

# Memorandum

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**To:** Natalie Porter, P.E., T.E.  
**From:** Chris Gregerson, P.E., T.E., PTP  
Michael Schmitt, AICP CTP, PTP  
**Re:** Technical Memorandum #2: Corrective Factors to External Trips  
**Date:** February 9, 2019

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The purpose of this memorandum is to summarize the modifications made to the model to account for trips outside the El Dorado County Travel Demand Model (EDC TDM) area, or more simply, external trips. External trips come in three types, summarized below:

- External-Internal trips (X-I): trips that originate from outside the spatial area covered by the EDC TDM, but are destined for a location outside of that area
- Internal-External trips (I-X): trips that originate from within the spatial area covered by the EDC TDM, but are destined for a location outside of that area
- External-External trips (X-X): trips that originate from, and are destined to, locations within the spatial area covered by the EDC TDM

## **I. Background and Methodology**

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The EDC TDM network features 31 external gateways at the boundaries of the model area to represent trips entering, leaving or passing through the spatial area covered by the model. The gateway trip productions and purposes are maintained in as a separate data input and fed directly into the trip distribution process. The external trips are managed by two different files, the “TGSP” and the “THRU” model files, with versions for each of the model years (2016 and 2040). The TGSP file contains all I-X and X-I trips, while the THRU file contains all X-X trips.

Both files were updated as a part of the effort to update the base year model scenario from 2015 to 2016 and the future year model scenario from 2035 to 2040. These updates were completed by completing a select zone analysis using the Sacramento Area Council of Governments’ (SACOG) 2016 SACSIM travel demand model, as well as using the growth between the base and future year model scenarios to inform the growth assumed for this model update. The select zone analysis was completed by taking the 31 external gateways within the EDC TDM and matching them with the corresponding zones in the SACSIM model. All but a few of these 31 gateways are internal zones in the SACSIM model. The trip tables that are output from the select zone analysis were then used to update the TGSP and THRU files in the EDC TDM.

## **II. THRU Model File Update**

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The THRU model file was updated for both the 2016 and 2040 model scenarios for both personal and commercial vehicles. As mentioned above, these updates were completed using the trip table output from the select zone analysis performed using SACOG’s 2016 SACSIM travel demand model. The SACSIM model has a base year of 2012 and a future year of 2036. The trip tables, which represent the number of trips between every zone pair, origin and destination, are provided by time period and then combined to represent the number of daily trips that travel between each zone in a single matrix. This matrix was then converted to list format where each line contains the origin zone, the destination zone, the number of personal vehicle trips, and the number of commercial vehicle trips. The SACSIM model does not,

however, separate between personal and commercial trips in the trip matrix so the split was calculated after the model runs were complete. In order to calculate what the split between commercial and person vehicles would be, the historic split for each zone pair using the previous version of the EDC TDM for both base and future year scenarios was calculated. In addition, the minimum, maximum, average, and median percentage of total trips that are commercial trips was calculated for all zone pairs for the previous version of the model. For each zone pair in the two scenarios, either the historic personal/commercial ratio was maintained, or the median percentage of commercial trips was applied.

Once this was completed for the 2012 and 2036 trips tables, the tables were used to develop the final 2016 and 2040 trip tables. This was completed by taking the 2012 and 2036 trip values and interpolating between them using straight line growth between the 2012 and 2036 trip tables to obtain trip values for 2016. The growth between 2012 and 2036 is also projected to 2040 by calculating the average yearly growth between 2012 and 2036 and projecting four years into the future.

### III. TGSP Model File Update

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As mentioned previously, the TGSP file contains the X-I and I-X trips for both scenarios of the model. However, unlike the THRU model file, the TGSP file only contains a list of the external gateway zones and the number of trips to that external gateway zone from/to the spatial area by trip type. For example, for the zone representing easternmost point of US 50 in the model, the TGSP file lists all home-based work trips to that zone from the internal model zones as well as all the home-based work trips from that model zone to the rest of the internal model zones. A list of the trip types contained within the TGSP model file are as follows:

- Home-based Work (HBW)
- Home-based Shopping (HBS)
- Home-based College (HBC)
- Home-based Other (HBO)
- Work-based Other (WO)
- Other-based Other (OO)
- Commercial trips with two axels (C2)
- Commercial trips with three or more axels (C3)

Since the TGSP file does not have zone to zone pairing like the THRU model file does, the trips contained within the TGSP file are distributed throughout the internal model zones during the trip distribution process. Therefore, the select zone analysis could not be used to update this model file as the trips are provided on an aggregate zone to zone basis and do not contains trip purpose details. Instead, the TGSP file was updated using historical growth trends between the 2015 and 2035 TGSP model files from the previous version of the model. The 2016 TGSP file was developed by calculating the average annual growth for each zone by trip type and adding a six years' worth of growth to the 2010 file while the 2040 TGSP file was developed by adding five years' worth of annual growth to the 2035 file.