# Memorandum

Date: October 19, 2022

To: Nicolas Ruhl, The Spanos Corporation

From: Sarah Chan, PE, TE, Fehr & Peers

**Subject: Green Valley III Residential Project – CEQA Assessment**

*WC21-3783.00*

This memorandum summarizes the CEQA transportation impact evaluation for the Green Valley III Residential Project (Project). This memorandum includes analysis methodology for vehicle-miles traveled (VMT) and evacuation planning, analysis, and findings.

## Project Description

The Project is located to the north of the Business Center Drive/Neitzel Road intersection in the City of Fairfield. The Project, as proposed, includes the construction of a four-story residential building composed of up to 185 multifamily dwelling units; parking demand generated by the dwelling units would be served by 330 parking spaces. The Project site would be accessed by an existing access road off Business Center Drive, just east of the Neitzel Road/Business Center Drive intersection, which is currently shared with an existing office building located at 4830 Business Center Drive. The access roadway would provide full access driveways along the Project frontage. **Attachment A** includes the proposed site plan.

## Analysis Methodology

This section describes Fehr & Peers' approach and significance thresholds for the transportation and evacuation planning analysis.

### Analysis Criteria

The California Environmental Quality Act (CEQA) Guidelines were updated in December 2019 per Senate Bill 743 (SB 743) to remove Level of Service (LOS) from CEQA analysis and to require the use of VMT to evaluate a Project's environmental effect on the transportation system. VMT measures the amount of driving generated by the project and thereby the impacts on the environment from those miles traveled. SB 743 changes the focus of transportation impact analysis in CEQA from measuring *impacts to drivers* to measuring the *environmental impact of driving*.

An analysis of the project's effects related to LOS within the study area is presented in a separate memorandum to address the project's consistency with General Plan standards for circulation system operations and to address community concerns. The LOS analysis is not included in this memorandum based on CEQA Guidelines §15064.3, which notes that automobile delay does not constitute an environmental effect.

The relevant CEQA guidelines Appendix G Checklist questions for transportation impact evaluation are shown below.

Would the project:

> *Criterion A:* Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?
>
> *Criterion B:* Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?
>
> *Criterion C:* Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
>
> *Criterion D:* Result in inadequate emergency access?

## Criterion B: Vehicle-Miles Traveled (VMT)

Criterion B is the formal implementation of the SB 743 requirement to analyze VMT as part of the CEQA Transportation section. Under SB 743, congestion related project effects (such as those measured by LOS or similar metrics) are deemed to be not a suitable basis on which to determine a significant environmental effect. Relevant subsections of CEQA Guidelines section 15064.3(b) for the project read as follows:

*(1)* **Land Use Projects.** Vehicle-miles traveled exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects within one-half mile of either an existing major transit stop or a stop along an existing high-quality transit corridor should be presumed to cause a less than significant transportation impact. Projects that decrease vehicle-miles traveled in the project area compared to existing conditions should be presumed to have a less than significant transportation impact.

*(4)* **Methodology.** A lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure. A lead agency may use

> models to estimate a project's vehicle miles traveled and may revise those estimates to reflect professional judgment based on substantial evidence. Any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project. The standard of adequacy in Section 15151 shall apply to the analysis described in this section.

The City of Fairfield, in its discretion as lead agency, has the ability to select the methodology and CEQA significance criteria for use in the CEQA Transportation section. The City of Fairfield formally adopted locally applicable CEQA metrics, methodology, and significance criteria in December 2020, published in the *Fairfield Guidelines for Project VMT Screening Transportation Analysis* and summarized in the section below.

## Analysis Methodology

The *Fairfield Guidelines for Project VMT Screening Transportation Analysis* states that VMT analysis shall be prepared using the City of Fairfield travel demand model. As part of the City's SB 743 implementation efforts, the City of Fairfield model was updated in 2020 by the City's consultant to improve the accounting of trip lengths for trips that leave the model coverage area. Models are frequently updated over time to reflect new information, and the use of the latest available models in the CEQA analysis of a project is encouraged as CEQA analyses should use the latest and best data available (*Cleveland National Forest Foundation vs. San Diego Associations of Governments, 2017)*.

VMT calculations were prepared for the following scenarios:

- Existing No Project: Travel model estimates for the Existing based on the City of Fairfield model without the Project
- Existing Plus Project: Travel model estimates for the Existing based on the City of Fairfield model with the Project added into transportation analysis zone (TAZ) 245[1].

### *Thresholds of Significance*

Impacts are identified based on the project's VMT compared against a percentage of a baseline value of VMT. The model VMT metric estimates are key in setting baseline values to be used in CEQA thresholds. It is noted, however, that the "base year" thresholds rely on a rolling baseline – that is, the base year baseline metric value should be re-considered on a project-by-project basis when each project's Notice of Preparation is released. As such, the Baseline for Existing No Project VMT per multifamily dwelling unit was estimated as 51.9 VMT per multifamily dwelling unit.

[1] The Project is located in TAZ 245.

The City of Fairfield has formally adopted locally specific CEQA VMT thresholds. The thresholds in the *Fairfield Guidelines for Project VMT Screening Transportation Analysis* are stratified by project type and include the following generalized thresholds for use in CEQA VMT analyses:

A project would result in a significant impact if:

- **Single-Family Residential Projects:** Project VMT would be in excess of 85% of the City-wide average VMT per single-family dwelling unit
- **Multifamily Residential Projects:** Project VMT would be in excess of 85% of the City-wide average VMT per multifamily dwelling unit

Based on the proposed Project description, the "Multifamily Residential Projects" threshold of significance would apply. Therefore, the Project would result in a significant impact if VMT of the Project site TAZ exceeds 85% of the above Existing City-wide average VMT per multifamily dwelling unit.

## Emergency Response and Evacuation Planning

In addition to the traffic impacts addressed above, Fehr & Peers evaluated the Projects effect on adopted emergency response plans or emergency evacuation plans.

Solano County includes several Emergency Plans[2]:

- Solano County Emergency Operations Plan (EOP), *Emergency Annex (last updated in June 2017)*
- Solano County Local Multi-Hazard Mitigation Plan (last updated in March 2012)
- Solano County Multi-Jurisdictional Hazard Mitigation Plan (pending Board adoption, last updated in 2022)

The available plans do not provide details on specific evacuation routes (other than I-80, I-505, or Highway 12) or the capacity of the evacuation routes. For purposes of this assessment, the Project would result in an impact if the Project would degrade existing intersections operations along Green Valley Road from acceptable to unacceptable Level of Service (LOS) or contribute five or more seconds to an intersection performing under the acceptable LOS under No Project conditions. The following three study intersections along Green Valley Road were included in this assessment:

1. Green Valley Road/Business Center Drive
2. Green Valley Road/Westbound I-80 Ramps
3. Green Valley Road/Eastbound I-80 Ramps

[2] https://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=13275

The three above intersections were selected because Green Valley Road would be the most direct evacuation route to I-80 (a designated freeway evacuation route in the Solano County EOP) for the Green Valley community located north of the Project site.

# Impact Evaluation

## Criterion A

The Project would not conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

### Transit Facilities

Transit service is provided in the Project area by the Fairfield and Suisun Transit (FAST), which provides local service, and Solano County Transit (SolTrans), which provides regional bus service. A detailed schedule and headways are included in **Table 1**, below. Route 7 is a local serving route connecting the Project site to the Fairfield Transportation Center and the SolTrans express intercity Blue and Green lines. Route 8 is also a local serving route, connecting the Project site to the communities west of Interstate 680. Route R is a regional route that connects the City of Fairfield, City of Vallejo, and the El Cerrito Del Norte BART station.

**Table 1: Transit Route Summary**

| Route | Operating Days | Operating Hours | Approximate Headway | Closest Transit Stop |
|---|---|---|---|---|
| Route 7 | Monday to Friday<br>Saturday | 6:00 AM to 6:55 PM<br>10:00 AM to 3:55 PM | 60 minutes | Fairfield Cordelia Library |
| Route 8 | Monday to Friday<br>Saturday | 6:30 AM to 6:55 PM<br>9:55 AM to 4:20 PM | 60 minutes | Fairfield Cordelia Library |
| Route R | Monday to Friday<br>Saturday | 4:30 AM to 12:00 AM<br>7:00 AM to 10:00 PM | 60 minutes<br>2 hours | Suisun Valley Road/West America Drive |

Source: https://fasttransit.org/

The Project would not obstruct future changes to FAST or SolTrans bus service. Additionally, the Project is not expected to generate high ridership and lead to over-capacity transit conditions.

### Roadway Facilities

The Project does not propose infrastructure changes which would substantially alter the configuration or capacity of the local roadway network and contains no zoning code elements nor

General Plan policies and programs which would obstruct the City's ability to make improvements to the roadway network.

### Bicycle and Pedestrian Facilities

The project does not propose zoning code changes nor General Plan policies and programs which would obstruct the City's ability to make improvements to bicycle and pedestrian facilities.

Based on the above evaluation, the impact of the project is ***less than significant*** with respect to Criterion A.

## Criterion B

The Project would not conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b) with implementation of mitigation measures.

The Project would increase the number of new housing units in the area and reduce the potential for new business and industrial development, current allowed use per the City's 2035 General Plan. As such, the Project will require a General Plan amendment. However, the characteristics of the proposed project are consistent with the relevant objectives of the SB 743 statute. Below describes the VMT analysis and findings.

### Project Land Use Changes

The Existing City of Fairfield model assumes one single-family residential unit and 102,000 square feet of office uses in the Project TAZ. It does not assume any multifamily residential units. The Project's 185 multifamily dwelling units were then added to the Project TAZ (TAZ 245) to assess the Plus Project condition.

### VMT Results

The analysis scenarios were analyzed using the methodologies described above, and the VMT analysis results are summarized in **Table 2** below.

**Table 2: Multifamily VMT Analysis Summary[1]**

| Scenario | Baseline (VMT/ MFDU) | CEQA Threshold[2] | Project (VMT/MFDU) | Delta versus Threshold |
|---|---|---|---|---|
| Existing | 51.9 | 44.1 | 46.3 | +2.2 (5%) |

Notes:

1. The Project TAZ (TAZ 245) includes one single family home and 102,000 square feet of office. However, the analysis calculates VMT by each land use type. Therefore, the results presented reflect the VMT generated by multifamily housing only.
2. Based on the City of Fairfield CEQA VMT Threshold, Baseline Threshold is 85% of the City-wide average VMT per multifamily dwelling unit

Based on the City of Fairfield VMT impact threshold described above, the Project would result in a significant VMT impact if the Project VMT would exceed 85% of City-wide average VMT per multifamily dwelling unit in the Baseline (No Project) conditions. The Project is expected to result in a VMT of 46.3 VMT per multifamily dwelling unit, which exceeds the 44.1 VMT per dwelling unit threshold by approximately 5-percent. While the addition of the Project reduces the Citywide VMT per multifamily dwelling unit to 51.8 VMT per multifamily dwelling unit, the Project exceeds the significance thresholds and would result in a **significant impact** in the Existing. Mitigation measures, described below, would be required to reduce the Project's impact.

### *Mitigation Measures*

This section describes potential mitigation measures the Project should consider to reduce the Project's Existing VMT impact.

### Transportation Demand Management (TDM) Program

For residential-focused land uses, such as the proposed Project, mitigation measures tend to focus on reducing residential trips through implementation of Transportation Demand Management (TDM) Programs. TDM refers to strategies that motivate alternatives to automobile travel, either through positive incentives for walking, biking, and transit, or through adding additional costs to automobile use at the project site. Fehr & Peers developed the TDM+ tool that estimates a percent reduction in VMT due to a single TDM strategy as well as the combination of multiple TDM strategies. TDM+ incorporates the effects of numerous land use and design strategies as well as various travel incentives and disincentives. The VMT reductions applied in TDM+ are based on strategies identified in the Handbook for Analyzing GHG Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity, California Air Pollution Control Officers Association (CAPCOA), August 2021.[3]

The TDM+ tool was used to analyze the Project's VMT reduction potential in a suburban multifamily residential environment. The recommended TDM measures include unbundled parking, pedestrian network improvements, and establishing a carshare, bikeshare, and scootershare program. Additional TDM measures such as transit subsidies, or contributing to improved transit service, may also be considered at the owner's discretion. The effectiveness of each strategy is dependent on the project location, the surrounding infrastructure, and the complimentary TDM measures offered on site.  The proposed TDM measures and their estimated percent VMT reduction for the Project are summarized in **Table 3**. **Attachment B** documents the TDM analysis assumptions and calculations and **Attachment C** includes excerpts from the CAPCOA Handbook documenting each strategy.

[3] This report is a resource for local agencies to quantify the benefit, in terms of reduced travel demand, of implementing various TDM strategies.

**Table 3: TDM Measures and VMT Reduction**

| Measure | Description | Project Implementation VMT Reduction | Maximum VMT Reduction |
|---|---|---|---|
| Unbundled Parking | The Project applicant shall separate parking costs from property costs (i.e., the purchase or rent of parking spaces are separate from the apartment rental). The cost per parking space can influence the potential VMT reduction (i.e., the higher the fee for parking, the greater the VMT reduction). | 6.3% | 15.7% |
| Pedestrian Network Improvements | The Project site plan shall improve pedestrian access to the primary pedestrian attractions (transit stops), as well as include pedestrian oriented elements such as planters, widened sidewalks, benches, etc. | 1% | 6.4% |
| Carshare, Bikeshare, and Scootershare | The Project applicant shall establish a carshare, bikeshare, electric bikeshare, and scootershare program to provide residents short-term convenience access for personal or commuting purposes. | 0.3% | 0.5% |
| **Total** | | **7.6%** | **22.6%** |

Source: TDM+, Fehr & Peers.

The pedestrian-network improvements TDM measure shall be incorporated into the site plan design, while ongoing TDM measures, including unbundled parking and establishing a carshare, bikeshare, and scootershare program shall be implemented and managed by the property manager and/or TDM coordinator.

Based on the Handbook for Analyzing GHG Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity, California Air Pollution Control Officers Association (CAPCOA), implementing the strategies in **Table 3** would reduce the Project's VMT reduction by 7.6-percent, which is 1.5 times higher than the 5-percent reduction required for the Project. As documented in **Table 2**, the Project VMT exceeds the significance thresholds by 5-percent; therefore, with implementation of the proposed TDM program, the Project would result in an impact that is ***less than significant***.

## Criterion C

The Project would not substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

The Project would be required to conform to all applicable City of Fairfield design standards and zoning code requirements. Therefore, the Project would not create new hazards due to non-conforming design elements.

Based on the above evaluation, the impact of the project is ***less than significant*** with respect to Criterion C.

## Criterion D

The Project would not result in inadequate emergency access.

The Safety Element of the City of Fairfield's current General Plan requires that "… no development project should rely on a single entry/exit road. Rather, multiple entrance and exit roads should be provided to ensure emergency vehicle access." Therefore, the Project would be considered a significant impact if two or more emergency access points have not been identified.

The Project provides two driveways from an adjacent access road, and two driveways on Business Center Drive provides access to the access road, therefore, the Project meets the General Plan requirements and meets the emergency access needs. Additionally, the City of Fairfield Fire Department's Fire Inspector, Bryan Just, reviewed and approved the emergency access plans illustrated in **Attachment A**. A letter confirming his review and approval is included in **Attachment D**.

Based on the above evaluation, the impact of the project is ***less than significant*** with respect to Criterion D.

## Emergency Response and Evacuation Planning

The project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

The Project site is located near the northeast quadrant of the Green Valley Road/Business Center Drive intersection, just north of the I-80 corridor. Regional access to the site is provided along I-680, I-80, and SR-12. Local access to the site is provided along Green Valley Road, Neitzel Road, Suisun Valley Road, and Business Center Drive.

The area surrounding the project is predominantly occupied by residential uses, with commercial uses located along Business Center Drive. Based on the City of Fairfield Travel Model, approximately 2,900 residential units are located around the Green Valley corridor, of which approximately 930 units are located in Green Valley (the area along Green Valley Road, north of Reservoir Lane). The remaining residential units are located south of Reservoir Lane and north of I-80. **Attachment E** includes the number of dwelling units in each TAZ with a corresponding map. According to the County of Solano's Fire Hazard Severity Zone Map[4], included in **Attachment F**, and the Solano County Multi-Jurisdictional Hazard Mitigation Plan *City of Fairfield Annex*[5], the Project site is not located in a hazardous wildfire location. However, residential neighborhoods located about three miles north of the Project site and along the Green Valley Road corridor, are considered moderate and high fire hazard severity zones. **Table 4** summarizes the estimated number of homes along Green Valley Road that are located in moderate, high, and very high fire hazard zones.

### Table 4: Estimated Number of Homes in Moderate, High, and Very High Fire Hazard Severity Zones Nearby the Project[1]

| Fire Hazard Severity Zone | Not in a Fire Hazard Zone[2] | Moderate | High | Very High |
|---|---|---|---|---|
| Approximate Number of Homes in Each Zone along the Green Valley Corridor | 2,512 | 408 | 11 | 0 |

Notes:

1. Nearby defined as residential dwelling units that are required to use Green Valley Road, north of the Project site.
2. The City of Fairfield Travel Model was used to estimate the total number of homes in the Green Valley area and subtracted the number of moderate and high parcels from the County of Solano Fire map to determine the number of homes not located in a fire hazard zone.

Source: County of Solano's Fire Hazard Severity Zone Map and City of Fairfield Travel Model

As shown in **Table 4**, approximately 2,500 homes are not located in a fire hazard severity zone, 410 homes are considered in a moderate zone, 10 homes in a high zone, and 0 homes in a very high wildfire zone.

As noted in the sections above, the County's Evacuation Plans do not identify local emergency evacuation routes or their available capacity. However, based on available data from the 2017 Atlas Fire, homes in Green Valley, including those not located in moderate or high fire severity zones were evacuated and utilized Green Valley Road and I-80 as evacuation routes. In the event of a future evacuation, homes in the area would likely utilize these same routes, which provide

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[4] https://egis.fire.ca.gov/FHSZ/

[7] https://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=36384

local and regional access to the Project site. An AM and PM peak hour trip generation analysis was prepared to estimate the potential number of vehicles generated by the residential units in the Project vicinity during an evacuation. The AM and PM peak hours represent the one hour during the morning and evening period when traffic is highest. **Table 5** includes a summary of the trip generation estimates.

**Table 5: Residential Vehicle Trip Generation**

| Location | Quantity (Dwelling Units) | AM Peak Hour Trips | | | PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total |
| Green Valley | 930 | 169 | **483** | 652 | **552** | 323 | 875 |
| South of Green Valley, between Reservoir Lane and I-80 | 2,001 | 351 | **999** | 1,350 | **1,138** | 672 | 1,810 |
| Sub-total | 2,931 | 520 | **1,482** | 2,002 | **1,690** | 995 | 2,685 |
| Green Valley III Apartments | 185 | 16 | **52** | 68 | **44** | 28 | 72 |
| Percent Project Growth | 7% | 3% | **4%** | 3% | **3%** | 3% | 3% |
| Total | 3,116 | 536 | **1,534** | 2,070 | **1,734** | 1,023 | 2,757 |

Notes:
**Bold** = Peak one-way direction of volume
Source: Institute of Transportation Engineers (ITE), *Trip Generation, 10th Edition*.

The morning and evening trip generation show the number of inbound (going to the residential units), outbound (leaving the residential units), and total during each peak hour. During the AM peak hour, the outbound movement generates the highest amount of traffic and during the PM peak hour, the inbound movement generates the highest amount of traffic. As shown in **Table 5**, approximately 1,500 outbound trips are generated in the AM, of which approximately 500 trips are generated from Green Valley. During the PM peak hour, approximately 1,700 trips are generated, of which 550 are to Green Valley. **Table 5** also shows the total number of trips generated by the Project. As shown, the Project is estimated to generate about 70 AM and PM peak hour trips, which results in approximately 3-percent growth in traffic during the AM and PM peak hours.

Weekday daily roadway volumes were also collected in March 2022. **Figure 1** illustrates the number of vehicles along southbound Green Valley Road (towards I-80), south of Business Center Drive, during a 24-hour period. **Figure 1** also illustrates the total capacity of the roadway to achieve LOS D conditions.

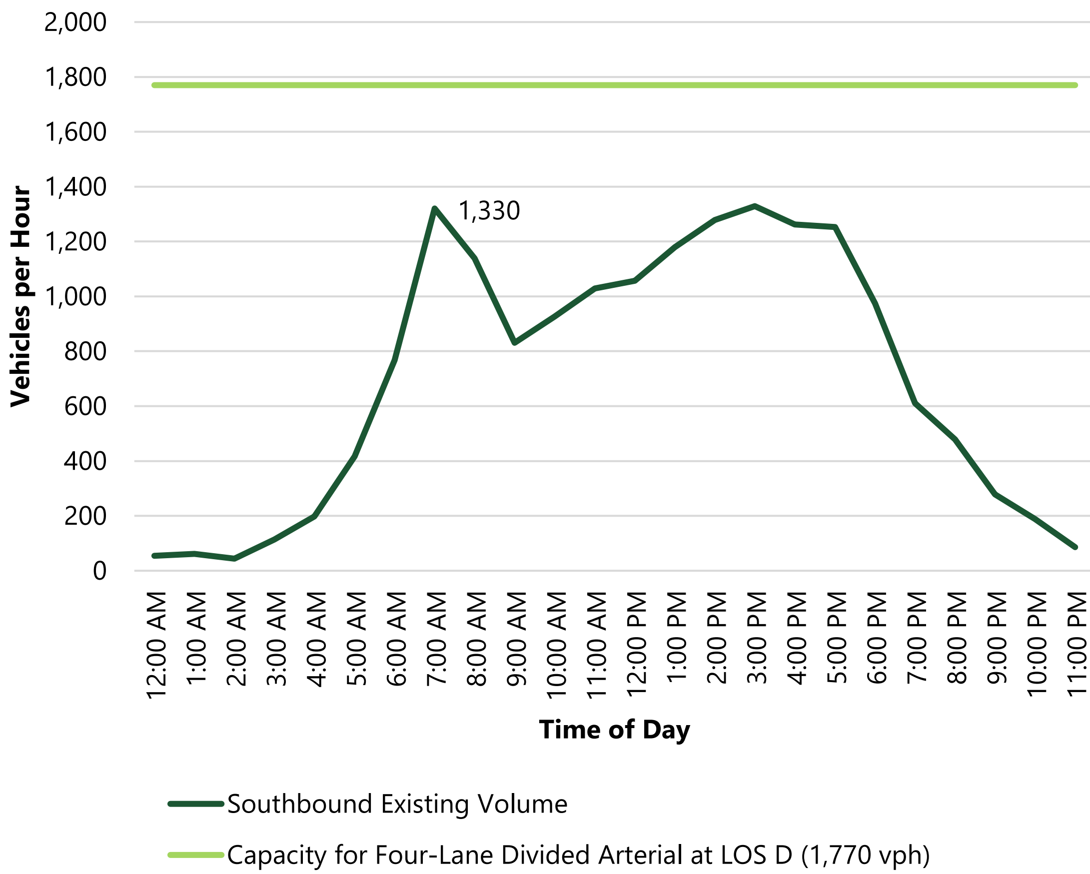



***Figure 1: Green Valley Road Roadway Volume by Direction and Time-of-Day vs Capacity***

As shown, the southbound peak occurs between 7:00 AM and 8:00 AM when approximately 1,330 vehicles are traveling along southbound Green Valley Road. The existing peak hour volume represents most of the nearly 1,500 outbound vehicle trips expected to be generated during the AM peak hour summarized in **Table 5**. Based on a LOS D threshold, the corridor can accommodate up to 1,770 vehicles per hour. Based on the existing peak hour volume, the roadway has capacity to accommodate an additional 500 vehicles during the morning peak hour.

In the event of an emergency evacuation, it is likely that traffic control measures would be deployed such that northbound movements into the affected areas along Green Valley Road would be prohibited. Side street traffic may also be restricted in order to facilitate getting evacuees to I-80. Implementation of these strategies would increase the southbound capacity of Green Valley Road, beyond what is included in this assessment.

Therefore, in the event of an emergency evacuation, it is estimated that the existing roadway capacity can accommodate peak vehicle outbound traffic and the additional project generated traffic summarized in **Table 5**, such that the Project is not expected to affect adopted emergency response plans or evacuation plans and will result in a ***less-than-significant*** impact under Existing and Existing with Approved Conditions. Additionally, the Solano County Emergency Operations Plan, *Emergency Annex (last updated in June 2017)* states that the County OES has plans to identify and manage evacuation routes including traffic control at key intersections. In the event of an emergency evacuation, traffic control officers would be deployed to key locations such as the Green Valley Road corridor, to manage evacuee traffic.

This concludes our assessment. Please contact Sarah Chan at s.chan@fehrandpeers.com if you have questions or comments.

# Attachments

**Attachment A: Project Site Plan**

**Attachment B: TDM Assumptions and Calculations**

**Attachment C: CAPCOA Handbook Excerpts**

**Attachment D: City of Fairfield Fire Department Driveway Access Review**

**Attachment E: Residential Units and Peak Hour Trip Generation by TAZ**

**Attachment F: County of Solano Fire Hazard Severity Zones Map**

# Attachment A: Project Site Plan

# Illustrative Site Plan

| | | | |
|---|---|---|---|
| GV3 APTS | | | |
| PARKING BREAK DOWN | | | |
| 185 UNITS<br>xxx ac (+/-) (xxxxx sf)<br>xxx units / acre - Density<br>Target Spaces: 315 @ 1.7 spaces / unit | | | |
| 87 | resident carport | 206 covered | resident |
| 34 | resident GARAGE | | |
| 1 | resident covered HC | | |
| 82 | resident structure | | |
| 2 | resident HC structure | | |

(2% of covered spaces)

| | | | |
|---|---|---|---|
| 30 | guest parking (9x19) | 124 open | Guest |
| 6 | guest HC | | |
| 18 | guest parking compact | | |
| 35 | guest tandem | | |
| 35 | guest GARAGE struct | | |

(5% of guest spaces)

(15% of total "uncovered" spaces [25% allowed])

| | |
|---|---|
| TOTAL PARKING | 330 |

PARKING RATIO: 1.79 /unit

HC OVERALL PARKING SPACES: 8 (1.9% of total spaces)

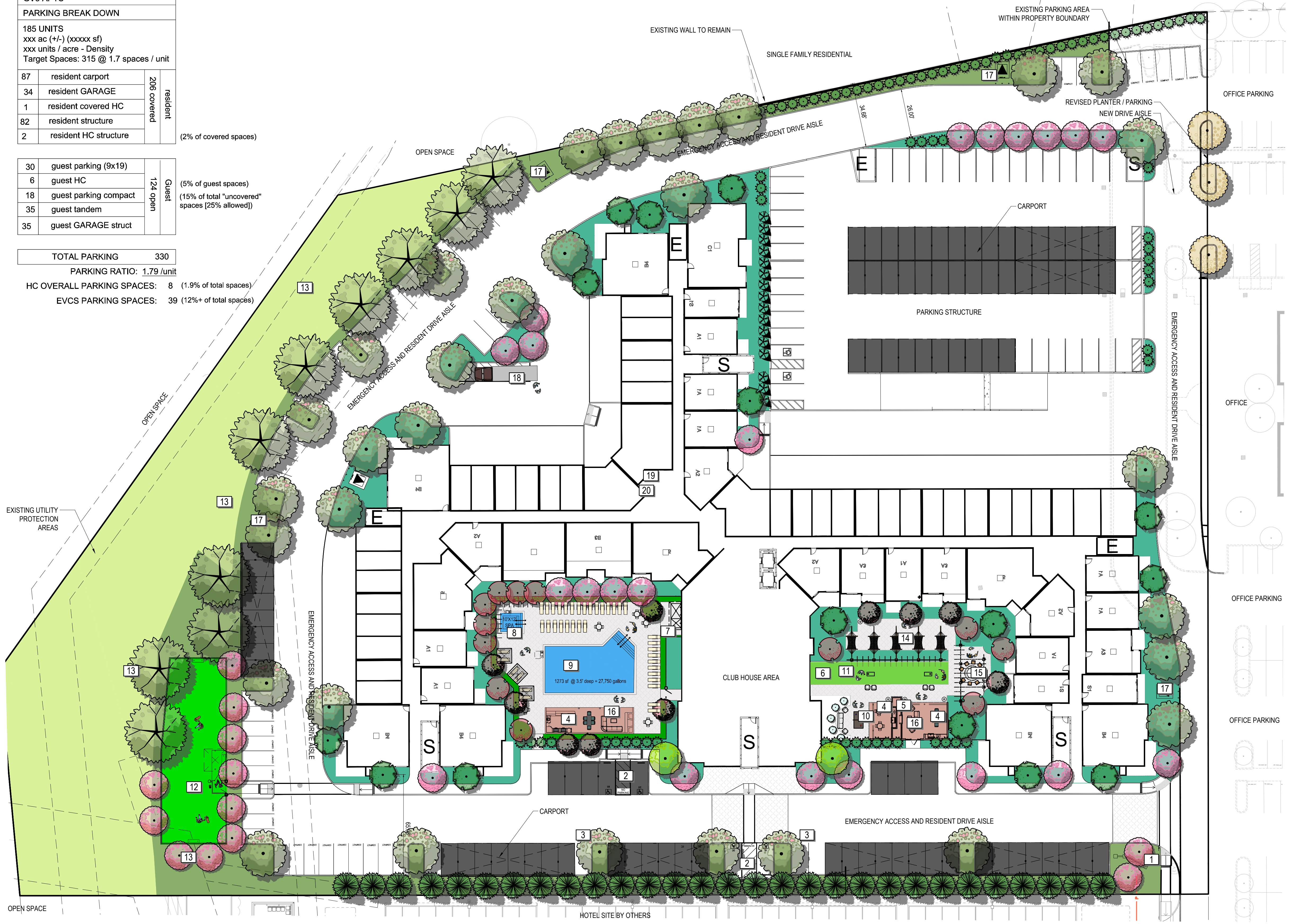
EVCS PARKING SPACES: 39 (12%+ of total spaces)

## PROJECT STATISTICS

| | |
|---|---|
| TOTAL SITE AREA | 251,776.80 SF<br>(5.78 (+/-) ACRES |
| TOTAL UNIT SF | xxxxxx SF |
| TOTAL UNITS | 185 |
| TOTAL PARKING | 320 +/- (1.7/UNIT) |
| TOTAL OPEN SPACE | xxx SF (xxx%) |
| TOTAL USEABLE O.S. | xxx SF (xx%) |
| CLUB HOUSE AREA | xxxx SF |
| ROOF TOP LOUNGE | xxxxx SF |
| TOTAL REC / LOUNGE | xxxxxx SF |
| TOTAL PRIVATE O.S. | tbd |

## REFERENCE NOTES SCHEDULE

| SYMBOL | DESCRIPTION |
|---|---|
| 1 | SIGN MONUMENT |
| 2 | HC PARKING - GUEST |
| 3 | VISITOR PARKING |
| 4 | OUTDOOR KITCHEN |
| 5 | OUTDOOR FIREPLACE LOUNGE |
| 6 | OUTDOOR YOGA |
| 7 | OUTDOOR SHOWERS |
| 8 | SPA |
| 9 | POOL |
| 10 | TABLE TENNIS |
| 11 | CORN HOLE |
| 12 | DOG RUN |
| 13 | PROTECTED OPEN SPACE |
| 14 | HAMMOCK AREA |
| 15 | OUTDOOR FIRE TABLE LOUNGE |
| 16 | OUTDOOR LOUNGE |
| 17 | ELECTRICAL TRANSFORMER |
| 18 | MOVE IN / OUT TRUCK PARKING |
| 19 | FIRE ROOM |
| 20 | TRASH ROOM |




GREEN VALLEY-3 APARTMENTS

SITE

ROSEVILLE OFFICE
943 Reserve Drive
Roseville, California 95678
www.GHD.COM

February 18, 2022
112-25049-GHD-PREL-SIT-LA-0002.dwg

Fairfield, California

Proposed By: A.G. Spanos Companies

**The Spanos Companies**
10100 Trinity Parkway, 5th Floor
Stockton, CA 95219

In Association With: **Kephart (Architects), TSD Engineering (Civil), and GHD (Landscape Architecture)**

# Attachment B: TDM Assumptions and Calculations

## Parking or Road Pricing/Management - T-16. Unbundle Residential Parking Costs from Property Cost

| | |
|---|---|
| Locational Context | **Urban, Suburban** |
| Scale of Application | **Project/Site** |
| Type of VMT affected: | **Project-generated trips** |
| Max VMT reduction: | **15.70%** |

This measure will unbundle, or separate, a residential project's parking costs from property costs, requiring those who wish to purchase parking spaces to do so at an additional cost. On the assumption that parking costs are passed through to the vehicle owners/drivers utilizing the parking spaces, this measure results in decreased vehicle ownership and, therefore, a reduction in VMT and GHG emissions.

| | | | |
|---|---|---|---|
| **Annual parking cost per space** | $1,440.00 | dollar | user input (default value = 0-3600) |
| **Average annual vehicle cost** | $9,282.00 | dollar | constant (default value = 9282) |
| **Elasticity of vehicle ownership with respect to total vehicle cost** | -0.400 | unitless | constant (default value = -0.4) |
| **Adjustment factor from vehicle ownership to VMT** | 1.010 | unitless | constant (default value = 1.01) |
| **Change in VMT** | **-6.27%** | **percent reduction** | |

Formula: % Change in VMT = ( Annual parking cost per space / Average annual vehicle cost ) * Elasticity of vehicle ownership with respect to total vehicle cost * Adjustment factor from vehicle ownership to VMT

Sources:

(1) AAA. 2019. Your Driving Costs. September. Available: https://exchange.aaa.com/wpcontent/uploads/2019/09/AAA-Your-Driving-Costs-2019.pdf. Accessed: January 2021.

(2) Federal Highway Administration (FHWA). 2017. National Household Travel Survey – 2017 Table Designer. Annual VMT / Vehicle by Count of Household Vehicles in California. Available: https://nhts.ornl.gov/. Accessed: March 2021.

(3) Litman, T. 2020. Parking Requirement Impacts on Housing Affordability. June. Available: https://www.vtpi.org/park-hou.pdf. Accessed: January 2021.

## Neighborhood Design - T-18. Provide Pedestrian Network Improvements

| | |
|---|---|
| Locational Context | **Urban, Suburban, Rural** |
| Scale of Application | **Plan/Community** |
| Type of VMT affected: | **Household trips** |
| Max VMT reduction: | **6.40%** |

This measure will increase the sidewalk coverage to improve pedestrian access. Providing sidewalks and an enhanced pedestrian network encourages people to walk instead of drive. This mode shift results in a reduction in VMT and GHG emissions. The 'study area' should be based on a 1 KM buffer around the area where the pedestrian network is being improved. The VMT reduction is limited to household VMT.

| | | | |
|---|---|---|---|
| **Existing sidewalk length in study area** | **1.0** | mile | user input (default value = 0-9999) |
| **Sidewalk length in study area with measure** | **1.2** | mile | user input (default value = 0-9999) |
| **Elasticity of VMT with respect to the ratio of sidewalks-to-streets** | **-0.050** | unitless | constant (default value = -0.05) |
| **Change in VMT** | **-1.00%** | **percent reduction** | |

Formula: % Change in VMT = (( Sidewalk length in study area with measure / Existing sidewalk length in study area ) - 1) * Elasticity of VMT with respect to the ratio of sidewalks-to-streets

Sources:

(1) Federal Highway Administration (FHWA). 2019. 2017 National Household Travel Survey Popular Vehicle Trip Statistics. Available: https://nhts.ornl.gov/vehicle-trips. Accessed: January 2021.

(2) Frank, L., M. Greenwald, S. Kavage, and A. Devlin. 2011. An Assessment of Urban Form and Pedestrian and Transit Improvements as an Integrated GHG Reduction Strategy. WSDOT Research Report WA-RD 765.1, Washington State Department of Transportation. April. Available: www.wsdot.wa.gov/research/reports/fullreports/765.1.pdf. Accessed: January 2021.

(3) Handy, S., S. Glan-Claudia, and M. Boarnet. 2014. Impacts of Pedestrian Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions: Policy Brief. September. Available: https://ww2.arb.ca.gov/sites/default/files/2020- 06/Impacts_of_Pedestrian_Strategies_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Policy_Brief.pdf. Accessed: January 2021.

## Neighborhood Design - T-21-A. Implement Conventional Carshare Program

| | |
|---|---|
| Locational Context | **Urban, Suburban** |
| Scale of Application | **Plan/Community** |
| Type of VMT affected: | **All neighborhood/city trips** |
| Max VMT reduction: | **0.15%** |

This measure will increase carshare access in the user's community by deploying conventional carshare vehicles. Carsharing offers people convenient access to a vehicle for personal or commuting purposes. This helps encourage transportation alternatives and reduces vehicle ownership, thereby avoiding VMT and associated GHG emissions. A variation of this measure, electric carsharing, is described in Measure T-20-B, Implement Electric Carshare Program.

| | | | |
|---|---|---|---|
| **Number of vehicles deployed in plan/community** | 5 | integer | user input (default value = 0-9999) |
| **VMT in plan/community without measure** | 50.0 | VMT | user input (default value = 0-999) |
| **Conventional VMT avoided with measure** | 68.2 | VMT | constant (default value = 68.2) |
| **Conventional VMT added with measure** | 24.4 | VMT | constant (default value = 24.4) |
| **Change in VMT** | **-0.15%** | **percent reduction** | |

Formula: % Change in VMT = ( Number of vehicles deployed in plan/community * ( Conventional VMT added with measure - Conventional VMT avoided with measure )) / VMT in plan/community without measure

Sources:

(1) Martin, E. and S. Shaheen. 2016. The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities. July. Available: https://tsrc.berkeley.edu/publications/impacts-car2go-vehicle-ownership-modal-shiftvehicle-miles-traveled-and-greenhouse-gas. Accessed: March 2021.

(2) San Diego Association of Governments (SANDAG). 2019. Mobility Management VMT Reduction Calculator Tool – Design Document. June. Available: https://www.icommutesd.com/docs/defaultsource/planning/tool-design-document_final_7-17-19.pdf?sfvrsn=ec39eb3b_2. Accessed: January 2021.

## Neighborhood Design - T-22-A. Implement Pedal (Non-Electric) Bikeshare Program

| | |
|---|---|
| Locational Context | **Urban, Suburban** |
| Scale of Application | **Plan/Community** |
| Type of VMT affected: | **All neighborhood/city trips** |
| Max VMT reduction: | **0.02%** |

This measure will establish a bikeshare program. Bikeshare programs provide users with on-demand access to bikes for shortterm rentals. This encourages a mode shift from vehicles to bicycles, displacing VMT and thus reducing GHG emissions. Variations of this measure are described in Measure T-21-B, Implement Electric Bikeshare Program, and Measure T-21-C, Implement Scootershare Program. Access to bikesharing is measured as the percent of residences in the plan/community within 0.25 mile of a bikeshare station. For dockless bikes, assume that all residences within 0.25 mile of the designated dockless service area would have access.

| | | | |
|---|---|---|---|
| **Select the Core-Based Statistical Area for the project.** | San Francisco-Oakland-Hayward | | Appendix C. T-9.1 |
| **Percent of residences in plan/community with access to bikeshare system without measure** | 0.0% | percent | user input (default value = 0-1) |
| **Percent of residences in plan/community with access to bikeshare system with measure** | 100.0% | percent | user input (default value = 0-1) |
| **Daily bikeshare trips per person** | 0.021 | trip | constant (default value = 0.021) |
| **Vehicle to bikeshare substitution rate** | 19.6% | percent | constant (default value = 0.196) |
| **Bikeshare average one-way trip length** | 1.4 | mile | optional (default value = 1.4) |
| **Daily vehicle trips per person** | 2.700 | trip | constant (default value = 2.7) |
| **Regional average one-way vehicle trip length** | 12.4 | mile | optional (default value = 9.7-19.1) |
| **Change in VMT** | **-0.02%** | percent reduction | |

Formula: % Change in VMT = -1 * ((( Percent of residences in plan/community with access to bikeshare system with measure - Percent of residences in plan/community with access to bikeshare system without measure ) * Daily bikeshare trips per person * Vehicle to bikeshare substitution rate * Bikeshare average one-way trip length ) / ( Daily vehicle trips per person * Regional average one-way vehicle trip length ))

Sources:
(1) Federal Highway Administration (FHWA). 2017. National Household Travel Survey–2017 Table Designer. Travel Day PT by TRPTRANS by HH_CBSA. Available: https://nhts.ornl.gov/. Accessed: January 2021.

(2) Federal Highway Administration (FHWA). 2018. Summary of Travel Trends 2017–National Household Travel Survey. July. Available: https://www.fhwa.dot.gov/policyinformation/documents/2017_nhts_summary_travel_trends.pdf. Accessed: January 2021.

(3) Lazarus, J., J. Pourquier, F. Feng, H. Hammel, and S. Shaheen. 2019. Bikesharing Evolution and Expansion: Understanding How Docked and Dockless Models Complement and Compete – A Case Study of San Francisco. Paper No. 19-02761. Annual Meeting of the Transportation Research Board: Washington, D.C. Available: https://trid.trb.org/view/1572878. Accessed: January 2021.

(4) McQueen, M., G. Abou-Zeid, J. MacArthur, and K. Clifton. 2020. Transportation Transformation: Is Micromobility Making a Macro Impact on Sustainability? Journal of Planning Literature. November. Available: https://doi.org/10.1177/0885412220972696. Accessed: March 2021.

(5) Metropolitan Transportation Commission (MTC). 2017. Plan Bay Area 2040 Final Supplemental Report–Travel Modeling Report. July. Available: http://2040.planbayarea.org/files/2020-02/Travel_Modeling_PBA2040_Supplemental%20Report_7-2017.pdf. Accessed: January 2021.

## Neighborhood Design - T-22-B. Implement Electric Bikeshare Programs

| | |
|---|---|
| Locational Context | **Urban, Suburban** |
| Scale of Application | **Plan/Community** |
| Type of VMT affected: | **All neighborhood/city trips** |
| Max VMT reduction: | **0.06%** |

This measure will establish an electric bikeshare program. Electric bikeshare programs provide users with on-demand access to electric pedal assist bikes for short-term rentals. This encourages a mode shift from vehicles to electric bicycles, displacing VMT and reducing GHG emissions. Variations of this measure are described in Measure T-21-A, Implement Pedal (Non-Electric) Bikeshare Program, and Measure T-21-C, Implement Scootershare Program. Access to electric bikesharing is measured as the percent of residences in the plan/community within 0.25-mile of an electric bikeshare station. For dockless bikes, assume that all residences within 0.25 mile of the designated dockless service area would have access.

| | | | |
|---|---|---|---|
| **Select the Core-Based Statistical Area for the project.** | San Francisco-Oakland-Hayward | | Appendix C. T-9.1 |
| **Percent of residences in plan/community with access to electric bikeshare system without measure** | 0.0% | percent | user input (default value = 0-1) |
| **Percent of residences in plan/community with access to electric bikeshare system with measure** | 100.0% | percent | user input (default value = 0-1) |
| **Daily electric bikeshare trips per person** | 0.021 | trip | constant (default value = 0.021) |
| **Vehicle to electric bikeshare substitution rate** | 35.0% | percent | constant (default value = 0.35) |
| **Electric bikeshare average one-way trip length** | 2.1 | mile | optional (default value = 2.1) |
| **Daily vehicle trips per person** | 2.700 | trip | constant (default value = 2.7) |
| **Regional average one-way vehicle trip length** | 12.4 | mile | optional (default value = 9.7-19.1) |
| **Change in VMT** | **-0.05%** | **percent reduction** | |

Formula: % Change in VMT = -1 * ((( Percent of residences in plan/community with access to electric bikeshare system with measure - Percent of residences in plan/community with access to electric bikeshar system without measure ) * Daily electric bikeshare trips per person * Vehicle to electric bikeshare substitution rate * Electric bikeshare average one-way trip length ) / ( Daily vehicle trips per person * Regional average one-way vehicle trip length ))

Sources:

(1) Federal Highway Administration (FHWA). 2017. National Household Travel Survey–2017 Table Designer. Travel Day PT by TRPTRANS by HH_CBSA. Available: https://nhts.ornl.gov/. Accessed: January 2021.

(2) Federal Highway Administration (FHWA). 2018. Summary of Travel Trends 2017–National Household Travel Survey. July. Available: https://www.fhwa.dot.gov/policyinformation/documents/2017_nhts_summary_travel_trends.pdf. Accessed: January 2021.

(3) Fitch, D., H. Mohiuddin, and S. Handy. 2021. Examining the Effects of the Sacramento Dockless E-Bike Share on Bicycling and Driving. MDPI: Sustainability. January. Available: https://www.mdpi.com/2071-1050/13/1/368. Accessed: March 2021.

(4) Metropolitan Transportation Commission (MTC). 2017. Plan Bay Area 2040 Final Supplemental Report–Travel Modeling Report. July. Available: http://2040.planbayarea.org/files/2020-02/Travel_Modeling_PBA2040_Supplemental%20Report_7-2017.pdf. Accessed: January 2021.

## Neighborhood Design - T-22-C. Implement Scootershare Program

| | |
|---|---|
| Locational Context | **Urban, Suburban** |
| Scale of Application | **Plan/Community** |
| Type of VMT affected: | **All neighborhood/city trips** |
| Max VMT reduction: | **0.07%** |

This measure will establish a scootershare program. Scootershare programs provide users with on-demand access to electric scooters for short-term rentals. This encourages a mode shift from vehicles to scooters, displacing VMT and thus reducing GHG emissions. Variations of this measure are described in Measure T-21-A, Implement Pedal (Non-Electric) Bikeshare Program, and Measure T-21-B, Implement Electric Bikeshare Program. Access to scootersharing is measured as the percent of residences in the plan/community within 0.25-mile of a scootershare station. For dockless scooters, assume that all residences within 0.25-mile of the designated dockless service area would have access.

| | | | |
|---|---|---|---|
| **Select the Core-Based Statistical Area for the project.** | San Francisco-Oakland-Hayward | | Appendix C. T-9.1 |
| **Percent of residences in plan/community with access to scootershare system without measure** | 0.0% | percent | user input (default value = 0-1) |
| **Percent of residences in plan/community with access to scootershare system with measure** | 100.0% | percent | user input (default value = 0-1) |
| **Daily scootershare trips per person** | 0.021 | trip | constant (default value = 0.021) |
| **Vehicle to scootershare substitution rate** | 38.5% | percent | constant (default value = 0.385) |
| **Scootershare average one-way trip length** | 2.1 | mile | optional (default value = 2.14) |
| **Daily vehicle trips per person** | 2.700 | trip | constant (default value = 2.7) |
| **Regional average one-way vehicle trip length** | 12.4 | mile | optional (default value = 9.7-19.1) |
| **Change in VMT** | **-0.05%** | percent reduction | |

Formula: % Change in VMT = -1 * ((( Percent of residences in plan/community with access to scootershare system with measure - Percent of residences in plan/community with access to scootershare system without measure ) * Daily scootershare trips per person * Vehicle to scootershare substitution rate * Scootershare average one-way trip length ) / ( Daily vehicle trips per person * Regional average one-way vehicle trip length ))

Sources:


(1) Federal Highway Administration (FHWA). 2017. National Household Travel Survey–2017 Table Designer. Travel Day PT by TRPTRANS by HH_CBSA. Available: https://nhts.ornl.gov/. Accessed: January 2021.

(2) Federal Highway Administration (FHWA). 2018. Summary of Travel Trends 2017–National Household Travel Survey. July. Available: https://www.fhwa.dot.gov/policyinformation/documents/2017_nhts_summary_travel_trends.pdf. Accessed: January 2021.

(3) Metropolitan Transportation Commission (MTC). 2017. Plan Bay Area 2040 Final Supplemental Report–Travel Modeling Report. July. Available: http://2040.planbayarea.org/files/2020-02/Travel_Modeling_PBA2040_Supplemental%20Report_7-2017.pdf. Accessed: January 2021.

(4) McQueen, M., G. Abou-Zeid, J. MacArthur, and K. Clifton. 2020. Transportation Transformation: Is Micromobility Making a Macro Impact on Sustainability? Journal of Planning Literature. November. Available: https://doi.org/10.1177/0885412220972696. Accessed: March 2021. (5) Portland Bureau of Transportation (PBOT). 2021. Portland Bureau of Transportation E-Scooter Dashboard. Available: https://public.tableau.com/profile/portland.bureau.of.transportation#!/vizhome/PBOTEScooterTripsDashboard/ScooterDashboard. Accessed: March 2021.

# Attachment C: CAPCOA Handbook Excerpts

# T-16. Unbundle Residential Parking Costs from Property Cost

## GHG Mitigation Potential

15.7%

Up to 15.7% of GHG emissions from project VMT in the study area

## Co-Benefits (icon key on pg. 34)

## Climate Resilience

Unbundling residential parking costs from property costs could incentivize increased use of public transit and thus result in less traffic, potentially reducing congestion or delays on major roads during peak AM and PM traffic periods. When this reduction occurs during extreme weather events, it better allows emergency responders to access a hazard site.

## Health and Equity Considerations

The unbundling of parking costs would help decrease housing costs for individuals who do not own personal vehicles.

## Measure Description

This measure will unbundle, or separate, a residential project's parking costs from property costs, requiring those who wish to purchase parking spaces to do so at an additional cost. On the assumption that parking costs are passed through to the vehicle owners/drivers utilizing the parking spaces, this measure results in decreased vehicle ownership and, therefore, a reduction in VMT and GHG emissions. Unbundling may not be available to all residential developments, depending on funding sources.

## Subsector

Parking or Road Pricing/Management

## Locational Context

Urban, suburban

## Scale of Application

Project/Site

## Implementation Requirements

Parking costs must be passed through to the vehicle owners/drivers utilizing the parking spaces for this measure to result in decreased vehicle ownership.

## Cost Considerations

Unbundling residential parking costs from property costs may decrease revenue for property owners. This loss may be partially offset by reduced costs needed to maintain parking facilities with less car occupancy and the potential for non-resident parking as a supplementary income stream. For residents, reduced fees and the ability to go without owning a car is a major cost benefit. Municipalities also benefit from a reduction of cars on the road, which can lead to lower infrastructure and roadway maintenance costs.

## Expanded Mitigation Options

Pair with Measure T-19-A or T-19-B to ensure that residents who eliminate their vehicle and shift to a bicycle can safely access the area's bikeway network.

## GHG Reduction Formula

$$A = \frac{B}{C} \times D \times E$$

## GHG Calculation Variables

| ID | Variable | Value | Unit | Source |
|---|---|---|---|---|
| **Output** | | | | |
| A | Percent reduction in GHG emissions from project VMT in study area | 0–15.7 | % | calculated |
| **User Inputs** | | | | |
| B | Annual parking cost per space | [ ] | $ per year | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| C | Average annual vehicle cost | $9,282 | $ per year | AAA 2019 |
| D | Elasticity of vehicle ownership with respect to total vehicle cost | -0.4 | unitless | Litman 2020 |
| E | Adjustment factor from vehicle ownership to VMT | 1.01 | unitless | FHWA 2017 |

Further explanation of key variables:

- (B) – For most projects, this represents a monthly parking fee multiplied by 12. For deeded parking spaces, an estimate of the additional cost to a mortgage may be used, or the total cost may be prorated over 30 years. Costs to park will vary widely based on location; however, this value should consider if other nearby offsite parking options are available at lower cost. See Table T-16.1 in Appendix C for examples of monthly parking prices for different facility types.
- (C) – The average vehicle cost per year in 2019 was $9,282, based on a car driven 15,000 miles per year. Costs include gasoline, maintenance, insurance, license and registration, loan finance charges, and depreciation but do not include parking (AAA 2019).
- (D) – A synthesis of literature reported that, on the low end, a 0.4 percent decrease in vehicle ownership occurs for every 1 percent increase in total vehicle costs (Litman 2020).
- (E) – The adjustment factor from vehicle ownership to VMT is based on the following (FHWA 2017):
  - The average Californian household with 1 vehicle drives 11,117 miles per vehicle while households with 2 vehicles drives 11,223 miles per vehicle.
  - The reduction of 1 vehicle from a 2-vehicle household leads to a 0.94 percent decrease in VMT per vehicle.
  - So, $E = 1 - \left( \frac{11{,}117 \frac{\text{miles}}{\text{vehicle}} - 11{,}223 \frac{\text{miles}}{\text{vehicle}}}{11{,}223 \frac{\text{miles}}{\text{vehicle}}} \right) = 1.01$

## GHG Calculation Caps or Maximums

*Measure Maximum*

($A_{max}$) The GHG reduction from unbundled parking is capped at 15.7 percent, which is based on the use of ($B_{max}$) in the GHG reduction formula.

($B_{max}$) The annual cost of parking space is capped at $3,600, or $300 per month. At monthly costs above $300, the cost of parking represents more than a 30 percent increase in total vehicle cost. In addition, this reflects the upper maximum of observed parking prices outside of extremely dense downtown areas (such as San Francisco's SOMA neighborhood).

*Subsector Maximum*

($\sum A_{max_{T\text{-}14\ through\ T\text{-}16}} \leq 35\%$) This measure is in the Parking or Road Pricing/Management subsector. This subcategory includes Measures T-14 through T-16. The VMT reduction from the combined implementation of all measures within this subsector is capped at 35 percent.

## Example GHG Reduction Quantification

The user reduces VMT by unbundling the parking costs from property costs of a project, discouraging vehicle ownership, and therefore reducing VMT. In this example, the annual parking cost per space is $1,800 (B), which would reduce GHG emissions from project study area VMT (as compared to the same project with bundled parking costs) by 7.8 percent.

$$A = \left(\frac{\$1{,}800}{\$9{,}282}\right) \times -0.4 \times 1.01 = -7.8\%$$

## Quantified Co-Benefits

*Improved Local Air Quality*

The percent reduction in GHG emissions (A) would be the same as the percent reduction in $NO_X$, CO, $NO_2$, $SO_2$, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

*Energy and Fuel Savings*

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A).

*VMT Reductions*

The percent reduction in VMT would be the same as the percent reduction in GHG emissions (A).

## Sources


- AAA. 2019. *Your Driving Costs*. September. Available: https://exchange.aaa.com/wp-content/uploads/2019/09/AAA-Your-Driving-Costs-2019.pdf. Accessed: January 2021.
- Federal Highway Administration (FHWA). 2017. *National Household Travel Survey – 2017 Table Designer*. Annual VMT / Vehicle by Count of Household Vehicles in California. Available: https://nhts.ornl.gov/. Accessed: March 2021.
- Litman, T. 2020. *Parking Requirement Impacts on Housing Affordability*. June. Available: https://www.vtpi.org/park-hou.pdf. Accessed: January 2021.

# T-18. Provide Pedestrian Network Improvement

## GHG Mitigation Potential

6.4%

Up to 6.4% of GHG emissions from vehicle travel in the plan/community

## Co-Benefits (icon key on pg. 34)

## Climate Resilience

Improving pedestrian networks increases accessibility of outdoor spaces, which can provide health benefits and thus improve community resilience. This can also improve connectivity between residents and resources that may be needed in an extreme weather event.

## Health and Equity Considerations

Ensure that the improvements also include accessibility features to allow for people of all abilities to use the network safely and conveniently. Ensure that sidewalks connect to nearby community assets, such as schools, retail, and healthcare.

## Measure Description

This measure will increase the sidewalk coverage to improve pedestrian access. Providing sidewalks and an enhanced pedestrian network encourages people to walk instead of drive. This mode shift results in a reduction in VMT and GHG emissions.

## Subsector

Neighborhood Design

## Locational Context

Urban, suburban, rural

## Scale of Application

Plan/Community

## Implementation Requirements

The GHG reduction of this measure is based on the VMT reduction associated with expansion of sidewalk coverage expansion, which includes not only building of new sidewalks but also improving degraded or substandard sidewalk (e.g., damaged from street tree roots). However, pedestrian network enhancements with non-quantifiable GHG reductions are encouraged to be implemented, as discussed under *Expanded Mitigation Options*.

## Cost Considerations

Depending on the improvement, capital and infrastructure costs may be high. However, improvements to the pedestrian network will increase pedestrian activity, which can increase businesses patronage and provide a local economic benefit. The local municipality may achieve cost savings through a reduction of cars on the road leading to lower infrastructure and roadway maintenance costs.

## Expanded Mitigation Options

When improving sidewalks, a best practice is to ensure they are contiguous and link externally with existing and planned pedestrian facilities. Barriers to pedestrian access and interconnectivity, such as walls, landscaping buffers, slopes, and unprotected crossings should be minimized. Other best practice features could include high-visibility crosswalks, pedestrian hybrid beacons, and other pedestrian signals, mid-block crossing walks, pedestrian refuge islands, speed tables, bulb-outs (curb extensions), curb ramps, signage, pavement markings, pedestrian-only connections and districts, landscaping, and other improvements to pedestrian safety (see Measure T-35, *Provide Traffic Calming Measures*).

## GHG Reduction Formula

$$A = \left(\frac{C}{B} - 1\right) \times D$$

## GHG Calculation Variables

| ID | Variable | Value | Unit | Source |
|---|---|---|---|---|
| **Output** | | | | |
| A | Percent reduction in GHG emissions from household vehicle travel in plan/community | 0–6.4 | % | calculated |
| **User Inputs** | | | | |
| B | Existing sidewalk length in study area | [ ] | miles | user input |
| C | Sidewalk length in study area with measure | [ ] | miles | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| D | Elasticity of household VMT with respect to the ratio of sidewalks-to-streets | -0.05 | unitless | Frank et al. 2011 |

Further explanation of key variables:

- (B and C) – Sidewalk length should be measured on both sides of the street. For example, if one 0.5-mile-long street has full sidewalk coverage, the sidewalk length would be 1.0 mile. If there is only sidewalk on one side of the street, the sidewalk length would be 0.5 mile. The recommended study area is 0.6 mile around the pedestrian network improvement. This represents a 6- to 10-minute walking time.
- (D) – A study found that a 0.05 percent decrease in household vehicle travel occurs for every 1 percent increase in the sidewalk-to-street ratio (Frank et al. 2011; Handy et al. 2014).

## GHG Calculation Caps or Maximums

*Measure Maximum*

($A_{max}$) The percent reduction in GHG emissions (A) is capped at 3.4 percent, which is based on the following assumptions:

- 35.2 percent of vehicle trips are short trips (2 mile or less, average of 1.29 miles) and thus could easily shift to walking (FHWA 2019).
- 64.8 percent of vehicle trips are longer trips that are unlikely to shift to walking (2 miles or more, average of 10.93 miles) (FHWA 2019).
- So $A_{max} = \frac{35.2\% \times 1.29 \text{ miles}}{64.8\% \times 10.93 \text{ miles}} = 6.4\%$

*Subsector Maximum*

$(\sum A_{max_{T\text{-}18 \text{ through } T\text{-}22\text{-}C}} \leq 10\%)$ This measure is in the Neighborhood Design subsector. This subcategory includes Measures T-18 through T-22-C. The VMT reduction from the combined implementation of all measures within this subsector is capped at 10 percent.

## Example GHG Reduction Quantification

The user reduces household VMT by improving the pedestrian network in the study area. In this example, the existing sidewalk length (B) is 9 miles, and the sidewalk length with the measure (C) would be 10 miles. With these conditions, the user would reduce GHG emissions from household VMT within the study area by 0.6 percent.

$$A = \left(\frac{10 \text{ miles}}{9 \text{ miles}} - 1\right) \times -0.05 = -0.6\%$$

## Quantified Co-Benefits

*Improved Local Air Quality*

The percent reduction in GHG emissions (A) would be the same as the percent reduction in $NO_X$, CO, $NO_2$, $SO_2$, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

*Energy and Fuel Savings*

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A).

*VMT Reductions*

The percent reduction in household VMT would be the same as the percent reduction in GHG emissions (A).

*Improved Public Health*

Users are directed to the Integrated Transport and Health Impact Model (ITHIM) (CARB et al. 2020). The ITHIM can quantify the annual change in health outcomes associated with active transportation, including deaths, years of life lost, years of living with disability, and incidence of community and individual disease.

### Sources


- California Air Resources Board (CARB), California Department of Public Health (CDPH), and Nicholas Linesch Legacy Fund. 2020. Integrated Transport and Health Impact Model. Available: https://skylab.cdph.ca.gov/HealthyMobilityOptionTool-ITHIM/#Home. Accessed: September 17, 2021.
- Federal Highway Administration (FHWA). 2019. *2017 National Household Travel Survey Popular Vehicle Trip Statistics*. Available: https://nhts.ornl.gov/vehicle-trips. Accessed: January 2021.

- Frank, L., M. Greenwald, S. Kavage, and A. Devlin. 2011. *An Assessment of Urban Form and Pedestrian and Transit Improvements as an Integrated GHG Reduction Strategy*. WSDOT Research Report WA-RD 765.1, Washington State Department of Transportation. April. Available: www.wsdot.wa.gov/research/reports/fullreports/765.1.pdf. Accessed: January 2021.
- Handy, S., S. Glan-Claudia, and M. Boarnet. 2014. *Impacts of Pedestrian Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions: Policy Brief.* September. Available: https://ww2.arb.ca.gov/sites/default/files/2020-06/Impacts_of_Pedestrian_Strategies_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Policy_Brief.pdf. Accessed: January 2021.

# T-21-A. Implement Conventional Carshare Program


## GHG Mitigation Potential

0.15%

Up to 0.15% of GHG emissions from vehicle travel in the plan/community

## Co-Benefits (icon key on pg. 34)

## Climate Resilience

Carshare programs can increase accessibility and provide redundancy to vehicles that can be used to evacuate or obtain resources during an extreme weather event. Carshare programs can allow residents to give up or avoid car ownership, leading to cost savings that can help build economic resilience.

## Health and Equity Considerations

Provide inclusive mechanisms so people without bank accounts, credit cards, or smart phones can access the system.

## Measure Description

This measure will increase carshare access in the user's community by deploying conventional carshare vehicles. Carsharing offers people convenient access to a vehicle for personal or commuting purposes. This helps encourage transportation alternatives and reduces vehicle ownership, thereby avoiding VMT and associated GHG emissions. A variation of this measure, electric carsharing, is described in Measure T-21-B, *Implement Electric Carshare Program*.

## Subsector

Neighborhood Design

## Locational Context

Urban, suburban

## Scale of Application

Plan/Community

## Implementation Requirements

The GHG mitigation potential is based, in part, on literature analyzing one-way carsharing service with a free-floating operational model. This measure should be applied with caution if using a different form of carsharing (e.g., roundtrip, peer-to-peer, fractional).

## Cost Considerations

The costs incurred by the carshare program service manager (typically a municipality or carshare company) may include the capital costs of purchasing vehicles; costs of storing, maintaining, and replacing the fleet; and costs for marketing and administration. Some of these costs may be offset by income generated through program use.

## Expanded Mitigation Options

When implementing a carshare program, best practice is to discount carshare membership and provide priority parking for carshare vehicles to encourage use of the service.

## GHG Reduction Formula

$$A = \frac{B \times (E - D)}{C}$$

## GHG Calculation Variables

| ID | Variable | Value | Unit | Source |
|---|---|---|---|---|
| **Output** | | | | |
| A | Percent reduction in GHG emissions from vehicle travel in plan/community | 0–0.15 | % | calculated |
| **User Inputs** | | | | |
| **B** | Number of vehicles deployed in plan/community | [ ] | integer | user input |
| **C** | VMT in plan/community without measure | [ ] | VMT per day | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| D | Conventional VMT avoided with measure | 68.2 | VMT per day per vehicle | Martin and Shaheen 2016 |
| E | Conventional VMT added with measure | 24.4 | VMT per day per vehicle | Martin and Shaheen 2016 |

Further explanation of key variables:

- (B) – The number of cars in the carshare program is selected by the carshare provider, but its magnitude is relative to the size of the service area. A study of several carsharing programs (Martin and Shaheen 2016) documented a range of carshare fleet sizes for different North American cities: Calgary (590), San Diego (406), Seattle (640), Vancouver (920), Washington, D.C. (626).
- (C) – The total plan/community VMT should represent the expected total VMT generated by all land use in that area. The most appropriate source for this data is from a local travel demand model.
- (D) – Conventional VMT avoided per deployed carshare vehicle was derived based on a study of conventional-engine based car share programs in Calgary, Seattle, Vancouver, and Washington, D.C. It accounts for VMT avoided from carshare users who sold their personal vehicles and carshare users who decided not to purchase a personal vehicle, both directly because of the availability of carshare (Martin and Shaheen 2016).
- (E) – Conventional VMT added per deployed carshare vehicle was derived based on a study of conventional-engine based car share programs in Calgary, Seattle, Vancouver, and Washington, D.C. It accounts for the VMT of the carshare vehicles (Martin and Shaheen 2016).

## GHG Calculation Caps or Maximums

*Measure Maximum*

($A_{max}$) The maximum GHG reduction from this measure is 0.15 percent. This maximum scenario is presented in the below example quantification.

*Subsector Maximum*

($\sum A_{max_{\text{T-18 through T-22-C}}} \leq 10\%$) This measure is in the Neighborhood Design subsector. This subcategory includes Measures T-18 through T-22-C. The VMT reduction from the combined implementation of all measures within this subsector is capped at 10 percent.

## Example GHG Reduction Quantification

The user reduces plan/community VMT by deploying carshare vehicles. In this example, the project would be in the city of San Diego, which in 2017 had a VMT per day of 24,101,089 miles (C) (SANDAG 2019). Assuming twice the number of vehicles used in the Car2go San Diego program (B), the GHG emissions from plan/community VMT would be reduced by 0.15 percent.

$$A = \frac{\mathbf{812\ vehicles} \times (24.4\ \frac{\text{VMT}}{\text{day}\cdot\text{vehicle}} - 68.2\ \frac{\text{VMT}}{\text{day}\cdot\text{vehicle}})}{\mathbf{24{,}101{,}089\ \frac{VMT}{day}}} = \text{-}0.15\%$$

## Quantified Co-Benefits

*Improved Local Air Quality*

The percent reduction in GHG emissions (A) would be the same as the percent reduction in $NO_X$, CO, $NO_2$, $SO_2$, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

*Energy and Fuel Savings*

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A).

*VMT Reductions*

The percent reduction in VMT would be the same as the percent reduction in GHG emissions (A).

## Sources


- Martin, E. and S. Shaheen. 2016. *The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities.* July. Available: https://tsrc.berkeley.edu/publications/impacts-car2go-vehicle-ownership-modal-shift-vehicle-miles-traveled-and-greenhouse-gas. Accessed: March 2021.
- San Diego Association of Governments (SANDAG). 2019. *Mobility Management VMT Reduction Calculator Tool – Design Document.* June. Available: https://www.icommutesd.com/docs/default-source/planning/tool-design-document_final_7-17-19.pdf?sfvrsn=ec39eb3b_2. Accessed: January 2021.

# T-21-B. Implement Electric Carshare Program


## GHG Mitigation Potential

0.18%

Up to 0.18% of GHG emissions from vehicle travel in the plan/community

## Co-Benefits (icon key on pg. 34)

## Climate Resilience

Electric carshare programs can increase accessibility and provide redundancy to vehicles that can be used to evacuate or obtain resources during an extreme weather event. Electric vehicles also provide fuel redundancy by allowing an alternative fuel source if an extreme event disrupts other fuel sources; however, they may decrease resilience if they are the only option available during a power outage.

## Health and Equity Considerations

Provide inclusive mechanisms so people without bank accounts, credit cards, or smart phones can access the system.

## Measure Description

This measure will increase carshare access in the user's community by deploying electric carshare vehicles. Carsharing offers people convenient access to a vehicle for personal or commuting purposes. This helps encourage transportation alternatives and reduces vehicle ownership, thereby avoiding VMT and associated GHG emissions. This also encourages a mode shift from internal combustion engine vehicles to electric vehicles, displacing the emissions-intensive fossil fuel energy with less emissions-intensive electricity. Electric carshare vehicles require more staffing support compared to conventional carshare programs for shuttling electric vehicles to and from charging points. A variation of this measure, conventional carsharing, is described in Measure T-21-A, *Implement Conventional Carshare Program*.

## Subsector

Neighborhood Design

## Locational Context

Urban, suburban

## Scale of Application

Plan/Community

## Implementation Requirements

The GHG mitigation potential is based, in part, on literature analyzing one-way carsharing service with a free-floating operational model. This measure should be applied with caution if using a different form of carsharing (e.g., roundtrip, peer-to-peer, fractional).

## Cost Considerations

Costs incurred by the service manager (e.g., municipality, carshare company) may include the capital costs of purchasing vehicles; costs of storing, maintaining, and replacing the fleet; and costs for marketing and administration. Some of these costs may be offset by income generated through program use. Participants' recurring costs of renting a carshare vehicle may be offset by the cost savings from access to cheaper transportation.

## Expanded Mitigation Options

When implementing a carshare program, best practice is to discount carshare membership and provide priority parking for carshare vehicles to encourage use of the service.

## GHG Reduction Formula

$$A = -1 \times \frac{B \times ((E \times G \times H \times I \times J) - (D \times F))}{C \times F}$$

## GHG Calculation Variables

| ID | Variable | Value | Unit | Source |
|---|---|---|---|---|
| **Output** | | | | |
| A | Percent reduction in GHG emissions from vehicle travel in plan/community | 0–0.18 | % | calculated |
| **User Inputs** | | | | |
| B | Number of electric vehicles deployed in plan/community | [ ] | integer | user input |
| C | VMT in plan/community without measure | [ ] | VMT per day | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| D | Conventional VMT avoided with measure | 54.8 | VMT per day per EV | Martin and Shaheen 2016 |
| E | Electric VMT added with measure | 13.7 | VMT per day per EV | Martin and Shaheen 2016 |
| F | Emission factor of non-electric light duty fleet mix | 307.5 | g $CO_2e$ per mile | CARB 2020a |
| G | Energy efficiency of carshare electric vehicle | 0.327 | kWh per mile | CARB 2020b; U.S. DOE 2021 |
| H | Carbon intensity of local electricity provider | Tables E-4.3 and E-4.4 | lb $CO_2e$ per MWh | CA Utilities 2021 |
| I | Conversion from lb to g | 454 | g per lb | conversion |
| J | Conversion from kWh to MWh | 0.001 | MWh per kWh | conversion |

Further explanation of key variables:

- (B) – The number of cars in the carshare program is selected by the carshare provider, but its magnitude is relative to the size of the service area. A study of several carsharing programs (Martin and Shaheen 2016) documented a range of carshare fleet sizes for different North American cities: Calgary (590), San Diego (406), Seattle (640), Vancouver (920), Washington, D.C. (626).
- (C) – The total plan/community VMT should represent the expected total VMT generated by all land use in that area. The most appropriate source for this data is from a local travel demand forecasting model.
- (D) – Conventional VMT avoided per deployed carshare vehicle was derived based on a study of an electric vehicle carshare program in San Diego. It accounts for VMT avoided from carshare users who sold their personal vehicles and carshare users who decided not to purchase a personal vehicle, both directly because of the availability of carshare (Martin and Shaheen 2016).

- (E) – Electric VMT added per deployed carshare vehicle was derived based on a study of an electric vehicle carshare program in San Diego. It accounts for the VMT of the carshare vehicles and includes staff-driven VMT needed to bring the vehicles to charging points (Martin and Shaheen 2016).
- (F) – The average GHG emission factor for non-electric vehicles was calculated in terms of $CO_2e$ per mile using EMFAC2017 (v1.0.3). The model was run for a 2020 statewide average of LDA, LDT1, and LDT2 vehicles using diesel and gasoline fuel. The running emission factors for $CO_2$, $CH_4$, and $N_2O$ (CARB 2020a) were multiplied by the corresponding 100-year GWP values from the IPCC's Fourth Assessment Report (IPCC 2007). If the user can provide a project-specific value (i.e., for a future year and project location), the user should run EMFAC to replace the default in the GHG reduction formula.
- (G) – Scaled from light-duty automobile gasoline equivalent fuel economy (G from Measure T-14) based on energy efficiency ratio (EER) of 2.5 (CARB 2020b) and an assumption of 33.7 kWh electricity per gallon of gasoline (U.S. DOE 2021).
- (H) – GHG intensity factors for major California electricity providers are provided in Tables E-4.3 and E-4.4 in Appendix C. If the project study area is not serviced by a listed electricity provider, or the user is able to provide a project-specific value (i.e., for the future year not referenced in Appendix C), the user should replace the default in the GHG calculation formula. If the electricity provider is not known, the user may elect to use the statewide grid average carbon intensity.

## GHG Calculation Caps or Maximums

*Measure Maximum*

($A_{max}$) The maximum GHG reduction from this measure is 0.18 percent. This maximum scenario is presented in the below example quantification.

*Subsector Maximum*

($\sum A_{max_{T\text{-}18 \text{ through } T\text{-}22\text{-}C}} \leq 10\%$) This measure is in the Neighborhood Design subsector. This subcategory includes Measures T-18 through T-22-C. The VMT reduction from the combined implementation of all measures within this subsector is capped at 10 percent.

## Example GHG Reduction Quantification

The user reduces plan/community VMT by deploying carshare vehicles. In this example, the project would be in the city of San Diego, which in 2017 had a VMT per day of 24,101,089 miles (C) (SANDAG 2019). Assuming twice the number of vehicles used in the Car2go San Diego program (B), and a commitment by the carshare service provider to purchase zero-carbon electricity for all carshare charging stations (H), the GHG emissions from plan/community VMT would be reduced by 0.18 percent.

$$A = -1 \times \frac{\mathbf{812} \times \left( \left( 13.7 \frac{\text{eVMT}}{\text{day}\cdot\text{vehicle}} \times 0.327 \frac{\text{kWh}}{\text{mile}} \times 0 \frac{\text{lb } CO_2e}{\text{MWh}} \times 454 \frac{\text{g}}{\text{lb}} \times 0.001 \frac{\text{MWh}}{\text{kWh}} \right) - \left( 54.8 \frac{\text{cVMT}}{\text{day}\cdot\text{vehicle}} \times 307.5 \frac{\text{g } CO_2e}{\text{mile}} \right) \right)}{\mathbf{24,101,089} \frac{\mathbf{VMT}}{\mathbf{day}} \times 307.5 \frac{\text{g } CO_2e}{\text{mile}}} = -0.18\%$$

## Quantified Co-Benefits

### *Improved Local Air Quality*

Local criteria pollutants will be reduced by the reduction in vehicle fuel consumption. Electricity supplied by statewide fossil-fueled or bioenergy power plants will generate criteria pollutants. However, because these power plants are located throughout the state, electricity consumption from electric vehicles will not generate localized criteria pollutant emissions. Accordingly, the percent reduction in $NO_X$, CO, $NO_2$, $SO_2$, and PM (K) is calculated using a simplified version of the GHG reduction formula, as follows:

$$K = -1 \times \frac{B \times -D}{C}$$

Reductions in ROG emissions can be calculated by multiplying the percent reduction in other criteria pollutant emissions (K) by an adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

### *Fuel Savings (Increased Electricity)*

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in criteria pollutant emissions (K). The percent increase in electricity use (L) from this measure can be calculated using a variation of the GHG reduction formula, as follows.

**Electricity Use Increase Formula**

$$L = \frac{B \times E \times G \times N}{M}$$

**Electricity Use Increase Calculation Variables**

| ID | Variable | Value | Unit | Source |
|---|---|---|---|---|
| **Output** | | | | |
| L | Increase in electricity from electric vehicles | [ ] | % | calculated |
| **User Inputs** | | | | |
| M | Existing electricity consumption of plan/community | [ ] | kWh per year | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| N | Days per year carshare program operational | 365 | days per year | assumed |

Further explanation of key variables:

- (M) – The user should take care to properly quantify building electricity using accepted methodologies (such as CalEEMod).
- Please refer to the GHG Calculation Variables table above for definitions of variables that have been previously defined.

*VMT Reductions*

The percent reduction in VMT (O) is calculated using a simplified version of the GHG reduction formula that excludes the variables related to emission factors, as follows.

$$O = -1 \times \frac{B \times (E - D)}{C}$$

## Sources


- California Air Resources Board (CARB). 2020a. *EMFAC2017 v1.0.3*. August. Available: https://arb.ca.gov/emfac/emissions-inventory. Accessed: January 2021.
- California Air Resources Board (CARB). 2020b. Unofficial electronic version of the Low Carbon Fuel Stproved_unofficial_06302020.pdf
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- Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp. Available: https://www.ipcc.ch/report/ar4/wg1/. Accessed: January 2021.
- Martin, E. and Shaheen, S. 2016. *The Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities*. July. Available: https://tsrc.berkeley.edu/publications/impacts-car2go-vehicle-ownership-modal-shift-vehicle-miles-traveled-and-greenhouse-gas. Accessed: March 2021.
- San Diego Association of Governments (SANDAG). 2019. *Mobility Management VMT Reduction Calculator Tool – Design Document*. June. Available: https://www.icommutesd.com/docs/default-source/planning/tool-design-document_final_7-17-19.pdf?sfvrsn=ec39eb3b_2. Accessed: January 2021.
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# T-22-A. Implement Pedal (Non-Electric) Bikeshare Program

## GHG Mitigation Potential

0.02%

Up to 0.02% of GHG emissions from vehicle travel in the plan/community

## Co-Benefits (icon key on pg. 34)

## Climate Resilience

Bikeshare programs can incentivize more bicycle use and decrease vehicle use, which have health benefits and can thus improve community resilience. This can also improve connectivity between residents and resources that may be needed in an extreme weather event.

## Health and Equity Considerations

Provide inclusive mechanisms so people without bank accounts, credit cards, or smart phones can access the system.

## Measure Description

This measure will establish a bikeshare program. Bikeshare programs provide users with on-demand access to bikes for short-term rentals. This encourages a mode shift from vehicles to bicycles, displacing VMT and thus reducing GHG emissions. Variations of this measure are described in Measure T-22-B, *Implement Electric Bikeshare Program*, and Measure T-22-C, *Implement Scootershare Program*.

## Subsector

Neighborhood Design

## Locational Context

Urban, suburban

## Scale of Application

Plan/Community

## Implementation Requirements

The GHG mitigation potential is based, in part, on literature analyzing docked (i.e., station-based) bikeshare programs. This measure should be applied with caution if using dockless (free-floating) bikeshare.

## Cost Considerations

The costs incurred by the service manager (e.g., municipality or bikeshare company) may include the capital costs for purchasing a bicycle fleet; installing accessible and secure docking stations; storing, maintaining, and replacing the fleet; and marketing and administration. Some of these costs may be offset by income generated through program use. Program participants will benefit from the cost savings from access to cheaper transportation alternatives (compared to private vehicles, private bicycles, or use of ride-hailing services). The local municipality may achieve cost savings through a reduction of cars on the road leading to lower infrastructure and roadway maintenance costs.

## Expanded Mitigation Options

Best practice is to discount bikeshare membership and dedicate bikeshare parking to encourage use of the service. Also consider including space on the vehicle to store personal items while traveling, such as a basket.

## GHG Reduction Formula

This measure methodology does not account for the direct GHG emissions from vehicle travel of program employees picking up and dropping off bikes.

$$A = -1 \times \frac{(C - B) \times D \times E \times F}{G \times H}$$

## GHG Calculation Variables

| ID | Variable | Value | Unit | Source |
|---|---|---|---|---|
| **Output** | | | | |
| A | Percent reduction in GHG emissions from vehicle travel in plan/community | 0–0.02 | % | calculated |
| **User Inputs** | | | | |
| B | Percent of residences in plan/community with access to bikeshare system without measure | 0–100 | % | user input |
| C | Percent of residences in plan/community with access to bikeshare system with measure | 0–100 | % | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| D | Daily bikeshare trips per person | 0.021 | trips per day per person | MTC 2017 |
| E | Vehicle to bikeshare substitution rate | 19.6 | % | McQueen et al. 2020 |
| F | Bikeshare average one-way trip length | 1.4 | miles per trip | Lazarus et al. 2019 |
| G | Daily vehicle trips per person | 2.7 | trips per day per person | FHWA 2018 |
| H | Regional average one-way vehicle trip length | Table T-10.1 | miles per trip | FHWA 2017 |

Further explanation of key variables:

- (B and C) – Access to bikesharing is measured as the percent of residences in the plan/community within 0.25 mile of a bikeshare station. For dockless bikes, assume that all residences within 0.25 mile of the designated dockless service area would have access.
- (D) – An analysis of bike share service areas in the San Francisco Bay Area estimated that in locations with access to bikesharing, there were between 21 and 25 bikeshare trips per day per 1,000 residents (MTC 2017). To be conservative, the low end of this range is cited.
- (E) – A literature review of several academic and government reports found that the average car trip substitution rate by bikeshare trips was 19.6 percent. This included bikeshare programs in Washington D.C., Minneapolis, and Montreal (McQueen et al. 2020).

- (F) – A case study on average trip lengths for pedal and electric bikeshare programs in San Francisco reported a one-way pedal bikeshare trip of 1.4 miles (Lazarus et al. 2019).
- (G) – A summary report of the 2017 National Household Travel Survey data found that the average person in the U.S. takes 2.7 vehicle trips per day (FHWA 2018).
- (H) – Ideally, the user will calculate auto trip length for a plan/community at a scale no larger than a census tract. Potential data sources include the U.S. Census, California Household Travel Survey (preferred), or local survey efforts. If the user is not able to provide a plan-specific value using one of these data sources, they have the option to input the existing regional average one-way auto trip length for one of the six most populated CBSAs in California, as presented in Table T-10.1 in Appendix C (FHWA 2017). Trip lengths are likely to be longer for areas not covered by the listed CBSAs, which represent the denser areas of the state.

## GHG Calculation Caps or Maximums

*Measure Maximum*

($A_{max}$) For projects that use default CBSA data from Table T-10.1, the maximum percent reduction in GHG emissions (A) is 0.02 percent. This maximum scenario is presented in the below example quantification.

*Subsector Maximum*

($\sum A_{max_{T\text{-}18 \text{ through } T\text{-}22\text{-}C}} \leq 10\%$) This measure is in the Neighborhood Design subsector. This subcategory includes Measures T-18 through T-22-C. The VMT reduction from the combined implementation of all measures within this subsector is capped at 10 percent.

## Example GHG Reduction Quantification

The user reduces plan/community VMT by deploying bikesharing throughout the area. In this example, the project is in the Los Angeles-Long Beach-Anaheim CBSA, and the one-way vehicle trip length would be 9.72 miles (H). Assuming 100 percent of residents in the plan/community would have bikeshare access (C) where there was no existing access (B), the user would reduce GHG emissions from plan/community VMT by 0.02 percent.

$$A = -1 \times \frac{(\mathbf{100\% - 0\%}) \times 0.021\ \frac{\text{trips}}{\text{day·person}} \times 19.6\% \times 1.4\ \frac{\text{miles}}{\text{trip}}}{2.7\ \frac{\text{trips}}{\text{day·person}} \times 9.72\ \frac{\text{miles}}{\text{trip}}} = -0.02\%$$

## Quantified Co-Benefits

*Improved Local Air Quality*

The percent reduction in GHG emissions (A) would be the same as the percent reduction in $NO_X$, CO, $NO_2$, $SO_2$, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an

adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

*Energy and Fuel Savings*

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A).

*VMT Reductions*

The percent reduction in VMT would be the same as the percent reduction in GHG emissions (A).

## Sources


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# T-22-B. Implement Electric Bikeshare Program

## GHG Mitigation Potential

0.06%

Up to 0.06% of GHG emissions vehicle travel in the plan/community

## Co-Benefits (icon key on pg. 34)

## Climate Resilience

Bikeshare programs can incentivize more bicycle use and decrease vehicle use, which have health benefits and can thus improve community resilience. This can also improve connectivity between residents and resources that may be needed in an extreme weather event. However, they may decrease resilience if they are the only option available during a power outage.

## Health and Equity Considerations

Provide inclusive mechanisms so people without bank accounts, credit cards, or smart phones can access the system.

## Measure Description

This measure will establish an electric bikeshare program. Electric bikeshare programs provide users with on-demand access to electric pedal assist bikes for short-term rentals. This encourages a mode shift from vehicles to electric bicycles, displacing VMT and reducing GHG emissions. Variations of this measure are described in Measure T-22-A, *Implement Pedal (Non-Electric) Bikeshare Program*, and Measure T-22-C, *Implement Scootershare Program*.

## Subsector

Neighborhood Design

## Locational Context

Urban, suburban

## Scale of Application

Plan/Community

## Implementation Requirements

The GHG mitigation potential is based, in part, on literature analyzing docked (i.e., station-based) bikeshare programs. This measure should be applied with caution if using dockless (free-floating) bikeshare.

## Cost Considerations

The costs incurred by the service manager (e.g., municipality or bikeshare company) may include the capital costs for purchasing a bicycle fleet; installing accessible and secure charging stations; storing, maintaining, and replacing the fleet; and marketing and administration. Some of these costs may be offset by income generated through program use. Program participants will benefit from the cost savings from access to cheaper transportation alternatives (compared to private vehicles, private bicycles, or use of ride-hailing services). The local municipality may achieve cost savings through a reduction of cars on the road leading to lower infrastructure and roadway maintenance costs.

## Expanded Mitigation Options

Best practice is to discount electric bikeshare membership and dedicate electric bikeshare parking to encourage use of the service. Consider also including space on the vehicle to store personal items while traveling, such as a basket.

## GHG Reduction Formula

The quantification methodology does not account for indirect GHG emissions from electricity used to charge the bicycles or direct GHG emissions from vehicle travel of program employees picking up and dropping off bikes.

$$A = -1 \times \frac{(C - B) \times D \times E \times F}{G \times H}$$

## GHG Calculation Variables

| ID | Variable | Value | Unit | Source |
|---|---|---|---|---|
| **Output** | | | | |
| A | Percent reduction in GHG emissions from vehicle travel in plan/community | 0–0.06 | % | calculated |
| **User Inputs** | | | | |
| B | Percent of residences in plan/community with access to electric bikeshare system without measure | 0–100 | % | user input |
| C | Percent of residences in plan/community with access to electric bikeshare system with measure | 0–100 | % | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| D | Daily electric bikeshare trips per person | 0.021 | trips per day per person | MTC 2017 |
| E | Vehicle to electric bikeshare substitution rate | 35 | percent | Fitch et al. 2021 |
| F | Electric bikeshare average one-way trip length | 2.1 | miles per trip | Fitch et al. 2021 |
| G | Daily vehicle trips per person | 2.7 | trips per day per person | FHWA 2018 |
| H | Regional average one-way vehicle trip length | Table T-10.1 | miles per trip | FHWA 2017 |

Further explanation of key variables:

- (B and C) – Access to electric bikesharing is measured as the percent of residences in the plan/community within 0.25-mile of an electric bikeshare station. For dockless bikes, assume that all residences within 0.25 mile of the designated dockless service area would have access.
- (D) – An analysis of bike share service areas in the San Francisco Bay Area estimated that in locations with access to bikesharing, there were between 21 and 25 bikeshare trips per day per 1,000 residents (MTC 2017). To be conservative, the low end of this range is cited. Conventional bikeshare trip rate data was used due to lack of specific data for electric bikeshare.
- (E) – A study of dockless electric bike share in Sacramento found that the substitution rate of vehicles trips by electric bikeshare trips was 35 percent (Fitch et al. 2021).

- (F) – A study of dockless electric bike share in Sacramento found that the average one-way bikeshare trip was 2.1 miles (Fitch et al. 2021).
- (G) – A summary report of the 2017 National Household Travel Survey data found that the average person in the U.S. takes 2.7 vehicle trips per day (FHWA 2018).
- (H) – Ideally, the user will calculate auto trip length for a plan/community at a scale no larger than a census tract. Potential data sources include the U.S. Census, California Household Travel Survey (preferred), or local survey efforts. If the user is not able to provide a plan-specific value using one of these data sources, they have the option to input the existing regional average one-way auto trip length for one of the six most populated CBSAs in California, as presented in Table T-10.1 in Appendix C (FHWA 2017). Trip lengths are likely to be longer for areas not covered by the listed CBSAs, which represent the denser areas of the state.

## GHG Calculation Caps or Maximums

*Measure Maximum*

($A_{max}$) For projects that use default CBSA data from Table T-10.1, the maximum percent reduction in GHG emissions (A) is 0.06 percent. This maximum scenario is presented in the below example quantification.

*Subsector Maximum*

($\sum A_{max_{T\text{-}18 \text{ through } T\text{-}22\text{-}C}} \leq 10\%$) This measure is in the Neighborhood Design subsector. This subcategory includes Measures T-18 through T-22-C. The VMT reduction from the combined implementation of all measures within this subsector is capped at 10 percent.

## Example GHG Reduction Quantification

The user reduces plan/community VMT by deploying electric bikesharing throughout the area. In this example, the project is in the Los Angeles-Long Beach-Anaheim CBSA, and the one-way vehicle trip length would be 9.72 miles (H). Assuming 100 percent of residents in the plan/community would have bikeshare access (C) where there was no existing access (B), the user would reduce GHG emissions from plan/community VMT by 0.06 percent.

$$A = -1 \times \frac{(\mathbf{100\% - 0\%}) \times 0.021\ \frac{\text{trips}}{\text{day}\cdot\text{person}} \times 35\% \times 2.1\ \frac{\text{miles}}{\text{trip}}}{2.7\ \frac{\text{trips}}{\text{day}\cdot\text{person}} \times 9.72\ \frac{\text{miles}}{\text{trip}}} = -0.06\%$$

## Quantified Co-Benefits

*Improved Local Air Quality*

The percent reduction in GHG emissions (A) would be the same as the percent reduction in $NO_X$, CO, $NO_2$, $SO_2$, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an

adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

### *Energy and Fuel Savings*

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A). This quantification methodology does not account for the increase in electricity used to charge the vehicles or the fuel consumption from vehicle travel of program employees picking up and dropping off bikes.

### *VMT Reductions*

The percent reduction in VMT would be the same as the percent reduction in GHG emissions (A). This quantification methodology does not account for the miles traveled from vehicle travel of program employees picking up and dropping off bikes.

## Sources


- Federal Highway Administration (FHWA). 2017. *National Household Travel Survey–2017 Table Designer*. Travel Day PT by TRPTRANS by HH_CBSA. Available: https://nhts.ornl.gov/. Accessed: January 2021.
- Federal Highway Administration (FHWA). 2018. *Summary of Travel Trends 2017–National Household Travel Survey*. July. Available: https://www.fhwa.dot.gov/policyinformation/documents/2017_nhts_summary_travel_trends.pdf. Accessed: January 2021.
- Fitch, D., H. Mohiuddin, and S. Handy. 2021. *Examining the Effects of the Sacramento Dockless E-Bike Share on Bicycling and Driving*. MDPI: Sustainability. January. Available: https://www.mdpi.com/2071-1050/13/1/368. Accessed: March 2021.
- Metropolitan Transportation Commission (MTC). 2017. *Plan Bay Area 2040 Final Supplemental Report–Travel Modeling Report*. July. Available: http://2040.planbayarea.org/files/2020-02/Travel_Modeling_PBA2040_Supplemental%20Report_7-2017.pdf. Accessed: January 2021.

# T-22-C. Implement Scootershare Program

## GHG Mitigation Potential

0.07%

Up to 0.07% of GHG emissions from vehicle travel in the plan/community

## Co-Benefits (icon key on pg. 34)

## Climate Resilience

Scootershare programs can incentivize more scooter use and decrease vehicle use, which have health benefits and can thus improve community resilience. This can also improve connectivity between residents and resources that may be needed in an extreme weather event.

## Health and Equity Considerations

Provide inclusive mechanisms so people without bank accounts, credit cards, or smart phones can access the system.

## Measure Description

This measure will establish a scootershare program. Scootershare programs provide users with on-demand access to electric scooters for short-term rentals. This encourages a mode shift from vehicles to scooters, displacing VMT and thus reducing GHG emissions. Variations of this measure are described in Measure T-22-A, *Implement Pedal (Non-Electric) Bikeshare Program*, and Measure T-22-B, *Implement Electric Bikeshare Program*.

## Subsector

Neighborhood Design

## Locational Context

Urban, suburban

## Scale of Application

Plan/Community

## Implementation Requirements

The GHG mitigation potential is based, in part, on literature analyzing docked (i.e., station-based) bikeshare programs. This measure should be applied with caution given the likely higher popularity of scootershare compared to bikeshare.

## Cost Considerations

The costs incurred by the service manager (e.g., municipality or scootershare company) may include the capital costs for purchasing a scooter fleet; installing accessible and secure docking stations; storing, maintaining, and replacing the fleet; and marketing and administration. Some of these costs may be offset by income generated through program use. Program participants will benefit from cost savings from access to cheaper transportation alternatives (compared to private vehicles, private scooters, or use of ride-hailing services). The local municipality may achieve cost savings through a reduction of cars on the road leading to lower infrastructure and roadway maintenance costs.

## Expanded Mitigation Options

Best practice is to discount scootershare membership and dedicate scootershare parking to encourage use of the service. Consider also including space on the vehicle to store personal items while traveling, such as a basket.

## GHG Reduction Formula

This measure methodology does not account for the indirect GHG emissions from electricity used to charge the scooters or direct GHG emissions from vehicle travel of program employees picking up and dropping off scooters.

$$A = -1 \times \frac{(C - B) \times D \times E \times F}{G \times H}$$

## GHG Calculation Variables

| ID | Variable | Value | Unit | Source |
|---|---|---|---|---|
| **Output** | | | | |
| A | Percent reduction in GHG emissions from vehicle travel in plan/community | 0–0.07 | % | calculated |
| **User Inputs** | | | | |
| B | Percent of residences in plan/community with access to scootershare system without measure | 0–100 | % | user input |
| C | Percent of residences in plan/community with access to scootershare system with measure | 0–100 | % | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| D | Daily scootershare trips per person | 0.021 | trips per day per person | MTC 2017 |
| E | Vehicle to scootershare substitution rate | 38.5 | % | McQueen et al. 2020 |
| F | Scootershare average one-way trip length | 2.14 | miles per trip | PBOT 2021 |
| G | Daily vehicle trips per person | 2.7 | trips per day per person | FHWA 2018 |
| H | Regional average one-way vehicle trip length | Table T-10.1 | miles per trip | FHWA 2017 |

Further explanation of key variables:

- (B and C) – Access to scootersharing is measured as the percent of residences in the plan/community within 0.25-mile of a scootershare station. For dockless scooters, assume that all residences within 0.25-mile of the designated dockless service area would have access.
- (D) – An analysis of bike share service areas in the San Francisco Bay Area estimated that in locations with access to bikesharing, there were between 21 and 25 bikeshare trips per day per 1,000 residents (MTC 2017). To be conservative, the low end of this range is cited. Conventional bikeshare trip rate data was used due to lack of specific data for scootershare.
- (E) – A literature review of several academic and government reports found that the average car trip substitution rate by scootershare trips was 38.5 percent. This included scootershare programs in Santa Monica, Minneapolis, San Francisco, and Portland (McQueen et al. 2020).

- (F) – In Oregon, Portland's scootershare pilot data dashboard reports that the average trip length of scootershare trips is 2.14 miles (PBOT 2021).
- (G) – A summary report of the 2017 National Household Travel Survey data found that the average person in the U.S. takes 2.7 vehicle trips per day (FHWA 2018).
- (H) – Ideally, the user will calculate auto trip length for a plan/community at a scale no larger than a census tract. Potential data sources include the U.S. Census, California Household Travel Survey (preferred), or local survey efforts. If the user is not able to provide a plan-specific value using one of these data sources, they have the option to input the existing regional average one-way auto trip length for one of the six most populated CBSAs in California, as presented in Table T-10.1 in Appendix C (FHWA 2017). Trip lengths are likely to be longer for areas not covered by the listed CBSAs, which represent the denser areas of the state.

## GHG Calculation Caps or Maximums

*Measure Maximum*

($A_{max}$) For projects that use default CBSA data from Table T-10.1, the maximum percent reduction in GHG emissions (A) is 0.07 percent. This maximum scenario is presented in the below example quantification.

*Subsector Maximum*

($\sum A_{max_{T\text{-}18\text{ through }T\text{-}22\text{-}C}} \leq 10\%$) This measure is in the Neighborhood Design subsector. This subcategory includes Measures T-18 through T-22-C. The VMT reduction from the combined implementation of all measures within this subsector is capped at 10 percent.

## Example GHG Reduction Quantification

The user reduces plan/community VMT by deploying scootershare throughout the area. In this example, the project is in the Los Angeles-Long Beach-Anaheim CBSA, and the one-way vehicle trip length would be 9.72 miles (H). Assuming 100 percent of residents in the plan/community would have scootershare access (C) where there was no existing access (B), the user would reduce GHG emissions from plan/community VMT by 0.07 percent.

$$A = -1 \times \frac{(\mathbf{100\% - 0\%}) \times 0.021\ \frac{\text{trips}}{\text{day}\cdot\text{person}} \times 38.5\% \times 2.14\ \frac{\text{miles}}{\text{trip}}}{2.7\ \frac{\text{trips}}{\text{day}\cdot\text{person}} \times 9.72\ \frac{\text{miles}}{\text{trip}}} = -0.07\%$$

## Quantified Co-Benefits

*Improved Local Air Quality*

The percent reduction in GHG emissions (A) would be the same as the percent reduction in $NO_X$, CO, $NO_2$, $SO_2$, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an

adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

*Energy and Fuel Savings*

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A). This quantification methodology does not account for the increase in electricity used to charge the scooters or the fuel consumption from vehicle travel of program employees picking up and dropping off scooters.

*VMT Reductions*

The percent reduction in VMT would be the same as the percent reduction in GHG emissions (A). This quantification methodology does not account for the miles traveled from vehicle travel of program employees picking up and dropping off scooters.

## Sources


- Federal Highway Administration (FHWA). 2017. *National Household Travel Survey–2017 Table Designer*. Travel Day PT by TRPTRANS by HH_CBSA. Available: https://nhts.ornl.gov/. Accessed: January 2021.
- Federal Highway Administration (FHWA). 2018. *Summary of Travel Trends 2017–National Household Travel Survey*. July. Available: https://www.fhwa.dot.gov/policyinformation/documents/2017_nhts_summary_travel_trends.pdf. Accessed: January 2021.
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- McQueen, M., G. Abou-Zeid, J. MacArthur, and K. Clifton. 2020. *Transportation Transformation: Is Micromobility Making a Macro Impact on Sustainability?* Journal of Planning Literature. November. Available: https://doi.org/10.1177/0885412220972696. Accessed: March 2021.
- Portland Bureau of Transportation (PBOT). 2021. *Portland Bureau of Transportation E-Scooter Dashboard*. Available: https://public.tableau.com/profile/portland.bureau.of.transportation#!/vizhome/PBOTE-ScooterTripsDashboard/ScooterDashboard. Accessed: March 2021.

# Attachment D: City of Fairfield Fire Department Driveway Access Review

## Atkinson, Jonathan

**From:** Just, Bryan
**Sent:** Wednesday, April 6, 2022 11:10 AM
**To:** Atkinson, Jonathan
**Subject:** Emergency Vehicle Access for Green Valley 3 Apartments | GPA2021-001

Jonathan,

Regarding the Green Valley 3 Apartments project at 4840 Business Center Drive.

The two driveways from Business Center Drive allow sufficient emergency vehicle access to the project site crossing the northeast portions of the adjoining property, as currently proposed (plans dated received February 28, 2022). Plans show access to the "rear" of the properties and the ability to traverse throughout for apparatus turn around.

Providing a third access-point to Business Center Drive from the project site through the Residence Inn project site is not required.

Noted that a request from PD to provide a security fence may cause additional issues that will need to be addressed along with the fencing and gate designs that may be proposed under that request.

Respectfully,

CITY OF FAIRFIELD FFD EST. 1965 FIRE DEPT.

**Bryan Just | Plans Examiner, Fire Inspector III**
Fire Department | City of Fairfield
O | 707-428 -7377
1200 Kentucky Street Fairfield, CA 94533
www.Fairfield.ca.gov
***City Offices are closed the 1st and 3rd Fridays of the month***

# Attachment E: Residential Units and Peak Hour Trip Generation by TAZ

| TAZ* | 2020 Household | | | ITE Trip Generation Rates -2020 HH | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | AM | | | PM | | |
| | SFDU | MFDU | Total | In | Out | Total | In | Out | Total |
| 26 | 147 | 0 | 147 | 27 | 76 | 103 | 87 | 51 | 138 |
| 28 | 117 | 0 | 117 | 21 | 61 | 82 | 69 | 41 | 110 |
| 30 | 197 | 0 | 197 | 36 | 102 | 138 | 117 | 69 | 186 |
| 31 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| 35 | 167 | 0 | 167 | 30 | 87 | 117 | 99 | 58 | 157 |
| 36 | 65 | 0 | 65 | 12 | 34 | 46 | 38 | 23 | 61 |
| 37 | 270 | 4 | 274 | 49 | 140 | 189 | 160 | 94 | 254 |
| 40 | 256 | 100 | 356 | 53 | 146 | 199 | 166 | 100 | 266 |
| 41 | 39 | 0 | 39 | 7 | 20 | 27 | 23 | 14 | 37 |
| 42 | 28 | 0 | 28 | 5 | 15 | 20 | 17 | 10 | 27 |
| 242 | 91 | 0 | 91 | 17 | 47 | 64 | 54 | 32 | 86 |
| 243 | 65 | 0 | 65 | 12 | 34 | 46 | 38 | 23 | 61 |
| 244 | 205 | 0 | 205 | 37 | 106 | 143 | 121 | 71 | 192 |
| 245 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| 246 | 148 | 0 | 148 | 27 | 77 | 104 | 88 | 51 | 139 |
| 405 | 100 | 0 | 100 | 18 | 52 | 70 | 59 | 35 | 94 |
| 541 | 5 | 0 | 5 | 1 | 3 | 4 | 3 | 2 | 5 |
| 544 | 50 | 0 | 50 | 9 | 26 | 35 | 30 | 17 | 47 |
| 546 | 150 | 0 | 150 | 27 | 78 | 105 | 89 | 52 | 141 |
| 547 | 511 | 0 | 511 | 93 | 265 | 358 | 303 | 178 | 481 |
| 548 | 214 | 0 | 214 | 39 | 111 | 150 | 127 | 74 | 201 |
| **Total** | **2,827** | **104** | **2,931** | **520** | **1,482** | **2,002** | **1,690** | **995** | **2,685** |

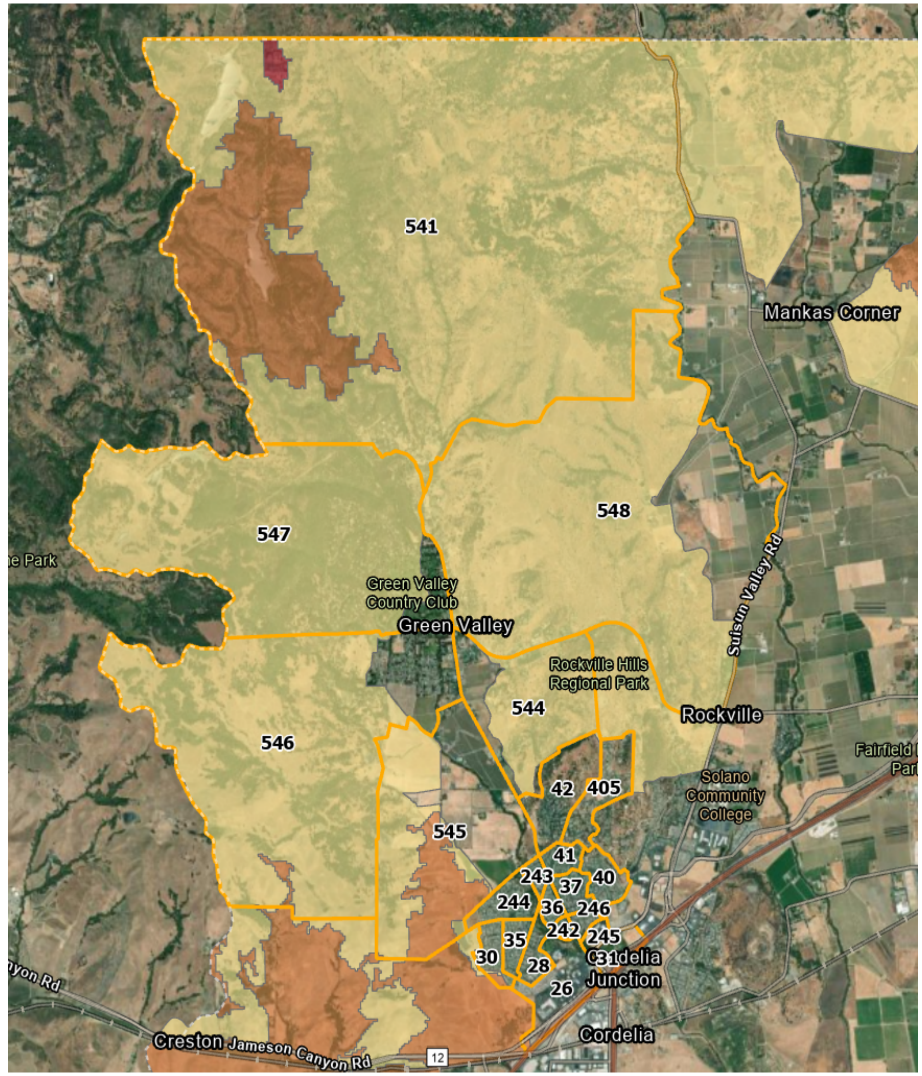
Note: *There are no household in TAZ 545, thus is excluded from this table.

Homes in Green Valley (north of Reservoir Lane)

Source: City of Fairfield Travel Model, Cal Fire's Fire Hazard Severity Zone Map (https://egis.fire.ca.gov/FHSZ/)

**Trip Gen by Location**

| TAZ* | 2020 Household | | | ITE Trip Generation Rates -2020 HH | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | AM | | | PM | | |
| | SFDU | MFDU | Total | In | Out | Total | In | Out | Total |
| Green Valley | 930 | 0 | 930 | 169 | 483 | 652 | 552 | 323 | 875 |
| South of Green Valley | 1,897 | 104 | 2,001 | 351 | 999 | 1,350 | 1,138 | 672 | 1,810 |
| ***Sub-total*** | ***2,827*** | ***104*** | ***2,931*** | ***520*** | ***1,482*** | ***2,002*** | ***1,690*** | ***995*** | ***2,685*** |
| Project | 185 | | 185 | 16 | 52 | 68 | 44 | 28 | 72 |
| **Total** | **3,012** | **104** | **3,116** | **536** | **1,534** | **2,070** | **1,734** | **1,023** | **2,757** |



# Attachment F: County of Solano Fire Hazard Severity Zones Map

# County of Solano

## Fire Hazard Severity Zones in SRA