

Memorandum

To: Kimberly Kerr, Assistant Chief Administrative Officer

Cc: Natalie Porter, PE, TE
Shawna Purvines, AICP
Claudia Wade, PE

From: Michael Schmitt, AICP CTP, PTP

Re: Technical Memorandum #1: Existing Land Use and Socio Economic Data
Technical Memorandum #6: Trip Generation and Distribution

Date: August 31, 2012;
Revised November 11, 2013

The purpose of this memorandum is to present information on the development of base year (2010) land use and socio-economic data and the selected trip generation and trip distribution methodologies for the ongoing update to the El Dorado County (EDC) Travel Demand Model (TDM). The land use and socio-economic data discussed in the memo will be used as:

- Input for the base (2010) model trip generation,
- Basis for developing future land use and socio-economic data; and
- Other model functions and analyses as appropriate.

Given the close relationship and overlapping data and methodology sources, it was determined that Technical Memorandum #1 and #6 would be combined to facilitate reader understanding and the review and discussion of base year data and its related trip generation and distribution processes.

I. Model, Land Use and Socio-Economic Reports and Data

Kimley-Horn and Associates, Inc. (Kimley-Horn) reviewed numerous modeling, land use, and socio-economic reports and data sets in developing the model inputs and the associated trip generation and trip distribution submodels, including the following:

- **2008 El Dorado County Housing Element**, amended in April 21, 2009 this report includes data and analysis on housing, by type, within EDC.
- **2010 Living Units database**, compiled by EDC staff during the development of the ongoing Housing Element Update, this version was revised to include data through only 2010, at the request of Kimley-Horn, to determine multi-family units (as parcel data does not include this as a standard attribute) in the base year.
- **2010 EDC parcel shapefile**, this version which was revised to include data through only 2010 was prepared by EDC at the request of Kimley-Horn for use as the base file for identifying single family residences and the use and status of individual parcels.
- **2010 US Census data and shapefiles**, obtained from the US Census website that includes information on employment, dwelling units, and housing vacancy rates.
- **2000 Sacramento Area Household Travel Survey: Final Report**, this is the most recent household survey available for the Sacramento Council of Governments (SACOG) region and includes detailed information on the socio-economic characteristics and related trip characteristics of its inhabitants.
- **2008 SACOG Small Area Data Set**, prepared by SACOG in support of regional modeling activities, this data set includes detailed parcel level analysis of employment and housing characteristics.

- **2008 SACOG Traffic Analysis Zones**, prepared by SACOG in support of regional modeling activities, this data set includes detailed cross classification information for 2008 and 2035 conditions.
- **2008 Model Update Report: SACMET 07**, although not finalized this report discusses the major processes carried out by the most recent version of the SACMET model.

As discussed in **Section III**, the trip generation submodel essentially utilizes household (units and associated socio-economic data) and employees as the primary data input. However, as designed, the model relies heavily on land use as the basic user input. Although, this may appear to create a contradictory approach to developing model input, it is appropriate considering the following:

- Land use data is readily available, reliable and verifiable through the County's parcel database
- Given the nature of future forecasting a model that relies on land use (rather than direct population, employment and socio-economic data inputs) is typically more useful and flexible considering its likely applications.
- The trip generation rates are developed based on analysis of thousands of individual responses contained in the regional household survey that are subsequently defined in terms of socio-economic characteristics and individual trip making characteristics.

The following section discusses the development of model inputs for the trip generation submodel in further detail.

II. Developing Base (2010) Model Inputs

Exhibit 1 shows the major steps involved with developing the base (2010) model dataset for input into the trip generation submodel. As shown, the residential input data related to households was developed through the following steps:

1. To obtain a count of dwelling units by single family and multi-family residences, the **2010 EDC parcel shapefile** was joined with the **2010 Living Units Database**. This combined dataset was then overlaid with the Traffic Analysis Zone (TAZ) structure previously developed and discussed in **Technical Memorandum #4** to develop aggregate totals of dwelling units by TAZ.
2. The TAZ structure was also joined in GIS with a **2010 US Census shapefile** that had information on dwelling units and households (occupied units) at the census block group level. This analysis in GIS provided occupancy rates for each TAZ in the study area. For reference, a thematic map showing the relative vacancy rates of dwelling units (by Census block group) in El Dorado County is provided in **Exhibit 2**.
3. The vacancy rates by TAZ from the Census data was applied to the dataset in step 1 to convert dwelling units from the EDC parcel data to the number of occupied units or households.
4. The household totals by TAZ were associated with a unique cross-classification by overlaying the **2008 SACOG Traffic Analysis Zones** structure with the EDC TAZ structure. As shown in Exhibit 1, this data was then validated and subsequently used as a direct input into the EDC TDM's trip generation submodel.

Similarly, the process for determining non-residential input data (primarily employment in the study area) for the trip generation submodel relied on the **2010 EDC parcel shapefile** to identify land uses that would likely include employment (such as commercial or industrial). Although the **2010 EDC parcel shapefile** database includes extensive information on land use, zoning, and ownership information it

does not include specific information regarding the number of employees located at a particular site. As the **2008 SACOG Small Area Data Set** includes extensive employment information, including data purchased from InfoUSA, it was determined to be a useful basis for establishing employment values for the EDC TDM. Following is an overview of the steps completed to establish the non-residential input data for trip generation submodel:

1. The **2010 EDC parcel shapefile** was overlaid in GIS with the **2008 SACOG Small Area Data Set** to establish the base dataset to determine the number of employees per non-residential parcel. Subsequently, this base dataset was reviewed in detail to review location whose uses did not clearly include employment based on their descriptions provided in the **2010 EDC parcel shapefile**.
2. Analysis of the dataset created in the overlay described in Step 1 identified 33,003 employees associated with parcels that were marked as non-residential use in the **2010 EDC parcel shapefile**.
3. The overlay also matched employees from the **2008 SACOG Small Area Data Set** to parcels identified as a residential use in the parcel dataset. These “mismatched” parcels represented 11,748 employees. A review of the validity of the employment totals for these parcels was conducted for the top 100 parcels by number of employees. This included 9,560 employees or approximately 81% of the 11,748 identified for review.
4. The check of the “mismatched” parcels involved extensive review of aerial photography for these 100 parcels to determine the validity of these employment locations. The review narrowed the total to 10,479 employees identified in the mismatched parcels as being locations that likely include employment activities and were misidentified in the EDC parcel dataset.
5. The parcels identified within the **2008 SACOG Small Area Data Set** as having employment activities was analyzed to determine average employment rates for the various land use categories within the dataset. Through a series of GIS based overlays, this data was used to derive employment rates that correspond to the land use descriptions used by EDC.
6. The resulting employment rates, shown in **Exhibit 3**, were then applied to the EDC parcels identified as development that occurred after 2008 and having employment based activities. As shown in Exhibit 1, the resulting parcel employment data was then added to larger data set and overlaid with the EDC TAZs for validation and subsequent use in the trip generation submodel.

It is important to note that refinements to the residential and non-residential trip base year (2010) trip generation inputs are anticipated during the model calibration and validation process as necessary to address identified data abnormalities or as other missing or “mismatched” attribute data is identified.

III. Validation of Base (2010) Trip Generation Input Data

Validation of the Base (2010) model inputs was accomplished through a review of available Census data and other readily available data sources. Specifically, 2010 Census data from the Decennial Census was used as the basis for tabulating the number of dwelling units, vacancy rates, households, and employment in El Dorado County. As shown in **Exhibit 4**, households are within 4 percent.

Since the Census data on employment is only available countywide (includes Tahoe Basin), a direct comparison to the totals for the study area is more difficult. Comparison of the employment totals between the Census and the EDC dataset is further complicated by the fact that employment estimates are widely considered less accurate than household estimates (which is why TDMs typically hold productions constant during the balancing of productions and attractions). The 56,121 employment

number shown is representative of 41,027 from the 2010 Census County Business Patterns database and 15,094 from the Census Non-Employer database (typically self-employed unincorporated businesses). As noted, the employment estimate shown is Countywide (includes the Tahoe Basin) while the EDC estimate is only for the study area. The EDC employment estimate would suggest that approximately 73% of total employment is within the study area (which excludes the Tahoe Basin). Considering that approximately 79% (total households for EDC was estimated by the 2010 Census to be 70,223) of the total households are in the study area and that the Tahoe Basin has a significant service employment sector (hotels, restaurants, etc.) these values, on a proportional basis, appear reasonable. Additionally the 2008 SACOG Small Area Data Set which relies on data from InfoUSA, which is commonly used and widely considered a valid source for employment data for model development. Accordingly, based on this review the household and employment totals were determined to be reasonable for use in the TDM.

IV. Trip Generation

The EDC TDM as designed relies heavily on the trip generation submodel previously developed for the SACOG's SACMET model. **Exhibit 5** summarized the major differences between this submodel and the one utilized in the existing EDC TDM. This submodel has its basis in regional survey data collected and reported in the **2000 Sacramento Area Household Travel Survey: Final Report**. This submodel has been refined several times prior to its most recent available description which is provided in the **2008 Model Update Report: SACMET 07**. Based on a review of available documentation and a review of model scripts and procedures, the trip generation submodel was determined to be consistent with standard practices for regional model development, thus statistically valid and appropriate for application to the EDC TDM.

Following is a description of the trip generation submodel provided within the EDC TDM:

- The trip generation submodel consists of estimating trip productions and attractions based on socioeconomic variables (occupied dwelling units, population and employment). The socioeconomic data inputs that go into the model are derived from land use projections. The trip generation submodel features eight basic trip purposes: Home-based Work; Home-based Shop; Home-based School; Home-based Other; Work-Other; Other-Other; Commercial Vehicle 2 axle; and Commercial Vehicle 3+ Axle.
- Household characteristics are the primary input for socioeconomic data converted from residential land uses. The trip generation process uses a three-way cross-classification scheme that relates household size with levels of income and auto-ownership. Households are classified by the number of persons (1, 2, 3, and 4+), number of workers (0, 1, 2, and 3+) and income level (5 income classes). The household classification scheme for occupied single family and multi-family housing units is based on the 2000 Census. Statistical analysis of the 2000 Census data and the 2000 Household Travel Survey provided estimates of trip production rates for different household types classified by the number of workers, persons and income levels.
- Employment is the primary input for socioeconomic data converted from non-residential land use. The trip generation submodel uses five employment categories: retail, medical, educational, and manufacturing/other. The employment types are grouped into retail and non-retail employment categories. Trip attraction rates are developed for each trip purpose

categorized by household type, retail and non-retail employment, and K-12 and college enrollment.

- The trip generation submodel also accounts for trips that enter and leave the region. The model network features 31 external gateways at the boundaries of the model area to represent trips entering, leaving or passing through the region. Trips attractions and productions for each trip purpose are estimated from the Household Travel Survey. The gateway trip productions and purposes are maintained in as a separate data input and fed directly into the trip distribution process.

V. Trip Distribution

Similarly to the trip generation submodel, the EDC TDM relies heavily on the trip distribution submodel previously developed for SACOG's SACMET model. Based on a review of available documentation and a review of model scripts and procedures it was determined to have been developed consistent with the best practices for regional model development and be appropriate for application within EDC TDM. As part of the model development process, the trip distribution submodel will be recalibrated to reflect the localized trip characteristics of El Dorado County. Following is a description of the trip distribution submodel provided within the EDC TDM:

The trip distribution submodel uses a gravity model where trips flow from origin to a destination. The gravity model formula determines destinations according to the size of the size of the destination (level of attractions) and the attractiveness of the destination in the form of travel distance or travel cost. The trip distribution submodel is applied to non-work and non-home based trip purposes; destinations for Home-based Work purposes are determined within the mode choice submodel. In general, people tend to tolerate long travel times and distances during their commute compared to non-work travel such as shopping. The gravity model formula includes a friction factor that considers the automobile travel time for non-commute trips.

A limited trip length distribution assessment was completed as part of the model development. Although no specific thresholds for validating model trip lengths are identified by FHWA¹, Caltrans² or the 2010 California Regional Transportation Plan Guidelines³, it is commonly considered a useful practice. Based on discussions with SACOG staff and based on a review of the most recent SACOG household travel survey⁴ data, it was determined that the household data would be used in its totality and not be disaggregated to only include EDC records. Input from SACOG staff, technical issues related to the dataset, and concerns over the sample size and the geographical distribution of EDC data were the primary considerations in this determination. **Exhibits 6, 7, 8, 9, and 10** show the results of this analysis.

Given the limitations of the data, the application of a rigorous mathematical model was deemed to not be practical. However, based on an understanding that trip lengths are generally longer in EDC than in other parts of the SACOG region - given the lower densities, more dispersed development patterns, and

¹ FHWA Calibration and Adjustment of System Planning Models, 1990.

² Travel Forecasting Guidelines, Caltrans, 1992

³ 2010 California Regional Transportation Plan Guidelines, California Transportation Commission

⁴ 2000 Sacramento Area Household Travel Survey: Final Report, 2000

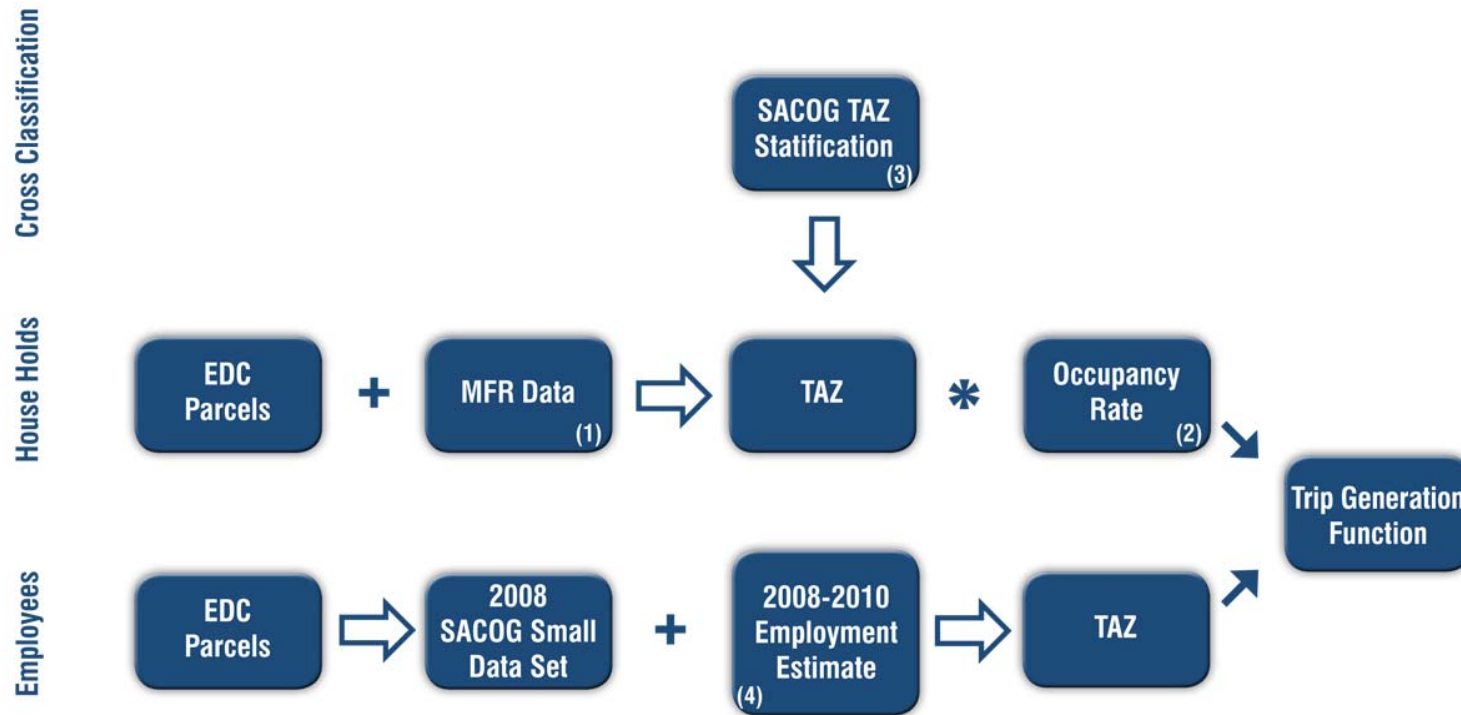
that many significant regional destinations are outside of EDC - the graphs are considered to be representative of reasonable trip length distributions.

VI. Considerations for Future Land Use Scenarios/Forecasting

As previously described, the EDC TDM utilizes the household cross-classification data provided in the SACMET TAZs as input to estimate trip generation for the base year model. For future land use scenarios, a series of unique land use profiles are being developed to facilitate model use. The application of these cross-classification profiles is anticipated to be automated so that that the user will not be required to provide the extensive socio-economic stratification that would otherwise be required for input.

The EDC TDM will apply the same gravity model for the base year and future year traffic forecasts.

Exhibit 1 – Base (2010) Model Trip Generation Inputs



- (1) 2012 El Dorado County Living Units Data Base
- (2) 2010 US Consensus Block Group Data
- (3) 2000 SACOG Household Travel Survey including data in 2000 US Census
- (4) 2012 Kimley-Horn Analysis
- MFR - Multi-Family Residence
- EDC - El Dorado County
- GIS - Geographical Information System
- SACOG - Sacramento Association Council of Governments
- ⇒ GIS Overlay

Exhibit 2 – 2010 EDC Vacancy Rates

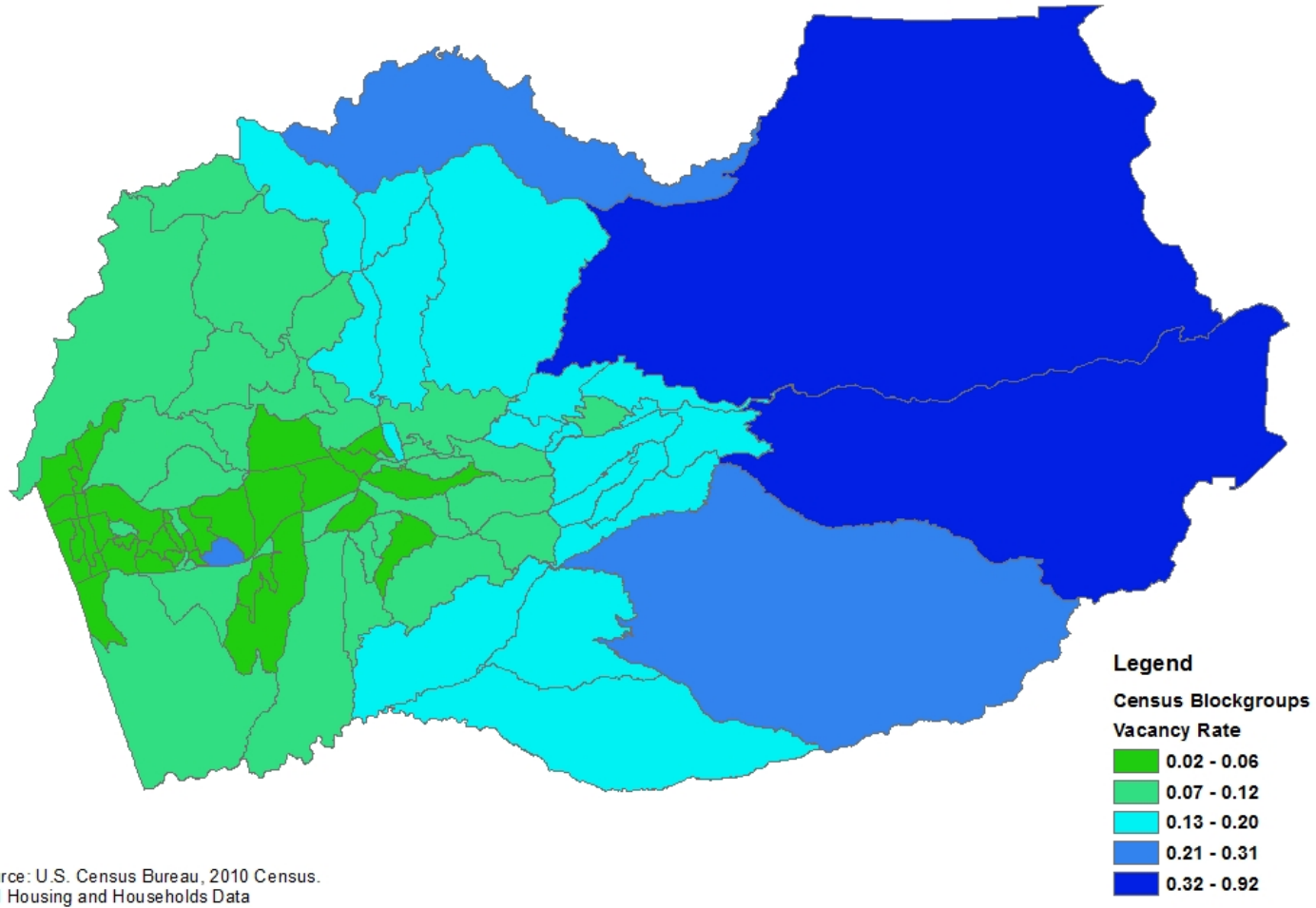




Exhibit 3 – SACOG Small Area Dataset Employment Rates

EDC 2010 Parcel Use Types by Use Class	SACOG 2008 Parcel LANDUSE TYPES	SACOG Conversion Factors														
		HH/DU	DU/ACRE	WORKER/HH	ENR_K12/ACRE	ENR_UNI/ACRE	EDU/ACR	FOOD/ACRE	GOV/ACRE	OFC/ACR	OTHER/A	RET/ACR	SVC/ACR	MED/ACRE	IND/ACR	TOTAL/ACRE
COM																
BAR	10. Community/Neighborhood Retail	0	0	0	0	0	0	8.32	0	0	0	8.32	8.32	0	0	24.96
MARINAS	AIRPORT	0	0	0	0	0	0	0.01	0.01	0	0	0	0.03	0	0.03	0.07
MISC. IMPROVED COMMERCIAL	16. Community/Neighborhood Commercial/Office	0	0	0	0	0	0	1.36	0	0	0	12.16	9.93	0.89	0	24.34
MOBILE HOME PARKS	4. Medium Density Residential	0.95	10.95	0.51	0	0	0	0	0	0	0	0	0	0	0	0
MOTEL	10. Community/Neighborhood Retail	0	0	0	0	0	0	8.32	0	0	0	8.32	8.32	0	0	24.96
PARKING LOT	AIRPORT	0	0	0	0	0	0	0.01	0.01	0	0	0	0.03	0	0.03	0.07
PLACE OF WORSHIP	Civic/Institution	0	0	0	0	0	0	0	0.22	0	0	0	3.55	0.66	0	4.42
RESTAURANT	10. Community/Neighborhood Retail	0	0	0	0	0	0	8.32	0	0	0	8.32	8.32	0	0	24.96
RETAIL STORES <=5	10. Community/Neighborhood Retail	0	0	0	0	0	0	8.32	0	0	0	8.32	8.32	0	0	24.96
RETAIL STORES >15	11. Regional Retail	0	0	0	0	0	0	2.92	0	0	0	15.56	3.33	0.21	0	22.01
RETAIL STORES 5	10. Community/Neighborhood Retail	0	0	0	0	0	0	8.32	0	0	0	8.32	8.32	0	0	24.96
SERVICE STATION	10. Community/Neighborhood Retail	0	0	0	0	0	0	8.32	0	0	0	8.32	8.32	0	0	24.96
SUPERMARKETS	10. Community/Neighborhood Retail	0	0	0	0	0	0	8.32	0	0	0	8.32	8.32	0	0	24.96
VACANT COMMERCIAL LAND	16. Community/Neighborhood Commercial/Office	0	0	0	0	0	0	1.36	0	0	0	12.16	9.93	0.89	0	24.34
IND																
HEAVY MANUFACTURING	14. Heavy Industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	7.86	7.86
HOSPITALS & CONVALESCENT HOSPITALS	49. Medical Facility	0	0	0	0	0	0	0	0	0	0	0	139.05	0	139.05	0
LIGHT MANUFACTURING	13. Light Industrial	0	0	0	0	0	0	0.5	0	3.58	0	0.5	0.5	0.36	6.38	11.8
MEDICAL/DENTAL/VET OFFICES	9. Moderate-Intensity Office	0	0	0	0	0	0	0.48	4.1	15.22	0	0	15.46	6.33	0	41.59
MINI-WAREHOUSES (MINI-STORAGE)	13. Light Industrial	0	0	0	0	0	0	0.5	0	3.58	0	0.5	0.5	0.36	6.38	11.8
MISC. IMPROVED INDUSTRIAL PROPERTY	14. Heavy Industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	7.86	7.86
OFFICES	12. Light Industrial - Office	0	0	0	0	0	0	0.38	0	20.15	0	0.38	0.38	1.77	2.72	25.79
PRIV. HYDROELECTRIC GENERATION PLANT	AIRPORT	0	0	0	0	0	0	0.01	0.01	0	0	0	0.03	0	0.03	0.07
PUBLIC UTILITY (ON STATE ASSESSED ROLL)	15. Public/Quasi-Public	0	0	0	0	0	0	0	4.57	0	0	0	0	0	0	4.61
VACANT INDUSTRIAL LAND	14. Heavy Industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	7.86	7.86
WAREHOUSES	13. Light Industrial	0	0	0	0	0	0	0.5	0	3.58	0	0.5	0.5	0.36	6.38	11.8
MFR																
CONDOMINIUMS & TOWNHOUSES	4. Medium Density Residential	0.95	10.95	0.51	0	0	0	0	0	0	0	0	0	0	0	0
MULTI-RESIDENTIAL 2-3 UNITS	4. Medium Density Residential	0.95	10.95	0.51	0	0	0	0	0	0	0	0	0	0	0	0
MULTI-RESIDENTIAL 4+ UNITS	5. Medium-High Density Residential	0.96	12.05	0.28	0	0	0	0	0	0	0	0	0	0	0	0
RETIREMENT HOUSING	4. Medium Density Residential	0.95	10.95	0.51	0	0	0	0	0	0	0	0	0	0	0	0
VACANT MULTI-RES. LAND 4+ UNITS ALLOWED	5. Medium-High Density Residential	0.96	12.05	0.28	0	0	0	0	0	0	0	0	0	0	0	0
MSC																
CAMPGROUNDS	AIRPORT	0	0	0	0	0	0	0.01	0.01	0	0	0	0.03	0	0.03	0.07
CEMETERIES	AIRPORT	0	0	0	0	0	0	0.01	0.01	0	0	0	0.03	0	0.03	0.07
COMMUNITY ORIENTED FACILITIES	Civic/Institution	0	0	0	0	0	0	0	0.22	0	0	0	3.55	0.66	0	4.42
ENV. SENSITIVE LAND - RESTRICTED USE																
FARMLAND SECURITY ZONE (CONTRACT)																
FIRE SUPPRESSION FACILITIES	Civic/Institution	0	0	0	0	0	0	0	0.22	0	0	0	3.55	0.66	0	4.42
MINERAL RIGHTS	13. Light Industrial	0	0	0	0	0	0	0.5	0	3.58	0	0.5	0.5	0.36	6.38	11.8
MISC. IMPROVED RECREATIONAL	AIRPORT	0	0	0	0	0	0	0.01	0.01	0	0	0	0.03	0	0.03	0.07
RURAL NON-RES. IMPROVEMENT 2.51-20.0 AC.	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
RURAL RESTRICTIVE ZONING - CLCA (ACTIVE)	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
RURAL RESTRICTIVE ZONING - NON-RENEWAL	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
SCHOOLS - LARGE (101+ STUDENTS)	50. K-12 Schools	0	0	0	23.42739	0	0	4.24	0	0	0	0	0	0	0	4.24
SCHOOLS - MEDIUM (13-100 STUDENTS)	50. K-12 Schools	0	0	0	23.42739	0	0	4.24	0	0	0	0	0	0	0	4.24
SCHOOLS - SMALL (1-12 STUDENTS)	50. K-12 Schools	0	0	0	23.42739	0	0	4.24	0	0	0	0	0	0	0	4.24
SKI RESORTS	AIRPORT	0	0	0	0	0	0	0.01	0.01	0	0	0	0.03	0	0.03	0.07
RES																
MANUF. HOMES <=2.5 AC. (MOBILES)	3. Low Density Residential	0.91	4.85	1.19	0	0	0	0	0	0	0	0	0	0	0	0
MOBILE HOME ON RENTED LAND	3. Low Density Residential	0.91	4.85	1.19	0	0	0	0	0	0	0	0	0	0	0	0
NON-RES. IMPROVEMENTS <=2.5 AC.	3. Low Density Residential	0.91	4.85	1.19	0	0	0	0	0	0	0	0	0	0	0	0
PLANNED UNIT DEVELOPMENTS	3. Low Density Residential	0.91	4.85	1.19	0	0	0	0	0	0	0	0	0	0	0	0
RESIDENCE ON LEASED LAND	3. Low Density Residential	0.91	4.85	1.19	0	0	0	0	0	0	0	0	0	0	0	0
RURAL MOBILE HOME 2.51+ AC.	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
RURAL RES. 2.51-20.0 AC. 1 SF UNIT	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
RURAL RES. 20+ AC. 1 RES. UNIT	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
RURAL RES. LAND 20+ MINOR NON-RES IMPR	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
SINGLE FAM. RES. <=2.5 AC. (INC. MAN. HMS	2. Very Low Density Residential	0.9	2.25	1.2	0	0	0	0	0	0	0	0	0	0	0	0
VAC RURAL RES LAND 2.51-20.0 AC. 1 UNIT	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
VACANT RES. LAND <=2.5 AC. 1-3 UNITS	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0
ZERO LOT LINE	1. Rural Residential	0.88	0.32	1.1	0	0	0	0	0	0	0	0	0	0	0	0

Exhibit 4 – Analysis of Base Year Household and Employment Estimates (1)

	EDC Base Model Data (2010)	Decennial Census Data (2010)
Dwelling Units	62,110	64,209
Vacancy Rate	10.6%	10.7%
Households	55,507	57,346
Employment	43,545	56,121 (2)

(1) Study area is El Dorado County with the exception of the Tahoe Basin

(2) Total of non-employment and employment data from the Census databases which are Countywide (include Tahoe Basin)

Exhibit 5 - Model Comparison

	Current El Dorado County Model (1)	Updated El Dorado County Model (2013)
Software Platform	MINUTP (supported by Citilabs but no longer available for purchase)	CUBE (a Citilabs product)
GIS Compatibility	No	Yes with binded ESRI product
GIS Network	No	Yes with binded ESRI product
# of TAZs (2)	267 within the Study Area	624 (493 covering the Study Area) (3)
Trip Generation	<ul style="list-style-type: none"> ▪ Utilizes linear equations (trip generation rates) for 2 residential categories of land use (single family and multifamily) ▪ Utilizes linear equations (trip generation rates) for 3 non-residential trip rates (retail employment, service employment, other employment). ▪ Based on 3 trip purposes (Home-based Work, Home-based Other, and Non-Home-based). 	<ul style="list-style-type: none"> ▪ For residential, utilizes a sophisticated cross classification model based on household data including persons, workers, income, and auto ownership. ▪ For non-residential, utilizes 5 categories of employment (manufacturing, office, retail, medical, education, other). Two types of school enrollment: K-12 and college are also used. ▪ Based on 8 trip purposes (Home-based work, Home-based Shop, Home-based School, Home-based Other, Work-Other, Other-Other, 2 Axel Commercial, 3+ Axel Commercial)
Trip Distribution	Gravity models using friction factors	Gravity models using friction factors for all purposes except Home-based Work which utilizes a nested destination/mode choice model.

(1) El Dorado Travel Demand Forecasting Model Development Report, October 1999, Fehr & Peers Associates, Inc.

(2) Study area is El Dorado County with the exception of the Tahoe Basin

(3) Updated EDC TDM TAZ numbers as of August 31, 2012 – final may be different

Exhibit 6 – Home-Based Other Trip Length Distribution

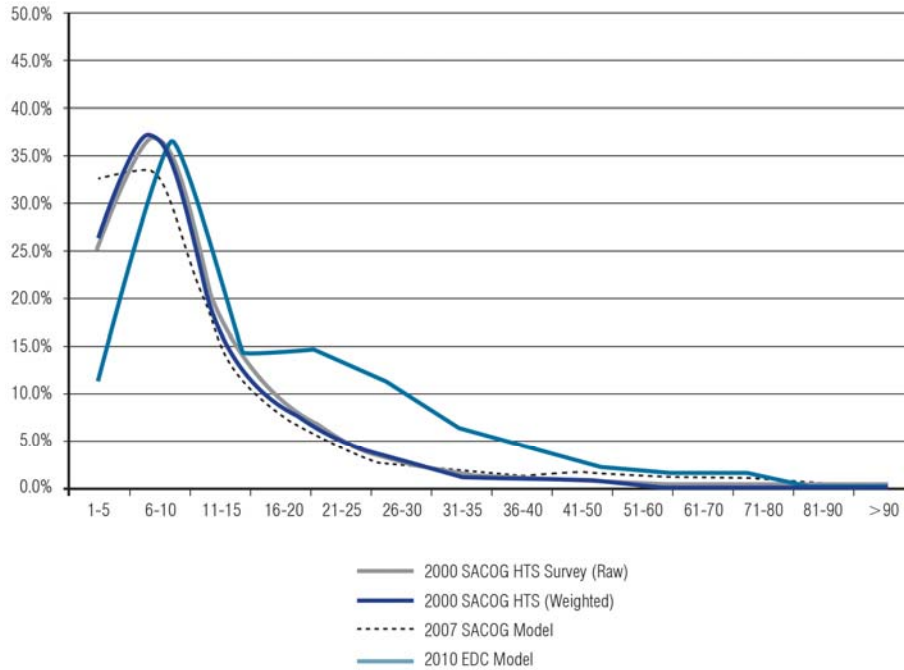


Exhibit 7 – Home-Based Shop Trip Length Distribution

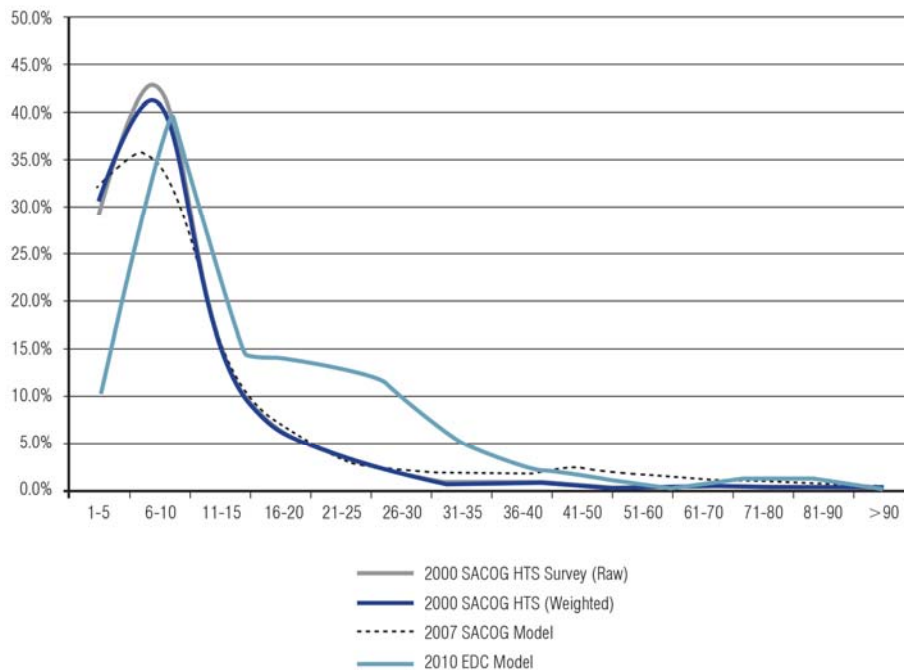


Exhibit 8 – Home-Based Work Trip Length Distribution

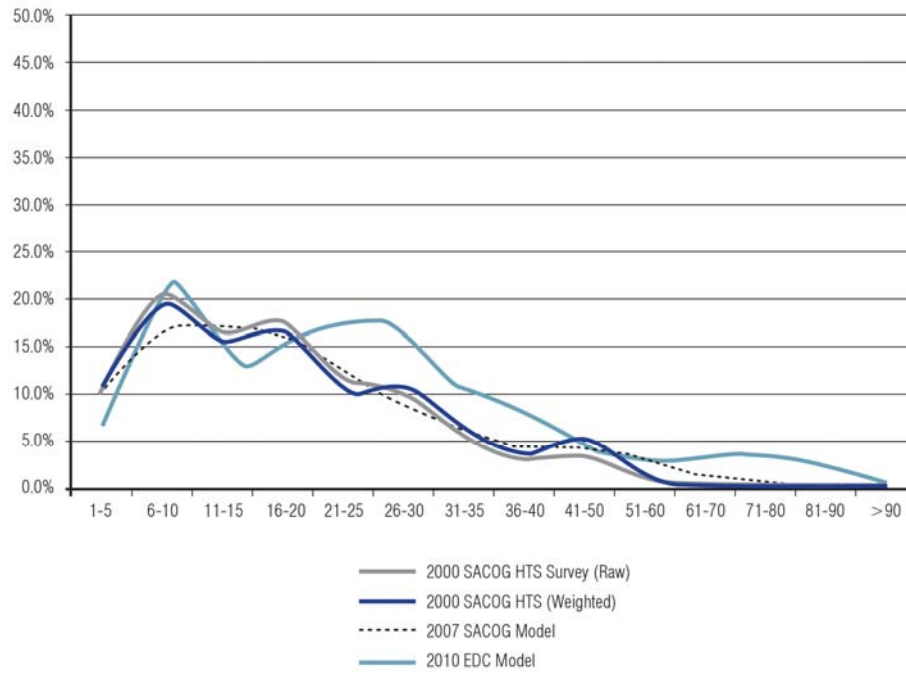


Exhibit 9 – Other-Other Trip Length Distribution

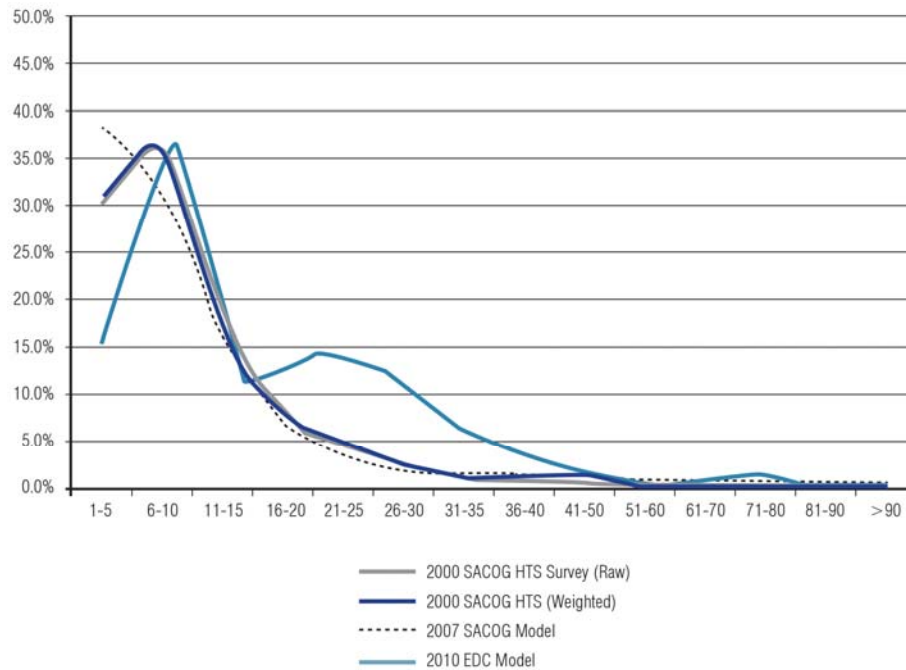


Exhibit 10 – Work-Other Trip Length Distribution

