City of Culver City VMT Tool User Guide

Prepared for:
City of Culver City

Updated March 30, 2021

LA19-3064

FEHR PEERS

FEHR PEERS

Contents

Culver City VMT Tool: User Guide

The Culver City Transportation Study Criteria and Guidelines (Guidelines) describe the California Environmental Quality Act (CEQA) and non-CEQA analysis required in a Transportation Study. The Culver City Vehicle Miles Traveled (VMT) Tool (Tool) facilitates one component of the analysis required in the Guidelines.

The purpose of the VMT Tool is to conduct CEQA project-level VMT impact analysis on projects comprised of typical land uses built into the Tool. It includes project screening and VMT impact analysis consistent with the CEQA VMT for Land Use Projects section of the Guidelines. For impact analysis, it can calculate home-based VMT per capita and home-based work VMT per employee, the metrics required by the Guidelines for common residential and employment-oriented land use types.

This User Guide describes when and how to use the VMT Tool. The first section describes where the Tool is and is not applicable for VMT screening and analysis. The next section provides a tour of the Tool with a description of the information presented on each page. The last section walks through the steps for using the Tool. In addition to this User Guide, Appendix D details the VMT reduction calculations relevant to each TDM strategy in the VMT Tool, and Appendix A answers some common questions about the VMT and TDM assumptions.

Applicability

The sections below describe where the Tool can be applied to conduct VMT impact analysis in Culver City.

Where the Tool Applies

Based on the Guidelines, there are three primary types of VMT that should be used for CEQA impact analysis for different project types. Two of those VMT types can be calculated in the VMT Tool: home-based VMT per capita and home-based work VMT per employee. The third type, change in Total VMT, cannot be calculated using the Tool.

Applicants should consult with the City during the MOU process to determine the appropriate analysis approach for a project.

The following types of residential land uses are included in the VMT Tool and are analyzed using home-based VMT per capita:

- Single Family
- Multi-Family
- Affordable Housing
    - Family
    - Senior

- Special Needs
- Permanent Supportive

The following types of employment-oriented land uses are included in the VMT Tool and are analyzed using home-based work VMT per employee:

- Office - General
- Medical
  - Medical Office
  - Hospital
- Industrial
  - Light Industrial
  - Manufacturing
  - Warehousing / Self-Storage
- Movie Studio
  - Office
  - Post Production
  - Stage
  - Support

Projects with a mix of these uses can be analyzed using the Tool. Other land uses are included in the Tool that cannot be analyzed using the Tool (retail, hotel, and school land uses); the reason for their inclusion in the Tool is to account for internalization of trips (and therefore VMT reduction) as a result of mixed use projects that include these components. If a project includes a mix of the residential and employment-oriented land uses listed above *and* retail, hotel, or school land uses, all land uses should be entered but only the residential and employment-oriented land uses can be analyzed using the Tool.

What the Tool Does Not Do

While the tool can be used to analyze or perform screening checks for many of the common development projects in Culver City, it cannot be used for all projects or for all components of a Transportation Study.

The Tool cannot be used for impact analysis of land retail, hotel, or school land uses.

According to the Guidelines, these land uses cannot be analyzed using home-based VMT per Capita or home-based work VMT per employee metrics, the only VMT impact metrics computed in the Tool. Rather these uses must be analyzed using the change in Total VMT metric, which is not computed in the Tool. To select the appropriate analysis method, consult the Guidelines and City staff.

Retail, hotel, and school land uses are included in the Tool (1) to perform screening checks on these land uses, (2) to estimate daily trip generation, total VMT, and TDM effectiveness for these and uses, and (3) when these uses are part of a mixed-use project, to account for internalization of trips. If these uses are part of a mixed-use project, the residential and employment-oriented components of the project can be analyzed in the Tool and, unless it is screened from analysis, the retail, hotel, and school components must be analyzed outside of the Tool. When analyzing a project which includes these uses, add them to the land use table in the Tool and leave them there through the duration of the analysis.

The Tool cannot be used to calculate change in Total VMT for VMT impact analysis.

Total project-level VMT is provided in the Tool for informational purposes only and should not be used for impact analysis. According to the Guidelines, project-level Total VMT is not an impact metric for any land use. However, the Guidelines specify that certain land use types should be analyzed using change in Total VMT, which the Tool does not provide.

The Tool does not calculate Trip Generation and VMT if it is not applicable to the project.

If certain metrics are not applicable to a project because of the screening criteria or land use mix, the Tool will show "N/A" in place of certain results. Results will not be present in the following cases:

- If the proximity to transit screening criteria is met, the tool will not report trip generation or VMT.
- If a project is screened entirely based on the screening criteria, the tool will not report VMT.
- If a project requires analysis for only residential uses, the tool will not report home-based work VMT per employee.
    - For example, if the only non-residential land use in a mixed-use project is retail; retail is screened below a certain square-foot threshold and cannot be analyzed in the tool and only the residential metric will be reported.
- If the project requires analysis for only employment-oriented uses (office, medical, industrial or movie studio), the tool will not report home-based VMT per capita.
    - For example, if the residential land use in a mixed-use project is exclusively affordable housing; affordable housing is screened out when 100% of the residential component of a project is affordable and only the employment metric will be reported.

Using the Tool

This section provides an overview of the VMT Tool, including a description of the calculations performed by the Tool and the steps to use the Tool.

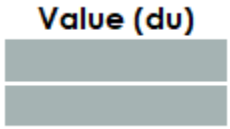
System Requirements

The VMT Calculator tool has been tested to run in Excel for Office 365 on the Windows 10 operating system.

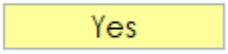
Color Coding

The Tool is color coded to highlight the input and output values.

- Gray = user input
  - This color indicates an input required by the user to generate a VMT result.
  - Example:



- Yellow = calculated output
  - This color indicates an output calculated by the Tool based on the user inputs.
  - Example:



Tour of the Tool

Page 1: Screening & Land Use

On this page a user inputs the key characteristics of a project: the name, location, and land uses. This page also performs a screening check to determine if VMT analysis is required for all or part of the project.

The top box on this page initially presents instructions for filling in the screening page. As inputs are populated, this box updates to include the result of the project screening, indicating whether VMT analysis is required. This box may also state that analysis is required for only part of the project.

In the next box the user inputs the project name and parcel number. Based on the parcel number, a red star will appear at the project site in the map on the right; this provides visual feedback to the user.

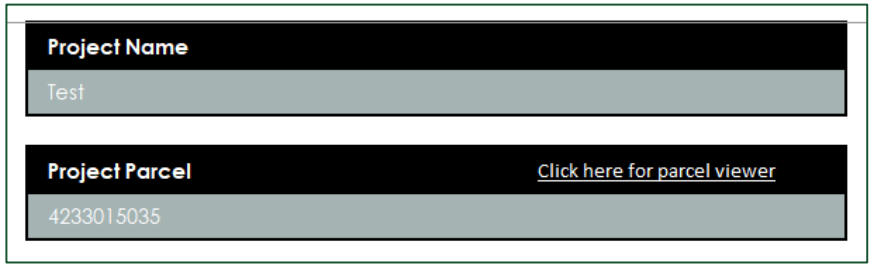
The Project Screening box presents the results of the screening criteria. The proximity to transit screening criterion populates immediately based on the parcel number. The retail screening criterion requires the user to select Yes or No. The daily trips and affordable housing screening criteria require the user to input land use data before populating. Below the map, there is a box that presents the project daily trips. This trip generation estimate is used to evaluate the daily trips screening criterion.

In the Project Land Use box, the user inputs the appropriate land use quantities for each land use included in the project. The land uses on the left can be evaluated for significant VMT impacts using this Tool. The land uses on the right cannot be evaluated for

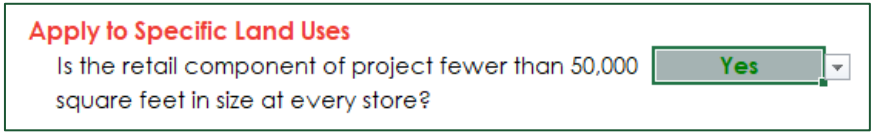
Steps for Running the Tool

Page 1: Screening & Land Use

- Input the project name
- Input the assessor parcel number (APN) without dashes
    - Click on the gray box to open the parcel input window
    - If there is already a number in the bottom box, to clear it, click on the bottom box and click yes in the pop-up window
    - Enter the parcel number in the top box and press enter
    - ***Note**: the once the parcel is entered, it will show on the map as a red dot.*
    - ***Note**: the Tool includes a link to the City's online parcel viewer. If your parcel does not appear in the correct place on the map, contact the City to determine the appropriate parcel number.*



- If applicable, respond to the retail screening question



- Input the project land use
    - For a mixed-use project, input all land uses
    - Impact analysis can be performed using this Tool for the land uses on the left
    - Impact analysis cannot be performed using this Tool for the land uses on the right

significant VMT impacts using this Tool, but they should still be included to account for their interaction with other land uses.

- ***Note**: although impact analysis for the land uses on the right cannot be performed in this Tool, they should still be added to the land use table in the Tool to account for internalization (interaction between land uses) in a mixed-use project.*
- ***Note**: if land uses on the right are included and not screened from analysis, the results box will include a note stating that this land use requires a "separate analysis." A "separate analysis" means that impact analysis for this part of the project must be performed outside of the VMT Tool.*
- Review the screening results at the top of the page and proceed with analysis if required
- For example:

Analysis is required. This project does not meet screening criteria. No separate analysis is required for retail. Separate analysis is required for hotel.

Page 2: Transportation Demand Management (TDM)

This page presents the initial trip generation and VMT estimates. The daily trip generation is based on trip generation rates calibrated to the Culver City Travel Demand Forecast Model (TDFM), so that the resulting VMT can be adequately compared to the VMT thresholds from the TDFM. The initial trip generation is adjusted based on transit penetration from the TDFM, walking and bicycling credits, and internalization between uses in a mixed-use project.

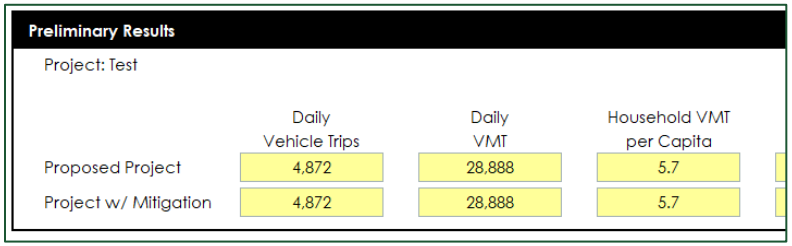
The trip lengths come directly from the TDFM and are multiplied by the trip generation, to calculate VMT. The Tool uses the trip length based on the TAZ where the project is located. The trip-specific VMT is isolated using trip purpose distribution from the TDFM. The people and employees used to generate the per capita and per employee metrics, are generated by multiplying the land use by a capita or employee rate. Finally, the trip-specific VMT is divided by the people or employment, depending on the land use, to generate the impact metric.

On the TDM page, the user can reduce the initial VMT estimates by applying TDM features to the proposed project or applying TDM measures as VMT mitigations. The distinction between "proposed project" and "mitigation" measures is at the discretion of the City and applicant. Functionally the outcome is the same for final VMT results. TDM measures applied to the proposed project will also apply to the mitigation scenario. The mitigation selection will only apply the TDM measure in the mitigation scenario, not in the proposed project scenario.

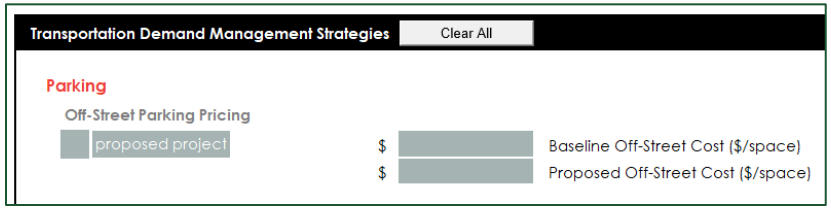
The Preliminary Results box presents the daily trips, daily VMT, household VMT, and work VMT. Depending on the land use inputs,

Page 2: Transportation Demand Management (TDM)

- Review the preliminary VMT and impact results at the top of the page



- As applicable, to mitigate a project impact or correctly reflect project features, apply TDM measures. For selected TDM measures:
  - Click the left-most gray box to turn on a measure
  - Select "proposed project" or "mitigation" from the drop-down menu to determine if the measure applies to the proposed project or as a mitigation measure
  - Examine the next column to determine if additional inputs are required to apply a TDM measure; fill in as appropriate
  - ***Note**: not all TDM measures can be applied to all project types, some measures apply only to residential uses and some to only employment uses.*
  - ***Note**: if adding additional measures does not reduce the trip generation or VMT, please see FAQ for tips*



- At any time use the "Clear All" button to turn off all TDM measures.

the household and/or work VMT is compared to the VMT threshold to make an initial impact determination. This box includes a line for the proposed project and for the project with mitigations. The data presented in these two rows will adjust as the user inputs TDM measures below.

The Transportation Demand Management Strategies box includes a series of TDM measures. Each measure can be turned on and off and applied to the proposed project or as a VMT mitigation. Some of the measures require detailed inputs. On the right side of this box each TDM measure includes a note about which land uses the measure may be applied to.

FEHR PEERS

Page 3: Report

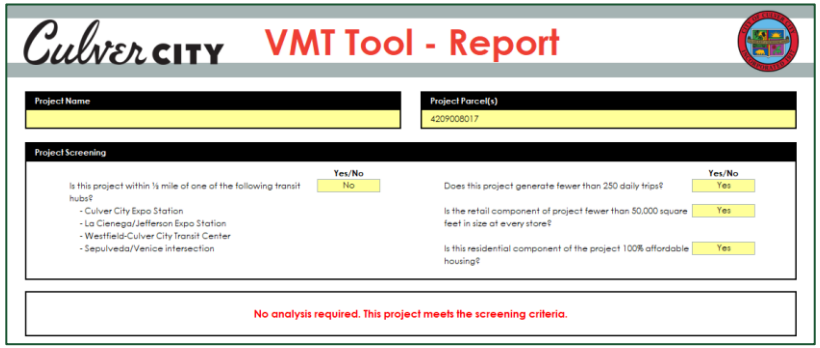
This page is the product of the VMT Tool, it summarizes the user inputs, the VMT outputs, potential VMT impacts, and the TDM measures applied. The top box of this page summarizes the project name and parcel number. Then the screening results are presented, followed by the project land use.

The Proposed Project Summary box summarizes the project VMT, with and without TDM mitigations. For household and work VMT, the project metric is compared with the citywide baseline to test if the project results in a significant impact. This information matches the information on the top of the TDM page.

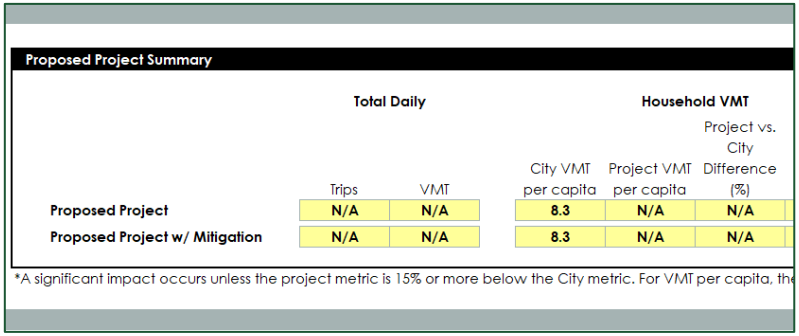
The Transportation Demand Management Strategies box summarizes the TDM inputs from the previous page, it also includes the VMT reductions calculated for each TDM measure. Note: the sum of each individual strategy does not equal the total VMT reductions for the project because a multiplicative dampening formula is used to combine the effects of multiple strategies. See Appendix D for additional information. In addition, the combined total effects are reflected in the *Total VMT* results, but only those strategies and land uses that are relevant to each efficiency metric are reflected in the VMT efficiency metrics (*VMT per Capita* and *VMT per Employee)*.

Page 3: Report

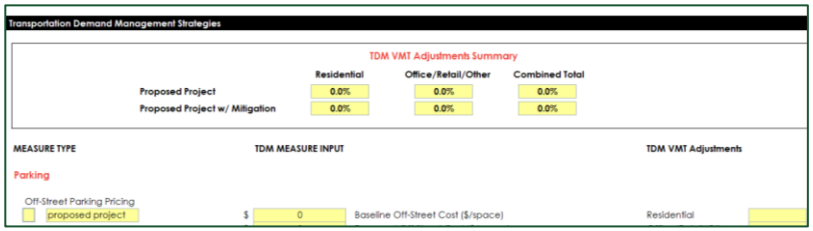
- Review and print VMT results
- **Note**: no additional inputs are required on this tab.



- The Proposed Project Summary summarizes all project VMT metrics for the proposed project and the proposed project with mitigation



- The TDM VMT Adjustments Summary summarizes the combined effects of all selected TDM strategies by land use type



FEHR PEERS

Appendix A: Frequently Asked Questions

FEHR PEERS

Frequently Asked Questions

VMT

1. How are the transit screening areas defined?

    - For projects where less than 15% of the on-site residential units are affordable, or where there are no affordable residential units, the transit screening areas are comprised of half mile areas around the major transit hubs in the City. The state OPR Technical Advisory[1] on VMT impact analysis says that all "Transit Priority Areas," as defined by the state, may be used for VMT screening, at the discretion of the lead agency. To reflect the particular character of Culver City, a more focused approach to transit screening areas was developed to include only the major transit hubs; this screening criterion applies to any land use.
    - For projects where at least 15% of the on-site residential units are affordable, the standard definition of "Transit Priority Areas" is used to screen projects from VMT analysis. For this criterion, any projects located within a ½ mile radius around an existing or planned major transit stop or an existing stop along a high-quality transit corridor (HQTC) are screened from VMT analysis. HQTCs are defined as a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.

2. Can I analyze a retail, hotel, and school project in the VMT Tool?

    - VMT impact analysis for retail, hotel, and school projects cannot be performed using the VMT Tool. However, the Tool can perform screening checks and calculate Total VMT for projects containing these land uses. When analyzing a mixed-use project that includes these uses, the retail, hotel, and school components should be input in the Project Land Use box, to account for internalization (trips between uses).

3. Where do the trip generation rates come from? Why are they different from the ITE Trip Generation Manual?

    - The Tool begins with trip rates from the ITE Trip Generation Manual and then are refined after calibration and validation of the TDFM has been completed. Because the VMT impact thresholds come from the TDFM, trip generation rates in the VMT Tool are consistent with the rates in the TDFM, to ensure consistency between the thresholds and the project-level VMT calculations.

[1] *Technical Advisory on Evaluating Transportation Impacts in CEQA*, OPR, December 2018, https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf

4. Where do the trip lengths come from?

    - The trip lengths come from the TDFM. The VMT Tool uses the average trip length for the TAZ where the project is located, with specific trip lengths for each trip purpose (e.g. home-based trips for residential land uses and home-based work trips for employment-oriented land uses).

5. How are VMT efficiency metrics calculated (per capita and employee)?

    - The VMT Tool contains average population and employment rates that estimate the population associated with residential land uses and the employment associated with each type of employment-oriented land use, which are applied based on the land use inputs. Project VMT is calculated using trip lengths and trip rates associated with the location and land use characteristics of the project, for each relevant trip purpose (e.g. home-based trips for residential land uses and home-based work trips for employment-oriented land uses). The VMT estimate for each trip purpose is then divided by the population or employment estimate to determine the VMT per capita or employee.

6. Why is the VMT different for the same project in different parts of the City?

    - The VMT calculations are based on several variables which are sensitive to the project's location within the City. These variables include average trip length by trip purpose and vehicle trip reductions due to walking, bicycling, or riding transit.

7. Why doesn't reducing a project size have an effect on my VMT results?

    - While the total VMT produced by a project may be lower if the project size is smaller, in many cases the size may not affect the VMT impact analysis metric as it is based on average VMT per capita or VMT per employee. As the project size – and therefore total VMT by trip purpose – increases, so does the population or employment estimates, resulting in similar per capita or per employee VMT results. Only extreme differences in project size will change the VMT per capita or per employee.

Travel Demand Management (TDM)

1. Why are the VMT reductions different from CAPCOA's estimated reductions?

    - Since the publication of CAPCOA, new research has found different reduction amounts compared to the reductions in CAPCOA. In addition, CAPCOA offers a wide range for some strategies, based on different demonstrated outcomes from single case studies, not all of which have relevant contexts to Culver City. For the purposes of CEQA, a conservative approach is taken, incorporating into the Tool only the research that is the most defensible in methodology, with outcomes that have been replicated, and with similar contexts and applications (based on land use, trip types, and urban context).

2. CAPCOA uses Place Types for TDM reductions, how is that applied here?

- Place Types are applied in the Tool, though the categories differ from those in CAPCOA. CAPCOA has five land use place types, including urban, compact infill, suburban center, suburban, and rural, which are used to determine the maximum VMT reduction for any combination of TDM strategies. Since the publication of that tool, research has demonstrated that seven place types are more appropriate – suburban-single family housing, suburban-multifamily housing, urban low transit, urban high transit, urban core, rural in urban, and rural – which are used to determine the effectiveness of an individual TDM strategy based on the land use context (Salon 2014). For Culver City, the area within transit screening areas (major transit hubs) is classified as Urban High Transit and the rest of the City is classified as Urban Low Transit.

3. I checked a TDM measure, why is it not changing the VMT results?

   - Check the inputs: Is the left-most check box turned on? Are the inputs in the center column populated?
   - Check the applicability: The right column notes which land uses each TDM measure can apply to; check that this matches the land use being analyzed.
   - Check the Daily VMT in the Preliminary Results in the TDM tab. The TDM measure should result in some reduction of Daily VMT, though the decrease may not be enough to decrease the VMT per capita or per employee.
   - The VMT Tool includes a maximum reduction, beyond which the VMT cannot be reduced. If the VMT does not reduce further, the maximum reduction has been reached.

4. How are TDM strategy reductions calculated and applied?

   - See the TDM Appendix for a detailed description of the calculation method for each TDM strategy.

FEHR PEERS

Appendix B: TDM Strategy Details

Transportation Demand Management Strategies in the Culver City VMT Tool

Introduction

This document provides an overview of the Transportation Demand Management (TDM) strategies included in the City of Culver City Vehicle Miles Traveled (VMT) Tool. The VMT Tool estimates VMT and the potential VMT reductions available from certain types of project site modifications, programming, and operational changes collectively known as *TDM strategies*.

The effectiveness of each of the 10 TDM strategies included in the VMT Tool is based primarily on documentation and research identified in the California Air Resource Board's Zero Carbon Building Study (ongoing), which draws from the 2010 California Air Pollution Control Officers Association (CAPCOA) publication, *Quantifying Greenhouse Gas Mitigation Measures* (CAPCOA, 2010) and additional research that has been published since 2010. Each of these studies include evidence pertaining to anticipated changes in travel behavior in response to TDM programs, pricing, or other factors. The methodology to calculate the anticipated VMT reductions is specified for each strategy in the pages that follow.

The effectiveness of TDM strategies to reduce VMT depend on the general context of a site, referred to as "place types" in CAPCOA. For the purposes of calculating the VMT reduction associated with the TDM strategies, the entire City of Culver City was classified as "Urban Low Transit" based on the existing land use characteristics of the City and the existing transit network, with the exception of the transit screening areas around the four major transit hubs which were classified as "Urban High Transit" (but screened out of VMT impact analysis).

The TDM strategies are individually described in this document, with individual levels of effectiveness identified. However, to ensure the effectiveness of TDM strategies is not overstated, the VMT reductions in the VMT Tool are both *dampened* and *capped*.

*Dampening***:** Within each type of trip (home-based work trips, for example), a multiplicative dampening formula is applied. For example, if both Strategy A and Strategy B are applied, the combined effectiveness is not A+B, but rather 1-(1-A)*(1-B). This captures the reality that many people who would consider using Strategy B overlap with the potential market for Strategy A, and would choose A or B for each trip, but not both A and B.

*Capping***:** For the full set of strategies selected across all trip types, a global maximum reduction of 40% is applied. This level of reduction reflects the CAPCOA maximum reduction for TDM measures.

In the pages that follow, the inputs required by the user are listed for each TDM measure. The other formula components are either coefficients identified in the research or predefined quantities based on the location of the project.

Culver City TDM Strategies

Parking Category

1. Off-Street Parking Cost
2. On-Street Parking Cost
3. Parking Supply

Transit Category

1. Transit Frequency
2. Private Point-to-Point Shuttle
3. Last Mile Shuttle

Commute Trip Reduction Category

1. Commute Marketing Program

2A. Financial Commuter Incentives – Commuter Incentives

2B. Financial Commuter Incentives – Transit Subsidies

Site Design Category

1. Pedestrian Network Improvements

Parking Category

1. Off-Street Parking Cost

This strategy implements parking pricing for off-street parking locations for residents, employees, and visitors to the site. Off-street parking refers to parking in a lot, garage, or other parking facility where the project developer or site manager can control the parking price. This strategy is appropriate for all land-use contexts and all types of development, and it applies to all trip types. This strategy should be used in locations where parking pricing is already present, and where the surrounding on-street parking environment is either metered or otherwise constrained. If this strategy is selected for visitors, the measure will affect the total VMT but will not affect the VMT metrics (VMT per capita and VMT per employee).

The maximum available VMT reduction from this strategy is 5.5%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction = (Elasticity of Parking Demand to Parking Price) x (Percent Change in Parking Price) x (Percent of Trips Parking Off-Street)

User Inputs:

- Baseline Parking Price – enter the dollar amount of the parking cost (per hour or per day) that is required today to park on-site
- Proposed Parking Price – enter the dollar amount of the parking cost (per hour or per day) that the project will require to park on-site
- Select whether the measure applies to residents, employees, and/or visitors

Additional Factors:

- Constant elasticity of -0.11
- Percent of all trips parking off-street is assumed to be 70%, which is 5/6 of the existing trips made by vehicle (84%) based on the US Census' American Communities Survey commute mode share information from 2017

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research documents:

- Ottosson, D. B., Chen, C., Wang, T., & Lin, H. (2013). The sensitivity of on-street parking demand in response to price changes: A case study in Seattle, WA. Transport Policy, 25, 222-232.

- Pierce, G., & Shoup, D. (2013). Getting the prices right: an evaluation of pricing parking by demand in San Francisco. Journal of the American Planning Association, 79(1), 67-81.
- J. Peter Clinch and J. Andrew Kelly (2003). Temporal Variance of Revealed Preference On-Street Parking Price Elasticity, Department of Environmental Studies, University College Dublin (www.environmentaleconomics.net). http://www.ucd.ie/gpep/research/workingpapers/2004/04-02.pdf As referenced in VTPI: http://www.vtpi.org/tdm/tdm11.htm#_Toc161022578

2. On-Street Parking Cost

This strategy implements parking pricing for on-street parking locations for residents, employees, and visitors to the site. On-street parking refers to parking along the curb on the streets within walking distance of the project site. This strategy would require coordination with the City of Culver City to implement. This strategy is appropriate for all land-use contexts and all types of development, and it applies to all trip types.

The maximum available VMT reduction from this strategy is 5.5%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction = (Elasticity of Parking Demand to Parking Price) x (Percent Change in Parking Price) x (Percent of Trips Parking On-Street)

User Inputs:

- Baseline Parking Price – enter the dollar amount of the parking cost (per hour or per day) that is required today to park on-street near the project site
- Proposed Parking Price – enter the dollar amount of the parking cost (per hour or per day) that the project will require to park on-street near the project site

Additional Factors:

- Constant elasticity of -0.11
- Percent of all trips parking on-street is assumed to be 14%, which is 1/6 of the existing trips made by vehicle (84%) based on US Census' American Communities Survey commute mode share information from 2017

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research documents:

- Ottosson, D. B., Chen, C., Wang, T., & Lin, H. (2013). The sensitivity of on-street parking demand in response to price changes: A case study in Seattle, WA. Transport Policy, 25, 222-232.
- Pierce, G., & Shoup, D. (2013). Getting the prices right: an evaluation of pricing parking by demand in San Francisco. Journal of the American Planning Association, 79(1), 67-81.
- J. Peter Clinch and J. Andrew Kelly (2003). Temporal Variance of Revealed Preference On-Street Parking Price Elasticity, Department of Environmental Studies, University College Dublin (www.environmentaleconomics.net). http://www.ucd.ie/gpep/research/workingpapers/2004/04-02.pdf As referenced in VTPI: http://www.vtpi.org/tdm/tdm11.htm#_Toc161022578

3. Parking Supply

This strategy reduces the on-site residential parking supply below a baseline parking supply (typically the code requirement for parking provision without consideration of parking reduction mechanisms permitted in the code, or the amount of parking provided by similar spaces in similar locations). Reductions in parking supply could also result from variances sought by a project. This strategy is appropriate to use for residential developments and applies to Home-based Work (Production) and Home-based Other (Production) trip types. This strategy is 100% effective in Urban High Transit contexts and 50% effective in Urban Low Transit contexts.

The maximum available VMT reduction from this strategy is 5.5%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

% VMT Reduction = (Estimate of Baseline Vehicle Trips – Estimate of Proposed Vehicle Trips) / (Estimate of Baseline Vehicle Trips) * (R^2)

Where

Vehicle Trips = 0.7015 * (Parking Supply) – 0.1389; and R^2 = 0.4292

A 50% effectiveness factor is applied to Urban Low Transit contexts, which is the designated context for most of Culver City.

User Inputs:

- Base city code parking requirements – enter the number of spaces that would be required by direct application of the parking code (without integrating any parking reduction mechanisms permitted in the code), or the amount of parking typically provided by similar projects in similar locations.
- Actual parking provision – enter the number of spaces that the project will be providing.

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research document:

- Schuett, Paine, Riessen, Schwartz, Ziebarth, Chan & Whinery. (2015). "Does Providing Parking Influence Auto Mode Share in an Urban Environment?" Transportation Research Board 95th Annual Meeting, 2016.

Transit Category

1. Transit Frequency

This strategy makes transit service more appealing by reducing headways and thereby reducing overall transit trip time, encouraging riders to switch from auto to transit use. This strategy assumes transit is already present in the project area, and it requires close coordination with the transit service operator in the area to demonstrate the assumed service improvements will be implemented by the time the project is open. The project applicant would typically be required to financially support the operation of additional service and demonstrate commitment and partnership with the transit service provider through formal documentation. This strategy is appropriate for all land-use contexts and all types of development, and it applies to all trip types.

The maximum available VMT reduction from this strategy is 0.6%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction = (Elasticity of Transit Ridership to Transit Frequency) x (Percent Change in Transit Frequency) x (Existing Transit Mode Share) x (Ratio of Average Transit Trip Length to Average Vehicle Trip Length)

User Inputs:

- Baseline Headway – enter the existing peak period headways, in minutes.
- Proposed Headway – enter the proposed peak period headways, in minutes.

Additional Factors:

- Constant elasticity of 0.5
- Existing transit mode share – the percent mode share for transit in Culver City, which is 3% based on US Census' American Communities Survey commute mode share information from 2017.
- Ratio of Average Transit Trip Length to Average Vehicle Trip Length is assumed to be 25% (summarized research literature demonstrated a range of 2% to 50%; 25% was used as a sensible mid-point)

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research documents:

- Handy, Lovejoy, Boarnet, Spears. (2013). Impacts of Transit Service Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions. http://www.arb.ca.gov/cc/sb375/policies/transitservice/transit_brief.pdf

- Litman, T. (2004). Transit price elasticities and cross-elasticities. Journal of Public Transportation, 7(2), 3.
- Taylor, B.D., Miller, D., Iseki, H., & Fink, C. (2009). Nature and/or nurture? Analyzing the determinants of transit ridership across US urbanized areas. Transportation Research Part A: Policy and Practice, 43(1), 60-77.

2. Private Point-to-Point Shuttle

This strategy involves the implementation of a project-operated or project-sponsored long-haul shuttle, transporting employees of the project site between the project site and residential areas. This strategy is most appropriate for application to very large project sites where employee residences are concentrated. For employment-oriented developments in Culver City, these private point-to-point shuttles may carry large numbers of employees to Downtown LA, the Valley, Long Beach, or other areas where a concentration of non-local employees may live. This strategy is appropriate for all land-use contexts. This strategy is appropriate for employment-oriented developments and applies to Home-based Work (Attraction) trips.

The maximum available VMT reduction from this strategy is 1.4%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction = (Elasticity of VMT to Shuttle Mode Share) x (Percent Shuttle Mode Share)

User Inputs:

- There are no user inputs for this strategy

Additional Factors:

- Constant elasticity of -0.27
- Percent Shuttle Mode Share (default) – this is based on the transit mode share for the project area, which is from the Culver City model

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research documents:

- Handy, Lovejoy, Boarnet, Spears. (2013). Impacts of Transit Service Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions. http://www.arb.ca.gov/cc/sb375/policies/transitservice/transit_brief.pdf
- Litman, T. (2004). Transit price elasticities and cross-elasticities. Journal of Public Transportation, 7(2), 3.
- Taylor, B.D., Miller, D., Iseki, H., & Fink, C. (2009). Nature and/or nurture? Analyzing the determinants of transit ridership across US urbanized areas. Transportation research Part A: Policy and Practice, 43(1), 60-77.

3. Last Mile Shuttle

This strategy involves the implementation of a project-operated or project-sponsored shuttle, transporting employees of the project site between the project site and the nearest transit hubs. This strategy is most appropriate for application to very large project sites; smaller projects may also utilize this strategy through participating in a neighborhood shuttle with other projects in the vicinity. Shuttle service should not simply mirror existing service but should provide new opportunities for access to rail stations or transit hubs. This strategy is appropriate for all land-use contexts. This strategy is appropriate for employment-oriented developments and applies to Home-based Work (Attraction) trips.

The maximum available VMT reduction from this strategy is 0.8%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction = (Elasticity of Transit Ridership to Transit Network Coverage) x (Existing Transit Mode Share) x (Ratio of Average Transit Trip Length to Average Vehicle Trip Length)

User Inputs:

- There are no user inputs for this strategy

Additional Factors:

- Constant elasticity of 0.7
- Existing transit mode share – this is based on the transit mode share for the project area, which is from the Culver City model
- Ratio of Average Transit Trip Length to Average Vehicle Trip Length is assumed to be 25% (summarized research literature demonstrated a range of 2% to 50%; 25% was used as a sensible mid-point).

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research documents:

- Handy, Lovejoy, Boarnet, Spears. (2013). Impacts of Transit Service Strategies on Passengers Vehicle Use and Greenhouse Gas Emissions. http://www.arb.ca.gov/cc/sb375/policies/transitservice/transit_brief.pdf
- Sadek et al. (2011). Reducing VMT through Smart Land-Use Design. NYDOT. https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C-08-29%20Final%20Report_December%202011%20%282%29.pdf

Commute Trip Reduction Category

1. Commute Marketing Program

This strategy involves the use of marketing and promotional tools to educate and inform travelers about site-specific transportation options and the effects of their travel choices. This strategy is most effective when it includes two-way communication tools or tools that would encourage an individual to consider a different mode at the time the trip is taken (such as an app or a daily email). At a minimum, this strategy includes regularly-updated educational and promotional materials, such as posters, info boards, and a regularly-updated website with information that a traveler could choose to read at their own leisure. This strategy also requires the presence of a staffed coordinator position to field questions, manage the regular updates of transportation materials, and explore additional marketing and communications additions to keep the program active and engaging over time. This strategy is appropriate for all land-use contexts and all types of development, and it applies to all trip types. This strategy can be used in conjunction with either *Commuter Incentives* or *Transit Subsidies*, TDM strategies with descriptions that follow on the subsequent pages.

The maximum available VMT reduction from this strategy is 3.2%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction based on a 3.2% blanket reduction of VMT based on the application of a commute marketing program at the site.

User Inputs:

- There are no user inputs for this strategy

Source:

The application and effectiveness of this strategy are based on the following research document:

- National Academies of Sciences, Engineering, and Medicine. 2010. Traveler Response to Transportation System Changes Handbook, Third Edition: Chapter 19, Employer & Institutional Travel Demand Strategies. Washington, DC: The National Academies Press. https://doi.org/10.17226/23433

2. Commuter Incentives

This strategy involves the subsidization of commute cost for employees of the project site. The subsidy must be proactively offered to each employee at least once annually on an ongoing basis and must be provided for the entirety of the year on a daily, weekly, monthly or annual basis. This subsidy could be applied at the discretion of the employee to cover commute costs such as carpool/vanpool costs, carshare membership, bikeshare membership, or transit passes, or could be used by the employee for non-commute purposes in exchange for forgoing a parking space (i.e., parking cash-out). The value of the subsidy must be approved by the City. This strategy is appropriate for all land-use contexts. This strategy is appropriate for employment-oriented developments and applies to Home-based Work (Attraction) trips.

The maximum available VMT reduction from this strategy is 0.8%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction = (Elasticity of VMT to Commute Cost) x (% Commute Cost Subsidized) x (Ratio of Shifted Trip Length to Average Vehicle Trip Length)

User Inputs:

- Baseline Commute Cost – enter the dollar amount of average commute cost (per day, per week, or per month) per employee
- Commute Subsidy Amount – enter the dollar amount of commute subsidy (for same time period as for baseline) per employee

Additional Factors:

- Constant elasticity of -0.03
- Ratio of Average Transit Trip Length to Average Vehicle Trip Length is assumed to be 25% (summarized research literature demonstrated a range of 2% to 50%; 25% was used as a sensible mid-point)

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research document:

- Dong, J., Davidson, D., Southworth, F., & Reuscher, T. (2012). Analysis of Automobile Travel Demand Elasticities with Respect to Travel Cost.

3. Transit Subsidies

This strategy involves the subsidization of transit fare for residents and employees of the project site. The subsidy must be proactively offered to each dwelling unit and/or employee at least once annually for a minimum of five years and must be provided for the entirety of the year on a daily, weekly, monthly or annual basis. The value of the subsidy must be approved by the City. This strategy assumes transit service is already present in the project area. This strategy is appropriate for all land-use contexts. This strategy is appropriate for residential and employment-oriented developments, and applies to Home-based Work (Production), Home-based Other (Production), and Home-based Work (Attraction) trip types.

In Culver City, many transit fare products are available that can pay for individual trips, unlimited trips on a single transit operator's system, or unlimited trips on multiple transit operators' systems, including Culver City Bus and LA Metro. For LA Metro, unlimited passes are available on a daily, weekly, and monthly basis, and can provide a per-trip discount if the rider exceeds a certain number of trips within the given time period. In addition, LA Metro offers several employer annual pass programs, including the Metro Annual Transit Access Pass (ATAP), the Metro Employer Pass Program (E-Pass), and the Metro Small Employer Pass Program (SEP), which offer steep discounts but require a high minimum threshold of participation amongst all employees. In the future, new pass options may become available and fare structures may change.

The maximum available VMT reduction from this strategy is 0.3%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction = (Elasticity of Transit Ridership to Transit Cost) x (% Transit Cost Subsidized) x (Existing Transit Mode Share) x (Ratio of Transit Trip Length to Average Vehicle Trip Length)

User Inputs:

- Percentage of transit cost subsidized – enter the percent of the transit cost that is subsidized per person

Additional Factors:

- Constant elasticity of -0.28
- Existing transit mode share – this is based on the transit mode share for the project area, which is from the Culver City model
- Ratio of Average Transit Trip Length to Average Vehicle Trip Length is assumed to be 25% (summarized research literature demonstrated a range of 2% to 50%; 25% was used as a sensible mid-point)

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research document:

- National Academies of Sciences, Engineering, and Medicine. (2010). Traveler Response to Transportation System Changes Handbook, Third Edition: Chapter 19, Employer & Institutional Travel Demand Strategies. Washington, DC: The National Academies Press. https://doi.org/10.17226/23433

Site Design Category

1. Pedestrian Network Improvements

This strategy involves implementation of pedestrian network improvements throughout and around the project site that encourages people to walk. This includes internally linking all uses within the project site with on-street pedestrian facilities such as sidewalks and connecting the project site to the surrounding pedestrian network. It also includes the elimination of barriers such as walls, landscaping, and slopes that impede pedestrian circulation. At a minimum, project elements should include traffic calming, sidewalks on all frontages, pedestrian access via sidewalks, and block distances not exceeding 600 feet. This strategy is appropriate for all land-use contexts and all types of development, and it applies to all trip types. Internal pedestrian connections between the project's land uses and its parking supply do not qualify.

The maximum available VMT reduction from this strategy is 0.1%.

The formula used to calculate the reduction in VMT as a result of this strategy is as follows:

VMT Reduction based on a 0.1% blanket reduction of VMT based on the implementation of pedestrian network improvements at the site.

User Inputs:

- There are no user inputs for this strategy

Source:

The application and effectiveness of this strategy, including the factors and assumptions mentioned above, are based on the following research documents:

- Handy, Sciara, Boarnet. (2014). Impacts of Pedestrian Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions. http://www.arb.ca.gov/cc/sb375/policies/ped/walking_brief.pdf
- Pratt, Evans, Levinson. (2012). "Traveler Response to Transportation System Changes Handbook, Third Edition; Chapter 16, Pedestrian and Bicycle Facilities." TCRP Report 95.