

CSTDM Training

VMT Analysis for SB 743

presented to
Caltrans

presented by
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Think  Forward

VMT Analysis Background



- New SB 743 guidelines require project to be evaluated in terms of VMT impact

- Regional models or the California Statewide Travel Demand Model (CSTDM) can be used
 - » Regional models may be better at capturing VMT due to more detailed highway networks and trip patterns
 - » CSTDM VMT summaries are readily available and can be obtained from Caltrans via website?
<http://www.dot.ca.gov/hq/tpp/offices/omsp/SB743.html>
 - Similar summaries can be developed for regional models

VMT Analysis

- New projects may need to be evaluated using VMT and trip length information for either home or work TAZ
- Residential projects → home zone information:
 - » Household VMT by TAZ or Home-based VMT by TAZ
 - » Home-based (HB) work, HB shopping, HB other trip lengths
- Office projects → employment zone information:
 - » Employee household VMT by TAZ and HB work VMT by TAZ
 - » Worker commute length by TAZ
- Retail projects evaluated in terms of total VMT change
 - » Retail may increase or decrease VMT due to re-routing

SB 743 Thresholds

- Thresholds are used to determine whether the project will have a less than significant impact on VMT
- Residential projects:
 - » Existing city household VMT per capita minus 15% AND
 - » Existing regional household VMT per capita minus 15%
- Office projects:
 - » Existing regional VMT per employee minus 15%
- Retail projects:
 - » Net decrease in VMT

SB 743 Thresholds Cont'd



- Local-serving retail creates a less than significant impact
- Regional-serving retail can lead to longer trips and needs to be evaluated in terms of net change in VMT
- Mixed-use project components should be evaluated independently
 - » Can take credit for internal capture
- Transportation projects (such as adding highway lanes) need to be evaluated in terms of impact on VMT
 - » Change in VMT calculated using a model or elasticities
 - » Threshold as of 2015: 2,075,220 VMT/year

VMT Change: Residential



- **Step 1.** Determine average household VMT/capita or home-based VMT/capita where at project location
 - » Based on regional model or CSTDM
- **Step 2.** Compare the VMT/capita from above to the regional and city thresholds (VMT/capita - 15%)
 - » If VMT/capita from step 1 lower than both thresholds, project assumed to have less than significant impact on VMT (you're done!)
- **Step 3.** Use CalEEMod to estimate the project VMT
 - » Use project area specific trip lengths
- **Step 4.** Consider mitigation measures in your analysis (they help the project meet threshold)

VMT Change: Office

- Step 1. Determine average VMT/employee or home-based-work VMT/employee at project location
 - » Based on the regional model or CSTDM
- Step 2. Compare the VMT/employee from above to the regional threshold (VMT/employee - 15%)
 - » If VMT/capita from step 1 is lower than threshold, project assumed to have less than significant impact on VMT (you're done!)
- Step 3. Consider mitigation measures in your analysis

VMT Change: Retail

- Locally-serving retail is assumed to have a less than significant impact on VMT (you're done)
- For regionally-serving retail, a travel demand model run needs to be conducted to evaluate the impact of re-routing and changes in mode choice on VMT

VMT Change: Transportation Projects



- Only need to consider when the project can lead to an induced demand and hence higher VMT
 - » Addition of through lanes on existing or new highways, including general purpose lanes, HOV lanes, peak period lanes, auxiliary lanes, and lanes through grade-separated interchanges
 - » Less Than Significant: pavement rehab, maintenance, transit, bike, pedestrian
https://www.opr.ca.gov/docs/Revised_VMT_CEQA_Guidelines_Proposal_January_20_2016.pdf
- Step 1. Determine VMT elasticity from research based on the facility functional type
 - » $\text{Elasticity} = \frac{\% \text{Change in VMT}}{\% \text{Change in lane miles}}$
- Step 2. Calculate % Change in lane miles as % of total lane miles for the functional class and multiply by total functional class miles
- Step 3. Compare the resulting VMT/year to the threshold

SB 743 Case Study 1

- New mixed use residential and retail development located at the corner of Stockton Blvd and T St.
 - » 214 multifamily units
 - » 24 single family houses
 - » 6,000 square feet of locally-serving retail
- Locally-serving retail has less than significant impact
 - » Only used to capture internal residential trip making activity

Model Information

- CSTDM summaries were used to get the following information:
 - » Project TAZ: 538
 - » VMT per capita: 12.1
 - » Home-based VMT per capita: 8.4
 - » HBW trip length: 8.08 miles
 - » HBShop trip length: 4.32 miles
 - » HBO trip length: 3.81 miles

Trips Analysis

- SACOG average VMT rate: 16.8 VMT per capita
- City of Sacramento average VMT rate: 15.8
- SB 743 guidelines suggest less than significant project impact if trip rate is 15% below regional average
- This project's overall trip rate is 28% below regional average and 23% below the city threshold
- No further analysis is needed but will be conducted for demonstration purposes

CalEEMod Inputs

The screenshot displays the CalEEMod 2013.2.2 software interface. The main menu includes Home, Project Characteristics, Land Use, Construction, Operational, Vegetation, Mitigation, Reporting, and Help. The 'Project Characteristics' section is active, showing a map of California and a 'Project Detail' form. The 'Utility Information' section contains a warning message and input fields for utility company and intensity factors. A 'Pollutants' table is visible on the right, listing various pollutants with selection checkboxes. A 'Next >>' button is located at the bottom right of the form.

Project Characteristics

Project Detail

Project Name:

Project Location: County:

Windspeed (m/s):

Precipitation Frequency (days):

Climate Zone:

Land Use Setting:

Operational Year:

Utility Information

*If "User Defined" is selected, user must specify data source in Remarks

Select Utility Company:

CO2 Intensity Factor (lb/MWh):

CH4 Intensity Factor (lb/MWh):

N2O Intensity Factor (lb/MWh):

Remarks:

Pollutants

Pollutant Selection	Pollutant Full Name
<input checked="" type="checkbox"/>	Reactive Organic Gases (ROG)
<input checked="" type="checkbox"/>	Nitrogen Oxides (NOx)
<input checked="" type="checkbox"/>	Carbon Monoxide (CO)
<input checked="" type="checkbox"/>	Sulfur Dioxide (SO2)
<input checked="" type="checkbox"/>	Particulate Matter 10um (PM10)
<input checked="" type="checkbox"/>	Particulate Matter 2.5um (PM2.5)
<input checked="" type="checkbox"/>	Fugitive PM10um (PM10)
<input checked="" type="checkbox"/>	Fugitive PM2.5um (PM2.5)
<input checked="" type="checkbox"/>	Biogenic Carbon Dioxide (CO2)
<input checked="" type="checkbox"/>	Non-Biogenic Carbon Dioxide (CO2)
<input checked="" type="checkbox"/>	Carbon Dioxide (CO2)
<input checked="" type="checkbox"/>	Methane (CH4)
<input checked="" type="checkbox"/>	Nitrous Oxide (N2O)
<input checked="" type="checkbox"/>	CO2 Equivalent GHGs (CO2e)

Next >>

CalEEMod Inputs

CalEEMod.2013.2.2

Home Project Characteristics Land Use Construction Operational Vegetation Mitigation Reporting Help

Cascade Defaults

Land Use

Import csv Default Undo

Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage	Square Feet	Population
Residential	Apartments Mid Rise	214	Dwelling Unit	5.63	214,000	571
Residential	Single Family Housing	24	Dwelling Unit	7.79	43,200	64
Retail	Strip Mall	6	1000sqft	0.14	6,000	0
*						

Population

Lot Acreage

Remarks

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CalEEMod Inputs

CalEEMod.2013.2.2

Home Project Characteristics Land Use Construction Operational Vegetation Mitigation Reporting Help

Cascade Defaults

Operational - Mobile

Vehicle Trips Vehicle Emissions Road Dust

Import csv Default Undo

	Land Use SubType	Size Metric	WkDy Trip Rate (/size /day)	Sat Trip Rate (/size /day)	Sun Trip Rate (/size /day)	Res H-W Trip Length (miles)	Res H-S Trip Length (miles)	Res H-O Trip Length (miles)	Non Res C-C Trip Length (miles)	Non Res C-W Trip Length (miles)	Non Res C-NW Trip Length (miles)	Primar Trip (%)	Divert Trip (%)	Pass-B Trip (%)	Res H-W Trip (%)	Res H-S Trip (%)	Res H-O Trip (%)	Non Res C-C Trip (%)	Non Res C-W Trip (%)	Non Res C-NW Trip (%)
	Apartments Mid Rise	Dwelling Unit	6.59	7.16	6.07	8.08	4.32	3.81	0	0	0	86	11	3	46.5	12.5	41	0	0	0
	Single Family Housing	Dwelling Unit	9.57	10.08	8.77	8.08	4.32	3.81	0	0	0	86	11	3	46.5	12.5	41	0	0	0
	Strip Mall	1000sqft	44.32	42.04	20.43	0	0	0	5	10	6.5	45	40	15	0	0	0	64.4	16.6	19

Remarks
CSTDM

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Results

- Unmitigated VMT:
 - » Apartments mid rise= 2,673,841
 - » Single Family Housing=433,117
 - » Total=3,106,958
- Based on AHSC GGQM off model calculation, project VMT reduction is 40% (max possible)
- Resulting VMT: 1,864,175
- Resulting VMT per capita: 2,936
- Threshold based on 85% of regional VMT per capita: 3,971
- While regional models may have different VMT numbers, the results of the analysis should be similar

SB 743 Case Study 2

- Medical Center in Mission Viejo
 - » 110,000 square feet of space located between Crown Valley Pkwy and Marguerite Pkwy
- VMT/employee in the SCAG region:
 - » 1. Add Work VMT table to CSTDM TAZ layer
 - » 2. Join SCAG region layer to CSTDM TAZ+VMT layer using spatial join
 - » 3. Extract TAZs within SCAG region and calculate average VMT per employee
 - » 4. Locate the project and determine VMT per employee
 - » 5. Check against 85% of regional VMT per employee threshold

Model Information

- CSTDM summaries were used to get the following information:
 - » Project TAZ: 6043
 - » VMT: 15.3 miles per employee

Trips Analysis

- SCAG average VMT rate: 15.9 VMT per employee
- SB 743 guidelines suggest less than significant project impact if trip rate is 15% below regional average (13.5 VMT/employee)
- This project's overall trip rate is above the threshold, hence it will have significant impact on VMT
- Need to consider mitigation strategies to reduce the VMT/employee by 12%

SB 743 Case Study 3

- Addition of 2.2 lane-miles of freeway in Kern County
- Most recent study on induced travel reveals an elasticity of 1.03 for freeways
- 2.2 lane-miles out of 670.47 lane-miles of California highway including freeways/expressways corresponds to 0.328% increase
- Change in VMT = Change in lane-miles of freeways/ expressways * Total VMT on freeways/expressways * Elasticity
 - » $0.328\% * 2,333,940,000 * 1.03 = 7,884,982$ VMT
- Exceeds the threshold of 2,075,220 VMT/year and requires mitigation