



Date: May 14, 2010

# Memorandum

**To:** Cari Anderson, CAC  
**cc:** Mike Bitner, Fresno COG  
**From:** Kym Sterner and Mike Aronson, Dowling Associates  
**Reference:** San Joaquin Valley SB 375 Target Setting Assistance P08086.04  
**Subject:** Application of the Statewide Model for Interregional Travel

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## Objective

Under SB375 Step 1 (or Baseline Emissions Development), MPOs are to prepare a greenhouse gas emissions analysis of their adopted fiscally constrained RTP. These analyses are typically based on estimates of vehicle miles traveled (VMT) by congested speed bins. The Regional Targets Advisory Committee (RTAC) discussed interregional travel and determined how VMT should be estimated (see the RTAC Report on Recommendations, page 26). In summary, it was determined at that time that each MPO would track VMT associated with all trips traveling within their MPO, half of the trips originating in their MPO and going outside of their MPO (and vice versa), and would exclude trips traveling through their MPO. However, this guidance did not prescribe how MPOs were to account for total VMT for those trips that extend beyond their MPO model boundaries.

The MPO models in the SJV region do not track trips beyond the extents of their model borders, which is usually their MPO boundary. Therefore, if only the MPO models are employed for the forecasting of interregional trips, the VMT associated with the full length of trips between non-adjacent counties is not accounted for. For example, trips between Fresno and Bakersfield are only accounted for within the Fresno COG MPO model boundary and the Kern COG MPO model boundary. The length of the trip through Kings or Tulare Counties isn't considered (even though external-external through trips are forecast in the individual MPO models, VMT associated with these trips are not included in the individual SB375 forecasts).

The technical staff of the San Joaquin Valley MPOs decided that VMT from the trips outside of their MPO boundaries should be determined. The consensus was that it was important to have this information in hand to assist in target-setting, although it was not decided how this information would be used. Technical staff reviewed options for potential tools to estimate this travel and it was decided that the California Statewide Model (STM) as updated for the BluePrint Study would be applied to track trips related to the San Joaquin Valley region *statewide*.

Upon a request from the technical staff, Dowling Associates applied a version of the California Statewide Model to estimate the VMT associated with interregional travel (IXXI) to and from each of the 8 MPOs within the San Joaquin Valley (SJV) region. It is important to note that the application of the statewide model does NOT affect the trip and VMT estimates within the SJV MPOs. This application provides the *addition* of VMT outside of their model boundaries.

This memorandum briefly provides a background on the statewide model, summarizes the assumptions and process applied, and recommends improvements to the Statewide Modeling element of the interregional trip evaluation.

## **Background on the Statewide Model**

The California Statewide Model has undergone several versions since the first version was developed in TP+/Cube by Caltrans in 2002.

### **Original Model Development**

Caltrans developed a TP+/Cube version of the Statewide Model in 2002. Dowling was officially the CMAS software trainer on the project. Caltrans provided staff from each of the districts to be responsible for network edits and land use. The model was calibrated to Year 2000 counts on screenlines throughout the state. Caltrans conducted several training sessions to distribute the model and train all districts in its use. One of the outcomes of the training sessions was a list of desired updates and improvements.

### **Goods Movement (Freight Model) Version**

The original version of the Statewide Model was updated for the Goods Movement Study in 2003. This version of the model was distributed but was difficult for locals to open and apply.

### **High Speed Rail Version**

There is also a more recent High Speed Rail version of the Statewide Model, but this version has not been distributed.

### **SJV BluePrint Version**

In support of the travel demand modeling efforts in the San Joaquin Valley, Dowling Associates made improvements to the original version of the Statewide Model. This included separating out trips by purpose and incorporating the 2000 Census Journey to Work data to ensure that work flows between counties were reasonable and to provide more information at the gateways to each MPO model. In addition, as part of the BluePrint Study, the San Joaquin Valley MPOs developed a process to update the statewide model land use assumptions based on aggregations of the individual MPO models.

### **Selection of SJV BluePrint Version of Statewide Model as Tool**

The SJV MPOs agreed that the current operating and distributed version of the Statewide Model (the BluePrint version) is likely the best tool for external travel forecasts since the next generation of the statewide model is not expected to be able to produce reasonable road-level traffic forecasts until 2013 at the earliest.

Selection of the BluePrint Version of the Statewide Model allows the San Joaquin Valley's interregional analysis (and the external trip assumptions at the gateways for most of the San Joaquin Valley region MPO models) to be based on a model in which several public agencies were involved.

In summary, the version of the Statewide Model applied for the SB375 work:

- uses the most current planning assumptions for all of the San Joaquin Valley,
- uses the latest Department of Finance population forecasts for all other areas,
- has a documented calibration to 2000 observed data, and
- the methodology is at least as sound as many of the local MPO models in regular use.

## **Land Use Assumptions in the Statewide Travel Demand Model**

### **Within the San Joaquin Valley Region**

Each of the 8 MPOs provided land use by traffic analysis zone in their local travel demand model format for a base year (usually 2005), 2020, and 2035. Using a process consistent with that used for the BluePrint Study, Dowling Associates aggregated the land use into the statewide model household and employment categories (total households, retail, service, and other employment) by statewide model traffic analysis zone.

### **Outside the San Joaquin Valley Region**

For counties outside of the SJV region, original statewide model land use inputs were interpolated/extrapolated using 2007 Department of Finance (DOF) forecasts. For simplicity, it was assumed that the population and employment ratio would remain consistent.

### **Recommended Potential Improvements to the Statewide Model Land Use Assumptions**

Obtain land use data from MPOs outside of the SJV.

## **Network Assumptions in the Statewide Travel Demand Model**

Given the short time frame required for estimation of interregional travel, the network assumptions are consistent with the original statewide model assumptions. The year 2000 network was used for 2005 forecasts and the future financially constrained network was used for 2020 and 2035.

### **Recommended Potential Improvements to the Statewide Model Network Assumptions**

Incorporate individual MPO RTP network assumptions into the Statewide Model.

## **Statewide Travel Demand Model Validation**

The version of the statewide model used for this task includes the estimation of county to county work flows based on the 2000 Census Journey to Work data. However, several of the MPOs voiced concerns over the validation of the statewide model to base year counts. It was agreed, given the quick turn-around time required for this task, that review and validation of the statewide model was not possible within the available time-frame.

That said, even though each of the MPO models have been validated at their county cordons, or gateways, to base year counts, most (all?) adjacent MPOs in the SJV region have not necessarily agreed upon or validated county gateway forecasts to consistent future year forecasts. Therefore, it is expected that, depending upon the process used to develop county line forecast volumes (usually an input into the MPO models), adjacent MPOs would have very different forecasts at their shared county borders for 2020 and 2035. It could be argued that use of the statewide model at least ensures consistent assumptions at the MPO cordons.

### **Recommended Potential Improvements to Statewide Model Validation**

Have adjacent MPOs agree on county cordon volumes for 2005, 2020 and 2035 and validate statewide model to these forecasts. Review county to county flows and determine if reasonable.

## Statewide Model Coverage

The Statewide model covers the entire state of California, including MPO, tribal, and federal lands. The density of coverage varies from county to county, and MPO to MPO. See example below for Fresno and Kings:

County	~TAZs	~Links	Nodes
Fresno COG Model	1,900	21,300	7,400
Statewide Model	90	1,200	450
Kings CAG Model	1,000	13,400	4,000
Statewide Model	40	300	130

For discussion purposes in this document, we are using MPO interchangeably with “county” to clarify links in the statewide model for which trips and VMT are being tracked.

## Daily Vehicle Trip Assignments by County in the Statewide Model

Dowling Associates developed scripts to track trips to/from each statewide model traffic analysis zone (TAZ) in the 8 MPOs within the SJV region. Trips were tracked between statewide model TAZs if they had an origin or a destination within each of the SJV region, as well as whether the other end originates or is destined for another MPO within or outside of the SJV region. VMT from interregional travel to/from each of the SJV MPOs was calculated from centroid to centroid on a link basis within each SJV MPO as well as to, from, and through any counties in the rest of the state (MTC, SACOG, SCAG, SanDAG, and remaining).

## Recommended Potential Improvements to Statewide Modeling

Determine exclusions for non MPO trips within other MPOs (e.g., tribal and federal lands) by TAZ.

## Calculation of Interregional VMT using the Statewide Travel Demand Model

### Within the Individual SJV MPOs

It was agreed that the individual MPO travel demand models are the best source for intra MPO travel as well as the portion of interregional travel that occurs on links within each MPO. Therefore, the methodology developed and applied for the MPO models should stand.

NOTE: In February 2010, Dowling assisted the SJV MPOs in developing a consistent script to apply to their “all VMT within the county” transportation model runs. The script applied a 50% factor to links within the county from any zone origin within the County to the County line or from the County line to a destination zone within the County, and removed the VMT for through (external to external) trips. In addition, a 50% factor was applied to links within the county to a tribal land and/or military base (if included in a separate TAZ); and remove all IZ on such areas.

### Outside Individual SJV MPOs

Even with the known limitations of this version of the Statewide Travel Demand Model it was also agreed that the statewide model would be the best available tool to estimate the ***additional VMT associated with interregional travel (IXXI) that is not accounted for in the individual MPO travel models.*** By definition, this IXXI travel would be XX travel through some counties and would not be attributed on either end to those counties.

The VMT related to interregional travel (IXXI) on links outside of the MPO have been estimated using three different methodologies:

**Method #1: Total VMT**

This method accounts for the VMT associated with travel to/from SJV region (trips where either the origin or the destination are within SJV) on all statewide links. Total travel across the state is reflected.

**Method #2: VMT on SJV Links**

This method accounts for VMT associated with travel to/from SJV region (trips where either the origin or the destination are within SJV) on SJV links. This method is consistent with the methodology of the Big 4 if SJV were to act as a single MPO. The Big 4 MPO models account for all travel on their links but do not account for travel beyond their model borders.

**Method #3: SJV Only VMT**

This method accounts for only those trips that start and end and remain within the SJV region, or VMT associated with travel within SJV region (trips where both the origin and the destination are within SJV) on SJV links. Unlike the Big 4 methodology which accounts for IXXI trips on their internal links, this methodology excludes the VMT associated with trips not originating AND ending in the SJV region.

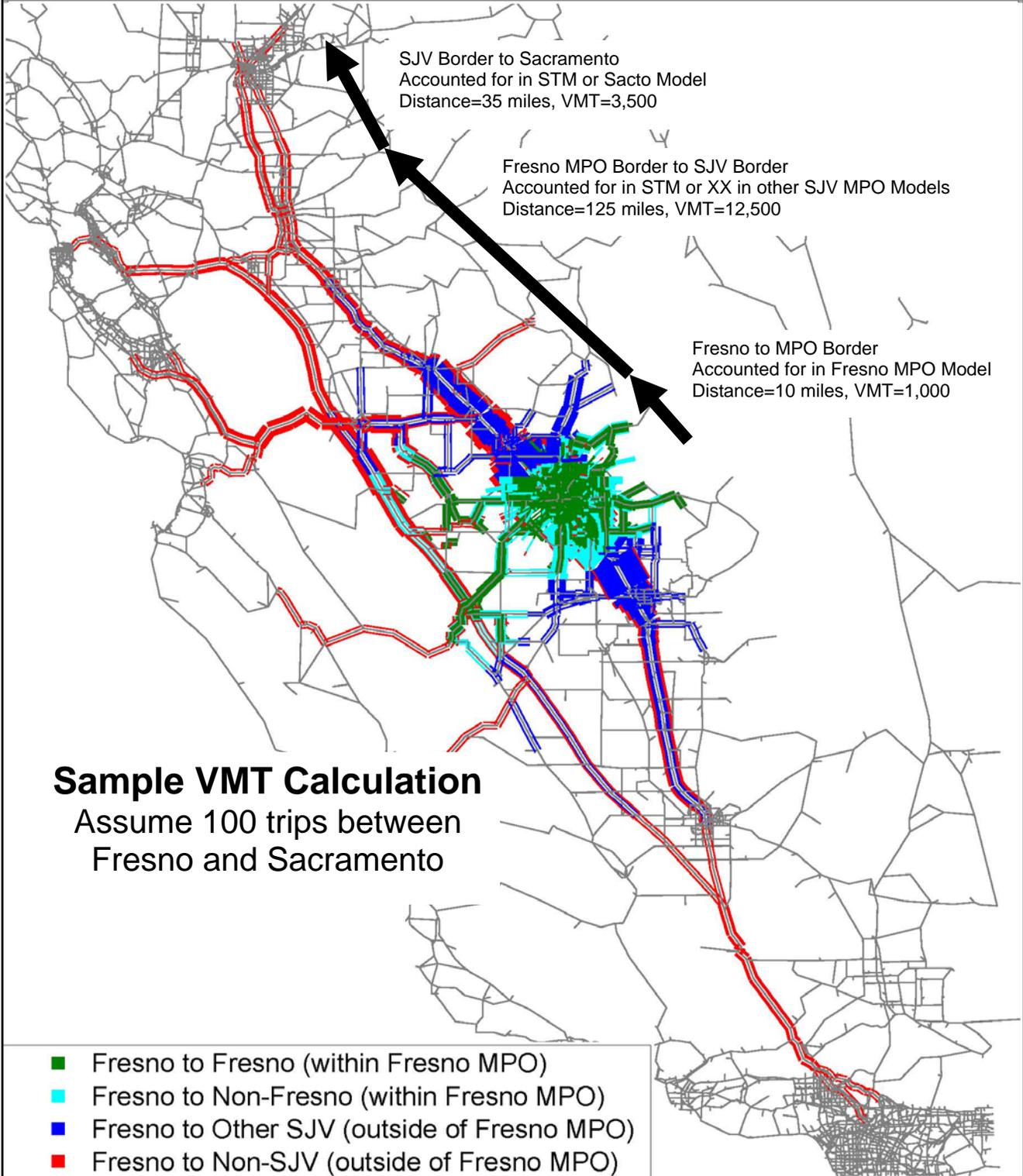
In order to clarify, below is a sample calculation of VMT for an assumed 100 trips traveling from a Fresno origin to a Sacramento destination. The same example is shown graphically on the next page. As can be seen below, for long distance trips to and from the SJV region, most of the VMT is associated with portion of the trips outside the coverage of the individual MPO models.

**Sample VMT Calculations for Interregional Trips (IXXI)  
SJV Origin to Non SJV Destination**

	Distance for trip portion (miles)	VMT Estimates		
		Method #1 All Trips All Links	Method #2 All Trips SJV Links	Method #3 SJV Trips SJV Links
Fresno-Sacramento				
Within Fresno MPO	10	1,000	1,000	1,000
Other SJV	125	12,500	12,500	0
Non SJV	<u>35</u>	<u>3,500</u>	<u>0</u>	<u>0</u>
Totals	170	17,000	13,500	1,000
% of Total		<b>100%</b>	<b>79%</b>	<b>6%</b>

Tables summarizing the VMT results by year and MPO, as well as by speed bin, are attached in an appendix to this memo.

San Joaquin Valley Interregional Travel  
 SB 375 Target Setting  
 Fresno Travel in 2020



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