StreetLight and SB 743

SCAG Modeling Task Force Meeting
September 23, 2020

Matthew Pettit | Solution Engineer
Agenda

1. SB743 Background & Challenges
2. What’s Available Today
3. Methodology to Derive New Big Data SB743 Metrics
4. Validation Study
What is California Senate Bill (SB) 743?

A TRANSFORMATIONAL CHANGE TO TRANSPORTATION IMPACT ANALYSIS

• California shifting from vehicle LOS \(\rightarrow\) VMT as a measure of environmental impact

• Transition to VMT is 180-degree difference in how we think about impacts. Not “to drivers” but “of driving”

• VMT is not observed like traffic counts – it can only be estimated

• This could be coming elsewhere soon
What are the challenges?

State technical guidance focuses on VMT as an efficiency metric
– Focuses on Automobile VMT
– Isolates VMT for specific land uses and trip purposes
  • **Residential**: Home-based VMT per resident
  • **Office**: Home-based work VMT per employee
  • **Retail**: Total VMT
Can I always use my local travel demand model?

MODEL ESTIMATES CAN HAVE LIMITATIONS

- Models produce ‘aggregate’ results for fixed time periods.
  - CEQA requires ‘Baseline’ conditions, which typically require current year estimates.
  - TAZ level data may misidentify low VMT generating areas
  - Models may truncate trip lengths at their boundaries
  - Models may not produce estimates for unique land uses

- Output gets old fast especially during disruptive times. COVID-19 is part of it, but disruption was occurring fast even before.

- Not using ‘best in class’ data can increase legal risks for CEQA compliance.

- StreetLight data is near real-time and can help achieve the real goals of the SB 743.

MTC 2020 ESTIMATES OF HOUSEHOLD GENERATED VMT PER RESIDENT FOR RESIDENTS THAT LIVE AND WORK IN THE MTC REGION
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We have created a special cut of our metrics for SB743

ALL METRICS FROM THE TRIP FRAMEWORK – WE’LL GET TO TOURS IN THE FUTURE

<table>
<thead>
<tr>
<th>Resident Status / Trip Purpose</th>
<th>W2H</th>
<th>W2O</th>
<th>H2W</th>
<th>H2O</th>
<th>O2W</th>
<th>O2H</th>
<th>O2O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
</tr>
<tr>
<td></td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
</tr>
<tr>
<td>Worker</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
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<td></td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
<td>VMT/cap</td>
</tr>
<tr>
<td>Visitor</td>
<td>NA*</td>
<td>Trip Vol Trip length</td>
<td>NA*</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
<td>Trip Vol Trip length</td>
</tr>
<tr>
<td></td>
<td>VMT/cap</td>
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<td>VMT/cap</td>
</tr>
</tbody>
</table>
**Intended Use Case #1 - Screening**

HBW TRIP LENGTH – RESIDENTS VMT IMPACT SCREENING COMPARED TO COUNTY AVG

- **Screening**: streamlined review for residential and office projects located in low VMT generating areas
Intended Use Case #2 - Comparables

HBW TRIP LENGTH – RESIDENTS VMT IMPACT SCREENING COMPARED TO COUNTY AVG

• **Comparable sites:** trip generation, trip length, and VMT estimation for comparable sites if you want to estimate VMT generation for your own site.

<table>
<thead>
<tr>
<th>Existing Local Shopping Center 1</th>
<th>Existing Local Shopping Center 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 12 VMT(all)/sq ft</td>
<td>• 15 VMT(all)/sq ft</td>
</tr>
<tr>
<td>• 16 HBW VMT/employee</td>
<td>• 19 HBW VMT/employee</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Existing Local Shopping Center 3</th>
<th>Forecast for New Shopping Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 12 VMT(all)/sq ft</td>
<td>• 13.5 VMT(all)/sq ft</td>
</tr>
<tr>
<td>• 11 HBW VMT/employee</td>
<td>• 15.3 HBW VMT/employee</td>
</tr>
</tbody>
</table>
There are many more use cases — we want to hear from you…
Summary: What’s available today?

**OPTION 1**

Metrics by blockgroup for a city, county or MPO

- Screening for VMT thresholds
- Choose avg 2019 weekday/weekend or monthly updates
- Metrics are delivered as shapefiles + CSV

**OPTION 2**

Metrics for a few blockgroups

- Establishing VMT gen for comparable locations
- Choose avg 2019 weekday/weekend or monthly updates
- Metrics are delivered as shapefiles + CSV

**OPTION 3**

Custom metrics

- We’re sure there’s more. Different geographies, trip purposes, etc. What do you need?
- Metrics are delivered as shapefiles + CSV
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Method step 1: who is a “resident” and “employee”? 

- **Resident**: is the device’s predominant nighttime location for this month in this blockgroup*? 

- **Employee**: is this device’s predominant daytime location a) different from nighttime and b) in this blockgroup? 
  - This will undercount some workers: nightshifts, WFH, or ‘moving’ jobs (Uber driver, postal worker, plumber) 

*Metrics for different geographies will adjust. IE – for TAZ we will look if the location is within the TAZ.
Method step 2: how to infer trip purpose

- **Home trip**: Does the trip start or end near the device’s home?
- **Work trip**: Does the trip start or end near the device’s workplace?
- **Other** – every other trip

*NB Roundtrips were dropped, some special considerations for devices that “live” or “work” on the border of a blockgroup.

***“Near” varies from 100-500M depending on ping cadence
Method step 3: how to infer trip length

1. Drop trips <500m or <3min
2. Drop “hairball” trips (i.e. forklift drivers moving around a warehouse)
3. Lock to route (see image)
Method step 4: how to scale up to volume and VMT/capita

Vehicle Miles Traveled =

\[
\text{Vehicle Miles Traveled} = \frac{\text{Trip Length} \times \text{Volume}}{\text{Capita}}
\]

Residents from US Census

Workers from LEHD

Sample Zone Trip Volume

www.streetlightdata.com/whitepapers for volume methodology
Our approach has more local nuance than modeled approaches

Figure 2. Example map of household VMT that could be used to delineate areas eligible to receive streamlining for VMT analysis. (Source: City of San José, Department of Transportation, draft output of City Transportation Model.)
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Comparison to SACOG 2018 expanded survey

RECENT, RIGOROUS SURVEY METHODOLOGY

<table>
<thead>
<tr>
<th>SACOG Survey</th>
<th>StreetLight Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018 (7 days from respondent across two calendar months)</td>
<td>2019 (365 days)</td>
</tr>
<tr>
<td>App assisted survey GPS assist to normalize, expand</td>
<td>Big data fused with contextual data to normalize, expand</td>
</tr>
<tr>
<td>Known bias – oversampling of “towns” within Placer to get transit sample up</td>
<td>Known bias – undersampling of very elderly</td>
</tr>
<tr>
<td>Time to complete: ~7 months</td>
<td>Time to complete: &lt;1 day</td>
</tr>
</tbody>
</table>

### Trip Sample Size Comparison

![Trip Sample Size Comparison Chart]

- SACOG 2018 Survey
- StreetLight 2019 SACOG Run
Trip volume by trip purpose x residential class for residents

Daily Trip Volume Comparison – Placer County

- SACOG 2018 Survey
- Streetlight 2019 Summarized Block Group Study

Trip purposes and residential classes compared:
- W2H
- H2W
- H2O
- O2H
- HB(all)
- HBW
Trip length by trip purpose for residents

- H2W and W2H length match very closely
- StreetLight has longer average trip lengths for any purpose including “Other”
- This is an expected result because
  - Exclusion of Tahoe Basin
  - Under sampling of outlying parts of town and large/busy households
  - Limited sample days
  - Potential difference in trip breaking (gas stop)
  - No elimination of 500m Trips
Deep dive: Placer County case study

Materials and validation study from Fehr & Peers

REASONABLENESS CHECKING AGAINST AN ACTIVITY BASED MODEL (ABM)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>SACSIM 2016*</th>
<th>SACSIM 2016**</th>
<th>StreetLight 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auburn</td>
<td>13.97</td>
<td>21.63</td>
<td>20.52</td>
</tr>
<tr>
<td>Lincoln</td>
<td>17.49</td>
<td>22.58</td>
<td>19.63</td>
</tr>
<tr>
<td>Rocklin</td>
<td>12.78</td>
<td>17.77</td>
<td>18.92</td>
</tr>
<tr>
<td>Roseville</td>
<td>12.13</td>
<td>17.18</td>
<td>16.75</td>
</tr>
<tr>
<td>Placer County</td>
<td>15.71</td>
<td>21.29</td>
<td>21.47</td>
</tr>
</tbody>
</table>

*Excludes internal-external (IX) and external-internal (XI) trips and trip lengths outside model boundary.

** Total VMT per resident – Includes non-home-based trips plus internal-external (IX) and external-internal (XI) trips. Excludes trip length outside model boundary.
Deep dive: Placer County Case Study

Materials and validation study from Fehr & Peers

REASONABLENESS CHECKING AGAINST AN ACTIVITY BASED MODEL (ABM)
Deep Dive: Placer County Case Study

Materials and validation study from Fehr & Peers

REASONABLENESS CHECKING AGAINST AN ACTIVITY BASED MODEL (ABM)

For RESIDENTIAL projects, threshold is defined as total household VMT per capita achieving 15% of reduction comparing to regional (or any appropriate sub-area) average. The map uses HEX geography. Household VMT per capita per HEX is calculated by tallying all household VMTs generated by the residents living at the HEX and divided by the total population in the HEX.
Deep Dive: Placer County Case Study
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Note that these maps represent an example of just one of the many criteria projects are subject to when analyzing transportation impacts under CEQA, specific to SB 743.
Deep Dive: Placer County Case Study

Materials and validation study from Fehr & Peers

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# Deep Dive: Placer County Case Study

Materials and validation study from Fehr & Peers

REASONABLENESS CHECKING AGAINST AN ACTIVITY BASED MODEL (ABM)

<table>
<thead>
<tr>
<th>&quot;BlockGroup ID&quot;</th>
<th>&quot;Day Type&quot;</th>
<th>&quot;Total Sample Count&quot;</th>
<th>&quot;Total Daily Volume&quot;</th>
<th>ACS Population/block group</th>
<th>Resident VMT/Capita (ACS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60610220131</td>
<td>1: Weekdays</td>
<td>24,475</td>
<td>7,075</td>
<td>523</td>
<td>105.41</td>
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<tr>
<td>60610220203</td>
<td>1: Weekdays</td>
<td>5,422</td>
<td>6,973</td>
<td>367</td>
<td>102.66</td>
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<tr>
<td>60610211031</td>
<td>1: Weekdays</td>
<td>277,096</td>
<td>44,041</td>
<td>808</td>
<td>52.11</td>
</tr>
<tr>
<td>60610220141</td>
<td>1: Weekdays</td>
<td>27,802</td>
<td>8,314</td>
<td>172</td>
<td>49.66</td>
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<tr>
<td>60610202004</td>
<td>1: Weekdays</td>
<td>19,116</td>
<td>4,930</td>
<td>319</td>
<td>49.05</td>
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<tr>
<td>60610220132</td>
<td>1: Weekdays</td>
<td>19,104</td>
<td>4,276</td>
<td>821</td>
<td>46.75</td>
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<tr>
<td>60610213221</td>
<td>1: Weekdays</td>
<td>18,337</td>
<td>3,510</td>
<td>424</td>
<td>45.94</td>
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<tr>
<td>60610220133</td>
<td>1: Weekdays</td>
<td>20,482</td>
<td>5,675</td>
<td>1,053</td>
<td>43.23</td>
</tr>
<tr>
<td>60610213044</td>
<td>1: Weekdays</td>
<td>43,641</td>
<td>7,729</td>
<td>1,364</td>
<td>42.51</td>
</tr>
</tbody>
</table>