# Final Tulare CAG VMIP 2
# Model Development Report

**Prepared for:**
**Tulare CAG**

July 2017

WC12-2954

FEHR PEERS

# Table of Contents

# 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 Tulare County Association of Governments (TCAG) 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)<br>0.24 (MF) | 0.62 (SF)<br>0.45 (MF) | 0.87 | 1.28 | 1.50 |
| ***Low Income; Place Types 3, 4, 5*** | 0.55 (SF)<br>0.43 (MF) | 0.80 (SF)<br>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 |

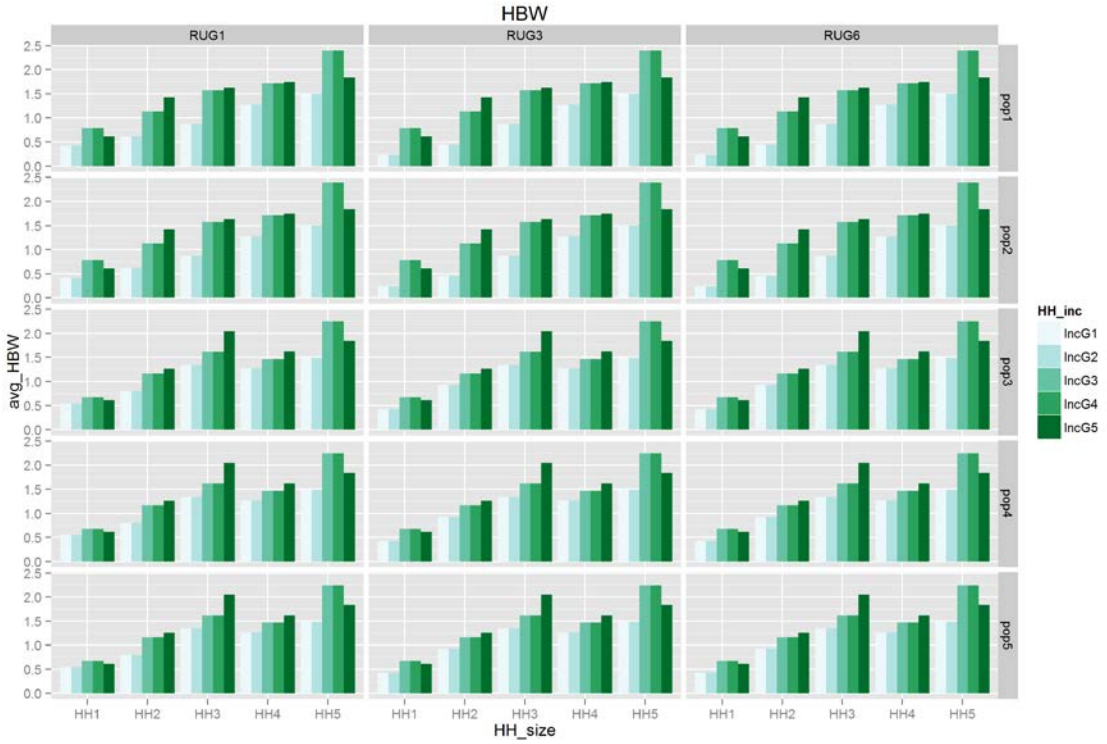
**TABLE 23: HBS HOUSEHOLD PERSON TRIP PRODUCTION RATES (DAILY TRIPS PER HOUSEHOLD)**

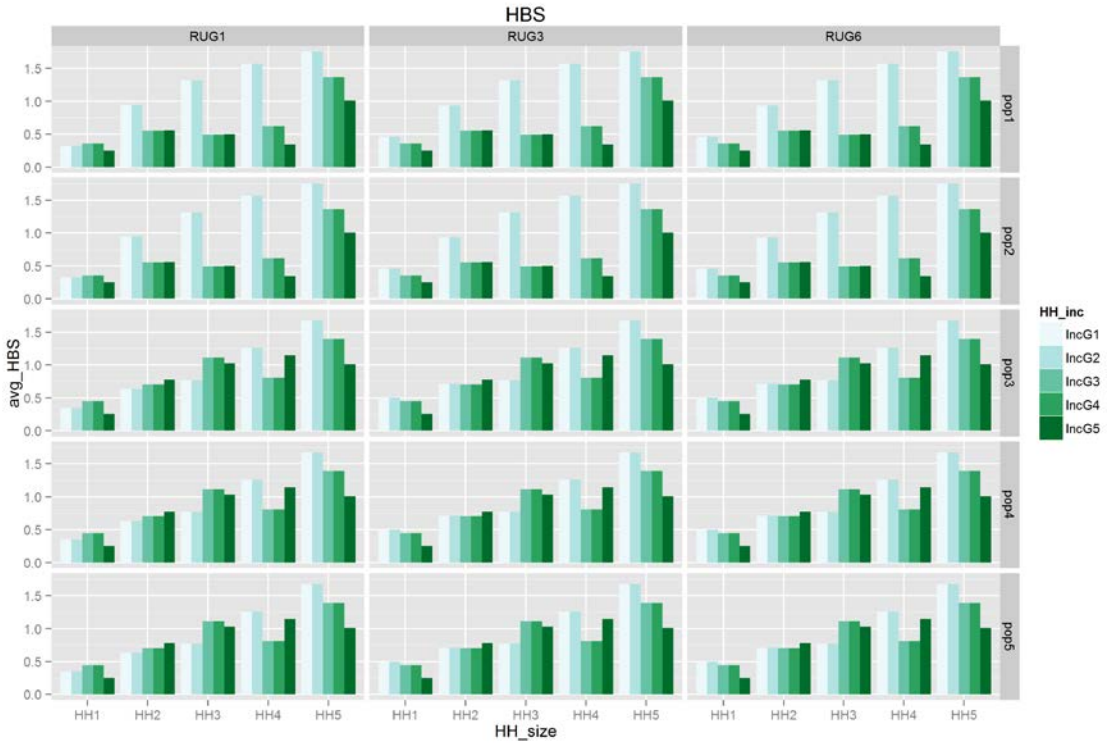
| | 1-person HH | 2-person HH | 3-person HH | 4-person HH | 5+-person HH |
|---|---|---|---|---|---|
| ***Low Income; Place Types 1 and 2*** | 0.32 (SF)<br>0.46 (MF) | 0.95 (SF)<br>0.93 (MF) | 1.32 | 1.57 | 1.75 |
| ***Low Income; Place Types 3, 4, 5*** | 0.34 (SF)<br>0.50 (MF) | 0.63 (SF)<br>0.71 (MF) | 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 |

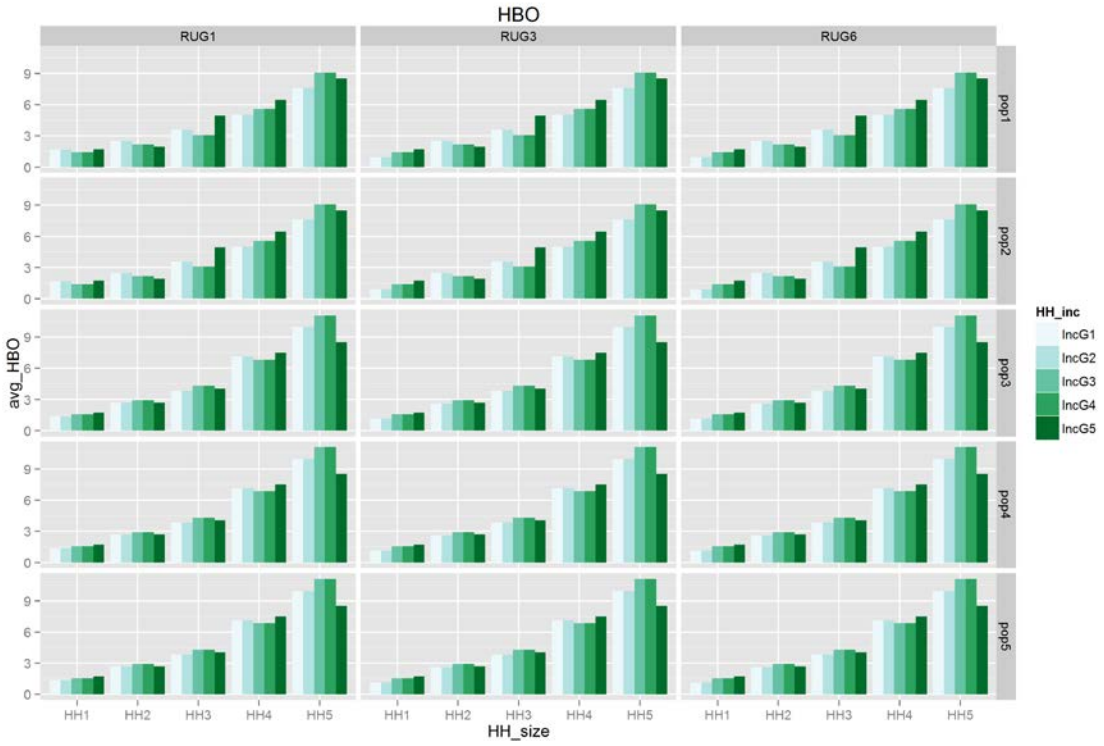
**TABLE 24: HBO HOUSEHOLD PERSON TRIP PRODUCTION RATES (DAILY TRIPS PER HOUSEHOLD)**

| | 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)<br>0.92 (MF) | 2.50 | 3.57 | 5.02 | 7.61 |
| ***Low Income; Place Types 3, 4, 5*** | 1.35 (SF)<br>1.14 (MF) | 2.69 (SF)<br>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 MODE 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.

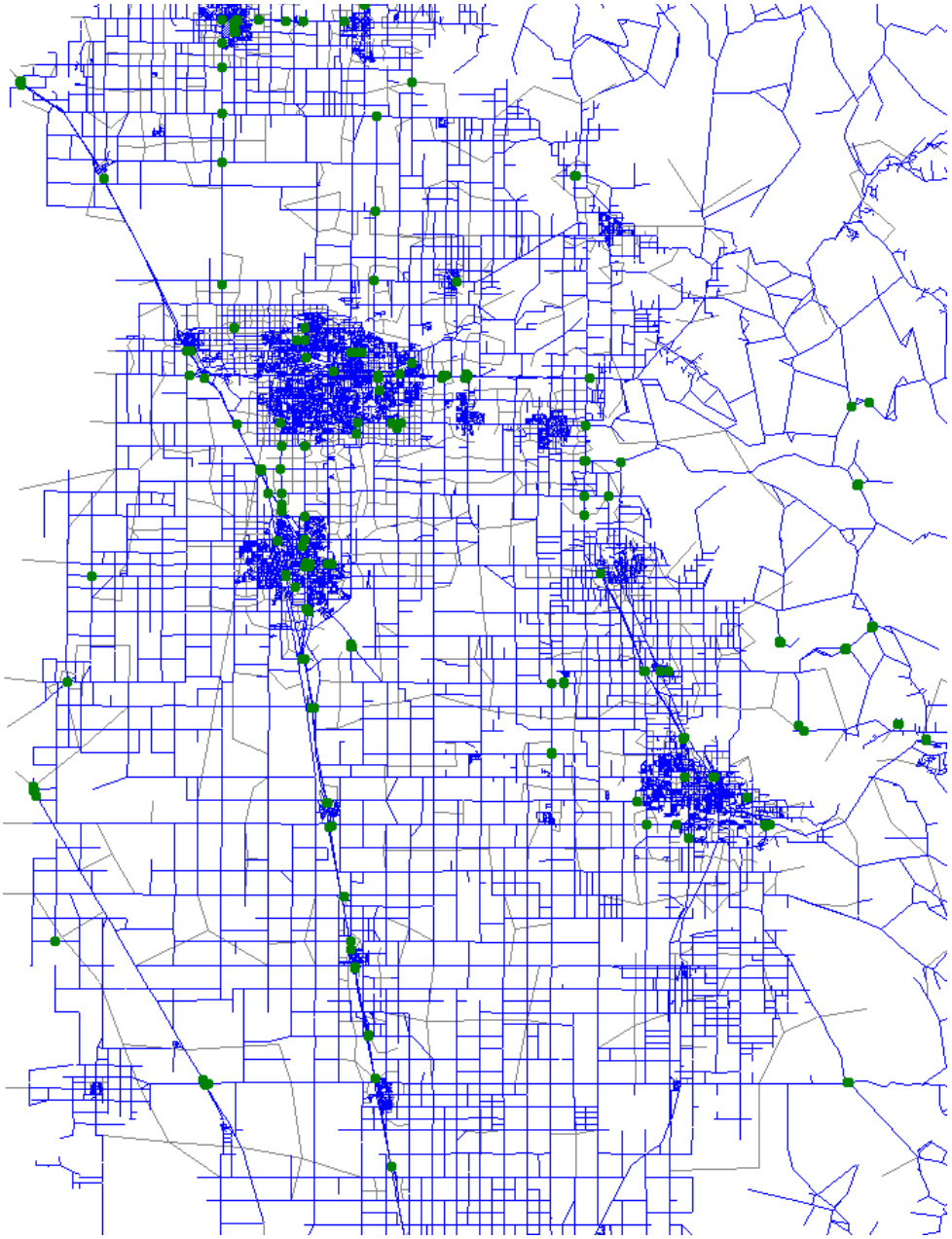
To allow for a different value of time, traffic assignments by vehicle availability was implemented for a multi-class assignment which separately evaluates and reports the following five vehicle types:

- 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).

### Turn Penalties

Turn penalties were added for rural routes connecting between cities to reflect delay of all-way or side-street stop intersections. The green nodes in the figure below denote turn penalties on rural routes and turn prohibitions for one-way or ramp junctions.



### 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

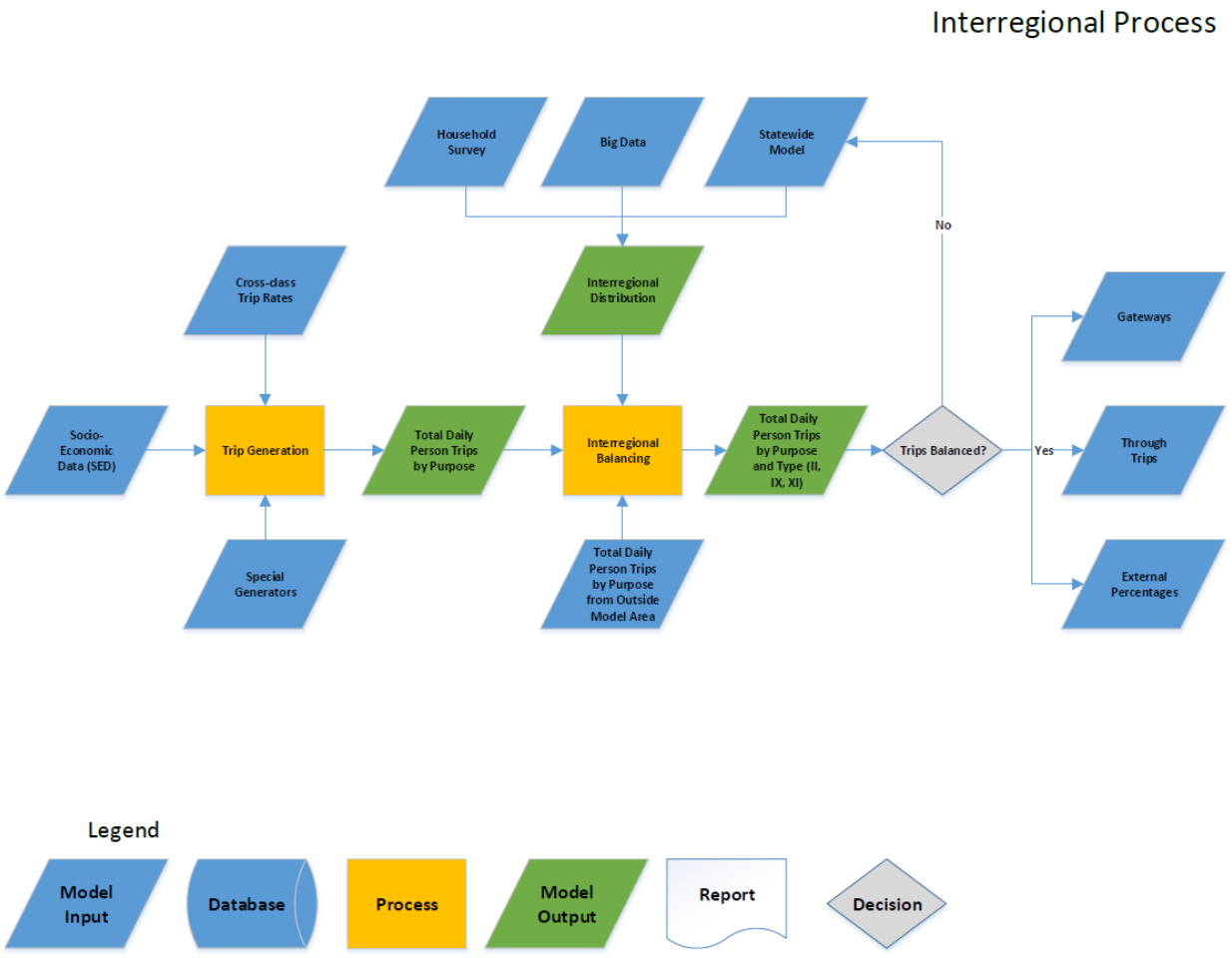
- User classes (this needs to reflect types of MPO questions, such as sensitivity to fares or value of time)
- Transfer and wait rules

### 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_TCAG_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% | 238,381 | 232,299 | 1.03 | -6,082 | -2.6% |
| HBS | +/- 10% | 272,561 | 270,959 | 1.01 | -1,602 | -0.6% |
| HBO | +/- 10% | 590,281 | 603,873 | 0.98 | 13,593 | 2.3% |
| NHB | +/- 10% | 413,757 | 430,197 | 0.96 | 16,440 | 4.0% |

**TABLE 40: WEEKDAY PERSON TRIPS PER HOUSEHOLD**

| CHTS | Model |
|---|---|
| 11.6 | 11.1 |

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 very 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 |
| 6% | 7% | 32% | 33% | 40% | 40% | 22% | 19% |

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 | 16% | 14% | 80% | 81% | 9% | 8% | 5% | 7% | 0.3% | 0.7% | 5% | 3% | 1% | 1% | 0% | 0% |
| HBO | 59% | 61% | 24% | 25% | 28% | 30% | 31% | 30% | 0.5% | 1.5% | 13% | 8% | 1% | 1% | 3% | 4% |
| NHB | 26% | 24% | 42% | 40% | 27% | 26% | 18% | 17% | 0.3% | 0.9% | 12% | 13% | 0% | 3% | 1% | 0% |
| Total | 100% | 100% | 37% | 37% | 25% | 26% | 24% | 23% | 0.4% | 1.2% | 11% | 9% | 1% | 2% | 2% | 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. 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. The transit data in the survey were 100% HBO which was not realistic, so the other modes were calibrated and the resulting transit mode in the model was retained rather than forcing 0% transit for other purposes. Additional on-board or similar surveys could be used to verify the results for transit. Similar, the walk and bike overall mode shares are low and the non-home trips are often underreported. Although somewhat costly given the mode share, surveys of pedestrian or bike trips could refine the purpose split. Knowing the underreporting of non-home trips, the model was calibrated to have a higher percentage of these types of trips while retaining the overall mode share.

**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 | 16% | 14% | 34% | 32% | 6% | 4% | 3% | 4% | 11% | 8% | 7% | 4% | 14% | 5% |
| HBO | 59% | 61% | 38% | 42% | 67% | 71% | 77% | 77% | 70% | 74% | 67% | 59% | 69% | 56% |
| NHB | 26% | 24% | 29% | 27% | 28% | 25% | 20% | 18% | 19% | 18% | 26% | 36% | 16% | 39% |
| 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 lower than CHTS average times. For key rural routes between cities the model was overestimating assigned trips. Based on discussion with TCAG staff, turn penalties were added to retain the overall speed for air quality and emissions purposes while reflecting the all-way or side-street stop delay along the routes.

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

| Trip Purpose | | | | | |
|---|---|---|---|---|---|
| HBW | | HBO | | NHB | |
| CHTS | Model | CHTS | Model | CHTS | Model |
| 16.1 | 14.3 | 12.4 | 9.9 | 10.4 | 9.1 |

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

## 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 rounding error (0% difference) compared to HPMS and is within the allowed deviation. 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% | 10,062,200 | 10,307,185 | + 2.4% |

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 | 92% | 90% | 85% | 85% | 94% | 91% | 92% | 90% |
| IX | 4% | 7% | 9% | 11% | 3% | 7% | 4% | 6% |
| XI | 4% | 3% | 5% | 4% | 3% | 3% | 5% | 4% |

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 TCAG model, weekday traffic counts were compared to the model assigned volume for total vehicle trips. TCAG collects 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 2015. **Table 47** summarizes the static validation tests for both sets of counts. In general, screening out counts influenced by construction activity improves the link level validation. 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 | 232 |
| Model/Count Ratio | +/- 10% | 1.06 |
| Percent within Caltrans Deviation | >75% | 67% |
| Percent Root Mean Square Error | < 40% | 60% |
| Correlation Coefficient | > 0.88 | 0.95 |
| Screenlines within Caltrans Deviation | 100% | 91% |

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 tests even after filtering the counts for construction activity. The model/count ratio shows the model tends to under-predict observed counts despite matching CHTS trip generation rates almost identically. This may suggest increases in trip rates could be justified since surveys may not fully capture existing travel behavior from busier households that are difficult to recruit, plus the potential to under-report short distance trips. The percent of links (and screenlines) within acceptable Caltrans deviations is also lower than the recommended guideline. The percentage root mean square error of 60% is higher than the recommended value of 40%, but this same statistic is reasonable for higher volume roadways above 25,000 as shown in the supplemental dashboards below. The time of day validation results are also shown for informational purposes, with 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, 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. To help identify or target sub-regional areas requiring more refinements, users should review the map of daily validation locations. 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)
## All Two-Way Volume Model Validation Results
## Tulare County Model (07/11/2017)

**7/12/17 2:57 PM**

Recommended in RTP Guidelines *

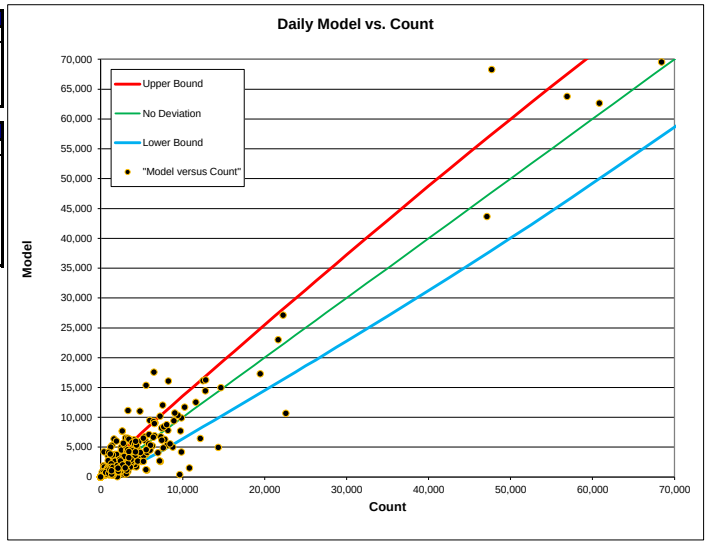
For Informational Purposes Only. **

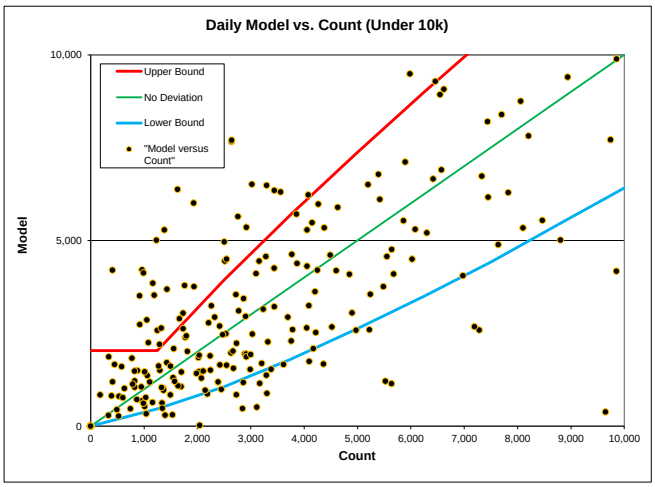
| All Links Assignment | Guidelines | Daily | AM Peak Period | Mid-Day | PM Peak Period | Off-Peak | AM Peak Hour | PM Peak Hour |
|---|---|---|---|---|---|---|---|---|
| Model/Count Ratio = | +-10% | 1.06 | 1.11 | 1.01 | 1.08 | 1.09 | 0.75 | 1.06 |
| Percent Within Maximum Deviation = | > 75% | 67% | 65% | 62% | 68% | 67% | 54% | 64% |
| Percent Root Mean Square Error = | < 40% | 60% | 76% | 61% | 66% | 57% | 122% | 69% |
| Correlation Coefficient = | > 0.88 | 0.95 | 0.93 | 0.95 | 0.94 | 0.96 | 0.79 | 0.93 |
| %of Screenlines Within Standard Dev. = | 100% | 91% | 82% | 91% | 82% | 73% | 55% | 82% |
| Total Count | | 232 | 232 | 232 | 232 | 232 | 232 | 232 |
| Link Within Deviation | | 156 | 150 | 144 | 157 | 156 | 126 | 148 |
| Link Outside Deviation | | 76 | 82 | 88 | 75 | 76 | 106 | 84 |

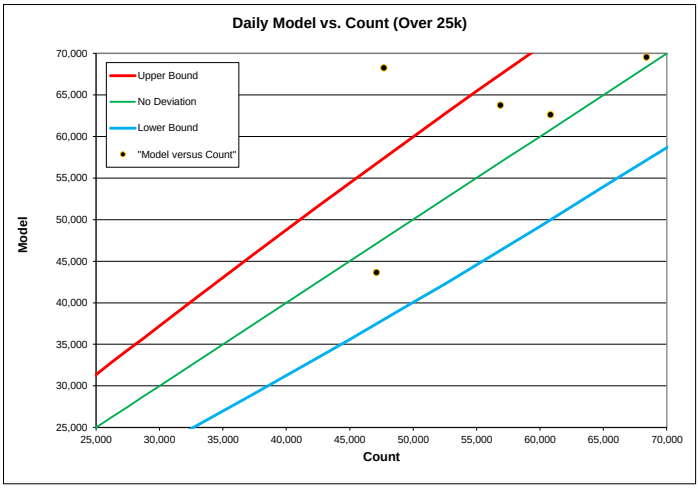
| Daily Model/Count by Functional Class | | |
|---|---|---|
| Functional Class | M/C | # Locations |
| Freeway | 1.02 | 4 |
| Highway\Expressway | 1.04 | 3 |
| Arterial | 0.84 | 225 |
| Collector | NA | 0 |

| RMSE by Daily Volume Groups | | |
|---|---|---|
| Count Volume | Guideline | Model |
| > 50,000 | < 21% | 17% |
| 25,000 - 49,999 | < 22% | 31% |
| 10,000 - 24,999 | < 25% | 37% |
| 5,000 - 9,999 | < 29% | 51% |
| 2,500 - 4,999 | < 36% | 62% |
| 1,000 - 2,499 | < 47% | 86% |
| < 1,000 | < 60% | 203% |

| Notes: | |
|---|---|
| Land Use Checks | |
| Highway Network Checks | |
| Transit Network Checks | |
| Total Trip Generation | |
| Trip Balancing | |
| Trip per Household | |
| Average Travel Time | |
| Mode Share | |
| VMT | |
| VMT per Capita | |
| HPMS Error | |
| Gravity Model Iterations = | 20 |
| Number of Interations per Off-Peak Assignment = | 20 |
| Number of Interations per Peak Assignment = | 50 |
| Time to Run = | |



## 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 for transit less than 3%, minor differences in mode result in a noticeable difference in transit riders. The person trips per household match survey data, although surveys often don't fully represent all households, especially larger households with demanding schedules.

**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% | 10,123 | 11,718 | + 16% |

Notes: Observed Ridership includes VT, TIME, DART, TCAT and PT average weekday unlinked trips for 2015

## THROUGH TRIPS

Although the through trips have not been 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 not adjusted upward. Further, 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. The volumes at the gateway are a combination of IXXI and XX and increasing either\both will increase VMT. 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.

# 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.

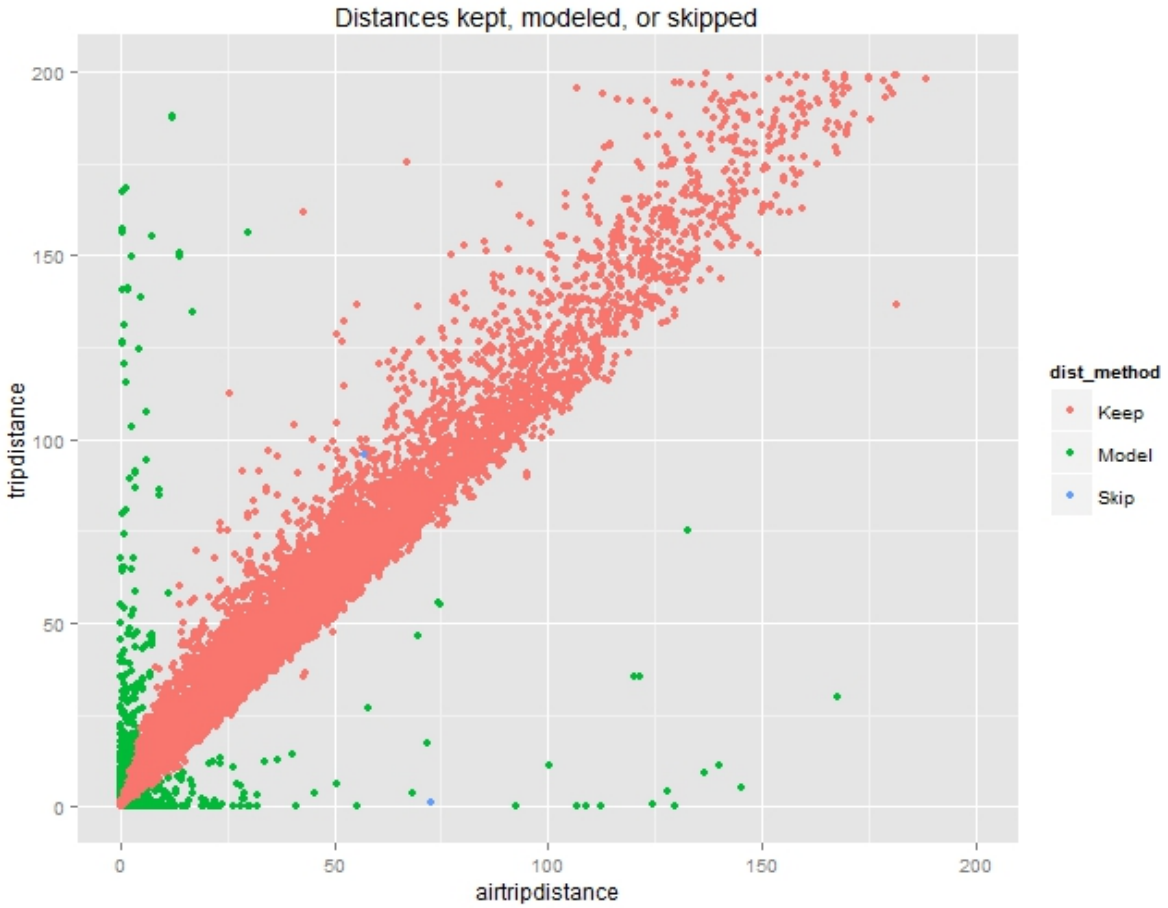
The 2012 CHTS is a statewide dataset of multi-modal travel behavior and household demographics. The survey includes data from a total of 42,431 households, collected using telephone surveys and GPS devices from all counties in California. The dataset includes travel patterns, including activity purpose, 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;<br>Wheelchair / Mobility Scooter<br>Other Non-Motorized |
| Bike | Bike |

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

| Simplified mode | Original modes |
|---|---|
| Walk to Rail | BART, Metro Red / Purple Line<br>ACE, Amtrak, Caltrain, Coaster, Metrolink<br>Metro Blue / Green / Gold Line, Muni Metro,<br>Sacramento Light Rail, San Diego Sprinter / Trolley /<br>Orange/Blue/Green, VTA Light Rail<br>Street Car / Cable Car<br>Other Rail |
| Drive to Rail | BART, Metro Red / Purple Line<br>ACE, Amtrak, Caltrain, Coaster, Metrolink<br>Metro Blue / Green / Gold Line, Muni Metro,<br>Sacramento Light Rail, San Diego Sprinter / Trolley /<br>Orange/Blue/Green, VTA Light Rail<br>Street Car / Cable Car<br>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:

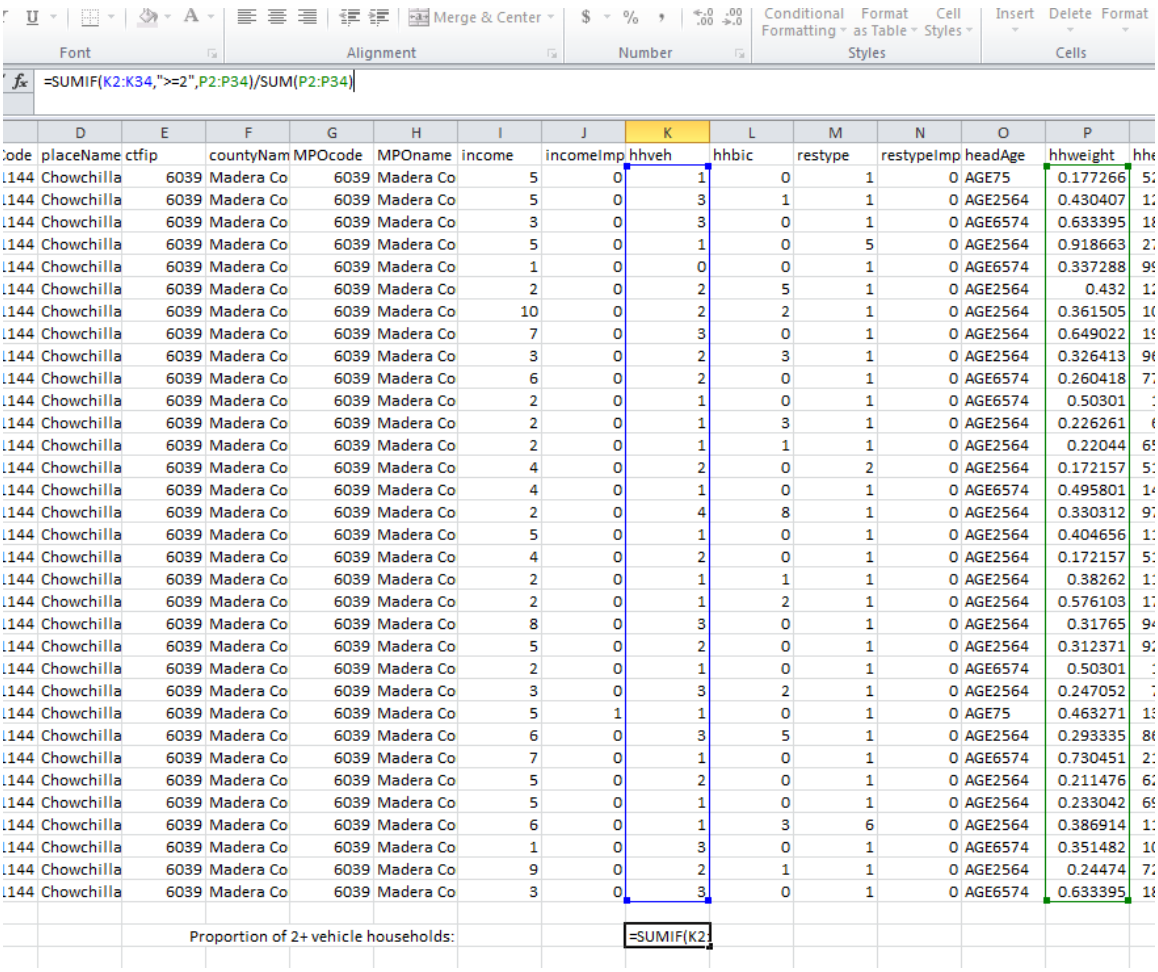
- When summing or averaging values that pertain to households, use the household weights *hhweight* or *hhexpweight*. Examples include calculating the percentage of 0-vehicle households in a region, calculating the average number of licensed drivers per household, or calculating the number of households 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:




| | D | E | F | G | H | I | J | K | L | M | N | O | P | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 52 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 5 | 0 | 3 | 1 | 1 | 0 | AGE2564 | 0.430407 | 12 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 3 | 0 | 3 | 0 | 1 | 0 | AGE6574 | 0.633395 | 18 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 5 | 0 | 1 | 0 | 5 | 0 | AGE2564 | 0.918663 | 27 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 1 | 0 | 0 | 0 | 1 | 0 | AGE6574 | 0.337288 | 99 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 2 | 0 | 2 | 5 | 1 | 0 | AGE2564 | 0.432 | 12 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 10 | 0 | 2 | 2 | 1 | 0 | AGE2564 | 0.361505 | 10 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 7 | 0 | 3 | 0 | 1 | 0 | AGE2564 | 0.649022 | 19 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 3 | 0 | 2 | 3 | 1 | 0 | AGE2564 | 0.326413 | 96 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 6 | 0 | 2 | 0 | 1 | 0 | AGE6574 | 0.260418 | 77 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 2 | 0 | 1 | 0 | 1 | 0 | AGE6574 | 0.50301 | 1 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 2 | 0 | 1 | 3 | 1 | 0 | AGE2564 | 0.226261 | 6 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 2 | 0 | 1 | 1 | 1 | 0 | AGE2564 | 0.22044 | 65 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 4 | 0 | 2 | 0 | 2 | 0 | AGE2564 | 0.172157 | 51 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 4 | 0 | 1 | 0 | 1 | 0 | AGE6574 | 0.495801 | 14 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 2 | 0 | 4 | 8 | 1 | 0 | AGE2564 | 0.330312 | 97 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 5 | 0 | 1 | 0 | 1 | 0 | AGE2564 | 0.404656 | 11 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 4 | 0 | 2 | 0 | 1 | 0 | AGE2564 | 0.172157 | 51 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 2 | 0 | 1 | 1 | 1 | 0 | AGE2564 | 0.38262 | 11 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 2 | 0 | 1 | 2 | 1 | 0 | AGE2564 | 0.576103 | 17 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 8 | 0 | 3 | 0 | 1 | 0 | AGE2564 | 0.31765 | 94 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 5 | 0 | 2 | 0 | 1 | 0 | AGE2564 | 0.312371 | 92 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 2 | 0 | 1 | 0 | 1 | 0 | AGE6574 | 0.50301 | 1 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 3 | 0 | 3 | 2 | 1 | 0 | AGE2564 | 0.247052 | 7 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 5 | 1 | 1 | 0 | 1 | 0 | AGE75 | 0.463271 | 13 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 6 | 0 | 3 | 5 | 1 | 0 | AGE2564 | 0.293335 | 86 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 7 | 0 | 1 | 0 | 1 | 0 | AGE6574 | 0.730451 | 21 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 5 | 0 | 2 | 0 | 1 | 0 | AGE2564 | 0.211476 | 62 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 5 | 0 | 1 | 0 | 1 | 0 | AGE2564 | 0.233042 | 68 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 6 | 0 | 1 | 3 | 6 | 0 | AGE2564 | 0.386914 | 11 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 1 | 0 | 3 | 0 | 1 | 0 | AGE6574 | 0.351482 | 10 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 9 | 0 | 2 | 1 | 1 | 0 | AGE2564 | 0.24474 | 72 |
| 144 | Chowchilla | 6039 | Madera Co | 6039 | Madera Co | 3 | 0 | 3 | 0 | 1 | 0 | AGE6574 | 0.633395 | 18 |
| | | | 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.

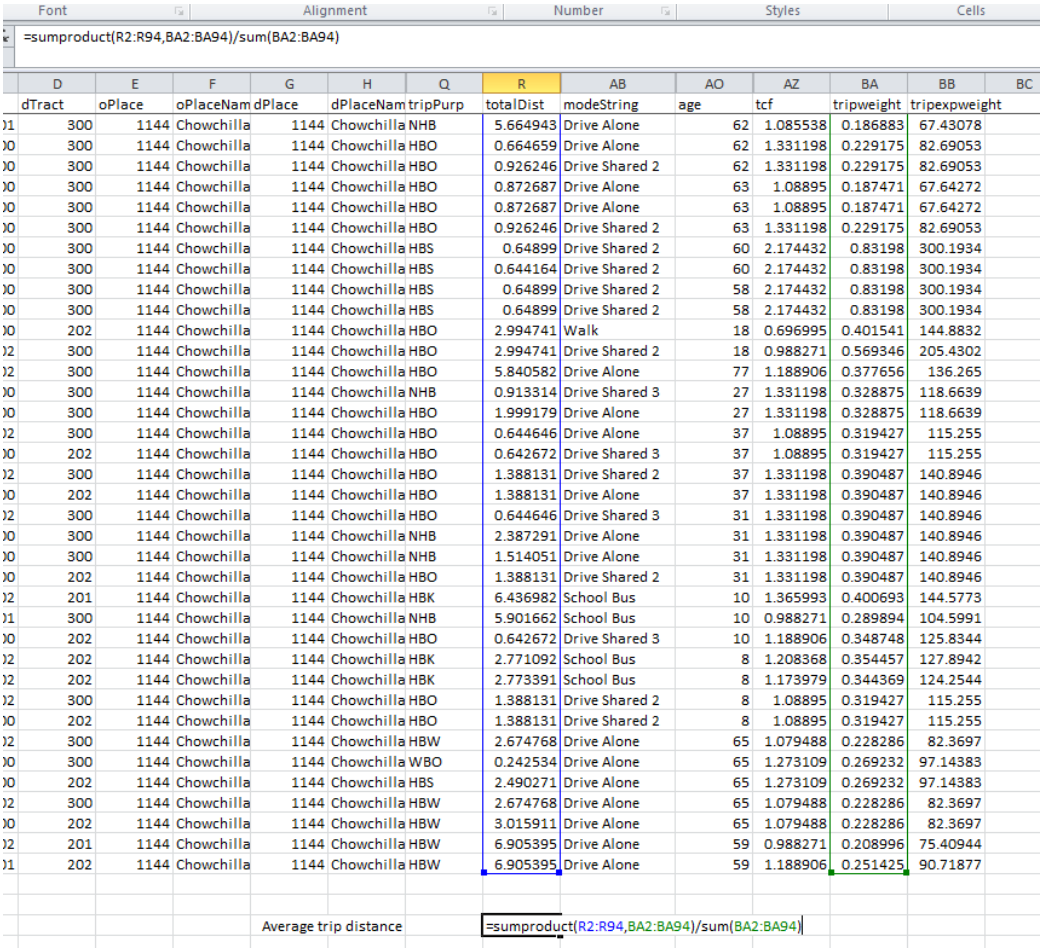
```
> prop_2plus <- sum(chowchilla$hhweight[chowchilla$hhveh>=2]) / sum(chowchilla$hhweight)
> prop_2plus
[1] 0.4930628
>
```

## 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<br>1 = Less than $10,000<br>2 = $10,000 - $24,999<br>3 = $25,000 - $34,999<br>4 = $35,000 - $49,999<br>5 = $50,000 - $74,999<br>6 = $75,000 - $99,999<br>7 = $100,000 - $149,999<br>8 = $150,000 - $199,999<br>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:<br>1. Less than $10,000<br>2. $10,000 to $24,999<br>3. $25,000 to $34,999<br>4. $35,000 to $49,999<br>5. $50,000 to $74,999<br>6. $75,000 to $99,999<br>7. $100,000 to $149,999<br>8. $150,000 to $199,999<br>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.

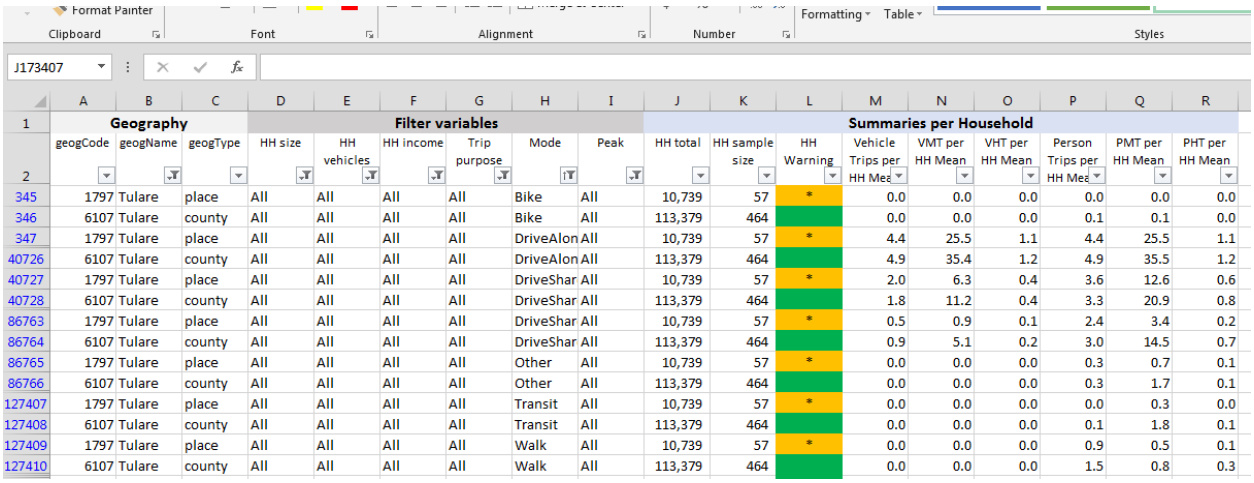
| | |
|---|---|
| | Large enough sample size for confident reporting. |
| * | Use with caution: sample size may be not be large enough for statistical confidence. |
| ** | Do not use in isolation. Sample size is too small for this result to stand on its own. |

## 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.

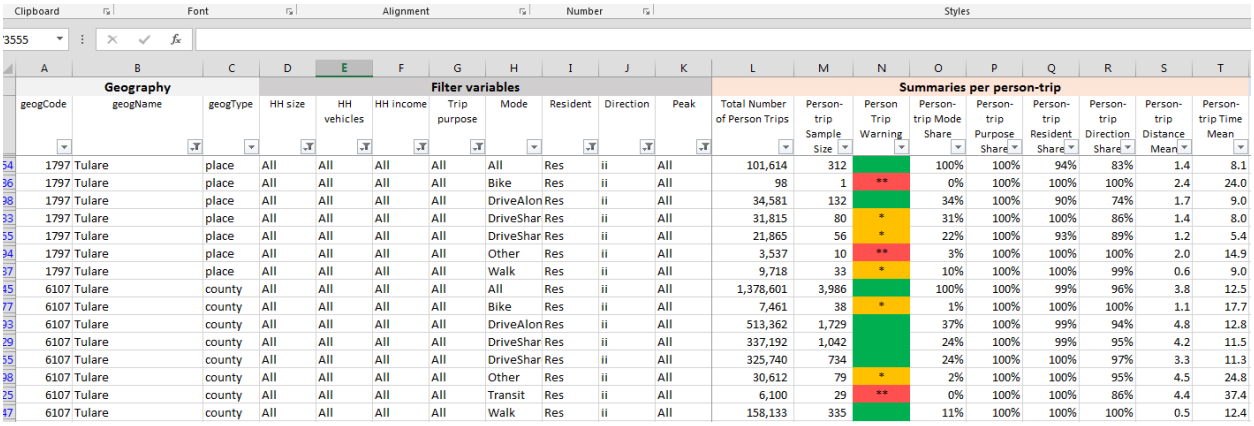
## EXAMPLES

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.



| | 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 |
| 36 | 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 |
| 55 | 1797 | Tulare | place | All | All | All | All | DriveShar | Res | ii | All | 21,865 | 56 | * | 22% | 100% | 93% | 89% | 1.2 | 5.4 |
| 34 | 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 |
| 55 | 6107 | Tulare | county | All | All | All | All | DriveShar | Res | ii | All | 325,740 | 734 | | 24% | 100% | 100% | 97% | 3.3 | 11.3 |
| 88 | 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:<br>Low = $0 - $49,999;<br>Med = $50,000 - $99,999;<br>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:<br>Low = $0 - $49,999;<br>Med = $50,000 - $99,999;<br>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.<br>ii =internal trip within the geography.<br>ix = outgoing trip which starts inside and ends outside the geography.<br>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,<br>Vehicle Trip Purpose Share,<br>Vehicle Trip Resident Share,<br>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,<br>Person Trip Purpose Share,<br>Person Trip Resident Share,<br>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:<br>• AMBAG: Monterey, San Benito, and Santa Cruz Counties<br>• MTC: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties<br>• SACOG: El Dorado*, Placer*, Sacramento, Sutter, Yolo, and Yuba Counties, excluding Tahoe Basin area of El Dorado and Placer counties<br>• SCAG: Imperial, Los Angeles, Orange, Riverside, San Bernardino, Ventura Counties<br>• TMPO: Tahoe Basin area of El Dorado and Placer Counties<br>• SJV: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare Counties<br>• North: Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Nevada, Plumas, Shasta, Sierra, Siskiyou, Tehama, and Trinity Counties<br>• Central Mountains: Alpine, Amador, Calaveras, Inyo, Mariposa, Mono, and Tuolumne Counties<br>• S Central Coast: San Luis Obispo and Santa Barbara Counties<br>• SANDAG: San Diego County |
| Mode | Mode | One of the following travel modes:<br>• DriveAlone, DriveShared<br>• Bus, Rail, Ferry<br>• Walk, Bike<br>• Other (e.g., taxi, school bus, paratransit, …) |
| Purpose | Purpose | One of the following trip purposes:<br>• HBW (home-based work)<br>• HBO (home-based other)<br>• 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.

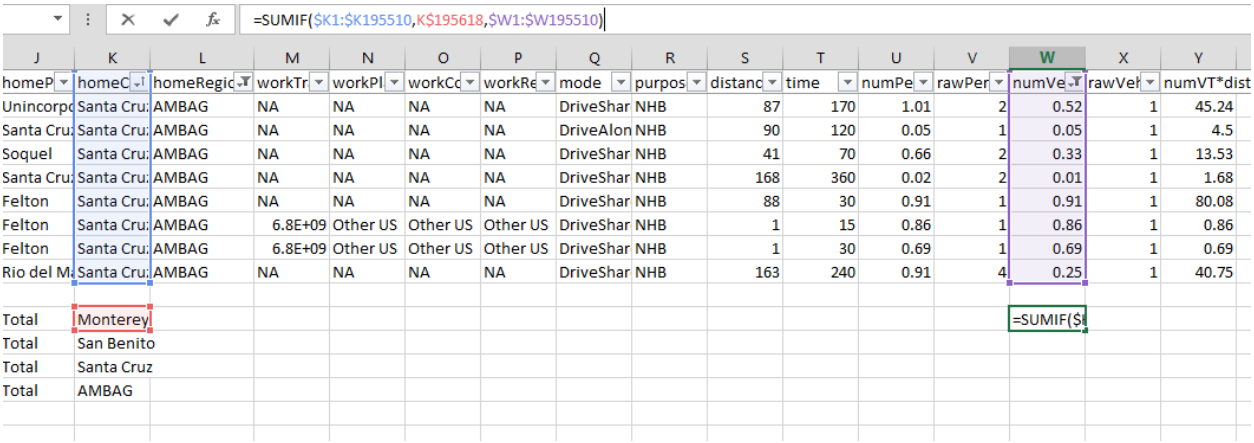
| | |
|---|---|
| homeRegion | AMBAG |

| 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)

| | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** |

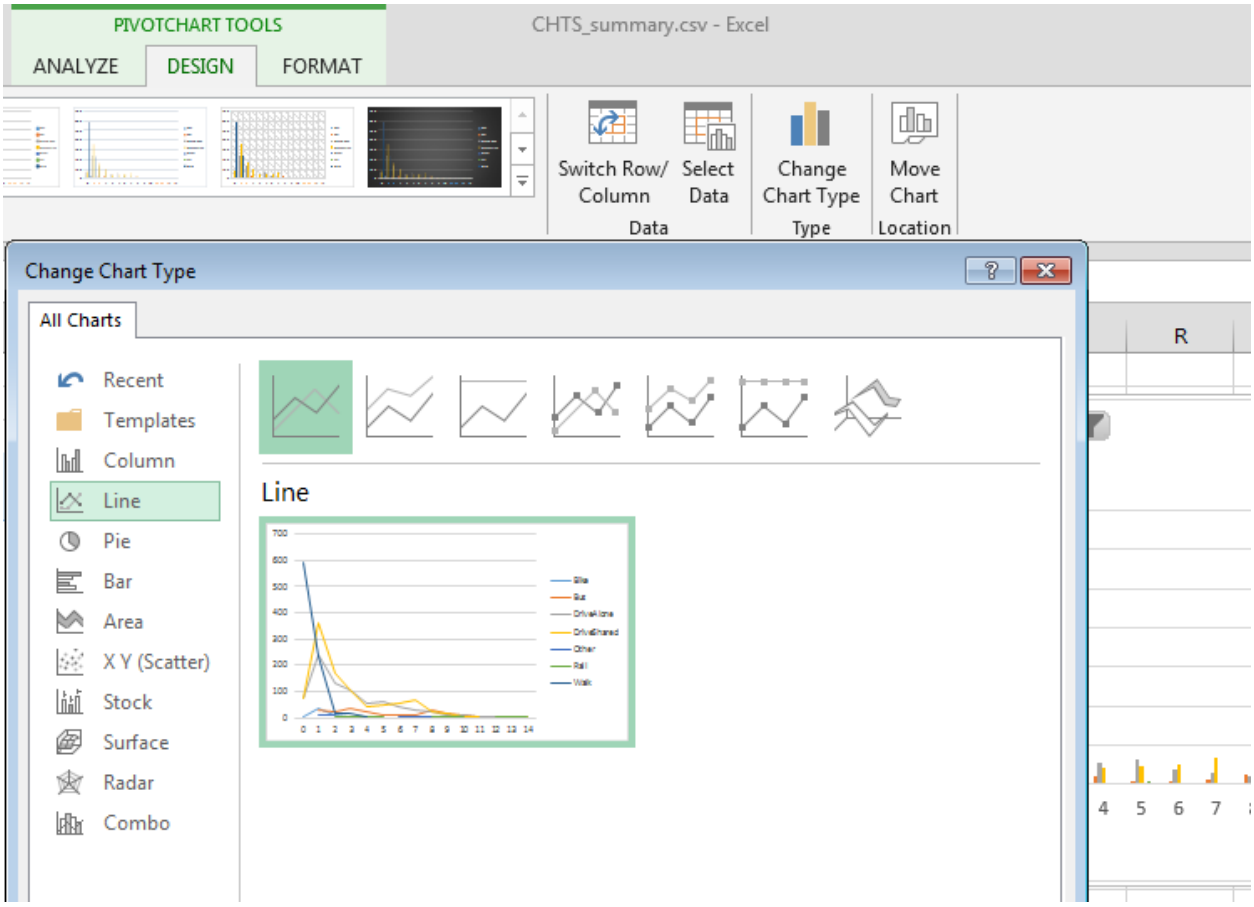
## GRAPH OF TRIP DISTANCE BY MODE

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

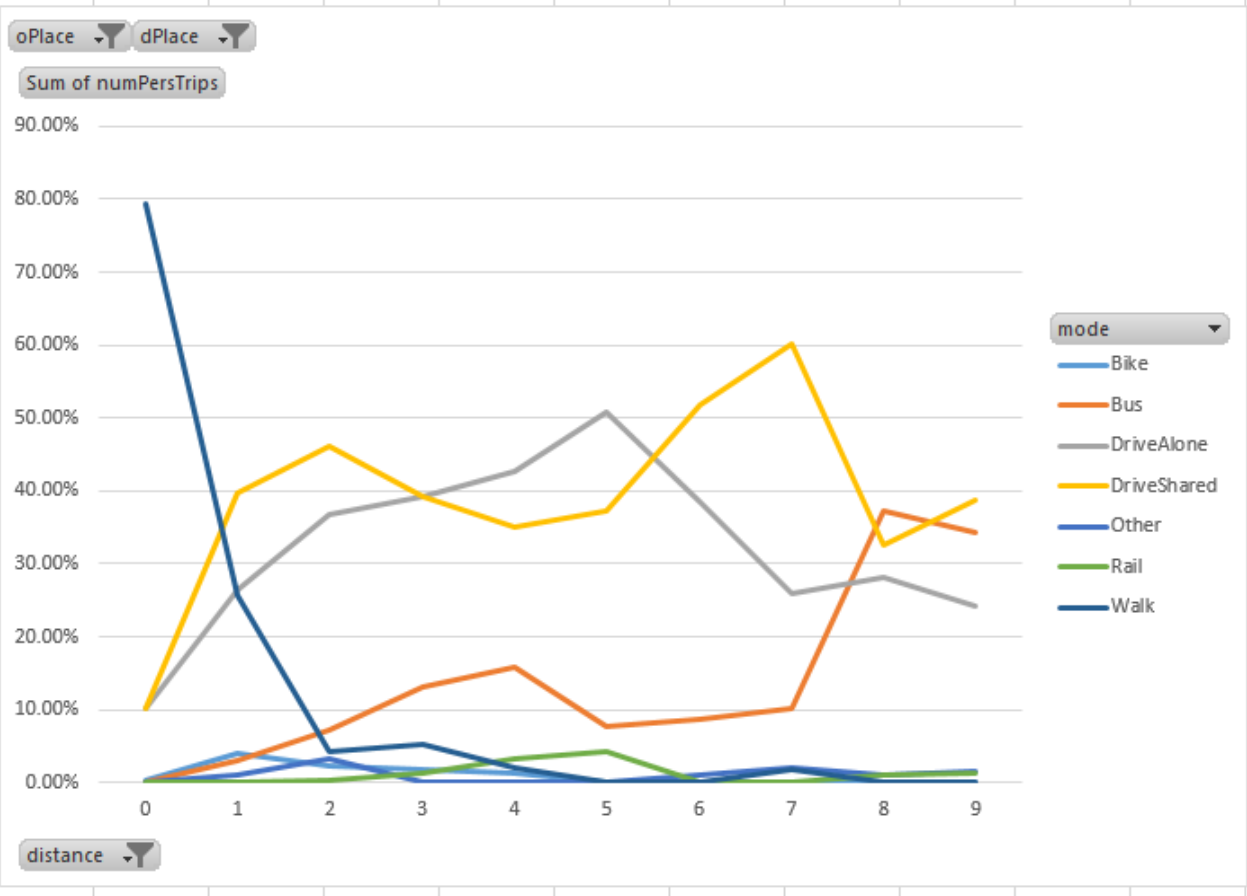
Rail or Other modes. Also, trips of 10 miles or longer are few enough that they should be considered as an aggregate rather than mile-by-mile.

| 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<br>10 to 14 years | | People 5 to 14 years | |
| | | POP1517 | | 15 to 17 years | | People 15 to 17 years | |
| | | POP1824 | | 18 and 19 years<br>20 years<br>21 years<br>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<br>30 to 34 years<br>35 to 39 years<br>40 to 44 years<br>45 to 49 years<br>50 to 54 years | | People 25 to 54 years | |
| | | POP5564 | | 55 to 59 years<br>60 and 61 years<br>62 to 64 years | | People 55 to 64 years | |
| | | POP6574 | | 65 and 66 years<br>67 to 69 years<br>70 to 74 years | | People 65 to 74 years | |
| | | POP75 | | 75 to 79 years<br>80 to 84 years<br>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<br>Householder 35 to 44 years | Hage2<br>Hage3 | Householder 25 to 34 years<br>Householder 35 to 44 years | Householder 18 to 24 years<br>Householder 25 to 44 years |
| | | | | Householder 45 to 54 years<br>Householder 55 to 59 years<br>Householder 60 to 64 years | Hage4<br>Hage5<br>Hage6 | Householder 45 to 54 years<br>Householder 55 to 59 years<br>Householder 60 to 64 years | Householder 45 to 59 years<br>Householder 60 to 64 years<br>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<br>Householder 85 years and over | Hage8<br>Hage9 | Householder 75 to 84 years<br>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<br>TT2<br>TT3<br>TT4<br>TT5<br>TT6<br>TT7<br>TT8 | Less than 10 minutes<br>10 to 14 minutes<br>15 to 19 minutes<br>20 to 24 minutes<br>25 to 29 minutes<br>30 to 34 minutes<br>35 to 44 minutes<br>45 to 59 minutes | Less than 5<br>5 to 9 minutes<br>15 to 19 minutes<br>20 to 20 minutes<br>30 to 44 minutes<br>45 to 59 minutes<br>60 to 74 minutes<br>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<br>*is available as same in CTPP<br>*still looking for place of work by census tract | 90 minutes or more<br>**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<br>*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<br>Daily, non-directional<br>Functional Class:<br>Freeway<br>Highway<br>Expressway<br>Arterial<br>Collector | Table |
| | 7. Percent Root Mean Squared Error (RMSE) (volume range) | 0-4,999 – <116%<br>5,000 to 9,999 – <43%<br>10,000 to 19,999 – <28%<br>20,000 to 39,999 – < 25%<br>40,000 to 59,000 – < 30%<br>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%<br>1,000-2,500 < 47%<br>2,500-5,000 – <36%<br>5,000-10,000 – <29%<br>10,000-25,000 – <25%<br>25,000-50,000 – <22%<br>>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<br>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<br>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 54**.

**Table 49: 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 55**.

**Table 50: 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 55** 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 56** for each of the MPO areas for years 2005 through 2012. These prices will be used in subsequent model development activities[5].

**Table 51: 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 57**; 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 52: 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 58** 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 53: 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 56** and **Table 57**; either way, consistent ratios for fuel prices (presented in **Table 55**) and non-fuel-related prices (**Table 58**) 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 59**.

**Table 54: MTC Region Example Calculations Assuming Updated 2005 Results (Prices in Year 2010 dollars)**

| Year | Quantity | Value |
|---|---|---|
| 2005 | Region-specific fuel price (Table 56, dollars per mile) | $2.83 |
| | Non-fuel-related price (Table 57, 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 55) | 1.45 |
| | Region-specific fuel price (Ratio x 2005 price) | $4.09 |
| | Consistent non-fuel-related price ratio (Table 58) | 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 55) | 1.72 |
| | Region-specific fuel price (Ratio x 2005 price) | $4.85 |
| | Consistent non-fuel-related price ratio (Table 58) | 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 61.**

**Table 55: SCAG Region Example Calculations (Prices in Year 2010 dollars)**

| Year | Quantity | Value |
|---|---|---|
| 2005 | Region-specific fuel price (Table 56, dollars per gallon) | $2.85 |
| | Non-fuel-related price (Table 57, 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 55) | 1.45 |
| | Region-specific fuel price (Ratio x 2005 price) | $4.12 |
| | Consistent non-fuel-related price ratio (Table 58) | 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 55) | 1.72 |
| | Region-specific fuel price (Ratio x 2005 price) | $4.89 |
| | Consistent non-fuel-related price ratio (Table 58) | 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 61.**

**Table 56: 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 55) | 1.45 |
| | Region-specific fuel price (Ratio x 2005 price) | $3.96 |
| | Consistent non-fuel-related price ratio (Table 58) | 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 55) | 1.72 |
| | Region-specific fuel price (Ratio x 2005 price) | $4.70 |
| | Consistent non-fuel-related price ratio (Table 58) | 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 62.**

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

| Year | Quantity | Value |
|---|---|---|
| 2005 | Region-specific fuel price (Table 56, dollars per gallon) | $2.84 |
| | Non-fuel-related price (Table 57, 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 55) | 1.45 |
| | Region-specific fuel price (Ratio x 2005 price) | $4.11 |
| | Consistent non-fuel-related price ratio (Table 58) | 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 55) | 1.72 |
| | Region-specific fuel price (Ratio x 2005 price) | $4.87 |
| | Consistent non-fuel-related price ratio (Table 58) | 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 63** 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 58: 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 | 0.293 | 0.26 | 0 | 0 | 0.426 | 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 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1019 | RU1_HHSIZE1_INC2 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1020 | RU1_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1021 | RU1_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1022 | RU1_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1023 | RU1_HHSIZE2_INC1 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1024 | RU1_HHSIZE2_INC2 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1025 | RU1_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1026 | RU1_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1027 | RU1_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1028 | RU1_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1029 | RU1_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1030 | RU1_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1031 | RU1_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1032 | RU1_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1033 | RU1_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1034 | RU1_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1035 | RU1_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1036 | RU1_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1037 | RU1_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1038 | RU1_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1039 | RU1_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1040 | RU1_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1041 | RU1_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1042 | RU1_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1043 | RU3_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1044 | RU3_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1045 | RU3_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1046 | RU3_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1047 | RU3_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1048 | RU3_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1049 | RU3_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1050 | RU3_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1051 | RU3_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1052 | RU3_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1053 | RU3_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1054 | RU3_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1055 | RU3_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1056 | RU3_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1057 | RU3_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1058 | RU3_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1059 | RU3_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1060 | RU3_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1061 | RU3_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1062 | RU3_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1063 | RU3_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1064 | RU3_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1065 | RU3_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1066 | RU3_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1067 | RU3_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1068 | RU9_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1069 | RU9_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1070 | RU9_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 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 | 1071 | RU9_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1072 | RU9_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1073 | RU9_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1074 | RU9_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1075 | RU9_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1076 | RU9_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1077 | RU9_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1078 | RU9_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1079 | RU9_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1080 | RU9_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1081 | RU9_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1082 | RU9_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1083 | RU9_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1084 | RU9_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1085 | RU9_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1086 | RU9_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1087 | RU9_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1088 | RU9_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1089 | RU9_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1090 | RU9_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1091 | RU9_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1092 | RU9_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 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 | 0.049 | 0 | 0.03 | 0.0361815 |
| 1 | 1106 | POP0514 | 0 | 0 | 0.34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.391 | 0 | 0.25 | 0.3186756 |
| 1 | 1107 | POP1517 | 0 | 0 | 0.12 | 0.46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.41 | 0 | 0 |
| 1 | 1108 | POP1824 | 0 | 0 | 0 | 0.24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.079 | 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 | 0.74 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1114 | EMPFOO | 0 | 0 | 0 | 0 | 0 | 4.764 | 8.998 | 0 | 0 | 0 | 0 | 1.26 | 11.07 | 0 | 0 | 8.57 | 2.699697 |
| 1 | 1115 | EMPGOV | 0 | 0 | 0 | 0 | 0 | 1.311 | 0.734 | 0 | 0 | 0 | 0 | 3.11 | 0 | 0 | 0 | 2.58 | 0.7862519 |
| 1 | 1116 | EMPIND | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.04 | 0 | 0 | 0 | 1.79 | 0 |
| 1 | 1117 | EMPMED | 0 | 0 | 0 | 0 | 0 | 0.637 | 0.349 | 0 | 0 | 0 | 0 | 1.51 | 0 | 0 | 0 | 1.26 | 0.3799058 |
| 1 | 1118 | EMPOFC | 0 | 0 | 0 | 0 | 0 | 0.831 | 0.469 | 0 | 0 | 0 | 0 | 1.98 | 0 | 0 | 0 | 1.64 | 0.5037579 |
| 1 | 1119 | EMPOTH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 0 |
| 1 | 1120 | EMPRET | 0 | 0 | 0 | 0 | 0 | 3.573 | 6.748 | 0 | 0 | 0 | 0 | 0.94 | 8.3 | 0 | 0 | 6.43 | 2.0247727 |
| 1 | 1121 | EMPAGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 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 | 1.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.171 | 0 | 0.75 | 0.9448939 |
| 1 | 1134 | HS | 0 | 0 | 0.44 | 1.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.543 | 0 | 0 |
| 1 | 1135 | COLLEGE | 0 | 0 | 0 | 0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.097 | 0 | 0 |
| 2 | 2001 | TOTHH | 0.293 | 0.26 | 0 | 0 | 0.426 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 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 |

| /* 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 | 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 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2019 | RU1_HHSIZE1_INC2 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2020 | RU1_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2021 | RU1_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2022 | RU1_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2023 | RU1_HHSIZE2_INC1 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2024 | RU1_HHSIZE2_INC2 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2025 | RU1_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2026 | RU1_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2027 | RU1_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2028 | RU1_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2029 | RU1_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2030 | RU1_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2031 | RU1_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2032 | RU1_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2033 | RU1_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2034 | RU1_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2035 | RU1_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2036 | RU1_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2037 | RU1_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2038 | RU1_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2039 | RU1_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2040 | RU1_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2041 | RU1_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2042 | RU1_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2043 | RU3_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2044 | RU3_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2045 | RU3_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2046 | RU3_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2047 | RU3_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2048 | RU3_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2049 | RU3_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2050 | RU3_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2051 | RU3_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2052 | RU3_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2053 | RU3_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2054 | RU3_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2055 | RU3_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2056 | RU3_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2057 | RU3_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2058 | RU3_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2059 | RU3_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2060 | RU3_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2061 | RU3_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2062 | RU3_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2063 | RU3_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2064 | RU3_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2065 | RU3_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2066 | RU3_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2067 | RU3_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2068 | RU9_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2069 | RU9_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2070 | RU9_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2071 | RU9_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2072 | RU9_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2073 | RU9_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2074 | RU9_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2075 | RU9_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 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 | 2076 | RU9_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2077 | RU9_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2078 | RU9_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2079 | RU9_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2080 | RU9_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2081 | RU9_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2082 | RU9_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2083 | RU9_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2084 | RU9_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2085 | RU9_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2086 | RU9_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2087 | RU9_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2088 | RU9_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2089 | RU9_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2090 | RU9_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2091 | RU9_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2092 | RU9_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 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 | 0.049 | 0 | 0.03 | 0.0361815 |
| 2 | 2106 | POP0514 | 0 | 0 | 0.34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.391 | 0 | 0.25 | 0.3186756 |
| 2 | 2107 | POP1517 | 0 | 0 | 0.12 | 0.46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.41 | 0 | 0 |
| 2 | 2108 | POP1824 | 0 | 0 | 0 | 0.24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.079 | 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 | 0.74 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2114 | EMPFOO | 0 | 0 | 0 | 0 | 0 | 4.764 | 8.998 | 0 | 0 | 0 | 0 | 1.26 | 11.07 | 0 | 0 | 8.57 | 2.699697 |
| 2 | 2115 | EMPGOV | 0 | 0 | 0 | 0 | 0 | 1.311 | 0.734 | 0 | 0 | 0 | 0 | 3.11 | 0 | 0 | 0 | 2.58 | 0.7862519 |
| 2 | 2116 | EMPIND | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.04 | 0 | 0 | 0 | 1.79 | 0 |
| 2 | 2117 | EMPMED | 0 | 0 | 0 | 0 | 0 | 0.637 | 0.349 | 0 | 0 | 0 | 0 | 1.51 | 0 | 0 | 0 | 1.26 | 0.3799058 |
| 2 | 2118 | EMPOFC | 0 | 0 | 0 | 0 | 0 | 0.831 | 0.469 | 0 | 0 | 0 | 0 | 1.98 | 0 | 0 | 0 | 1.64 | 0.5037579 |
| 2 | 2119 | EMPOTH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 0 |
| 2 | 2120 | EMPRET | 0 | 0 | 0 | 0 | 0 | 3.573 | 6.748 | 0 | 0 | 0 | 0 | 0.94 | 8.3 | 0 | 0 | 6.43 | 2.0247727 |
| 2 | 2121 | EMPAGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 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 | 1.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.171 | 0 | 0.75 | 0.9448939 |
| 2 | 2134 | HS | 0 | 0 | 0.44 | 1.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.543 | 0 | 0 |
| 2 | 2135 | COLLEGE | 0 | 0 | 0 | 0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.097 | 0 | 0 |
| 3 | 3001 | TOTHH | 0.293 | 0.26 | 0 | 0 | 0.426 | 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 |
| 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 |

| /* 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 | 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 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3019 | RU1_HHSIZE1_INC2 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3020 | RU1_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3021 | RU1_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3022 | RU1_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3023 | RU1_HHSIZE2_INC1 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3024 | RU1_HHSIZE2_INC2 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3025 | RU1_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3026 | RU1_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3027 | RU1_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3028 | RU1_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3029 | RU1_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3030 | RU1_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3031 | RU1_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3032 | RU1_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3033 | RU1_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3034 | RU1_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3035 | RU1_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3036 | RU1_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3037 | RU1_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3038 | RU1_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3039 | RU1_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3040 | RU1_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3041 | RU1_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3042 | RU1_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3043 | RU3_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3044 | RU3_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3045 | RU3_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3046 | RU3_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3047 | RU3_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3048 | RU3_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3049 | RU3_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3050 | RU3_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3051 | RU3_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3052 | RU3_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3053 | RU3_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3054 | RU3_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3055 | RU3_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3056 | RU3_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3057 | RU3_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3058 | RU3_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3059 | RU3_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3060 | RU3_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3061 | RU3_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3062 | RU3_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3063 | RU3_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3064 | RU3_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3065 | RU3_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3066 | RU3_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3067 | RU3_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3068 | RU9_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3069 | RU9_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3070 | RU9_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3071 | RU9_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3072 | RU9_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3073 | RU9_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3074 | RU9_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3075 | RU9_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3076 | RU9_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3077 | RU9_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3078 | RU9_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3079 | RU9_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3080 | RU9_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 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 | 3081 | RU9_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3082 | RU9_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3083 | RU9_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3084 | RU9_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3085 | RU9_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3086 | RU9_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3087 | RU9_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3088 | RU9_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3089 | RU9_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3090 | RU9_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3091 | RU9_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3092 | RU9_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 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 | 0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.049 | 0 | 0.03 | 0.0361815 |
| 3 | 3106 | POP0514 | 0 | 0 | 0.34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.391 | 0 | 0.25 | 0.3186756 |
| 3 | 3107 | POP1517 | 0 | 0 | 0.12 | 0.46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.41 | 0 | 0 |
| 3 | 3108 | POP1824 | 0 | 0 | 0 | 0.24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.079 | 0 | 0 |
| 3 | 3109 | POP2554 | 0 | 0 | 0 | 0.02 | 0 | 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 | 0 |
| 3 | 3111 | POP6574 | 0 | 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 | 0 |
| 3 | 3113 | EMPEDU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.74 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3114 | EMPFOO | 0 | 0 | 0 | 0 | 0 | 4.764 | 8.998 | 0 | 0 | 0 | 0 | 1.26 | 11.07 | 0 | 0 | 8.57 | 2.699697 |
| 3 | 3115 | EMPGOV | 0 | 0 | 0 | 0 | 0 | 1.311 | 0.734 | 0 | 0 | 0 | 0 | 3.11 | 0 | 0 | 0 | 2.58 | 0.7862519 |
| 3 | 3116 | EMPIND | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.04 | 0 | 0 | 0 | 1.79 | 0 |
| 3 | 3117 | EMPMED | 0 | 0 | 0 | 0 | 0 | 0.637 | 0.349 | 0 | 0 | 0 | 0 | 1.51 | 0 | 0 | 0 | 1.26 | 0.3799058 |
| 3 | 3118 | EMPOFC | 0 | 0 | 0 | 0 | 0 | 0.831 | 0.469 | 0 | 0 | 0 | 0 | 1.98 | 0 | 0 | 0 | 1.64 | 0.5037579 |
| 3 | 3119 | EMPOTH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 0 |
| 3 | 3120 | EMPRET | 0 | 0 | 0 | 0 | 0 | 3.573 | 6.748 | 0 | 0 | 0 | 0 | 0.94 | 8.3 | 0 | 0 | 6.43 | 2.0247727 |
| 3 | 3121 | EMPAGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 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 | 1.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.171 | 0 | 0.75 | 0.9448939 |
| 3 | 3134 | HS | 0 | 0 | 0.44 | 1.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.543 | 0 | 0 |
| 3 | 3135 | COLLEGE | 0 | 0 | 0 | 0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.097 | 0 | 0 |
| 4 | 4001 | TOTHH | 0.293 | 0.26 | 0 | 0 | 0.426 | 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 |
| 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 |

| /* 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 | 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 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4019 | RU1_HHSIZE1_INC2 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4020 | RU1_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4021 | RU1_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4022 | RU1_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4023 | RU1_HHSIZE2_INC1 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4024 | RU1_HHSIZE2_INC2 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4025 | RU1_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4026 | RU1_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4027 | RU1_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4028 | RU1_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4029 | RU1_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4030 | RU1_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4031 | RU1_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4032 | RU1_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4033 | RU1_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4034 | RU1_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4035 | RU1_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4036 | RU1_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4037 | RU1_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4038 | RU1_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4039 | RU1_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4040 | RU1_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4041 | RU1_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4042 | RU1_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4043 | RU3_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4044 | RU3_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4045 | RU3_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4046 | RU3_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4047 | RU3_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4048 | RU3_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4049 | RU3_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4050 | RU3_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4051 | RU3_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4052 | RU3_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4053 | RU3_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4054 | RU3_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4055 | RU3_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4056 | RU3_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4057 | RU3_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4058 | RU3_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4059 | RU3_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4060 | RU3_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4061 | RU3_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4062 | RU3_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4063 | RU3_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4064 | RU3_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4065 | RU3_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4066 | RU3_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4067 | RU3_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4068 | RU9_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4069 | RU9_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4070 | RU9_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4071 | RU9_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4072 | RU9_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4073 | RU9_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4074 | RU9_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4075 | RU9_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4076 | RU9_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4077 | RU9_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4078 | RU9_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4079 | RU9_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4080 | RU9_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4081 | RU9_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4082 | RU9_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4083 | RU9_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4084 | RU9_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4085 | RU9_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 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 | 4086 | RU9_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4087 | RU9_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4088 | RU9_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4089 | RU9_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4090 | RU9_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4091 | RU9_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4092 | RU9_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 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 | 0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.049 | 0 | 0.03 | 0.0361815 |
| 4 | 4106 | POP0514 | 0 | 0 | 0.34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.391 | 0 | 0.25 | 0.3186756 |
| 4 | 4107 | POP1517 | 0 | 0 | 0.12 | 0.46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.41 | 0 | 0 |
| 4 | 4108 | POP1824 | 0 | 0 | 0 | 0.24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.079 | 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 | 0.74 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4114 | EMPFOO | 0 | 0 | 0 | 0 | 0 | 4.764 | 8.998 | 0 | 0 | 0 | 0 | 1.26 | 11.07 | 0 | 0 | 8.57 | 2.699697 |
| 4 | 4115 | EMPGOV | 0 | 0 | 0 | 0 | 0 | 1.311 | 0.734 | 0 | 0 | 0 | 0 | 3.11 | 0 | 0 | 0 | 2.58 | 0.7862519 |
| 4 | 4116 | EMPIND | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.04 | 0 | 0 | 0 | 1.79 | 0 |
| 4 | 4117 | EMPMED | 0 | 0 | 0 | 0 | 0 | 0.637 | 0.349 | 0 | 0 | 0 | 0 | 1.51 | 0 | 0 | 0 | 1.26 | 0.3799058 |
| 4 | 4118 | EMPOFC | 0 | 0 | 0 | 0 | 0 | 0.831 | 0.469 | 0 | 0 | 0 | 0 | 1.98 | 0 | 0 | 0 | 1.64 | 0.5037579 |
| 4 | 4119 | EMPOTH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 0 |
| 4 | 4120 | EMPRET | 0 | 0 | 0 | 0 | 0 | 3.573 | 6.748 | 0 | 0 | 0 | 0 | 0.94 | 8.3 | 0 | 0 | 6.43 | 2.0247727 |
| 4 | 4121 | EMPAGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 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 | 1.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.171 | 0 | 0.75 | 0.9448939 |
| 4 | 4134 | HS | 0 | 0 | 0.44 | 1.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.543 | 0 | 0 |
| 4 | 4135 | COLLEGE | 0 | 0 | 0 | 0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.097 | 0 | 0 |
| 5 | 5001 | TOTHH | 0.293 | 0.26 | 0 | 0 | 0.426 | 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 |
| 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 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5019 | RU1_HHSIZE1_INC2 | 0.741 | 0.66 | 0 | 0 | 1.077 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5020 | RU1_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 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 | 5021 | RU1_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5022 | RU1_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5023 | RU1_HHSIZE2_INC1 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5024 | RU1_HHSIZE2_INC2 | 1.247 | 1.1 | 0 | 0 | 1.817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5025 | RU1_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5026 | RU1_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5027 | RU1_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5028 | RU1_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5029 | RU1_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5030 | RU1_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5031 | RU1_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5032 | RU1_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5033 | RU1_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5034 | RU1_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5035 | RU1_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5036 | RU1_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5037 | RU1_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5038 | RU1_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5039 | RU1_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5040 | RU1_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5041 | RU1_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5042 | RU1_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5043 | RU3_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5044 | RU3_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5045 | RU3_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5046 | RU3_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5047 | RU3_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5048 | RU3_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5049 | RU3_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5050 | RU3_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5051 | RU3_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5052 | RU3_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5053 | RU3_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5054 | RU3_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5055 | RU3_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5056 | RU3_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5057 | RU3_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5058 | RU3_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5059 | RU3_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5060 | RU3_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5061 | RU3_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5062 | RU3_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5063 | RU3_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5064 | RU3_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5065 | RU3_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5066 | RU3_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5067 | RU3_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5068 | RU9_HHSIZE1_INC1 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5069 | RU9_HHSIZE1_INC2 | 0.499 | 0.44 | 0 | 0 | 0.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5070 | RU9_HHSIZE1_INC3 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5071 | RU9_HHSIZE1_INC4 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5072 | RU9_HHSIZE1_INC5 | 0.625 | 0.9 | 0 | 0 | 1.217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5073 | RU9_HHSIZE2_INC1 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5074 | RU9_HHSIZE2_INC2 | 1.19 | 1.06 | 0 | 0 | 1.735 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5075 | RU9_HHSIZE2_INC3 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5076 | RU9_HHSIZE2_INC4 | 0.932 | 1.34 | 0 | 0 | 1.807 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5077 | RU9_HHSIZE2_INC5 | 0.947 | 1.36 | 0 | 0 | 1.837 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5078 | RU9_HHSIZE3_INC1 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5079 | RU9_HHSIZE3_INC2 | 1.77 | 1.57 | 0 | 0 | 2.569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5080 | RU9_HHSIZE3_INC3 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5081 | RU9_HHSIZE3_INC4 | 1.247 | 1.79 | 0 | 0 | 2.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5082 | RU9_HHSIZE3_INC5 | 1.71 | 2.46 | 0 | 0 | 3.319 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5083 | RU9_HHSIZE4_INC1 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5084 | RU9_HHSIZE4_INC2 | 2.415 | 2.14 | 0 | 0 | 3.512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5085 | RU9_HHSIZE4_INC3 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5086 | RU9_HHSIZE4_INC4 | 1.923 | 2.75 | 0 | 0 | 3.714 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5087 | RU9_HHSIZE4_INC5 | 2.07 | 2.97 | 0 | 0 | 4.009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5088 | RU9_HHSIZE5_INC1 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5089 | RU9_HHSIZE5_INC2 | 3.332 | 2.97 | 0 | 0 | 4.851 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5090 | RU9_HHSIZE5_INC3 | 3.105 | 4.45 | 0 | 0 | 6.019 | 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 | 5091 | RU9_HHSIZE5_INC4 | 3.105 | 4.45 | 0 | 0 | 6.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5092 | RU9_HHSIZE5_INC5 | 2.753 | 3.95 | 0 | 0 | 5.329 | 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 | 0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.049 | 0 | 0.03 | 0.0361815 |
| 5 | 5106 | POP0514 | 0 | 0 | 0.34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.391 | 0 | 0.25 | 0.3186756 |
| 5 | 5107 | POP1517 | 0 | 0 | 0.12 | 0.46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.41 | 0 | 0 |
| 5 | 5108 | POP1824 | 0 | 0 | 0 | 0.24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.079 | 0 | 0 |
| 5 | 5109 | POP2554 | 0 | 0 | 0 | 0.02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 | 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 | 0.74 | 0 | 0 | 0 | 0 | 0 |
| 5 | 5114 | EMPFOO | 0 | 0 | 0 | 0 | 0 | 4.764 | 8.998 | 0 | 0 | 0 | 0 | 1.26 | 11.07 | 0 | 0 | 8.57 | 2.699697 |
| 5 | 5115 | EMPGOV | 0 | 0 | 0 | 0 | 0 | 1.311 | 0.734 | 0 | 0 | 0 | 0 | 3.11 | 0 | 0 | 0 | 2.58 | 0.7862519 |
| 5 | 5116 | EMPIND | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.04 | 0 | 0 | 0 | 1.79 | 0 |
| 5 | 5117 | EMPMED | 0 | 0 | 0 | 0 | 0 | 0.637 | 0.349 | 0 | 0 | 0 | 0 | 1.51 | 0 | 0 | 0 | 1.26 | 0.3799058 |
| 5 | 5118 | EMPOFC | 0 | 0 | 0 | 0 | 0 | 0.831 | 0.469 | 0 | 0 | 0 | 0 | 1.98 | 0 | 0 | 0 | 1.64 | 0.5037579 |
| 5 | 5119 | EMPOTH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 0 |
| 5 | 5120 | EMPRET | 0 | 0 | 0 | 0 | 0 | 3.573 | 6.748 | 0 | 0 | 0 | 0 | 0.94 | 8.3 | 0 | 0 | 6.43 | 2.0247727 |
| 5 | 5121 | EMPAGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.62 | 0 | 0 | 0 | 0.54 | 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 | 1.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.171 | 0 | 0.75 | 0.9448939 |
| 5 | 5134 | HS | 0 | 0 | 0.44 | 1.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.543 | 0 | 0 |
| 5 | 5135 | COLLEGE | 0 | 0 | 0 | 0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.097 | 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 | 0.0077 | 0.00012 | 0.01085 | 0.01615 | 0.14309 | 0 | 0.00001 | 0.00323 | 0.00369 | 0.00151 |
| 102 | TOTEMP | 0.0121 | 0.00167 | 0 | 0.03041 | 0.32839 | 0.00238 | 0.00012 | 0 | 0.01615 | 0.12736 | 0 | 0.00001 | 0 | 0.00369 | 0.00151 |
| 103 | RETAIL | 0 | 0 | 0.12571 | 0 | 0 | 0 | 0 | 0.02769 | 0 | 0 | 0 | 0 | 0.00554 | 0 | 0 |
| 104 | AG | 0 | 0 | 0.15714 | 0 | 0 | 0 | 0 | 0.03167 | 0 | 0 | 0 | 0 | 0.01482 | 0 | 0 |
| 105 | MINING | 0 | 0 | 0.15714 | 0 | 0 | 0 | 0 | 0.03167 | 0 | 0 | 0 | 0 | 0.01482 | 0 | 0 |
| 106 | CONSTR | 0 | 0 | 0.15714 | 0.03041 | 0 | 0 | 0 | 0.03167 | 0.01615 | 0 | 0 | 0 | 0.01482 | 0.00369 | 0 |
| 107 | MFGPROD | 0 | 0 | 0.13278 | 0 | 0 | 0 | 0 | 0.02653 | 0 | 0 | 0 | 0 | 0.00885 | 0 | 0 |
| 108 | MFGEQUIP | 0 | 0 | 0.13278 | 0 | 0 | 0 | 0 | 0.02653 | 0 | 0 | 0 | 0 | 0.00885 | 0 | 0 |
| 109 | TRANSP | 0 | 0 | 0.13278 | 0 | 0 | 0 | 0 | 0.02653 | 0 | 0 | 0 | 0 | 0.00885 | 0 | 0 |
| 110 | WHLSALE | 0 | 0 | 0.13278 | 0 | 0 | 0 | 0 | 0.02653 | 0 | 0 | 0 | 0 | 0.00885 | 0 | 0 |
| 111 | FINANCE | 0 | 0 | 0.06186 | 0 | 0 | 0 | 0 | 0.0074 | 0 | 0 | 0 | 0 | 0.00076 | 0 | 0 |
| 112 | EDUGOV | 0 | 0 | 0.06186 | 0 | 0 | 0 | 0 | 0.0074 | 0 | 0 | 0 | 0 | 0.00076 | 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 |

| INDEX | A | KEY |
|---|---|---|
| 47 | -999 | ;EXTWALK_NHB_HHSIZE |
| 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 |

| ;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 | 0.1 | 0.161598 | -0.06672 | -0.87411 | -0.87411 | -0.87411 | -0.87411 | -3.02416 | 1.508496 | 0 | 0 | 0.506 | 0.408 |
| 12 | 1 | 2 | PK | -0.04 | 2 | 0.25 | -0.002 | 10.06 | 0.1 | -2.4826 | -2.48208 | -0.88467 | -0.88467 | -3.15767 | -3.15767 | -3.77774 | 0.061496 | 0 | 0 | 0.506 | 0.408 |
| 13 | 1 | 3 | PK | -0.04 | 2 | 0.25 | -0.001 | 18 | 0.1 | -3.0808 | -2.88744 | -1.75023 | -1.75023 | -4.93323 | -4.42823 | -4.93632 | -1.0435 | 0 | 0 | 0.506 | 0.408 |
| 21 | 2 | 1 | OK | -0.025 | 2 | 0.25 | -0.005 | 3 | 2.75 | 3.675118 | 2.693838 | 0.723128 | 0.723128 | 0.723128 | 0.723128 | 1.32299 | 5.074608 | 0 | 0 | 0.297 | 0.026 |
| 22 | 2 | 2 | OK | -0.025 | 2 | 0.25 | -0.003 | 6 | 2.75 | 2.834177 | 2.813133 | 0.472896 | 0.472896 | 0.472896 | 0.472896 | -1.68101 | 2.318608 | 0 | 0 | 0.297 | 0.026 |
| 23 | 2 | 3 | OK | -0.025 | 2 | 0.25 | -0.002 | 6.32 | 2.75 | 2.751236 | 2.750927 | -0.20031 | -0.20031 | -0.20031 | -0.20031 | -0.53802 | -0.55639 | 0 | 0 | 0.161 | 0.161 |
| 31 | 3 | 1 | OK | -0.025 | 2 | 0.25 | -0.005 | 3 | 0 | 2.639697 | 2.946478 | 3.923114 | 3.923114 | 3.923114 | 3.923114 | -2.00521 | 2.787008 | 2.165628 | 0 | 0 | 0 |
| 32 | 3 | 2 | OK | -0.025 | 2 | 0.25 | -0.003 | 6 | 0 | 2.671046 | 2.634217 | 1.793328 | 1.793328 | 1.793328 | 1.793328 | -3.21581 | 2.787008 | 2.066443 | 0 | 0 | 0 |
| 33 | 3 | 3 | OK | -0.025 | 2 | 0.25 | -0.002 | 9 | 0 | 0.781395 | 1.209957 | 1.017771 | 1.017771 | 1.017771 | 1.017771 | -5.61041 | 1.610008 | 2.163257 | 0 | 0 | 0 |
| 41 | 4 | 1 | OK | -0.025 | 2 | 0.25 | -0.005 | 3 | 0 | -1.32257 | -2.03859 | -1.35706 | -1.35706 | -1.35706 | -1.35706 | -0.23633 | -0.23633 | 0 | 0 | 0 | 0 |
| 42 | 4 | 2 | OK | -0.025 | 2 | 0.25 | -0.003 | 6 | 0 | -0.98736 | -1.97789 | -1.77559 | -1.77559 | -1.77559 | -1.77559 | -2.00521 | -0.86867 | 0 | 0 | 0 | 0 |
| 43 | 4 | 3 | OK | -0.025 | 2 | 0.25 | -0.002 | 9 | 0 | -0.65114 | -1.91718 | -2.19311 | -2.19311 | -2.19311 | -2.19311 | -3.21581 | -2.36329 | 0 | 0 | 0 | 0 |
| 51 | 5 | 1 | OK | -0.025 | 2 | 0.25 | -0.005 | 3 | 0 | 1.000694 | 0.781757 | -0.99946 | -0.99946 | -0.99946 | -0.99946 | -5.61041 | 3.187849 | 0 | 0 | 0 | 0 |
| 52 | 5 | 2 | OK | -0.025 | 2 | 0.25 | -0.003 | 6 | 0 | 0.574542 | 0.564635 | -1.89519 | -1.89519 | -1.89519 | -1.89519 | -3.33711 | 0.772849 | 0 | 0 | 0 | 0 |
| 53 | 5 | 3 | OK | -0.025 | 2 | 0.25 | -0.002 | 9 | 0 | 0.178389 | 0.384514 | -2.79291 | -2.79291 | -2.79291 | -2.79291 | -3.79381 | -0.20415 | 0 | 0 | 0 | 0 |
| 61 | 6 | 1 | OK | -0.035 | 2.515 | 0.25 | -0.004 | 6.08 | 0 | -1.37835 | -2.90079 | -3.67523 | -3.67523 | -2.88823 | -2.88823 | -1.5948 | -0.72818 | 0 | 0 | 0 | 0 |
| 62 | 6 | 2 | OK | -0.035 | 2.515 | 0.25 | -0.001 | 16.62 | 0 | -1.35902 | -3.32618 | -3.98685 | -3.98685 | -3.19985 | -3.19985 | -0.67871 | -0.72818 | 0 | 0 | 0 | 0 |
| 63 | 6 | 3 | OK | -0.03 | 2.515 | 0.25 | -0.001 | 18 | 0 | -1.4207 | -3.86458 | -2.44546 | -2.44546 | -3.27746 | -2.48946 | -1.77061 | -0.77318 | 0 | 0 | 0 | 0 |
| 71 | 7 | 1 | OK | -0.03 | 2 | 0.25 | -0.004 | 5.19 | 0 | 2.53277 | 2.204668 | 3.081883 | 3.081883 | 1.828883 | 1.828883 | 0.95001 | 4.622395 | 0 | 0 | 0 | 0 |
| 72 | 7 | 2 | OK | -0.03 | 2 | 0.25 | -0.003 | 6 | 0 | 1.082656 | 0.650502 | -0.80718 | -0.80718 | -0.80718 | -0.80718 | -3.66748 | 1.247395 | 0 | 0 | 0 | 0 |
| 73 | 7 | 3 | OK | -0.074 | 2 | 0.25 | -0.005 | 9 | 0 | 0.520541 | 0.462336 | -1.46223 | -1.46223 | -2.42923 | -2.42923 | -3.86798 | 0.071395 | 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_TWB | 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_TWE | 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 |

;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_TDI | CI_PID_TDI | 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 | -0.1 | 0 | ;HWH |
| 2 | 100000 | -0.1 | 0 | ;HWM |
| 3 | 100000 | -0.15 | 0 | ;HWL |
| 4 | 100000 | -0.5 | 0 | ;HS |
| 5 | 100000 | -0.09 | 0 | ;HK |
| 6 | 100000 | -0.06 | 0 | ;HC |
| 7 | 100000 | -0.2 | 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_X | DEP_HS_X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | 1 | 1 | 0.09048 | 0.08983 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | 0.09048 | 0.08983 |
| 102 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 103 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 104 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 105 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 106 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 107 | 1 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 108 | 1 | 8 | 0.19228 | 0.0181 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | 0.1748 | 0.0181 |
| 109 | 1 | 9 | 0.1018 | 0.02416 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | 0.11928 | 0.02416 |
| 110 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 | 1 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 112 | 1 | 12 | 0.11418 | 0.25861 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | 0.11418 | 0.25861 |
| 113 | 1 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 114 | 1 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 115 | 1 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 116 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 117 | 1 | 17 | 0.0124 | 0.0737 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | 0.0124 | 0.0737 |
| 118 | 1 | 18 | 0.003825 | 0.04913 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | 0.003825 | 0.04913 |
| 119 | 1 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 120 | 1 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 121 | 1 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 122 | 1 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 123 | 1 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 124 | 1 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

; 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_X | DEP_HS_X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 201 | 2 | 1 | 0.09048 | 0.08983 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | 0.09048 | 0.08983 |
| 202 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 203 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 204 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 205 | 2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 206 | 2 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 207 | 2 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 208 | 2 | 8 | 0.19228 | 0.0181 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | 0.1748 | 0.0181 |
| 209 | 2 | 9 | 0.1018 | 0.02416 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | 0.11928 | 0.02416 |
| 210 | 2 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 211 | 2 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 212 | 2 | 12 | 0.11418 | 0.25861 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | 0.11418 | 0.25861 |
| 213 | 2 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 214 | 2 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 215 | 2 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 216 | 2 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 217 | 2 | 17 | 0.0124 | 0.0737 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | 0.0124 | 0.0737 |
| 218 | 2 | 18 | 0.003825 | 0.04913 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | 0.003825 | 0.04913 |
| 219 | 2 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 220 | 2 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 221 | 2 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 222 | 2 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 223 | 2 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 224 | 2 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

; 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_X | DEP_HS_X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 301 | 3 | 1 | 0.09048 | 0.08983 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | 0.09048 | 0.08983 |
| 302 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 303 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 304 | 3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 305 | 3 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 306 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 307 | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 308 | 3 | 8 | 0.19228 | 0.0181 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | 0.1748 | 0.0181 |
| 309 | 3 | 9 | 0.1018 | 0.02416 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | 0.11928 | 0.02416 |
| 310 | 3 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 311 | 3 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 312 | 3 | 12 | 0.11418 | 0.25861 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | 0.11418 | 0.25861 |
| 313 | 3 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 314 | 3 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 315 | 3 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 316 | 3 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| ; 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_X | DEP_HS_X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 317 | 3 | 17 | 0.0124 | 0.0737 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | 0.0124 | 0.0737 |
| 318 | 3 | 18 | 0.003825 | 0.04913 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | 0.003825 | 0.04913 |
| 319 | 3 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 320 | 3 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 321 | 3 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 322 | 3 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 323 | 3 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 324 | 3 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ; | ; 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_X | DEP_HS_X |
| 401 | 4 | 1 | 0.09048 | 0.08983 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | 0.09048 | 0.08983 |
| 402 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 403 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 404 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 405 | 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 406 | 4 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 407 | 4 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 408 | 4 | 8 | 0.19228 | 0.0181 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | 0.1748 | 0.0181 |
| 409 | 4 | 9 | 0.1018 | 0.02416 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | 0.11928 | 0.02416 |
| 410 | 4 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 411 | 4 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 412 | 4 | 12 | 0.11418 | 0.25861 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | 0.11418 | 0.25861 |
| 413 | 4 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 414 | 4 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 415 | 4 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 416 | 4 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 417 | 4 | 17 | 0.0124 | 0.0737 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | 0.0124 | 0.0737 |
| 418 | 4 | 18 | 0.003825 | 0.04913 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | 0.003825 | 0.04913 |
| 419 | 4 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 420 | 4 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 421 | 4 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 422 | 4 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 423 | 4 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 424 | 4 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ; 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_X | DEP_HS_X |
| 501 | 5 | 1 | 0.09048 | 0.08983 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | 0.09048 | 0.08983 |
| 502 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 503 | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 504 | 5 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 505 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 506 | 5 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 507 | 5 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 508 | 5 | 8 | 0.19228 | 0.0181 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | 0.1748 | 0.0181 |
| 509 | 5 | 9 | 0.1018 | 0.02416 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | 0.11928 | 0.02416 |
| 510 | 5 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 511 | 5 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 512 | 5 | 12 | 0.11418 | 0.25861 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | 0.11418 | 0.25861 |
| 513 | 5 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 514 | 5 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 515 | 5 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 516 | 5 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 517 | 5 | 17 | 0.0124 | 0.0737 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | 0.0124 | 0.0737 |
| 518 | 5 | 18 | 0.003825 | 0.04913 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | 0.003825 | 0.04913 |
| 519 | 5 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 520 | 5 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 521 | 5 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 522 | 5 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 523 | 5 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 524 | 5 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ;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_X | DEP_HS_X |
| 601 | 6 | 1 | 0.09048 | 0.08983 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | 0.09048 | 0.08983 |
| 602 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 603 | 6 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 604 | 6 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 605 | 6 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 606 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 607 | 6 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 608 | 6 | 8 | 0.19228 | 0.0181 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | 0.1748 | 0.0181 |

| ; 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_X | DEP_HS_X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 609 | 6 | 9 | 0.1018 | 0.02416 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | 0.11928 | 0.02416 |
| 610 | 6 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 611 | 6 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 612 | 6 | 12 | 0.11418 | 0.25861 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | 0.11418 | 0.25861 |
| 613 | 6 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 614 | 6 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 615 | 6 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 616 | 6 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 617 | 6 | 17 | 0.0124 | 0.0737 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | 0.0124 | 0.0737 |
| 618 | 6 | 18 | 0.003825 | 0.04913 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | 0.003825 | 0.04913 |
| 619 | 6 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 620 | 6 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 621 | 6 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 622 | 6 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 623 | 6 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 624 | 6 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

;

ıctors by mode and pur

ıe

| D1 | Hour | | DEP_HK_X | DEP_HC_X | DEP_HO_X | DEP_WO_ | DEP_OO_X | DEP_HY_X | DEP_TS_X | DEP_TM_X | DEP_TH_X | RET_HW_X | RET_HS_X | RET_HK_X | RET_HC_X | RET_HO_X | RET_WO_X | RET_OO_X | RET_HY_X | RET_TS_X | RET_TM_X | RET_TH_X | TOD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | ; Off Peak |
| | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 8 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | ; AM Peak |
| | 1 | 9 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | ; AM Period |
| | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 12 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | ; Mid-Day Period |
| | 1 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 17 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | ; PM Period |
| | 1 | 18 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | ; PM Peak |
| | 1 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

ıe 2

| SR2 | Hour | | DEP_HK_X | DEP_HC_X | DEP_HO_X | DEP_WO_ | DEP_OO_X | DEP_HY_X | DEP_TS_X | DEP_TM_X | DEP_TH_X | RET_HW_X | RET_HS_X | RET_HK_X | RET_HC_X | RET_HO_X | RET_WO_X | RET_OO_X | RET_HY_X | RET_TS_X | RET_TM_X | RET_TH_X | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 1 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | ; Off Peak |
| | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 8 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | ; AM Peak |
| | 2 | 9 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | ; AM Period |
| | 2 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 12 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | ; Mid-Day Period |
| | 2 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 17 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | ; PM Period |
| | 2 | 18 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | ; PM Peak |
| | 2 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 2 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

ıe 3+

| SR3+ | Hour | | DEP_HK_X | DEP_HC_X | DEP_HO_X | DEP_WO_ | DEP_OO_X | DEP_HY_X | DEP_TS_X | DEP_TM_X | DEP_TH_X | RET_HW_X | RET_HS_X | RET_HK_X | RET_HC_X | RET_HO_X | RET_WO_X | RET_OO_X | RET_HY_X | RET_TS_X | RET_TM_X | RET_TH_X | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 1 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | ; Off Peak |
| | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 8 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | ; AM Peak |
| | 3 | 9 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | ; AM Period |
| | 3 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 12 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | ; Mid-Day Period |
| | 3 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 3 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

| D1 | Hour | DEP_HK_X | DEP_HC_X | DEP_HO_X | DEP_WO_X | DEP_OO_X | DEP_HY_X | DEP_TS_X | DEP_TM_X | DEP_TH_X | RET_HW_X | RET_HS_X | RET_HK_X | RET_HC_X | RET_HO_X | RET_WO_X | RET_OO_X | RET_HY_X | RET_TS_XX | RET_TM_X | RET_TH_X | TOD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 17 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | ; PM Period |
| 3 | 18 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | ; PM Peak |
| 3 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

; Transit

| TRN | Hour | DEP_HK_X | DEP_HC_X | DEP_HO_X | DEP_WO_X | DEP_OO_X | DEP_HY_X | DEP_TS_X | DEP_TM_X | DEP_TH_X | RET_HW_X | RET_HS_X | RET_HK_X | RET_HC_X | RET_HO_X | RET_WO_X | RET_OO_X | RET_HY_X | RET_TS_XX | RET_TM_X | RET_TH_XX | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | ; Off Peak |
| 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 8 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | ; AM Peak |
| 4 | 9 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | ; AM Period |
| 4 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 12 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | ; Mid-Day Period |
| 4 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 17 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | ; PM Period |
| 4 | 18 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | ; PM Peak |
| 4 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

| WLK | Hour | DEP_HK_X | DEP_HC_X | DEP_HO_X | DEP_WO_X | DEP_OO_X | DEP_HY_X | DEP_TS_X | DEP_TM_X | DEP_TH_X | RET_HW_X | RET_HS_X | RET_HK_X | RET_HC_X | RET_HO_X | RET_WO_X | RET_OO_X | RET_HY_X | RET_TS_XX | RET_TM_X | RET_TH_XX | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 1 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | ; Off Peak |
| 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 8 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | ; AM Peak |
| 5 | 9 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | ; AM Period |
| 5 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 12 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | ; Mid-Day Period |
| 5 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 17 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | ; PM Period |
| 5 | 18 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | ; PM Peak |
| 5 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

| TRK | Hour | DEP_HK_X | DEP_HC_X | DEP_HO_X | DEP_WO_X | DEP_OO_X | DEP_HY_X | DEP_TS_X | DEP_TM_X | DEP_TH_X | RET_HW_X | RET_HS_X | RET_HK_X | RET_HC_X | RET_HO_X | RET_WO_X | RET_OO_X | RET_HY_X | RET_TS_XX | RET_TM_X | RET_TH_XX | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1 | 0.00507 | 0.00507 | 0.04628 | 0.01417 | 0.04979 | 0.08983 | 0.20449 | 0.1183 | 0.18252 | 0.1222 | 0.12597 | 0.08645 | 0.08645 | 0.14391 | 0.00676 | 0.04823 | 0.12597 | 0.20449 | 0.1183 | 0.18252 | ; Off Peak |
| 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 8 | 0.219 | 0.219 | 0.1123 | 0.012 | 0.0228 | 0.0181 | 0.025 | 0.0408 | 0.0345 | 0.0004 | 0.0019 | 0 | 0 | 0.0371 | 0.0883 | 0.0698 | 0.0019 | 0.025 | 0.0408 | 0.0345 | ; AM Peak |

| D1 | Hour | DEP_HK_X | DEP_HC_X | DEP_HO_X | DEP_WO_X | DEP_OO_X | DEP_HY_X | DEP_TS_X | DEP_TM_X | DEP_TH_X | RET_HW_X | RET_HS_X | RET_HK_X | RET_HC_X | RET_HO_X | RET_WO_X | RET_OO_X | RET_HY_X | RET_TS_X | RET_TM_X | RET_TH_X | TOD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 9 | 0.0576 | 0.0576 | 0.05792 | 0.01584 | 0.01104 | 0.02416 | 0.04 | 0.06528 | 0.0552 | 0.0064 | 0.01336 | 0 | 0 | 0.03416 | 0.05128 | 0.01536 | 0.01336 | 0.04 | 0.06528 | 0.0552 | ; AM Period |
| 6 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 12 | 0.21538 | 0.21538 | 0.23958 | 0.46915 | 0.2794 | 0.25861 | 0.13013 | 0.19404 | 0.18403 | 0.13607 | 0.24893 | 0.35926 | 0.35926 | 0.23254 | 0.22352 | 0.39534 | 0.24893 | 0.13013 | 0.19404 | 0.18403 | ; Mid-Day Period |
| 6 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 17 | 0.0346 | 0.0346 | 0.0543 | 0.0798 | 0.0492 | 0.0737 | 0.1156 | 0.0828 | 0.0734 | 0.162 | 0.0979 | 0.0373 | 0.0373 | 0.0641 | 0.0033 | 0.083 | 0.0979 | 0.1156 | 0.0828 | 0.0734 | ; PM Period |
| 6 | 18 | 0.02176 | 0.02176 | 0.01938 | 0.06885 | 0.02567 | 0.04913 | 0.04913 | 0.03519 | 0.031195 | 0.10727 | 0.065025 | 0.015895 | 0.015895 | 0.03689 | 0.0051 | 0.032215 | 0.065025 | 0.04913 | 0.03519 | 0.031195 | ; PM Peak |
| 6 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

; Roadway parameters by facility and typology

| ; Capacity ( | Terrain | Area Type | Facility Typ | 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 |

District

D 1 = 101-110 ; Alpaugh
D 2 = 111-131 ; Cutler
D 3 = 132-225 ; Dinuba
D 4 = 226-237 ; Ducor
D 5 = 238-265 ; Earlimart
D 6 = 266-290 ; East Porterville
D 7 = 291-375 ; Exeter
D 8 = 376-450 ; Farmersville
D 9 = 451-470 ; Goshen
D 10 = 471-510 ; Ivanhoe
D 11 = 511-600 ; Lindsay
D 12 = 601-611 ; London
D 13 = 612-675 ; Orosi
D 14 = 676-695 ; Pixley
D 15 = 696-700 ; Poplor-Cotton Cen
D 16 = 701-839 ; Porterville
D 17 = 911-936 ; Strathmore
D 18 = 937-950 ; Terra Bella
D 19 = 951-967 ; Three Rivers
D 20 = 968-975 ; Tipton
D 21 = 976-1000 ; Traver
D 22 = 1001-1156; Tulare
D 23 = 1201-1579 ; Visalia
D 24 = 1580-1625 ; Woodlake
D 25 = 1626-1628; Woodville
D 26 = 840-910,1011,1122,1136,1157-1200,1629-2105 ; Unincorporated

Lables

1 Alpaugh
2 Cutler
3 Dinuba
4 Ducor
5 Earlimart
6 East Porterville
7 Exeter
8 Farmersville
9 Goshen
10 Ivanhoe
11 Lindsay
12 London
13 Orosi
14 Pixley
15 Poplor-Cotton Cen
16 Porterville
17 Strathmore
18 Terra Bella
19 Three Rivers
20 Tipton
21 Traver
22 Tulare
23 Visalia
24 Woodlake
25 Woodville
26 Unincorporated

**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 |