

# Vehicle Miles Traveled

This info-bulletin generalizes the process of analyzing and mitigating transportation impacts resulting from development projects using the Vehicle Miles Traveled (VMT) methodology, as required under the California Environmental Quality Act (CEQA). The intent of this bulletin is to provide the general public with a high-level understanding of VMT; it is not intended to act as a technical guide. For that level of detail, please refer to the links and documents referenced in this bulletin.



## SENATE BILL 743

[SB 743](#) (Public Resources Code [§21099](#)) was passed by the state legislature and signed into law in the fall of 2013 and led to a significant change in the way transportation impacts are measured under CEQA (Refer to [IB-150](#) for more information on CEQA and its role in the development process). SB 743 mandates that jurisdictions can no longer use automobile delay – commonly measured by Level of Service ([LOS](#)) – as the performance measure to determine the transportation impacts of land development projects pursuant to CEQA.

SB 743 helps reduce transportation impacts on the environment by measuring the overall amount that people drive. While a replacement performance measure was not specified, SB 743 required that the replacement metric needed to bring CEQA transportation analyses into closer alignment with other statewide policies regarding greenhouse gas reductions, smart growth, and improved and expanded multimodal transportation networks (i.e., more complete streets to serve a variety of roadway users including pedestrians and bicyclists).

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### Documents Referenced

Senate Bill 743; [PRC §21099](#)

OPR Technical Advisory; [OPR Advisory](#)

California Air Pollution Control Officers Association (CAPCOA) Guidance Document; [GHG Handbook](#)

Carlsbad VMT Analysis Guidelines; [VMT Guidelines](#)

Transportation Demand Management; [TDM](#)

CEQA Informational Bulletin; [IB-150](#)

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## GOV. OFFICE OF PLANNING & RESEARCH

The SB 743 legislation designated the Governor's Office of Planning and Research ([OPR](#)) to develop detailed implementation guidelines consistent with SB 743 that jurisdictions can use for CEQA transportation analysis. While the bill does not prevent jurisdictions from developing their own methodologies or guidelines, the city, along with virtually every other jurisdiction in the state, opted to follow OPR's chosen methodology.



OPR develops technical advice on various issues that broadly affect CEQA practice and land use planning. These "advisories" provide general advice and recommendations, which agencies, the public, and other entities may use at their discretion.

When developing a replacement for LOS, OPR looked towards an alternative transportation impact metric that more closely approximates the true environmental impacts of driving --- how much actual auto travel (additional miles driven) a proposed project would create on regional and local roads. If the project adds excessive car travel onto our roads, the project may cause a significant transportation impact that requires mitigation under CEQA.

The process of writing guidelines started in January 2014 and concluded in 2018, when OPR released their guidance document entitled Technical Advisory on Evaluating Transportation Impacts in CEQA ([OPR Advisory](#)), which cities can, and have used to develop their own VMT guidelines. The [OPR Advisory](#) contains technical recommendations regarding assessment of VMT, thresholds of significance, screening criteria, and mitigation guidance. More on this below.

## CALIFORNIA NATURAL RESOURCES AGENCY

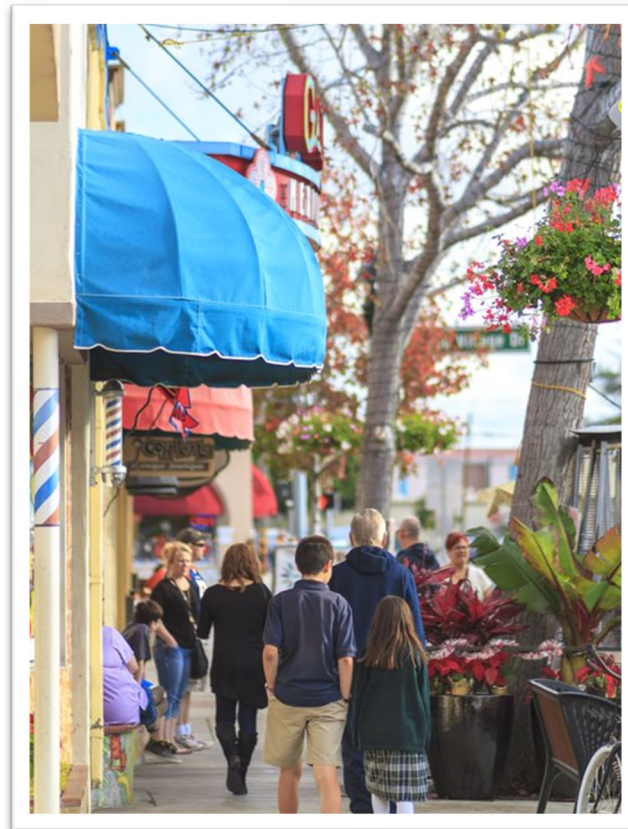
The mission of the California Natural Resources Agency ([Resources Agency](#)) is to restore, protect and manage the state’s natural, historical, and cultural resources. Among other duties, the Resources Agency is tasked with updating the state’s CEQA Guidelines, which are state administrative regulations that public agencies follow in order to show compliance with CEQA statute, applicable court decisions, and practical planning considerations.

Relative to VMT, the Resources Agency on Dec. 28, 2018 adopted revisions to CEQA Guidelines [§15064.3](#) stating that VMT is the most appropriate measure of transportation impacts under CEQA. This is the official action taken by the state that replaced LOS with VMT. Following this action, and the release of the [OPR Advisory](#), jurisdictions throughout the state had until July 1, 2020, to adopt local VMT analysis guidelines for CEQA analysis.

## CALIFORNIA ENVIRONMENTAL QUALITY ACT

Before we can discuss the components of the city’s VMT Analysis Guidelines, which were largely based on the [OPR Advisory](#), it is important to define certain CEQA terms such as “thresholds of significance” and “screening criteria” to better understand their roles and functions when reviewing VMT impacts.

Simply put, CEQA requires government agencies to inform decision-makers and the public about the potential environmental impacts of proposed projects, and to reduce those environmental impacts to the extent feasible. In practice, however, CEQA is a complex piece of legislation with complicated processes and procedures that projects must follow. The sections below provide a brief description of the aforementioned terms, and how they relate to VMT. For additional information on how CEQA works, please refer to our Info-Bulletin on CEQA ([IB-150](#)).



### CEQA Thresholds of Significance

To assist in determining whether a specific impact is “significant” under CEQA, public agencies are encouraged to develop administrative guidance often referred to as significance thresholds. For VMT analysis, significance thresholds are based on the use of land, because land use conditions directly affect transportation activity. For residential projects, OPR recommends that a project’s VMT per capita be compared to the citywide average. For office and industrial projects, a project’s VMT per employee is compared to the regional average. For retail and other projects that evaluate VMT, the threshold is based on the change in VMT in the affected area.

### CEQA Screening Criteria

In another method similar to creating significance thresholds, public agencies are encouraged to develop “screening criteria” to help quickly and easily screen out projects that are likely not to cause significant environmental impacts. For VMT, OPR recommends that a project may be presumed to not have a significant impact resulting from VMT if it is near public transit, comprised entirely of affordable housing, or considered a small project.



## CARLSBAD VMT ANALYSIS GUIDELINES

Transportation impacts and their potential need for mitigation are important for any community to consider when contemplating proposed new developments, expansion of existing developments, or implementation of transportation projects. Carlsbad residents, businesses, other community members, and permit decision-makers all have a stake in understanding and responding to additional demands on the transportation system.

To help analyze project related transportation impacts, the city developed VMT Analysis Guidelines ([VMT Guidelines](#)), which include procedures to promote consistency in VMT analysis and assist with the evaluation of discretionary projects under CEQA. In preparing and implementing the [VMT Guidelines](#), the city relied on the [OPR Advisory](#).

The city’s VMT screening criteria and thresholds were adopted by the City Council on June 16, 2020. Any changes to the thresholds and criteria will require City Council action, following recommendations by the Traffic & Mobility Commission. The rest of the [VMT Guidelines](#) are for informational purposes only to assist applicants and their consultants when preparing traffic impact analyses. As such, the [VMT Guidelines](#) themselves may be administratively updated as new information becomes available.

## VMT Screening Criteria

Below are the city’s adopted VMT screening criteria, which coincide with the VMT screening criteria in the [OPR Advisory](#) with the exception of one (discussed further below). It is presumed that projects meeting any one of the criteria listed below will not cause a significant impact on transportation services. As such, no further VMT analysis or mitigation is required.

### VMT SCREENING CRITERIA

Projects that generate less than 110 average daily trips

Residential, office or retail uses located within ½ mile of a major public transit stop or a stop along a high-quality transit corridor

Locally serving retail uses (i.e., retail development that is less than 50,000 square feet in size)

Residential projects made up of entirely affordable housing

Redevelopment projects that result in a net overall decrease in VMT for the site

Locally serving public facilities (i.e., public schools, parks, fire/police stations, libraries, other facilities intended to serve the local public)

All screening criteria listed in [OPR’s Advisory](#) for transportation projects

“Locally serving public facilities” are not specifically defined in the [OPR Advisory](#). However, like “locally serving retail uses,” locally serving public facilities *redistribute* trips rather than create new ones. For example, the construction of a new community park or library actually shortens trips for nearby residents because users do not need to travel as far to receive the same public service or benefit. As such, these facilities are screened out and determined not to have a significant impact on transportation.

It should be noted, however, that if a proposed public facility includes a use that has the potential of generating trips from outside the region, such as an amphitheater or a public golf course, a study evaluating where users are coming from may be required to demonstrate that a public facility is locally serving and still eligible to be screened out under these criteria.



## VMT Significance Thresholds

A threshold of significance for a given environmental impact defines the level of effect above which the city will normally consider impacts to be significant, and below which it will normally consider impacts to be less than significant. The table below reflects the City Council adopted VMT Thresholds of Significance, which are used to determine whether a project, which did not meet the screening criteria, will create a significant transportation impact. The thresholds and specific VMT metrics used to measure VMT are described by land use type below. These thresholds are consistent with [OPR Advisory](#) recommendations. How these thresholds are applied in practice is discussed later in the bulletin.

PROJECT TYPE	THRESHOLD OF SIGNIFICANCE
Residential	A significant transportation impact occurs if the project VMT/capita exceeds a level 15% below the city average VMT/capita.
Office	A significant transportation impact occurs if the project VMT per employee exceeds a level 15% below the regional average VMT/employee.
Retail	A significant transportation impact occurs if the project results in a net increase in VMT.
Industrial	A significant transportation impact occurs if the project VMT/employee exceeds the average regional VMT/employee.
Transportation	A significant transportation impact occurs if the project creates a net VMT increase in the affected area.

## VMT Analysis

The OPR Advisory advises that a city/county may use transportation modeling to estimate a project’s VMT. And CEQA requires that jurisdictions must use the best available data when assessing project impacts. As such, jurisdictions, including Carlsbad, typically use the most current regional travel demand model available, which is developed and maintained by the San Diego Association of Governments ([SANDAG](#)).

The value of travel forecasting using SANDAG’s activity-based modeling comes from its capacity to provide a full range of quantitative dimensions to estimate travel-inducing activities and choices. The model simulates daily activities and travel patterns in the region, as affected by the transportation level of service, and it simulates the effects of transportation and land development patterns and policies on the quality (time and cost) and quantity (traffic volume, congestion, and VMT) of travel by different modes (walk, bike, transit, and auto).



However, the VMT data that is provided by SANDAG does not account for interregional trips. Put another way, SANDAG’s data does not reflect the miles that are traveled beyond the county border or those trips originating from outside the county.

As such, the city takes the SANDAG travel demand model data and combines it with the regional transportation model data that is collected by Caltrans. This combined data is then used to create local VMT maps that better forecast a full accounting of VMT, not limited by regional boundaries, as recommended by the OPR Technical Advisory.

Residential, office, and industrial projects generating under 2,400 Average Daily Trips (ADT) can utilize these VMT Maps. Projects that generate over 2,400 ADT, or retail projects that do not meet screening criteria discussed earlier in this bulletin, must perform project-specific modeling consistent with OPR guidelines.

The 2,400 threshold comes from the document entitled “Guidelines for Transportation Impact Studies in the San Diego Region,” as prepared by a SB 743 subcommittee led by the Institute of Transportation Engineers. Staff from SANDAG and Caltrans were on this subcommittee along with transportation engineers from the region.

*Sometimes showing the math helps folks better understand how the analysis works. This is one way of calculating VMT impacts.*

### **THEORETICAL PROJECT**

A law firm is locating in Carlsbad and proposing to construct a new two-story office complex on a vacant lot located near the corner of Carlsbad Village and Pio Pico Drive. The size of the office building is anticipated to generate an ADT of 1,500 trips.

Per city VMT maps, the regional mean is shown as 20.6 VMT/employee and the office project will have a VMT/employee of 18.71, which is 90.8 % of the regional average (18.7 divided by 20.6).

Per the city's significance threshold, a significant transportation impact occurs when an office project exceeds a level of 15% below the regional average, or another way of stating this is the project exceeds 85% of the regional average. 85% of the regional average is 17.5 VMT/employee. As such, in this theoretical example, the percentage of project VMT that must be reduced is 6.4% (1-(17.5/18.7)).

It is important to note that travel demand modeling is very sensitive to input changes. As growth and transportation system development occurs in the region, which is inconsistent with the assumptions used in the model, SANDAG will adjust the model to keep the analysis current and reliable for CEQA review. The city defaults to the most recent version of SANDAG's model when analyzing VMT but accepts other modeling strategies that are consistent with the [OPR Advisory](#) (see "Common VMT Questions" for additional information).

### **VMT Mitigation**

Under CEQA, projects resulting in a significant impact requires that mitigation measures be applied in an effort to reduce VMT impacts to the extent feasible. There are two ways to do this.

- Reduce the number of automobile trips generated by the project; and/or,
- Reduce the distance people drive.

A project can accomplish this by incorporating Transportation Demand Management ([TDM](#)) strategies or actions into the development. Some examples include rideshare programs, trip reduction marketing, charging to use parking, employer paid transit expenses, end-of-trip bicycle facilities, and improvements to existing infrastructure such as bike paths and sidewalks.

TDM strategies can be quantified using the methodologies described in the "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity" ([GHG Handbook](#)). As mentioned above, CEQA requires that cities use the most reliable information available --- this document meets this requirement and is currently used by virtually all state jurisdictions when developing VMT mitigation.

The resource document provides a description of each TDM measure with examples, notes on which measures must be grouped with others to be effective, a range of effectiveness (how much VMT reduction will be achieved), and guidance on how the measure should be implemented.

Some of the TDM measures can be combined with others to increase the effectiveness of VMT mitigation; however, the interaction between the various strategies is complex and the effectiveness levels are not directly additive --- simply adding together the maximum VMT reduction values of multiple TDM measures will not provide a true representation of the total VMT expected to be reduced. This is because some TDM measures, when combined with others, may become redundant.

Per the GHG Handbook, maximum VMT reductions are dependent upon the category of TDM measures implemented, which are defined as subsectors. Subsector maximums are intended to ensure that emissions are not double counted when measures within a given subsector are combined. For example, the subsector maximum for "Trip Reduction Programs" is 45% of a project's commute VMT.

For a TDM program consisting of many measures, care must be taken to verify that the calculated VMT reductions are dampened (diminished) according to a multiplicative formula to account for the above-mentioned redundancies. This formula can be found on page C-2 of the city's guidelines but let's use the sample project above to show how a TDM program made up of multiple measures is discounted.



### THEORETICAL PROJECT, CONTINUED...

As shown previously, the office project requires a 6.4% reduction in VMT to have a transportation impact that is less than significant under CEQA. As such, the applicant proposes two TDM measures from the GHG Handbook to mitigate this impact.

- Rideshare Program (3.2% VMT reduction)
- Commute Trip Marketing (4.0% VMT reduction)

To address anticipated redundancies when applying multiple TDM measures, the following GHG Handbook dampening equation must be applied.

$$1 - [(1 - P_a) \times (1 - P_b) \times (1 - P_c)] = \text{Total VMT Reduction}$$

(where  $P_x$  is percent reduction of a TDM measure)

After applying this dampening equation to the proposed TDM measures for the theoretical office project, the anticipated VMT reduction for the project is adjusted to 7.1%.

$$1 - [(1 - 3.2\%) \times (1 - 4.0\%)] = 7.1\%$$

Since 7.1% is more than the minimum 6.4% reduction needed, the proposed TDM measures, which will be added as conditions to the project permit, will adequately reduce the project's transportation impacts to a level of less than significant.

### COMMON VMT QUESTIONS

VMT analysis is new and evolving, which has resulted in a lot of confusion and questions in its appropriateness and effectiveness. This info-bulletin is intended to explain to the reader the value, aptness, and usefulness of measuring and mitigating transportation impacts through the reduction of VMT. However, given its technical nature, there are some common questions that warrant discussion.

#### Why are new projects only required to implement minimum TDM measures?

This question comes up a lot during the review of new development projects --- particularly in areas where traffic congestion is already an issue or existing infrastructure (e.g., bus stop) is lacking or deficient.

CEQA Guidelines §15126.4(a) requires lead agencies (city) to consider and require feasible mitigation measures to avoid or substantially reduce a proposed project's significant environmental impacts. The key word here is the project's impacts. The city cannot legally require a project to make improvements to resolve transportation deficiencies that existed prior to the project being developed; the city can only require mitigation that addresses the direct and

cumulative impacts generated by the proposed development.

The due process clause of the Fifth Amendment of the US Constitution further addresses this point. Pursuant to the US Constitution, local governments can exact property, or something of value from a property owner (developer), without having to provide compensation, provided two tests are met:

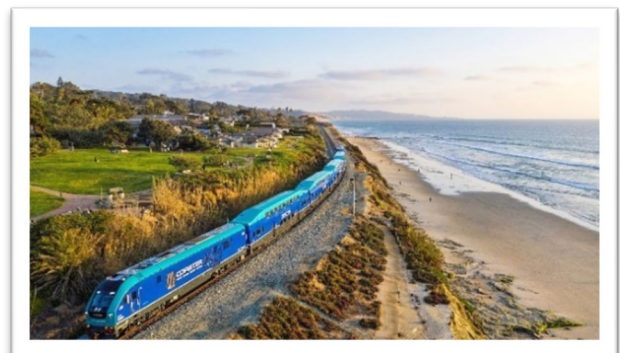
- "Nexus"
- "Rough Proportionality"

Nexus means the exaction (TDM mitigation) must have a rational connection (nexus) to the burden the government seeks to avoid (increased VMT). The nexus requirement derives from the court case *Nollan v. California Coastal Commission*, 483 U.S. 825, 107 S. Ct. 3141 (1987).

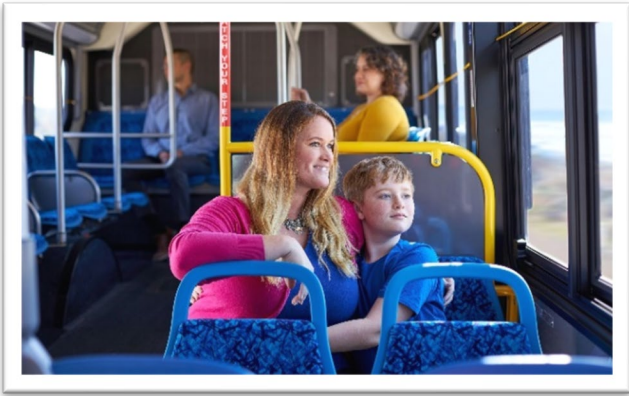
Rough proportionality means that the amount of the exaction (TDM mitigation) must roughly correspond to the burden placed on the government/public (increased VMT), resulting from the proposed development. This test derives from court case *Dolan v. City of Tigard*, 512 U.S. 374, 114 S. Ct. 2309 ('94).

Using the theoretical project example, since the rideshare and commute trip reduction marketing programs address the VMT impacts of the office project to a level of less than significant, the city cannot require that the same project also improve a nearby transit stop or add a turn lane to an existing intersection to improve existing traffic flows as a mitigation requirement under CEQA. To do so would violate both tests.

That said, there may be other city policies that require multimodal improvements and transportation demand management strategies. The city may impose additional project requirements in order to satisfy these mobility policies IF the city finds that the VMT mitigation does not adequately address them. In other words, VMT CEQA mitigation can also be used to satisfy other city mobility policies.







### Why are applicants allowed to use customized VMT models?

While the SANDAG model is the city’s default model to analyze project level VMT impacts, it is not without its limitations. The SANDAG model makes certain general assumptions on how land will be develop/redeveloped. However, proposed development projects, or the surrounding development area, may be a particular size or contain certain features that were not or could not be accounted for in the SANDAG model.

Recognizing this, the [OPR Advisory](#), and in turn the city, allows applicants to develop customized models using varying model strategies. Travel demand models, sketch models, spreadsheet models, research, and data can all be used to calculate and estimate VMT. Models can also work together. For example, an applicant can use travel demand models or survey data to estimate existing trip lengths and input those into sketch models to achieve more accurate results.

When using alternative models and tools, however, the city requires consultants to use comparable data and methods in order to set up an “apples-to-apples” comparison between thresholds, VMT estimates, and VMT mitigation estimates.

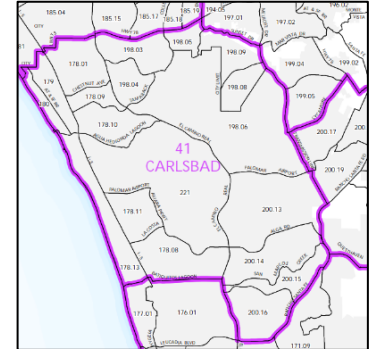
### Why do some TDM measures work for some projects, but don’t work for others?

There are some limits to overall VMT reduction effectiveness depending on a project’s land use context --- Developable area, proposed land use mix, surrounding development patterns, and availability of transit resources can vary significantly from project to project. Similarly, so can the effectiveness of TDM measures. For this reason, VMT mitigation measures must be reviewed on a case-by-case basis to ensure that they are site appropriate, justified, and can be reasonably incorporated in the proposed project.

### Why does the city use traffic analysis zones for VMT analysis?

Daily activities and travel patterns in any city is greatly influenced by existing land use patterns and transportation networks. To maximize the effectiveness of a predictive model, it is important to assess VMT impacts in smaller, more focused geographic areas.

SANDAG provides transportation model data in two different ways: Census Tracts and Traffic Analysis Zones (TAZ). Some people may be familiar with Census Tracts (image right), which are small



geographical subdivisions of a county that help present different statistical data points (i.e., average age, ethnicity, household income, household size), with each tract representing a population size between 1,200 and 8,000 people. A TAZ is a similar geographical area, but typically much smaller than a census tract and most commonly used in transportation models.

Use of either geographic area is perfectly acceptable for VMT analysis. However, the city prefers to use TAZ data because the TAZ offers a more refined area around the project. The data tends to be a better representation of the VMT in the area of the project as opposed to the census tract where the VMT is averaged across larger areas.

### YOUR OPTIONS FOR SERVICE

To learn more, please contact one of our staff in Land Development Engineering at 760-602-2750 or via email at [LandDev@CarlsbadCA.gov](mailto:LandDev@CarlsbadCA.gov).

