ACS values until the household cross-classification totals from the model match the validation data source totals.

Model-Specific Calibration Targets

To verify that acceptable levels of calibration have been achieved, the model output for each step or submodel is compared to observed data. This comparison is referred to as validation.

- Vehicle availability was validated using census vehicle ownership cross-classified by household size and income.
- Trip generation was validated for trip productions, attractions, and trip balancing.
    - Trip production: A comparison of model total trips by purpose and observed totals from the expanded 2012 CHTS data. A secondary comparison, if needed, can be HBW trips from more aggregate sources such as the CTPP or NHTS. These sources are used with caution since they report "usual" workplace locations and are not directly comparable to model generated workplace locations. Convert person trip rates to ITE rates using Ave Veh Occ by purpose.
    - Trip attraction: Compare HBW attractions to total jobs in zone, range of 1.2-1.5 HBW attractions per employee in zone (source TFResource.org).
    - Trip balancing: PA totals, within +-10% of totals and totals by purpose.

- The trip distribution gravity model and any associated friction factors (k-factors) were calibrated iteratively to match average trip lengths by purpose and trip length frequencies by purpose are compared with the CHTS.
- The mode choice model was validated against CHTS mode shares.

The calibrated parameters used in the model are reported in Appendix L: Calibrated Parameters and summarized in the 1_Inputs\Support\ VMIP2_FresnoCOG_Parameters.xlsx.

MODEL STATIC VALIDATION

In the static validation tests, we ran the model to ensure the model output matches available traffic counts and ridership counts, and assessed the model's ability to replicate roadway speeds. This process starts with measuring the model traffic volume flows across screenlines composed of several roadways to ensure overall traffic flows in specific directions are accurately captured. Then, model volumes on individual links are compared to traffic counts. As part of the static validation procedure, elements of the trip generation, trip distribution, and traffic assignment modules were adjusted. Validation results are in the 0_Documents\Validation directory included with the model.

TRIP GENERATION

Trip generation validation consisted of the total production to attraction ratio (P/A) by purpose and the total trips generated per household. As we can see from the table, the P/A ratios are quite close to 1 for all the trip purposes and well within the 10% guideline. When applying the model for future years or land use scenarios, the P/A ratio should be reviewed along with the trips per household to ensure the model results reasonably reflect the scenario. The User Guide contains additional detail on checking the land use, trip balancing, and adjusting the inter-regional factors if needed.

TABLE 39: TRIP GENERATION – PRODUCTION (P)/ATTRACTION (A) BALANCE

Trip Purpose	Evaluation Criterion	Productions	Attractions	P/A Ratio	Difference	Percent Difference
HBW	+/- 10%	207,845	204,054	1.02	-3,790	-1.8%
HBS	+/- 10%	472,158	462,414	1.02	-9,744	-2.1%
HBO	+/- 10%	1,306,831	1,246,216	1.05	-60,615	-4.6%
NHB	+/- 10%	706,722	722,447	0.98	15,725	2.2%

The person trips per household are lower than the CHTS. As directed by Fresno COG staff, trip generation rates were reduced to have VMT and other validation criteria closer to the guidelines. Subarea validation should be performed prior to using the model for applications other than regional performance metrics.

TABLE 40: WEEKDAY PERSON TRIPS PER HOUSEHOLD

CHTS	Model
11.0	9.6

Notes: 2012 California Household Travel Survey, Weekday Trips, re-weighted by F&P

VEHICLE AVAILABILITY

Next, we checked weekday person trips per household as shown in the table below. Again, the model output matches closely with the data from the 2012 CHTS. Similarly, vehicle availability from the model as shown in the table below matches with the CHTS data.

TABLE 41: VEHICLE AVAILABILITY

0		1		2		3+	
CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model
9%	14%	35%	34%	37%	39%	30%	13%

Notes: 2012 California Household Travel Survey, Weekday Trips, re-weighted by F&P

MODE SPLIT

When it comes to mode split by purpose, including modes such as drive alone, shared ride 2, transit and walking as well as purposes such as home based work (HBW) and non-home based work (NHB), outputs from the model are once again very close to the CHTS data.

TABLE 42: MODE SPLIT BY PURPOSE

Purpose	Total		Drove Alone		Shared Ride 2		Shared Ride 3+		Transit		Walk		Bike		Other	
	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model
HBW	13%	8%	81%	81%	8%	8%	4%	4%	1.7%	1.7%	4%	4%	1%	1%	0%	0%
HBO	59%	66%	27%	25%	28%	26%	24%	19%	2.2%	3.0%	13%	24%	3%	3%	3%	1%
NHB	28%	27%	46%	45%	26%	29%	21%	19%	0.5%	0.6%	5%	5%	2%	2%	0%	0%
Total	100%	100%	40%	34%	25%	26%	20%	17%	1.7%	2.3%	10%	17%	2%	2%	1%	1%

Notes: 2012 California Household Travel Survey, Weekday Trips, re-weighted by F&P. Includes only internal-to-internal, weekday person trips for all modes. School bus trips are categorized as Other.

Model output for trip purposes by mode also falls close to the survey results as clearly shown in the table below.

TABLE 43: PURPOSE BY MODE

Purpose	Total		Drove Alone		Shared Ride 2		Shared Ride 3+		Transit		Walk		Bike	
	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model
HBW	13%	8%	27%	18%	4%	2%	2%	2%	14%	6%	6%	2%	7%	4%
HBO	59%	66%	41%	47%	67%	67%	69%	70%	78%	88%	81%	90%	71%	72%
NHB	28%	27%	32%	35%	29%	30%	29%	29%	8%	7%	14%	8%	22%	24%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Notes: 2012 California Household Travel Survey, Weekday Trips, re-weighted by F&P. Includes only internal-to-internal, weekday person trips for all modes. School bus trips are categorized as Other.

DISTRIBUTION – TRAVEL TIME

During the model estimation process the individual household survey records were evaluated. In many cases the reported travel time, level of congestion in the area, and travel distance were inconsistent for a given trip. Rather than using trip distance, the model uses travel time for distribution so future congestion or changes in travel time between modes influences overall travel. The results of the average travel time from

the model are close to those observed, with the model being slightly lower than CHTS average times for home-based trips.

TABLE 44: TRIP ASSIGNMENT – AVERAGE TRAVEL TIME (IN MINUTES) BY TRIP PURPOSE

Trip Purpose					
HBW		HBO		NHB	
CHTS	Model	CHTS	Model	CHTS	Model
20.8	20.0	14.0	12.6	13.0	13.6

Notes: 2012 California Household Travel Survey, Weekday Trips, re-weighted by F&P. Includes only internal-to-internal, weekday person trips for all modes.

VEHICLE MILES TRAVELED

Data from Highway Performance Management System (HPMS) were used as a benchmark for comparison of Vehicle Miles Traveled (VMT) within the model area. Although HPMS is an estimate of VMT based on sampled count data throughout the county, it is a standard method and a point of comparison often referenced especially for air quality analysis. The model is within the recommended deviation compared to HPMS. Based upon VMT being within the estimate from HPMS combined with the travel time distribution and the lack of significant congestion within the region, the distribution portion of the model seems reasonable.

TABLE 45: TRIP ASSIGNMENT – VMT

Evaluation Criterion	HPMS	Model	% Deviation
+-3%	22,574,620	23,053,713	+2.1%

Notes: Daily Vehicle Miles Traveled. Highway Performance Management System – 2014 California Public Road Data, Table 6.

DISTRIBUTION – INTER-REGIONAL TRAVEL

We also looked at model trip distribution and compared it with CHTS survey data. As shown in the table below, the model is close to the survey data for each trip type.

TABLE 46: TRIP DISTRIBUTION – BY PURPOSE (ALL MODES)

Trip Type	Trip Purpose							
	Total		HBW		HBO		NHB	
	CHTS	Model	CHTS	Model	CHTS	Model	CHTS	Model
II	93%	94%	88%	91%	95%	95%	93%	94%
IX	3%	3%	4%	3%	3%	3%	4%	3%
XI	3%	3%	8%	6%	3%	3%	3%	2%

Notes: 2012 California Household Travel Survey, Weekday Trips, re-weighted by F&P. Includes only internal-to-internal, weekday person trips for all modes.

ROADWAY ASSIGNMENT – TRAFFIC VOLUMES

For the Fresno COG model, weekday traffic counts were compared to the model assigned volume for total vehicle trips. Fresno COG collected a large number of counts on county roads and city streets, and these counts were supplemented by count data collected by Caltrans as part of the Highway Performance Management System (HPMS) reporting. Count data ranged from 2014 to 2016, with the model land use reflecting 2014. **Table 47** summarizes the static validation tests for both sets of counts. The Assignment Validation Dashboard on the following page.

TABLE 47: SUMMARY OF TRAFFIC ASSIGNMENT VALIDATION – DAILY CONDITIONS

Evaluation Criterion	Guidelines(1)	Model
Number of count locations	N/A	793
Model/Count Ratio	+/- 10%	0.94
Percent within Caltrans Deviation	>75%	79%
Percent Root Mean Square Error	< 40%	54%
Correlation Coefficient	> 0.88	95%
Screenlines within Caltrans Deviation	100%	92%

Notes: (1) *2017 Regional Transportation Plan Guidelines for Metropolitan Planning Organizations*, California Transportation Commission, January 18, 2017 and *Travel Forecasting Guidelines*, State of California Department of Transportation, 1992.

The VMIP 2 model does not pass all of the static validation, with the %RMSE being slightly high and some of the screenlines not passing. The model meeting most of the criteria but local area model validation and calibration is recommended for project application.

The model validation results demonstrate the model performs acceptably at a regional scale especially for key metrics such as VMT and higher volume roadways. At a local scale or specific times of day, sub-area refinements and validation should be performed before using the model for project applications. Refinements may include adding zonal or network detail to the model along with modifications to centroid loadings, network inputs (i.e., speeds), land use inputs, and demographic inputs. As described in the Fresno COG forecasting guidelines, any applications forecasts should also use an appropriate forecasting approach as described by National Cooperative Highway Research Program (NCHRP) Report 255 or 716 rather than using model forecast volumes directly.

San Joaquin Valley Model Improvement Project (San Joaquin Valley MIP)
One-Way Volume Model Validation Results
Fresno County Model

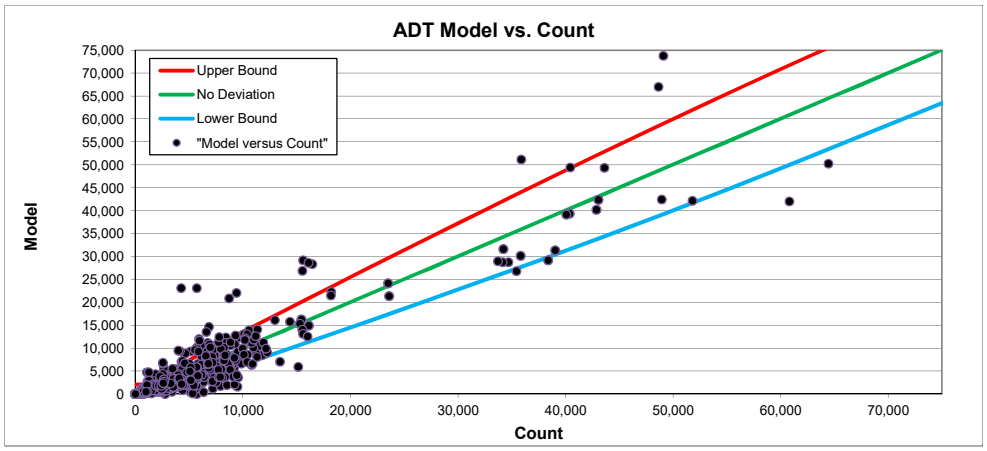
August 1, 2017

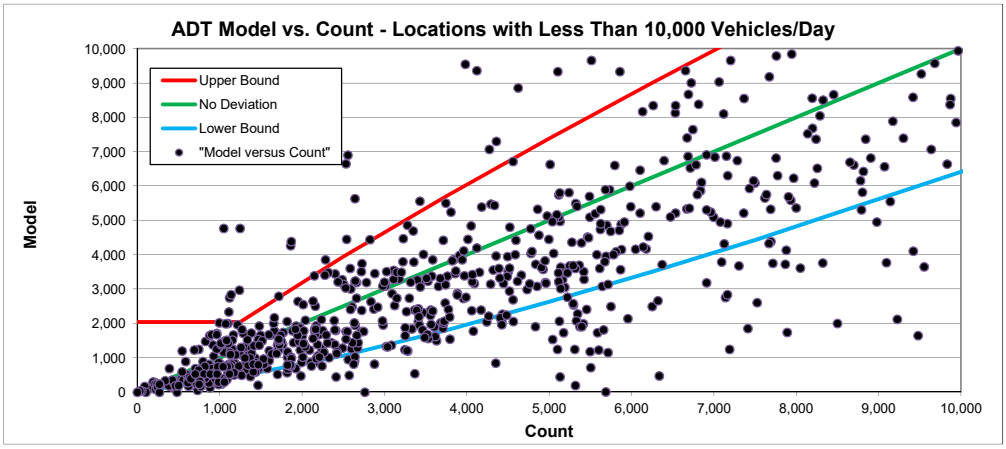
DAILY Assignment		
Model/Count Ratio =	**0.94**	
Percent Within Caltrans Maximum Deviation =	**79%**	> 75%
Percent Root Mean Square Error =	**54%**	<40
Correlation Coefficient =	**95%**	> 0.88
%of Screenlines Within Caltrans Standard Dev. =	**92%**	100%
Externals M/C Ratio =		
Externals % RMSE =		
Total Count	793	
Link Within Deviation	623	
Link Outside Deviation	170	
	Remaining	Total Needed
	-28	595

Model/Count by ADT Volume Groups		
Link Volume	**M/C**	**Counts**
> 50,000	**1.09**	
25,000 - 49,999	**0.98**	
10,000 - 24,999	**1.02**	
5,000 - 9,999	**0.87**	
2,500 - 4,999	**0.88**	
1,000 - 2,499	**0.85**	
< 1,000	**0.82**	

RMSE by ADT Volume Groups		
Link Volume	**%RMSE**	**FHWA**
> 50,000	**28%**	< 21%
25,000 - 49,999	**21%**	< 22%
10,000 - 24,999	**32%**	< 25%
5,000 - 9,999	**48%**	< 29%
2,500 - 4,999	**56%**	< 36%
1,000 - 2,499	**52%**	< 47%
< 1,000	**60%**	< 60%

ADT Model/Count by Functional Class		
Functional Class	**M/C**	**Counts**
Freeway	**1.04**	**54**
Highway	**1.26**	**17**
Expressway	**1.25**	**26**
Arterial	**0.79**	**339**
Collector	**0.82**	**368**





Note: Detailed validation results can be found in Appendix M.

TRANSIT ASSIGNMENT – SYSTEM RIDERSHIP

As shown in the table below, the total transit system ridership is slightly high compared to the observed ridership. With transit mode share reported in CHTS for transit less than 2%, minor differences in mode share result in a noticeable difference in transit riders.

TABLE 48: DAILY TRANSIT ASSIGNMENT

Validation Statistic	Evaluation Criterion	Observed Ridership	Model Ridership	Percentage
Difference between actual ridership to model results for entire system	+/- 20%	61,324	77,545	+26%

Notes: Observed Ridership includes FAX, Clovis Transit, FCRTA average weekday unlinked trips for 2014

THROUGH TRIPS

In addition to the through trips beeing updated, enhancements to travel behavior within the model include more reasonable internal trip rates and estimates consistent with the 2012 CHTS. As discussed in the inter-regional coordination section, the CSTDM has not been updated to reflect the SJV MPO current RTPs. As such, the XX trips, derived from the CSTDM, were based on the CSTDM but calibrated to better match counts on the freeways near gateways. Also, XX truck trips in VMIP 2 were converted from passenger car equivalents (PCEs) to vehicles since the assignment accounts for PCEs and the counts (passenger vehicles plus trucks) are also in terms of vehicles. It is recommended that the through trips for the base year and future scenarios be updated when the CSTDM is updated to reflect the SJV MPO RTP/SCS.

MODEL DYNAMIC VALIDATION

The model was tested to evaluate the sensitivity of auto operating cost and the results were compared to published research. Since the test was implemented for the base year, the results were compared to the short-term elasticities. The internal-external, household demographics, and all other factors remained constant so only internal-internal VMT was compared to reduce the influence of interregional travel. Research on the elasticity of fuel price on vehicle miles traveled summarized by ARB indicate ranges of -.026 to -0.195. The model sensitivity to an increase and decrease in auto operating cost in the same magnitude but not as sensitive as published research suggests. Given the high dependence on auto travel for the county as a whole and the fuel price being a smaller component of auto operating cost when the maintenance and other fixed prices are include, the model is sensitive for relative scenario comparisons.

TABLE 49: AUTO OPERATING COST AND VMT

Test	Change in Cost	VMT	% Change in VMT	Elasticity
Increase Auto Operating Cost	+ 3%	16,355,828	-0.05%	-0.017
Decrease Auto Operating Cost	- 3%	16,370,611	0.04%	-0.013

Notes: Base year internal VMT= 16,364,286

APPENDIX A:

PREPARATION OF CALIFORNIA HOUSEHOLD TRAVEL SURVEY DATA

MEMORANDUM

Date: June 23, 2015

To: Users of CHTS data prepared by Fehr & Peers

From: Jennifer Ziebarth

Subject: Cleaning and Weighting of California Household Travel Survey Data

WC14-3115

The purpose of this memo is to document the steps undertaken to prepare the 2012 California Household Travel Survey (CHTS) for use in the Valley Model Improvement Program, Phase 2 (VMIP 2) project.

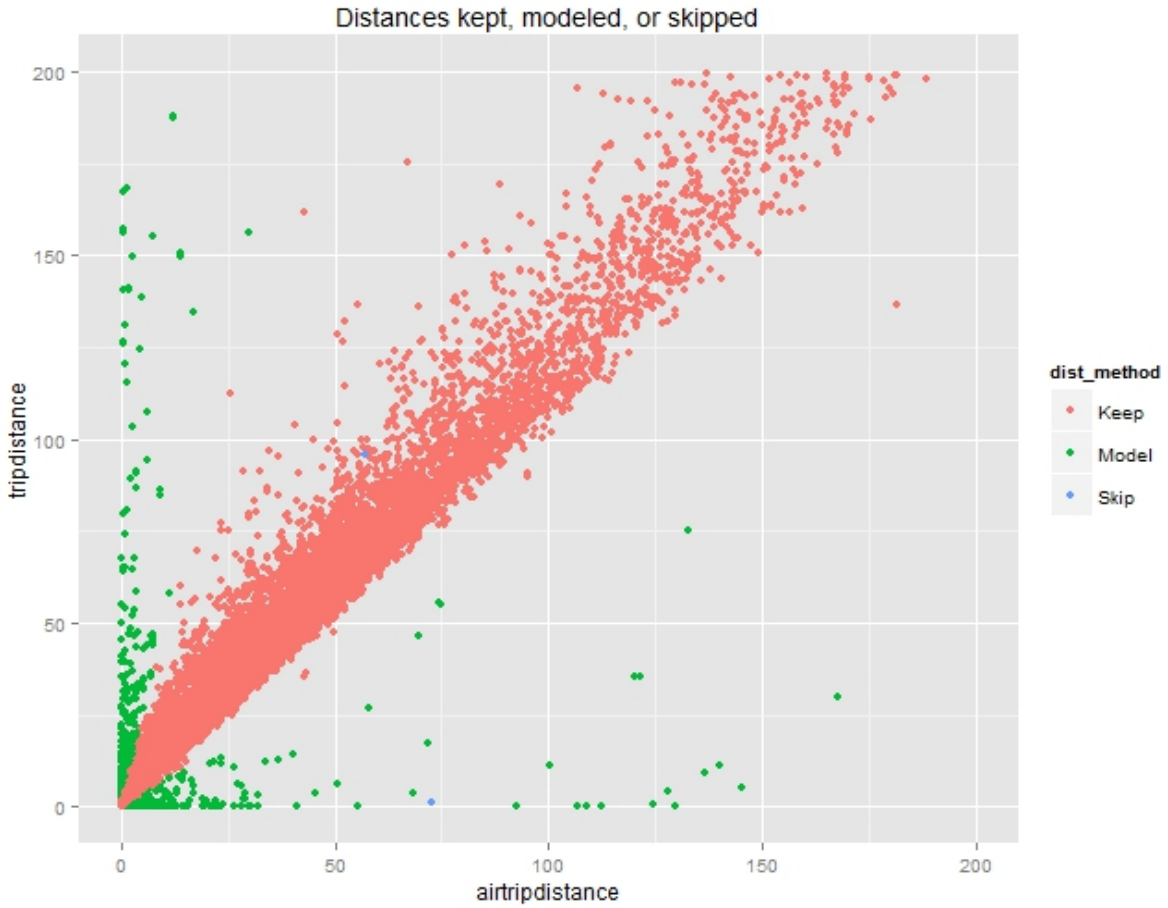
The 2012 CHTS is a statewide dataset of multi-modal travel behavior and household demographics. The survey includes data from a total of 42,431 households, collected using telephone surveys and GPS devices from all counties in California. The dataset includes travel patterns, including activity purpose, duration, travel distance, travel time, and mode choice. Demographics include household size, income, vehicle availability, and the additional characteristics of the individuals within the household.

Data preparation included the following steps:

1. Identify and repair unreasonable or missing trip distances.
2. Identify and consolidate transit trip chains.
3. Identify trip purposes.
4. Impute missing household income data.
5. Calculate a set of household-level weights to replace those provided with the CHTS.
6. Recode certain variables
7. Attach MPO and Census Designated Place information to trip and household records
8. Aggregate information about persons in the household to the household record
9. Attach person-level data to the trip records

TRIP DISTANCE CLEANING

The California Household Travel Survey provides trip distances in two formats: an "as-traveled" distance intended to be the actual distance traveled, and an "air distance" reflecting the straight-line distance between the trip's origin and destination. However, the as-traveled distance was missing from some trip records and was unreasonable in others. The graph below shows the relationship between air distance and as-traveled distance for all non-airplane trips in the CHTS. Trips whose as-traveled distance deviate too much from their air distance are candidates for providing a "cleaned" distance.



To provide "cleaned" trip distances, a simple linear regression was performed separately for each travel mode based only on the data where the as-traveled distance is deemed reasonable.

IDENTIFY TRIP PURPOSES

To identify trip purposes, both the activity purpose from the CHTS activities file and the place name from the CHTS places file were used. The activity codes provided in the CHTS data are as follows:

1. PERSONAL ACTIVITIES (SLEEPING, PERSONAL CARE, LEISURE, CHORES)
2. PREPARING MEALS/EATING
3. HOSTING VISITORS/ENTERTAINING GUESTS
4. EXERCISE (WITH OR WITHOUT EQUIPMENT)/PLAYING SPORTS
5. STUDY / SCHOOLWORK
6. WORK FOR PAY AT HOME USING TELECOMMUNICATIONS EQUIPMENT
7. USING COMPUTER/TELEPHONE/CELL OR SMART PHONE OR OTHER COMMUNICATIONS DEVICE FOR PERSONAL ACTIVITIES
8. ALL OTHER ACTIVITIES AT MY HOME
9. WORK/JOB DUTIES
10. TRAINING
11. MEALS AT WORK
12. WORK-SPONSORED SOCIAL ACTIVITIES (HOLIDAY OR BIRTHDAY CELEBRATIONS, ETC)
13. NON-WORK RELATED ACTIVITIES (SOCIAL CLUBS, ETC)
14. EXERCISE/SPORTS
15. VOLUNTEER WORK/ACTIVITIES
16. ALL OTHER WORK-RELATED ACTIVITIES AT MY WORK
17. IN SCHOOL/CLASSROOM/LABORATORY
18. MEALS AT SCHOOL/COLLEGE
19. AFTER SCHOOL OR NON-CLASS-RELATED SPORTS/PHYSICAL ACTIVITY
20. ALL OTHER AFTER SCHOOL OR NON-CLASS RELATED ACTIVITIES (LIBRARY, BAND REHEARSAL, CLUBS, ETC)
21. CHANGE TYPE OF TRANSPORTATION/TRANSFER (WALK TO BUS, WALK TO/FROM PARKED CAR)
22. PICKUP/DROP OFF PASSENGER(S)

23. DRIVE THROUGH MEALS (SNACKS, COFFEE, ETC.) [SHOW IF PTYPE <> 1 (HOME)]
24. DRIVE THROUGH OTHER (ATM, BANK) [SHOW IF PTYPE <> 1]
25. WORK-RELATED (MEETING, SALES CALL, DELIVERY)
26. SERVICE PRIVATE VEHICLE (GAS, OIL, LUBE, REPAIRS)
27. ROUTINE SHOPPING (GROCERIES, CLOTHING, CONVENIENCE STORE, HH MAINTENANCE)
28. SHOPPING FOR MAJOR PURCHASES OR SPECIALTY ITEMS (APPLIANCE, ELECTRONICS, NEW VEHICLE, MAJOR HH REPAIRS)
29. HOUSEHOLD ERRANDS (BANK, DRY CLEANING, ETC.)
30. PERSONAL BUSINESS (VISIT GOVERNMENT OFFICE, ATTORNEY, ACCOUNTANT)
31. EAT MEAL AT RESTAURANT/DINER
32. HEALTH CARE (DOCTOR, DENTIST, EYE CARE, HIROPRACTOR, VETERINARIAN)
33. CIVIC/RELIGIOUS ACTIVITIES
34. OUTDOOR EXERCISE (PLAYING SPORTS/JOGGING, BICYCLING, WALKING, WALKING THE DOG, ETC.)
35. INDOOR EXERCISE (GYM, YOGA, ETC.)
36. ENTERTAINMENT (MOVIES, WATCH SPORTS, ETC)
37. SOCIAL/VISIT FRIENDS/RELATIVES
38. OTHER (SPECIFY) [NOTE: LISTED ON DIARY] (O_APURP)
39. LOOP TRIP (FOR INTERVIEWER ONLY-NOT LISTED ON DIARY)
99. DONT KNOW/REFUSED

Each place visited was assigned a place based on the following criteria:

- If the place name is "HOME," then the place is "HOME," regardless of the activity purposes.
- If the place includes an activity with purpose code between 9 and 16, the place is "WORK."
- If the place includes an activity with purpose code between 17 and 20, then:
    - If the place name includes identifying strings such as "COLLEGE," "UNIV," "UCLA," or "USC," the place is "COLLEGE."
    - If the place name includes "PRESCHOOL" or "DAYCARE," the place is "OTHER".

  - Otherwise the place is "K12."
- If the place includes an activity with purpose code 27 or 28, then the place is "SHOP."
- Otherwise, the place is "OTHER."

Once the purpose for each place has been determined, assigning a purpose to each trip is straightforward. For non-transit trips, the purpose at the trip origin is the purpose of the immediately preceding place record, and the purpose at the trip destination is the purpose of the place record itself. Then:

- If one end of the trip is "HOME" and the other is "WORK," the trip is home-based work ("HBW").
- If one end of the trip is "HOME" and the other is "K12," the trip is home-based K-12 ("HBK").
- If one end of the trip is "HOME" and the other is "COLLEGE," the trip is home-based college ("HBC").
- If one end of the trip is "HOME" and the other is "SHOP," the trip is home-based shop ("HBS").
- If one end of the trip is "HOME" and the other is either "OTHER" or "HOME," the trip is home-based other ("HBO").
- If one end of the trip is "WORK" and the other end is anything but "HOME," the trip is work-based other ("WBO").
- In all other cases, the trip is non-home-based ("NHB").

In some cases it is useful to consolidate these trips into a simpler scheme:

- Home-based work ("HBW") is the same as above.
- Home-based other ("HBO") includes "HBO," "HBK," "HBC," and "HBS" above.
- Non-home-based ("NHB") includes "WBO" and "NHB" above.

For transit trips, the purpose identification is slightly more complex and first requires identification of chains of transit trips (see below).

JOINT TRAVEL AMONG HOUSEHOLD MEMBERS

When multiple household members travel together in a single vehicle, the trip is considered a joint trip. Such trips are identified using arrival and departure times as well as person codes for household members on the trip. If the only purpose of the trip is to drop off or pick up household members, the trip is flagged as an escort trip.

This coding allows flexibility in how escort trips are counted when CHTS records are summarized. To avoid losing potentially important information, no trip purposes are changed.

IDENTIFY AND CONSOLIDATE TRANSIT TRIP CHAINS

In recording transit trips, the California Household Travel Survey treats each portion of the transit trip chain as a separate trip. For example, a trip in which the traveler drives to a rail station, takes the train to a second rail station, and then walks to a workplace is listed in the survey as three separate, consecutive trips, with three separate modes. This method of record-keeping makes it possible to track the mode of access and egress for a transit trip, but for most travel behavior analyses it is preferable to consider these three trips as a single unit. . Thus, a necessary step of data preparation is identification and consolidation of chains which make up a single linked transit trip.

To identify chains of transit trips, trips are flagged as transit access, transit egress, or transit transfer using the following criteria. A transit access trip is one which:

- Immediately precedes a trip whose mode is a transit mode,
- Does not itself use a transit mode, and either
    - Has an activity of "change to type of transportation / transfer" coded, or
    - Has an activity duration less than 30 minutes and a location whose name contains a keyword suggesting a transit stop, such as "station," "bus," "subway," etc.
- Does not end at the traveler's home.

A transit egress trip is one which:

- Immediately follows a trip whose mode is a transit mode,
- Does not itself use a transit mode, and either
    - Has an activity of "change to type of transportation / transfer" coded, or
    - Has an activity duration less than 30 minutes and a location whose name contains a keyword suggesting a transit stop, such as "station," "bus," "subway," etc.
- Does not depart from the traveler's home.

A trip which fits both sets of criteria, appearing to be both transit access and transit egress, is considered a transit transfer.

Once potential access, transfer, and egress trips have been identified, the first and last legs of transit trip chains are identified according to the following criteria. The first leg of a transit trip chain is one which:

- Is flagged as a transit access trip, or
- Is a transit trip whose preceding trip is not transit and does not have an activity of "change to type of transportation" coded, and whose previous activity duration is greater than 30 minutes.

The last leg of a transit trip chain is one which:

- Is flagged as a transit egress trip, or
- Is a transit trip which does not have an activity of "change to type of transportation" coded, whose following trip is not transit and whose activity duration is greater than 30 minutes.

Note the actual criteria are slightly more involved; for details see the R code. For validation of this process, it was confirmed no person has a different number of trips flagged as the first in a transit chain than flagged as the last in a transit chain.

Once transit trip chains have been identified, a trip purpose can be assigned to the chain as a whole. The chain origin is the origin for the first trip in the chain, that is, the purpose of the immediately preceding place. The chain destination is the destination for the final trip in the chain. The same categorization of trip purposes is used as described in the previous section.

COMPARISON OF TRIP MODES

The modes reported in the cleaned CHTS data are slightly simplified from those reported in the original CHTS data. In addition, mode categories in the cleaned CHTS data reflect vehicle occupancy of drive modes and mode of access for transit modes. The comparison between the original mode reported in the CHTS and the simplified mode in the cleaned data is as follows:

Simplified mode	Original modes
Walk	Walk; Wheelchair / Mobility Scooter Other Non-Motorized
Bike	Bike

Simplified mode	Original modes
Drive Alone	Auto / Van / Truck Driver Auto / Van / Truck Passenger Carpool / Vanpool Motorcycle / Scooter / Moped Rental Car / Vehicle
Drive Shared 2	Auto / Van / Truck Driver Auto / Van / Truck Passenger Carpool / Vanpool Motorcycle / Scooter / Moped Rental Car / Vehicle
Drive Shared 3	Auto / Van / Truck Driver Auto / Van / Truck Passenger Carpool / Vanpool Motorcycle / Scooter / Moped Rental Car / Vehicle
Drive Shared 4+	Auto / Van / Truck Driver Auto / Van / Truck Passenger Carpool / Vanpool Motorcycle / Scooter / Moped Rental Car / Vehicle
Taxi	Taxi / Hired Car / Limo
Shuttle	Private shuttle (SuperShuttle, employer, hotel, etc.) Other Private Transit
Walk to Bus	Greyhound Bus Local Bus, Rapid Bus Express Bus / Commuter Bus (AC Transbay, Golden Gate Transit, etc.) Premium Bus (Metro Orange / Silver Line) Public Transit Shuttle (DASH, Emery Go Round, etc.) AirBART / LAX FlyAway Amtrak Bus Other Bus
Drive to Bus	Greyhound Bus Local Bus, Rapid Bus Express Bus / Commuter Bus (AC Transbay, Golden Gate Transit, etc.) Premium Bus (Metro Orange / Silver Line) Public Transit Shuttle (DASH, Emery Go Round, etc.) AirBART / LAX FlyAway Amtrak Bus Other Bus

Simplified mode	Original modes
Walk to Rail	BART, Metro Red / Purple Line ACE, Amtrak, Caltrain, Coaster, Metrolink Metro Blue / Green / Gold Line, Muni Metro, Sacramento Light Rail, San Diego Sprinter / Trolley / Orange/Blue/Green, VTA Light Rail Street Car / Cable Car Other Rail
Drive to Rail	BART, Metro Red / Purple Line ACE, Amtrak, Caltrain, Coaster, Metrolink Metro Blue / Green / Gold Line, Muni Metro, Sacramento Light Rail, San Diego Sprinter / Trolley / Orange/Blue/Green, VTA Light Rail Street Car / Cable Car Other Rail
Walk to Ferry	Ferry / Boat
Drive to Ferry	Ferry / Boat
School Bus	School Bus
Paratransit	Dial-a-Ride / Paratransit (Access Services, etc.)
(removed from cleaned data)	Plane
NA	RF

IMPUTATION OF MISSING DATA

Although the household records are largely complete, certain key variables are missing for a small number of records. Variables used to estimate household weights (see next section) are imputed if they are missing. Additional variables were created to flag households whose data is imputed rather than reported in the original survey. The imputation process for these variables is described below.

HOUSEHOLD INCOME

Household income was not reported for 3,642 (8.6%) of households. For these households, the most likely income was calculated by comparing households of the same size, number of vehicles owned, and tenure type (own versus rent). The imputed household income is the average income category of the comparable households. For cases where fewer than ten households were considered comparable, households were grouped to provide a larger sample.

HOUSEHOLD RESIDENTIAL TYPE

The residential unit type was not available for 69 households (0.2% of the full CHTS). Residential unit type was imputed for these households by examining the residential unit types of households with the same size, number of vehicles owned, and household income category. The imputed residential unit type (single family, multi-family, or other) is set to be the most common residential unit type for matching households.

AGE OF HEAD OF HOUSEHOLD

Age of the head of household could not be determined for one household. This household was assumed to have a head in the age 25-64 category.

ESTIMATION OF SURVEY WEIGHTS

Surveys are meant to capture the characteristics of an entire population by randomly sampling a small proportion of the population. Often, a perfectly random sample is hard to achieve — some groups are difficult to survey and are under-represented, other groups are over-represented. To balance this bias, sample weights are estimated to "reshape" the sample. Fehr & Peers estimated household sample weights for the CHTS to balance the survey sample to match county-level percentages for several variables as reported in the 2012 American Community Survey 5-year estimates. Variables used as controls for the re-weighting are:

- Household size (one to seven or more)
- Household income (nine income categories)
- Number of workers per household (zero to three or more)
- Number of vehicles owned per household (zero to four or more)
- Household residential unit type (three categories)
- Household size (one to five or more) cross-classified by household income (five categories)
- Household size (one to five or more) cross-classified by number of vehicles per household (zero to four or more)
- Household size (one to five or more) cross-classified by number of workers per household (zero to three or more)

Counties were weighted either individually or, in the case of counties with fewer CHTS households, in groups of at most four adjacent counties weighted as a single unit. The multi-county groups used for weighting where single-county sample sizes were insufficient were:

- Lake and Mendocino Counties
- Del Norte, Siskiyou, Lassen, Modoc, Plumas, Sierra, and Nevada Counties
- Shasta, Tehama, Trinity, Glenn, and Colusa Counties
- Yolo, Yuba, and Sutter Counties
- Alpine, Amador, Calaveras, Mariposa, Tuolomne, Inyo, and Mono Counties
- Monterey and San Benito Counties

Expansion weights, suitable for expanding CHTS data to represent the full population of a county, were calculated for each county individually. Separate expansion weights exist for all households, and for households whose travel day is a weekday.

Weighting reports for each of the eight San Joaquin Valley counties is in the appendix to this memo.

ATTACH MPO AND CENSUS DESIGNATED PLACE INFORMATION

Fields are added to the household record listing the MPO and the Census Designated Place (CDP) of the household location; fields are added to the trip record listing the MPO and CDP of the trip origin and destination. Many MPOs in California are a single county; in this case, the MPO code is identical to the county FIP code. Multi-county MPOs are coded as follows:

1. AMBAG: Santa Cruz, Monterey, and San Benito Counties
2. MTC: Alameda, Contra Costa, Solano, Napa, Sonoma, Marin, San Francisco, San Mateo, and Santa Clara Counties
3. SACOG: Sacramento, Yolo, Yuba, Sutter, and portions of El Dorado and Placer counties
4. SCAG: Los Angeles, Ventura, Orange, Riverside, Imperial, and San Bernardino counties
5. TMPO: Portions of El Dorado and Placer counties

El Dorado and Placer counties are divided between two MPOs: the Tahoe Basin area lies in TMPO while the remainder of the counties are part of SACOG. Records are coded into the proper MPO using their census tract.

ATTACH PERSON DATA

A limited amount of data from the raw CHTS person file is attached to the final household and trip records. Demographic information such as the traveler's age, racial identity, worker, and student status is attached to the trip record. Fields indicating the number of household members in various age categories are added to the household record, along with a field indicating the age category of the head of household. The age categories used are:

- Age 0-2
- Age 3-4
- Age 5-14
- Age 15-17
- Age 18-24
- Age 25-34
- Age 35-44
- Age 45-54
- Age 55-64
- Age 65-74
- Age 75 and up

APPENDIX B:

CALIFORNIA HOUSEHOLD TRAVEL SURVEY DATA DICTIONARY

MEMORANDUM

Date: April 21, 2015

To: File

From: Jennifer Ziebarth

Subject: Instructions for using CHTS cleaned data

WC14-3115

The purpose of this memo is to provide instructions for using the cleaned and re-weighted California Household Travel Survey data. It includes data dictionaries for both the household and trip files, and important instructions regarding the use of household and trip weights.

JOINING THE HOUSEHOLD AND TRIP FILES

The "sampno" variable is a household ID code which can be used to join the household and trip files.

USING THE WEIGHTS

Please note that the CHTS data comes with survey weights which must be correctly applied to yield accurate summaries.

There are three types of weights included with the cleaned CHTS data:

- Household-level weights (hhweight and hhexpweight)
- Trip-level weights (tripweight and tripexpweight)
- Trip correction factor (tcf)

In order to use CHTS data accurately, one or more of these weights must be applied. The following instructions describe when to use each type of weight, and explain and give examples of using the weights.

DETERMINING WHICH WEIGHTS TO USE

To determine which weights to use, consider the following criteria:

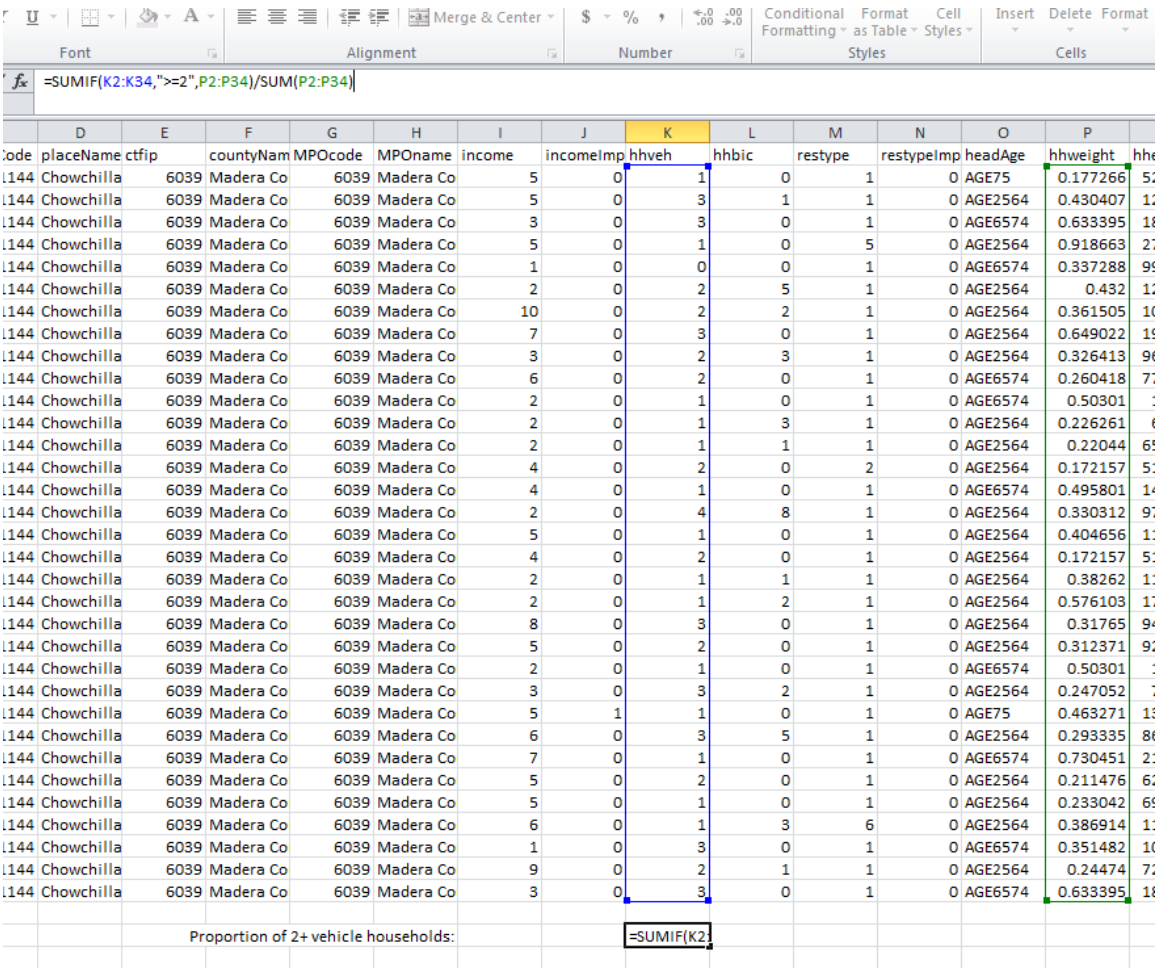
- When summing or averaging values that pertain to households, use the household weights *hhweight* or *hhexpweight*. Examples include calculating the percentage of 0-vehicle households in a region, calculating the average number of licensed drivers per household, or calculating the number of households in a region with school-aged children. The *hhweight* weighting factor will weight households relative to one another and is useful for computing percentages, while the *hhexpweight* factor will also provide estimates of the total number of households.
- When summing or averaging values that pertain to trips from different households, use the trip weights *tripweight* or *tripexpweight*. Examples include calculating the average distance per vehicle trip, calculating mode shares, or calculating the distribution of travel times. As with the household weights, *tripweight* will weight trips relative to one another and is useful for computing percentages, while the *tripexpweight* factor will also provide estimates of the total number of trips.
- When summing or averaging values that pertain to trips within a single household, use the trip correction factor *tcf*. Often this is not done on its own but as the first of a two-step process; an example is calculating average VMT per household: first sum the VMT per household using the *tcf* weight, then average each household's VMT using either the *hhweight* or the *hhexpweight* weight. Similar two-step processes should be used to calculate the number of person-trips per household and the number of vehicle-trips per household.
- When in doubt about which weight to use, please contact Jennifer Ziebarth. I'm more than happy to help or to double-check that you've chosen the right weighting factor for your situation.

EXAMPLE 1: PROPORTION OF 2-OR-MORE VEHICLE HOUSEHOLDS

To calculate the proportion of households with two or more vehicles, sum the weights of households with two or more vehicles, then divide by the sum of all household weights. In equation form:

$$Proportion\ of\ 2-vehicle\ households = \frac{\sum_{2\ or\ more\ vehicle\ households}(household\ weight)}{\sum_{all\ households}(household\ weight)}$$

To do this in Excel, use the SUMIF and SUM functions:



=SUMIF(K2:K34,">=2",P2:P34)/SUM(P2:P34)

ode	placeName	ctfip	countyNam	MPOcode	MPOname	income	incomeImp	hhveh	hhbic	restype	restypeImp	headAge	hhweight	hhe
144	Chowchilla	6039	Madera Co	6039	Madera Co	5	0	1	0	1	0	AGE75	0.177266	5
144	Chowchilla	6039	Madera Co	6039	Madera Co	5	0	3	1	1	0	AGE2564	0.430407	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	3	0	3	0	1	0	AGE6574	0.633395	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	5	0	1	0	5	0	AGE2564	0.918663	2
144	Chowchilla	6039	Madera Co	6039	Madera Co	1	0	0	0	1	0	AGE6574	0.337288	9
144	Chowchilla	6039	Madera Co	6039	Madera Co	2	0	2	5	1	0	AGE2564	0.432	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	10	0	2	2	1	0	AGE2564	0.361505	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	7	0	3	0	1	0	AGE2564	0.649022	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	3	0	2	3	1	0	AGE2564	0.326413	9
144	Chowchilla	6039	Madera Co	6039	Madera Co	6	0	2	0	1	0	AGE6574	0.260418	7
144	Chowchilla	6039	Madera Co	6039	Madera Co	2	0	1	0	1	0	AGE6574	0.50301	
144	Chowchilla	6039	Madera Co	6039	Madera Co	2	0	1	3	1	0	AGE2564	0.226261	
144	Chowchilla	6039	Madera Co	6039	Madera Co	2	0	1	1	1	0	AGE2564	0.22044	6
144	Chowchilla	6039	Madera Co	6039	Madera Co	4	0	2	0	2	0	AGE2564	0.172157	5
144	Chowchilla	6039	Madera Co	6039	Madera Co	4	0	1	0	1	0	AGE6574	0.495801	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	2	0	4	8	1	0	AGE2564	0.330312	9
144	Chowchilla	6039	Madera Co	6039	Madera Co	5	0	1	0	1	0	AGE2564	0.404656	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	4	0	2	0	1	0	AGE2564	0.172157	5
144	Chowchilla	6039	Madera Co	6039	Madera Co	2	0	1	1	1	0	AGE2564	0.38262	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	2	0	1	2	1	0	AGE2564	0.576103	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	8	0	3	0	1	0	AGE2564	0.31765	9
144	Chowchilla	6039	Madera Co	6039	Madera Co	5	0	2	0	1	0	AGE2564	0.312371	9
144	Chowchilla	6039	Madera Co	6039	Madera Co	2	0	1	0	1	0	AGE6574	0.50301	
144	Chowchilla	6039	Madera Co	6039	Madera Co	3	0	3	2	1	0	AGE2564	0.247052	
144	Chowchilla	6039	Madera Co	6039	Madera Co	5	1	1	0	1	0	AGE75	0.463271	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	6	0	3	5	1	0	AGE2564	0.293335	8
144	Chowchilla	6039	Madera Co	6039	Madera Co	7	0	1	0	1	0	AGE6574	0.730451	2
144	Chowchilla	6039	Madera Co	6039	Madera Co	5	0	2	0	1	0	AGE2564	0.211476	6
144	Chowchilla	6039	Madera Co	6039	Madera Co	5	0	1	0	1	0	AGE2564	0.233042	6
144	Chowchilla	6039	Madera Co	6039	Madera Co	6	0	1	3	6	0	AGE2564	0.386914	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	1	0	3	0	1	0	AGE6574	0.351482	1
144	Chowchilla	6039	Madera Co	6039	Madera Co	9	0	2	1	1	0	AGE2564	0.24474	7
144	Chowchilla	6039	Madera Co	6039	Madera Co	3	0	3	0	1	0	AGE6574	0.633395	1
			Proportion of 2+ vehicle households:					=SUMIF(K2						

To do this in R, use the sum function, identifying the subset of households with at least two vehicles in the numerator and all households in the denominator.

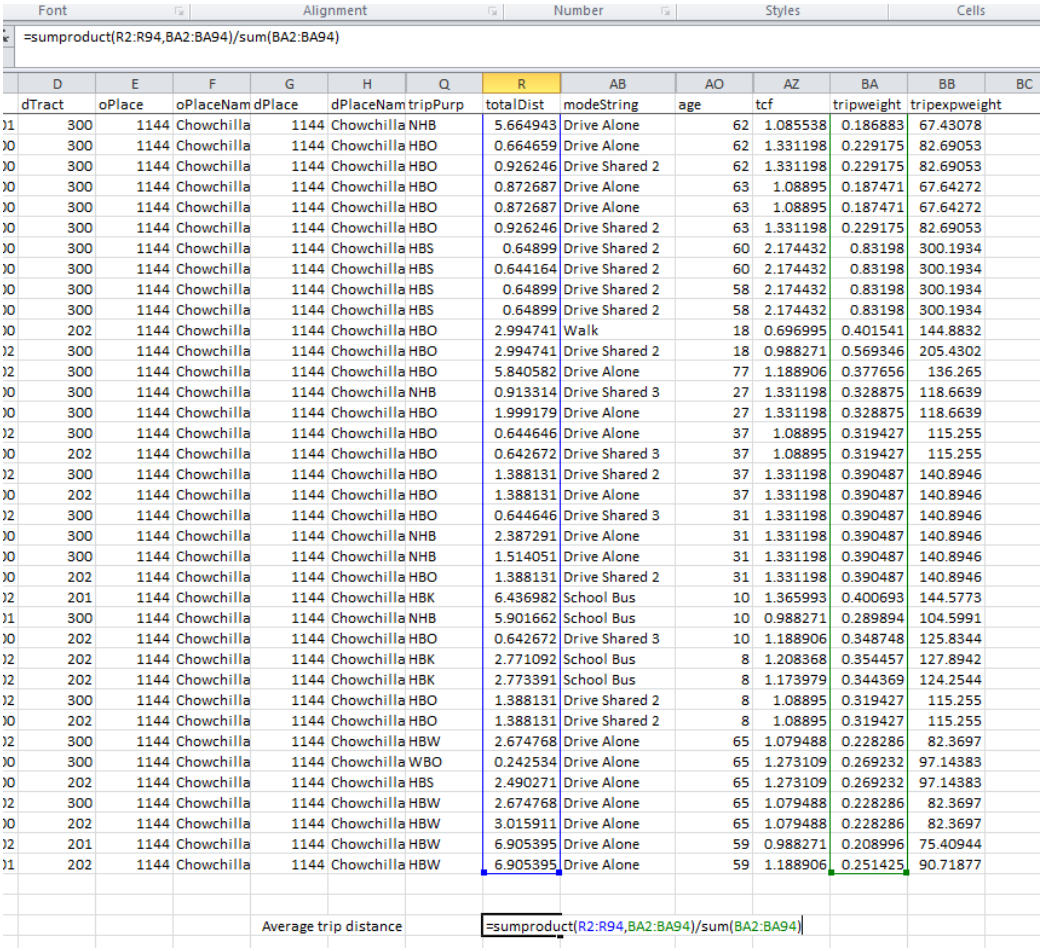
```
> prop_2plus <- sum(chowchilla$hhweight[chowchilla$hhveh>=2]) / sum(chowchilla$hhweight)
> prop_2plus
[1] 0.4930628
>
```

EXAMPLE 2: AVERAGE TRIP DISTANCE

To calculate average trip distance for a collection of trips, sum the products of each trip distance multiplied by the trip weight, then divide by the sum of all trip weights. In equation form:

$$Average\ trip\ distance = \frac{\sum_{trips}(trip\ distance) * (trip\ weight)}{\sum_{trips}(trip\ weight)}$$

To do this in Excel, use the SUMPRODUCT and SUM functions:



Font | Alignment | Number | Styles | Cells

=sumproduct(R2:R94,BA2:BA94)/sum(BA2:BA94)

	D	E	F	G	H	Q	R	AB	AO	AZ	BA	BB	BC
	dTract	oPlace	oPlaceNam	dPlace	dPlaceNam	tripPurp	totalDist	modeString	age	tcf	tripweight	tripexpweight	
01	300	1144	Chowchilla	1144	Chowchilla	NHB	5.664943	Drive Alone	62	1.085538	0.186883	67.43078	
00	300	1144	Chowchilla	1144	Chowchilla	HBO	0.664659	Drive Alone	62	1.331198	0.229175	82.69053	
00	300	1144	Chowchilla	1144	Chowchilla	HBO	0.926246	Drive Shared 2	62	1.331198	0.229175	82.69053	
00	300	1144	Chowchilla	1144	Chowchilla	HBO	0.872687	Drive Alone	63	1.08895	0.187471	67.64272	
00	300	1144	Chowchilla	1144	Chowchilla	HBO	0.872687	Drive Alone	63	1.08895	0.187471	67.64272	
00	300	1144	Chowchilla	1144	Chowchilla	HBO	0.926246	Drive Shared 2	63	1.331198	0.229175	82.69053	
00	300	1144	Chowchilla	1144	Chowchilla	HBS	0.64899	Drive Shared 2	60	2.174432	0.83198	300.1934	
00	300	1144	Chowchilla	1144	Chowchilla	HBS	0.644164	Drive Shared 2	60	2.174432	0.83198	300.1934	
00	300	1144	Chowchilla	1144	Chowchilla	HBS	0.64899	Drive Shared 2	58	2.174432	0.83198	300.1934	
00	300	1144	Chowchilla	1144	Chowchilla	HBS	0.64899	Drive Shared 2	58	2.174432	0.83198	300.1934	
00	202	1144	Chowchilla	1144	Chowchilla	HBO	2.994741	Walk	18	0.696995	0.401541	144.8832	
02	300	1144	Chowchilla	1144	Chowchilla	HBO	2.994741	Drive Shared 2	18	0.988271	0.569346	205.4302	
02	300	1144	Chowchilla	1144	Chowchilla	HBO	5.840582	Drive Alone	77	1.188906	0.377656	136.265	
00	300	1144	Chowchilla	1144	Chowchilla	NHB	0.913314	Drive Shared 3	27	1.331198	0.328875	118.6639	
00	300	1144	Chowchilla	1144	Chowchilla	HBO	1.999179	Drive Alone	27	1.331198	0.328875	118.6639	
02	300	1144	Chowchilla	1144	Chowchilla	HBO	0.644646	Drive Alone	37	1.08895	0.319427	115.255	
00	202	1144	Chowchilla	1144	Chowchilla	HBO	0.642672	Drive Shared 3	37	1.08895	0.319427	115.255	
02	300	1144	Chowchilla	1144	Chowchilla	HBO	1.388131	Drive Shared 2	37	1.331198	0.390487	140.8946	
00	202	1144	Chowchilla	1144	Chowchilla	HBO	1.388131	Drive Alone	37	1.331198	0.390487	140.8946	
02	300	1144	Chowchilla	1144	Chowchilla	HBO	0.644646	Drive Shared 3	31	1.331198	0.390487	140.8946	
00	300	1144	Chowchilla	1144	Chowchilla	NHB	2.387291	Drive Alone	31	1.331198	0.390487	140.8946	
00	300	1144	Chowchilla	1144	Chowchilla	NHB	1.514051	Drive Alone	31	1.331198	0.390487	140.8946	
00	202	1144	Chowchilla	1144	Chowchilla	HBO	1.388131	Drive Shared 2	31	1.331198	0.390487	140.8946	
02	201	1144	Chowchilla	1144	Chowchilla	HBK	6.436982	School Bus	10	1.365993	0.400693	144.5773	
01	300	1144	Chowchilla	1144	Chowchilla	NHB	5.901662	School Bus	10	0.988271	0.289894	104.5991	
00	202	1144	Chowchilla	1144	Chowchilla	HBO	0.642672	Drive Shared 3	10	1.188906	0.348748	125.8344	
02	202	1144	Chowchilla	1144	Chowchilla	HBK	2.771092	School Bus	8	1.208368	0.354457	127.8942	
02	202	1144	Chowchilla	1144	Chowchilla	HBK	2.773391	School Bus	8	1.173979	0.344369	124.2544	
02	300	1144	Chowchilla	1144	Chowchilla	HBO	1.388131	Drive Shared 2	8	1.08895	0.319427	115.255	
00	202	1144	Chowchilla	1144	Chowchilla	HBO	1.388131	Drive Shared 2	8	1.08895	0.319427	115.255	
02	300	1144	Chowchilla	1144	Chowchilla	HBW	2.674768	Drive Alone	65	1.079488	0.228286	82.3697	
00	300	1144	Chowchilla	1144	Chowchilla	WBO	0.242534	Drive Alone	65	1.273109	0.269232	97.14383	
00	202	1144	Chowchilla	1144	Chowchilla	HBS	2.490271	Drive Alone	65	1.273109	0.269232	97.14383	
02	300	1144	Chowchilla	1144	Chowchilla	HBW	2.674768	Drive Alone	65	1.079488	0.228286	82.3697	
00	202	1144	Chowchilla	1144	Chowchilla	HBW	3.015911	Drive Alone	65	1.079488	0.228286	82.3697	
02	201	1144	Chowchilla	1144	Chowchilla	HBW	6.905395	Drive Alone	59	0.988271	0.208996	75.40944	
01	202	1144	Chowchilla	1144	Chowchilla	HBW	6.905395	Drive Alone	59	1.188906	0.251425	90.71877	

Average trip distance | =sumproduct(R2:R94,BA2:BA94)/sum(BA2:BA94)

To do this in R, use the weighted.mean function:

```
> weighted.mean(chowchilla_ii_trips$totalDist,chowchilla_ii_trips$tripweight)
[1] 2.282369
>
```

EXAMPLE 3: VMT PER HOUSEHOLD

To calculate the average VMT per household requires working with both the trips and households data, and using two different weights at different steps of the process. Note the "sampno" variable is a household ID which can be used to join the household and trip data to each other.

The first step in calculating VMT per household is to find the sum of all vehicle trip distances for each household, using the trip correction factor as a weight. Note that to select vehicle trips you can select trips for which autoDriver=1; this will select each vehicle trip exactly once. The total VMT per household is the sum $VMT = \sum_{vehicle\ trips}(trip\ distance) * (tcf)$.

The second step in calculating VMT per household is to find the weighted average of all of the household VMTs just calculated. Because we're working per household, we need to use the household weights:

$$Average\ VMT\ per\ household = \frac{\sum_{households}(household\ VMT) * (household\ weight)}{\sum_{households}(household\ weight)}$$

DATA DICTIONARY: HOUSEHOLDS

The following table documents the variables in the cleaned household data file.

HOUSEHOLDS FILE DATA DICTIONARY

Variable	Description
sampno	Household ID
hctract	Census tract of household residence. A 10-digit ID which includes the county FIP as well as the census tract.
placeCode, placeName	Census Designated Place of household residence
ctfip,countyName	County of household residence
MPOcode, MPOname	MPO of household residence. Same as county for 1-county MPOs.
servicepop	Service population: Jobs + workers within 45 minutes by auto (time-decay-weighted)
income, incomeImputed	Household income category, flag for imputed data 1 = Less than $10,000 2 = $10,000 - $24,999 3 = $25,000 - $34,999 4 = $35,000 - $49,999 5 = $50,000 - $74,999 6 = $75,000 - $99,999 7 = $100,000 - $149,999 8 = $150,000 - $199,999 9 = $200,000 or more
hhsize	Number of household residents
hhemp, hhstu, hhlic	Number of household workers, students, driver's license holders
hhveh, hhbic	Number of vehicles and number of bicycles owned by household
restype, restypeImputed	Residential unit type, flag for imputed data

HOUSEHOLDS FILE DATA DICTIONARY

Variable	Description
headAge, headAgeImputed	Age category of HH head, flag for imputed data
tripMonth	Month of travel day
tripDay	Day of week for travel day
householdTrips	Total number of person-trips taken by household members on the travel day
Age0002, Age0304, Age0514, Age1517, Age1824, Age2534, Age3544, Age4554, Age5564, Age6574, Age75	The number of household residents in each age category
hhweight	Household weight
hhexpweight, hhexpweight_weekday	Household expansion weight for all households and for weekday subset of households

Data sources: 2012 CHTS household and person files, as cleaned and prepared by F&P; for details see the CHTS data preparation memo.

DATA DICTIONARY: TRIPS

The following table documents the variables in the cleaned trips data file.

TRIPS FILE DATA DICTIONARY

Variable	Description
sampno, perno	Household ID, person ID
chainno, numLegs	Trip chain ID, number of legs in trip chain
dep_hr, dep_min, arr_hr, arr_min	Time of trip departure & arrival (hour, minute)
tripPurp	Trip purpose (7 categories)
modeString	Trip mode (16 categories)
totalDist, totalTime	Total trip distance (miles) and time (minutes)
oTract, dTract	Census tract of trip origin and destination. (10-digit number, includes county FIP code)
pTract, aTract	Census tract of trip production and attraction
oPlace, oPlaceName, dPlace, dPlaceName	Census Designated Place of trip origin and destination
pPlace, pPlaceName, aPlace, aPlaceName	Census Designated Place of trip production and attraction

TRIPS FILE DATA DICTIONARY

Variable	Description
oFIP, oCountyName, dFIP, dCountyName	County of trip origin and destination
pFIP, pCountyName, aFIP, aCountyName	County of trip production and attraction
oMPO, oMPOname, dMPO, dMPOname	MPO of trip origin & destination (same as county for one-county MPOs)
pMPO, pMPOname, aMPO, aMPOname	MPO of trip production and attraction
oServicePop, dServicePop	Service population (jobs + workers within 45 minutes by auto, time-decay-weighted) at trip origin and destination
opurp, dpurp	Purpose recorded at trip origin and destination
opurp1,opurp2,opurp3,dpurp1,dpurp2,dpurp3	Detailed activity purpose codes at trip origin and destination
totalDist	Total trip distance (including transit access/egress)
accessDist, xferDist, egressDist	Transit access, transfer , egress distances
IVT, accessTime, xferTime, egressTime, waitTime	In-vehicle time, transit access, transfer, egress, and wait times
dwellTime	Time spent at trip destination
autoDriver	Flag for driver of auto trips
nonHHDriver	Flag for trips where the respondent is a passenger on a trip where a non-HH member is the driver
hhmem, nonhhmem	Count of HH and non-HH passengers on trip (not including the driver)
escortFlag	Flag for trip whose only discernable purpose is to escort another person
accMode, egrMode	Transit access and egress modes
accOcc, egrOcc	Vehicle occupancy of access and egress modes
age	Age of trip-maker
gender,ntvty, hisp,race,disab	Gender, nativity, Hispanic & racial identity, disability status of trip-maker
worker,student, schoolType	Worker & student status, and school type of trip-maker
license, transPass	Driver's license, transit pass status of trip-maker
tcf, tripweight	Trip correction factor , trip weight

Data sources: Data sources: 2012 CHTS person, place, and activity files, as cleaned and prepared by F&P; for details see the CHTS data preparation memo.

APPENDIX C:

SIMPLE SUMMARIES OF CHTS DATA

MEMORANDUM

Date: December 29, 2015

To: File

From: Jennifer Ziebarth

Subject: Data dictionary for CHTS simple summaries

WC14-3115

The purpose of this memo is to provide a data dictionary for the "simple" summaries of CHTS data. These summaries come in both Excel (.xlsx) and csv (.csv) formats. The summaries have one record for each geographic unit and are suitable for joining to a shapefile for visualization in GIS. The data summarized here includes the most commonly requested data from the CHTS including mode shares, trip purposes, trip distance, and trip time.

DATA DICTIONARY: CHTS SIMPLE SUMMARIES

Grouping	Variable	Description
Geography	geogCode, geogName, geogType, lookup	Code, name, and type of geography (e.g., state, county, MPO, or "place" (city or named place recognized by census). The lookup field is useful for creating VLOOKUPs in Excel, and helps to distinguish between cities and counties with the same name (e.g., Alameda_place is the city of Alameda; Alameda_county is the county.)
Households, Trips, and Sample Sizes	HHsampleSize, PTsampleSize,VTsampleSize	Number of household, person-trip, and vehicle-trip records in the CHTS for this geography. CAUTION: If there are fewer than 100 households or trips for a geography, then the corresponding summaries should be used with caution. If there are fewer than 30 households for a given geography, it is excluded from this summary. Consult Jennifer Ziebarth for advice on how to proceed.

DATA DICTIONARY: CHTS SIMPLE SUMMARIES

Grouping	Variable	Description
Households, Trips, and Sample Sizes	numHH, numPersonTrips, numVehTrips	The total number of households, person-trips, and vehicle trips represented by the CHTS for this geography.
Person-Trips per Household	PersonTrips_per_HH, PersonTrips_per_HH_HBW, PersonTrips_per_HH_HBO, PersonTrips_per_HH_NHB	The average number of person-trips per household, total and by trip purpose. Includes all travel modes, and all trips regardless of o/d.
Person-Trips per Household	PMT_per_HH, PMT_per_HH_HBW, PMT_per_HH_HBO, PMT_per_HH_NHB	The average number of person-miles traveled per household, total and by trip purpose. Includes all travel modes, and all trips regardless of o/d.
Person-Trips per Household	PHT_per_HH, PHT_per_HH_HBW, PHT_per_HH_HBO, PHT_per_HH_NHB	The average number of person-hours traveled per household, total and by trip purpose. Includes all travel modes, and all trips regardless of o/d.
Vehicle-Trips per Household	VehicleTrips_per_HH, VehicleTrips_per_HH_HBW, VehicleTrips_per_HH_HBO, VehicleTrips_per_HH_NHB	The average number of vehicle-trips per household, total and by trip purpose. Includes all trips regardless of o/d.
Vehicle-Trips per Household	VMT_per_HH, VMT_per_HH_HBW, VMT_per_HH_HBO, VMT_per_HH_NHB	The average number of vehicle-miles traveled per household, total and by trip purpose. Includes all trips regardless of o/d.
Vehicle-Trips per Household	VHT_per_HH, VHT_per_HH_HBW, VHT_per_HH_HBO, VHT_per_HH_NHB	The average number of vehicle-hours traveled per household, total and by trip purpose. Includes all trips regardless of o/d.
Person-Trips per Household (ii only)	PersonTrips_per_HH_ii, PersonTrips_per_HH_HBW_ii, PersonTrips_per_HH_HBO_ii, PersonTrips_per_HH_NHB_ii	The average number of person-trips per household, total and by trip purpose. Includes all travel modes, but only trips *within the named geography.*
Person-Trips per Household (ii only)	PMT_per_HH_ii, PMT_per_HH_HBW_ii, PMT_per_HH_HBO_ii, PMT_per_HH_NHB_ii	The average number of person-miles traveled per household, total and by trip purpose. Includes all travel modes, but only trips *within the named geography.*
Person-Trips per Household (ii only)	PHT_per_HH_ii, PHT_per_HH_HBW_ii, PHT_per_HH_HBO_ii, PHT_per_HH_NHB_ii	The average number of person-hours traveled per household, total and by trip purpose. Includes all travel modes, but only trips *within the named geography.*

DATA DICTIONARY: CHTS SIMPLE SUMMARIES

Grouping	Variable	Description
Vehicle-Trips per Household (ii only)	VehicleTrips_per_HH_ii, VehicleTrips_per_HH_HBW_ii, VehicleTrips_per_HH_HBO_ii, VehicleTrips_per_HH_NHB_ii	The average number of vehicle-trips per household, total and by trip purpose. Includes only trips *within the named geography*.
Vehicle-Trips per Household (ii only)	VMT_per_HH_ii, VMT_per_HH_HBW_ii, VMT_per_HH_HBO_ii, VMT_per_HH_NHB_ii	The average number of vehicle-miles traveled per household, total and by trip purpose. Includes only trips *within the named geography*.
Vehicle-Trips per Household (ii only)	VHT_per_HH_ii, VHT_per_HH_HBW_ii, VHT_per_HH_HBO_ii, VHT_per_HH_NHB_ii	The average number of vehicle-hours traveled per household, total and by trip purpose**.** Includes only trips *within the named geography*.
Person-Trip Distance by mode & purpose	PersonTrip_Avg_Distance_*mode-_purpose*	Average person-trip distance (miles) for each combination of mode and purpose. Includes ii trips (trips internal to the named geography) only.
Person-Trip Time by mode & purpose	PersonTrip_Avg_Time_*mode_purpose*	Average person-trip time (minutes) for each combination of mode and purpose. Includes ii trips (trips internal to the named geography) only.
Daily mode shares	modeShare_*mode_purpose*	Average daily mode share for the listed mode within all trips of the listed purpose. If no purpose is listed, mode share is for trips of all purposes. Includes ii trips (trips internal to the named geography) only.
Peak period mode shares	modeShare_*mode_purpose*_peak	Average peak period mode share for the listed mode within all trips of the listed purpose. For purposes of this summary, peak period is defined as 6-9 AM and 4-7 PM. If no purpose is listed, mode share is for trips of all purposes. Includes ii trips (trips internal to the named geography) only.
Daily purpose shares	purpShare_*mode_purpose*	Average daily purpose share for the listed purpose within all trips of the listed mode. Includes ii trips (trips internal to the named geography) only.
Peak period purpose shares	purpShare_*mode_purpose*_peak	Average peak period purpose share for the listed purpose within all trips of the listed mode. For purposes of this summary, peak period is defined as 6-9 AM and 4-7 PM. Includes ii trips (trips internal to the named geography) only.
Direction Share	dirShare_*direction_purpose*	Average daily share of trips by direction: internal (ii), outgoing (ix), and incoming (xi), within all trips of the given purpose. If no purpose is listed, then share of trips by direction for all purposes combined.

Data sources: 2012 CHTS household, person, place, and activity files, with F&P modifications
Summarized using script MasterCHTSSummaries.R

APPENDIX D:

FLAT SUMMARIES OF CHTS DATA

MEMORANDUM

Date: April 22, 2015

To: File

From: Jennifer Ziebarth

Subject: Data dictionary for CHTS flat summaries

WC14-3115

The purpose of this memo is to provide a data dictionary for the "flat" summaries of CHTS data. These summaries come in both Excel (.xlsx) and csv (.csv) formats. The summaries have one record for each geographic unit and are suitable for joining to a shapefile for visualization in GIS.

DATA DICTIONARY: CHTS FLAT SUMMARIES

Grouping	Variable	Description
Geography	geogCode, geogName, geogType	Code, name, and type of geography (e.g., state, county, MPO, or "place" (city or named place recognized by census)
Number of Households and Trips	numHH, HHsampleSize, HH_Warning	Number of households represented by the CHTS for this geography, CHTS household sample size for this geography, and warning indicating whether data should be used with caution (*, 100 households or fewer) or used only when aggregated to include more households (**, 30 households or fewer).
Number of Households and Trips	numVehTrips, VTsampleSize, vehTripWarning	Number of vehicle trips represented by the CHTS for this geography, CHTS vehicle trip sample size for this geography, and warning indicating whether data should be used with caution (*, 100 vehicle trips or fewer) or used only when aggregated to include more vehicle trips (**, 30 vehicle trips or fewer).

DATA DICTIONARY: CHTS FLAT SUMMARIES

Grouping	Variable	Description
Number of Households and Trips	numPersonTrips, PTsampleSize, personTripWarning	Number of person trips represented by the CHTS for this geography, CHTS person trip sample size for this geography, and warning indicating whether data should be used with caution (*, 100 person trips or fewer) or used only when aggregated to include more person trips (**, 30 person trips or fewer).
Demographics	HH1, HH2, HH3, HH4, HH5, hhsize	Percentage of households with 1, 2, 3, 4, or 5+ members; average number of persons per household
Demographics	Veh0,Veh1,Veh2,Veh3,Veh4; hhveh	Percentage of households with 0,1,2,3, or 4+ autos; average number of vehicles per household
Demographics	Inc1, Inc2, Inc3, Inc4, Inc5, Inc6, Inc7, Inc8, Inc9	Percentage of households in each income category: 1. Less than $10,000 2. $10,000 to $24,999 3. $25,000 to $34,999 4. $35,000 to $49,999 5. $50,000 to $74,999 6. $75,000 to $99,999 7. $100,000 to $149,999 8. $150,000 to $199,999 9. $200,000 or more
Demographics	RUG1, RUG3, RUG6	Percentage of households by residential type. RUG1 = Single family; RUG3=Multi-family; RUG6 = Other (e.g., Mobile home, RV, boat)
Demographics	Age1824,Age2564,Age6574, Age75	Percentage of households by age category of household head
Demographics	Pop0005, Pop0514, Pop1517, Pop1824, Pop2554, Pop5564, Pop6574, Pop75	Average number of residents per HH in each category
Household Summaries	VMT_per_HH_*purpose_mode*	Average VMT per Household by purpose and mode.
Household Summaries	VehicleTrips_per_HH_*purpose_mode*	Average Vehicle Trips per Household by purpose and mode
Household Summaries	PersonTrips_per_HH_*purpose_mode*	Average Person Trips per Household by purpose and Mode
Vehicle Trip Summaries	numVehTrips_*purpose_mode_distribution*	Total number of vehicle trips represented for each combination of purpose, mode, distribution

DATA DICTIONARY: CHTS FLAT SUMMARIES

Grouping	Variable	Description
Vehicle Trip Summaries	vehDist_*purpose_mode_distribution*	Average vehicle trip distance for each combination of purpose, mode, distribution
Vehicle Trip Summaries	vehTime_*purpose_mode_distribution*	Average vehicle trip time for each combination of purpose, mode, distribution
Vehicle Trip Summaries	vehOcc_*purpose_mode_distribution*	Average vehicle occupancy for each combination of purpose, mode, distribution
Person Trip Summaries	numPersonTrips_*purpose_mode_distribution*	Total number of person trips represented for each combination of purpose, mode, distribution
Person Trip Summaries	PersDist_*purpose_mode_distribution*	Average person trip distance for each combination of purpose, mode, distribution
Person Trip Summaries	PersTime_*purpose_mode_distribution*	Average person trip time for each combination of purpose, mode, distribution

Data sources: 2012 CHTS household and person files, with F&P modifications
Summarized using script MasterCHTSSummaries.R

APPENDIX E:

FILTERABLE SUMMARIES OF CHTS DATA

MEMORANDUM

Date: December 29, 2015

To: File

From: Jennifer Ziebarth

Subject: Data dictionary for CHTS filterable summaries

WC14-3115

The purpose of this memo is to provide instructions for using the "filterable" summaries of CHTS data. Unlike the "flat" summaries, which are comparatively small in size, the "filterable" summaries allow for filtering based on multiple criteria, and as such they are quite large files. To simplify the summaries and allow for somewhat smaller file sizes, the filterable summaries are separated into two files, household summaries and trip summaries, which are described below.

INSTRUCTIONS AND HINTS

The filterable summaries allow CHTS data to be viewed by geography as well as selecting households or trips with certain demographic or travel profiles, such as households with two or more vehicles owned, or trips internal to the geography.

In most cases it is possible to select any combination of filter variables and see a summary of the relevant CHTS data. However, note that for some combinations the sample size of CHTS households, vehicle trips, or person trips may be quite small. Warning fields indicate whether the data can be used on its own, should be viewed with caution, or used only when aggregated with other data.

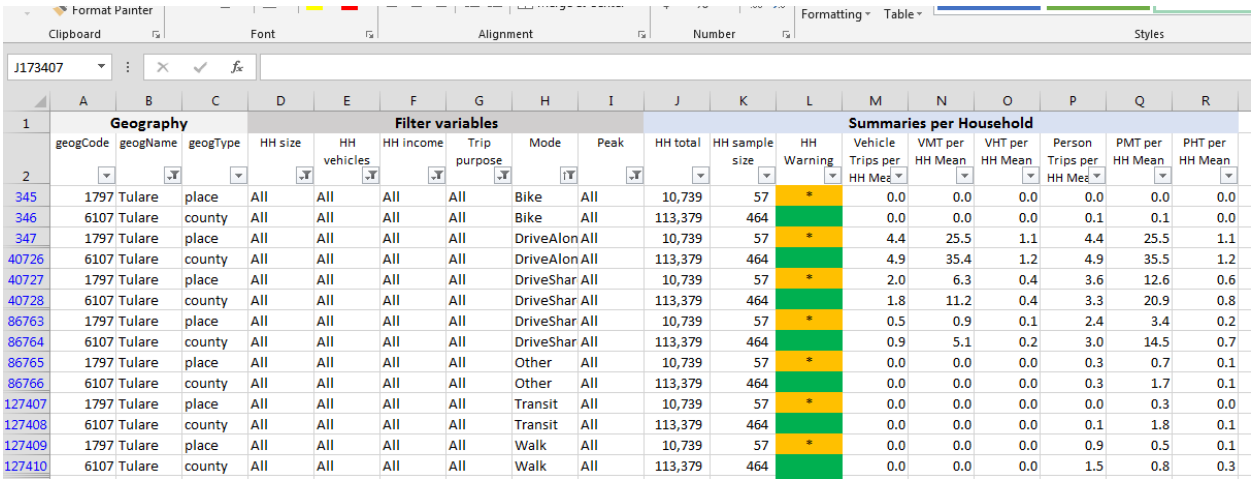
	Large enough sample size for confident reporting.
*	Use with caution: sample size may be not be large enough for statistical confidence.
**	Do not use in isolation. Sample size is too small for this result to stand on its own.

OTHER TIPS

- Non-vehicle modes such as bike, walk, or transit always have 0 vehicle trips per household in the household summaries, and 0 vehicle trips in the trip summaries, because these modes do not generate vehicle trips.
- Mode shares (and other "share" variables) are measured relative to mode= "All," with all other filters identical.
- Note that in some cases cities and counties share a name, so you may need to filter on both geogName and geogType to get the result you're looking for.

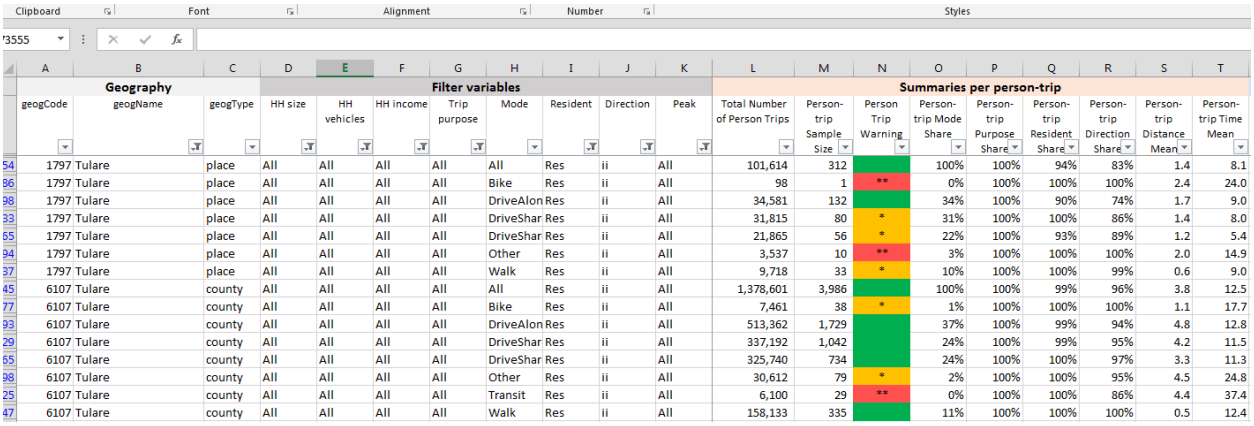
EXAMPLES

The examples below shows some of the tips above:



	Geography			Filter variables						Summaries per Household								
2	geogCode	geogName	geogType	HH size	HH vehicles	HH income	Trip purpose	Mode	Peak	HH total	HH sample size	HH Warning	Vehicle Trips per HH Mea	VMT per HH Mean	VHT per HH Mean	Person Trips per HH Mea	PMT per HH Mean	PHT per HH Mean
345	1797	Tulare	place	All	All	All	All	Bike	All	10,739	57	*	0.0	0.0	0.0	0.0	0.0	0.0
346	6107	Tulare	county	All	All	All	All	Bike	All	113,379	464		0.0	0.0	0.0	0.1	0.1	0.0
347	1797	Tulare	place	All	All	All	All	DriveAlon	All	10,739	57	*	4.4	25.5	1.1	4.4	25.5	1.1
40726	6107	Tulare	county	All	All	All	All	DriveAlon	All	113,379	464		4.9	35.4	1.2	4.9	35.5	1.2
40727	1797	Tulare	place	All	All	All	All	DriveShar	All	10,739	57	*	2.0	6.3	0.4	3.6	12.6	0.6
40728	6107	Tulare	county	All	All	All	All	DriveShar	All	113,379	464		1.8	11.2	0.4	3.3	20.9	0.8
86763	1797	Tulare	place	All	All	All	All	DriveShar	All	10,739	57	*	0.5	0.9	0.1	2.4	3.4	0.2
86764	6107	Tulare	county	All	All	All	All	DriveShar	All	113,379	464		0.9	5.1	0.2	3.0	14.5	0.7
86765	1797	Tulare	place	All	All	All	All	Other	All	10,739	57	*	0.0	0.0	0.0	0.3	0.7	0.1
86766	6107	Tulare	county	All	All	All	All	Other	All	113,379	464		0.0	0.0	0.0	0.3	1.7	0.1
127407	1797	Tulare	place	All	All	All	All	Transit	All	10,739	57	*	0.0	0.0	0.0	0.0	0.3	0.0
127408	6107	Tulare	county	All	All	All	All	Transit	All	113,379	464		0.0	0.0	0.0	0.1	1.8	0.1
127409	1797	Tulare	place	All	All	All	All	Walk	All	10,739	57	*	0.0	0.0	0.0	0.9	0.5	0.1
127410	6107	Tulare	county	All	All	All	All	Walk	All	113,379	464		0.0	0.0	0.0	1.5	0.8	0.3

- The summary shows both the city of Tulare and the county of Tulare; the CHTS has 464 households in the county, but only 57 households in the city. Thus, summaries for the city should be used with caution.
- Vehicle trips, VMT, and VHT per household are 0 for all modes except the drive modes.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	Geography			Filter variables								Summaries per person-trip								
	geogCode	geogName	geogType	HH size	HH vehicles	HH income	Trip purpose	Mode	Resident	Direction	Peak	Total Number of Person Trips	Person-trip Sample Size	Person Trip Warning	Person-trip Mode Share	Person-trip Purpose Share	Person-trip Resident Share	Person-trip Direction Share	Person-trip Distance Mean	Person-trip Time Mean
54	1797	Tulare	place	All	All	All	All	All	Res	ii	All	101,614	312		100%	100%	94%	83%	1.4	8.1
86	1797	Tulare	place	All	All	All	All	Bike	Res	ii	All	98	1	**	0%	100%	100%	100%	2.4	24.0
98	1797	Tulare	place	All	All	All	All	DriveAlon	Res	ii	All	34,581	132		34%	100%	90%	74%	1.7	9.0
33	1797	Tulare	place	All	All	All	All	DriveShar	Res	ii	All	31,815	80	*	31%	100%	100%	86%	1.4	8.0
65	1797	Tulare	place	All	All	All	All	DriveShar	Res	ii	All	21,865	56	*	22%	100%	93%	89%	1.2	5.4
94	1797	Tulare	place	All	All	All	All	Other	Res	ii	All	3,537	10	**	3%	100%	100%	100%	2.0	14.9
37	1797	Tulare	place	All	All	All	All	Walk	Res	ii	All	9,718	33	*	10%	100%	100%	99%	0.6	9.0
45	6107	Tulare	county	All	All	All	All	All	Res	ii	All	1,378,601	3,986		100%	100%	99%	96%	3.8	12.5
77	6107	Tulare	county	All	All	All	All	Bike	Res	ii	All	7,461	38	*	1%	100%	100%	100%	1.1	17.7
93	6107	Tulare	county	All	All	All	All	DriveAlon	Res	ii	All	513,362	1,729		37%	100%	99%	94%	4.8	12.8
29	6107	Tulare	county	All	All	All	All	DriveShar	Res	ii	All	337,192	1,042		24%	100%	99%	95%	4.2	11.5
65	6107	Tulare	county	All	All	All	All	DriveShar	Res	ii	All	325,740	734		24%	100%	100%	97%	3.3	11.3
98	6107	Tulare	county	All	All	All	All	Other	Res	ii	All	30,612	79	*	2%	100%	100%	95%	4.5	24.8
25	6107	Tulare	county	All	All	All	All	Transit	Res	ii	All	6,100	29	**	0%	100%	100%	86%	4.4	37.4
47	6107	Tulare	county	All	All	All	All	Walk	Res	ii	All	158,133	335		11%	100%	100%	100%	0.5	12.4

- All visible entries for "purpose share" are 100%, because trip purpose has been filtered to show all trip purposes combined ("All").
- Mode shares for rows where mode= "All" are 100%, while mode shares in other rows are smaller than 100%. The 34% mode share in the third row indicates that that row's mode ("Drive Alone") represents 34% of all person trips with the selected characteristics: In the city of Tulare, all household sizes, vehicles, and incomes, trips by residents only ("Res"), and only trips within Tulare ("ii").
- In many cases shown the number of households or trips is too small to draw any conclusions with the visible data. For example, the second row indicates the CHTS has only one weekday person trip, made by a resident of the city of Tulare, within that city, by bike. The red highlight serves as a warning that this single trip is not enough to draw wider conclusions.

DATA DICTIONARIES

DATA DICTIONARY: CHTS HOUSEHOLD FILTERABLE SUMMARIES

Type	Variable	Description
Geography	geogCode, geogName, geogType	Code, name, and type of geography (e.g., state, county, region/MPO, or "place" (city or named place recognized by census)
Filter	HH size	Household size : HH1=1, HH2=2, HH3=3, HH4=4, HH5=5 or more, HH4+ = 4 or more,
	HH vehicles	Number of vehicles owned by household: Veh0=0, Veh1=1, Veh2=2, Veh3=3, Veh4=4 or more, Veh2+ = 2 or more

DATA DICTIONARY: CHTS HOUSEHOLD FILTERABLE SUMMARIES

Type	Variable	Description
	HH income	Household income by category: Low = $0 - $49,999; Med = $50,000 - $99,999; High = $100,000 or more
	Trip purpose	Trip purpose, 3 categories (HBW, HBO, NHB). "HB" includes both HBW and NHB.
	Mode	Mode (Active, Drive Alone, Drive Shared 2, Drive Shared 3+, Transit, Other)
	Peak	All = All trips; Peak = 6-9am or 4-7pm; Offpeak = all other times
Summaries Per Household	HH total	Total number of households
	HH sample size	Number of CHTS household records
	HH Warning	Warning indicating whether data should be used with caution (*, 100 households or fewer) or used only when aggregated to include more households (**, 30 households or fewer).
	Person Trips per HH Mean	Average number of person trips per household
	PMT per HH Mean	Average Person Miles Traveled per household
	PHT per HH Mean	Average Person Hours Traveled per household
	Vehicle Trips per HH Mean	Average number of vehicle trips per household
	VMT per HH Mean	Average Vehicle Miles Traveled per household
	VHT per HH Mean	Average Vehicle Hours Traveled per household

Data sources: 2012 CHTS, as cleaned and summarized by Fehr & Peers

DATA DICTIONARY: CHTS TRIP FILTERABLE SUMMARIES

Type	Variable	Description
Geography	geogCode, geogName, geogType	Code, name, and type of geography (e.g., state, county, MPO, or "place" (city or named place recognized by census)
Filter	HH size	Household size : HH1=1, HH2=2, HH3=3, HH4=4, HH5=5 or more, HH4+ = 4 or more,

DATA DICTIONARY: CHTS TRIP FILTERABLE SUMMARIES

Type	Variable	Description
	HH vehicles	Number of vehicles owned by household: Veh0=0, Veh1=1, Veh2=2, Veh3=3, Veh4=4 or more, Veh2+ = 2 or more
	HH income	Household income by category: Low = $0 - $49,999; Med = $50,000 - $99,999; High = $100,000 or more
	Trip purpose	Trip purpose, 3 categories (HBW, HBO, NHB). "HB" includes both HBW and NHB.
	Mode	Mode (Active, Drive Alone, Drive Shared 2, Drive Shared 3+, Transit, Other)
	Resident	Restrict to residents of the listed geography? Res= Only residents; Non= Only non-residents; All = Both residents and non-residents
	Direction	Direction of trip, relative to the listed geography. ii =internal trip within the geography. ix = outgoing trip which starts inside and ends outside the geography. xi = incoming trip which begins outside and ends inside the geography.
	Peak	All = All trips; Peak = 6-9am or 4-7pm; Offpeak = all other times
Summaries per Vehicle Trip	Total Number of Vehicle Trips	Total number of vehicle trips
	Vehicle trip sample size	Number of CHTS vehicle trip records
	Vehicle Trip Warning	Warning indicating whether data should be used with caution (*, 100 vehicle trips or fewer) or used only when aggregated to include more vehicle trips (**, 30 vehicle trips or fewer).
	Vehicle Trip Mode Share, Vehicle Trip Purpose Share, Vehicle Trip Resident Share, Vehicle Trip Direction Share	Percent of vehicle trips with the current mode , purpose, residence status, or direction
	Vehicle Trip Distance Mean	Average vehicle trip distance
	Vehicle Trip Time Mean	Average vehicle trip time
	Vehicle Occupancy Mean	Average vehicle occupancy per vehicle trip
	Total Number of Person Trips	Total number of person trips
	Person Trip Sample Size	Number of CHTS person trip records

DATA DICTIONARY: CHTS TRIP FILTERABLE SUMMARIES

Type	Variable	Description
Summaries per Person Trip	Person Trip Warning	Warning indicating whether data should be used with caution (*, 100 person trips or fewer) or used only when aggregated to include more vehicle trips (**, 30 person trips or fewer).
	Person Trip Mode Share, Person Trip Purpose Share, Person Trip Resident Share, Person Trip Direction Share	Percent of person trips with the current mode , purpose, residence status, or direction
	Person Trip Distance Mean	Average person trip distance
	Person Trip Time Mean	Average person trip time

Data sources: 2012 CHTS, as cleaned and summarized by Fehr & Peers

APPENDIX F:

SIMPLIFIED CHTS DATA

MEMORANDUM

Date: October 7, 2015

To: File

From: Jennifer Ziebarth

Subject: How to use simplified CHTS data

WC14-3115

The purpose of this memo is to provide a data dictionary and instructions for using the simplified CHTS data (also known as "pivot summaries"). This data comes in .csv format and is intended to be further processed in Excel.

DATA DICTIONARY

The table below lists the variables present in the simplified CHTS data.

DATA DICTIONARY: SIMPLIFIED CHTS DATA

Grouping	Variables	Description
Location	oTract, dTract, homeTract, workTract	Census tract for trip origin, destination, home location, and (for respondents with a work trip on survey date) work location. Census tracts are listed as 10-digit state+county+tract FIPS code.
Location	oPlace, dPlace, homePlace, workPlace	Census Designated Place (e.g., city or other named place) for trip origin, destination, home location, and (for respondents with a work trip on survey date) work location.
Location	oFIP, dFIP, homeFIP, workFIP; oCounty, dCounty, homeCounty, workCounty	County (both FIPS code and name) for trip origin, destination, home location, and (for respondents with a work trip on survey date) work location.

DATA DICTIONARY: SIMPLIFIED CHTS DATA

Grouping	Variables	Description
Location	oRegion, dRegion, homeRegion, workRegion	Region for trip origin, destination, home location, and (for respondents with a work trip on survey date) work location. Regions are multi-county MPOs or other multi-county regions as listed below: • AMBAG: Monterey, San Benito, and Santa Cruz Counties • MTC: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties • SACOG: El Dorado*, Placer*, Sacramento, Sutter, Yolo, and Yuba Counties, excluding Tahoe Basin area of El Dorado and Placer counties • SCAG: Imperial, Los Angeles, Orange, Riverside, San Bernardino, Ventura Counties • TMPO: Tahoe Basin area of El Dorado and Placer Counties • SJV: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare Counties • North: Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Nevada, Plumas, Shasta, Sierra, Siskiyou, Tehama, and Trinity Counties • Central Mountains: Alpine, Amador, Calaveras, Inyo, Mariposa, Mono, and Tuolumne Counties • S Central Coast: San Luis Obispo and Santa Barbara Counties • SANDAG: San Diego County
Mode	Mode	One of the following travel modes: • DriveAlone, DriveShared • Bus, Rail, Ferry • Walk, Bike • Other (e.g., taxi, school bus, paratransit, …)
Purpose	Purpose	One of the following trip purposes: • HBW (home-based work) • HBO (home-based other) • NHB (non-home-based)
Distance	Distance	Total trip distance, rounded to the nearest mile. (Trips under half a mile are reported as distance 0). Note that trip distances in the survey are calculated from respondent's origin and destination, and the route used may not match the respondent's actual route.

DATA DICTIONARY: SIMPLIFIED CHTS DATA

Grouping	Variables	Description
Time	Time	Total trip time (including transit access/egress and waiting), rounded to the nearest 5 minutes. (Trips under 2.5 minutes are reported as time 0.) Note that trip times are self-reported by survey respondents.
Person-Trips	numPersTrips	Weighted and expanded number of person-trips for the given origin, destination, home, work, purpose, mode, distance, and time.
Person-Trips	rawPersTrips	Survey sample size for person-trips with the given origin, destination, home, work, purpose, mode, distance, and time.
Vehicle-Trips	numVehTrips	Weighted and expanded number of vehicle-trips for the given origin, destination, home, work, purpose, mode, distance, and time.
Vehicle-Trips	rawVehTrips	Survey sample size for vehicle-trips with the given origin, destination, home, work, purpose, mode, distance, and time.

Data sources: 2012 CHTS household and person files, with F&P modifications
Summarized using script ModeDistTime_PurposeDistrib.R

ON SURVEY WEIGHTING AND EXPANSION

The variables representing the number of person-trips and vehicle-trips are weighted and expanded to represent the total number of household-related trips of the listed type. While the survey is weighted to match household demographics (such as household size, household income, etc.) on a per-county basis, some limitations of the survey should be kept in mind when using the expanded number of trips.

- Because the CHTS is a **household** travel survey, it only measures travel related to (California) households. It does not measure commercial trips, trips made by visitors, or trips made by California residents who are not classified by the census as belonging to households – e.g., residents of group living quarters such as college dormitories, military bases, medical facilities, or correctional facilities.
- The survey weights supplied with the CHTS were judged to be insufficient for Fehr & Peers' purposes and we have therefore re-calculated weights in-house. For more information, see the CHTS data preparation memo or contact Jennifer Ziebarth.

USING THE SIMPLIFIED DATA

The simplified CHTS data is designed to be a flexible format which can produce the most commonly-requested summaries of CHTS data. Within Excel, this data can be filtered, summed, averaged, or brought into pivot tables and pivot charts to create a variety of summaries. Several common examples are detailed below. Two general comments may help you get started:

1. Because the CHTS is a weighted survey, you'll want to use the weighted variables numPersTrips and numVehTrips to count person-trips or vehicle-trips for almost any summary.
2. It's important to always confirm your summary is based on a large enough sample to provide reasonable representation of the population. For this reason, the sample sizes rawPersTrips and rawVehTrips are also provided. In general, caution should be used when summaries are based on less than 100 total (person- or vehicle-) trips; summaries based on a sample of less than 30 total trips should not be used alone, but should rather be pooled with additional data.

EXAMPLES OF COMMONLY REQUESTED SUMMARIES

MODE SHARE BY TRIP PURPOSE

To create a table of mode shares by trip purpose, start by confirming the CHTS has enough records to summarize the characteristics of interest. Create a pivot table with modes as rows, trip purposes as columns, and raw person-trips as values. In the Value Field Settings dialog, summarize values by Sum. Add filters to the pivot table to select other characteristics of interest such as residence or work location, origin, destination, etc. In the example below, we've selected records for respondents who live in Oakland and work in Walnut Creek.

homePlace	Oakland			
workPlace	Walnut Creek			
Sum of rawPersTrips	**Column Labels**			
Row Labels	**HBO**	**HBW**	**NHB**	**Grand Total**
DriveAlone	8	12	7	27
Rail		1	1	2
Walk	3		1	4
Grand Total	**11**	**13**	**9**	**33**

Unsurprisingly, there aren't very many trips in the CHTS with these characteristics, so we should expand our criteria. A good guideline for mode share summaries is at least 100 trips total, and at least 30 trips for each trip purpose.

Once we've confirmed the CHTS has enough responses with the characteristics of interest, create a second pivot table with the same rows, columns, and filters, and with number of person-trips as values. In the Value Field Settings dialog, summarize values by Sum, and show the values as percentage of column total.

homePlace	Oakland			
workCounty	Contra Costa			
Sum of numPersTrips	**Column Labels**			
Row Labels	**HBO**	**HBW**	**NHB**	**Grand Total**
DriveAlone	59%	84%	68%	70%
DriveShared	29%	0%	15%	14%
Rail	0%	16%	1%	5%
Walk	12%	0%	16%	11%
Grand Total	**100%**	**100%**	**100%**	**100%**

AVERAGE VEHICLE TRIP LENGTH

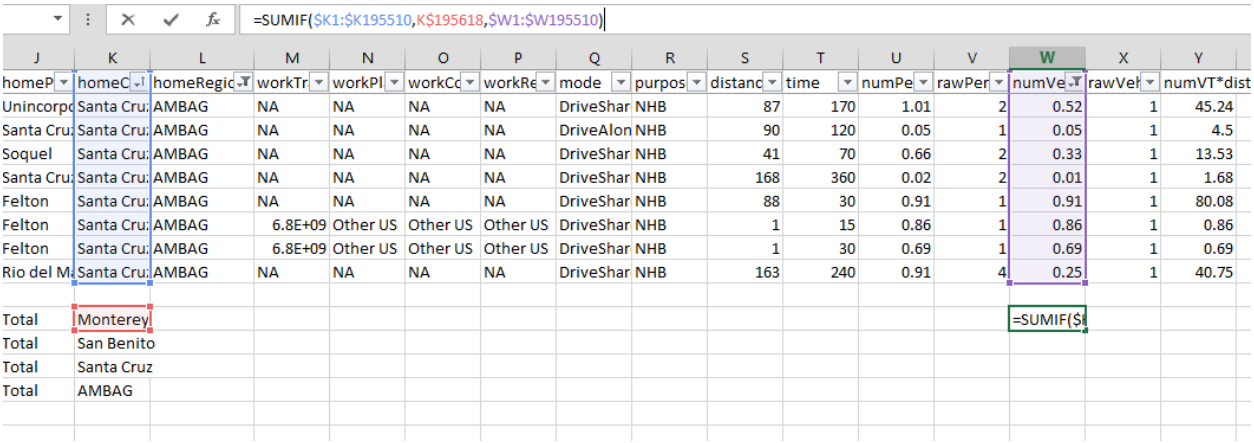
To estimate average vehicle-trip length, again start by confirming the CHTS has enough trips with the desired characteristics. Create a pivot table with raw vehicle trips (summarized by sum) in the value field, and any other desired characteristics in filters, rows and columns. Here, we see there are sufficient records for residents of all three AMBAG counties to allow summarizing vehicle trip length.

homeRegion	AMBAG			
Sum of rawVehTrips	**Column Labels**			
Row Labels	**HBO**	**HBW**	**NHB**	**Grand Total**
Monterey	1,597	827	997	3,421
San Benito	429	225	279	933
Santa Cruz	1,170	521	849	2,540
Grand Total	**3,196**	**1,573**	**2,125**	**6,894**

To determine average vehicle trip length by trip purpose, it's easier not to use a pivot table but to work with the relevant portion of the data directly. Set filters for the desired characteristics, and create a new column multiplying trip distance by the number of vehicle trips.

L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
homeRegic	workTr	workPl	workCo	workRe	mode	purpos	distanc	time	numPe	rawPer	numVe	rawVeh	numVT*distance	
AMBAG	NA	NA	NA	NA	DriveAlon	HBO	109	150	0.09	1	0.09	1	=W817*S817	
AMBAG	6E+09	San Leand	Alameda	MTC	DriveShar	HBW	92	170	1.07	1	1.07	1		
AMBAG	6E+09	Fremont	Alameda	MTC	DriveAlon	HBW	90	115	0.1	1	0.1	1		
AMBAG	NA	NA	NA	NA	DriveShar	NHB	111	270	0.19	2	0.09	1		
AMBAG	NA	NA	NA	NA	DriveAlon	HBO	333	340	0.06	1	0.06	1		
AMBAG	NA	NA	NA	NA	DriveShar	NHB	84	110	0.18	1	0.18	1		
AMBAG	NA	NA	NA	NA	DriveAlon	HBO	55	55	0.11	1	0.11	1		
AMBAG	6.05E+09	Los Banos	Merced	SJV	DriveShar	NHB	2	5	1.36	2	0.67	1		
AMBAG	6.05E+09	Los Banos	Merced	SJV	DriveShar	HBO	71	70	1.06	2	0.53	1		

Then, create sums for both the number of vehicle trips and vehicle trips * distance. Because we want to calculate average vehicle trip length for residents of the three AMBAG counties separately, SUMIF statements will help to sum only the values we're interested in.



=SUMIF($K1:$K195510,K$195618,$W1:$W195510)

homeP	homeC	homeRegic	workTr	workPl	workCc	workRe	mode	purpos	distanc	time	numPe	rawPer	numVe	rawVeh	numVT*dist
Unincorpc	Santa Cru	AMBAG	NA	NA	NA	NA	DriveShar	NHB	87	170	1.01	2	0.52	1	45.24
Santa Cru	Santa Cru	AMBAG	NA	NA	NA	NA	DriveAlon	NHB	90	120	0.05	1	0.05	1	4.5
Soquel	Santa Cru	AMBAG	NA	NA	NA	NA	DriveShar	NHB	41	70	0.66	2	0.33	1	13.53
Santa Cru	Santa Cru	AMBAG	NA	NA	NA	NA	DriveShar	NHB	168	360	0.02	2	0.01	1	1.68
Felton	Santa Cru	AMBAG	NA	NA	NA	NA	DriveShar	NHB	88	30	0.91	1	0.91	1	80.08
Felton	Santa Cru	AMBAG	6.8E+09	Other US	Other US	Other US	DriveShar	NHB	1	15	0.86	1	0.86	1	0.86
Felton	Santa Cru	AMBAG	6.8E+09	Other US	Other US	Other US	DriveShar	NHB	1	30	0.69	1	0.69	1	0.69
Rio del M	Santa Cru	AMBAG	NA	NA	NA	NA	DriveShar	NHB	163	240	0.91	4	0.25	1	40.75
Total	Monterey												=SUMIF($		
Total	San Benito														
Total	Santa Cruz														
Total	AMBAG														

Finally, divide the sum of vehicle trips * distance by the sum of vehicle trips, and you have the average vehicle trip distance. Note that this process is creating a weighted average of the trip distance, using the number of vehicle trips as a weight.

	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
	homeP	homeC												numVe	rawVeh	numVT*distance	
7	Felton	Santa Cru	A	N	N	N	N	D	N	#	#	1	1	0.91	1	80.08	
8	Felton	Santa Cru	A	#	O	O	O	D	N	1	#	1	1	0.86	1	0.86	
9	Felton	Santa Cru	A	#	O	O	O	D	N	1	#	1	1	0.69	1	0.69	
0	Rio del M	Santa Cru	A	N	N	N	N	D	N	#	#	1	4	0.25	1	40.75	
7																	Average Vehicle Trip Distance
8	Total	Monterey												1685.18		13083.81	7.76
9	Total	San Benito												250.92		2686.28	10.71
0	Total	Santa Cruz												1287.31		9913.47	7.70
1	Total	AMBAG												3223.41		25683.56	7.97
2																	

O/D TABLE

To create an O/D table for a set of geographies, again start by setting up a pivot table with the desired filters, with origins as rows, destinations as columns, and raw trips (either person- or vehicle-trips) as value; this will help you to confirm whether sample sizes are sufficient.

oRegion	SJV								
dRegion	SJV								
Sum of rawVehTrips	**Column Labels**								
Row Labels	**Fresno**	**Kern**	**Kings**	**Madera**	**Merced**	**San Joaquin**	**Stanislaus**	**Tulare**	**Grand Total**
Fresno	3,576	8	51	107	20	1	3	100	3,866
Kern	11	4,024	1		1	1	1	38	4,077
Kings	55	2	798	1				43	899
Madera	110	1	1	633	18	-	6		769
Merced	17	1		19	1,354	6	85	1	1,483
San Joaquin	2			2	7	2,076	104		2,191
Stanislaus	2	1		4	84	104	1,602	2	1,799
Tulare	99	33	46	4		1	1	2,519	2,703
Grand Total	**3,872**	**4,070**	**897**	**770**	**1,484**	**2,189**	**1,802**	**2,703**	**17,787**

In this example, overall we have plenty of vehicle trips to summarize, but for the pairs with a small number of survey records we shouldn't draw any conclusions beyond the obvious one that these pairs don't experience as much interaction as other pairs.

Create a second pivot table with the same rows, columns, and filters, and with number of trips as values. To help distinguish cells with enough sample size to draw conclusions, cells with sufficient sample size are highlighted in green in the example below.

oRegion	SJV								
dRegion	SJV								
Sum of numVehTrips	**Column Labels**								
Row Labels	**Fresno**	**Kern**	**Kings**	**Madera**	**Merced**	**San Joaquin**	**Stanislaus**	**Tulare**	**Grand Total**
Fresno	1,716,778	1,962	13,634	18,028	8,853	266	1,077	22,169	1,782,766
Kern	2,265	1,439,497	162		448	162	211	9,538	1,452,284
Kings	14,181	470	215,434	269				8,006	238,360
Madera	20,314	330	269	165,030	3,725	-	1,463		191,130
Merced	9,487	583		3,981	372,138	716	25,554	121	412,581
San Joaquin	247			1,378	833	1,157,843	37,287		1,197,587
Stanislaus	556	621		1,120	25,876	36,474	793,667	500	858,813
Tulare	21,272	7,294	8,705	1,693		264	410	795,079	834,717
Grand Total	**1,785,099**	**1,450,758**	**238,204**	**191,498**	**411,873**	**1,195,725**	**859,669**	**835,413**	**6,968,238**

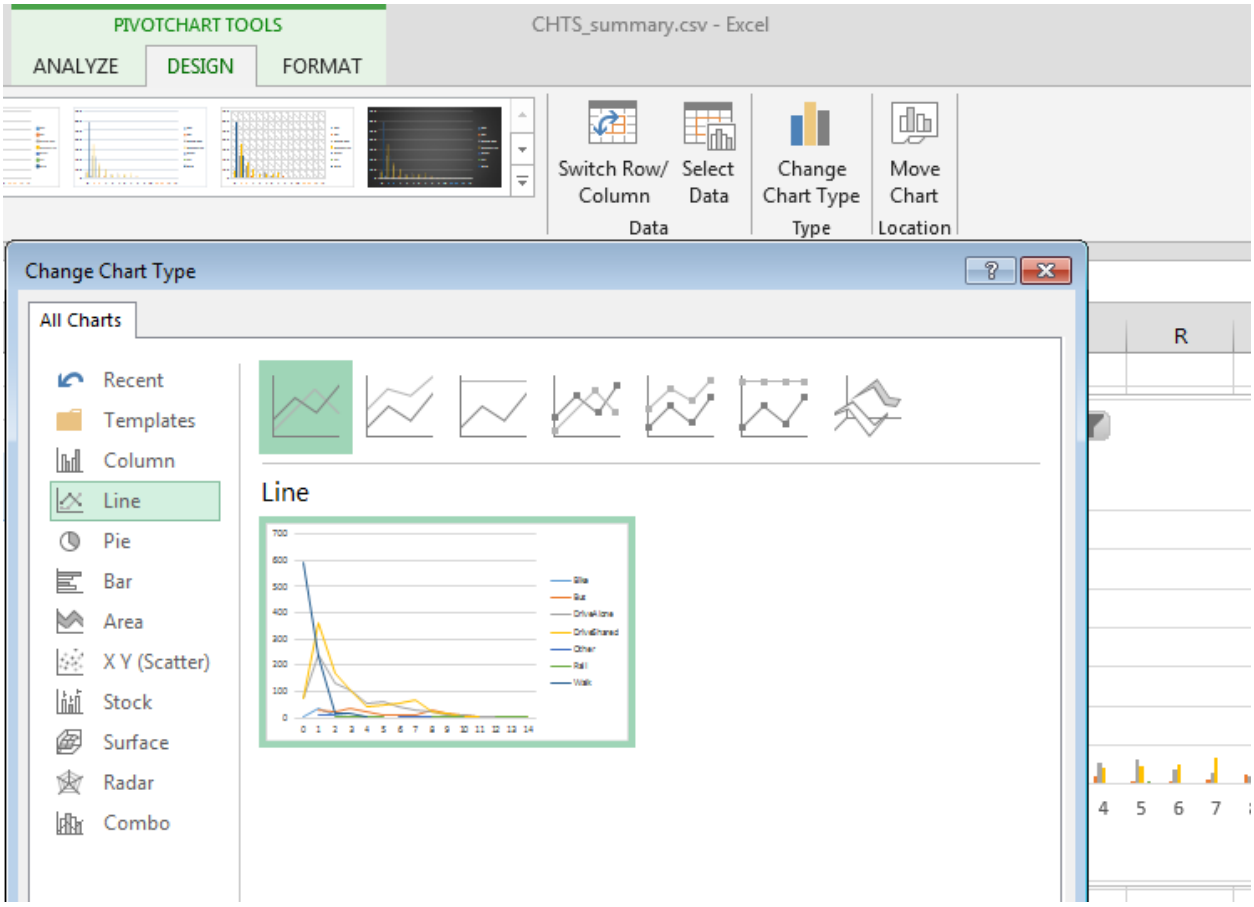
GRAPH OF TRIP DISTANCE BY MODE

Excel can create pivot tables and pivot charts which appear side-by-side with the same data. As before, confirm there are enough trips in the CHTS to summarize by creating a pivot table with mode as columns, distance as rows, raw person-trips as values (summarized by sum), and any desired filters. In this example, we certainly have enough trips for most modes, but should be cautious about drawing conclusions about

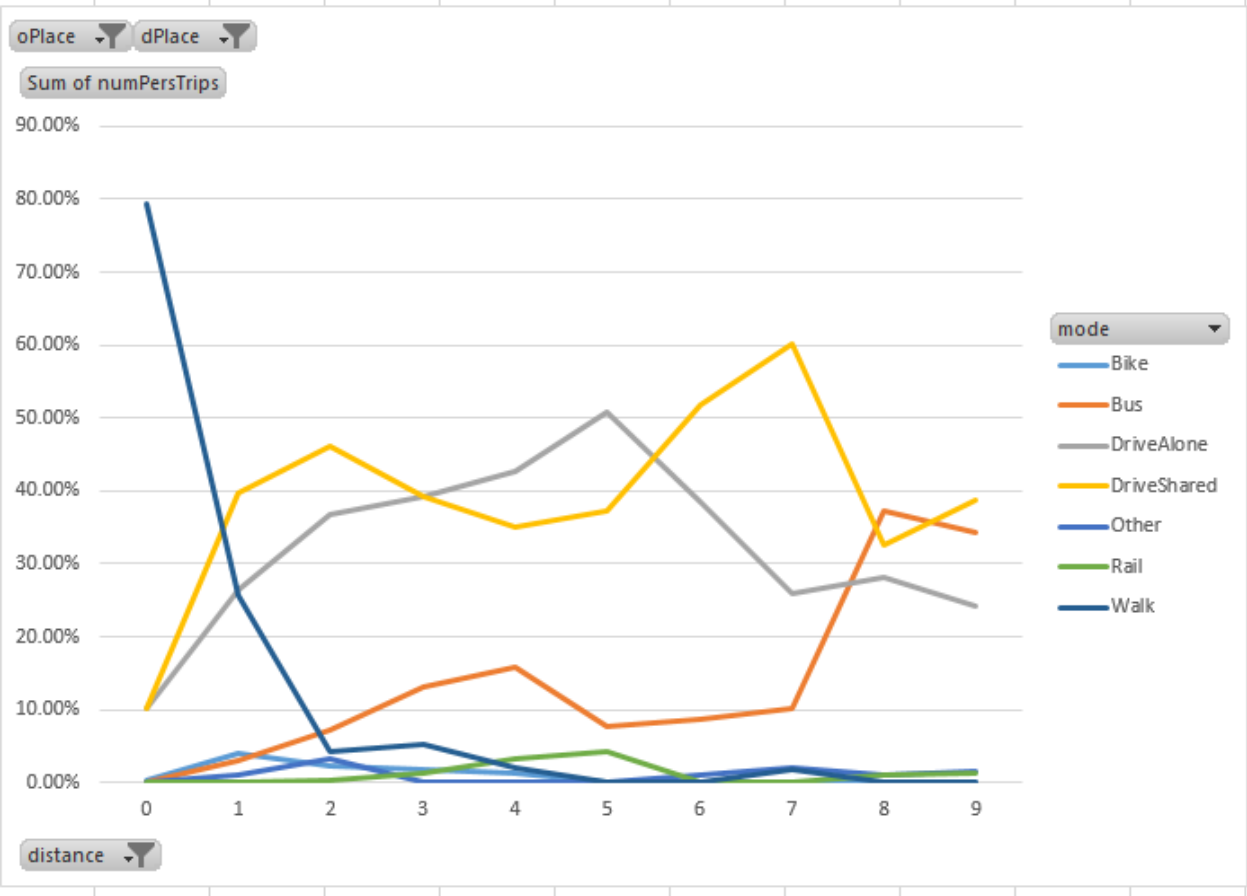
Rail or Other modes. Also, trips of 10 miles or longer are few enough that they should be considered as an aggregate rather than mile-by-mile.

oPlace	Oakland							
dPlace	Oakland							
Sum of rawPersTrips	**Column Labels**							
Row Labels	**Bike**	**Bus**	**DriveAlone**	**DriveShared**	**Other**	**Rail**	**Walk**	**Grand Total**
0	4		58	60			384	506
1	31	16	162	245	10		149	613
2	9	14	110	122	11	1	10	277
3	4	22	85	84		3	4	202
4	1	13	42	38		2	4	100
5		5	53	43		6		107
6		6	36	33	1			76
7		3	20	24	2		1	50
8		7	18	17	1	1		44
9		7	13	12	1	1		34
10		4	6	3		4		17
11		2	5	3				10
12		1	2			1		4
13			1	7		1		9
14				2		1		3
Grand Total		**49**	**100**	**611**	**693**	**26**	**21**	**552**	**2052**

To create the graph, change the value field from raw person trips to number of person trips (still summarized by sum). While the default pivot-chart bar chart format conveys some information, it's probably clearer to see if we change the chart type to a line chart:



If we'd rather look at mode share for each distance, we can show the values as a percentage of the row total – remembering that trips of 10 miles are longer may show unreasonable variability because there are so few of them in the survey.


oPlace
dPlace
Sum of numPersTrips
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
0
1
2
3
4
5
6
7
8
9
distance
mode
Bike
Bus
DriveAlone
DriveShared
Other
Rail
Walk

APPENDIX G:
DATA DICTIONARY FOR TAZ DATA INPUTS

The table below is a data dictionary for the elements of the TAZdata.csv model input.

DATA DICTIONARY FOR TAZDATA.CSV

Name	Description
TAZ	Traffic Analysis Zone ID
AIRBASIN	For counties containing multiple air basins,
MID_BNDRY	Middle school boundary
HIGH_BNDRY	High school boundary
GENPARKCOST	Parking cost, general public
EMPCOST	Parking cost, employees
INTDEN	Intersection density (No longer used, replaced by Python script)
WALKPERC	Percentage of TAZ lane miles that are walkable (No longer used, replaced by Python script)
MHHINC	Median household income
AREA_AC	Total area of the TAZ, in acres, including undeveloped land
RESACRE	Total developed area of TAZ devoted to residential uses
EMPACRE	Total developed area of TAZ devoted to non-residential uses
HWYCOM	Percentage of commercial that is highway focused
PTERM	Additional out-of-vehicle time required for drive trip productions to reach vehicle
ATERM	Additional out-of-vehicle time required for drive trip attractions to reach vehicle
PKFREQ	Frequency of peak-period transit service (used for synthetic transit)
OPFREQ	Frequency of off-peak transit service (used for synthetic transit)
EJ	Environmental Justice code
HBWH_ix	Percentage of home-based work (high income) trips produced which leave the model
HBWH_xi	Percentage of home-based work (high income) trips attracted from outside the model
HBWM_ix	Percentage of home-based work (medium income) trips produced which leave the model

DATA DICTIONARY FOR TAZDATA.CSV

Name	Description
HBWM_xi	Percentage of home-based work (medium income) trips attracted from outside the model
HBWL_ix	Percentage of home-based work (low income) trips produced which leave the model
HBWL_xi	Percentage of home-based work (low income) trips attracted from outside the model
HBS_ix	Percentage of home-based shop trips produced which leave the model
HBS_xi	Percentage of home-based shop trips attracted from outside the model
HBK_ix	Percentage of home-based school (K-12) trips produced which leave the model **(NOT used in the model: all HBK trips are assumed to be internal to the model.)**
HBK_xi	Percentage of home-based school (K-12) trips attracted from outside the model **(NOT used in the model: all HBK trips are assumed to be internal to the model.)**
HBC_ix	Percentage of home-based college trips produced which leave the model
HBC_xi	Percentage of home-based college trips attracted from outside the model
HBO_ix	Percentage of home-based other trips produced which leave the model
HBO_xi	Percentage of home-based other trips attracted from outside the model
WBO_ix	Percentage of work-based other trips produced which leave the model
WBO_xi	Percentage of work-based other trips attracted from outside the model
OBO_ix	Percentage of other-based other trips produced which leave the model
OBO_xi	Percentage of other-based other trips attracted from outside the model
EMP_EDUH	Percentage of educational employment that is high-income
EMP_EDUM	Percentage of educational employment that is medium-income
EMP_EDUL	Percentage of educational employment that is low-income
EMP_FOOH	Percentage of food/entertainment employment that is high-income
EMP_FOOM	Percentage of food/entertainment employment that is medium-income
EMP_FOOL	Percentage of food/entertainment employment that is low-income
EMP_GOVH	Percentage of government employment that is high-income
EMP_GOVM	Percentage of government employment that is medium-income
EMP_GOVL	Percentage of government employment that is low-income
EMP_INDH	Percentage of industrial employment that is high-income

DATA DICTIONARY FOR TAZDATA.CSV

Name	Description
EMP_INDM	Percentage of industrial employment that is medium-income
EMP_INDL	Percentage of industrial employment that is low-income
EMP_MEDH	Percentage of medical employment that is high-income
EMP_MEDM	Percentage of medical employment that is medium-income
EMP_MEDL	Percentage of medical employment that is low-income
EMP_OFCH	Percentage of office employment that is high-income
EMP_OFCM	Percentage of office employment that is medium-income
EMP_OFCL	Percentage of office employment that is low-income
EMP_RETH	Percentage of retail employment that is high-income
EMP_RETM	Percentage of retail employment that is medium-income
EMP_RETL	Percentage of retail employment that is low-income
EMP_OTHH	Percentage of mining/manufacturing employment that is high-income
EMP_OTHM	Percentage of mining/manufacturing employment that is medium-income
EMP_OTHL	Percentage of mining/manufacturing employment that is low-income
EMP_AGRH	Percentage of agricultural employment that is high-income
EMP_AGRM	Percentage of agricultural employment that is medium-income
EMP_AGRL	Percentage of agricultural employment that is low-income

APPENDIX H:
ACCESSIBILITY VARIABLES

The table below lists all of the accessibility and D-variables calculated during the Accessibility portions of the model. Note that the accessibility metrics are calculated during the Input Preparation phase of the model, and updated as the model runs through each iteration.

TABLE H-1: DATA DICTIONARY FOR TAZ-LEVEL ACCESSIBILITY VARIABLES

Variable	Description
ATYPE	Place type, calculated from EMP_30AUT + WRK_30AUT
TOTHH_SF	Total households in single-family residential units
HHPOP_SF	Total household population in single-family residential units
TOTHH_MF	Total households in multi-family residential units
HHPOP_MF	Total household population in multi-family residential units.
WRKPOP	Total working-age population.
INTDEN	Intersection density (intersections per square mile, including undeveloped area)
DIRECT	Not currently used; placeholder for measure of directness
WALK_MI	Miles of walkable roadway links
WALKPERC	Percentage of TAZ which is walkable
RESACRE	Developed acres for residential purposes
EMPACRE	Developed acres for non-residential purposes
HH_05TRN	Households within half-mile of transit
WRK_05TRN	Working-age population within half-mile of transit
EMP_05TRN	Jobs within half-mile of transit
EMP_30TRN	Jobs within 30 minutes by transit
WRK_30TRN	Working-age population within 30 minutes by transit
EMP_1WALK	Jobs within 1-mile walk
WRK_1WALK	Working-age population within 1-mile walk
EMP_3BIKE	Jobs within 3-mile bike ride

TABLE H-1: DATA DICTIONARY FOR TAZ-LEVEL ACCESSIBILITY VARIABLES

Variable	Description
WRK_3BIKE	Working-age population within 3-mile bike ride
EMP_30AUT	Jobs within 30 minutes by auto
WRK_30AUT	Working-age population within 30 minutes by auto
ACT_30AUT	Activity (jobs + working-age population) within 30 minutes by auto
ACT_30TRN	Activity (jobs + working-age population) within 30 minutes by transit
COMMUTECOST	Average annual cost of commuting by auto

APPENDIX I:
COMPARISON OF LAND USE CATEGORIES

The table below shows the residential land use data elements and how the VMIP 2 grouping compares to other data sources including the CHTS, ACS, and VMIP 1 categorization.

TABLE 3.2-8:
RESIDENTIAL AGGREGATION STRUCTURE FOR VMIP 2

	VMIP 2 (grouped)	VMIP 2	2012 CHTS	2012 ACS 5 Year	VMIP 1		CTPP 2010
Residence Type			*resty*	*B25024 (BG)*			
		RUG1 (SF)	01 1, detached	RU1	RU1	1, detached	SF detached (RU1)
			02 1, attached	RU2	RU2	1, attached	SF attached (RU2)
		RUG2 (MF)	04 2-4 units	RU3	RU3	2	MF 2-4 (RU3 + RU4)
				RU4	RU4	3 or 4	
			05 5-19 units	RU5	RU5	5 to 9	MF 5-19 (RU5 + RU6)
				RU6	RU6	10 to 19	
			06 20+ units	RU7	RU7	20 to 49	MF 20-49 (RU7)
				RU8	RU8	50 or more	MF 50+ (RU8)
		RUG3 (OTH)	03 Mobile home	RU9	RU9	Mobile home	MH (RU9)
			07 Boat, RV, van, etc.	RU10	RU10	Boat, RV, van, etc.	Other (RU10)
Household Size			*hhsize*	*B25009 (BG)*			
		HH1	Range is 1-15	1-person	HH1	HOUSEHOLD SIZE 1	1-person
		HH2		2-person	HH2	HOUSEHOLD SIZE 2	2-person
		HH3		3-person	HH3	HOUSEHOLD SIZE 3	3-person
		HH4		4-person	HH4	HOUSEHOLD SIZE 4	4-or-more-person
		HH5		5-person	HH5	HOUSEHOLD SIZE 5	
				6-person	HH6	HOUSEHOLD SIZE 6	
				7-or-more-person	HH7	HOUSEHOLD SIZE 7 or more	
				Total Households	TOTHH	TOTAL HOUSEHOLD	
Household Vehicles			*hhveh*	*B25044 (BG)*			
		Veh0	Range is 0-15	No vehicle available	Veh0	No vehicle available	0 cars
		Veh1		1 vehicle available	Veh1	1 vehicle available	1 car
		Veh2		2 vehicles available	Veh2	2 vehicles available	2 cars

TABLE 3.2-8:
RESIDENTIAL AGGREGATION STRUCTURE FOR VMIP 2

	VMIP 2 (grouped)	VMIP 2	2012 CHTS	2012 ACS 5 Year	VMIP 1		CTPP 2010
		Veh3		3 vehicles available	Veh3	3 vehicles available	3 cars
		Veh4		4 vehicles available	Veh4	4 vehicles available	4-or-more-cars
				5 or more vehicles available	Veh5	5 or more vehicles available	
Household Income			*incom*	*S1901 (BG)*			
	INCLOW	INC1	1 Less than $10,000	Less than $10,000	INC1	Less than $10,000	Less than $15,000
			2 $10,000 - $24,999	$10,000 to $14,999	INC2	$10,000 to $14,999	
				$15,000 to $19,999	INC3	$15,000 to $24,999	$15,000-$24,999
				$20,000 to $24,999			
		INC2	3 $25,000 - $34,999	$25,000 to $29,999	INC4	$25,000 to $34,999	$25,000-$34,999
				$30,000 to $34,999			
			4 $35,000 - $49,999	$35,000 to $39,999	INC5	$35,000 to $49,999	$35,000-$49,999
				$40,000 to $44,999			
				$45,000 to $49,999			
	INCMED	INC3	5 $50,000 - $74,999	$50,000 to $59,999	INC6	$50,000 to $74,999	$50,000-$74,999
				$60,000 to $74,999			
		INC4	6 $75,000 - $99,999	$75,000 to $99,999	INC7	$75,000 to $99,999	$75,000-$99,999
	INCHIGH	INC5	7 $100,000 - $149,999	$100,000 to $124,999	INC8	$100,000 to $149,999	$100,000-$149,999
				$125,000 to $149,999			
			8 $150,000 - $199,999	$150,000 to $199,999	INC9	$150,000 to $199,999	$150,000 or more
			9 $200,000 - $249,999	$200,000 or more	INC10	$200,000 or more	
			10 $250,000 or more				
				Total, household income	TOTINC	TOTAL HH INCOME	Total, household income
Population by Age			*age*	*B01001 (BG)*	AGE		
		POP0005	*Range is 0-98, 99 for 99+*	Under 5 years		People 0 to 5 years	
		POP0514		5 to 9 years 10 to 14 years		People 5 to 14 years	
		POP1517		15 to 17 years		People 15 to 17 years	
		POP1824		18 and 19 years 20 years 21 years 22 to 24 years		People 18 to 24 years	

TABLE 3.2-8:
RESIDENTIAL AGGREGATION STRUCTURE FOR VMIP 2

	VMIP 2 (grouped)	VMIP 2	2012 CHTS	2012 ACS 5 Year	VMIP 1		CTPP 2010
		POP2554		25 to 29 years 30 to 34 years 35 to 39 years 40 to 44 years 45 to 49 years 50 to 54 years		People 25 to 54 years	
		POP5564		55 to 59 years 60 and 61 years 62 to 64 years		People 55 to 64 years	
		POP6574		65 and 66 years 67 to 69 years 70 to 74 years		People 65 to 74 years	
		POP75		75 to 79 years 80 to 84 years 85 and over		People 75 years and over	
Age of head of household			*age*	*SF1-2010 H17 (ACS B19037 has fewer categories)*			
		AGE1524	*Not a separate variable but does have ages of all household members to use for calculation of this variable*	Householder 15 to 24 years	Hage1	Householder 15 to 24 years	Householder 15 to 17 years
		AGE2564		Householder 25 to 34 years	Hage2	Householder 25 to 34 years	Householder 18 to 24 years
				Householder 35 to 44 years	Hage3	Householder 35 to 44 years	Householder 25 to 44 years
				Householder 45 to 54 years	Hage4	Householder 45 to 54 years	Householder 45 to 59 years
				Householder 55 to 59 years	Hage5	Householder 55 to 59 years	Householder 60 to 64 years
				Householder 60 to 64 years	Hage6	Householder 60 to 64 years	Householder 65 to 74 years
		AGE6574		Householder 65 to 74 years	Hage7	Householder 65 to 74 years	Householder 75 years and over
		AGE75		Householder 75 to 84 years	Hage8	Householder 75 to 84 years	
				Householder 85 years and over	Hage9	Householder 85 years and over	
work trip Travel time			*totalTime (F&P created)*				
			All travel times are measured in minutes; for transit trips totalTime is a sum of IVT, waitTime, accessTime, xferTime,egressTime		TT1	Less than 10 minutes	Less than 5
					TT2	10 to 14 minutes	5 to 9 minutes
					TT3	15 to 19 minutes	15 to 19 minutes
					TT4	20 to 24 minutes	20 to 20 minutes
					TT5	25 to 29 minutes	30 to 44 minutes
					TT6	30 to 34 minutes	45 to 59 minutes
					TT7	35 to 44 minutes	60 to 74 minutes
					TT8	45 to 59 minutes	75 to 89 minutes

TABLE 3.2-8:
RESIDENTIAL AGGREGATION STRUCTURE FOR VMIP 2

	VMIP 2 (grouped)	VMIP 2	2012 CHTS	2012 ACS 5 Year	VMIP 1		CTPP 2010
				*same as VMIP 1	TT9	60 or more minutes *is available as same in CTPP *still looking for place of work by census tract	90 minutes or more **aggregate option

TABLE 3-2.9: NON-RESIDENTIAL LAND USE CATEGORY AGGREGATION STRUCTURE

VMIP 2	VMIP 1	Description	NAICS	CTPP	CSTDM
EMPEDU	EDUCATION	Educational Services (Schools, Junior Colleges, Colleges, Universities, Professional Schools	61	Edu / Health	Education and health
EMPFOO	ACCOMODTNS	Accommodation	721	Arts/Rec/Accom/Food	Leisure and hospitality
	FOOD	Food Services	722	Arts/Rec/Accom/Food	Leisure and hospitality
	ENT_REC	Arts, Entertainment, and Recreation	71	Arts/Rec/Accom/Food	Leisure and hospitality
EMPGOV	PUBLIC	Public Administration	92	Government	Office
EMPIND	CONSTRUCTN	Construction	23	Construction	Primary and Secondary
	UTILITIES	Utilities	22	Trans / Util.	Trans / Util.
	SVC_OTHER	Other Services (except Public Administration)	81	Other Service	Other Service
	WHOLESALE	Wholesale Trade	42	Wholesale	Wholesale
	WAREHOUSE	Transportation and Warehousing	48-49	Trans / Util.	Trans / Util.
EMPMED	HEALTH	Health Care and Social Assistance	62	Edu / Health	Education and health

TABLE 3-2.9: NON-RESIDENTIAL LAND USE CATEGORY AGGREGATION STRUCTURE

VMIP 2	VMIP 1	Description	NAICS	CTPP	CSTDM
EMPOFC	INFORMATN	Information	51	Information	Office
	FINAN_INSR	Finance and Insurance	52	FIRE	Office
	REALESTATE	Real Estate and Rental and Leasing	53	FIRE	Office
	SVC_PROF	Professional, Scientific, and Technical Services	54	Prof Sci, Admin	Office
	SVC_MNGMNT	Management of Companies and Enterprises	55	Prof Sci, Admin	Office
	SVC_ADMIN	Administrative and Support and Waste Management and Remediation Services	56	Prof Sci, Admin	Office
EMPRET	RETAIL	Retail Trade	44-45	Retail	Retail
EMPOTH	MANUFACTUR	Manufacturing	31-33	Manufacturing	Primary and Secondary
	MINING	Mining, Quarrying, and Oil and Gas Extraction	21	Ag_Mining	Primary and Secondary
EMPAGR	AGRICULTUR	Agriculture, Forestry, Fishing and Hunting	11	Ag_Mining	Primary and Secondary

APPENDIX J:

GUIDANCE ON STATIC VALIDATION

TABLE A-1:
DRAFT SUMMARY OF MODEL PERFORMANCE – STATIC VALIDATION

Model Component	Validation Statistic	Evaluation Criterion	Source	Notes, further guidance[1]	Documentation
Static Validation					
Transit Assignment	1. Difference between actual ridership to model results for entire system	+/- 20%	2010 RTP Guidelines Daily	Source of actual daily ridership: http://www.ntdprogram.gov/ntdprogram/archives.htm (National transit database for base year, typically 2008) 2010 RTP Guidelines specify difference between actual ridership to model results for a given year by route group (i.e., Local Bus, Express Bus, etc.). However, National transit database only specifies transit ridership for entire system. Valley Transit operators do not use consistent route groups.	Table
Traffic Assignment	2. % of Links within Caltrans Deviation Allowance	At Least 75%	2010 RTP Guidelines *Travel Forecasting Guidelines*, Caltrans, 1992	Source of traffic data: Vehicle count database for each County for comparison Daily, non-directional	Table, Figure of location and deviation color (valid, +1, +2, -1, -2). Graph (model validation scatter plot).
	3. % of Screenlines within Caltrans Deviation Allowance	100%	2010 RTP Guidelines *Travel Forecasting Guidelines*, Caltrans, 1992	Daily, non-directional	Table

[1] Potential solutions to unexpected results may vary-: TMIP Guidelines are the standard reference for troubleshooting and solutions: http://tmip.fhwa.dot.gov/resources/clearinghouse/docs/FHWA-HEP-10-042/FHWA-HEP-10-042.pdf

TABLE A-1:
DRAFT SUMMARY OF MODEL PERFORMANCE – STATIC VALIDATION

Model Component	Validation Statistic	Evaluation Criterion	Source	Notes, further guidance[1]	Documentation
	4. Correlation Coefficient	At Least 0.88	3.2010 RTP Guidelines *Travel Forecasting Guidelines*, Caltrans, 1992	Daily, non-directional	Table
	5. Percent Root Mean Squared Error (RMSE) (model-wide)	Below 40%	2010 RTP Guidelines	Daily, non-directional	Table
	6. Percent Root Mean Squared Error (RMSE) (functional classification)	Below 40%		No specific criteria available Daily, non-directional Functional Class: Freeway Highway Expressway Arterial Collector	Table
	7. Percent Root Mean Squared Error (RMSE) (volume range)	0-4,999 – <116% 5,000 to 9,999 – <43% 10,000 to 19,999 – <28% 20,000 to 39,999 – < 25% 40,000 to 59,000 – < 30% 60,000 to 89,999 – <-19%	Harvey, G., et al. A Manual of Regional Transportation Modeling Practice for Air Quality Analysis for the Natural Association of Regional Councils, Washington, D.C. July 1993	Is there a minimum number of counts in a volume range or functional class range that we want to consider?	Table

TABLE A-1:
DRAFT SUMMARY OF MODEL PERFORMANCE – STATIC VALIDATION

Model Component	Validation Statistic	Evaluation Criterion	Source	Notes, further guidance[1]	Documentation
	8. Model Volume to Count Ratio (model-wide)	General relationship (i.e., high or low) between model volumes and counts	2010 RTP Guidelines	Daily, non-directional *Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee*. FHWA - identifies that model volumes should be within 5-10% of observed traffic volumes on the highway network. This is the range reference in TMIP, *Model Validation and Reasonableness Checking Manual*, 1997 for screenlines	Table
	9. Model Volume to Count Ratio (roadway functional classification)	Freeway – +/- 7% Major Arterial – 10% Minor Arterial – 15% Collector – 25%	TMIP, *Model Validation and Reasonableness Checking Manual*, 1997	Daily, non-directional Percent difference targets for daily traffic volumes by facility type.	Table
	XX. Distribution of Class by Time of Day	Comparison to collected count data		Total vehicles trips stratified by class and time of day.	Table
	XX. Distribution of Time of Day by Class	Comparison to collected count data		Total vehicles trips stratified by time of day and class.	Table

TABLE A-1:
DRAFT SUMMARY OF MODEL PERFORMANCE – STATIC VALIDATION

Model Component	Validation Statistic	Evaluation Criterion	Source	Notes, further guidance[1]	Documentation
	10. Model Volume to Count Ratio (volume range)	<1,000 < 60% 1,000-2,500 < 47% 2,500-5,000 – <36% 5,000-10,000 – <29% 10,000-25,000 – <25% 25,000-50,000 – <22% >50,000 – <21%	TMIP, *Model Validation and Reasonableness Checking Manual*, 1997	Percent difference targets for daily traffic volumes for individual links.	Table
Reasonableness Checks					
Highway and Transit Networks	11. General roadway network and transit line coding	Reasonableness Check	TDF Model	Centerline	
Trip Generation	12. PA Balance	+/- 10% by purpose and overall	TDF Model	after including IX/XI trips	Table or bar chart comparing balance before and after adjustment
Trip Distribution	13. Zonal Trip Distribution		TDF Model	Select link assignment for gateways, TAZ near gateway, and TAZ central to model network.	Network bandwidth plots.

TABLE A-1:
DRAFT SUMMARY OF MODEL PERFORMANCE – STATIC VALIDATION

Model Component	Validation Statistic	Evaluation Criterion	Source	Notes, further guidance[1]	Documentation
Vehicle Availability	14.		2010 ACS (Surveys from 2006-2010) and CHTS http://www.dot.ca.gov/hq/tsip/tab/documents/travelsurveys/Final2001_StwTravelSurveyWkdayRpt.pdf	County level comparison Compare percent of households (single and multiple) with 0, 1, 2, 3+ autos CHTS includes survey data for Fresno, Kern, Merced, San Joaquin, Stanislaus, and Tulare counties. (Table 4, Pages 26 – 30)	
Feedback Loop	15.			Convergence	
Comparisons					
Land Use	16. Total Population	Within 3% (based on RHNA criteria)	Census	by income group	Bar chart comparing model to census data.
	17. Total Households	Ideally within 3% (RHNA criteria)	Census or Department of Finance	RHNA allocations are not anticipated until mid-2013	Bar chart comparing model to census data.
	18. Total Employment	Note	Department of Finance	Check reasonableness of retail jobs per household and non-retail jobs per household. Job mix?	Bar chart comparing model to census data.
Trip Generation	19. Person trip rates		CHTS, ITE	Convert person trip rates to ITE rates using Ave Veh Occ by purpose	Table
Trip Distribution	20. Average Trip Length by Purpose		CHTS	3-County model also has OD survey	Table
	21. Trip Length Frequency Distribution by Purpose		CHTS	3-County model also has OD survey	Graph for each purpose

TABLE A-1:
DRAFT SUMMARY OF MODEL PERFORMANCE – STATIC VALIDATION

Model Component	Validation Statistic	Evaluation Criterion	Source	Notes, further guidance[1]	Documentation
	XX. Percentage of IX/XI/XX trips for long-distance trips		Cellphone Inter-regional Data	Compare percentage of II/IX/XI trips from model trip tables with percentage of II/IX/XI trips from cellphone inter-regional travel data.	Table and/or Map
Trip Assignment	22. Vehicle class		Count data	Percent by class for each period Percent by time period for each class	Table
	23. VMT	+/- 5%	HPMS http://www.dot.ca.gov/hq/tsip/hpms/hpmslibrary	Compare countywide daily VMT estimate from HPMS (Table 10, Page 80) Reasonableness of comparison should be based on how the model compares to HMPS estimates. In general, The model should be VMT forecasts should be lower than the HPMS estimate, since HPMS VMT is estimated for local streets that are not in the model networks.	Table
	24. Travel Speed by Functional Classification		Existing Data	Compare by functional classification based on observed data. For all classifications, summarize average speed, minimum, and maximum. If observed data is not available, compare relative congested speed by functional class.	Table
	25. Average Travel Time by Trip Purpose		CHTS	Daily CHTS provide travel time for HBW trips and total trips. http://www.dot.ca.gov/hq/tsip/tab/documents/travelsurveys/Final2001_StwTravelSurveyWkdayRpt.pdf	Table
Mode Split	26. Mode split by purpose		CHTS	Daily	Pie chart

Source: Fehr & Peers, 2016

APPENDIX K:

MEMO ON AUTO OPERATING COST

MEMORANDUM

To: Ken Kirkey, MTC; Huasha Liu, SCAG; Gordan Garry, SACOG; Muggs Stoll, SANDAG

From: David Ory, MTC; Guoxiong Huang, SCAG; Bruce Griesenbeck, SACOG; Clint Daniels, SANDAG

Re: Automobile Operating Cost for the Second Round of Sustainable Communities Strategies

Date: October 13, 2014

This memorandum summarizes our collective thinking regarding fuel price assumptions for the second round of sustainable communities strategies (SCSs)[2].

Background

The Regional Targets Advisory Committee (or RTAC) formed by the California Air Resources Board (ARB) recommended that MPOs use "consistent long-range planning assumptions statewide, to the degree practicable, including … existing and forecasted fuel prices and automobile operating costs."[3] For the first round of sustainable communities strategies, we agreed to use the following sets of assumptions:

- Base Year Fuel Price: Region-specific, set during model calibration
- Year 2020 Fuel Price: $4.74 (Year 2009 dollars, $2009);
- Year 2035 Fuel Price: $5.24 ($2009);
- Effective Fleet-wide Fuel Efficiency: Region-specific, derived from ARB's Emission Factor (EMFAC) software;
- Year 2020 Non-fuel-related Operating Cost (if included in region-specific automobile operating cost calculations): $0.09 ($2009);

[2] The first round beginning with SANDAG's 2011 RTP/SCS; the second round beginning with SANDAG's 2015 RTP/SCS.
[3] See page 10 of *Recommendations of the Regional Targets Advisory Committee Pursuant to Senate Bill 375: A Report to the California Air Resources Board*.

- Year 2035 Non-fuel-related Operating Cost (if included in region-specific automobile operating cost calculation): $0.11 ($2009).

This set of assumptions were used to compute the assumed perceived automobile operating cost for each MPO. The resulting values are shown in **Table 50**.

Table 50: Assumed Perceived Automobile Operating Costs ($2009) for First Round of SCSs

MPO	Base Year Cost (year)	Year 2020 Cost	Year 2035 Cost	Avg Annual Growth (Base to 2035)
SCAG	$0.23 (2005)	$0.32	$0.32	1.1%
MTC	$0.18 (2010)	$0.28	$0.28	1.8%
SACOG	$0.21 (2008)	$0.27	$0.29	1.2%
SANDAG	$0.19 (2008)	$0.22	$0.21	0.4%

Using the above assumptions, we achieved consistency in forecast year fuel price as well as the approach to computing perceived automobile operating cost. Unfortunately, we were not able to achieve consistency in base year assumptions. Achieving consistency across MPOs for base year input is more difficult than achieving consistency across forecast year input because base year input is part of the expensive and time consuming model development process.

The result of using consistent forecast year assumptions and inconsistent base year assumptions were uneven changes in the assumed increase in perceived automobile operating cost across MPOs. For example, between 2010 and 2035, MTC assumes a 1.8 percent average annual increase in perceived automobile operating cost; between 2008 and 2035, SANDAG assumes a 0.4 percent average annual increase. It is worth noting that the base year differences may reflect actual base year differences (i.e., fuel prices changing from 2005 to 2010) and do reflect regional differences in the assumed average fleet-wide fuel efficiency. In any case, the differences in growth rates make it difficult to claim that the perceived automobile operating costs were handled in a consistent manner.

Proposed Approach

Our proposed remedy for the above-described problem is *not* to try and achieve consistent base year assumptions. The model calibration process is difficult enough without adding the constraint of a single perceived automobile operating cost introduced at an unknown time in the model development cycle. Rather, we propose using a consistent growth in fuel price between the SB 375 base year of 2005 and the forecast years used in the SCS, specifically the target years 2020, and 2035. In addition, we propose using a consistent non-fuel-related operating cost as well as consistent data sources for effective fleet-wide fuel efficiency and base year gas price.

The following subsections outline the approach. Note that the below assumptions do not account for potential increases in fuel costs from California's Cap-and-Trade program.

Fuel Price Assumptions

The Department of Energy issues an annual forecast of motor vehicle gasoline prices. The 2013 forecast[4] is paired with historical information from 2005 to compute a consistent fuel price ratio that will be used by each MPO. The target value for the calculation is not the midpoint between the low and high forecast, but rather three-quarters of the way between the low and high forecasts, plus 32 cents ($2010) – the 32 cents accounts for gasoline generally being more expensive in California than the rest of the nation. These calculations are shown in **Table 51**.

Table 51: Department of Energy Forecasts and Resulting Growth Ratio (Prices in Year 2010 Dollars)

Year	Low	High	Low plus 75% Diff + 32 cents	Ratio to 2005
2005	---	---	$2.82*	---
2015	$2.70	$3.77	$3.82	1.35
2020	$2.54	$4.17	$4.08	1.45
2025	$2.53	$4.39	$4.25	1.51
2030	$2.52	$4.77	$4.53	1.61
2035	$2.53	$5.18	$4.84	1.72
2040	$2.57	$5.70	$5.24	1.86

* – Historical price taken from http://www.eia.gov/dnav/pet/pet_pri_gnd_a_epm0_pte_dpgal_a.htm, and converted to year 2010 dollars.

To compute an MPO-specific forecast year fuel price, the growth ratios in **Table 51** are paired with base year prices. We propose using base year prices from a consistent source, specifically the retail gasoline price data from the Oil Price Information Service (OPIS); these prices will be introduced during our next round of model development activities. The assumed base year prices are shown in **Table 52** for each of the MPO areas for years 2005 through 2012. These prices will be used in subsequent model development activities[5].

Table 52: Historical Gas Prices per OPIS (All prices in Year 2010 dollars)

Year*	MTC	SCAG	SACOG	SANDAG
2005	$2.83	$2.85	$2.74	$2.84

[4] The data is here: http://www.eia.gov/forecasts/archive/aeo13/source_oil.cfm.

[5] Some MPOs will be recalibrating their models and generating a "new" "forecasts" (or "backcasts") of year 2005. Others will not. Those generating new forecasts will use the fuel prices listed in **Table 56**; those not generating new forecasts will leave their prices as they were set in their model development processes.

2008	$3.68	$3.53	$3.53	$3.35
2010	$3.17	n/a	$3.09	$2.92
2012	$3.87	$3.90	$3.85	$3.64

* - The base year prices are only shown (and, in some cases, only purchased) for 2005 and potential model calibration years. For example, SCAG intends to use a 2012 calibration year, and, as such, did not purchase the year 2010 prices from OPIS.

Non-Fuel-Related Operating Costs

As noted above, the calculation of perceived automobile operating cost is assumed to have two components: fuel costs and non-fuel-related costs. Similar to the base year fuel price, we propose using base year non-fuel-related operating costs from a consistent source, specifically the American Automobile Association (AAA). The assumed non-fuel-related base year prices are shown in **Table 53**; these are national estimates that we'll assume apply to each of the MPO areas. These prices will be used in subsequent model development activities.

Table 53: Non-Fuel-Related Operating Costs (Prices in Year 2010 dollars per mile)

Year	Maintenance	Tires	Maint. + Tires
2005	$0.0437	$0.0062	$0.05
2006	$0.0453	$0.0065	$0.05
2007	$0.0437	$0.0069	$0.05
2008	$0.0452	$0.0076	$0.05
2009	$0.0447	$0.0082	$0.05
2010	$0.0444	$0.0096	$0.05
2011	$0.0461	$0.0103	$0.06
2012	$0.0524	$0.0105	$0.06

The above data can be used to estimate forecast-year non-fuel-related costs. Using a simple linear regression and extrapolation, the forecast year values shown in **Table 54** can be computed. Similar to the gasoline price, the MPOs will use the computed ratio to calculate the forecast year values from whatever values were or are assumed for year 2005.

Table 54: Forecast Year Non-Fuel-Related Operating Costs Ratios (Prices in Year 2010 dollars)

Year	Estimate	Ratio to 2005
2005	$0.050	---
2012	$0.063	1.26
2015	$0.062	1.25
2020	$0.069	1.38
2025	$0.075	1.50
2030	$0.081	1.62
2035	$0.087	1.75
2040	$0.093	1.87

Effective Fleet-wide Fuel Efficiency

The computation of perceived automobile operating cost requires an assumption be made about the effective passenger-vehicle[6] fuel efficiency. ARB's EMFAC software provides two estimates of carbon dioxide (CO_2) emissions. The first estimate is for a hypothetical future in which fuel and vehicle regulations are not enacted; this hypothetical future is used only for computing emissions for SB 375 purposes (method A). The second estimate is for the expected future in which fuel and vehicle regulations are enacted (method B). This future is assumed for all non-SB 375 purposes, including federally-mandated conformity analyses. Unfortunately, the EMFAC software only provides a fuel consumption result for the first set (method A) of CO_2 emissions. The effective fleet-wide fuel efficiency needs to be calculated from the second estimate. Each MPO will use the following equation to compute the effective fleet-wide fuel efficiency:

$$FE = \frac{VMT}{\frac{(CO_2)_B \cdot FLCFS}{(CO_2)_A} \cdot FC_A}$$

where VMT is passenger-vehicle miles traveled, $(CO_2)_A$ is the passenger-vehicle CO_2 estimate from method A, $(CO_2)_B$ is the passenger-vehicle CO_2 estimate from method B, and FC_A is the passenger-vehicle fuel consumption from method A. FLCFS is an adjustment factor to account for Low Carbon Fuel Standards (LCFS) CO_2 reduction factors assumed in EMFAC 2011. LCFS is a fuel standard that requires a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020 (see Table 5-2, http://www.arb.ca.gov/msei/emfac2011-technical-documentation-final-updated-0712-v03.pdf). FLCFS is set at 1.11 to offset this reduction factor in the fuel efficiency calculations as the reduction

[6] Defined as EMFAC vehicle types LDA, LDT1, LDT2, and MDV.

from LCFS is related to carbon content rather than fuel consumption. The calculation assumes a linear relationship between CO_2 emissions and fuel consumption.

Using the effective fuel efficiency derived from EMFAC presents a "chicken or egg" problem, as one cannot generate the fuel-efficiency estimate unless an input assumption about operating cost is made, but the operating cost assumption requires a fuel-efficiency estimate. In practice, each MPO will select a representative fuel efficiency estimate during the SCS development process that will be carried through SCS adoption.

Region-Specific Calculations

Detailed calculations are provided below for each of the MPO regions. The regions differ as to whether they will update the year 2005 simulation results using the prices presented in **Table 52** and **Table 53**; either way, consistent ratios for fuel prices (presented in **Table 51**) and non-fuel-related prices (**Table 54**) are applied to either the updated or non-updated 2005 assumptions.

MTC: Assuming updated Year 2005 Simulation Results

Using the above information, MTC will compute the year 2005, 2020, and 2035 perceived automobile operating cost estimates using the approach detailed in **Table 55**.

Table 55: MTC Region Example Calculations Assuming Updated 2005 Results (Prices in Year 2010 dollars)

Year	Quantity	Value
2005	Region-specific fuel price (Table 52, dollars per mile)	$2.83
	Non-fuel-related price (Table 53, dollars per mile)	$0.05
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	20.09
	Perceived automobile operating cost (cents per mile)	19.1¢
2020	Consistent fuel price ratio (Table 51)	1.45
	Region-specific fuel price (Ratio x 2005 price)	$4.09
	Consistent non-fuel-related price ratio (Table 54)	1.38
	Region-specific non-fuel-related price	$0.07
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	25.15[†]
	Perceived automobile operating cost (cents per mile)	23.1¢
2035	Consistent fuel price ratio (Table 51)	1.72
	Region-specific fuel price (Ratio x 2005 price)	$4.85
	Consistent non-fuel-related price ratio (Table 54)	1.75

	Region-specific non-fuel-related price	$0.09
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	28.85[†]
	Perceived automobile operating cost (cents per mile)	25.6¢

[†] - Value may change during the planning process.

SCAG: Assuming Updated Year 2005 Simulation Results

Using the information contained in this memorandum, SCAG will compute the year 2020 and 2035 perceived automobile operating cost estimates using the approach detailed in **Table 57.**

Table 56: SCAG Region Example Calculations (Prices in Year 2010 dollars)

Year	Quantity	Value
2005	Region-specific fuel price (Table 52, dollars per gallon)	$2.85
	Non-fuel-related price (Table 53, dollars per mile)	$0.05
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	18.63
	Perceived automobile operating cost (cents per mile)	20.3¢
2020	Consistent fuel price ratio (Table 51)	1.45
	Region-specific fuel price (Ratio x 2005 price)	$4.12
	Consistent non-fuel-related price ratio (Table 54)	1.38
	Region-specific non-fuel-related price	$0.07
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	23.63[†]
	Perceived automobile operating cost (cents per mile)	24.3¢
2035	Consistent fuel price ratio (Table 51)	1.72
	Region-specific fuel price (Ratio x 2005 price)	$4.89
	Consistent non-fuel-related price ratio (Table 54)	1.75
	Region-specific non-fuel-related price	$0.09
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	26.40[†]
	Perceived automobile operating cost (cents per mile)	27.3¢

[†] - Value may change during the planning process.

SACOG: Assuming Static Year 2005 Simulation Results

Using the information contained in this memorandum, SACOG will compute the year 2020 and 2035 perceived automobile operating cost estimates using the approach detailed in **Table 57.**

Table 57: SACOG Region Example Calculations (Prices in Year 2010 dollars)

Year	Quantity	Value
2005	Region-specific fuel price (Table 3, dollars per gallon)	$2.74
	Non-fuel-related price (Table 4, dollars per mile)	$0.05
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	19.50
	Perceived automobile operating cost (cents per mile)	19.1¢
2020	Consistent fuel price ratio (Table 51)	1.45
	Region-specific fuel price (Ratio x 2005 price)	$3.96
	Consistent non-fuel-related price ratio (Table 54)	1.38
	Region-specific non-fuel-related price	$0.07
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	24.92[†]
	Perceived automobile operating cost (cents per mile)	22.8¢
2035	Consistent fuel price ratio (Table 51)	1.72
	Region-specific fuel price (Ratio x 2005 price)	$4.70
	Consistent non-fuel-related price ratio (Table 54)	1.75
	Region-specific non-fuel-related price	$0.09
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	28.30[†]
	Perceived automobile operating cost (cents per mile)	25.4¢

[†] - Value may change during the planning process.

SANDAG: Assuming Static Year 2005 Simulation Results

Using the information contained in this memorandum, SANDAG will compute the year 2020 and 2035 perceived automobile operating cost estimates using the approach detailed in **Table 58.**

Table 58: SANDAG Region Example Calculations (Prices in Year 2010 dollars)

Year	Quantity	Value
2005	Region-specific fuel price (Table 52, dollars per gallon)	$2.84
	Non-fuel-related price (Table 53, dollars per mile)	$0.05
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	18.89
	Perceived automobile operating cost (cents per mile)	20.0¢
2020	Consistent fuel price ratio (Table 51)	1.45
	Region-specific fuel price (Ratio x 2005 price)	$4.11
	Consistent non-fuel-related price ratio (Table 54)	1.38
	Region-specific non-fuel-related price	$0.07
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	23.98[†]
	Perceived automobile operating cost (cents per mile)	24.0¢
2035	Consistent fuel price ratio (Table 51)	1.72
	Region-specific fuel price (Ratio x 2005 price)	$4.87
	Consistent non-fuel-related price ratio (Table 54)	1.75
	Region-specific non-fuel-related price	$0.09
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	27.20[†]
	Perceived automobile operating cost (cents per mile)	26.7¢

[†] - Value may change during the planning process.

Comparisons across SCS Rounds

Table 59 compares the fuel price and resulting automobile operating cost results across SCS rounds for each MPO *assuming* the effective fleet-wide fuel efficiency number remains unchanged from the first to second round – this number will change during the planning process.

Table 59: Fuel Price and Automobile Operating Cost Comparison across SCS Rounds (Prices in Year 2010 Dollars)

Year	Quantity	MTC		SCAG		SANDAG		SACOG	
		Rnd 1	Rnd 2	Rnd 1	Rnd 2	Rnd 1	Rnd 2	Rnd 1	Rnd 2
2005	Fuel price	$2.79	$2.83	$2.83	$2.85	$2.68	$2.84	$2.70	$2.74
	Auto. Oper. Cost	21.2¢	19.1¢	23.8¢	20.3¢	19.2¢	18.9¢	19.7¢	19.1¢
2020	Fuel price	$4.74	$4.09	$4.74	$4.12	$4.74	$4.11	$4.74	$3.96
	Auto. Oper. cost	28.7¢	23.1¢	31.9¢	24.3¢	22.6¢	24.0¢	27.0¢	22.8¢
2035	Fuel price	$5.24	$4.85	$5.24	$4.89	$5.24	$4.87	$5.24	$4.70
	Auto. Oper. cost	28.6¢	25.6¢	32.3¢	27.3¢	21.7¢	26.7¢	28.9¢	25.4¢
Ratios	2020 to 2005	1.34	1.21	1.34	1.20	1.18	1.20	1.37	1.20
	2035 to 2005	1.33	1.34	1.36	1.34	1.13	1.33	1.47	1.33

Next Steps

This memorandum proposes a consistent approach for computing fuel price for each of our MPOs for the second round of sustainable community strategies. After collecting your feedback and modifying our approach accordingly, we will share this approach with ARB and the other MPOs across the state.

APPENDIX L:
CALIBRATED PARAMETERS

Auto Operating Cost

	Fresno	Kern	Kings	Madera	TCM	Tulare
2005	19.12	20.43	19.13	19.79	19.56	19.48
2006	20.68	20.68	20.68	20.68	20.68	20.68
2007	22.23	22.23	22.23	22.23	22.23	22.23
2008	23.78	25.75	23.82	24.61	24.45	24.86
2009	22.63	22.63	22.63	22.63	22.63	22.63
2010	21.48	22.96	21.50	22.17	22.08	21.99
2011	21.70	21.70	21.70	21.70	21.70	21.70
2012	21.92	21.92	21.92	21.92	21.92	21.92
2013	22.14	22.14	22.14	22.14	22.14	22.14
2014	22.36	22.36	22.36	22.36	22.36	22.36
2015	22.58	22.58	22.58	22.58	22.58	22.58
2016	22.80	22.80	22.80	22.80	22.80	22.80
2017	23.02	23.02	23.02	23.02	23.02	23.02
2018	23.24	23.24	23.24	23.24	23.24	23.24
2019	23.46	23.46	23.46	23.46	23.46	23.46
2020	23.68	24.81	23.22	24.87	24.45	24.35
2021	23.57	23.57	23.57	23.57	23.57	23.57
2022	23.46	23.46	23.46	23.46	23.46	23.46
2023	23.36	23.36	23.36	23.36	23.36	23.36
2024	23.25	23.25	23.25	23.25	23.25	23.25
2025	23.14	23.14	23.14	23.14	23.14	23.14
2026	23.03	23.03	23.03	23.03	23.03	23.03
2027	22.93	22.93	22.93	22.93	22.93	22.93
2028	22.82	22.82	22.82	22.82	22.82	22.82
2029	22.71	22.71	22.71	22.71	22.71	22.71
2030	22.60	22.60	22.60	22.60	22.60	22.60
2031	22.50	22.50	22.50	22.50	22.50	22.50
2032	22.39	22.39	22.39	22.39	22.39	22.39
2033	22.28	22.28	22.28	22.28	22.28	22.28
2034	22.17	22.17	22.17	22.17	22.17	22.17
2035	22.07	23.07	21.84	23.29	22.54	22.47
2036	22.29	22.29	22.29	22.29	22.29	22.29
2037	22.52	22.52	22.52	22.52	22.52	22.52
2038	22.74	22.74	22.74	22.74	22.74	22.74
2039	22.97	22.97	22.97	22.97	22.97	22.97
2040	23.19	24.28	22.96	24.47	23.66	23.58

		Fresno	Kern	Kings	Madera	TCM			Tulare	MTC	SCAG	SACOG	SANDAG
						Merced	San Joaquin	Stanislaus					
2005	Region-specific fuel price[1] (dollars per gallon)	$ 2.81	$ 2.79	$ 2.78	$ 2.82	$ 2.84	$ 2.82	$ 2.84	$ 2.88	2.83	2.85	2.74	2.84
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	19.87	18.09	19.66	19.05	19.47	19.47	19.47	19.2	20.09	18.3	19.5	18.89
	Fuel related automobile operating cost (dollars per mile)	$ 0.14	$ 0.15	$ 0.14	$ 0.15	$ 0.15	$ 0.14	$ 0.15	$ 0.15				
	Non-fuel-related price[2] (dollars per mile)	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05
	Perceived automobile operating cost (cents per mile)	19.12	20.43	19.13	19.79	19.56	19.48	19.58	20.00	19.1	20.3	19.1	20
2008	Region-specific fuel price[1] (dollars per gallon)	$ 3.65	$ 3.63	$ 3.61	$ 3.67	$ 3.69	$ 3.67	$ 3.69	$ 3.75	3.68	3.53	3.53	3.35
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	19.74	17.74	19.49	18.97	19.21	19.21	19.21	19.14				
	Fuel related automobile operating cost (cents per mile)	$ 0.19	$ 0.20	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.19	$ 0.20				
	Non-fuel-related price[2] (dollars per mile)	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05				
	Perceived automobile operating cost (cents per mile)	23.78	25.75	23.82	24.61	24.49	24.38	24.50	24.86				
2010	Region-specific fuel price[1] (dollars per gallon)	$ 3.15	$ 3.13	$ 3.11	$ 3.16	$ 3.18	$ 3.16	$ 3.18	$ 3.23	3.17	n/a	3.09	2.92
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	19.57	17.81	19.34	18.83	19.05	19.05	19.05	18.95				
	Fuel related automobile operating cost (cents per mile)	$ 0.16	$ 0.18	$ 0.16	$ 0.17	$ 0.17	$ 0.17	$ 0.17	$ 0.17				
	Non-fuel-related price[2] (dollars per mile)	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054				
	Perceived automobile operating cost (cents per mile)	21.48	22.96	21.50	22.17	22.08	21.99	22.10	22.44				
2020	Region-specific fuel price[1] (dollars per gallon)	$ 4.06	$ 4.04	$ 4.02	$ 4.07	$ 4.10	$ 4.08	$ 4.10	$ 4.17	4.09	4.12	3.96	4.1
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	24.19	22.53	24.61	22.68	23.37	23.37	23.37	24.17	25.15	23.63	24.92	23.98
	Fuel related automobile operating cost (cents per mile)	$ 0.17	$ 0.18	$ 0.16	$ 0.18	$ 0.18	$ 0.17	$ 0.18	$ 0.17				
	Non-fuel-related price[2] (dollars per mile)	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07
	Perceived automobile operating cost (cents per mile)	23.68	24.81	23.22	24.87	24.45	24.35	24.46	24.14	23.1	24.3	22.8	24
2035	Region-specific fuel price[1] (dollars per gallon)	$ 4.81	$ 4.79	$ 4.76	$ 4.83	$ 4.86	$ 4.83	$ 4.87	$ 4.94	4.85	4.89	4.7	4.87
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	36.01	33.3	36.24	33.11	35.12	35.12	35.12	36.97	28.85	26.4	28.3	27.2
	Fuel related automobile operating cost (cents per mile)	$ 0.13	$ 0.14	$ 0.13	$ 0.15	$ 0.14	$ 0.14	$ 0.14	$ 0.13				
	Non-fuel-related price[2] (dollars per mile)	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	0.087	0.087	0.087
	Perceived automobile operating cost (cents per mile)	22.07	23.07	21.84	23.29	22.54	22.47	22.56	22.06	25.6	27.3	25.4	26.7
2040	Region-specific fuel price[1] (dollars per gallon)	$ 5.21	$ 5.18	$ 5.15	$ 5.22	$ 5.26	$ 5.23	$ 5.26	$ 5.34				
	Effective passenger vehicle fuel efficiency (EMFAC, miles per gallon)	37.46	34.55	37.7	34.45	36.62	36.62	36.62	38.61				
	Fuel related automobile operating cost (cents per mile)	$ 0.14	$ 0.15	$ 0.14	$ 0.15	$ 0.14	$ 0.14	$ 0.14	$ 0.14				
	Non-fuel-related price[2] (dollars per mile)	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09				
	Perceived automobile operating cost (cents per mile)	23.19	24.28	22.96	24.47	23.66	23.58	23.67	23.14				

Based on the memo prepared by MTC, SCAG, SACOG, and SANDAG in October 2014 titled Automobile Operating Cost for the Second Round of Sustainable Communities Strategies.

Notes 1. See Table 2 of *Automobile Operating Cost for the Second Round of Sustainable Communities Strategies*

2. See Table 5 of *Automobile Operating Cost for the Second Round of Sustainable Communities Strategies*

AutoOwnParam

;Index	Veh0	Veh1	Veh2	Veh3	Veh4	key
1	0	0	0	0	0	;Alt-specific Constant (set in calibration)
2	7.51	3.95	0	0	0	;commute_cost_ratio
3	0.0093	0	0	-0.0036	-0.0036	;ped-oriented intersection density
4	0.000009	0.00001	0	-5.1E-05	-0.000112	;transit accessibility
5	0.39	0.24	0	0	-0.19	;log employment density
11	0	0	0	0	0	;RU_group=RUG1
12	1.27	0.53	0	-1.53	-1.53	;RU_group=RUG3
13	0.27	0.27	0	0	0	;RU_group=RUG6
21	-1.16	1.5	0	-3.15	-4.94	;HH_size=HH1
22	-3.03	-0.42	0	-2.26	-4.19	;HH_size=HH2
23	-3.37	-0.24	0	-1.34	-3.4	;HH_size=HH3
24	-4.02	-0.66	0	-1.61	-3.13	;HH_size=HH4
25	-3.5	-0.89	0	-1.32	-2.44	;HH_size=HH5
31	0	0	0	0	0	;HH_inc=IncG1
32	-1.33	-0.28	0	0.86	0.98	;HH_inc=IncG2
33	-3.87	-0.93	0	1.2	2.35	;HH_inc=IncG3
34	-2.98	-1.55	0	1.55	2.35	;HH_inc=IncG4
35	-4.23	-1.96	0	1.44	2.87	;HH_inc=IncG5

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
1	1001	TOTHH	0.195	0.17	0	0	0.625	0	0	0	0	0	0	0	0	0	0	0	0
1	1002	HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1003	GQPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1004	RU1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1005	RU3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1006	RU6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1007	RUSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1008	RUSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1009	RUSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1010	RUSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1011	RU1_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1012	RU3_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1013	RU9_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1014	RU7SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1015	RU8SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1016	RU9SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1017	RU10SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1018	RU1_HHSIZE1_INC1	0.483	0.42	0	0	1.582	0	0	0	0	0	0	0	0	0	0	0	0
1	1019	RU1_HHSIZE1_INC2	0.483	0.42	0	0	1.582	0	0	0	0	0	0	0	0	0	0	0	0
1	1020	RU1_HHSIZE1_INC3	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1021	RU1_HHSIZE1_INC4	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1022	RU1_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1023	RU1_HHSIZE2_INC1	0.816	0.71	0	0	2.645	0	0	0	0	0	0	0	0	0	0	0	0
1	1024	RU1_HHSIZE2_INC2	0.816	0.71	0	0	2.645	0	0	0	0	0	0	0	0	0	0	0	0
1	1025	RU1_HHSIZE2_INC3	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
1	1026	RU1_HHSIZE2_INC4	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
1	1027	RU1_HHSIZE2_INC5	0.983	0.76	0	0	2.265	0	0	0	0	0	0	0	0	0	0	0	0
1	1028	RU1_HHSIZE3_INC1	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
1	1029	RU1_HHSIZE3_INC2	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
1	1030	RU1_HHSIZE3_INC3	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
1	1031	RU1_HHSIZE3_INC4	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
1	1032	RU1_HHSIZE3_INC5	1.762	1.37	0	0	4.081	0	0	0	0	0	0	0	0	0	0	0	0
1	1033	RU1_HHSIZE4_INC1	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
1	1034	RU1_HHSIZE4_INC2	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
1	1035	RU1_HHSIZE4_INC3	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
1	1036	RU1_HHSIZE4_INC4	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
1	1037	RU1_HHSIZE4_INC5	2.133	1.65	0	0	4.929	0	0	0	0	0	0	0	0	0	0	0	0
1	1038	RU1_HHSIZE5_INC1	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
1	1039	RU1_HHSIZE5_INC2	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
1	1040	RU1_HHSIZE5_INC3	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
1	1041	RU1_HHSIZE5_INC4	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
1	1042	RU1_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
1	1043	RU3_HHSIZE1_INC1	0.325	0.29	0	0	1.054	0	0	0	0	0	0	0	0	0	0	0	0
1	1044	RU3_HHSIZE1_INC2	0.325	0.29	0	0	1.054	0	0	0	0	0	0	0	0	0	0	0	0
1	1045	RU3_HHSIZE1_INC3	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1046	RU3_HHSIZE1_INC4	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1047	RU3_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1048	RU3_HHSIZE2_INC1	0.77	0.68	0	0	2.528	0	0	0	0	0	0	0	0	0	0	0	0
1	1049	RU3_HHSIZE2_INC2	0.77	0.68	0	0	2.528	0	0	0	0	0	0	0	0	0	0	0	0
1	1050	RU3_HHSIZE2_INC3	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
1	1051	RU3_HHSIZE2_INC4	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
1	1052	RU3_HHSIZE2_INC5	0.983	0.76	0	0	2.265	0	0	0	0	0	0	0	0	0	0	0	0
1	1053	RU3_HHSIZE3_INC1	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
1	1054	RU3_HHSIZE3_INC2	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
1	1055	RU3_HHSIZE3_INC3	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
1	1056	RU3_HHSIZE3_INC4	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
1	1057	RU3_HHSIZE3_INC5	1.762	1.37	0	0	4.081	0	0	0	0	0	0	0	0	0	0	0	0
1	1058	RU3_HHSIZE4_INC1	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
1	1059	RU3_HHSIZE4_INC2	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
1	1060	RU3_HHSIZE4_INC3	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
1	1061	RU3_HHSIZE4_INC4	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
1	1062	RU3_HHSIZE4_INC5	2.133	1.65	0	0	4.929	0	0	0	0	0	0	0	0	0	0	0	0
1	1063	RU3_HHSIZE5_INC1	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
1	1064	RU3_HHSIZE5_INC2	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
1	1065	RU3_HHSIZE5_INC3	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
1	1066	RU3_HHSIZE5_INC4	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
1	1067	RU3_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
1	1068	RU9_HHSIZE1_INC1	0.325	0.29	0	0	1.054	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
1	1069	RU9_HHSIZE1_INC2	0.325	0.29	0	0	1.054	0	0	0	0	0	0	0	0	0	0	0	0
1	1070	RU9_HHSIZE1_INC3	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1071	RU9_HHSIZE1_INC4	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1072	RU9_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
1	1073	RU9_HHSIZE2_INC1	0.77	0.68	0	0	2.528	0	0	0	0	0	0	0	0	0	0	0	0
1	1074	RU9_HHSIZE2_INC2	0.77	0.68	0	0	2.528	0	0	0	0	0	0	0	0	0	0	0	0
1	1075	RU9_HHSIZE2_INC3	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
1	1076	RU9_HHSIZE2_INC4	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
1	1077	RU9_HHSIZE2_INC5	0.983	0.76	0	0	2.265	0	0	0	0	0	0	0	0	0	0	0	0
1	1078	RU9_HHSIZE3_INC1	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
1	1079	RU9_HHSIZE3_INC2	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
1	1080	RU9_HHSIZE3_INC3	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
1	1081	RU9_HHSIZE3_INC4	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
1	1082	RU9_HHSIZE3_INC5	1.762	1.37	0	0	4.081	0	0	0	0	0	0	0	0	0	0	0	0
1	1083	RU9_HHSIZE4_INC1	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
1	1084	RU9_HHSIZE4_INC2	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
1	1085	RU9_HHSIZE4_INC3	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
1	1086	RU9_HHSIZE4_INC4	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
1	1087	RU9_HHSIZE4_INC5	2.133	1.65	0	0	4.929	0	0	0	0	0	0	0	0	0	0	0	0
1	1088	RU9_HHSIZE5_INC1	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
1	1089	RU9_HHSIZE5_INC2	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
1	1090	RU9_HHSIZE5_INC3	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
1	1091	RU9_HHSIZE5_INC4	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
1	1092	RU9_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
1	1093	RU1_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1094	RU1_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1095	RU1_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1096	RU1_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1097	RU3_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1098	RU3_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1099	RU3_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1100	RU3_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1101	RU9_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1102	RU9_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1103	RU9_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1104	RU9_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1105	POP0005	0	0	0.04	0	0	0	0	0	0	0	0	0	0	0.048	0	0.03	0.038
1	1106	POP0514	0	0	0.28	0	0	0	0	0	0	0	0	0	0	0.365	0	0.23	0.26
1	1107	POP1517	0	0	0.09	0.31	0	0	0	0	0	0	0	0	0	0	0.462	0	0
1	1108	POP1824	0	0	0	0.19	0	0	0	0	0	0	0	0	0	0	0.077	0	0
1	1109	POP2554	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0	0.01	0	0
1	1110	POP5564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1111	POP6574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1112	POP75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1113	EMPEDU	0	0	0	0	0	0	0	0	0	0	0	0.933	0	0	0	0	0
1	1114	EMPFOO	0	0	0	0	0	3.324	7.472	0	0	0	0	1.267	6.343	0	0	11.2	2.007
1	1115	EMPGOV	0	0	0	0	0	1.032	0.566	0	0	0	0	2.793	0	0	0	3.98	0.585
1	1116	EMPIND	0	0	0	0	0	0	0	0	0	0	0	1.388	0	0	0	3.27	0
1	1117	EMPMED	0	0	0	0	0	0.496	0.278	0	0	0	0	1.359	0	0	0	1.94	0.278
1	1118	EMPOFC	0	0	0	0	0	0.645	0.358	0	0	0	0	1.783	0	0	0	2.54	0.365
1	1119	EMPOTH	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
1	1120	EMPRET	0	0	0	0	0	2.491	5.607	0	0	0	0	0.948	4.758	0	0	8.43	1.509
1	1121	EMPAGR	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
1	1122	POPDORM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1123	POPASSIST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1124	POPMILITARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1125	EMPSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1126	EMPSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1127	EMPSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1128	EMPSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1129	EMPSPARE5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1130	EMPSPARE6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1131	EMPSPARE7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1132	EMPSPARE8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1133	ELEM	0	0	0.82	0	0	0	0	0	0	0	0	0	0	1.095	0	0.67	0.778
1	1134	HS	0	0	0.36	1.17	0	0	0	0	0	0	0	0	0	0	1.767	0	0
1	1135	COLLEGE	0	0	0	0.23	0	0	0	0	0	0	0	0	0	0	0.087	0	0
2	2001	TOTHH	0.195	0.17	0	0	0.625	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
2	2002	HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2003	GQPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2004	RU1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2005	RU3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2006	RU6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2007	RUSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2008	RUSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2009	RUSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2010	RUSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2011	RU1_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2012	RU3_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2013	RU9_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2014	RU7SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2015	RU8SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2016	RU9SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2017	RU10SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2018	RU1_HHSIZE1_INC1	0.483	0.42	0	0	1.582	0	0	0	0	0	0	0	0	0	0	0	0
2	2019	RU1_HHSIZE1_INC2	0.483	0.42	0	0	1.582	0	0	0	0	0	0	0	0	0	0	0	0
2	2020	RU1_HHSIZE1_INC3	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2021	RU1_HHSIZE1_INC4	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2022	RU1_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2023	RU1_HHSIZE2_INC1	0.816	0.71	0	0	2.645	0	0	0	0	0	0	0	0	0	0	0	0
2	2024	RU1_HHSIZE2_INC2	0.816	0.71	0	0	2.645	0	0	0	0	0	0	0	0	0	0	0	0
2	2025	RU1_HHSIZE2_INC3	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
2	2026	RU1_HHSIZE2_INC4	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
2	2027	RU1_HHSIZE2_INC5	0.983	0.76	0	0	2.265	0	0	0	0	0	0	0	0	0	0	0	0
2	2028	RU1_HHSIZE3_INC1	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
2	2029	RU1_HHSIZE3_INC2	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
2	2030	RU1_HHSIZE3_INC3	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
2	2031	RU1_HHSIZE3_INC4	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
2	2032	RU1_HHSIZE3_INC5	1.762	1.37	0	0	4.081	0	0	0	0	0	0	0	0	0	0	0	0
2	2033	RU1_HHSIZE4_INC1	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
2	2034	RU1_HHSIZE4_INC2	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
2	2035	RU1_HHSIZE4_INC3	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
2	2036	RU1_HHSIZE4_INC4	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
2	2037	RU1_HHSIZE4_INC5	2.133	1.65	0	0	4.929	0	0	0	0	0	0	0	0	0	0	0	0
2	2038	RU1_HHSIZE5_INC1	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
2	2039	RU1_HHSIZE5_INC2	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
2	2040	RU1_HHSIZE5_INC3	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
2	2041	RU1_HHSIZE5_INC4	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
2	2042	RU1_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
2	2043	RU3_HHSIZE1_INC1	0.325	0.29	0	0	1.054	0	0	0	0	0	0	0	0	0	0	0	0
2	2044	RU3_HHSIZE1_INC2	0.325	0.29	0	0	1.054	0	0	0	0	0	0	0	0	0	0	0	0
2	2045	RU3_HHSIZE1_INC3	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2046	RU3_HHSIZE1_INC4	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2047	RU3_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2048	RU3_HHSIZE2_INC1	0.77	0.68	0	0	2.528	0	0	0	0	0	0	0	0	0	0	0	0
2	2049	RU3_HHSIZE2_INC2	0.77	0.68	0	0	2.528	0	0	0	0	0	0	0	0	0	0	0	0
2	2050	RU3_HHSIZE2_INC3	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
2	2051	RU3_HHSIZE2_INC4	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
2	2052	RU3_HHSIZE2_INC5	0.983	0.76	0	0	2.265	0	0	0	0	0	0	0	0	0	0	0	0
2	2053	RU3_HHSIZE3_INC1	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
2	2054	RU3_HHSIZE3_INC2	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
2	2055	RU3_HHSIZE3_INC3	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
2	2056	RU3_HHSIZE3_INC4	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
2	2057	RU3_HHSIZE3_INC5	1.762	1.37	0	0	4.081	0	0	0	0	0	0	0	0	0	0	0	0
2	2058	RU3_HHSIZE4_INC1	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
2	2059	RU3_HHSIZE4_INC2	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
2	2060	RU3_HHSIZE4_INC3	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
2	2061	RU3_HHSIZE4_INC4	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
2	2062	RU3_HHSIZE4_INC5	2.133	1.65	0	0	4.929	0	0	0	0	0	0	0	0	0	0	0	0
2	2063	RU3_HHSIZE5_INC1	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
2	2064	RU3_HHSIZE5_INC2	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
2	2065	RU3_HHSIZE5_INC3	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
2	2066	RU3_HHSIZE5_INC4	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
2	2067	RU3_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
2	2068	RU9_HHSIZE1_INC1	0.325	0.29	0	0	1.054	0	0	0	0	0	0	0	0	0	0	0	0
2	2069	RU9_HHSIZE1_INC2	0.325	0.29	0	0	1.054	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
2	2070	RU9_HHSIZE1_INC3	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2071	RU9_HHSIZE1_INC4	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2072	RU9_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
2	2073	RU9_HHSIZE2_INC1	0.77	0.68	0	0	2.528	0	0	0	0	0	0	0	0	0	0	0	0
2	2074	RU9_HHSIZE2_INC2	0.77	0.68	0	0	2.528	0	0	0	0	0	0	0	0	0	0	0	0
2	2075	RU9_HHSIZE2_INC3	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
2	2076	RU9_HHSIZE2_INC4	0.964	0.75	0	0	2.226	0	0	0	0	0	0	0	0	0	0	0	0
2	2077	RU9_HHSIZE2_INC5	0.983	0.76	0	0	2.265	0	0	0	0	0	0	0	0	0	0	0	0
2	2078	RU9_HHSIZE3_INC1	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
2	2079	RU9_HHSIZE3_INC2	1.141	1	0	0	3.749	0	0	0	0	0	0	0	0	0	0	0	0
2	2080	RU9_HHSIZE3_INC3	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
2	2081	RU9_HHSIZE3_INC4	1.28	0.99	0	0	2.977	0	0	0	0	0	0	0	0	0	0	0	0
2	2082	RU9_HHSIZE3_INC5	1.762	1.37	0	0	4.081	0	0	0	0	0	0	0	0	0	0	0	0
2	2083	RU9_HHSIZE4_INC1	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
2	2084	RU9_HHSIZE4_INC2	1.567	1.37	0	0	5.116	0	0	0	0	0	0	0	0	0	0	0	0
2	2085	RU9_HHSIZE4_INC3	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
2	2086	RU9_HHSIZE4_INC4	1.976	1.53	0	0	4.578	0	0	0	0	0	0	0	0	0	0	0	0
2	2087	RU9_HHSIZE4_INC5	2.133	1.65	0	0	4.929	0	0	0	0	0	0	0	0	0	0	0	0
2	2088	RU9_HHSIZE5_INC1	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
2	2089	RU9_HHSIZE5_INC2	2.17	1.9	0	0	7.058	0	0	0	0	0	0	0	0	0	0	0	0
2	2090	RU9_HHSIZE5_INC3	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
2	2091	RU9_HHSIZE5_INC4	3.2	2.49	0	0	7.4	0	0	0	0	0	0	0	0	0	0	0	0
2	2092	RU9_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
2	2093	RU1_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2094	RU1_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2095	RU1_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2096	RU1_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2097	RU3_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2098	RU3_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2099	RU3_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2100	RU3_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2101	RU9_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2102	RU9_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2103	RU9_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2104	RU9_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2105	POP0005	0	0	0.04	0	0	0	0	0	0	0	0	0	0	0.048	0	0.03	0.038
2	2106	POP0514	0	0	0.28	0	0	0	0	0	0	0	0	0	0	0.365	0	0.23	0.26
2	2107	POP1517	0	0	0.09	0.31	0	0	0	0	0	0	0	0	0	0	0.462	0	0
2	2108	POP1824	0	0	0	0.19	0	0	0	0	0	0	0	0	0	0	0.077	0	0
2	2109	POP2554	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0	0.01	0	0
2	2110	POP5564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2111	POP6574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2112	POP75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2113	EMPEDU	0	0	0	0	0	0	0	0	0	0	0	0.933	0	0	0	0	0
2	2114	EMPFOO	0	0	0	0	0	3.324	7.472	0	0	0	0	1.267	6.343	0	0	11.2	2.007
2	2115	EMPGOV	0	0	0	0	0	1.032	0.566	0	0	0	0	2.793	0	0	0	3.98	0.585
2	2116	EMPIND	0	0	0	0	0	0	0	0	0	0	0	1.388	0	0	0	3.27	0
2	2117	EMPMED	0	0	0	0	0	0.496	0.278	0	0	0	0	1.359	0	0	0	1.94	0.278
2	2118	EMPOFC	0	0	0	0	0	0.645	0.358	0	0	0	0	1.783	0	0	0	2.54	0.365
2	2119	EMPOTH	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
2	2120	EMPRET	0	0	0	0	0	2.491	5.607	0	0	0	0	0.948	4.758	0	0	8.43	1.509
2	2121	EMPAGR	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
2	2122	POPDORM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2123	POPASSIST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2124	POPMILITARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2125	EMPSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2126	EMPSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2127	EMPSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2128	EMPSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2129	EMPSPARE5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2130	EMPSPARE6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2131	EMPSPARE7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2132	EMPSPARE8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2133	ELEM	0	0	0.82	0	0	0	0	0	0	0	0	0	0	1.095	0	0.67	0.778
2	2134	HS	0	0	0.36	1.17	0	0	0	0	0	0	0	0	0	0	1.767	0	0
2	2135	COLLEGE	0	0	0	0.23	0	0	0	0	0	0	0	0	0	0	0.087	0	0
3	3001	TOTHH	0.195	0.17	0	0	0.625	0	0	0	0	0	0	0	0	0	0	0	0
3	3002	HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
3	3003	GQPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3004	RU1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3005	RU3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3006	RU6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3007	RUSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3008	RUSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3009	RUSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3010	RUSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3011	RU1_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3012	RU3_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3013	RU9_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3014	RU7SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3015	RU8SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3016	RU9SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3017	RU10SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3018	RU1_HHSIZE1_INC1	0.455	0.39	0	0	1.465	0	0	0	0	0	0	0	0	0	0	0	0
3	3019	RU1_HHSIZE1_INC2	0.455	0.39	0	0	1.465	0	0	0	0	0	0	0	0	0	0	0	0
3	3020	RU1_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
3	3021	RU1_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
3	3022	RU1_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
3	3023	RU1_HHSIZE2_INC1	0.826	0.71	0	0	2.684	0	0	0	0	0	0	0	0	0	0	0	0
3	3024	RU1_HHSIZE2_INC2	0.826	0.71	0	0	2.684	0	0	0	0	0	0	0	0	0	0	0	0
3	3025	RU1_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
3	3026	RU1_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
3	3027	RU1_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
3	3028	RU1_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
3	3029	RU1_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
3	3030	RU1_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
3	3031	RU1_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
3	3032	RU1_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
3	3033	RU1_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
3	3034	RU1_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
3	3035	RU1_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
3	3036	RU1_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
3	3037	RU1_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
3	3038	RU1_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
3	3039	RU1_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
3	3040	RU1_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
3	3041	RU1_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
3	3042	RU1_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
3	3043	RU3_HHSIZE1_INC1	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
3	3044	RU3_HHSIZE1_INC2	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
3	3045	RU3_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
3	3046	RU3_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
3	3047	RU3_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
3	3048	RU3_HHSIZE2_INC1	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
3	3049	RU3_HHSIZE2_INC2	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
3	3050	RU3_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
3	3051	RU3_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
3	3052	RU3_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
3	3053	RU3_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
3	3054	RU3_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
3	3055	RU3_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
3	3056	RU3_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
3	3057	RU3_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
3	3058	RU3_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
3	3059	RU3_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
3	3060	RU3_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
3	3061	RU3_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
3	3062	RU3_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
3	3063	RU3_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
3	3064	RU3_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
3	3065	RU3_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
3	3066	RU3_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
3	3067	RU3_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
3	3068	RU9_HHSIZE1_INC1	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
3	3069	RU9_HHSIZE1_INC2	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
3	3070	RU9_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
3	3071	RU9_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
3	3072	RU9_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
3	3073	RU9_HHSIZE2_INC1	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
3	3074	RU9_HHSIZE2_INC2	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
3	3075	RU9_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
3	3076	RU9_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
3	3077	RU9_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
3	3078	RU9_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
3	3079	RU9_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
3	3080	RU9_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
3	3081	RU9_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
3	3082	RU9_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
3	3083	RU9_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
3	3084	RU9_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
3	3085	RU9_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
3	3086	RU9_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
3	3087	RU9_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
3	3088	RU9_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
3	3089	RU9_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
3	3090	RU9_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
3	3091	RU9_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
3	3092	RU9_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
3	3093	RU1_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3094	RU1_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3095	RU1_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3096	RU1_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3097	RU3_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3098	RU3_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3099	RU3_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3100	RU3_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3101	RU9_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3102	RU9_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3103	RU9_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3104	RU9_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3105	POP0005	0	0	0.06	0	0	0	0	0	0	0	0	0	0.077	0	0.05	0.048	
3	3106	POP0514	0	0	0.25	0	0	0	0	0	0	0	0	0	0.337	0	0.2	0.24	
3	3107	POP1517	0	0	0.11	0.37	0	0	0	0	0	0	0	0	0	0.557	0	0	
3	3108	POP1824	0	0	0	0.23	0	0	0	0	0	0	0	0	0	0.087	0	0	
3	3109	POP2554	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0.01	0	0	
3	3110	POP5564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	3111	POP6574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	3112	POP75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	3113	EMPEDU	0	0	0	0	0	0	0	0	0	0	0	0.933	0	0	0	0	0
3	3114	EMPFOO	0	0	0	0	0	3.324	7.472	0	0	0	0	1.267	6.343	0	0	11.2	2.007
3	3115	EMPGOV	0	0	0	0	0	1.032	0.566	0	0	0	0	2.793	0	0	0	3.98	0.585
3	3116	EMPIND	0	0	0	0	0	0	0	0	0	0	0	1.388	0	0	0	3.27	0
3	3117	EMPMED	0	0	0	0	0	0.496	0.278	0	0	0	0	1.359	0	0	0	1.94	0.278
3	3118	EMPOFC	0	0	0	0	0	0.645	0.358	0	0	0	0	1.783	0	0	0	2.54	0.365
3	3119	EMPOTH	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
3	3120	EMPRET	0	0	0	0	0	2.491	5.607	0	0	0	0	0.948	4.758	0	0	8.43	1.509
3	3121	EMPAGR	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
3	3122	POPDORM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3123	POPASSIST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3124	POPMILITARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3125	EMPSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3126	EMPSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3127	EMPSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3128	EMPSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3129	EMPSPARE5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3130	EMPSPARE6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3131	EMPSPARE7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3132	EMPSPARE8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3133	ELEM	0	0	0.82	0	0	0	0	0	0	0	0	0	1.095	0	0.67	0.778	
3	3134	HS	0	0	0.36	1.17	0	0	0	0	0	0	0	0	0	1.767	0	0	
3	3135	COLLEGE	0	0	0	0.23	0	0	0	0	0	0	0	0	0	0.087	0	0	
4	4001	TOTHH	0.195	0.17	0	0	0.625	0	0	0	0	0	0	0	0	0	0	0	0
4	4002	HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4003	GQPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
4	4004	RU1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4005	RU3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4006	RU6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4007	RUSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4008	RUSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4009	RUSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4010	RUSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4011	RU1_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4012	RU3_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4013	RU9_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4014	RU7SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4015	RU8SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4016	RU9SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4017	RU10SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4018	RU1_HHSIZE1_INC1	0.455	0.39	0	0	1.465	0	0	0	0	0	0	0	0	0	0	0	0
4	4019	RU1_HHSIZE1_INC2	0.455	0.39	0	0	1.465	0	0	0	0	0	0	0	0	0	0	0	0
4	4020	RU1_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
4	4021	RU1_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
4	4022	RU1_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
4	4023	RU1_HHSIZE2_INC1	0.826	0.71	0	0	2.684	0	0	0	0	0	0	0	0	0	0	0	0
4	4024	RU1_HHSIZE2_INC2	0.826	0.71	0	0	2.684	0	0	0	0	0	0	0	0	0	0	0	0
4	4025	RU1_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
4	4026	RU1_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
4	4027	RU1_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
4	4028	RU1_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
4	4029	RU1_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
4	4030	RU1_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
4	4031	RU1_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
4	4032	RU1_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
4	4033	RU1_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
4	4034	RU1_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
4	4035	RU1_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
4	4036	RU1_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
4	4037	RU1_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
4	4038	RU1_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
4	4039	RU1_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
4	4040	RU1_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
4	4041	RU1_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
4	4042	RU1_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
4	4043	RU3_HHSIZE1_INC1	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
4	4044	RU3_HHSIZE1_INC2	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
4	4045	RU3_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
4	4046	RU3_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
4	4047	RU3_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
4	4048	RU3_HHSIZE2_INC1	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
4	4049	RU3_HHSIZE2_INC2	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
4	4050	RU3_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
4	4051	RU3_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
4	4052	RU3_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
4	4053	RU3_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
4	4054	RU3_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
4	4055	RU3_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
4	4056	RU3_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
4	4057	RU3_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
4	4058	RU3_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
4	4059	RU3_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
4	4060	RU3_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
4	4061	RU3_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
4	4062	RU3_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
4	4063	RU3_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
4	4064	RU3_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
4	4065	RU3_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
4	4066	RU3_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
4	4067	RU3_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
4	4068	RU9_HHSIZE1_INC1	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
4	4069	RU9_HHSIZE1_INC2	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
4	4070	RU9_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
4	4071	RU9_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
4	4072	RU9_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
4	4073	RU9_HHSIZE2_INC1	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
4	4074	RU9_HHSIZE2_INC2	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
4	4075	RU9_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
4	4076	RU9_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
4	4077	RU9_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
4	4078	RU9_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
4	4079	RU9_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
4	4080	RU9_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
4	4081	RU9_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
4	4082	RU9_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
4	4083	RU9_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
4	4084	RU9_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
4	4085	RU9_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
4	4086	RU9_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
4	4087	RU9_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
4	4088	RU9_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
4	4089	RU9_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
4	4090	RU9_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
4	4091	RU9_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
4	4092	RU9_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
4	4093	RU1_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4094	RU1_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4095	RU1_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4096	RU1_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4097	RU3_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4098	RU3_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4099	RU3_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4100	RU3_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4101	RU9_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4102	RU9_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4103	RU9_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4104	RU9_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4105	POP0005	0	0	0.06	0	0	0	0	0	0	0	0	0	0	0.077	0	0.05	0.048
4	4106	POP0514	0	0	0.25	0	0	0	0	0	0	0	0	0	0	0.337	0	0.2	0.24
4	4107	POP1517	0	0	0.11	0.37	0	0	0	0	0	0	0	0	0	0	0.557	0	0
4	4108	POP1824	0	0	0	0.23	0	0	0	0	0	0	0	0	0	0	0.087	0	0
4	4109	POP2554	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0	0.01	0	0
4	4110	POP5564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4111	POP6574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4112	POP75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4113	EMPEDU	0	0	0	0	0	0	0	0	0	0	0	0.933	0	0	0	0	0
4	4114	EMPFOO	0	0	0	0	0	3.324	7.472	0	0	0	0	1.267	6.343	0	0	11.2	2.007
4	4115	EMPGOV	0	0	0	0	0	1.032	0.566	0	0	0	0	2.793	0	0	0	3.98	0.585
4	4116	EMPIND	0	0	0	0	0	0	0	0	0	0	0	1.388	0	0	0	3.27	0
4	4117	EMPMED	0	0	0	0	0	0.496	0.278	0	0	0	0	1.359	0	0	0	1.94	0.278
4	4118	EMPOFC	0	0	0	0	0	0.645	0.358	0	0	0	0	1.783	0	0	0	2.54	0.365
4	4119	EMPOTH	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
4	4120	EMPRET	0	0	0	0	0	2.491	5.607	0	0	0	0	0.948	4.758	0	0	8.43	1.509
4	4121	EMPAGR	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
4	4122	POPDORM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4123	POPASSIST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4124	POPMILITARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4125	EMPSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4126	EMPSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4127	EMPSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4128	EMPSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4129	EMPSPARE5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4130	EMPSPARE6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4131	EMPSPARE7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4132	EMPSPARE8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4133	ELEM	0	0	0.82	0	0	0	0	0	0	0	0	0	0	1.095	0	0.67	0.778
4	4134	HS	0	0	0.36	1.17	0	0	0	0	0	0	0	0	0	0	1.767	0	0
4	4135	COLLEGE	0	0	0	0.23	0	0	0	0	0	0	0	0	0	0	0.087	0	0
5	5001	TOTHH	0.195	0.17	0	0	0.625	0	0	0	0	0	0	0	0	0	0	0	0
5	5002	HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5003	GQPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5004	RU1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
5	5005	RU3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5006	RU6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5007	RUSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5008	RUSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5009	RUSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5010	RUSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5011	RU1_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5012	RU3_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5013	RU9_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5014	RU7SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5015	RU8SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5016	RU9SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5017	RU10SPARE_HHPOP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5018	RU1_HHSIZE1_INC1	0.455	0.39	0	0	1.465	0	0	0	0	0	0	0	0	0	0	0	0
5	5019	RU1_HHSIZE1_INC2	0.455	0.39	0	0	1.465	0	0	0	0	0	0	0	0	0	0	0	0
5	5020	RU1_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
5	5021	RU1_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
5	5022	RU1_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
5	5023	RU1_HHSIZE2_INC1	0.826	0.71	0	0	2.684	0	0	0	0	0	0	0	0	0	0	0	0
5	5024	RU1_HHSIZE2_INC2	0.826	0.71	0	0	2.684	0	0	0	0	0	0	0	0	0	0	0	0
5	5025	RU1_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
5	5026	RU1_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
5	5027	RU1_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
5	5028	RU1_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
5	5029	RU1_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
5	5030	RU1_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
5	5031	RU1_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
5	5032	RU1_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
5	5033	RU1_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
5	5034	RU1_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
5	5035	RU1_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
5	5036	RU1_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
5	5037	RU1_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
5	5038	RU1_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
5	5039	RU1_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
5	5040	RU1_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
5	5041	RU1_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
5	5042	RU1_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
5	5043	RU3_HHSIZE1_INC1	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
5	5044	RU3_HHSIZE1_INC2	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
5	5045	RU3_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
5	5046	RU3_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
5	5047	RU3_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0
5	5048	RU3_HHSIZE2_INC1	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
5	5049	RU3_HHSIZE2_INC2	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
5	5050	RU3_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
5	5051	RU3_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
5	5052	RU3_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
5	5053	RU3_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
5	5054	RU3_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
5	5055	RU3_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
5	5056	RU3_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
5	5057	RU3_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
5	5058	RU3_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
5	5059	RU3_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
5	5060	RU3_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
5	5061	RU3_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
5	5062	RU3_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
5	5063	RU3_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
5	5064	RU3_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
5	5065	RU3_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
5	5066	RU3_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
5	5067	RU3_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
5	5068	RU9_HHSIZE1_INC1	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
5	5069	RU9_HHSIZE1_INC2	0.417	0.36	0	0	1.348	0	0	0	0	0	0	0	0	0	0	0	0
5	5070	RU9_HHSIZE1_INC3	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
5	5071	RU9_HHSIZE1_INC4	0.677	0.52	0	0	1.561	0	0	0	0	0	0	0	0	0	0	0	0
5	5072	RU9_HHSIZE1_INC5	0.64	0.51	0	0	1.493	0	0	0	0	0	0	0	0	0	0	0	0

/* Area Type	LU Code	LU_Type	HW_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	TS_P	TM_P	TH_P	HW_A	HS_A	HK_A	HC_A	HO_A	WO_A
5	5073	RU9_HHSIZE2_INC1	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
5	5074	RU9_HHSIZE2_INC2	0.844	0.73	0	0	2.743	0	0	0	0	0	0	0	0	0	0	0	0
5	5075	RU9_HHSIZE2_INC3	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
5	5076	RU9_HHSIZE2_INC4	1.196	0.93	0	0	2.762	0	0	0	0	0	0	0	0	0	0	0	0
5	5077	RU9_HHSIZE2_INC5	1.178	0.92	0	0	2.724	0	0	0	0	0	0	0	0	0	0	0	0
5	5078	RU9_HHSIZE3_INC1	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
5	5079	RU9_HHSIZE3_INC2	1.187	1.04	0	0	3.866	0	0	0	0	0	0	0	0	0	0	0	0
5	5080	RU9_HHSIZE3_INC3	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
5	5081	RU9_HHSIZE3_INC4	1.753	1.36	0	0	4.061	0	0	0	0	0	0	0	0	0	0	0	0
5	5082	RU9_HHSIZE3_INC5	1.771	1.38	0	0	4.11	0	0	0	0	0	0	0	0	0	0	0	0
5	5083	RU9_HHSIZE4_INC1	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
5	5084	RU9_HHSIZE4_INC2	1.919	1.69	0	0	6.286	0	0	0	0	0	0	0	0	0	0	0	0
5	5085	RU9_HHSIZE4_INC3	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
5	5086	RU9_HHSIZE4_INC4	2.273	1.77	0	0	5.261	0	0	0	0	0	0	0	0	0	0	0	0
5	5087	RU9_HHSIZE4_INC5	2.559	1.99	0	0	5.926	0	0	0	0	0	0	0	0	0	0	0	0
5	5088	RU9_HHSIZE5_INC1	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
5	5089	RU9_HHSIZE5_INC2	2.606	2.28	0	0	8.521	0	0	0	0	0	0	0	0	0	0	0	0
5	5090	RU9_HHSIZE5_INC3	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
5	5091	RU9_HHSIZE5_INC4	3.672	2.86	0	0	8.502	0	0	0	0	0	0	0	0	0	0	0	0
5	5092	RU9_HHSIZE5_INC5	2.837	2.2	0	0	6.56	0	0	0	0	0	0	0	0	0	0	0	0
5	5093	RU1_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5094	RU1_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5095	RU1_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5096	RU1_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5097	RU3_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5098	RU3_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5099	RU3_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5100	RU3_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5101	RU9_AGE1524	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5102	RU9_AGE2564	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5103	RU9_AGE6574	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5104	RU9_AGE75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5105	POP0005	0	0	0.06	0	0	0	0	0	0	0	0	0	0	0.077	0	0.05	0.048
5	5106	POP0514	0	0	0.25	0	0	0	0	0	0	0	0	0	0	0.337	0	0.2	0.24
5	5107	POP1517	0	0	0.11	0.37	0	0	0	0	0	0	0	0	0	0.557	0	0	0
5	5108	POP1824	0	0	0	0.23	0	0	0	0	0	0	0	0	0	0.087	0	0	0
5	5109	POP2554	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0.01	0	0	0
5	5110	POP5564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5111	POP6574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5112	POP75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5113	EMPEDU	0	0	0	0	0	0	0	0	0	0	0	0.933	0	0	0	0	0
5	5114	EMPFOO	0	0	0	0	0	3.324	7.472	0	0	0	0	1.267	6.343	0	0	11.2	2.007
5	5115	EMPGOV	0	0	0	0	0	1.032	0.566	0	0	0	0	2.793	0	0	0	3.98	0.585
5	5116	EMPIND	0	0	0	0	0	0	0	0	0	0	0	1.388	0	0	0	3.27	0
5	5117	EMPMED	0	0	0	0	0	0.496	0.278	0	0	0	0	1.359	0	0	0	1.94	0.278
5	5118	EMPOFC	0	0	0	0	0	0.645	0.358	0	0	0	0	1.783	0	0	0	2.54	0.365
5	5119	EMPOTH	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
5	5120	EMPRET	0	0	0	0	0	2.491	5.607	0	0	0	0	0.948	4.758	0	0	8.43	1.509
5	5121	EMPAGR	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0.99	0
5	5122	POPDORM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5123	POPASSIST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5124	POPMILITARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5125	EMPSPARE1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5126	EMPSPARE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5127	EMPSPARE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5128	EMPSPARE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5129	EMPSPARE5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5130	EMPSPARE6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5131	EMPSPARE7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5132	EMPSPARE8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5133	ELEM	0	0	0.82	0	0	0	0	0	0	0	0	0	0	1.095	0	0.67	0.778
5	5134	HS	0	0	0.36	1.17	0	0	0	0	0	0	0	0	0	0	1.767	0	0
5	5135	COLLEGE	0	0	0	0.23	0	0	0	0	0	0	0	0	0	0	0.087	0	0

CrossClass_TripRates_Trucks

/* LU Code	LU_Type	TS_People	TS_Mail	TS_UrbFrt	TS_Const	TS_Service	TM_People	TM_Mail	TM_UrbFrt	TM_Const	TM_Service	TH_People	TH_Mail	TM_UrbFrt	TH_Const	TH_Service */
101	TOTHH	0.0075	0.00167	0.03551	0.03041	0.35243	0.0051	0.00008	0.00719	0.0107	0.09483	0	0.00001	0.00345	0.00394	0.00161
102	TOTEMP	0.0121	0.00167	0	0.03041	0.32839	0.00158	0.00008	0	0.0107	0.0844	0	0.00001	0	0.00394	0.00161
103	RETAIL	0	0	0.12571	0	0	0	0	0.01835	0	0	0	0	0.00592	0	0
104	AG	0	0	0.15714	0	0	0	0	0.02099	0	0	0	0	0.01583	0	0
105	MINING	0	0	0.15714	0	0	0	0	0.02099	0	0	0	0	0.01583	0	0
106	CONSTR	0	0	0.15714	0.03041	0	0	0	0.02099	0.0107	0	0	0	0.01583	0.00394	0
107	MFGPROD	0	0	0.13278	0	0	0	0	0.01758	0	0	0	0	0.00945	0	0
108	MFGEQUIP	0	0	0.13278	0	0	0	0	0.01758	0	0	0	0	0.00945	0	0
109	TRANSP	0	0	0.13278	0	0	0	0	0.01758	0	0	0	0	0.00945	0	0
110	WHLSALE	0	0	0.13278	0	0	0	0	0.01758	0	0	0	0	0.00945	0	0
111	FINANCE	0	0	0.06186	0	0	0	0	0.0049	0	0	0	0	0.00081	0	0
112	EDUGOV	0	0	0.06186	0	0	0	0	0.0049	0	0	0	0	0.00081	0	0

INDEX	A	KEY
1	-999	;INTCAP_HBW_CONSTANT
2	-999	;INTCAP_HBW_MXD_EMP
3	-999	;INTCAP_HBW_MXD_AREA
4	-999	;INTCAP_HBW_DIVERSITY
5	-999	;INTCAP_HBW_INTDEN
6	-999	;INTCAP_HBW_HHSIZE
7	-999	;INTCAP_HBW_VEHOWN
8	-999	;INTCAP_HBO_CONSTANT
9	-999	;INTCAP_HBO_MXD_EMP
10	-999	;INTCAP_HBO_MXD_AREA
11	-999	;INTCAP_HBO_DIVERSITY
12	-999	;INTCAP_HBO_INTDEN
13	-999	;INTCAP_HBO_HHSIZE
14	-999	;INTCAP_HBO_VEHOWN
15	-999	;INTCAP_NHB_CONSTANT
16	-999	;INTCAP_NHB_MXD_EMP
17	-999	;INTCAP_NHB_MXD_AREA
18	-999	;INTCAP_NHB_DIVERSITY
19	-999	;INTCAP_NHB_INTDEN
20	-999	;INTCAP_NHB_HHSIZE
21	-999	;INTCAP_NHB_VEHOWN
22	-999	;EXTWALK_HBW_CONSTANT
23	-999	;EXTWALK_HBW_MXD_AREA
24	-999	;EXTWALK_HBW_DENSITY
25	-999	;EXTWALK_HBW_DIVERSITY
26	-999	;EXTWALK_HBW_RETAIL_DIVERSITY
27	-999	;EXTWALK_HBW_INTDEN
28	-999	;EXTWALK_HBW_EMP_1WALK
29	-999	;EXTWALK_HBW_HHSIZE
30	-999	;EXTWALK_HBW_VEHOWN
31	-999	;EXTWALK_HBO_CONSTANT
32	-999	;EXTWALK_HBO_MXD_AREA
33	-999	;EXTWALK_HBO_DENSITY
34	-999	;EXTWALK_HBO_DIVERSITY
35	-999	;EXTWALK_HBO_RETAIL_DIVERSITY
36	-999	;EXTWALK_HBO_INTDEN
37	-999	;EXTWALK_HBO_EMP_1WALK
38	-999	;EXTWALK_HBO_HHSIZE
39	-999	;EXTWALK_HBO_VEHOWN
40	-999	;EXTWALK_NHB_CONSTANT
41	-999	;EXTWALK_NHB_MXD_AREA
42	-999	;EXTWALK_NHB_DENSITY
43	-999	;EXTWALK_NHB_DIVERSITY
44	-999	;EXTWALK_NHB_RETAIL_DIVERSITY
45	-999	;EXTWALK_NHB_INTDEN
46	-999	;EXTWALK_NHB_EMP_1WALK
47	-999	;EXTWALK_NHB_HHSIZE

INDEX	A	KEY
48	-999	;EXTWALK_NHB_VEHOWN
49	-999	;EXTTRAN_HBW_CONSTANT
50	-999	;EXTTRAN_HBW_MXD_EMP
51	-999	;EXTTRAN_HBW_INTDEN
52	-999	;EXTTRAN_HBW_EMP_30TRN
53	-999	;EXTTRAN_HBW_HHSIZE
54	-999	;EXTTRAN_HBW_VEHOWN
55	-999	;EXTTRAN_HBO_CONSTANT
56	-999	;EXTTRAN_HBO_MXD_EMP
57	-999	;EXTTRAN_HBO_INTDEN
58	-999	;EXTTRAN_HBO_EMP_30TRN
59	-999	;EXTTRAN_HBO_HHSIZE
60	-999	;EXTTRAN_HBO_VEHOWN
61	-999	;EXTTRAN_NHB_CONSTANT
62	-999	;EXTTRAN_NHB_MXD_EMP
63	-999	;EXTTRAN_NHB_INTDEN
64	-999	;EXTTRAN_NHB_EMP_30TRN
65	-999	;EXTTRAN_NHB_HHSIZE
66	-999	;EXTTRAN_NHB_VEHOWN
67	-999	;AVG_MXD_EMP
68	-999	;AVG_MXD_AREA
69	-999	;AVG_DIVERSITY
70	-999	;AVG_INTDEN
71	-999	;AVG_HHSIZE
72	-999	;AVG_VEHOWN
73	-999	;AVG_DENSITY
74	-999	;AVG_RETAIL_DIVERSITY
75	-999	;AVG_EMP_1WALK
76	-999	;AVG_EMP_30TRN

ModeChoiceParam

;Mode Choice Coefficients				IVT	OVT/IVT	ParkCostFa	Cost	VOT	Constants										Accessibility variables		
;1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
;INDEX	PURP	SEGMENT	Period	CI_C_TIME	CI_FAC_OV	CI_PKCOST	CI_COST	CI_VOT	CI_C_D1	CI_C_S2	CI_C_S3	CI_C_TWB	CI_C_TWR	CI_C_TDB	CI_C_TDR	CI_C_BK	CI_C_WK	CI_C_SB	CI_LE_D1	CI_LE_S2	CI_LE_S3
11	1	1	PK	-0.035	2	0.25	-0.003	6	0	0.132408	-0.66259	-2.26597	-2.26597	-2.26597	-2.26597	-3.19033	0.934309	0	0	0.506	0.408
12	1	2	PK	-0.04	2	0.25	-0.002	10.06	0	-2.70589	-3.23738	-2.44896	-2.44896	-4.72196	-4.72196	-4.02649	-0.31054	0	0	0.506	0.408
13	1	3	PK	-0.04	2	0.25	-0.001	18	0	-3.49618	-3.80317	-3.41096	-3.41096	-6.59396	-6.08896	-5.26665	-1.68638	0	0	0.506	0.408
21	2	1	OK	-0.025	2	0.25	-0.005	3	0	1.816134	0.607982	2.386232	2.386232	2.386232	2.386232	-0.73225	6.332827	0	0	0.297	0.026
22	2	2	OK	-0.025	2	0.25	-0.003	6	0	-0.0628	-0.48653	-3.72515	-3.72515	-3.72515	-3.72515	-4.26237	3.740741	0	0	0.297	0.026
23	2	3	OK	-0.025	2	0.25	-0.002	6.32	0	-0.31273	-1.15104	-6.06115	-6.06115	-6.06115	-7.18815	-3.64749	1.558654	0	0	0.161	0.161
31	3	1	OK	-0.025	2	0.25	-0.005	3	0	2.656575	2.971383	4.428369	4.428369	-3.24563	-3.24563	1.163276	5.022453	2.440541	0	0	0
32	3	2	OK	-0.025	2	0.25	-0.003	6	0	2.649362	2.623574	-0.15195	-0.15195	-2.36895	-2.36895	1.534913	5.00418	2.478812	0	0	0
33	3	3	OK	-0.025	2	0.25	-0.002	9	0	0.721149	1.162765	0.273053	0.273053	-1.94395	-1.94395	0.723551	4.557907	2.714082	0	0	0
41	4	1	OK	-0.025	2	0.25	-0.005	3	0	-2.07362	-3.06083	-0.42985	-0.42985	-4.90885	-4.90885	-8.29093	-2.38342	0	0	0	0
42	4	2	OK	-0.025	2	0.25	-0.003	6	0	-1.99493	-3.39374	-0.38327	-0.38327	-4.86227	-4.86227	-10.5129	-2.55462	0	0	0	0
43	4	3	OK	-0.025	2	0.25	-0.002	9	0	-1.91723	-3.72666	-0.36327	-0.36327	-4.84227	-4.84227	-12.7349	-3.18283	0	0	0	0
51	5	1	OK	-0.025	2	0.25	-0.005	3	0	0.871384	0.557317	0.099229	-4.33577	-2.06677	-2.06677	0.420012	4.06964	0	0	0	0
52	5	2	OK	-0.025	2	0.25	-0.003	6	0	0.377076	0.225976	-0.87216	-3.41316	-3.87116	-3.87116	-2.20948	1.701959	0	0	0	0
53	5	3	OK	-0.025	2	0.25	-0.002	9	0	-0.08523	-0.06937	-2.13116	-2.29816	-6.17816	-6.17816	-2.29198	0.783279	0	0	0	0
61	6	1	OK	-0.035	2.515	0.25	-0.004	6.08	0	-1.87745	-3.27781	-5.48499	-5.48499	-4.69799	-4.69799	-1.71242	-3.8502	0	0	0	0
62	6	2	OK	-0.035	2.515	0.25	-0.001	16.62	0	-2.20317	-3.98822	-6.07449	-6.07449	-5.28749	-5.28749	-0.85663	-3.7668	0	0	0	0
63	6	3	OK	-0.03	2.515	0.25	-0.001	18	0	-2.61089	-4.81163	-4.36049	-4.36049	-5.19249	-4.40449	-2.00784	-4.6824	0	0	0	0
71	7	1	OK	-0.03	2	0.25	-0.004	5.19	0	2.479688	2.18443	-0.60976	-0.60976	-1.86276	-1.86276	1.821189	4.0766	0	0	0	0
72	7	2	OK	-0.03	2	0.25	-0.003	6	0	1.031532	0.645145	-6.09563	-6.09563	-6.09563	-6.09563	-2.36172	0.920899	0	0	0	0
73	7	3	OK	-0.074	2	0.25	-0.005	9	0	0.468375	0.47186	-7.78663	-7.78663	-8.75363	-8.75363	-2.12662	-0.2698	0	0	0	0
81	8	1	OK	-0.025	2	0.25	-0.003	6	0	-1.978	-1.978	-10	-10	-10	-10	-10	-10	0	0	0	0
82	8	2	OK	-0.025	2	0.25	-0.001	12	0	-0.642	-0.642	-10	-10	-10	-10	-10	-10	0	0	0	0
83	8	3	OK	-0.025	2	0.25	-0.001	18	0	-0.244	-0.244	-10	-10	-10	-10	-10	-10	0	0	0	0

;Mode Choice Coefficients

;1	2	3	4	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
;INDEX	PURP	SEGMENT	Period	CI_LE_TWE	CI_LE_TWF	CI_LE_TDB	CI_LE_TDR	CI_LE_BK	CI_LE_WK	CI_TA_D1	CI_TA_S2	CI_TA_S3	CI_TA_TWI	CI_TA_TWI	CI_TA_TDB	CI_TA_TDR	CI_TA_BK	CI_TA_WK	CI_PID_D1	CI_PID_S2	CI_PID_S3
11	1	1	PK	0.5	0.5	0.5	0.5	0.506	0.5	0	0.013	0.013	0.03	0.03	0.03	0.03	0.03	0.04	0	0	0
12	1	2	PK	0.5	0.5	0.5	0.5	0.506	0.178	0	0.013	0.013	0.027	0.027	0.027	0.027	0.031	0.031	0	0	0
13	1	3	PK	0.5	0.5	0.5	0.5	0.506	0.005	0	0.005	0.005	0.013	0.013	0.013	0.013	0.015	0.015	0	0	0
21	2	1	OK	0.5	0.5	0.5	0.5	0.4	0.19	0	0	0	0	0	0	0	0	0	0	0	0
22	2	2	OK	0.5	0.5	0.5	0.5	0.4	0.19	0	0	0	0	0	0	0	0	0	0	0	0
23	2	3	OK	0.5	0.5	0.5	0.5	0.4	0.19	0	0	0	0	0	0	0	0	0	0	0	0
31	3	1	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.007
32	3	2	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.007
33	3	3	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.007
41	4	1	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.004	-0.019
42	4	2	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.004	-0.019
43	4	3	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	5	1	OK	0.5	0.5	0.048	0.048	0.312	0.455	0	0	0	0	0	0	0	0	0	0	0	0
52	5	2	OK	0.5	0.5	0.363	0.363	0.312	0.455	0	0	0	0	0	0	0	0	0	0	0	0
53	5	3	OK	0.315	0.315	0.363	0.363	0.455	0.455	0	0	0	0	0	0	0	0	0	0	0	0
61	6	1	OK	0	0	0	0	0	0	0	0	0	0.023	0.023	0.023	0.023	0.03	0.04	0	0	0
62	6	2	OK	0	0	0	0	0	0	0	0	0	0.023	0.023	0.023	0.023	0.03	0.04	0	0	0
63	6	3	OK	0	0	0	0	0	0	0	0	0	0.023	0.023	0.023	0.023	0.03	0.04	0	0	0
71	7	1	OK	0	0	0	0	0	0	0	-0.007	-0.01	0.04	0.04	0.04	0.04	0.03	0.039	0	0	0
72	7	2	OK	0	0	0	0	0	0	0	-0.007	-0.01	0.04	0.04	0.04	0.04	0.03	0.039	0	0	0
73	7	3	OK	0	0	0	0	0	0	0	0	0	0.025	0.025	0.025	0.025	0	0.039	0	0	0
81	8	1	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82	8	2	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	8	3	OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ModeChoiceParam

;Mode Choice Coefficients

;1		2	3	4	41	42	43	44	45	46	47	48	49	50	51	
;INDEX	PURP	SEGMENT	Period		CI_PID_TW	CI_PID_TW	CI_PID_TD	CI_PID_TD	CI_PID_BK	CI_PID_WK	CI_PID_SB	TIMEPEN_S	TIMEPEN_S	TIMEPEN_S	DACC_PEN	KEY
11	1	1	PK		0	0	0	0	0	0	0	5	7	0	2	;HW 0 Veh HH
12	1	2	PK		0	0	0	0	0	0	0	5	7	0	2	;HW 1 Veh-2PHH
13	1	3	PK		0	0	0	0	0	0	0	5	7	0	2	;HW All Other HH
21	2	1	OK		0	0	0	0	0	0	0	5	7	0	2	;HS 0 Veh HH
22	2	2	OK		0	0	0	0	0	0	0	5	7	0	2	;HS 1 Veh-2PHH
23	2	3	OK		0	0	0	0	0	0	0	5	7	0	2	;HS All Other HH
31	3	1	OK		0.006	0.006	0	0	0.008	0.004	0	5	7	10	2	;HK 0 Veh HH
32	3	2	OK		0.006	0.006	0	0	0.008	0.004	0	5	7	10	2	;HK 1 Veh-2PHH
33	3	3	OK		0.006	0.006	0	0	0.008	0.004	0	5	7	10	2	;HK All Other HH
41	4	1	OK		0.004	0	0	0	0.005	0.005	0	5	7	0	2	;HC All Other HH
42	4	2	OK		0.004	0	0	0	0.005	0.005	0	5	7	0	2	;HC 1 Veh-2PHH
43	4	3	OK		0	0	0	0	0.005	0.005	0	5	7	0	2	;HC All Other HH
51	5	1	OK		0	0	0	0	0	0	0	5	7	0	2	;HO 0 Veh HH
52	5	2	OK		0	0	0	0	0	0	0	5	7	0	2	;HO 1 Veh-2PHH
53	5	3	OK		0	0	0	0	0	0	0	5	7	0	2	;HO All Other HH
61	6	1	OK		0	0	0	0	0	0	0	5	7	0	2	;WO 0 Veh HH
62	6	2	OK		0	0	0	0	0	0	0	5	7	0	2	;WO 1 Veh-2PHH
63	6	3	OK		0	0	0	0	0	0	0	5	7	0	2	;WO All Other HH
71	7	1	OK		0	0	0	0	0	0	0	5	7	0	2	;OO 0 Veh HH
72	7	2	OK		0	0	0	0	0	0	0	5	7	0	2	;OO 1 Veh-2PHH
73	7	3	OK		0	0	0	0	0	0	0	5	7	0	2	;OO All Other HH
81	8	1	OK		0	0	0	0	0	0	0	5	7	0	2	;HY 0 Veh HH
82	8	2	OK		0	0	0	0	0	0	0	5	7	0	2	;HY 1 Veh-2PHH
83	8	3	OK		0	0	0	0	0	0	0	5	7	0	2	;HY All Other HH

FFParam

;INDEX	A	B	C	KEY
1	100000	-0.06	0	;HWH
2	100000	-0.06	0	;HWM
3	100000	-0.06	0	;HWL
4	100000	-0.2	0	;HS
5	100000	-0.09	0	;HK
6	100000	-0.06	0	;HC
7	100000	-0.1	0	;HO
8	100000	-0.085	0	;WO
9	100000	-0.09	0	;OO
10	100000	-0.065	0	;HY
11	100000	-0.07	-0.5	;TS
12	100000	-0.07	-0.5	;TM
13	100000	-0.07	-0.5	;TH

; Diurnal factors by mode and purpose
; Drive Alone

; Lookup	D1	Hour	DEP_HW	DEP_HS	DEP_HK	DEP_HC	DEP_HO	DEP_WO	DEP_OO	DEP_HY	DEP_TS	DEP_TM	DEP_TH	RET_HW	RET_HS	RET_HK	RET_HC	RET_HO	RET_WO	RET_OO	RET_HY	RET_TS	RET_TM	RET_TH	DEP_HW_XX	DEP_HS_XX
101	1	1	0.066	0.035	0	0	0.039	0	0	0	0.0079	0.0059	0.0105	0.0974	0.03	0	0	0.0329	0	0.0034	0.0035	0.0079	0.0059	0.0105	0.002	0
102	1	2	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
103	1	3	0	0.003	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.0009	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.002
104	1	4	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
105	1	5	0.065	0.006	0	0	0.002	0	0	0.004	0.0079	0.0059	0.0105	0.0011	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.022	0.005
106	1	6	0.098	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.0645	0	0	0	0.0052	0	0.0045	0.0079	0.0059	0.0105	0.034	0
107	1	7	0.103	0.014	0.018	0.018	0.018	0.003	0	0.006	0.0374	0.0427	0.0369	0.0067	0	0	0	0.0035	0.0193	0.0031	0	0.0374	0.0427	0.0369	0.092	0.006
108	1	8	0.042	0.041	0.206	0.206	0.095	0.011	0.021	0.017	0.0374	0.0427	0.0369	0.0001	0.0245	0	0	0.0346	0.0883	0.0698	0.0019	0.0374	0.0427	0.0369	0.175	0.018
109	1	9	0.018	0.024	0.052	0.052	0.047	0.016	0.014	0.023	0.0374	0.0427	0.0369	0.0006	0.0156	0	0	0.0385	0.0448	0.0161	0.0167	0.0374	0.0427	0.0369	0.058	0.024
110	1	10	0.009	0.055	0.051	0.051	0.029	0.056	0.016	0.053	0.0214	0.0255	0.0238	0.0004	0.0226	0	0	0.0108	0.029	0.0111	0.0241	0.0214	0.0255	0.0238	0.031	0.055
111	1	11	0.004	0.037	0.024	0.024	0.03	0.054	0.024	0.036	0.0214	0.0255	0.0238	0.0011	0.0172	0.022	0.022	0.0121	0.0308	0.0317	0.0184	0.0214	0.0255	0.0238	0.017	0.038
112	1	12	0.018	0.037	0.017	0.017	0.032	0.057	0.046	0.036	0.0214	0.0255	0.0238	0.0092	0.0199	0.0633	0.0633	0.0278	0.023	0.0439	0.0212	0.0214	0.0255	0.0238	0.015	0.038
113	1	13	0.007	0.027	0.052	0.052	0.011	0.089	0.029	0.026	0.0214	0.0255	0.0238	0.0136	0.0441	0.0376	0.0376	0.0254	0.0492	0.0692	0.0471	0.0214	0.0255	0.0238	0.006	0.027
114	1	14	0.024	0.024	0.039	0.039	0.026	0.035	0.056	0.023	0.0214	0.0255	0.0238	0.0125	0.0316	0.065	0.065	0.023	0.0267	0.052	0.0337	0.0214	0.0255	0.0238	0.02	0.025
115	1	15	0.0092	0.0314	0.0025	0.0025	0.0264	0.0525	0.037	0.0328	0.0214	0.0255	0.0238	0.0274	0.0344	0.0553	0.0553	0.036	0.0268	0.0784	0.0352	0.0214	0.0255	0.0238	0.008	0.033
116	1	16	0.0076	0.0187	0	0	0.0255	0.0677	0.0373	0.0195	0.0214	0.0255	0.0238	0.0694	0.0455	0.0834	0.0834	0.0516	0.0176	0.0731	0.0466	0.0214	0.0255	0.0238	0.006	0.02
117	1	17	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0689	0.0509	0.0189	0.0189	0.0304	0.0024	0.0487	0.0469	0.0505	0.043	0.0359	0.002	0.03
118	1	18	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0778	0.0417	0.0187	0.0187	0.0477	0.006	0.0379	0.0765	0.0505	0.043	0.0359	0.005	0.058
119	1	19	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0309	0.0275	0.0184	0.0184	0.0323	0.0009	0.0343	0.051	0.0505	0.043	0.0359	0.01	0.044
120	1	20	0.001	0.022	0	0	0.009	0.007	0.006	0.044	0.0079	0.0059	0.0105	0.0247	0.0255	0.0243	0.0243	0.0143	0	0.0198	0.0473	0.0079	0.0059	0.0105	0.001	0.045
121	1	21	0.002	0.007	0	0	0.016	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.0114	0.0114	0.0346	0.0346	0.03	0	0.0025	0.0212	0.0079	0.0059	0.0105	0.002	0.014
122	1	22	0.004	0.002	0	0	0.003	0	0.005	0.002	0.0079	0.0059	0.0105	0.0076	0.0085	0.0076	0.0076	0.02	0	0.0111	0.0182	0.0079	0.0059	0.0105	0.003	0.002
123	1	23	0.002	0	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.0147	0	0	0	0.0101	0	0	0	0.0079	0.0059	0.0105	0.002	0
124	1	24	0.001	0.002	0.004	0.004	0.016	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.0142	0	0	0	0.0038	0	0	0	0.0079	0.0059	0.0105	0.001	0.002

; Shared-ride 2

;Lookup	SR2	Hour	DEP_HW	DEP_HS	DEP_HK	DEP_HC	DEP_HO	DEP_WO	DEP_OO	DEP_HY	DEP_TS	DEP_TM	DEP_TH	RET_HW	RET_HS	RET_HK	RET_HC	RET_HO	RET_WO	RET_OO	RET_HY	RET_TS	RET_TM	RET_TH	DEP_HW_XX	DEP_HS_XX
201	2	1	0.066	0.035	0	0	0.039	0	0	0	0.0079	0.0059	0.0105	0.0974	0.03	0	0	0.0329	0	0.0034	0.0035	0.0079	0.0059	0.0105	0.002	0
202	2	2	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
203	2	3	0	0.003	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.0009	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.002
204	2	4	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
205	2	5	0.065	0.006	0	0	0.002	0	0	0.004	0.0079	0.0059	0.0105	0.0011	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.022	0.005
206	2	6	0.098	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.0645	0	0	0	0.0052	0	0.0045	0.0079	0.0059	0.0105	0.034	0
207	2	7	0.103	0.014	0.018	0.018	0.018	0.003	0	0.006	0.0374	0.0427	0.0369	0.0067	0	0	0	0.0035	0.0193	0.0031	0	0.0374	0.0427	0.0369	0.092	0.006
208	2	8	0.042	0.041	0.206	0.206	0.095	0.011	0.021	0.017	0.0374	0.0427	0.0369	0.0001	0.0245	0	0	0.0346	0.0883	0.0698	0.0019	0.0374	0.0427	0.0369	0.175	0.018
209	2	9	0.018	0.024	0.052	0.052	0.047	0.016	0.014	0.023	0.0374	0.0427	0.0369	0.0006	0.0156	0	0	0.0385	0.0448	0.0161	0.0167	0.0374	0.0427	0.0369	0.058	0.024
210	2	10	0.009	0.055	0.051	0.051	0.029	0.056	0.016	0.053	0.0214	0.0255	0.0238	0.0004	0.0226	0	0	0.0108	0.029	0.0111	0.0241	0.0214	0.0255	0.0238	0.031	0.055
211	2	11	0.004	0.037	0.024	0.024	0.03	0.054	0.024	0.036	0.0214	0.0255	0.0238	0.0011	0.0172	0.022	0.022	0.0121	0.0308	0.0317	0.0184	0.0214	0.0255	0.0238	0.017	0.038
212	2	12	0.018	0.037	0.017	0.017	0.032	0.057	0.046	0.036	0.0214	0.0255	0.0238	0.0092	0.0199	0.0633	0.0633	0.0278	0.023	0.0439	0.0212	0.0214	0.0255	0.0238	0.015	0.038
213	2	13	0.007	0.027	0.052	0.052	0.011	0.089	0.029	0.026	0.0214	0.0255	0.0238	0.0136	0.0441	0.0376	0.0376	0.0254	0.0492	0.0692	0.0471	0.0214	0.0255	0.0238	0.006	0.027
214	2	14	0.024	0.024	0.039	0.039	0.026	0.035	0.056	0.023	0.0214	0.0255	0.0238	0.0125	0.0316	0.065	0.065	0.023	0.0267	0.052	0.0337	0.0214	0.0255	0.0238	0.02	0.025
215	2	15	0.0092	0.0314	0.0025	0.0025	0.0264	0.0525	0.037	0.0328	0.0214	0.0255	0.0238	0.0274	0.0344	0.0553	0.0553	0.036	0.0268	0.0784	0.0352	0.0214	0.0255	0.0238	0.008	0.033
216	2	16	0.0076	0.0187	0	0	0.0255	0.0677	0.0373	0.0195	0.0214	0.0255	0.0238	0.0694	0.0455	0.0834	0.0834	0.0516	0.0176	0.0731	0.0466	0.0214	0.0255	0.0238	0.006	0.02
217	2	17	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0689	0.0509	0.0189	0.0189	0.0304	0.0024	0.0487	0.0469	0.0505	0.043	0.0359	0.002	0.03
218	2	18	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0778	0.0417	0.0187	0.0187	0.0477	0.006	0.0379	0.0765	0.0505	0.043	0.0359	0.005	0.058
219	2	19	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0309	0.0275	0.0184	0.0184	0.0323	0.0009	0.0343	0.051	0.0505	0.043	0.0359	0.01	0.044
220	2	20	0.001	0.022	0	0	0.009	0.007	0.006	0.044	0.0079	0.0059	0.0105	0.0247	0.0255	0.0243	0.0243	0.0143	0	0.0198	0.0473	0.0079	0.0059	0.0105	0.001	0.045
221	2	21	0.002	0.007	0	0	0.016	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.0114	0.0114	0.0346	0.0346	0.03	0	0.0025	0.0212	0.0079	0.0059	0.0105	0.002	0.014
222	2	22	0.004	0.002	0	0	0.003	0	0.005	0.002	0.0079	0.0059	0.0105	0.0076	0.0085	0.0076	0.0076	0.02	0	0.0111	0.0182	0.0079	0.0059	0.0105	0.003	0.002
223	2	23	0.002	0	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.0147	0	0	0	0.0101	0	0	0	0.0079	0.0059	0.0105	0.002	0
224	2	24	0.001	0.002	0.004	0.004	0.016	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.0142	0	0	0	0.0038	0	0	0	0.0079	0.0059	0.0105	0.001	0.002

; Shared-ride 3+

;Lookup	SR3+	Hour	DEP_HW	DEP_HS	DEP_HK	DEP_HC	DEP_HO	DEP_WO	DEP_OO	DEP_HY	DEP_TS	DEP_TM	DEP_TH	RET_HW	RET_HS	RET_HK	RET_HC	RET_HO	RET_WO	RET_OO	RET_HY	RET_TS	RET_TM	RET_TH	DEP_HW_XX	DEP_HS_XX
301	3	1	0.066	0.035	0	0	0.039	0	0	0	0.0079	0.0059	0.0105	0.0974	0.03	0	0	0.0329	0	0.0034	0.0035	0.0079	0.0059	0.0105	0.002	0
302	3	2	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
303	3	3	0	0.003	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.0009	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.002
304	3	4	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
305	3	5	0.065	0.006	0	0	0.002	0	0	0.004	0.0079	0.0059	0.0105	0.0011	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.022	0.005
306	3	6	0.098	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.0645	0	0	0	0.0052	0	0.0045	0.0079	0.0059	0.0105	0.034	0
307	3	7	0.103	0.014	0.018	0.018	0.018	0.003	0	0.006	0.0374	0.0427	0.0369	0.0067	0	0	0	0.0035	0.0193	0.0031	0	0.0374	0.0427	0.0369	0.092	0.006
308	3	8	0.042	0.041	0.206	0.206	0.095	0.011	0.021	0.017	0.0374	0.0427	0.0369	0.0001	0.0245	0	0	0.0346	0.0883	0.0698	0.0019	0.0374	0.0427	0.0369	0.175	0.018
309	3	9	0.018	0.024	0.052	0.052	0.047	0.016	0.014	0.023	0.0374	0.0427	0.0369	0.0006	0.0156	0	0	0.0385	0.0448	0.0161	0.0167	0.0374	0.0427	0.0369	0.058	0.024
310	3	10	0.009	0.055	0.051	0.051	0.029	0.056	0.016	0.053	0.0214	0.0255	0.0238	0.0004	0.0226	0	0	0.0108	0.029	0.0111	0.0241	0.0214	0.0255	0.0238	0.031	0.055
311	3	11	0.004	0.037	0.024	0.024	0.03	0.054	0.024	0.036	0.0214	0.0255	0.0238	0.0011	0.0172	0.022	0.022	0.0121	0.0308	0.0317	0.0184	0.0214	0.0255	0.0238	0.017	0.038
312	3	12	0.018	0.037	0.017	0.017	0.032	0.057	0.046	0.036	0.0214	0.0255	0.0238	0.0092	0.0199	0.0633	0.0633	0.0278	0.023	0.0439	0.0212	0.0214	0.0255	0.0238	0.015	0.038
313	3	13	0.007	0.027	0.052	0.052	0.011	0.089	0.029	0.026	0.0214	0.0255	0.0238	0.0136	0.0441	0.0376	0.0376	0.0254	0.0492	0.0692	0.0471	0.0214	0.0255	0.0238	0.006	0.027
314	3	14	0.024	0.024	0.039	0.039	0.026	0.035	0.056	0.023	0.0214	0.0255	0.0238	0.0125	0.0316	0.065	0.065	0.023	0.0267	0.052	0.0337	0.0214	0.0255	0.0238	0.02	0.025
315	3	15	0.0092	0.0314	0.0025	0.0025	0.0264	0.0525	0.037	0.0328	0.0214	0.0255	0.0238	0.0274	0.0344	0.0553	0.0553	0.036	0.0268	0.0784	0.0352	0.0214	0.0255	0.0238	0.008	0.033
316	3	16	0.0076	0.0187	0	0	0.0255	0.0677	0.0373	0.0195	0.0214	0.0255	0.0238	0.0694	0.0455	0.0834	0.0834	0.0516	0.0176	0.0731	0.0466	0.0214	0.0255	0.0238	0.006	0.02

; Lookup	D1	Hour	DEP_HW	DEP_HS	DEP_HK	DEP_HC	DEP_HO	DEP_WO	DEP_OO	DEP_HY	DEP_TS	DEP_TM	DEP_TH	RET_HW	RET_HS	RET_HK	RET_HC	RET_HO	RET_WO	RET_OO	RET_HY	RET_TS	RET_TM	RET_TH	DEP_HW_XX	DEP_HS_XX
317	3	17	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0689	0.0509	0.0189	0.0189	0.0304	0.0024	0.0487	0.0469	0.0505	0.043	0.0359	0.002	0.03
318	3	18	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0778	0.0417	0.0187	0.0187	0.0477	0.006	0.0379	0.0765	0.0505	0.043	0.0359	0.005	0.058
319	3	19	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0309	0.0275	0.0184	0.0184	0.0323	0.0009	0.0343	0.051	0.0505	0.043	0.0359	0.01	0.044
320	3	20	0.001	0.022	0	0	0.009	0.007	0.006	0.044	0.0079	0.0059	0.0105	0.0247	0.0255	0.0243	0.0243	0.0143	0	0.0198	0.0473	0.0079	0.0059	0.0105	0.001	0.045
321	3	21	0.002	0.007	0	0	0.016	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.0114	0.0114	0.0346	0.0346	0.03	0	0.0025	0.0212	0.0079	0.0059	0.0105	0.002	0.014
322	3	22	0.004	0.002	0	0	0.003	0	0.005	0.002	0.0079	0.0059	0.0105	0.0076	0.0085	0.0076	0.0076	0.02	0	0.0111	0.0182	0.0079	0.0059	0.0105	0.003	0.002
323	3	23	0.002	0	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.0147	0	0	0	0.0101	0	0	0	0.0079	0.0059	0.0105	0.002	0
324	3	24	0.001	0.002	0.004	0.004	0.016	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.0142	0	0	0	0.0038	0	0	0	0.0079	0.0059	0.0105	0.001	0.002
;	; Transit																									
;Lookup	TRN	Hour	DEP_HW	DEP_HS	DEP_HK	DEP_HC	DEP_HO	DEP_WO	DEP_OO	DEP_HY	DEP_TS	DEP_TM	DEP_TH	RET_HW	RET_HS	RET_HK	RET_HC	RET_HO	RET_WO	RET_OO	RET_HY	RET_TS	RET_TM	RET_TH	DEP_HW_XX	DEP_HS_XX
401	4	1	0.066	0.035	0	0	0.039	0	0	0	0.0079	0.0059	0.0105	0.0974	0.03	0	0	0.0329	0	0.0034	0.0035	0.0079	0.0059	0.0105	0.002	0
402	4	2	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
403	4	3	0	0.003	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.0009	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.002
404	4	4	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
405	4	5	0.065	0.006	0	0	0.002	0	0	0.004	0.0079	0.0059	0.0105	0.0011	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.022	0.005
406	4	6	0.098	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.0645	0	0	0	0.0052	0	0.0045	0.0079	0.0059	0.0105	0.034	0
407	4	7	0.103	0.014	0.018	0.018	0.018	0.003	0	0.006	0.0374	0.0427	0.0369	0.0067	0	0	0	0.0035	0.0193	0.0031	0	0.0374	0.0427	0.0369	0.092	0.006
408	4	8	0.042	0.041	0.206	0.206	0.095	0.011	0.021	0.017	0.0374	0.0427	0.0369	0.0001	0.0245	0	0	0.0346	0.0883	0.0698	0.0019	0.0374	0.0427	0.0369	0.175	0.018
409	4	9	0.018	0.024	0.052	0.052	0.047	0.016	0.014	0.023	0.0374	0.0427	0.0369	0.0006	0.0156	0	0	0.0385	0.0448	0.0161	0.0167	0.0374	0.0427	0.0369	0.058	0.024
410	4	10	0.009	0.055	0.051	0.051	0.029	0.056	0.016	0.053	0.0214	0.0255	0.0238	0.0004	0.0226	0	0	0.0108	0.029	0.0111	0.0241	0.0214	0.0255	0.0238	0.031	0.055
411	4	11	0.004	0.037	0.024	0.024	0.03	0.054	0.024	0.036	0.0214	0.0255	0.0238	0.0011	0.0172	0.022	0.022	0.0121	0.0308	0.0317	0.0184	0.0214	0.0255	0.0238	0.017	0.038
412	4	12	0.018	0.037	0.017	0.017	0.032	0.057	0.046	0.036	0.0214	0.0255	0.0238	0.0092	0.0199	0.0633	0.0633	0.0278	0.023	0.0439	0.0212	0.0214	0.0255	0.0238	0.015	0.038
413	4	13	0.007	0.027	0.052	0.052	0.011	0.089	0.029	0.026	0.0214	0.0255	0.0238	0.0136	0.0441	0.0376	0.0376	0.0254	0.0492	0.0692	0.0471	0.0214	0.0255	0.0238	0.006	0.027
414	4	14	0.024	0.024	0.039	0.039	0.026	0.035	0.056	0.023	0.0214	0.0255	0.0238	0.0125	0.0316	0.065	0.065	0.023	0.0267	0.052	0.0337	0.0214	0.0255	0.0238	0.02	0.025
415	4	15	0.0092	0.0314	0.0025	0.0025	0.0264	0.0525	0.037	0.0328	0.0214	0.0255	0.0238	0.0274	0.0344	0.0553	0.0553	0.036	0.0268	0.0784	0.0352	0.0214	0.0255	0.0238	0.008	0.033
416	4	16	0.0076	0.0187	0	0	0.0255	0.0677	0.0373	0.0195	0.0214	0.0255	0.0238	0.0694	0.0455	0.0834	0.0834	0.0516	0.0176	0.0731	0.0466	0.0214	0.0255	0.0238	0.006	0.02
417	4	17	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0689	0.0509	0.0189	0.0189	0.0304	0.0024	0.0487	0.0469	0.0505	0.043	0.0359	0.002	0.03
418	4	18	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0778	0.0417	0.0187	0.0187	0.0477	0.006	0.0379	0.0765	0.0505	0.043	0.0359	0.005	0.058
419	4	19	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0309	0.0275	0.0184	0.0184	0.0323	0.0009	0.0343	0.051	0.0505	0.043	0.0359	0.01	0.044
420	4	20	0.001	0.022	0	0	0.009	0.007	0.006	0.044	0.0079	0.0059	0.0105	0.0247	0.0255	0.0243	0.0243	0.0143	0	0.0198	0.0473	0.0079	0.0059	0.0105	0.001	0.045
421	4	21	0.002	0.007	0	0	0.016	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.0114	0.0114	0.0346	0.0346	0.03	0	0.0025	0.0212	0.0079	0.0059	0.0105	0.002	0.014
422	4	22	0.004	0.002	0	0	0.003	0	0.005	0.002	0.0079	0.0059	0.0105	0.0076	0.0085	0.0076	0.0076	0.02	0	0.0111	0.0182	0.0079	0.0059	0.0105	0.003	0.002
423	4	23	0.002	0	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.0147	0	0	0	0.0101	0	0	0	0.0079	0.0059	0.0105	0.002	0
424	4	24	0.001	0.002	0.004	0.004	0.016	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.0142	0	0	0	0.0038	0	0	0	0.0079	0.0059	0.0105	0.001	0.002
; Walk/Bike																										
;Lookup	WLK	Hour	DEP_HW	DEP_HS	DEP_HK	DEP_HC	DEP_HO	DEP_WO	DEP_OO	DEP_HY	DEP_TS	DEP_TM	DEP_TH	RET_HW	RET_HS	RET_HK	RET_HC	RET_HO	RET_WO	RET_OO	RET_HY	RET_TS	RET_TM	RET_TH	DEP_HW_XX	DEP_HS_XX
501	5	1	0.066	0.035	0	0	0.039	0	0	0	0.0079	0.0059	0.0105	0.0974	0.03	0	0	0.0329	0	0.0034	0.0035	0.0079	0.0059	0.0105	0.002	0
502	5	2	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
503	5	3	0	0.003	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.0009	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.002
504	5	4	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
505	5	5	0.065	0.006	0	0	0.002	0	0	0.004	0.0079	0.0059	0.0105	0.0011	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.022	0.005
506	5	6	0.098	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.0645	0	0	0	0.0052	0	0.0045	0.0079	0.0059	0.0105	0.034	0
507	5	7	0.103	0.014	0.018	0.018	0.018	0.003	0	0.006	0.0374	0.0427	0.0369	0.0067	0	0	0	0.0035	0.0193	0.0031	0	0.0374	0.0427	0.0369	0.092	0.006
508	5	8	0.042	0.041	0.206	0.206	0.095	0.011	0.021	0.017	0.0374	0.0427	0.0369	0.0001	0.0245	0	0	0.0346	0.0883	0.0698	0.0019	0.0374	0.0427	0.0369	0.175	0.018
509	5	9	0.018	0.024	0.052	0.052	0.047	0.016	0.014	0.023	0.0374	0.0427	0.0369	0.0006	0.0156	0	0	0.0385	0.0448	0.0161	0.0167	0.0374	0.0427	0.0369	0.058	0.024
510	5	10	0.009	0.055	0.051	0.051	0.029	0.056	0.016	0.053	0.0214	0.0255	0.0238	0.0004	0.0226	0	0	0.0108	0.029	0.0111	0.0241	0.0214	0.0255	0.0238	0.031	0.055
511	5	11	0.004	0.037	0.024	0.024	0.03	0.054	0.024	0.036	0.0214	0.0255	0.0238	0.0011	0.0172	0.022	0.022	0.0121	0.0308	0.0317	0.0184	0.0214	0.0255	0.0238	0.017	0.038
512	5	12	0.018	0.037	0.017	0.017	0.032	0.057	0.046	0.036	0.0214	0.0255	0.0238	0.0092	0.0199	0.0633	0.0633	0.0278	0.023	0.0439	0.0212	0.0214	0.0255	0.0238	0.015	0.038
513	5	13	0.007	0.027	0.052	0.052	0.011	0.089	0.029	0.026	0.0214	0.0255	0.0238	0.0136	0.0441	0.0376	0.0376	0.0254	0.0492	0.0692	0.0471	0.0214	0.0255	0.0238	0.006	0.027
514	5	14	0.024	0.024	0.039	0.039	0.026	0.035	0.056	0.023	0.0214	0.0255	0.0238	0.0125	0.0316	0.065	0.065	0.023	0.0267	0.052	0.0337	0.0214	0.0255	0.0238	0.02	0.025
515	5	15	0.0092	0.0314	0.0025	0.0025	0.0264	0.0525	0.037	0.0328	0.0214	0.0255	0.0238	0.0274	0.0344	0.0553	0.0553	0.036	0.0268	0.0784	0.0352	0.0214	0.0255	0.0238	0.008	0.033
516	5	16	0.0076	0.0187	0	0	0.0255	0.0677	0.0373	0.0195	0.0214	0.0255	0.0238	0.0694	0.0455	0.0834	0.0834	0.0516	0.0176	0.0731	0.0466	0.0214	0.0255	0.0238	0.006	0.02
517	5	17	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0689	0.0509	0.0189	0.0189	0.0304	0.0024	0.0487	0.0469	0.0505	0.043	0.0359	0.002	0.03
518	5	18	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0778	0.0417	0.0187	0.0187	0.0477	0.006	0.0379	0.0765	0.0505	0.043	0.0359	0.005	0.058
519	5	19	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0309	0.0275	0.0184	0.0184	0.0323	0.0009	0.0343	0.051	0.0505	0.043	0.0359	0.01	0.044
520	5	20	0.001	0.022	0	0	0.009	0.007	0.006	0.044	0.0079	0.0059	0.0105	0.0247	0.0255	0.0243	0.0243	0.0143	0	0.0198	0.0473	0.0079	0.0059	0.0105	0.001	0.045
521	5	21	0.002	0.007	0	0	0.016	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.0114	0.0114	0.0346	0.0346	0.03	0	0.0025	0.0212	0.0079	0.0059	0.0105	0.002	0.014
522	5	22	0.004	0.002	0	0	0.003	0	0.005	0.002	0.0079	0.0059	0.0105	0.0076	0.0085	0.0076	0.0076	0.02	0	0.0111	0.0182	0.0079	0.0059	0.0105	0.003	0.002
523	5	23	0.002	0	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.0147	0	0	0	0.0101	0	0	0	0.0079	0.0059	0.0105	0.002	0
524	5	24	0.001	0.002	0.004	0.004	0.016	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.0142	0	0	0	0.0038	0	0	0	0.0079	0.0059	0.0105	0.001	0.002
;Truck																										
;Lookup	TRK	Hour	DEP_HW	DEP_HS	DEP_HK	DEP_HC	DEP_HO	DEP_WO	DEP_OO	DEP_HY	DEP_TS	DEP_TM	DEP_TH	RET_HW	RET_HS	RET_HK	RET_HC	RET_HO	RET_WO	RET_OO	RET_HY	RET_TS	RET_TM	RET_TH	DEP_HW_XX	DEP_HS_XX
601	6	1	0.066	0.035	0	0	0.039	0	0	0	0.0079	0.0059	0.0105	0.0974	0.03	0	0	0.0329	0	0.0034	0.0035	0.0079	0.0059	0.0105	0.002	0
602	6	2	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
603	6	3	0	0.003	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.0009	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0	0.002
604	6	4	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0
605	6	5	0.065	0.006	0	0	0.002	0	0	0.004	0.0079	0.0059	0.0105	0.0011	0	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.022	0.005
606	6	6	0.098	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.0645	0	0	0	0.0052	0	0.0045	0.0079	0.0059	0.0105	0.034	0
607	6	7	0.103	0.014	0.018	0.018	0.018	0.003	0	0.006	0.0374	0.0427	0.0369	0.0067	0	0	0	0.0035	0.0193	0.0031	0	0.0374	0.0427	0.0369	0.092	0.006
608	6	8	0.042	0.041	0.206	0.206	0.095	0.011	0.021	0.017	0.0374	0.0427	0.0369	0.0001	0.0245	0	0	0.0346	0.0883	0.0698	0.0019	0.0374	0.0427	0.0369	0.175	0.018

DiurnalFactors

; Lookup	D1	Hour	DEP_HW	DEP_HS	DEP_HK	DEP_HC	DEP_HO	DEP_WO	DEP_OO	DEP_HY	DEP_TS	DEP_TM	DEP_TH	RET_HW	RET_HS	RET_HK	RET_HC	RET_HO	RET_WO	RET_OO	RET_HY	RET_TS	RET_TM	RET_TH	DEP_HW_XX	DEP_HS_XX
609	6	9	0.018	0.024	0.052	0.052	0.047	0.016	0.014	0.023	0.0374	0.0427	0.0369	0.0006	0.0156	0	0	0.0385	0.0448	0.0161	0.0167	0.0374	0.0427	0.0369	0.058	0.024
610	6	10	0.009	0.055	0.051	0.051	0.029	0.056	0.016	0.053	0.0214	0.0255	0.0238	0.0004	0.0226	0	0	0.0108	0.029	0.0111	0.0241	0.0214	0.0255	0.0238	0.031	0.055
611	6	11	0.004	0.037	0.024	0.024	0.03	0.054	0.024	0.036	0.0214	0.0255	0.0238	0.0011	0.0172	0.022	0.022	0.0121	0.0308	0.0317	0.0184	0.0214	0.0255	0.0238	0.017	0.038
612	6	12	0.018	0.037	0.017	0.017	0.032	0.057	0.046	0.036	0.0214	0.0255	0.0238	0.0092	0.0199	0.0633	0.0633	0.0278	0.023	0.0439	0.0212	0.0214	0.0255	0.0238	0.015	0.038
613	6	13	0.007	0.027	0.052	0.052	0.011	0.089	0.029	0.026	0.0214	0.0255	0.0238	0.0136	0.0441	0.0376	0.0376	0.0254	0.0492	0.0692	0.0471	0.0214	0.0255	0.0238	0.006	0.027
614	6	14	0.024	0.024	0.039	0.039	0.026	0.035	0.056	0.023	0.0214	0.0255	0.0238	0.0125	0.0316	0.065	0.065	0.023	0.0267	0.052	0.0337	0.0214	0.0255	0.0238	0.02	0.025
615	6	15	0.0092	0.0314	0.0025	0.0025	0.0264	0.0525	0.037	0.0328	0.0214	0.0255	0.0238	0.0274	0.0344	0.0553	0.0553	0.036	0.0268	0.0784	0.0352	0.0214	0.0255	0.0238	0.008	0.033
616	6	16	0.0076	0.0187	0	0	0.0255	0.0677	0.0373	0.0195	0.0214	0.0255	0.0238	0.0694	0.0455	0.0834	0.0834	0.0516	0.0176	0.0731	0.0466	0.0214	0.0255	0.0238	0.006	0.02
617	6	17	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0689	0.0509	0.0189	0.0189	0.0304	0.0024	0.0487	0.0469	0.0505	0.043	0.0359	0.002	0.03
618	6	18	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0778	0.0417	0.0187	0.0187	0.0477	0.006	0.0379	0.0765	0.0505	0.043	0.0359	0.005	0.058
619	6	19	0.00983	0.03253	0.02847	0.02847	0.02843	0.059267	0.02987	0.0479	0.0505	0.043	0.0359	0.0309	0.0275	0.0184	0.0184	0.0323	0.0009	0.0343	0.051	0.0505	0.043	0.0359	0.01	0.044
620	6	20	0.001	0.022	0	0	0.009	0.007	0.006	0.044	0.0079	0.0059	0.0105	0.0247	0.0255	0.0243	0.0243	0.0143	0	0.0198	0.0473	0.0079	0.0059	0.0105	0.001	0.045
621	6	21	0.002	0.007	0	0	0.016	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.0114	0.0114	0.0346	0.0346	0.03	0	0.0025	0.0212	0.0079	0.0059	0.0105	0.002	0.014
622	6	22	0.004	0.002	0	0	0.003	0	0.005	0.002	0.0079	0.0059	0.0105	0.0076	0.0085	0.0076	0.0076	0.02	0	0.0111	0.0182	0.0079	0.0059	0.0105	0.003	0.002
623	6	23	0.002	0	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.0147	0	0	0	0.0101	0	0	0	0.0079	0.0059	0.0105	0.002	0
624	6	24	0.001	0.002	0.004	0.004	0.016	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.0142	0	0	0	0.0038	0	0	0	0.0079	0.0059	0.0105	0.001	0.002

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ors by mode and

D1	Hour	DEP_HK_XX	DEP_HC_XX	DEP_HO_XX	DEP_WO_XX	DEP_OO_XX	DEP_HY_XX	DEP_TS_XX	DEP_TM_XX	DEP_TH_XX	RET_HW_XX	RET_HS_XX	RET_HK_XX	RET_HC_XX	RET_HO_XX	RET_WO_XX	RET_OO_XX	RET_HY_XX	RET_TS_XX	RET_TM_XX	RET_TH_XX
1	1	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.004	0.004	0	0	0.004	0	0.003	0.004	0.0079	0.0059	0.0105
1	2	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.003	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
1	3	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0.001	0.002	0	0	0	0	0	0.002	0.0079	0.0059	0.0105
1	4	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
1	5	0	0	0	0	0	0.005	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
1	6	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.005	0	0	0	0.005	0	0.005	0.0079	0.0059	0.0105
1	7	0.02	0.02	0.021	0.003	0	0.006	0.0374	0.0427	0.0369	0.006	0	0	0	0.004	0.019	0.003	0	0.0374	0.0427	0.0369
1	8	0.219	0.219	0.112	0.012	0.023	0.018	0.0374	0.0427	0.0369	0	0.002	0	0	0.037	0.088	0.07	0.002	0.0374	0.0427	0.0369
1	9	0.052	0.052	0.051	0.016	0.014	0.024	0.0374	0.0427	0.0369	0.002	0.017	0	0	0.039	0.045	0.016	0.017	0.0374	0.0427	0.0369
1	10	0.054	0.054	0.034	0.059	0.017	0.055	0.0214	0.0255	0.0238	0.002	0.024	0	0	0.011	0.029	0.011	0.024	0.0214	0.0255	0.0238
1	11	0.026	0.026	0.034	0.057	0.025	0.038	0.0214	0.0255	0.0238	0.005	0.018	0.022	0.022	0.012	0.031	0.032	0.018	0.0214	0.0255	0.0238
1	12	0.018	0.018	0.037	0.06	0.048	0.038	0.0214	0.0255	0.0238	0.008	0.021	0.063	0.063	0.028	0.023	0.044	0.021	0.0214	0.0255	0.0238
1	13	0.054	0.054	0.013	0.093	0.031	0.027	0.0214	0.0255	0.0238	0.012	0.047	0.038	0.038	0.026	0.049	0.069	0.047	0.0214	0.0255	0.0238
1	14	0.042	0.042	0.029	0.037	0.059	0.025	0.0214	0.0255	0.0238	0.011	0.034	0.065	0.065	0.023	0.027	0.052	0.034	0.0214	0.0255	0.0238
1	15	0.003	0.003	0.036	0.053	0.037	0.033	0.0214	0.0255	0.0238	0.024	0.035	0.055	0.055	0.046	0.027	0.078	0.035	0.0214	0.0255	0.0238
1	16	0	0	0.035	0.068	0.037	0.02	0.0214	0.0255	0.0238	0.062	0.047	0.083	0.083	0.066	0.018	0.073	0.047	0.0214	0.0255	0.0238
1	17	0.006	0.006	0.026	0.063	0.03	0.03	0.0505	0.043	0.0359	0.112	0.047	0.019	0.019	0.035	0.002	0.049	0.047	0.0505	0.043	0.0359
1	18	0.026	0.026	0.023	0.081	0.03	0.058	0.0505	0.043	0.0359	0.126	0.077	0.019	0.019	0.043	0.006	0.038	0.077	0.0505	0.043	0.0359
1	19	0.029	0.029	0.029	0.016	0.02	0.044	0.0505	0.043	0.0359	0.05	0.051	0.018	0.018	0.029	0.001	0.034	0.051	0.0505	0.043	0.0359
1	20	0	0	0.01	0.007	0.006	0.045	0.0079	0.0059	0.0105	0.021	0.047	0.024	0.024	0.013	0	0.02	0.047	0.0079	0.0059	0.0105
1	21	0	0	0.017	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.01	0.021	0.035	0.035	0.027	0	0.003	0.021	0.0079	0.0059	0.0105
1	22	0	0	0.001	0	0.005	0.002	0.0079	0.0059	0.0105	0.006	0.018	0.008	0.008	0.025	0	0.011	0.018	0.0079	0.0059	0.0105
1	23	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.012	0	0	0	0.012	0	0	0	0.0079	0.0059	0.0105
1	24	0.004	0.004	0.003	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.012	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105

2

SR2	Hour	DEP_HK_XX	DEP_HC_XX	DEP_HO_XX	DEP_WO_XX	DEP_OO_XX	DEP_HY_XX	DEP_TS_XX	DEP_TM_XX	DEP_TH_XX	RET_HW_XX	RET_HS_XX	RET_HK_XX	RET_HC_XX	RET_HO_XX	RET_WO_XX	RET_OO_XX	RET_HY_XX	RET_TS_XX	RET_TM_XX	RET_TH_XX
2	1	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.004	0.004	0	0	0.004	0	0.003	0.004	0.0079	0.0059	0.0105
2	2	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.003	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
2	3	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0.001	0.002	0	0	0	0	0	0.002	0.0079	0.0059	0.0105
2	4	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
2	5	0	0	0	0	0	0.005	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
2	6	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.005	0	0	0	0.005	0	0.005	0.0079	0.0059	0.0105
2	7	0.02	0.02	0.021	0.003	0	0.006	0.0374	0.0427	0.0369	0.006	0	0	0	0.004	0.019	0.003	0	0.0374	0.0427	0.0369
2	8	0.219	0.219	0.112	0.012	0.023	0.018	0.0374	0.0427	0.0369	0	0.002	0	0	0.037	0.088	0.07	0.002	0.0374	0.0427	0.0369
2	9	0.052	0.052	0.051	0.016	0.014	0.024	0.0374	0.0427	0.0369	0.002	0.017	0	0	0.039	0.045	0.016	0.017	0.0374	0.0427	0.0369
2	10	0.054	0.054	0.034	0.059	0.017	0.055	0.0214	0.0255	0.0238	0.002	0.024	0	0	0.011	0.029	0.011	0.024	0.0214	0.0255	0.0238
2	11	0.026	0.026	0.034	0.057	0.025	0.038	0.0214	0.0255	0.0238	0.005	0.018	0.022	0.022	0.012	0.031	0.032	0.018	0.0214	0.0255	0.0238
2	12	0.018	0.018	0.037	0.06	0.048	0.038	0.0214	0.0255	0.0238	0.008	0.021	0.063	0.063	0.028	0.023	0.044	0.021	0.0214	0.0255	0.0238
2	13	0.054	0.054	0.013	0.093	0.031	0.027	0.0214	0.0255	0.0238	0.012	0.047	0.038	0.038	0.026	0.049	0.069	0.047	0.0214	0.0255	0.0238
2	14	0.042	0.042	0.029	0.037	0.059	0.025	0.0214	0.0255	0.0238	0.011	0.034	0.065	0.065	0.023	0.027	0.052	0.034	0.0214	0.0255	0.0238
2	15	0.003	0.003	0.036	0.053	0.037	0.033	0.0214	0.0255	0.0238	0.024	0.035	0.055	0.055	0.046	0.027	0.078	0.035	0.0214	0.0255	0.0238
2	16	0	0	0.035	0.068	0.037	0.02	0.0214	0.0255	0.0238	0.062	0.047	0.083	0.083	0.066	0.018	0.073	0.047	0.0214	0.0255	0.0238
2	17	0.006	0.006	0.026	0.063	0.03	0.03	0.0505	0.043	0.0359	0.112	0.047	0.019	0.019	0.035	0.002	0.049	0.047	0.0505	0.043	0.0359
2	18	0.026	0.026	0.023	0.081	0.03	0.058	0.0505	0.043	0.0359	0.126	0.077	0.019	0.019	0.043	0.006	0.038	0.077	0.0505	0.043	0.0359
2	19	0.029	0.029	0.029	0.016	0.02	0.044	0.0505	0.043	0.0359	0.05	0.051	0.018	0.018	0.029	0.001	0.034	0.051	0.0505	0.043	0.0359
2	20	0	0	0.01	0.007	0.006	0.045	0.0079	0.0059	0.0105	0.021	0.047	0.024	0.024	0.013	0	0.02	0.047	0.0079	0.0059	0.0105
2	21	0	0	0.017	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.01	0.021	0.035	0.035	0.027	0	0.003	0.021	0.0079	0.0059	0.0105
2	22	0	0	0.001	0	0.005	0.002	0.0079	0.0059	0.0105	0.006	0.018	0.008	0.008	0.025	0	0.011	0.018	0.0079	0.0059	0.0105
2	23	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.012	0	0	0	0.012	0	0	0	0.0079	0.0059	0.0105
2	24	0.004	0.004	0.003	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.012	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105

3+

SR3+	Hour	DEP_HK_XX	DEP_HC_XX	DEP_HO_XX	DEP_WO_XX	DEP_OO_XX	DEP_HY_XX	DEP_TS_XX	DEP_TM_XX	DEP_TH_XX	RET_HW_XX	RET_HS_XX	RET_HK_XX	RET_HC_XX	RET_HO_XX	RET_WO_XX	RET_OO_XX	RET_HY_XX	RET_TS_XX	RET_TM_XX	RET_TH_XX
3	1	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.004	0.004	0	0	0.004	0	0.003	0.004	0.0079	0.0059	0.0105
3	2	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.003	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
3	3	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0.001	0.002	0	0	0	0	0	0.002	0.0079	0.0059	0.0105
3	4	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
3	5	0	0	0	0	0	0.005	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
3	6	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.005	0	0	0	0.005	0	0.005	0.0079	0.0059	0.0105
3	7	0.02	0.02	0.021	0.003	0	0.006	0.0374	0.0427	0.0369	0.006	0	0	0	0.004	0.019	0.003	0	0.0374	0.0427	0.0369
3	8	0.219	0.219	0.112	0.012	0.023	0.018	0.0374	0.0427	0.0369	0	0.002	0	0	0.037	0.088	0.07	0.002	0.0374	0.0427	0.0369
3	9	0.052	0.052	0.051	0.016	0.014	0.024	0.0374	0.0427	0.0369	0.002	0.017	0	0	0.039	0.045	0.016	0.017	0.0374	0.0427	0.0369
3	10	0.054	0.054	0.034	0.059	0.017	0.055	0.0214	0.0255	0.0238	0.002	0.024	0	0	0.011	0.029	0.011	0.024	0.0214	0.0255	0.0238
3	11	0.026	0.026	0.034	0.057	0.025	0.038	0.0214	0.0255	0.0238	0.005	0.018	0.022	0.022	0.012	0.031	0.032	0.018	0.0214	0.0255	0.0238
3	12	0.018	0.018	0.037	0.06	0.048	0.038	0.0214	0.0255	0.0238	0.008	0.021	0.063	0.063	0.028	0.023	0.044	0.021	0.0214	0.0255	0.0238
3	13	0.054	0.054	0.013	0.093	0.031	0.027	0.0214	0.0255	0.0238	0.012	0.047	0.038	0.038	0.026	0.049	0.069	0.047	0.0214	0.0255	0.0238
3	14	0.042	0.042	0.029	0.037	0.059	0.025	0.0214	0.0255	0.0238	0.011	0.034	0.065	0.065	0.023	0.027	0.052	0.034	0.0214	0.0255	0.0238
3	15	0.003	0.003	0.036	0.053	0.037	0.033	0.0214	0.0255	0.0238	0.024	0.035	0.055	0.055	0.046	0.027	0.078	0.035	0.0214	0.0255	0.0238
3	16	0	0	0.035	0.068	0.037	0.02	0.0214	0.0255	0.0238	0.062	0.047	0.083	0.083	0.066	0.018	0.073	0.047	0.0214	0.0255	0.0238

D1	Hour	DEP_HK_XX	DEP_HC_XX	DEP_HO_XX	DEP_WO_XX	DEP_OO_XX	DEP_HY_XX	DEP_TS_XX	DEP_TM_XX	DEP_TH_XX	RET_HW_XX	RET_HS_XX	RET_HK_XX	RET_HC_XX	RET_HO_XX	RET_WO_XX	RET_OO_XX	RET_HY_XX	RET_TS_XX	RET_TM_XX	RET_TH_XX
3	17	0.006	0.006	0.026	0.063	0.03	0.03	0.0505	0.043	0.0359	0.112	0.047	0.019	0.019	0.035	0.002	0.049	0.047	0.0505	0.043	0.0359
3	18	0.026	0.026	0.023	0.081	0.03	0.058	0.0505	0.043	0.0359	0.126	0.077	0.019	0.019	0.043	0.006	0.038	0.077	0.0505	0.043	0.0359
3	19	0.029	0.029	0.029	0.016	0.02	0.044	0.0505	0.043	0.0359	0.05	0.051	0.018	0.018	0.029	0.001	0.034	0.051	0.0505	0.043	0.0359
3	20	0	0	0.01	0.007	0.006	0.045	0.0079	0.0059	0.0105	0.021	0.047	0.024	0.024	0.013	0	0.02	0.047	0.0079	0.0059	0.0105
3	21	0	0	0.017	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.01	0.021	0.035	0.035	0.027	0	0.003	0.021	0.0079	0.0059	0.0105
3	22	0	0	0.001	0	0.005	0.002	0.0079	0.0059	0.0105	0.006	0.018	0.008	0.008	0.025	0	0.011	0.018	0.0079	0.0059	0.0105
3	23	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.012	0	0	0	0.012	0	0	0	0.0079	0.0059	0.0105
3	24	0.004	0.004	0.003	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.012	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105

; Transit

TRN	Hour	DEP_HK_XX	DEP_HC_XX	DEP_HO_XX	DEP_WO_XX	DEP_OO_XX	DEP_HY_XX	DEP_TS_XX	DEP_TM_XX	DEP_TH_XX	RET_HW_XX	RET_HS_XX	RET_HK_XX	RET_HC_XX	RET_HO_XX	RET_WO_XX	RET_OO_XX	RET_HY_XX	RET_TS_XX	RET_TM_XX	RET_TH_XX
4	1	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.004	0.004	0	0	0.004	0	0.003	0.004	0.0079	0.0059	0.0105
4	2	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.003	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
4	3	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0.001	0.002	0	0	0	0	0	0.002	0.0079	0.0059	0.0105
4	4	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
4	5	0	0	0	0	0	0.005	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
4	6	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.005	0	0	0	0.005	0	0.005	0.0079	0.0059	0.0105
4	7	0.02	0.02	0.021	0.003	0	0.006	0.0374	0.0427	0.0369	0.006	0	0	0	0.004	0.019	0.003	0	0.0374	0.0427	0.0369
4	8	0.219	0.219	0.112	0.012	0.023	0.018	0.0374	0.0427	0.0369	0	0.002	0	0	0.037	0.088	0.07	0.002	0.0374	0.0427	0.0369
4	9	0.052	0.052	0.051	0.016	0.014	0.024	0.0374	0.0427	0.0369	0.002	0.017	0	0	0.039	0.045	0.016	0.017	0.0374	0.0427	0.0369
4	10	0.054	0.054	0.034	0.059	0.017	0.055	0.0214	0.0255	0.0238	0.002	0.024	0	0	0.011	0.029	0.011	0.024	0.0214	0.0255	0.0238
4	11	0.026	0.026	0.034	0.057	0.025	0.038	0.0214	0.0255	0.0238	0.005	0.018	0.022	0.022	0.012	0.031	0.032	0.018	0.0214	0.0255	0.0238
4	12	0.018	0.018	0.037	0.06	0.048	0.038	0.0214	0.0255	0.0238	0.008	0.021	0.063	0.063	0.028	0.023	0.044	0.021	0.0214	0.0255	0.0238
4	13	0.054	0.054	0.013	0.093	0.031	0.027	0.0214	0.0255	0.0238	0.012	0.047	0.038	0.038	0.026	0.049	0.069	0.047	0.0214	0.0255	0.0238
4	14	0.042	0.042	0.029	0.037	0.059	0.025	0.0214	0.0255	0.0238	0.011	0.034	0.065	0.065	0.023	0.027	0.052	0.034	0.0214	0.0255	0.0238
4	15	0.003	0.003	0.036	0.053	0.037	0.033	0.0214	0.0255	0.0238	0.024	0.035	0.055	0.055	0.046	0.027	0.078	0.035	0.0214	0.0255	0.0238
4	16	0	0	0.035	0.068	0.037	0.02	0.0214	0.0255	0.0238	0.062	0.047	0.083	0.083	0.066	0.018	0.073	0.047	0.0214	0.0255	0.0238
4	17	0.006	0.006	0.026	0.063	0.03	0.03	0.0505	0.043	0.0359	0.112	0.047	0.019	0.019	0.035	0.002	0.049	0.047	0.0505	0.043	0.0359
4	18	0.026	0.026	0.023	0.081	0.03	0.058	0.0505	0.043	0.0359	0.126	0.077	0.019	0.019	0.043	0.006	0.038	0.077	0.0505	0.043	0.0359
4	19	0.029	0.029	0.029	0.016	0.02	0.044	0.0505	0.043	0.0359	0.05	0.051	0.018	0.018	0.029	0.001	0.034	0.051	0.0505	0.043	0.0359
4	20	0	0	0.01	0.007	0.006	0.045	0.0079	0.0059	0.0105	0.021	0.047	0.024	0.024	0.013	0	0.02	0.047	0.0079	0.0059	0.0105
4	21	0	0	0.017	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.01	0.021	0.035	0.035	0.027	0	0.003	0.021	0.0079	0.0059	0.0105
4	22	0	0	0.001	0	0.005	0.002	0.0079	0.0059	0.0105	0.006	0.018	0.008	0.008	0.025	0	0.011	0.018	0.0079	0.0059	0.0105
4	23	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.012	0	0	0	0.012	0	0	0	0.0079	0.0059	0.0105
4	24	0.004	0.004	0.003	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.012	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105

WLK	Hour	DEP_HK_XX	DEP_HC_XX	DEP_HO_XX	DEP_WO_XX	DEP_OO_XX	DEP_HY_XX	DEP_TS_XX	DEP_TM_XX	DEP_TH_XX	RET_HW_XX	RET_HS_XX	RET_HK_XX	RET_HC_XX	RET_HO_XX	RET_WO_XX	RET_OO_XX	RET_HY_XX	RET_TS_XX	RET_TM_XX	RET_TH_XX
5	1	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.004	0.004	0	0	0.004	0	0.003	0.004	0.0079	0.0059	0.0105
5	2	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.003	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
5	3	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0.001	0.002	0	0	0	0	0	0.002	0.0079	0.0059	0.0105
5	4	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
5	5	0	0	0	0	0	0.005	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
5	6	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.005	0	0	0	0.005	0	0.005	0.0079	0.0059	0.0105
5	7	0.02	0.02	0.021	0.003	0	0.006	0.0374	0.0427	0.0369	0.006	0	0	0	0.004	0.019	0.003	0	0.0374	0.0427	0.0369
5	8	0.219	0.219	0.112	0.012	0.023	0.018	0.0374	0.0427	0.0369	0	0.002	0	0	0.037	0.088	0.07	0.002	0.0374	0.0427	0.0369
5	9	0.052	0.052	0.051	0.016	0.014	0.024	0.0374	0.0427	0.0369	0.002	0.017	0	0	0.039	0.045	0.016	0.017	0.0374	0.0427	0.0369
5	10	0.054	0.054	0.034	0.059	0.017	0.055	0.0214	0.0255	0.0238	0.002	0.024	0	0	0.011	0.029	0.011	0.024	0.0214	0.0255	0.0238
5	11	0.026	0.026	0.034	0.057	0.025	0.038	0.0214	0.0255	0.0238	0.005	0.018	0.022	0.022	0.012	0.031	0.032	0.018	0.0214	0.0255	0.0238
5	12	0.018	0.018	0.037	0.06	0.048	0.038	0.0214	0.0255	0.0238	0.008	0.021	0.063	0.063	0.028	0.023	0.044	0.021	0.0214	0.0255	0.0238
5	13	0.054	0.054	0.013	0.093	0.031	0.027	0.0214	0.0255	0.0238	0.012	0.047	0.038	0.038	0.026	0.049	0.069	0.047	0.0214	0.0255	0.0238
5	14	0.042	0.042	0.029	0.037	0.059	0.025	0.0214	0.0255	0.0238	0.011	0.034	0.065	0.065	0.023	0.027	0.052	0.034	0.0214	0.0255	0.0238
5	15	0.003	0.003	0.036	0.053	0.037	0.033	0.0214	0.0255	0.0238	0.024	0.035	0.055	0.055	0.046	0.027	0.078	0.035	0.0214	0.0255	0.0238
5	16	0	0	0.035	0.068	0.037	0.02	0.0214	0.0255	0.0238	0.062	0.047	0.083	0.083	0.066	0.018	0.073	0.047	0.0214	0.0255	0.0238
5	17	0.006	0.006	0.026	0.063	0.03	0.03	0.0505	0.043	0.0359	0.112	0.047	0.019	0.019	0.035	0.002	0.049	0.047	0.0505	0.043	0.0359
5	18	0.026	0.026	0.023	0.081	0.03	0.058	0.0505	0.043	0.0359	0.126	0.077	0.019	0.019	0.043	0.006	0.038	0.077	0.0505	0.043	0.0359
5	19	0.029	0.029	0.029	0.016	0.02	0.044	0.0505	0.043	0.0359	0.05	0.051	0.018	0.018	0.029	0.001	0.034	0.051	0.0505	0.043	0.0359
5	20	0	0	0.01	0.007	0.006	0.045	0.0079	0.0059	0.0105	0.021	0.047	0.024	0.024	0.013	0	0.02	0.047	0.0079	0.0059	0.0105
5	21	0	0	0.017	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.01	0.021	0.035	0.035	0.027	0	0.003	0.021	0.0079	0.0059	0.0105
5	22	0	0	0.001	0	0.005	0.002	0.0079	0.0059	0.0105	0.006	0.018	0.008	0.008	0.025	0	0.011	0.018	0.0079	0.0059	0.0105
5	23	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.012	0	0	0	0.012	0	0	0	0.0079	0.0059	0.0105
5	24	0.004	0.004	0.003	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.012	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105

TRK	Hour	DEP_HK_XX	DEP_HC_XX	DEP_HO_XX	DEP_WO_XX	DEP_OO_XX	DEP_HY_XX	DEP_TS_XX	DEP_TM_XX	DEP_TH_XX	RET_HW_XX	RET_HS_XX	RET_HK_XX	RET_HC_XX	RET_HO_XX	RET_WO_XX	RET_OO_XX	RET_HY_XX	RET_TS_XX	RET_TM_XX	RET_TH_XX
6	1	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.004	0.004	0	0	0.004	0	0.003	0.004	0.0079	0.0059	0.0105
6	2	0	0	0	0	0	0	0.0079	0.0059	0.0105	0.003	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
6	3	0	0	0	0	0	0.002	0.0079	0.0059	0.0105	0.001	0.002	0	0	0	0	0	0.002	0.0079	0.0059	0.0105
6	4	0	0	0	0	0	0	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
6	5	0	0	0	0	0	0.005	0.0079	0.0059	0.0105	0	0	0	0	0	0	0	0	0.0079	0.0059	0.0105
6	6	0	0	0.005	0	0	0	0.0079	0.0059	0.0105	0	0.005	0	0	0	0.005	0	0.005	0.0079	0.0059	0.0105
6	7	0.02	0.02	0.021	0.003	0	0.006	0.0374	0.0427	0.0369	0.006	0	0	0	0.004	0.019	0.003	0	0.0374	0.0427	0.0369
6	8	0.219	0.219	0.112	0.012	0.023	0.018	0.0374	0.0427	0.0369	0	0.002	0	0	0.037	0.088	0.07	0.002	0.0374	0.0427	0.0369

DiurnalFactors

D1	Hour	DEP_HK_XX	DEP_HC_XX	DEP_HO_XX	DEP_WO_XX	DEP_OO_XX	DEP_HY_XX	DEP_TS_XX	DEP_TM_XX	DEP_TH_XX	RET_HW_XX	RET_HS_XX	RET_HK_XX	RET_HC_XX	RET_HO_XX	RET_WO_XX	RET_OO_XX	RET_HY_XX	RET_TS_XX	RET_TM_XX	RET_TH_XX
6	9	0.052	0.052	0.051	0.016	0.014	0.024	0.0374	0.0427	0.0369	0.002	0.017	0	0	0.039	0.045	0.016	0.017	0.0374	0.0427	0.0369
6	10	0.054	0.054	0.034	0.059	0.017	0.055	0.0214	0.0255	0.0238	0.002	0.024	0	0	0.011	0.029	0.011	0.024	0.0214	0.0255	0.0238
6	11	0.026	0.026	0.034	0.057	0.025	0.038	0.0214	0.0255	0.0238	0.005	0.018	0.022	0.022	0.012	0.031	0.032	0.018	0.0214	0.0255	0.0238
6	12	0.018	0.018	0.037	0.06	0.048	0.038	0.0214	0.0255	0.0238	0.008	0.021	0.063	0.063	0.028	0.023	0.044	0.021	0.0214	0.0255	0.0238
6	13	0.054	0.054	0.013	0.093	0.031	0.027	0.0214	0.0255	0.0238	0.012	0.047	0.038	0.038	0.026	0.049	0.069	0.047	0.0214	0.0255	0.0238
6	14	0.042	0.042	0.029	0.037	0.059	0.025	0.0214	0.0255	0.0238	0.011	0.034	0.065	0.065	0.023	0.027	0.052	0.034	0.0214	0.0255	0.0238
6	15	0.003	0.003	0.036	0.053	0.037	0.033	0.0214	0.0255	0.0238	0.024	0.035	0.055	0.055	0.046	0.027	0.078	0.035	0.0214	0.0255	0.0238
6	16	0	0	0.035	0.068	0.037	0.02	0.0214	0.0255	0.0238	0.062	0.047	0.083	0.083	0.066	0.018	0.073	0.047	0.0214	0.0255	0.0238
6	17	0.006	0.006	0.026	0.063	0.03	0.03	0.0505	0.043	0.0359	0.112	0.047	0.019	0.019	0.035	0.002	0.049	0.047	0.0505	0.043	0.0359
6	18	0.026	0.026	0.023	0.081	0.03	0.058	0.0505	0.043	0.0359	0.126	0.077	0.019	0.019	0.043	0.006	0.038	0.077	0.0505	0.043	0.0359
6	19	0.029	0.029	0.029	0.016	0.02	0.044	0.0505	0.043	0.0359	0.05	0.051	0.018	0.018	0.029	0.001	0.034	0.051	0.0505	0.043	0.0359
6	20	0	0	0.01	0.007	0.006	0.045	0.0079	0.0059	0.0105	0.021	0.047	0.024	0.024	0.013	0	0.02	0.047	0.0079	0.0059	0.0105
6	21	0	0	0.017	0.002	0.004	0.014	0.0079	0.0059	0.0105	0.01	0.021	0.035	0.035	0.027	0	0.003	0.021	0.0079	0.0059	0.0105
6	22	0	0	0.001	0	0.005	0.002	0.0079	0.0059	0.0105	0.006	0.018	0.008	0.008	0.025	0	0.011	0.018	0.0079	0.0059	0.0105
6	23	0	0	0	0	0.007	0	0.0079	0.0059	0.0105	0.012	0	0	0	0.012	0	0	0	0.0079	0.0059	0.0105
6	24	0.004	0.004	0.003	0.002	0.002	0.002	0.0079	0.0059	0.0105	0.012	0	0	0	0.005	0	0	0	0.0079	0.0059	0.0105

; Roadway parameters by facility and typology

; Capacity Class	Terrain	Area Type	Facility Type	Capacity_1	Capacity_2+	Speed Max	Alpha	Beta	OpsCap_1	OpsCap_2+	Description
1	1	1	1	2100	2100	70	0.25	9	2205	2310	Flat, Rural, Freeway
2	1	1	2	1680	2100	45	0.08	6	1680	2200	Flat, Rural, Highway
3	1	1	3	1155	1155	55	0.08	6	1680	2200	Flat, Rural, Expressway
4	1	1	4	945	945	45	0.07	6	1680	1980	Flat, Rural, Arterial
5	1	1	5	735	735	50	0.07	6	1680	1980	Flat, Rural, Collector
6	1	1	6	600	600	40	0.34	4	1155	1870	Flat, Rural, Local
7	1	1	7	1900	1900	50	0.08	6	1890	1980	Flat, Rural, Ramp:Freeway-Freeway
8	1	1	8	1600	1600	50	0.74	5	1575	1650	Flat, Rural, Ramp:Slip
9	1	1	9	1300	1300	45	0.7	5	1313	1375	Flat, Rural, Ramp:Loop
10	1	1	10	0	0	35	0	0	0	0	Flat, Rural, Connector: Internal
11	1	2	1	2000	2000	70	0.25	9	2100	2200	Flat, Suburban, Freeway
12	1	2	2	1600	2000	45	0.08	6	1680	2200	Flat, Suburban, Highway
13	1	2	3	1100	1100	55	0.08	6	1155	1210	Flat, Suburban, Expressway
14	1	2	4	900	900	45	0.38	5	945	990	Flat, Suburban, Arterial
15	1	2	5	700	700	50	0.96	5	735	770	Flat, Suburban, Collector
16	1	2	6	600	600	40	1.11	5	630	660	Flat, Suburban, Local
17	1	2	7	1800	1800	50	0.08	6	1890	1980	Flat, Suburban, Ramp:Freeway-Freeway
18	1	2	8	1500	1500	50	0.74	5	1575	1650	Flat, Suburban, Ramp:Slip
19	1	2	9	1250	1250	45	0.7	5	1313	1375	Flat, Suburban, Ramp:Loop
20	1	2	11	0	0	15	0	0	0	0	Flat, Suburban, Connector: External
21	1	3	1	1900	1900	65	0.25	9	1995	2090	Flat, Urban, Freeway
22	1	3	2	1600	1600	45	0.34	4	1680	1760	Flat, Urban, Highway
23	1	3	3	1000	1000	55	0.74	5	1050	1100	Flat, Urban, Expressway
24	1	3	4	800	800	45	0.7	5	840	880	Flat, Urban, Arterial
25	1	3	5	700	700	40	1	5	735	770	Flat, Urban, Collector
26	1	3	6	600	600	40	1.2	5	630	660	Flat, Urban, Local
27	1	3	7	1800	1800	50	0.08	6	1890	1980	Flat, Urban, Ramp:Freeway-Freeway
28	1	3	8	1500	1500	50	0.74	5	1575	1650	Flat, Urban, Ramp:Slip
29	1	3	9	1250	1250	45	0.7	5	1313	1375	Flat, Urban, Ramp:Loop
30	1	3	0	0	0	0	0	0	0	0	#N/A
31	1	4	1	1800	1800	65	0.18	8.5	1890	1980	Flat, Fringe, Freeway
32	1	4	2	1500	1500	45	0.07	6	1575	1650	Flat, Fringe, Highway
33	1	4	3	900	900	55	0.74	5	945	990	Flat, Fringe, Expressway
34	1	4	4	800	800	45	0.7	5	840	880	Flat, Fringe, Arterial
35	1	4	5	700	700	40	1	5	735	770	Flat, Fringe, Collector
36	1	4	6	600	600	40	1.5	5	630	660	Flat, Fringe, Local
37	1	4	7	1800	1800	50	0.08	6	1890	1980	Flat, Fringe, Ramp:Freeway-Freeway
38	1	4	8	1500	1500	50	0.74	5	1575	1650	Flat, Fringe, Ramp:Slip
39	1	4	9	1250	1250	45	0.7	5	1313	1375	Flat, Fringe, Ramp:Loop
40	1	4	0	0	0	0	0	0	0	0	#N/A
41	1	5	1	1750	1750	65	0.1	10	1838	1925	Flat, CBD, Freeway
42	1	5	2	1300	1300	45	0.07	6	1365	1430	Flat, CBD, Highway
43	1	5	3	800	800	45	1.16	6	840	880	Flat, CBD, Expressway
44	1	5	4	750	750	45	1	5	788	825	Flat, CBD, Arterial
45	1	5	5	700	700	40	1.4	5	735	770	Flat, CBD, Collector
46	1	5	6	600	600	40	1.5	5	630	660	Flat, CBD, Local
47	1	5	7	1800	1800	50	0.08	6	1890	1980	Flat, CBD, Ramp:Freeway-Freeway
48	1	5	8	1500	1500	50	0.74	5	1575	1650	Flat, CBD, Ramp:Slip
49	1	5	9	1250	1250	45	0.7	5	1313	1375	Flat, CBD, Ramp:Loop
50	1	5	0	0	0	0	0	0	0	0	#N/A
51	2	1	1	1800	1800	70	0.25	9	1890	1980	Rolling, Rural, Freeway
52	2	1	2	1300	1800	45	0.08	6	1365	1980	Rolling, Rural, Highway
53	2	1	3	1300	1800	65	0.08	6	1365	1980	Rolling, Rural, Expressway
54	2	1	4	1300	1700	45	0.07	6	1365	1870	Rolling, Rural, Arterial
55	2	1	5	1300	1700	50	0.07	6	1365	1870	Rolling, Rural, Collector
56	2	1	6	1000	1600	50	0.34	4	1050	1760	Rolling, Rural, Local
57	2	1	7	1800	1800	50	0.08	6	1890	1980	Rolling, Rural, Ramp:Freeway-Freeway
58	2	1	8	1500	1500	50	0.74	5	1575	1650	Rolling, Rural, Ramp:Slip
59	2	1	9	1250	1250	45	0.7	5	1313	1375	Rolling, Rural, Ramp:Loop
60	2	1	10	0	0	35	0	0	0	0	Rolling, Rural, Connector: Internal
61	2	2	1	1800	1800	70	0.25	9	1890	1980	Rolling, Suburban, Freeway
62	2	2	2	1300	1800	45	0.08	6	1365	1980	Rolling, Suburban, Highway
63	2	2	3	890	890	65	0.08	6	935	979	Rolling, Suburban, Expressway
64	2	2	4	730	730	45	0.38	5	767	803	Rolling, Suburban, Arterial
65	2	2	5	570	570	50	0.96	5	599	627	Rolling, Suburban, Collector
66	2	2	6	550	550	50	1.11	5	578	605	Rolling, Suburban, Local
67	2	2	7	1800	1800	50	0.08	6	1890	1980	Rolling, Suburban, Ramp:Freeway-Freeway
68	2	2	8	1500	1500	50	0.74	5	1575	1650	Rolling, Suburban, Ramp:Slip
69	2	2	9	1250	1250	45	0.7	5	1313	1375	Rolling, Suburban, Ramp:Loop
70	2	2	11	0	0	15	0	0	0	0	Rolling, Suburban, Connector: External
71	2	3	1	1620	1620	70	0.18	8.5	1701	1782	Rolling, Urban, Freeway
72	2	3	2	1300	1300	45	0.34	4	1365	1430	Rolling, Urban, Highway
73	2	3	3	810	810	65	0.74	5	851	891	Rolling, Urban, Expressway
74	2	3	4	730	730	45	0.7	5	767	803	Rolling, Urban, Arterial
75	2	3	5	650	650	50	1	5	683	715	Rolling, Urban, Collector
76	2	3	6	640	640	50	1.2	5	672	704	Rolling, Urban, Local
77	2	3	7	1500	1500	50	0.08	6	1575	1650	Rolling, Urban, Ramp:Freeway-Freeway
78	2	3	8	1500	1500	50	0.74	5	1575	1650	Rolling, Urban, Ramp:Slip
79	2	3	9	1250	1250	45	0.7	5	1313	1375	Rolling, Urban, Ramp:Loop
80	2	3	0	0	0	0	0	0	0	0	#N/A
81	2	4	1	1580	1580	70	0.18	8.5	1659	1738	Rolling, Fringe, Freeway
82	2	4	2	1220	1220	45	0.07	6	1281	1342	Rolling, Fringe, Highway

; Roadway parameters by facility and typology

; Capacity Class	Terrain	Area Type	Facility Type	Capacity_1	Capacity_2+	Speed Max	Alpha	Beta	OpsCap_1	OpsCap_2+	Description
83	2	4	3	730	730	65	0.74	5	767	803	Rolling, Fringe, Expressway
84	2	4	4	650	650	45	0.7	5	683	715	Rolling, Fringe, Arterial
85	2	4	5	650	650	50	1	5	683	715	Rolling, Fringe, Collector
86	2	4	6	640	640	50	1.5	5	672	704	Rolling, Fringe, Local
87	2	4	7	1500	1500	50	0.08	6	1575	1650	Rolling, Fringe, Ramp:Freeway-Freeway
88	2	4	8	1500	1500	50	0.74	5	1575	1650	Rolling, Fringe, Ramp:Slip
89	2	4	9	1250	1250	45	0.7	5	1313	1375	Rolling, Fringe, Ramp:Loop
90	2	4	0	0	0	0	0	0	0	0	#N/A
91	2	5	1	1580	1580	70	0.1	10	1659	1738	Rolling, CBD, Freeway
92	2	5	2	1060	1060	45	0.07	6	1113	1166	Rolling, CBD, Highway
93	2	5	3	650	650	65	1.16	6	683	715	Rolling, CBD, Expressway
94	2	5	4	610	610	45	1	5	641	671	Rolling, CBD, Arterial
95	2	5	5	570	570	50	1.4	5	599	627	Rolling, CBD, Collector
96	2	5	6	550	550	50	1.5	5	578	605	Rolling, CBD, Local
97	2	5	7	1500	1500	50	0.08	6	1575	1650	Rolling, CBD, Ramp:Freeway-Freeway
98	2	5	8	1500	1500	50	0.74	5	1575	1650	Rolling, CBD, Ramp:Slip
99	2	5	9	1250	1250	45	0.7	5	1313	1375	Rolling, CBD, Ramp:Loop
100	2	5	0	0	0	0	0	0	0	0	#N/A
101	3	1	1	1500	1500	65	0.18	8.5	1575	1650	Mountain, Rural, Freeway
102	3	1	2	700	1400	45	0.08	6	735	1540	Mountain, Rural, Highway
103	3	1	3	700	1400	55	0.08	6	735	1540	Mountain, Rural, Expressway
104	3	1	4	700	1400	45	0.07	6	735	1540	Mountain, Rural, Arterial
105	3	1	5	700	1400	40	0.07	6	735	1540	Mountain, Rural, Collector
106	3	1	6	600	1300	40	0.34	4	630	1430	Mountain, Rural, Local
107	3	1	7	1500	1500	50	0.08	6	1575	1650	Mountain, Rural, Ramp:Freeway-Freeway
108	3	1	8	1500	1500	45	0.74	5	1575	1650	Mountain, Rural, Ramp:Slip
109	3	1	9	1250	1250	35	0.7	5	1313	1375	Mountain, Rural, Ramp:Loop
110	3	1	10	0	0	35	0	0	0	0	Mountain, Rural, Connector: Internal
111	3	2	1	1500	1500	65	0.18	8.5	1575	1650	Mountain, Suburban, Freeway
112	3	2	2	700	1400	45	0.08	6	735	1540	Mountain, Suburban, Highway
113	3	2	3	700	1400	55	0.08	6	735	1540	Mountain, Suburban, Expressway
114	3	2	4	390	390	45	0.38	5	410	429	Mountain, Suburban, Arterial
115	3	2	5	310	310	40	0.96	5	326	341	Mountain, Suburban, Collector
116	3	2	6	330	330	40	1.11	5	347	363	Mountain, Suburban, Local
117	3	2	7	1500	1500	50	0.08	6	1575	1650	Mountain, Suburban, Ramp:Freeway-Freeway
118	3	2	8	1500	1500	45	0.74	5	1575	1650	Mountain, Suburban, Ramp:Slip
119	3	2	9	1250	1250	35	0.7	5	1313	1375	Mountain, Suburban, Ramp:Loop
120	3	2	11	0	0	15	0	0	0	0	Mountain, Suburban, Connector: External
121	3	3	1	1350	1350	65	0.1	10	1418	1485	Mountain, Urban, Freeway
122	3	3	2	700	700	45	0.34	4	735	770	Mountain, Urban, Highway
123	3	3	3	440	440	55	0.74	5	462	484	Mountain, Urban, Expressway
124	3	3	4	390	390	45	0.7	5	410	429	Mountain, Urban, Arterial
125	3	3	5	350	350	40	1	5	368	385	Mountain, Urban, Collector
126	3	3	6	380	380	40	1.2	5	399	418	Mountain, Urban, Local
127	3	3	7	1500	1500	50	0.08	6	1575	1650	Mountain, Urban, Ramp:Freeway-Freeway
128	3	3	8	1500	1500	45	0.74	5	1575	1650	Mountain, Urban, Ramp:Slip
129	3	3	9	1250	1250	35	0.7	5	1313	1375	Mountain, Urban, Ramp:Loop
130	3	3	0	0	0	0	0	0	0	0	#N/A
131	3	4	1	1310	1310	65	0.1	10	1376	1441	Mountain, Fringe, Freeway
132	3	4	2	660	660	45	0.07	6	693	726	Mountain, Fringe, Highway
133	3	4	3	390	390	55	0.74	5	410	429	Mountain, Fringe, Expressway
134	3	4	4	350	350	45	0.7	5	368	385	Mountain, Fringe, Arterial
135	3	4	5	350	350	40	1	5	368	385	Mountain, Fringe, Collector
136	3	4	6	380	380	40	1.5	5	399	418	Mountain, Fringe, Local
137	3	4	7	1500	1500	50	0.08	6	1575	1650	Mountain, Fringe, Ramp:Freeway-Freeway
138	3	4	8	1500	1500	45	0.74	5	1575	1650	Mountain, Fringe, Ramp:Slip
139	3	4	9	1250	1250	35	0.7	5	1313	1375	Mountain, Fringe, Ramp:Loop
140	3	4	0	0	0	0	0	0	0	0	#N/A
141	3	5	1	1310	1310	65	0.1	10	1376	1441	Mountain, CBD, Freeway
142	3	5	2	570	570	45	0.07	6	599	627	Mountain, CBD, Highway
143	3	5	3	350	350	55	1.16	6	368	385	Mountain, CBD, Expressway
144	3	5	4	330	330	45	1	5	347	363	Mountain, CBD, Arterial
145	3	5	5	310	310	40	1.4	5	326	341	Mountain, CBD, Collector
146	3	5	6	330	330	40	1.5	5	347	363	Mountain, CBD, Local
147	3	5	7	1500	1500	50	0.08	6	1575	1650	Mountain, CBD, Ramp:Freeway-Freeway
148	3	5	8	1500	1500	45	0.74	5	1575	1650	Mountain, CBD, Ramp:Slip
149	3	5	9	1250	1250	35	0.7	5	1313	1375	Mountain, CBD, Ramp:Loop
150	3	5	0	0	0	0	0	0	0	0	#N/A

;

District

D 1 = 1-100 ; External
D 2 = 101-320 ; Clovis
D 3 = 321-370 ; Coalinga
D 4 = 371-410 ; Firebaugh
D 5 = 411-470 ; Fowler
D 6 = 471-1540 ; Fresno
D 7 = 1541-1580 ; Huron
D 8 = 1581-1630 ; Kerman
D 9 = 1631-1680 ; Kingsburg
D 10 = 1681-1720 ; Mendota
D 11 = 1721-1750 ; Orange Cove
D 12 = 1751-1790 ; Parlier
D 13 = 1791-1850 ; Reedley
D 14 = 1851-1920 ; Sanger
D 15 = 1921-3000 ; San Joaquin

Lables

1 External
2 Clovis
3 Coalinga
4 Firebaugh
5 Fowler
6 Fresno
7 Huron
8 Kerman
9 Kingsburg
10 Mendota
11 Orange Cove
12 Parlier
13 Reedley
14 Sanger
15 San Joaquin

Note: This file has been transposed for reporting and should not be used directly as formated in the model

; LOS_NO	1	2	3	4	5	6
TEMP01	0	100	590	810	850	999999
U_FWY_G2_2	1270	2110	2940	3580	3980	999999
U_FWY_G2_3	1970	3260	4550	5530	6150	999999
U_FWY_G2_4	2660	4410	6150	7480	8320	999999
U_FWY_G2_5	3360	5560	7760	9440	10480	999999
U_FWY_G2_6	4050	6710	9360	11390	12650	999999
TEMP07	0	100	590	810	850	999999
TEMP08	0	100	590	810	850	999999
TEMP09	0	100	590	810	850	999999
TEMP10	0	100	590	810	850	999999
TEMP11	0	100	590	810	850	999999
U_FWY_L2_2	1130	1840	2660	3440	3910	999999
U_FWY_L2_3	1780	2890	4180	5410	6150	999999
U_FWY_L2_4	2340	3940	5700	7380	8380	999999
U_FWY_L2_5	3080	4990	7220	9340	10620	999999
U_FWY_L2_6	3730	6040	8740	11310	12850	999999
TEMP17	0	100	590	810	850	999999
TEMP18	0	100	590	810	850	999999
TEMP19	0	100	590	810	850	999999
TEMP20	0	100	590	810	850	999999
U_HWY_UI_1	100	340	670	950	1300	999999
U_HWY_UI_2	1060	1720	2500	3230	3670	999999
U_HWY_UI_3	1600	2590	3740	4840	5500	999999
TEMP24	0	100	590	810	850	999999
TEMP25	0	100	590	810	850	999999
TEMP26	0	100	590	810	850	999999
TEMP27	0	100	590	810	850	999999
TEMP28	0	100	590	810	850	999999
TEMP29	0	100	590	810	850	999999
TEMP30	0	100	590	810	850	999999
U_ART_C1_1	0	220	720	860	890	999999
U_ART_C1_2	250	1530	1810	1860	1861	999999
U_ART_C1_3	380	2330	2720	2790	2791	999999
U_ART_C1_4	490	3030	3460	3540	3541	999999
TEMP35	0	100	590	810	850	999999
U_ART_C2_1	0	100	590	810	850	999999
U_ART_C2_2	0	220	1360	1710	1800	999999
U_ART_C2_3	0	340	2110	2570	2710	999999
U_ART_C2_4	0	440	2790	3330	3500	999999
TEMP40	0	100	590	810	850	999999
U_ART_C3_1	0	1	280	660	810	999999
U_ART_C3_2	0	1	650	1510	1720	999999
U_ART_C3_3	0	1	1020	2330	2580	999999
U_ART_C3_4	0	1	1350	3070	3330	999999
TEMP45	0	100	590	810	850	999999
U_ART_C4_1	0	1	270	720	780	999999
U_ART_C4_2	0	1	650	1580	1660	999999
U_ART_C4_3	0	1	1000	2390	2490	999999
U_ART_C4_4	0	1	1350	3130	3250	999999
TEMP50	0	100	590	810	850	999999
U_MAJ_NS_1	0	1	480	760	810	999999
U_MAJ_NS_2	0	1	1120	1620	1720	999999
U_MAJ_NS_3	0	1	1740	2450	2580	999999
TEMP54	0	100	590	810	850	999999
TEMP55	0	100	590	810	850	999999
U_OTH_NS_1	0	1	250	530	660	999999
U_OTH_NS_2	0	1	580	1140	1320	999999
U_OTH_NS_3	0	1	870	1710	1980	999999
TEMP59	0	100	590	810	850	999999
TEMP60	0	100	590	810	850	999999
TEMP61	0	100	590	810	850	999999
TEMP62	0	100	590	810	850	999999
TEMP63	0	100	590	810	850	999999
TEMP64	0	100	590	810	850	999999
TEMP65	0	100	590	810	850	999999
TEMP66	0	100	590	810	850	999999
TEMP67	0	100	590	810	850	999999
TEMP68	0	100	590	810	850	999999
TEMP69	0	100	590	810	850	999999
TEMP70	0	100	590	810	850	999999
TEMP71	0	100	590	810	850	999999
R_FWY_RU_2	1220	2020	2740	3240	3600	999999
R_FWY_RU_3	1890	3110	4230	5000	5560	999999
R_FWY_RU_4	2560	4210	5720	6770	7520	999999
TEMP75	0	100	590	810	850	999999
TEMP76	0	100	590	810	850	999999
TEMP77	0	100	590	810	850	999999
TEMP78	0	100	590	810	850	999999
TEMP79	0	100	590	810	850	999999
TEMP80	0	100	590	810	850	999999
R_HWY_RU_1	120	250	410	650	1060	999999
R_HWY_RU_2	940	1540	2200	2830	3140	999999
R_HWY_RU_3	1410	2310	3330	4240	4710	999999
TEMP84	0	100	590	810	850	999999
TEMP85	0	100	590	810	850	999999
R_HWY_SU_1	120	350	600	820	1120	999999
R_HWY_SU_2	950	1540	2230	2890	3280	999999
R_HWY_SU_3	1430	2310	3350	4330	4920	999999
TEMP89	0	100	590	810	850	999999
TEMP90	0	100	590	810	850	999999
R_ART_SU_1	0	120	590	740	800	999999
R_ART_SU_2	0	290	1360	1570	1660	999999
R_ART_SU_3	0	450	2100	2360	2500	999999
TEMP94	0	100	590	810	850	999999
TEMP95	0	100	590	810	850	999999
R_LOC_SU_1	0	1	100	410	540	999999
TEMP97	0	100	590	810	850	999999
TEMP98	0	100	590	810	850	999999
TEMP99	0	100	590	810	850	999999

APPENDIX M:
ONE-WAY VOLUME MODEL VALIDATION RESULTS

San Joaquin Valley Model Improvement Project (San Joaquin Valley MIP)
One-Way Volume Model Validation Results
Fresno County Model

August 1, 2017

DAILY Assignment		
Model/Count Ratio =	0.94	
Percent Within Caltrans Maximum Deviation =	79%	> 75%
Percent Root Mean Square Error =	54%	<40
Correlation Coefficient =	95%	> 0.88
%of Screenlines Within Caltrans Standard Dev. =	92%	100%
Externals M/C Ratio =		
Externals % RMSE =		
Total Count	793	
Link Within Deviation	623	
Link Outside Deviation	170	
	Remaining	Total Needed
	-28	595

Model/Count by ADT Volume Groups		
Link Volume	M/C	Counts
> 50,000	1.09	
25,000 - 49,999	0.98	
10,000 - 24,999	1.02	
5,000 - 9,999	0.87	
2,500 - 4,999	0.88	
1,000 - 2,499	0.85	
< 1,000	0.82	

RMSE by ADT Volume Groups		
Link Volume	%RMSE	FHWA
> 50,000	28%	< 21%
25,000 - 49,999	21%	< 22%
10,000 - 24,999	32%	< 25%
5,000 - 9,999	48%	< 29%
2,500 - 4,999	56%	< 36%
1,000 - 2,499	52%	< 47%
< 1,000	60%	< 60%

ADT Model/Count by Functional Class		
Functional Class	M/C	Counts
Freeway	1.04	54
Highway	1.26	17
Expressway	1.25	26
Arterial	0.79	339
Collector	0.82	368

AM Peak Period (6 - 9 AM)		
Model/Count Ratio =	0.84	
Percent Within Caltrans Maximum Deviation =	76%	> 75%
Percent Root Mean Square Error =	62%	<40
Correlation Coefficient =	0.93	> 0.88
%of Screenlines Within Caltrans Standard Dev. =	91%	100%
Externals M/C Ratio =		
Externals % RMSE =		
Total Count	793	
Link Within Deviation	606	
Link Outside Deviation	187	
	Remaining	Total Needed
	-11	595

MD Peak Period (10 AM - 2 PM)		
Model/Count Ratio =	0.93	
Percent Within Caltrans Maximum Deviation =	70%	> 75%
Percent Root Mean Square Error =	64%	<40
Correlation Coefficient =	0.94	> 0.88
%of Screenlines Within Caltrans Standard Dev. =	100%	100%
Externals M/C Ratio =		
Externals % RMSE =		
Total Count	793	
Link Within Deviation	552	
Link Outside Deviation	241	
	Remaining	Total Needed
	43	595

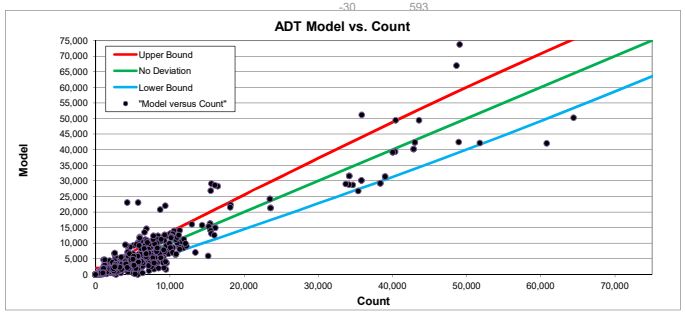
AM Peak Hour (7- 8 AM)		
Model/Count Ratio =	0.66	
Percent Within Caltrans Maximum Deviation =	47%	> 75%
Percent Root Mean Square Error =	105%	<40
Correlation Coefficient =	0.79	> 0.88
%of Screenlines Within Caltrans Standard Dev. =	58%	100%
Externals M/C Ratio =		
Externals % RMSE =		
Total Count	793	
Link Within Deviation	373	
Link Outside Deviation	420	
	Remaining	Total Needed
	222	595

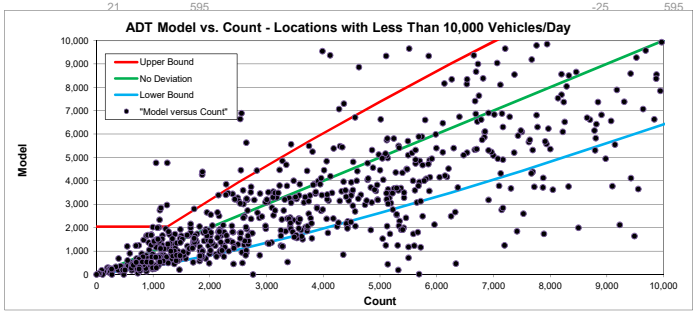
Freeway Traffic vs. Local Traffic	Model/Count	
Time Period Analyzed	Freeway	Streets
DAILY Assignment	1.02	0.88
AM Peak Period (6 - 9 AM)	0.90	0.80
MD Peak Period (10 AM - 2 PM)	1.11	0.82
PM Peak Period (3 - 7 PM)	1.05	0.97
Off Peak Period (8 PM - 5 AM)	0.93	1.00
AM Peak Hour (7- 8 AM)	1.00	0.48
PM Peak Hour (5 - 6 PM)	1.03	0.85

PM Peak Period (3 - 7 PM)		
Model/Count Ratio =	1.00	
Percent Within Caltrans Maximum Deviation =	79%	> 75%
Percent Root Mean Square Error =	51%	<40
Correlation Coefficient =	0.95	> 0.88
%of Screenlines Within Caltrans Standard Dev. =	100%	100%
Externals M/C Ratio =		
Externals % RMSE =		
Total Count	791	
Link Within Deviation	623	
Link Outside Deviation	168	
	Remaining	Total Needed
	-30	593

Off Peak Period (8 PM - 5 AM)		
Model/Count Ratio =	0.97	
Percent Within Caltrans Maximum Deviation =	72%	> 75%
Percent Root Mean Square Error =	71%	<40
Correlation Coefficient =	0.91	> 0.88
%of Screenlines Within Caltrans Standard Dev. =	100%	100%
Externals M/C Ratio =		
Externals % RMSE =		
Total Count	793	
Link Within Deviation	574	
Link Outside Deviation	219	
	Remaining	Total Needed
	21	595

PM Peak Hour (5 - 6 PM)		
Model/Count Ratio =	0.91	
Percent Within Caltrans Maximum Deviation =	78%	> 75%
Percent Root Mean Square Error =	157%	<40
Correlation Coefficient =	0.64	> 0.88
%of Screenlines Within Caltrans Standard Dev. =	92%	100%
Externals M/C Ratio =		
Externals % RMSE =		
Total Count	793	
Link Within Deviation	620	
Link Outside Deviation	173	
	Remaining	Total Needed
	-25	595





Note: The results reflect the validation status of VMIP 2 Model as of August 1, 2017. Fresno COG and model consultants will continually work on improving the model, including peak hour validations, as the process is a work-in-progress.