

Memorandum

To: Natalie Porter, P.E., T.E.
El Dorado County

From: Chris Gregerson, P.E., T.E., PTP
Mike Schmitt, AICP CTP, PTP

Re: *Technical Memorandum #1: Base Year Model Change Summary*
El Dorado County Travel Demand Model Update

Date: August 3, 2018

The purpose of this technical memorandum is to present the results of the update to the Base Year model for El Dorado County. This memorandum summarizes the modifications to the land use and roadway network model files as well as the techniques used to make these modifications. The result of the update brought the Base Year model from 2015 to 2016.

Background

The first step of the model update was to request the most recent Base Year model catalog from El Dorado County. The catalog contained both the land use files and roadway network for the Base Year and were the result of the TIM Fee Update process completed in 2016. While this process updated information within the County, no modifications were made to areas outside of the County (Buffer Area) or to the external zones. Therefore, this effort brings the TAZs and roadway network within the County from 2015 to 2016 while the areas outside the County and the external zones were brought from 2010 to 2016.

Buffer Area

The part of the County's model outside of El Dorado County in Sacramento County, is known as the Buffer Area. This area is included in the model due to the large number of trips that cross the County line every day and have a large impact on traffic operations within the County. This area was last updated based on the base year network for the Sacramento Area Council of Governments (SACOG) SACMET model using a base year of 2010. This model is no longer maintained by SACOG and it now uses an activity-based model known as SACSIM. SACSIM uses 2012 land use forecasts in its base year model while its future year model is based on 2036.

To develop a control total for the number of households contained in the Buffer Area for 2016, household data from the 2015 American Community Survey (ACS) was obtained for California at the Census block group level. The Census block groups representing the Buffer Area were extracted from the state as a whole, and household data was then summarized for the Buffer Area. The total number of households for the Buffer Area was calculated and this was used as the control total for growth between 2012 and 2015 for the Buffer Area. To determine a control total for 2016, the annual growth rate for the number of households in the Buffer Area was calculated between 2012 and 2036 within SACSIM. This annual growth was then added to the total number of households in 2015 as determined by the ACS data to get a final 2016 control total for households.

To develop a control total for employment and students, the SACSIM model was used exclusively. The yearly growth rate for the 2012 and 2036 SACSIM models was calculated for employment and students. This growth rate was then multiplied by four to represent the growth from 2012 to 2016. This four-year growth was added to the 2012 totals for employment and students to obtain 2016 control totals for employment and students. The 2016 control totals for households, employment, and students are summarized below in **Table 1**.

Table 1 – Buffer Area 2016 Control Totals for Households, Employment and Students

Control Total Year	Housing	Employment	K12 Students	University Students
2016	66,605	127,232	29,725	2,761

Buffer Area Land Use Update

Once the control totals were calculated, the steps taken to update the Buffer Area land use in the El Dorado County model from 2010 to 2016 include:

1. Selecting the TAZs in SACSIM that represent the TAZs in the Buffer Area of the El Dorado County Model
2. Summarizing the land use in SACSIM for these TAZs by households, students, and employment
3. Interpolating directly between 2012 and 2036 to obtain households, students and employment to obtain 2016 SACSIM totals
4. Checking to ensure that the 2016 SACSIM values were not lower than 2012 SACSIM values due to interpolation calculations and ensuring that there was no negative growth in any TAZ
5. Factoring each TAZ by land use type (households, students, and employment) using control totals.
 - a. Each land use type was summed for its 2016 Buffer Area estimate
 - b. The estimate was divided by the control total get obtain an estimate to control total factor
 - c. This factor was then multiplied by the estimate for each TAZ’s land use
6. The factored estimates for each TAZ were then totaled and compared to the 2016 control total to check for consistency
7. SACSIM does not differentiate between household types (single family vs multifamily) and so the distribution of new housing was completed based on the 2010 distribution of housing among the three housing types
8. SACSIM also contains different employment categories than the El Dorado County model contains. The employment types contained within SACSIM include education, food, retail, service, office, government, other, service, industrial, and medical. The five employment types contained in the El Dorado County model include retail and non-retail where non-retail is broken out into four categories including office, education, medical, and manufacturing-other. In order to convert the SACSIM employment types to comparable categories for the El Dorado County model, food and retail employment from SACSIM were included in the retail employment for El Dorado County; office and government employment from SACSIM were included in the office employment for El Dorado County; service, other, and industrial employment from SACSIM were included in the manufacturing-other employment for El Dorado County, while medical and education employment from SACSIM were included in their respective categories within the El Dorado County employment.

Buffer Area Roadway Network Update

The roadway network in the Buffer Area was also updated from 2010 to 2016. This update included modifying the roadway network to add any major projects known to have occurred between 2010 and 2016. The projects added include:

- Realigning and widening White Rock Road between Grant Line Road and Prairie City Road
- Widening Hazel Avenue north of US-50
- Adding Carson Crossing Road, connecting to White Rock Road at the El Dorado County/Sacramento County border

El Dorado County Land Use Update

The land use for the TAZs within the County were updated to 2015 as a part of the previous TIM Fee update and thus, the only update necessary was from 2015 to 2016. This was completed by obtaining building permits for 2015 and 2016 for the County for both residential and commercial uses. The permits were provided with the permit use type, date, location of the building by TAZ, lot size, and the size of the building in square feet. The permit use types were converted into land use types used by the El Dorado County model by grouping the permit use types into their respective model land use types as shown in **Table 2** below.

Table 2 – Building Permit Use Types and Corresponding Model Land Use Categories

Building Permit Use Type	Model Land Use Category	Total Permits
1-FMLY	SFHH (Single Family Household)	164
M1FMLY	SFHH (Single Family Household)	482
PERMMD	SFHH (Single Family Household)	3
2NDDWG	MFHH (Multifamily Household, 5 Units or Fewer)	17
2PERMD	MFHH (Multifamily Household, 5 Units or Fewer)	2
APRTMT	MHHH (Multifamily Household, Greater than 5 Units)	4
SCHOOL	Education Employment	1
OFFICE	Office Employment	4
PUBBLD	Office Employment	3
AUTMTV	Manufacturing-Other Employment	1
INDUST	Manufacturing-Other Employment	1
STRG-C	Manufacturing-Other Employment	3

While the households were added to their respective TAZs in a one permit to one household ratio, the permits related to employment needed to be converted into jobs based on the building size before being added to the model land use file. **Table 3** below summarizes this conversion from square feet to employment. For each permit use type, a corresponding land use code from the *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE) was found. The Trip Generation Manual contains daily, AM peak-hour, and PM peak-hour trip rates by square footage and employees for many land use types. The total square footage for each permit use type was calculated and then the number of corresponding trips was calculated using the daily trip rate from the Trip Generation Manual. The number of employees was then calculated using the number of trips previously calculated and the daily trip rate by employees. For example, a 10,000 square-foot office building with a trip rate of 9.75 daily trips per 1,000 square-feet and 3.25 daily trips per employee, would produce 97.5 trips based on the size of the building. Then, dividing 97.5 trips by the trip rate based on the number of employees would result in 30 employees for a 10,000 square-foot building. This methodology was also followed to calculate the number of new students for the school permit use type. The employment and students were then added to their respective TAZs within the model land use file.

Table 3 – Non-residential Building Permit Conversion to Employment

Use Type	ITE Land Use Code	Total Square-Feet	Trips per 1,000 Square-Feet	Trips per Employee	Trips per Student	Total Jobs	Total Students
AUTMTV	943	14,900	16.28	10.84	-	22	-
INDUST	110	5,675	4.96	3.05	-	9	-
OFFICE	710	2,940	9.74	3.28	-	9	-
PUBBLD	710	2,139	9.74	3.28	-	6	-
SCHOOL	522	960	19.52	21.00	1.89	1	10
STRG-C	150	7,840	1.74	5.05	-	3	-

In addition to updating the land use in the County from 2015 to 2016, two TAZ splits were performed to better represent the existing land use, better load trips associated with specific land uses such as the Cameron Park Drive retail, and to be consistent with the future year model. TAZ 180 was split along the ridgeline to create TAZ 628. TAZ 154 was split twice, once south of the Cambridge Road/US 50 interchange and once south of the Cameron Park Drive/US 50 interchange creating TAZs 626 and 627.

El Dorado County Roadway Network Update

The County model roadway network was updated based on a list of network modifications provided by the County. Those modifications include:

- New ramp configurations at the Missouri Flat Road interchange
- New bike/pedestrian connection adjacent to the freeway between Missouri Flat Road and Placerville Drive
- Silva Valley Parkway interchange added, including new auxiliary lanes to El Dorado Hills Boulevard
- HOV lanes added along US 50 between Cameron Park Drive and E Bidwell Street in the City of Folsom
- Windfield Way added
- White Rock Road between Latrobe Road and Windfield Way updated from two lanes to four lanes
- Carson Crossing Drive added
- El Dorado Hills Boulevard/Latrobe Road updated from four lanes to six lanes through the interchange
- Silva Valley Parkway updated from two lanes to four lanes from Serrano Parkway to just south of the Silva Valley Parkway interchange