

How to Calculate Vehicle Miles Traveled (VMT) Per Employee

$$\text{VMT Per Employee} = (\text{Adjusted Trips} / \text{Potential Trips}) * (\text{Total Miles} / \text{Total Respondents})$$

Adjusted Trips = Sum of all full and partial drive alone trips for all employees for all days of the week.

The following types of trips count as a **full trip** towards Adjusted Trips:

- Drive alone
- Motorcycle-1 (where there is a single rider on a motorcycle)

The following types of trips count as a **partial trip** towards Adjusted Trips:

- Carpool
- Vanpool
- Motorcycle-2 (where there is a rider and a passenger on a motorcycle)

A partial trip is 1 divided by the vehicle occupancy. Examples:

- A motorcycle trip with 2 riders counts as $1/2 = 0.5$ Adjusted Trips.
- A carpool trip with 4 people counts as $1/4 = 0.25$ Adjusted Trips.
- A vanpool trip with 10 people counts as $1/10 = 0.1$ Adjusted Trips.

When occupancy is left unanswered/blank:

- Default motorcycle occupancy is 1.
- Default carpool occupancy is 2.
- Default vanpool occupancy is 7.

Note: Per the survey, respondents are only able to give a single occupancy for all motorcycle/carpool/vanpool trips. If more than one of those modes were used, proceed with the following assumptions (*this section is under review and may change in the future*):

- A response of 2 applies to motorcycle and carpool (vanpool occupancy defaults to 7)
- A response of 3-5 applies to carpool only (motorcycle defaults to 1; vanpool defaults to 7)
- A response of 6+ applies to vanpool only (motorcycle defaults to 1; carpool defaults to 2)

The following trip modes **do not** count (i.e., count as 0) toward Adjusted Trips:

- Bus
- Train/Light Rail/Streetcar
- Bike
- Walk
- Telework
- Compressed Work Week (CWW)
- Overnight Business Trip
- Did Not Work
- Boarded Ferry with Car/Bus/Van
- Boarded Ferry as Walk-on Passenger
- Other

Potential Trips = Sum of All Trip Modes (includes Telework and Compressed Work Week days; excludes “Overnight Trips” or “Did Not Work”)

Adjusted Trips / Potential Trips calculation example:

Sarah Smith reports the following commutes during the survey week with a motorcycle/vanpool/carpool occupancy of 10:

- Monday drove alone (Adjusted Trips = 1; Potential Trips = 1)
- Tuesday took the bus (Adjusted Trips = 0; Potential Trips = 1)
- Wednesday carpooled (Adjusted Trips = 0.5*; Potential Trips = 1)
- Thursday vanpooled (Adjusted Trips = 0.1; Potential Trips = 1)
- Friday had off as a compressed work week (Adjusted Trips = 0; Potential Trips = 1)

* Occupancy was reported as 10, so assume 10 is vanpool only and default carpool occupancy to 2.

Mark Johnson reports the following commutes during the survey week:

- Monday boarded ferry with car (Adjusted Trips = 0; Potential Trips = 1)
- Tuesday overnight trip (Adjusted Trips = 0; **Potential Trips = 0**)
- Wednesday teleworked (Adjusted Trips = 0; Potential Trips = 1)
- Thursday took the train (Adjusted Trips = 0; Potential Trips = 1)
- Friday was Other (Used Car2Go)** (Adjusted Trips = 0; Potential Trips = 1)

** Even though Mr. Johnson technically drove alone in a Car2Go on Friday, marking “Other” results in it not counting as an Adjusted Trip.

The total Adjusted Trips for the week are (1+0+0.5+0.1+0+0+0+0+0) = 1.6 Adjusted Trips

The total Potential Trips for the week are (1+1+1+1+1+1+0+1+1+1) = 9 Potential Trips

$$\text{Adjusted Trips / Potential Trips} = (1.600 / 9) = 0.178$$

This means that for each trip to the worksite (or by telework or CWW), 0.178 drive-alone-equivalent trips are made.

Total Miles = Sum of each employee’s one-way distance to work, regardless of mode (i.e., sum of all answers to question 3 of the survey).

Total Respondents = A count of all people who have traveled more than 0 miles (e.g., if 90 survey respondents traveled 1 mile or more to work, then Total Employees = 90).

There are two scenarios where the one-way mileage and the employee count **are not included** (i.e., they are screened out as a suspected errors):

- **Any** one-way mileage that is greater than **150 miles**, regardless of commute mode type.
- When “Walked” and/or “Rode a bicycle” are selected as the commute mode type **three** or more times and the one-way mileage is greater than **30 miles**.

In those scenarios, the adjusted trips and potential trips **are still used**, but the mileage and employee count are not included. For example, if a person walks to work four times a week and drives once and lists a one-way commute mileage of 32 miles, one adjusted trip and five potential trips are included in the VMT calculation, but the 32 miles is not added to the Total Miles and the respondent is not added to the Total Respondents.

Total Miles / Total Respondents = Average one-way miles traveled by workers to that worksite.

Total Miles / Total Respondents calculation example:

- Using the same employees as above, Sarah Smith travels 10 miles to work and Mark Johnson travels 20 miles to work.

The sum of the one-way distance $(10 + 20) = 30$ Total Miles

The count of employees traveling a mile or more $(1+1) = 2$ Total Employees

Total Miles / Total Respondents = $(30 / 2) = 15$

The average distance a worker travels to this worksite is 15 miles.

You can now calculate VMT Per Employee for the worksite:

= (Adjusted Trips / Potential Trips) * (Total Miles / Total Respondents)

= $(1.6 / 9) * (30 / 2)$

= $(0.178) * (15) = 2.67$ VMT/Employee

The worksite's VMT is much lower than the average distance to work, as the employees rarely drive alone, and instead carpool, vanpool, use public transportation, and telework.

Questions?

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